International Civil Aviation Organization

The Seventh Meeting of System Wide Information Management Task Force (SWIM TF/7)

Bangkok, Thailand, 09 – 12 May 2023

Agenda Item 3: Updates on the assigned tasks by task leads/contributors including progress report and issues

b) SWIM Infrastructure

- Task 2: Regional SWIM Infrastructure

DRAFT AMHS/SWIM GATEWAY TECHNICAL SPECIFICATION

(Presented by SWAMWAY Study Group)

ABSTRACT

A group of organisations, the AMHS/SWIM Gateway Study Group (SWAMWAY SG), joined forces for the elaboration of a technical specification for the AMHS/SWIM Gateway in support of the transition from AMHS to SWIM.

This Working Paper introduces the work done by SWAMWAY SG to develop a mature draft of the technical specifications for the AMHS/SWIM Gateway.

1. Introduction

1.1 SWAMWAY SG is a joint initiative undertaken by a group of organisations including several ANSPs and industries with a deep expertise in both, AMHS and SWIM.

1.2 Austro Control, Copperchase, Enaire, Frequentis Comsoft, Indra Avitech, Telefónica and Thales joined forces in the AMHS/SWIM Gateway Study Group (SWAMWAY SG) in the spirit of working together on a gateway between AMHS and SWIM, the AMHS/SWIM Gateway.

1.3 SWAMWAY SG aims at developing a core technical specification for the AMHS/SWIM Gateway that establishes a basic framework through a set of essential requirements. This specification could be adopted by States and Organisations and become a recognised standard in support of the transition from AMHS to SWIM.

2. Discussion

2.1 It is important to recall that the major objective of SWAMWAY SG is the development of the AMHS/SWIM Gateway technical specification providing a minimum set of requirements ensuring the exchange of information during the transition to SWIM as well as ensuring the interoperability with AMHS and with SWIM.

2.2 The final draft of the technical specification of the AMHS/SWIM Gateway encompasses 4 different chapters:

2.2.1 Introduction

2.2.2 System Level Provisions

2.2.3 Configurations and Parameters

2.2.4 AMHS/SWIM Gateway Specification

2.3 The first three chapters, Introduction, System Level Provisions and Configuration and Parameters, are a summary and overview of the most important aspects that have been considered for the development of all the technical requirements and recommendations in chapter 4, AMHS/SWIM Gateway Specification.

2.3.1 The fourth chapter, AMHS/SWIM Gateway Specification chapter, is the most important one since it describes the different functions that the AMHS/SWIM Gateway shall perform and gathers all the requirements for the conversion of messages from AMHS to SWIM and from SWIM to AMHS.

2.4 The intention of SWAMWAY SG and of this specific paper is to announce the availability of a first draft but mature version of the AMHS/SWIM Gateway technical specification and to invite AST TF to go through it and provide feedback and comments with the target of improving this technical specification.

2.5 Once this technical specification has been circulated for review and improved considering the potential feedback received, the final target of SWWAMWAY SG is to get the endorsement of AST TF for the proposed AMHS/SWIM Gateway technical specification as a previous step to be recognized by ICAO and considered an international standard.

3. Action by the Meeting

3.1 The SWIM TF is invited to

a) note the contents of this paper;

b) provide comments to the attached draft version of the AMHS/SWIM Gateway technical specification, preferably in writing after the Meeting;

c) share this material through ICAO EUR NAT Office with other ICAO Regional Offices for awareness and to undertake a wider consultation to enhance this technical specification.

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SWIM TF/7

SEVENTH MEETING

(Bangkok, 9 - 12 May 2023)

Agenda Item x: AFS to SWIM transition matters??

AMHS/SWIM GATEWAY TECHNICAL SPECIFICATION

(Presented by SWAMWAY Study Group)

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Agenda

1) General overview and structure of the technical specification
2) Chapter 1 ➔ Introduction
3) Chapter 2 ➔ System Level Provisions
4) Chapter 3 ➔ Configuration and parameters
5) Chapter 4 ➔ AMHS/SWIM Gateway Specification
6) Q&A

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Agenda

1) General overview and structure of the technical specification
2) Chapter 1 ➔ Introduction
3) Chapter 2 ➔ System Level Provisions
4) Chapter 3 ➔ Configuration and parameters
5) Chapter 4 ➔ AMHS/SWIM Gateway Specification
6) Q&A

General overview and structure of the technical specification

- Structure of the Technical Specification:
  - ✓ Chapter 1 ➔ Introduction
  - ✓ Chapter 2 ➔ System Level Provisions
  - ✓ Chapter 3 ➔ Configuration and parameters
  - ✓ Chapter 4 ➔ AMHS/SWIM Gateway Specification

General overview and structure of the technical specification

- Same approach as ICAO Doc 9880 Part II
  - ✓Readers might already be familiar with.
  - ✓Structure and writing style.
  - ✓Steps of the different processing described in the same way as Doc 9880.
  - ✓AFTN vs AMQP
  - ✓References to Doc. 9880 avoiding duplication (some parts are reworded)

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Agenda

1) General overview and structure of the technical specification
2) Chapter 1 → Introduction
3) Chapter 2 → System Level Provisions
4) Chapter 3 → Configuration and parameters
5) Chapter 4 → AMHS/SWIM Gateway Specification
6) Q&A

Chapter 1 of the Technical Specification ➔ Introduction

- ✓ Overview
  - ✓ Brief introduction of AMHS and SWIM
  - ✓ Need to Exchange information between AMHS and SWIM
  - ✓ AMHS/SWIM Gateway shall allow the Exchange of information between AMHS and SWIM seamlessly
  - ✓ One of most important differences: message oriented vs exchange of information

Chapter 1 of the Technical Specification ➔ Introduction

- ✓ End users
  - ✓ Users of the AMHS/SWIM Gateway ➔ AMHS users, as well as SWIM users
  - ✓ Important considerations to bear in mind:
    - ✓ AMHS users may follow Basic or Extended profiles ➔ the AMHS/SWIM Gateway shall accept both profiles
    - ✓ SWIM users do not know upfront the capabilities of AMHS users ➔ Under the responsibility of the AMHS/SWIM Gateway
    - ✓ SWIM users submitting information do not know if the sent information is received by the destination or not

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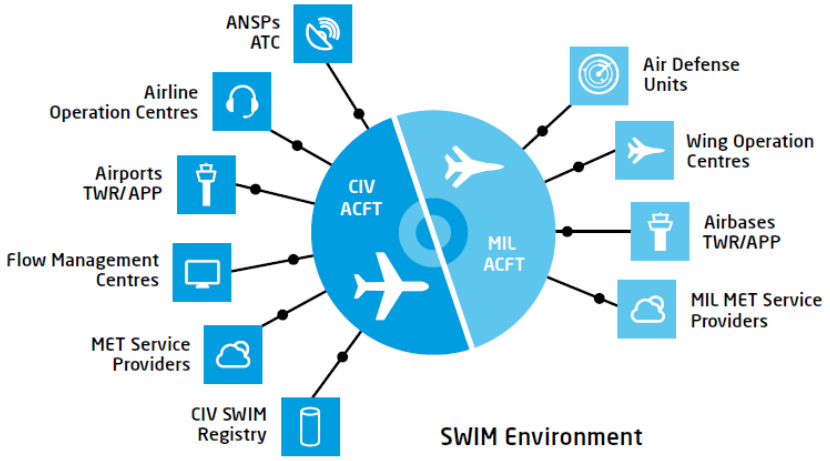
Chapter 1 of the Technical Specification ➔ Introduction

- ✓ Use cases
  - ✓ Use case 1: Exchange of meteorological information
  - ✓ Use case 2: Exchange of flight plan information
  - ✓ Use case 3: Exchange of AIS information



- ✓ Generic examples showing the possibilities to exchange SWIM and AMHS information among different parties
- ✓ The advantage of the AMHS/SWIM Gateway is that the impact on legacy users is minimized. Likewise, there is no impact on native SWIM users because they can use SWIM protocols with whoever they need to exchange information.

Chapter 1 of the Technical Specification ➔ Introduction

- ✓ References
- ✓ Terminology:
  - ✓ Terms and definitions that shall apply along the whole Technical specification
  - ✓ Definitions for both AMHS and SWIM
  - ✓ Additionally, clarification about the requirements (following ICAO Doc. 9880 approach), e.g., “M”, “O”, “C”, “-”, etc.

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Agenda

1) General overview and structure of the technical specification
2) Chapter 1 ➔ Introduction
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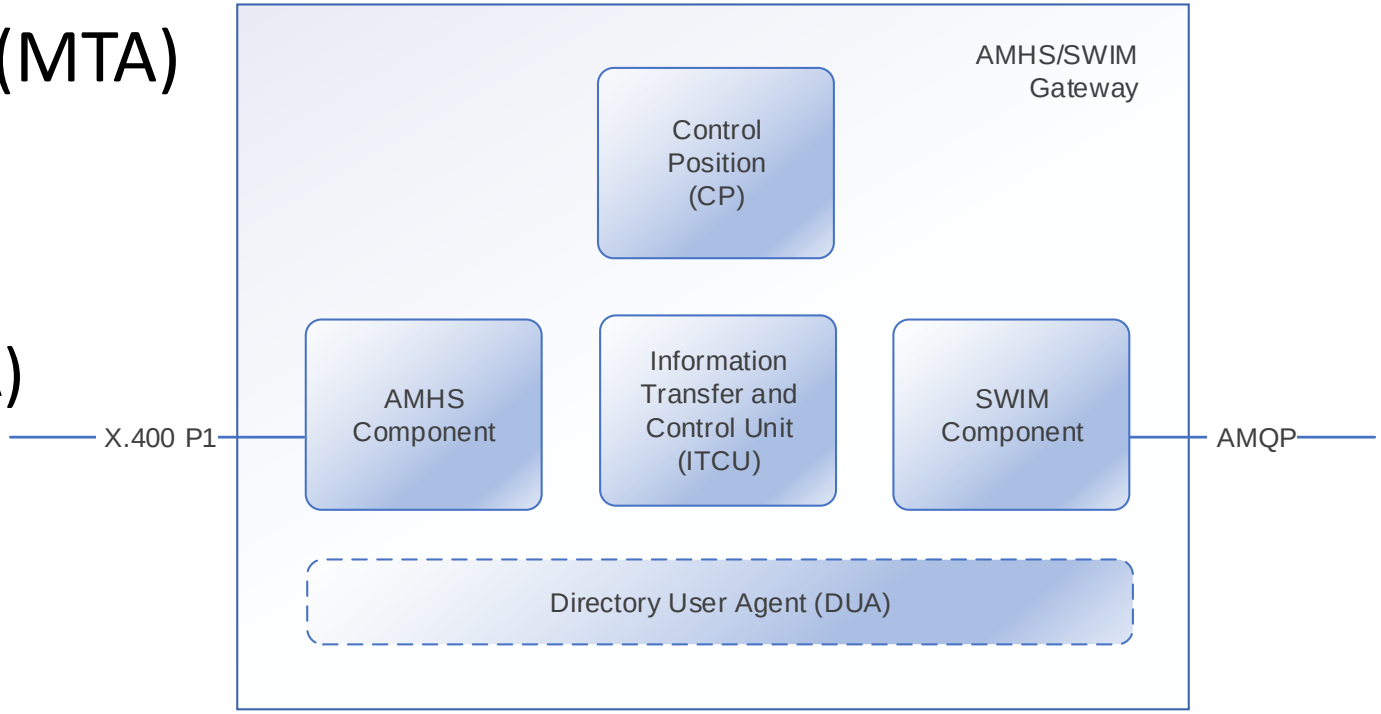
5) Chapter 4 ➔ AMHS/SWIM Gateway Specification
6) Q&A

Chapter 2 – System Level Provisions

- Abstract, high-level view using models
  - ✓Functional
  - ✓Information
  - ✓Security
  - ✓Management
  - ✓Naming and addressing
  - ✓Level of support

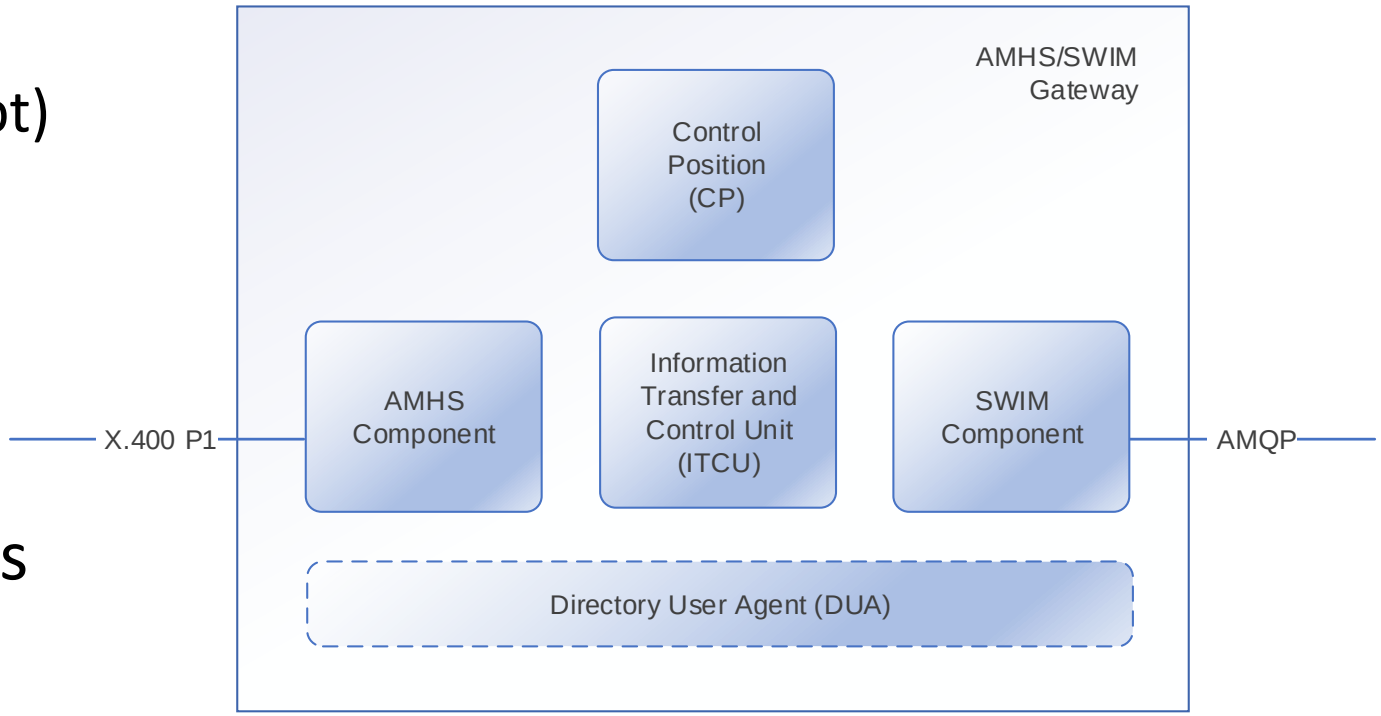
Chapter 2 – Functional Model – AMHS

- Message transfer agent (MTA)
  - ✓ AMHS Component
- Access unit (AU)
  - ✓ ITCU
- Directory user agent (DUA) Optional



Chapter 2 – Functional Model – SWIM

- SWIM Access Point
  - ✓ (Doc. 10039 SWIM Concept)
- Service Interface Binding
  - ✓**AMQP 1.0**
- Network Interface Bindings
  - ✓IPv4 (secure) unicast
  - ✓IPv6 (secure) unicast



Chapter 2 – Functional Model – SWIM – Why AMQP?

- SWIM Yellow profile – Best suited

- AMQP service interface binding:
  - ✓ Best in terms of performance
  - ✓ Wide range of Message Exchange Patterns (MEP) and security options

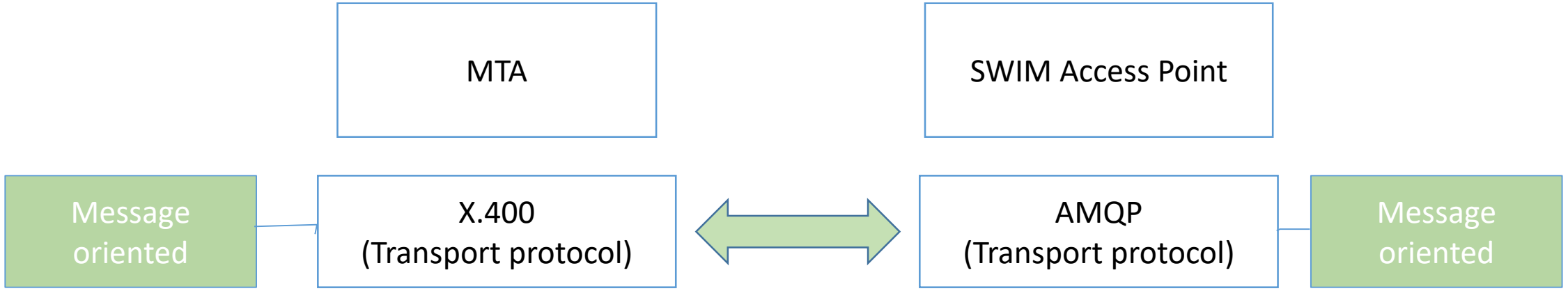
- Rest/WS/SOAP:
  - ✓ Not included in the specification
  - ✓ Not discarded for access AMHS/SWIM Gateway

Chapter 2 – Functional Model – SWIM – Why AMQP?

- Reliable exchange of business messages between two parties
- Standard for messaging (OASIS)
- Enables use of queues – Decoupling
- Binary wire-level - Supports binaries natively
- Vendor neutral
- Secure

Interoperability - Key concept on SWIM

Chapter 2 – Information Model

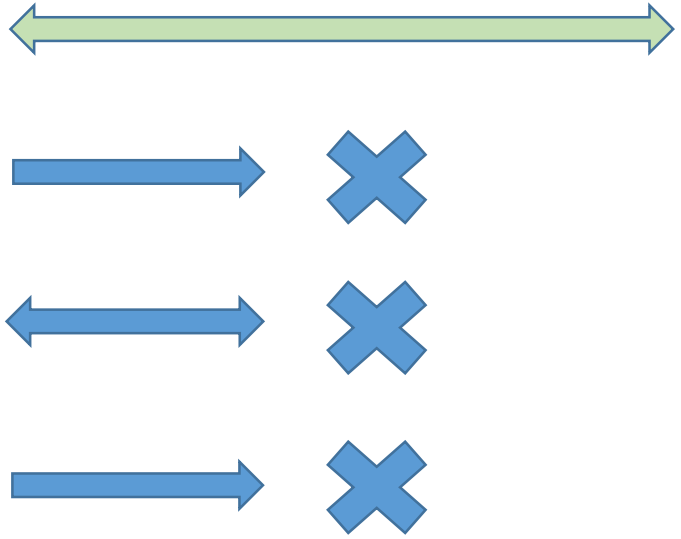


✓**Concept for mapping of information - Chapter 4**

Chapter 2 – Information Model

AMHS (X.400 information objects)

- ✓Message
  - ✓IPM
  - ✓IPN
- ✓Report
- ✓Probe



SWIM (SWIM information objects)

✓AMQP bare message

Chapter 2 – Security

AMHS

- AMHS SEC Functional Group
  - ✓Message origin authentication
  - ✓Content integrity
- Updated security requirements (AST TF/01 WP/06)
  - ✓Signature by Gateway
  - ✓Strong bind operations

SWIM

- AMQP Transport Security Authentication
- Simple Authentication and Security Layer (SASL);
- AMQP over TLS; and
- Transport Layer Security (TLS)

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Chapter 2 – Management

- Common management aspects
  - ✓Connections to at least one peer MTA / SWIM TI implementation
  - ✓Service available to only authorised AMHS users / SWIM providers/consumers
  - ✓Long-term logging
    - ✓Messages
    - ✓Related actions

Chapter 2 – Naming and addressing

- Representation of AMHS users in SWIM
  - ✓AFTN addressee indicators
  - ✓Re-use of address translation as per ICAO Doc 9880 Part II

- X.400 recipient address ←→ AMQP message queue

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Chapter 2 – Naming and addressing

AMHS

Message transmision oriented

MTA

SWIM

Consumer oriented

SWIM Access Point

Gateway as Consumer AMHS <- SWIM

Gateway as Producer AMHS -> SWIM

Chapter 2 – Level of support - AMHS

ATSMHS subsets	AMHS to SWIM	SWIM to AMHS	Limitati
I. Basic ATSMHS (basic)	M	O	(1)
II. Basic + FTBP	M	M	(2)
III. Basic + IHE	M	O	(3)
IV. Basic + DIR	C.1	C.2	(1)
V. Basic + FTBP + IHE	M	M	(4)
VI. Basic + DIR + FTBP	C.1	C.1	(2)
VII. Basic + DIR + IHE	C.1	C.2	(3)
VIII. Basic + DIR +SEC	C.3	C.4	(1)
- Basic + FTBP + DIR + SEC	C.3	C.3	(2)
IX. Basic + IHE + DIR + SEC	C.3	C.4	(3)
X. Basic + IHE + DIR + FTBP	C.1	C.1	(4)
XI. Basic + IHE + DIR + FTBP + SEC	C.3	C.3	(4)

(1) Support is limited to one text body part.

(2) Support is limited to two body parts; one text body part comprising an ATS message header and o FTBP. The ATS message text in the text body part is discarded, if available.

(3) Support is limited to one text body part with the ATS message header being discarded, if available respectively being absent/empty.

(4) Support is limited to one FTBP.

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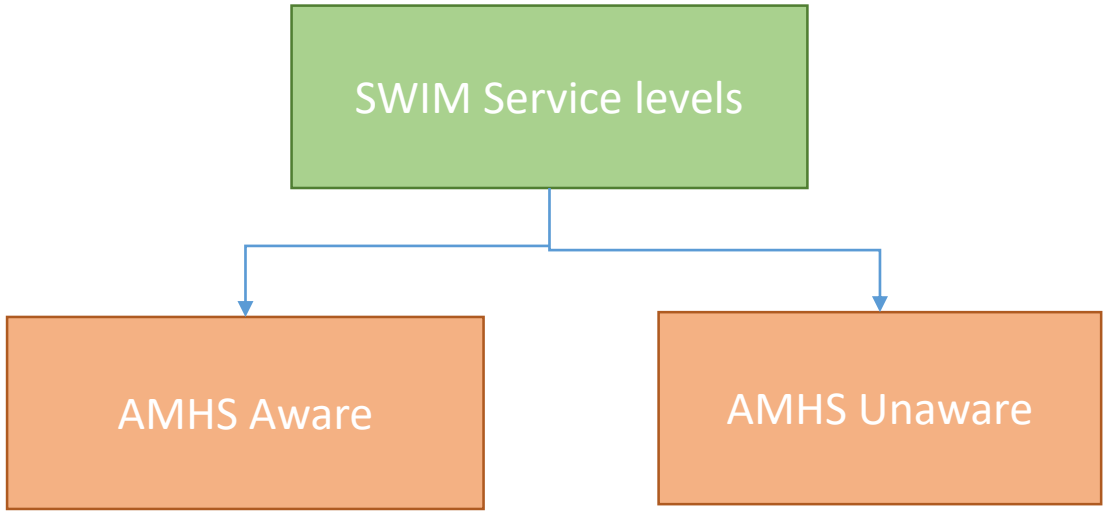
Chapter 2 – Level of support – SWIM



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Chapter 3 – Configuration and Parameters

- The AMHS/SWIM Gateway should be configurable to fit different deployment environments
- The different behaviour is reflected in configuration options and parameters
- Parameters that are referred to in other sections of the specification are documented in this section

Chapter 3 – Parameters groups

- Gateway Conversion Constraints
- AMHS Security
- Authorization
- Directory Services

Chapter 3 – Gateway Conversion Constraints

- The Gateway Conversion Constraints configure how the AMHS/SWIM Gateway behaves

- The use of theses parameters is optional

- Parameters:
  - *Conversion Direction*
  - *AMHS message maximum content size*
  - *AMHS message maximum number of recipients*
  - *ATSMHS Service Level*

Chapter 3 – AMHS Security

- The AMHS Security parameters may be required to generate signed AMHS messages and to validate the received signed AMHS messages
- The use of theses parameters is optional
- Parameters:
  - *PKI setup parameters*
  - *Digitally sign all AMHS messages*
  - *Action to take on reception of unsigned AMHS messages*
  - *Action to take on reception of signed AMHS messages that fails validation*

Chapter 3 – Authorization

- The Authorization parameters control which messages are deemed to be authorized to be converted from one domain to the next.

- By default, there shall be no authorization restrictions, all messages that can be converted by the AMHS/SWIM Gateway will be converted.

- Parameters:
  - *Authorized AMHS Users*
  - *Authorized SWIM Users*

Chapter 3 – Directory Services

- The Directory Services (an X.500 DSA) can be optionally used by the AMHS/SWIM Gateway to perform the conversion of AFTN addresses to AMHS and vice-versa.
- Example of a Directory Service is EDS.
- The DSA parameters control the configuration of the DSA and the ICAO MD Registry data.
- Parameters:
  - *Directory Service Presentation Address*
  - *Directory Service User DN*
  - *Directory Service User Password*
  - *ICAO MD Registry DN*

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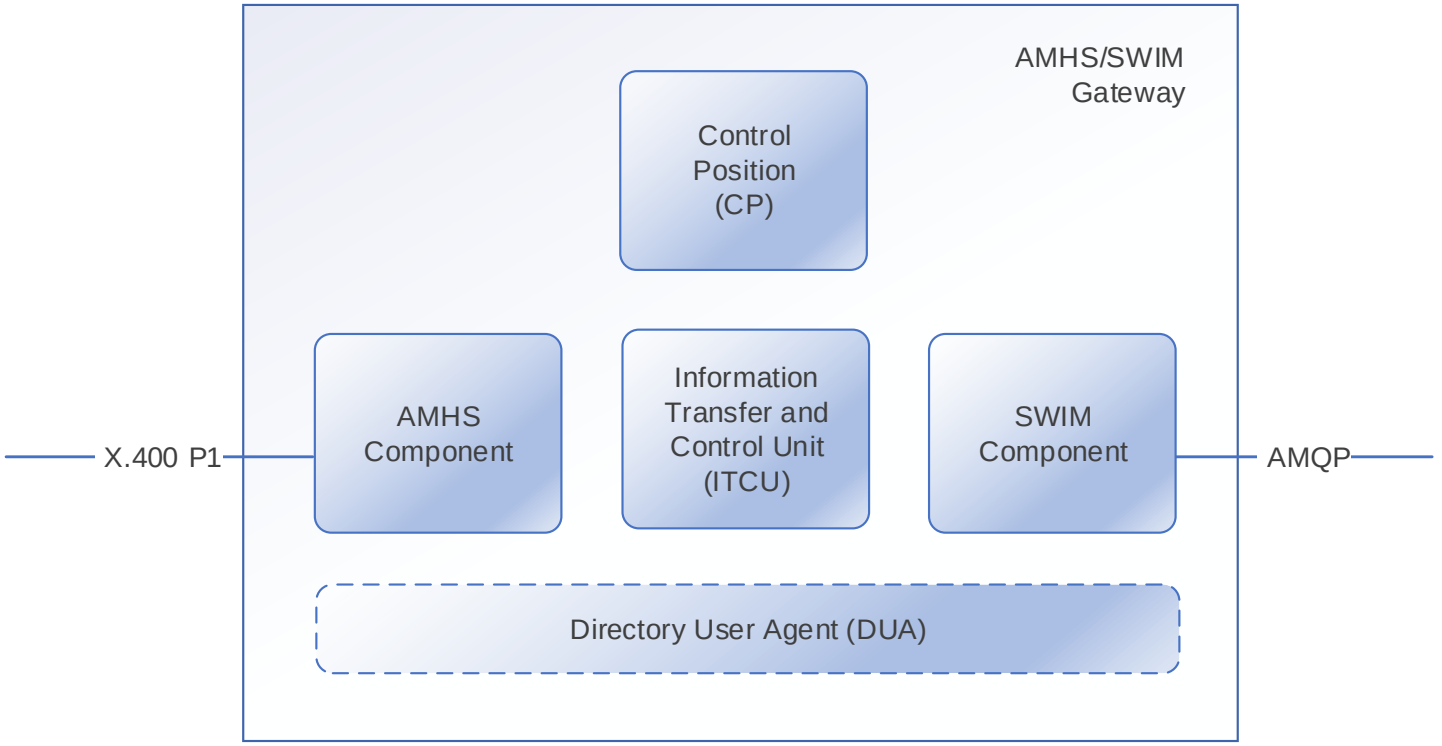
Chapter 4 – Sections

- General
- Gateway Components
- General Functions
- AMHS to SWIM conversion
- SWIM to AMHS conversion

Chapter 4 – General & Gateway components

- Establish mapping between AMHS and **AMPQ 1.0**
- Bidirectional

Chapter 4 – General & Gateway components

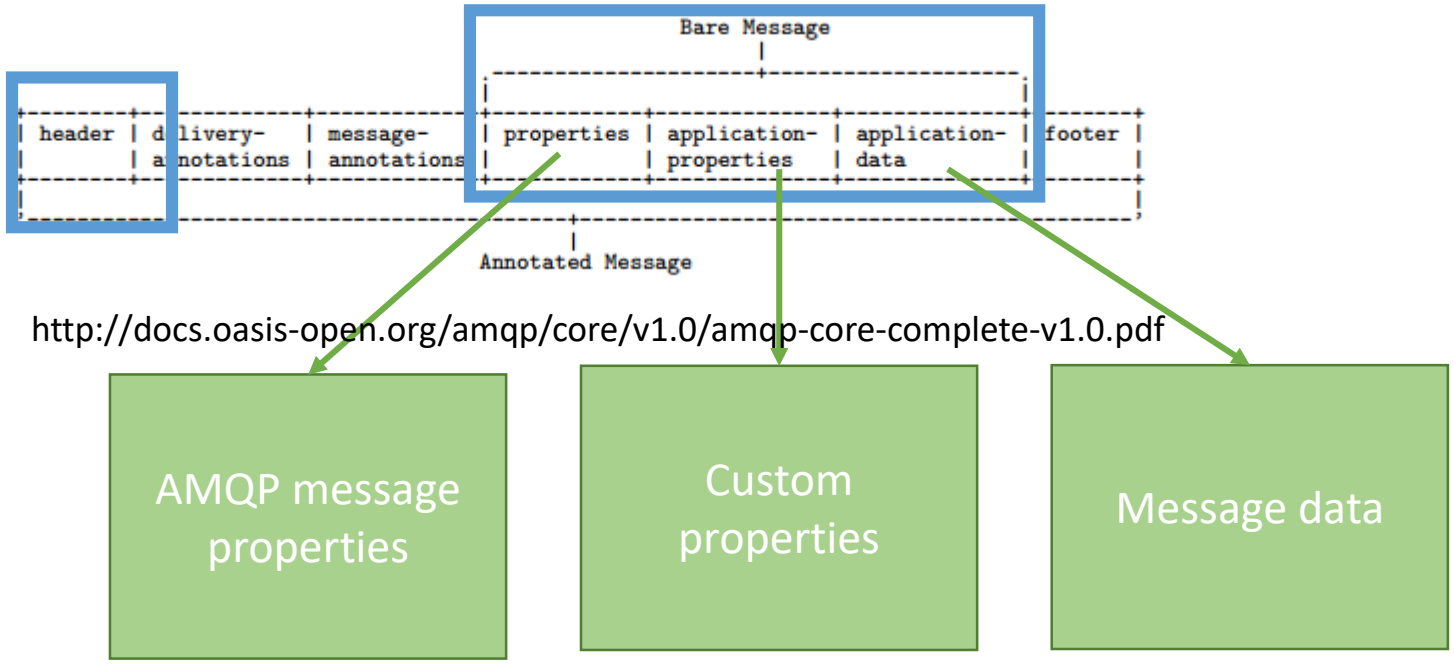


Chapter 4 – General Functions

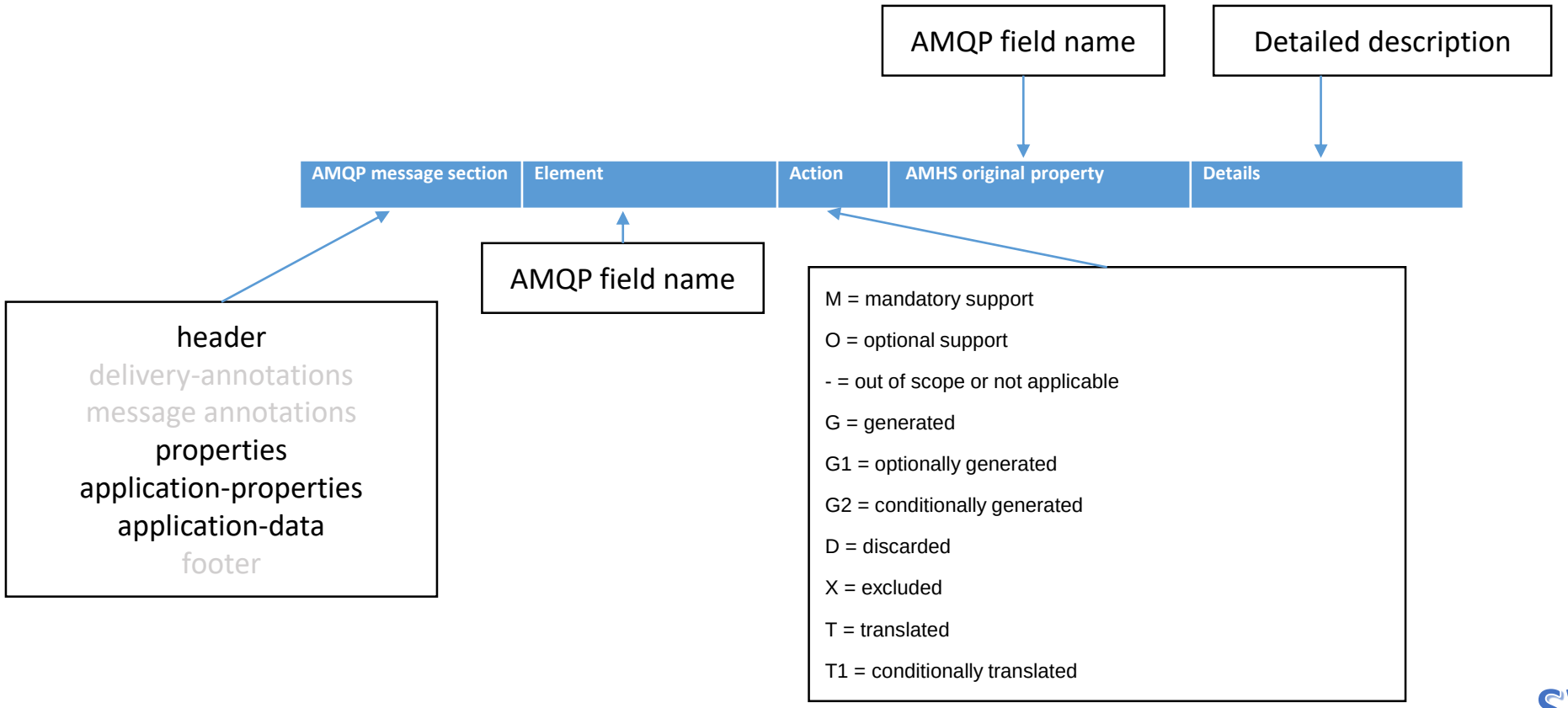
- Traffic logging
  - ✓Information related to:
    - ✓ Exchanges of information objects between the AMHS component and the SWIM component
    - ✓ Information of conversion from AMQP to AMHS
    - ✓ Information of conversion from AMHS to AMQP
    - ✓ Information related to AMHS message reports

- Address look-up tables - Doc 9880

Chapter 4 – AMHS to SWIM – AMQP Message



Chapter 4 – AMHS to SWIM – AMQP Message



Chapter 4 – AMHS to SWIM – Priority

- Priority translated to AMQP header priority
- Special relevance of AMHS priority indicator

AMQP message section	Element	Action	AMHS original property	Details
Header	priority	T	X.400 priority (envelope) or AFTN priority (ATS-message-priority or precedence)	See 4.4.3.2.2
application properties	amhs-ats-pri	T	ATS-message-priority OR precedence	See 4.4.3.4.5

Application property amhs-ats-pri

4.4.3.2.2 The value of the priority element of the header of the converted AMQP message shall be mapped and converted from:
a) the precedence element in the recipient-extensions in any of the RecipientSpecifier included in the IPM….; or
b) the value of the priority-indicator of the ATS-message-priority element of the AMHS message….

Chapter 4 – AMHS to SWIM – Priority

ATS-message-priority	IPM precedence	AMQP Priority
SS	107	6
DD	71	5
FF	57	4
GG	28	3
KK	14	2

Table 2. ATS Priority to AMQP Priority conversion

Chapter 4 – AMHS to SWIM – Body parts

- Complete translation of AMHS body parts

Table 5. AMHS body part types translation to SWIM

AMHS Body part type	Repertoire	AMQP Message content-type	amhs-content-type	amhs-content-encoding
ia5-text	-	<text/plain; charset="utf-8">	ia5-text	IA5
ia5-text-body-part	-	<text/plain; charset="utf-8">	ia5-text-body-part	IA5
general-text-body-part	Basic (ISO-646)	<text/plain; charset="utf-8">	general-text-body-part	ISO-646
general-text-body-part	Basic-1 (ISO-8859-1)	<text/plain; charset="utf-8">	general-text-body-part	ISO-8859-1
file-transfer-body-part	-	<application/octet-stream>	file-transfer-body-part	-

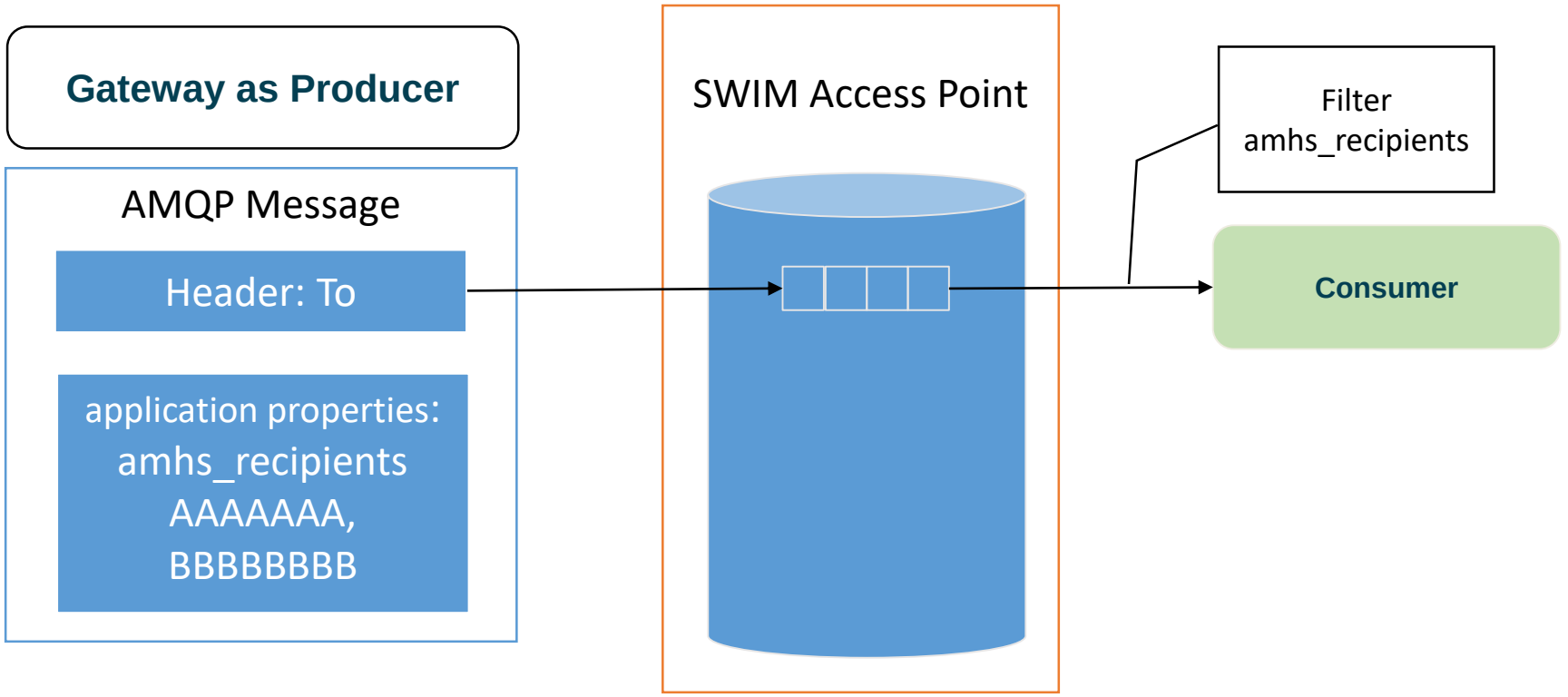
- One body part or two body parts for specific cases

Chapter 4 – AMHS to SWIM – Recipients

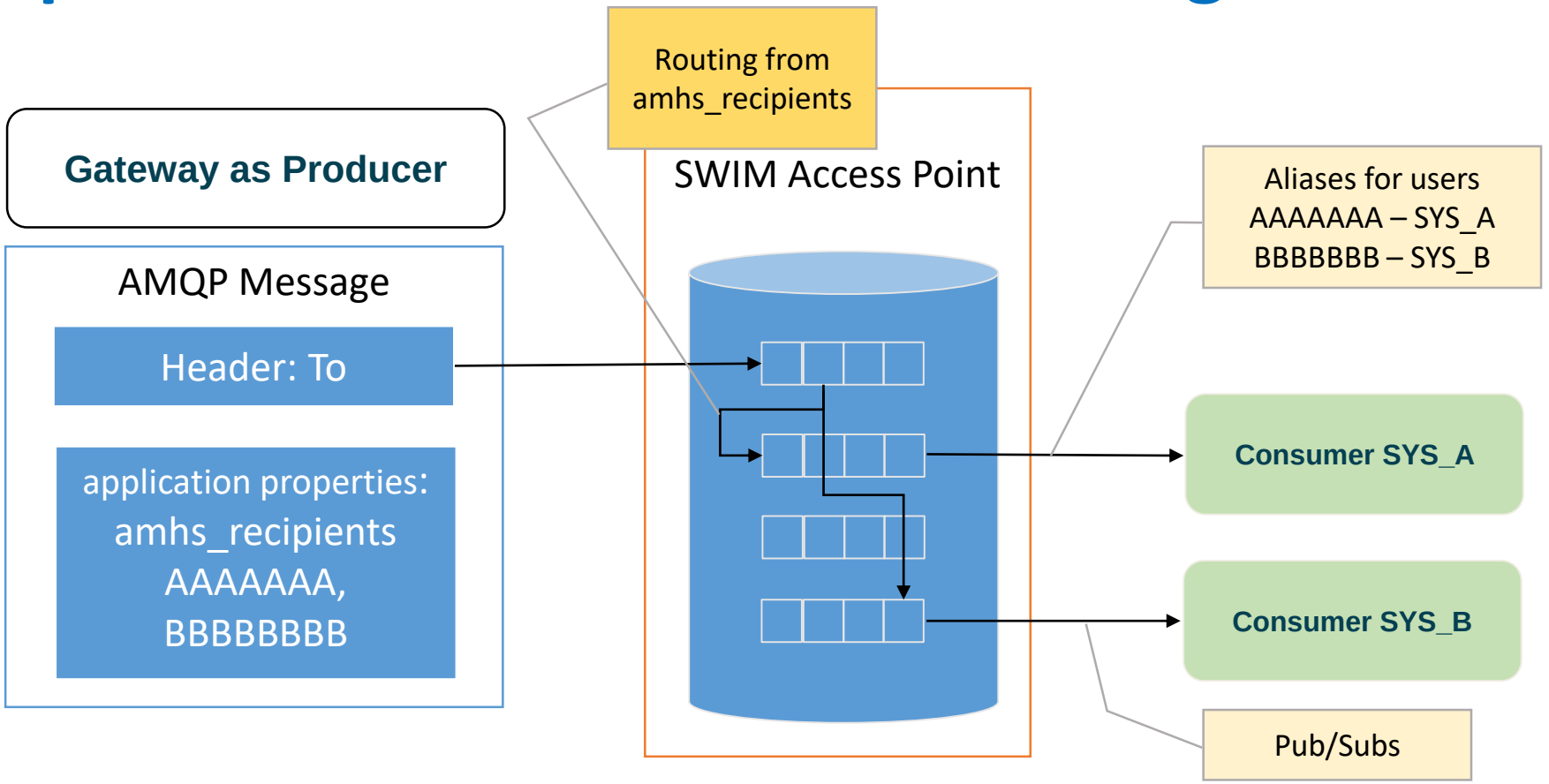
- AMQP Message property “to”
- Application property amhs-recipients

AMQP message section	Element	Action	AMHS original property	Details
properties	to	G	-	See 4.4.3.5.3
application properties	amhs-recipients	T	Recipient-name of per-recipient-fields (Envelope)	See 4.4.3.6.4

Chapter 4 – AMHS to SWIM – Routing on SWIM



Chapter 4 – AMHS to SWIM – Routing on SWIM



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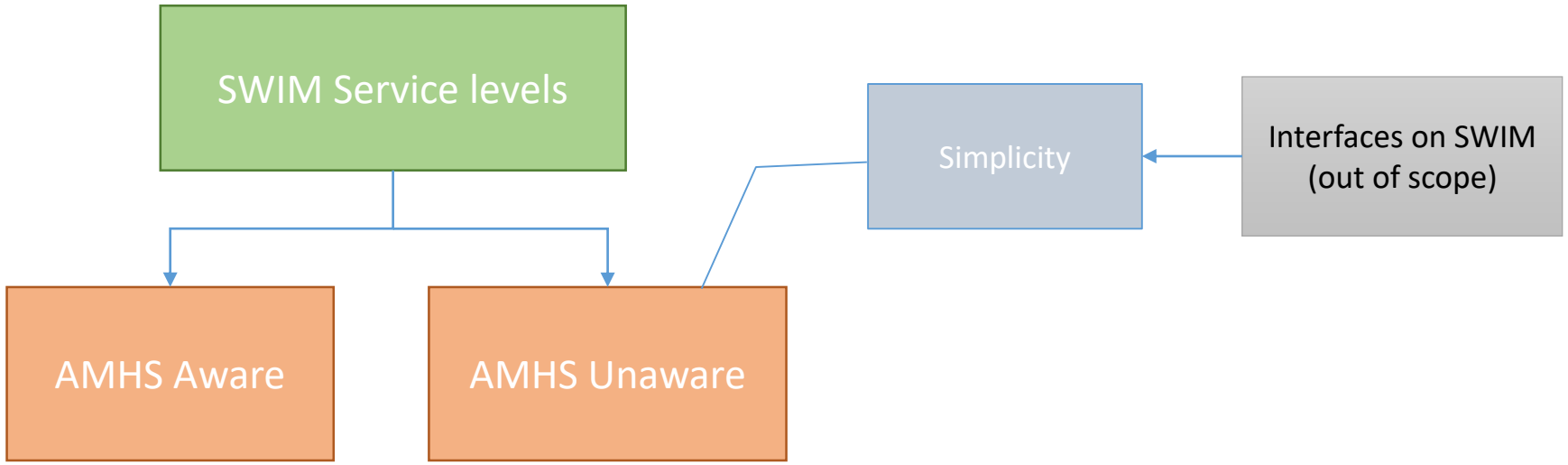
Chapter 4 – SWIM to AMHS – Levels of support



Chapter 4 – SWIM to AMHS – AMHS Unaware

- Minimum set of fields:

a) priority element in header section;

b) message-id element in properties section;

c) creation-time element in properties section

d) data element in application data section;

e) recipients in application properties section; and

f) originator in application properties section;

Chapter 4 - SWIM to AMHS - Body parts AMHS Unaware

AMQP Message content-type	amhs-bodypart-type	amhs-content-encoding	AMHS Body part type	Character set
<text/plain; charset="utf-8”>	-	-	general-text-body-part	(ISO-8859-1)
<application/octet-stream>	-	-	file-transfer-body-part	-

Table 10. Mapping of AMQP Message (AMHS unaware)

Chapter 4 – SWIM to AMHS – AMHS Aware

- Any AMQP field of the specification could be used
- Ability to handle AMHS messages properties

Chapter 4 – SWIM to AMHS – Body parts AMHS Aware

AMQP Message content-type	amhs-bodypart-type	amhs-content-encoding	AMHS Body part type	Character set
<text/plain; charset="utf-8”>	ia5-text	IA5	ia5-text	ia5
<text/plain; charset="utf-8”>	ia5-text-body-part	IA5	ia5-text-body-part	ia5
<text/plain; charset="utf-8”>	general-text-body-part	ISO-646	general-text-body-part	Basic (ISO-646)
<text/plain; charset="utf-8”>	general-text-body-part	ISO-8859-1	general-text-body-part	Basic-1 (ISO-8859-1)
<application/octet-stream>	file-transfer-body-part	-	file-transfer-body-part	-

Table 9. Mapping of AMQP Message (AMHS aware)

Action by the Meeting

The AST TF is invited to

a) note the content of this paper;

b) provide comments to the draft version of the AMHS/SWIM Gateway technical specification that will be introduced and provided to AST TF.


Questions
Answers


thank you
danke
謝謝
ngiyabonga
рахмат
teşekkür ederim
Баярлалаа
спасибо
gracias
tapadh leat
dank je
mochchakkeram
bedankt
dziękuję
hvala
maruuru
obrigado
sukriya
kop khun krap
go raibh maith agat
merci
arigatô
takk
dakujem
terima kasih
grazie
tạikụ
sagolun
chnorakaloutioun
gratias ago
gràcies
sulpáy
ありがとう
najis tuke
tanemirt
rahmet
diolch
dhanyavadagalu
shukriya
мерси
감사합니다
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তোমাকে ধন্যবাদ
kam sah hamnida
didi madloba
rahmat
mèsi
dėkuji
sobodi
enkosi
bayarlalaa
grâçie
köszönöm
nanni
nandri
dhanyavad
kiitos
dankie
faafetai lava
vinaka
спасибі
blagodaram
mersi
kia ora
barka
welalin
tack
spas
misaotra
matondo
paldies
grazzi
mahalo
akun
dankon
ačiū
djiere dieuf
tau
дякую
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chokrane
murakoze
obrigada
asante
manana
tenki
хвала
trugarez
мерси
merci
xièxie

AMHS/SWIM Gateway Specification

Version 1.1 Draft – 2023

AMHS/SWIM Gateway Study Group
(SWAMWAY SG)

SWAMWAY
Study Group

DOCUMENT CHANGE RECORD

The following table records the history of successive versions of the present document.

Version	Date	Modifications	Affected Sections
1.0 Draft	15/11/2022	Initial version of the AMHS/SWIM Gateway draft Technical Specification	All
1.1 Draft	27/02/2023	Review of previous version, based on development process	Chapters 1, 3, 4

DISCLAIMER

ACRONYMS

The acronyms used in this manual are defined as follows:

ACC	Area Control Centre
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunication Network
AIS	Aeronautical Information Service
AMHS	ATS Message Handling System
AMHSQ	AMHS over AMQP
AMQP	Advanced Message Queuing Protocol
API	Application Programming Interface
ASN	Abstract Syntax Notation
AST	AFS To SWIM Transition
AST TF	AFS To SWIM Transition Task Force
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
ATSMHS	ATS message handling service
AU	Access Unit
AUP	Acceptable Use Policy
DIR	ATN Directory Service
DL	Distribution List
DN	Distinguished Name
DSA	Directory System Agent
DUA	Directory User Agent
EAD	European AIS Database
EACP	European Aviation Common PKI
EDS	European Directory Service
FDPS	Flight Data Processing System
FTBP	File transfer body part
FPL	Flight Plan
HTTP	Hypertext Transfer Protocol
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Commission
IHE	IPM Heading Extension
IMP	Information Management Panel
IPM	Interpersonal Message
ISO	International Standardization Organization
ISP	International Standardized Profile

ITCU	Information transfer and control unit
MD	Management Domain
MHS	Message Handling System
MTA	Message transfer agent
MEP	Message Exchange Pattern
MIME	Multipurpose Internet Mail Extensions
MTA	Message Transfer Agent
MTS	Message Transfer System
NM	Network Manager
OHI	Optional Heading Information
OID	Object Identifier
OSI	Open System Interconnection
PKI	Public Key Infrastructure
REST	
RFC	Request For Comments
SMTP	Simple Mail Transfer Protocol
SOAP	Simple Object Access Protocol
SWIM	System wide information management
SWIM TI	System wide information management Technical Infrastructure
SWIM TI YP	System wide information management Technical Infrastructure Yellow Profile
TI	Technical Infrastructure
TLS	Transport Layer Security
ttl	
TWR	Control Tower
UUP	
WS	Web Services
WSDL	Web Services Description Language
XML	Extensible Markup Language
YP	Yellow Profile

FOREWORD

This manual is a result of the activities performed by the AMHS/SWIM Gateway Study Group, (SWAMWAY SG) during the last years in support of a smooth transition from the Aeronautical Fixed Service (AFS) to System Wide Information Management (SWIM).

SWAMWAY SG is a joint initiative undertaken by a group of organisations including several ANSPs and industries with a deep expertise in both, AMHS and SWIM. Austro Control, Copperchase, Enaire, Frequentis Comsoft, Indra Avitech, Telefónica and Thales joined forces in the SWAMWAY SG without economic interests in the spirit of working together on a Gateway specification between AMHS and SWIM, the AMHS/SWIM Gateway, to facilitate the aforementioned transition from AFS to SWIM.

The content of this manual has been shared for consultation with AMHS and SWIM experts and their feedback has been appropriately considered. SWAMWAY SG has closely collaborated with the AFS To SWIM Transition Planning Group (AST PG) and has also duly reported the progress of its activities to the AFS To SWIM Transition Task Force (AST TF) to provide up-to-date information on a timely basis and to incorporate potential inputs from the AST TF.

This manual contains the technical specifications for the AMHS/SWIM Gateway based on relevant standards and protocols established for open systems interconnection (OSI) by the International Organization for Standardization (ISO), the Telecommunication Standardization Sector of the International Telecommunication Union (ITU-T), the technical specification for SWIM Technical Infrastructure Yellow Profile by EUROCONTROL, and the AMQP standards by OASIS group.

It is important to notice that SWAMWAY SG does neither suggest nor recommend any specific way to implement the AMHS/SWIM Gateway described in this manual. This manual is intended to provide guidance to implementers so that they can build their own AMHS/SWIM Gateways ensuring interoperability as well as a specific determined behaviour according to the requirements gathered in this technical specification.

This technical specification has been widely shared and consulted with many different organizations within ICAO framework. The valuable inputs and feedback from these organizations have been duly considered and have certainly enriched this manual in the shape of a technical specification.

This technical specification is not prescriptive, and implementers are free to design and make their own implementations.

Editorial practices in this manual are as follows:

- The specifications that include the verb "shall" are essential to be implemented to secure proper operation of the AMHS/SWIM Gateway.
- The specifications that include the verb "should" are recommended for implementation in the AMHS/SWIM Gateway.
- The specifications that include the verb "may" are optional.

The technical specification for the AMHS/SWIM Gateway is structured as follows:

Chapter 1 Introduction, contains an overview to allow the readers to understand the context of and the need for the AMHS/SWIM Gateway. It also includes some important definitions, the references and an exhaustive list of the different terms and acronyms used along the technical specification.

Chapter 2 System Level Provisions, provides a high-level specification of the AMHS/SWIM Gateway and the environment in which it operates. This chapter addresses the functional, information, security, and management models. Finally, it also includes sections specifying how the information will be conveyed from AMHS to SWIM and from SWIM to AMHS.

Chapter 3 Configurations and Parameters, summarises several configurations and parameters of the AMHS/SWIM Gateway that allow adaption to the needs of organisations and integration with existing environments. This chapter includes important aspects that the AMHS/SWIM Gateway will take care of such as potential message constraints (size, maximum number of recipients, etc.), security, authorisation and optional directory services.

Chapter 4 AMHS/SWIM Gateway SPECIFICATION, describes the architecture and building blocks of the AMHS/SWIM Gateway and provides the detailed specification of this gateway and of the related functional requirements such as conversion of messages from AMHS to SWIM and from SWIM to AMHS.

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1 INTRODUCTION

1.1 OVERVIEW

1.1.1 The AMHS application, formerly known as the ATS message handling service allows ATS messages to be exchanged between service users as specified in ICAO Doc. 9880, Part II [1], Chapter 4.

1.1.2 The AMHS is provided by the implementation over the ATN Internet communication services of the message handling systems specified in ISO/IEC 10021 and ITU-T X.400.

1.1.3 SWIM information is exchanged between SWIM producers and SWIM consumers following the appropriate mechanisms available today in SWIM (e.g., SWIM TI Profiles and Message Exchange Patterns)

1.1.4 SWIM TI specifies interface binding requirements and infrastructure capabilities. They depend on the specific SWIM TI Profile SWIM users utilize to exchange information. AMQP is the protocol that has been chosen for the proposed AMHS/SWIM Gateway. SWIM Access Point can provide access to the AMHS/SWIM Gateway following any SWIM TI YP compliant interfaces (mainly AMQP and REST).

Among the different SWIM profiles published by EUROCONTROL, the SWIM Yellow profile is the best suited based on the type of information that the AMHS/SWIM gateway will exchange and the communications networks that will support them. The SWIM Yellow Profile [reference] offers four different types of service interface bindings: WS Light, WS SOAP, WS-N SOAP and AMQP messaging [3].

Analysis of the different service bindings and their capabilities [3] showed that AMQP is the best in terms of performance and offers a wide range of MEP and security options. AMQP offers high performance, reliability, decoupling, and is a consumer-driven binary wire-level protocol appropriate for the transmission of file transfer body parts. On top of that, AMQP offers interoperability, that is the key concept of the SWIM paradigm.

The SWIM Component enables access to SWIM in accordance with the EUROCONTROL SWIM Technical Infrastructure (TI) Yellow Profile [3] using the Advanced Message Queuing Protocol (AMQP).

1.1.5 There is a need to exchange information between AMHS users and SWIM users. This information exchange takes place may be bi-directional.

1.1.6 This bilateral exchange is not completely symmetrical and that shall be appropriately considered in order to understand what information is needed to be conveyed from AMHS to SWIM and vice versa.

1.1.7 Because of this need to exchange information between AMHS and SWIM environments and because of the use of different protocols, a mechanism shall be implemented making possible the exchange of information between the two environments.

1.1.8 This mechanism shall not only make possible the exchange of information between AMHS and SWIM but shall also adapt the format of the information to make it understandable for the users in each environment.

1.1.9 The proposed mechanism shall be an AMHS/SWIM Gateway following a similar approach to the one defined in ICAO Doc. 9880, Part II [1], Chapter 4, for the transition from AFTN to AMHS.

1.1.10 The AMHS/SWIM Gateway shall guarantee the interoperability between AMHS and SWIM users and the continuous and steady transition from AMHS to SWIM always ensuring the minimum impact on the end users.

1.1.11 The transition from AMHS to SWIM shall occur and shall take the required time to ensure a smooth transition between these two technologies minimizing the impact on the end users.

1.1.12 Although the AFTN/AMHS Gateway is taken as a reference, some important aspects have to be considered.

1.1.13 First of all, it has to be considered that AMHS and SWIM are associated to completely different sets of technologies and for the purpose of the AMHS/SWIM Gateway, those differences need to be reconciled somehow.

1.1.14 The way information is sent and received is completely different. Indeed, when talking about message delivery and message reception in the AMHS environment, the mechanism and the communication protocols that are followed have nothing to do with those used in the SWIM environment.

1.1.15 In the SWIM environment, the information flows are completely different. In SWIM, information producers are those SWIM actors who want to share some specific information with the whole community. On the contrary, information consumers are those who need some specific information that other SWIM actors may share with the whole community.

1.1.16 In this regard, in AMHS, the sender knows upfront who the recipient is and what path or paths the messages will follow to arrive at the destination, the AMHS recipient. However, this principle is not always applicable. Usually, the sender only knows specific recipient addresses, e.g., in case of a Distribution List, DL, the sender does not necessarily know all the recipients. Then, in AMHS it is quite usual that a message has multiple recipient addresses.

1.1.17 In SWIM, the situation is different. The information is made available by the producer and those users who may consider this information useful and relevant, may consume it at their discretion. Therefore, in SWIM, the producers do not know upfront to whom the information is made available and, consequently, who is going to consume that information.

1.1.18 Therefore, there are substantial differences in terms of routing to convey the messages or the information from the sender to the recipients or from the producers to the consumers.

1.1.19 AMHS has predefined routes that have been nationally and internationally agreed. These logical routes also have back-up routes in case the route by default is not available.

1.1.20 In most cases and when talking about AMHS, senders and recipients know each other upfront except when using DLs, but if that were not the case, senders can look up what destination address the recipients have and the associated route based on that address and the consequent physical location.

1.1.21 On the contrary, SWIM does not have predefined routes because the underlying concept of exchanging information does not follow the same approach as in AMHS. SWIM producers and consumers do not necessarily know each other beforehand. SWIM producers will publish the services they can provide using the SWIM Registry. SWIM consumers look up in the SWIM Registry what SWIM services are available and what are the pre-requisites to consume those services.

Note.— Producers of SWIM information do not necessarily need to be the ones also providing the service via which information is exchanged. It could be, for instance, that an ANSP is using a service implemented and hosted by a different vendor to share its ATM information with the SWIM consumers. Other examples are NM and EAD. Any ANSP publishes AUP/UUP to NM and NM shares via NM B2B, similarly with EAD.

1.1.22 In any case, it is clear as mentioned before that SWIM producers or consumers can need information that is only available within the AMHS environment, and the other way around, AMHS senders and recipients can also need information that is only available within the SWIM environment.

1.2 END SYSTEMS

1.2.1 The term End systems shall refer to the users of the AMHS/SWIM Gateway, either from the AMHS side (accessing the ATS Message server) or from the SWIM side (accessing the SWIM Access Point). Please, see chapter 2 for further details.

1.2.2 The users of the AMHS/SWIM Gateway shall be the AMHS users, as well as the SWIM users, either SWIM information producers or SWIM information consumers.

1.2.3 The communication between these end users shall be according to the following possibilities:

AMHS users with SWIM information producers through the AMHS/SWIM Gateway;

AMHS users with SWIM information consumers through the AMHS/SWIM Gateway and vice versa; and

AMHS users with the SWIM Access Point embedded inside the AMHS/SWIM Gateway.

1.2.4 AMHS and SWIM users may use functionalities, indicators and parameters, such as, priority, time stamp, information type, ACK request/confirmation, etc. All these parameters and indicators shall be properly addressed in the AMHS/SWIM Gateway so that the contextual conditions are absolutely clear for both AMHS and SWIM users.

1.2.5 The end users of the AMHS/SWIM Gateway shall duly consider the following aspects:

1.2.5.1 SWIM users do not know upfront the capabilities of AMHS users. That shall be the responsibility of the AMHS/SWIM Gateway.

1.2.5.2 SWIM users submitting information do not know if the sent information are received by the destinations or not (information is considered just delivered by the SWIM users).

1.2.5.3 SWIM users shall communicate with the AMHS/SWIM Gateway through a set of known communication protocols. For the time being, the technical specification for the AMHS/SWIM Gateway, this document, refers to the use of AMQP on the SWIM side.

1.2.5.4 It shall be ensured that SWIM information upon being submitted, contains the mandatory fields fulfilled to guarantee the translation to extended AMHS.

The AMHS/SWIM Gateway shall accept messages in support of both Basic and Extended AMHS for transfer into the SWIM environment.

1.2.6 At the time of writing of this Technical Specification, the vast majority of AMHS messages exchanged adhere to Basic AMHS.

1.2.7 When an Extended message (with FTBP or IHE) is submitted to a SWIM user, the AMHS/SWIM Gateway shall ensure the complete conversion of the message.

1.3 AMHS/SWIM GATEWAY IMPLEMENTATION

1.3.1 This manual shall be considered the technical specification that gathers the requirements of the AMHS/SWIM Gateway.

1.3.2 The requirements included in this technical specification ensure that the AMHS/SWIM Gateway shall be able to exchange information between AMHS users and SWIM users, either SWIM information producers or SWIM information consumers.

1.3.3 This technical specification does neither mandate nor recommend any specific implementation to build the AMHS/SWIM Gateway.

1.3.4 The authors of this technical specification, i.e., SWAMWAY SG members, understand that it is up to industrial organizations or implementers to build an AMHS/SWIM Gateway following the technical specifications herein.

1.3.5 This technical specification has been developed with the intention that any implementer meeting the described requirements shall be able to guarantee the information exchange between AMHS and SWIM. But it does not preclude implementers from adding additional features that may add other ancillary functionalities.

1.4 REFERENCES

1.4.1 This specification makes references to the following documents:

[1] ICAO Doc 9880, Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, 2nd Edition, Part II – Ground-Ground Applications - Air Traffic Services Message Handling Services (ATSMHS), 2nd edition

[2] ICAO EUR AFS to SWIM Transition Task Force, 1st Meeting (AST TF/01), Working Paper 6 (WP/06), Update of AMHS Security Requirements

[3] EUROCONTROL SWIM Technical Infrastructure (TI) Yellow Profile, edition 1.1

[4] ICAO Plan for Meteorology in System Wide Information Management (SWIM), Appendix C, MET-SWIM Plan and Roadmap, 1st edition

[5] ISO/IEC 10021-4:2003, Information technology — Message Handling Systems (MHS): Message transfer system — Abstract service definition and procedures — Part 4, edition 2003.

[6] ISO/IEC 10021-7:2003, Information technology — Message Handling Systems (MHS): Interpersonal messaging system — Part 7, edition 2003.

1.5 TERMINOLOGY

1.5.1 The following terminology shall apply:

Data format. A structure of data elements, records and files arranged to meet standards, specifications or data quality requirements.

Direct AMHS user. An AMHS user who engages in the AMHS at an ATS message user agent. A direct AMHS user may belong to two subgroups as follows:

Human users who interact with the AMHS by means of an ATS message user agent connected to an ATS message server.

Host users which are computer applications running on ATN end systems and interacting with the AMHS by means of application programme interfaces.

Exchange Schema. Formal description of the data involved in an information exchange, in particular including the encodings and other applicable constraints. An exchange schema assists information service consumers in understanding the syntax of the data delivered by the information service, and the technologies required for locally processing the data received. An exchange schema is based on a data exchange language which is standardized. For example, XML Schema is a W3C data exchange language used to define XML encoded messages.

Indirect AMHS user. An AMHS user at an AFTN station using an AFTN/AMHS gateway to communicate with other AMHS users.

Information exchange model. A document in a formal language identifying the information that is agreed to be shared between two or more organisations or groups and includes at least one exchange schema for the associated data. An information exchange model is normally defined for a specific information domain, such as aeronautical information, meteorological information or flight information. This typically includes the definition of information entities and their relationships.

Information service. A type of service in a service-oriented architecture that provides an ATM information sharing capability.

Information Service Consumer. A service consumer receiving information from information service providers using information services. The information service consumer role and the information consumer role may be allocated to different parties.

Information Service Provider. A service provider making information available to information service consumers using information services.

Interface binding. Specification of the protocols and data formats to be used in transmitting messages defined by the associated interface. Two systems that implement the same interface binding are considered technically interoperable and are able to connect to each other and exchange information. There are two types of interface bindings to be distinguished based on their position in the TCP/IP protocol: service bindings and network bindings. Service bindings specify the service interface protocols (e.g., protocols to interface with the applications, such as HTTP and AMQP). Network bindings specify the transport and network related protocols that will be used to exchange data over the network (e.g., TCP, IP v4/v6).

Message exchange pattern. A template that describes relationships of multiple messages exchanged between interacting components to accomplish a single complete information exchange.

Reference model. An abstract framework for understanding significant relationships among the entities of some environment.

Semantic interoperability. The ability of computer systems and organisations to exchange information with unambiguous, shared meaning.

Service (SWIM Context). A mechanism to enable access to one or more capabilities using a prescribed interface. In the context of SWIM, the notion of service addresses machine-to-machine interaction based on service-oriented architecture principles, and is not to be confused with the notion of service as used in ICAO provisions referring to business services such as AIS, ATS, etc.

Service consumer. An entity which seeks to satisfy a particular need through the use of capabilities offered by means of a service.

Service definition. A document, issued by a community of interest, used to harmonize service implementations.

Service description. Information needed in order to use, or consider using, a service.

Service instance. The service deployed into a running ICT system.

Service operation. Specification of a transformation or query that an object may be called to execute.

Service orientation. The designing of systems in terms of services and service-based development.

Service-oriented architecture. Architectural style that supports service orientation.

Service provider. An entity (person or organisation) that offers the use of capabilities by means of a service.

SWIM Access Point. As per ICAO Doc. 10039, A SWIM Access Point is a logical entity which bundles a number of technical capabilities (e.g., messaging, security, logging, interface management, etc.).

SWIM region. A geographical area in which a group of States and/or ATM stakeholders has agreed upon common regional governance in support of system wide information management implementation. A SWIM region can be an ICAO Region or any other area in which a community of interest has agreed on common governance.

SWIM service registry. A directory containing entries with the information necessary to discover and access SWIM services.

SWIM standard(s). The set of technology standards and specifications selected by SWIM Governance for use in a SWIM implementation.

SWIM Technical infrastructure. The assembly of software and hardware used to enable the provision of information services within SWIM.

SWIM Technical infrastructure management capability. The SWIM technical infrastructure capability enabling the monitoring of the performance of the technical infrastructure.

System Wide Information Management (SWIM). SWIM consists of standards, infrastructure and governance enabling the management of ATM related information and its exchange between qualified parties via interoperable services.

1.5.2 The following level of mandatory accomplishment of the requirements shall apply:

- mandatory (full) support (M);
- mandatory minimal support (M-);
- mandatory O/R name minimal support (M1) (see ISO/IEC ISP 12062-2);
- optional support (O);
- conditional support (C);
- out of scope (I), and;
- not applicable (-).

1.5.3 The following classification shall apply for expressing behaviour requirements related to parameters or elements included in Chapter 4 for the specification of the AMHS/SWIM Gateway:

a) **Generated (G):** used to describe the generation of an X.400 or AMQP information object. It means that the element is generated by the AMHS/SWIM Gateway. The value of the element is based on parameters related to the AMHS/SWIM Gateway itself or takes a pre-determined value and does not depend on the value of an element of the information object received by the AMHS/SWIM Gateway which caused the current generation of an information object. If an element comprises several components, then the element is classified as generated if at least one of its components is generated, and the others are either generated or excluded. The generation of message handling system parameters applies to abstract-values and does not constrain the ASN.1 encoding. In particular, elements generated with ASN.1 DEFAULT abstract-values may, but need not, be encoded;

b) **Optionally generated (G1):** used with the same meaning as generated (G), with the exception that the generation of the element is optional, the decision being a matter of policy local to the management domain operating the AMHS/SWIM Gateway;

c) **Conditionally generated (G2):** used only to describe the generation of an AMHS report or RN element. It means, for a report generation, that the element is generated in the report or RN based on some condition related to the subject AMHS message being true. If the element is generated, it takes a value derived from elements present in the received AMHS information object which caused the generation of the report or RN;

d) **Translated (T):** used to describe either the generation of an X.400 or AMQP information object or the use of a received information object. It means that the element is translated by the AMHS/SWIM Gateway, using a dependence relationship between the value of an element of the received information object and the value of the translated element in the generated information object. If an element comprises several components, then the element is classified as translated if at least one of its components is translated, and the others are either generated or excluded in generation, discarded or out of scope in reception;

e) **Conditionally translated (T1):** used with the same meaning as translated (T), with the exception that the translation of the element is subject to some condition being true, e.g., the presence of an optional element in the received information object;

f) **Discarded (D):** used to describe the use of a received X.400 or AMQP information object. It means that the value of the element is not used by the message transfer and control unit when generating the elements of the information object converted from the received information object, and that the semantic information conveyed in the element is discarded during the process of conversion in the AMHS/SWIM Gateway. However, the presence or value of the element may be used by the message transfer and control unit for purposes other than conversion, such as report generation and logging;

g) **Excluded (X):** used to describe either the generation of an X.400 or AMQP information object or the use of a received information object. Upon generation of an information object, it means that the element is not used or present in the generated information object. Upon reception of an AMHS information object, it means that the presence of the element causes rejection of the information object I and generation of an AMHS non-delivery report;

h) **Out of scope (I) or not-applicable (-):** used to describe the use of a received information object, when the element is either a format element which cannot be processed in any way or an element which is not in the scope of the section, but which presence is included in the ISPICS serving as a basis for the mapping specification.

2 SYSTEM LEVEL PROVISIONS

2.1 INTRODUCTION

2.1.1 System level provisions specify general requirements using abstract models and based on basic prerequisites. These general requirements are further refined by subsequent chapters of this specification.

2.2 FUNCTIONAL MODEL

2.2.1 General

2.2.1.1 The functional model covers functional aspects of the AMHS/SWIM Gateway related to X.400/AMHS and SWIM.

2.2.1.2 The AMHS/SWIM Gateway shall consist of following functional building blocks:

a) AMHS Component;

b) Information Transfer and Control Unit (ITCU);

c) SWIM Component;

d) Control Position (CP); and

e) Directory User Agent (DUA).

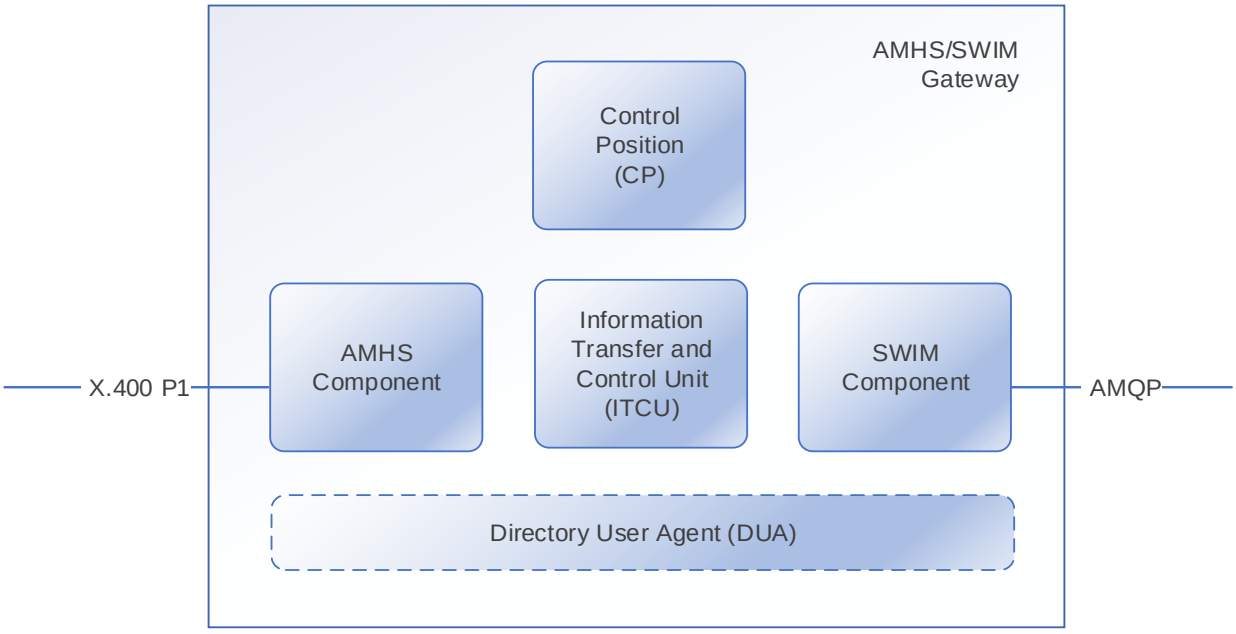


Figure 1. Building Blocks

2.2.1.3 The AMHS Component shall interface with AMHS for exchange of aeronautical information with AMHS users. Internally, it shall interface with the Information Transfer and Control Unit, the Control Position, and optionally the Directory User Agent.

2.2.1.4 The Information Transfer and Control Unit shall convert and transfer information and control the flow of information. Internally, it shall interface with the AMHS Component, the SWIM Component, the Control Position, and optionally the Directory User Agent.

2.2.1.5 The SWIM Component shall interface with SWIM for exchange of aeronautical information with SWIM information providers and consumers. Internally, it shall interface with the Information Transfer and Control Unit, the Control Position, and optionally the Directory User Agent.

2.2.1.6 The Control Position shall receive reports on issues occurred during the automated processing by the other components of the AMHS/SWIM Gateway for appropriate action. Internally it shall interface with the AMHS Component, the Information Transfer and Control Unit, the SWIM Component, and optionally the Directory User Agent.

2.2.1.7 The optional Directory User Agent shall interface with the ATN Directory. Internally it shall interface with the AMHS Component, the Information Transfer and Control Unit, the SWIM Component, and the Control Position.

2.2.1.8 The interfaces between the functional building blocks of the AMHS/SWIM Gateway are considered a local matter.

2.2.2 AMHS

2.2.2.1 The AMHS Component shall include an X.400 message transfer agent (MTA) which integrates with the AMHS becoming a part of it as per ICAO Doc 9880 Part II [1].

2.2.2.2 The Information Transfer and Control Unit shall include an X.400 access unit (AU).

2.2.2.3 The AMHS/SWIM Gateway may include an X.500 Directory User Agent (DUA).

2.2.3 SWIM

2.2.3.1 The SWIM component shall handle the interface to SWIM and provide an interface to the ITCU.

2.2.3.2 The SWIM Component shall integrate with the SWIM environment and make use of the SWIM Technical Infrastructure (TI).

2.2.3.3 The SWIM Component shall support the following profile in accordance with the SWIM Technical Infrastructure (TI) Yellow Profile [3]:

a) Service Interface Binding

1) AMQP messaging

b) Network Interface Bindings

1) IPv4 Unicast;

2) IPv4 Secure Unicast;

3) IPv6 Unicast;

4) IPv6 Secure Unicast

2.2.3.4 The SWIM Component may support further interface bindings.

2.2.3.5 The SWIM Component shall include a SWIM Access Point.

2.2.3.6 SWIM Access Point

2.2.3.6.1.1 A SWIM Access Point is just an architectural concept introduced on ICAO Doc. 10039.

2.2.3.6.1.2 As per ICAO Doc. 10039, it is a logical entity which bundles a number of technical capabilities.

2.2.3.6.1.3 The SWIM Access Point shall include some capabilities supporting the AMHS/SWIM Gateway:

a) Messaging

b) Security

c) Supervision

2.2.3.6.1.4 The SWIM Access Point may offer some additional capabilities in support of the AMHS/SWIM Gateway:

a) Subscription management, supporting the capability of subscribing as consumer to other SWIM systems as well as providing subscription mechanisms to external SWIM consumers if required

b) Routing rules

c) Interface management, providing several endpoints with different interfaces for access AMHS/SWIM Gateway

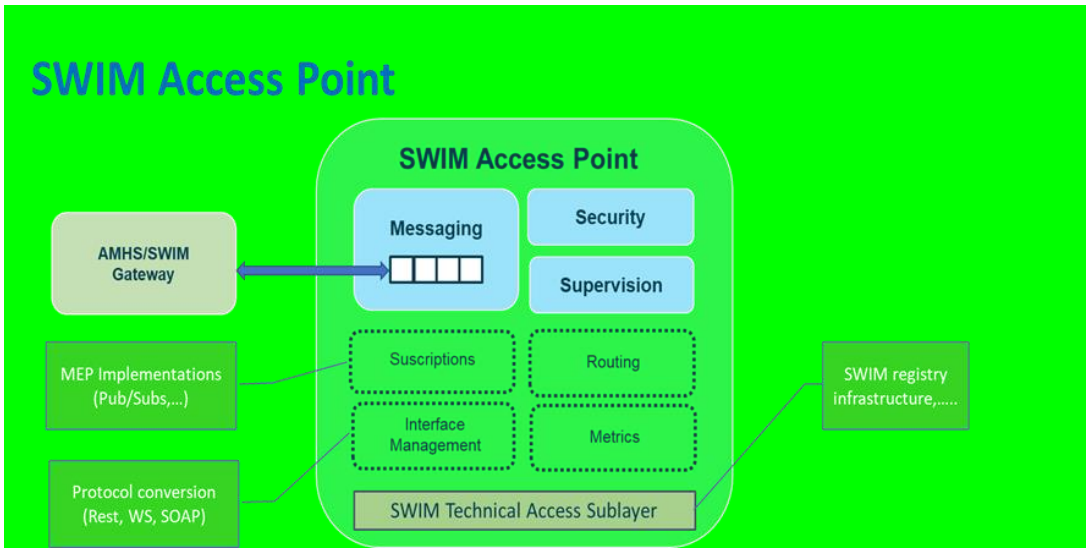
d) Format conversion, if conversion on AMHS and SWIM formats is required

2.2.3.6.1.5 The SWIM Access Point could offer some additional capabilities in support of the AMHS/SWIM Gateway:

a) Metrics

b) High availability

c) Any additional capabilities required in concrete implementations



2.2.3.6.1.6 The access to SWIM information services is supported by the SWIM Technical Access Sublayer.

2.2.3.6.1.7 SWIM Access Point shall provide to the gateway the ability to work like an Information Service Producer or like an Information Service Consumer .

Note.- Implementation scope of the SWIM Access Point should be understood as flexible, depending on local design matters, local user requirements, native SWIM or any other factors.

2.3 INFORMATION MODEL

2.3.1 General

2.3.1.1 The information model covers aspects related to data representation in AMHS and SWIM as well as mapping of information and meta data.

2.3.2 AMHS

2.3.2.1 The AMHS/SWIM Gateway shall support reception of following classes of X.400 information objects:

a) message taking the form of

1) an interpersonal message (IPM); or

2) an interpersonal notification (IPN);

b) report; and

c) probe.

2.3.2.2 The AMHS/SWIM Gateway shall support generation of following classes of X.400 information objects:

a) message taking the form of

1) an interpersonal message; or

b) report.

Note.— The AMHS/SWIM Gateway does not generate X.400 information objects of class message taking the form of an interpersonal notification, or of X.400 information objects of class probe.

2.3.3 SWIM

2.3.3.1 The SWIM Component shall support the AMQP bare message conveying properties and application-properties.

2.3.4 Mapping

2.3.4.1 The Information Transfer and Control Unit shall determine fields of the AMQP bare message for conveyance of information from AMHS to SWIM in the following order:

a) from X.400 message attributes;

b) by default values given by configuration; or

c) by static values given by specifications.

2.3.4.2 The Information Transfer and Control Unit shall determine X.400 message attributes for conveyance of information from SWIM to AMHS in the following order:

a) from AMQP annotated message;

b) by default values given by configuration; or

c) by static values given by specifications.

2.4 SECURITY MODEL

2.4.1 General

2.4.1.1 The security model addresses security aspects of the AMHS/SWIM Gateway.

Note.— AMHS and SWIM provide different means for establishing security. This difference prevents from achieving end-to-end security throughout the full path from provider to consumer. However, the AMHS/SWIM Gateway can benefit from trust frameworks such as the European Aviation Common Public Key Infrastructure (EACP).

2.4.2 AMHS

2.4.2.1 Use of AMHS security services applies to communications between the AMHS/SWIM Gateway and direct AMHS users, taking either the role of an information provider (originator) or consumer (recipient).

2.4.2.2 The AMHS/SWIM Gateway should support the AMHS functional group AMHS security (AMHS SEC) as per ICAO Doc 9880 Part II.

2.4.2.3 The AMHS/SWIM Gateway should support the updated AMHS security requirements as per Working Paper 6 presented to 1st meeting of ICAO EUR AFS to SWIM Transition Task Force (AST TF/01 WP/06) [2].

2.4.2.4 The AMHS/SWIM Gateway shall provide the following security services in accordance with the general AMHS security policy, if AMHS SEC is supported:

a) message origin authentication; and

b) content integrity.

The AMHS/SWIM gateway may receive and process X.400 messages not complying with the AMHS SEC functional group depending on the local policy as specified in subsequent chapters 3 and 4.

2.4.3 SWIM

2.4.3.1 Use of security services in SWIM applies to communications between the AMHS/SWIM Gateway and the SWIM Technical Infrastructure.

2.4.3.2 The SWIM Component shall support in accordance with the SWIM Technical Infrastructure (TI) Yellow Profile following security services:

a) AMQP Transport Security Authentication;

b) Simple Authentication and Security Layer (SASL);

c) AMQP over TLS; and

d) Transport Layer Security (TLS).

2.5 MANAGEMENT MODEL

2.5.1 General

2.5.1.1 The management model covers aspects related to management.

2.5.2 AMHS

2.5.2.1 The AMHS Component shall support associations to at least one peer ATS Message Server (MTA) implementation.

2.5.2.2 The AMHS Component should support simultaneous associations per peer ATS Message Server (MTA) implementation.

2.5.2.3 The AMHS/SWIM Gateway shall provide its service only to authorised AMHS users taking either the role of an information provider (originator) or consumer (recipient).

2.5.2.4 The AMHS/SWIM Gateway shall perform long-term logging of all messages, reports and probes generated or received.

2.5.2.5 The AMHS/SWIM Gateway shall record all actions related to messages, reports and probes.

2.5.2.6 The AMHS/SWIM Gateway shall retain logged messages, reports and probes as well as related actions for a period of at least thirty days.

2.5.3 SWIM

2.5.3.1.1 The SWIM Component shall support connections to at least one SWIM Technical Infrastructure implementation.

2.5.3.1.2 The SWIM Component shall support at least one AMQP message queue per SWIM Technical Infrastructure implementation for conveyance of information from AMHS to SWIM.

2.5.3.2 The AMHS/SWIM Gateway shall provide its service only to authorised information providers and consumers.

2.5.3.3 The AMHS/SWIM Gateway shall perform logging of all AMQP messages provided or consumed.

2.5.3.4 The AMHS/SWIM Gateway shall record all actions related to AMQP messages provided or consumed.

2.5.3.5 The AMHS/SWIM Gateway shall retain logged AMQP messages as well as related actions for a period of at least thirty days.

2.6 NAMING AND ADDRESSING

2.6.1 Conveyance of information from AMHS to SWIM

2.6.1.1 In the AMHS to SWIM direction the AMHS/SWIM Gateway may work like a producer of information.

2.6.1.2 The SWIM Access Point shall provide the capability to determine target AMQP message queues from X.400 recipient addresses of a received X.400 message.

2.6.1.3 The SWIM Access Point may provide the capability to determine target AMQP message queues from X.400 message attributes apart from X.400 recipient addresses. Such capabilities may be based on mechanisms like filtering and routing of AMQP messages.

2.6.1.4 The SWIM Access Point may have the capability to subscribe to and provide information to SWIM information consumers.

2.6.1.5 The SWIM Access Point may have the capability to provide information using other MEPs.

2.6.2 Conveyance of information from SWIM to AMHS

2.6.2.1 In the SWIM to AMHS direction the AMHS/SWIM Gateway may be considered as a consumer of information.

2.6.2.2 The SWIM Access Point may have the capability to subscribe to and receive information provided by SWIM information providers.

2.6.2.3 The SWIM Access Point may have the capability to receive information using other MEPs.

2.6.2.4 The SWIM Access Point may provide mechanisms to determine AFTN addresses to be annotated on the AMQP messages that will be conveyed by the AMHS/SWIM Gateway.

2.6.2.5 The AMHS/SWIM Gateway shall determine the X.400 originator address of a generated X.400 message from fields of the AMQP annotated message.

2.6.2.6 The AMHS/SWIM Gateway shall apply its default X.400 originator address in case the originator address of a generated X.400 message cannot be determined by means given in this specification.

2.6.2.7 The AMHS/SWIM Gateway shall ensure that originator addresses of received X.400 messages have been authorised for use by the AMHS/SWIM Gateway.

2.6.2.8 The AMHS/SWIM Gateway shall determine one or more recipient addresses of a generated X.400 message from fields of the AMQP annotated message.

2.6.2.9 The AMHS/SWIM Gateway shall log the situation and report to the Control Position in case no recipient addresses of the X.400 message can be determined.

2.6.2.10 The AMHS/SWIM Gateway may provide for conveyance of information from SWIM to AMHS the capability to determine X.400 O/R recipient addresses from fields of the AMQP bare message.

2.6.3 Representation of AMHS users in SWIM

2.6.3.1 The AMHS/SWIM Gateway shall make use of AFTN addressee indicators for representation of AMHS users in SWIM.

2.6.3.2 For mapping of X.400 O/R addresses onto AFTN addressee indicators and vice versa the AMHS/SWIM Gateway shall apply the algorithms specified by ICAO Doc 9880 Part II [1].

2.7 LEVEL OF SUPPORT

2.7.1 AMHS

2.7.1.1 Due to the general nature of gateways the support of ATSMHS by the AMHS/SWIM Gateway has some limitations.

2.7.1.2 The subsequent table outlines the level of support by the AMHS/SWIM Gateway with regard to the ATSMHS Functional Groups and subsets defined by section 3.4 of ICAO Doc 9880, Part II [1].

Table 1. Level of ATSMHS support

ATSMHS subsets	AMHS to SWIM	SWIM to AMHS	Limitations
I. Basic ATSMHS (basic)	M	O	(1)
II. Basic + FTBP	M	M	(2)
III. Basic + IHE	M	O	(3)
IV. Basic + DIR	C.1	C.2	(1)
V. Basic + FTBP + IHE	M	M	(4)
VI. Basic + DIR + FTBP	C.1	C.1	(2)
VII. Basic + DIR + IHE	C.1	C.2	(3)
VIII. Basic + DIR +SEC	C.3	C.4	(1)
- Basic + FTBP + DIR + SEC	C.3	C.3	(2)
IX. Basic + IHE + DIR + SEC	C.3	C.4	(3)
X. Basic + IHE + DIR + FTBP	C.1	C.1	(4)
XI. Basic + IHE + DIR + FTBP + SEC	C.3	C.3	(4)

O Optional support
M Mandatory support
X No Support (excluded)
C.1 Conditional support; M if DIR is supported, X otherwise
C.2 Conditional support; O if DIR is supported, X otherwise
C.3 Conditional support, M if DIR and SEC are supported, X otherwise
C.4 Conditional support, O if DIR and SEC are supported, X otherwise
(1) Support is limited to one text body part.
(2) Support is limited to two body parts; one text body part comprising an ATS message header and one FTBP. The ATS message text in the text body part is discarded, if available.
(3) Support is limited to one text body part with the ATS message header being discarded, if available, respectively being absent/empty.
(4) Support is limited to one FTBP.

Note.— ICAO Doc 9880, Part II [1] does not consider the ATSMHS subset Basic + FTBP + DIR + SEC and there is no reference number for identification of the subset.

2.7.2 SWIM

2.7.2.1 This technical specification considers two service levels for the exchange of AMHS-related meta information with SWIM information producers and consumers:

a) AMHS-unaware

b) AMHS-aware

2.7.2.2 The AMHS/SWIM Gateway shall support the AMHS-unaware service level which limits the exchange of AMHS-related meta information with SWIM information providers and consumers to a minimum.

Note.— The AMHS-unaware service level is intended for SWIM information providers and consumer not being aware of the exchange of aeronautical information with AMHS users by means of the AMHS/SWIM Gateway.

2.7.2.3 The AMHS/SWIM Gateway may support the AMHS-aware service level which incorporates an extensive set of AMHS-related meta information in the exchange of aeronautical information with SWIM information producers and consumers.

Note.— The AMHS-aware service level is intended for SWIM information providers and consumers being aware of the exchange of aeronautical information with AMHS users by means of the AMHS/SWIM Gateway. Through AMHS-related meta information a SWIM information provider controls the behaviour of the AMHS/SWIM Gateway.

3 CONFIGURATIONS AND PARAMETERS

3.1 OVERVIEW

This section summarizes the different configurations parameters that the AMHS/SWIM Gateway shall allow to be configurable by the administrator.

3.2 GATEWAY CONVERSION DIRECTION

3.2.1 Conversion Direction

3.2.1.1 The "*Conversion Direction*" parameter provides a way to configure in which directions the AMHS/SWIM Gateway converts message.

3.2.1.2 These shall be the possible options for the parameter:

1. Allow only the conversion of AMHS messages to SWIM, and not from SWIM to AMHS.
2. Allow only the conversion of SWIM messages to AMHS, and not from AMHS to SWIM.
3. Allow both the conversion of AMHS messages to SWIM and from SWIM to AMHS. This shall be the default value.

3.3 MESSAGE CONSTRAINTS

3.3.1 Maximum message data size

3.3.1.1 The integer parameter "*Maximum message data size*" provides a way to configure a maximum size for both AMHS messages and SWIM messages.

3.3.1.2 AMHS Messages that have a payload larger than the configured maximum number of bytes shall not be converted to SWIM, as specified in 4.4.2.6

3.3.1.3 SWIM Messages that have a payload larger than the configured maximum number of bytes shall not be converted to AMHS, as specified in 4.5.1.8.

3.3.1.4 The absence of the parameter, or a value of zero, means that there is no maximum value. This is the default value.

3.3.2 Maximum message number of recipients

3.3.2.1 The integer parameter "*Maximum message number of recipients*" provides a way to configure a maximum number of recipients for AMHS messages.

3.3.2.2 AMHS Messages that have larger number of recipients than the configured maximum shall not be converted to SWIM, as specified in 4.4.2.7.

3.3.2.3 SWIM Messages that have larger number of recipients than the configured maximum shall not be converted to AMHS, as specified in 4.5.1.9.

3.3.2.4 The absence of the parameter, or a value of zero, means that there is no maximum value. This is the default value.

3.3.3 ATSMHS Service Level

3.3.3.1 The enumerated parameter "ATSMHS Service Level" provides a way to configure the type of AMHS encoding that the AMHS/SWIM Gateway will use in generation of AMHS messages.

3.3.3.2 These shall be the possible options for the parameter: “extended”, “basic”, “content-based”, and “recipients-based”.

3.3.3.3 When set to “extended”, then AMQP elements susceptible to being translated using extended and basic ATSMHS service level will be mapped to extended service level.

3.3.3.4 When set to “basic”, then AMQP elements susceptible to being translated using extended and basic ATSMHS service level will be mapped to basic service level. If an AMQP message with binary content is received, then it will be rejected.

3.3.3.5 When set to “content-based”, then, if the content-type element of the properties section is set to <application/octet-stream>, AMQP elements susceptible to being translated using extended and basic ATSMHS service level will be mapped to extended service level. Otherwise, AMQP fields susceptible to being translated using extended and basic ATSMHS service level will be mapped to basic service level.

3.3.3.6 When set to “recipients-based”, then, if all the recipients of the converted AMHS message support the extended ATSMHS, AMQP elements susceptible to being translated using extended and basic ATSMHS service level will be mapped to extended service level. Otherwise, AMQP fields susceptible to being translated using extended and basic ATSMHS service level will be mapped to basic service level.

3.4 AMHS SECURITY

3.4.1 The AMHS Security parameters control the setting of PKIs that the AMHS/SWIM Gateway requires to both generate signed AMHS messages and to validate the received signed AMHS messages.

3.4.2 AMHS Security Trusted Certificate Authorities

3.4.2.1 The certificate parameter “*AMHS Security Trusted Certificate Authorities*” is used to represent the certificates of the Certificate Authorities that are to be trusted when performing AMHS Security validations. This parameter shall be optional. If absent, the AMHS Security features shall not be enabled.

3.4.3 AMHS/SWIM Gateway own Certificate file

3.4.3.1 The certificate parameter “*AMHS/SWIM Gateway own Certificate file*” is used by the AMHS/SWIM Gateway to sign AMHS messages. This parameter shall the optional. If absent, the AMHS Security features shall not be enabled.

3.4.4 AMHS/SWIM Gateway own Certificate passphrase

3.4.4.1 The String parameter “*AMHS/SWIM Gateway own Certificate passphrase*” is used as a passphrase that is often required to use the AMHS/SWIM Gateway’s own certificate. This parameter shall be optional.

3.4.5 Digitally sign all AMHS messages

3.4.5.1 The Boolean parameter “*Digitally sign all AMHS messages*” is used to control the generation of AMHS signatures

3.4.5.2 If the value is True, all AMHS messages created by the AMHS/SWIM Gateway shall be signed according to the AMHS SEC Functional Group.

3.4.5.3 The default value shall be False.

3.4.6 Action to take on reception of unsigned AMHS messages

3.4.6.1 The parameter “*Action to take on reception of unsigned AMHS messages*” is used to decide how to process the reception of an AMHS message that is not digitally signed.

3.4.6.2 These shall be the possible options for the parameter:

1. Convert the message to SWIM. This shall be the default value.
2. Reject the message with an NDR, log the incident and move the message to the Control Position.
3. Convert the message to SWIM and mark it as "*Unsigned*"

3.4.7 Action to take on reception of signed AMHS messages that fails validation

3.4.7.1 The parameter "*Action to take on reception of signed AMHS messages that fails validation*" is used to decide how to process the reception of an AMHS message that is digitally signed but the validation fails.

3.4.7.2 These shall be the possible options for the parameter:

1. Reject the message with an NDR, log the incident and move the message to the Control Position. This shall be the default value.
2. Convert the message to SWIM and mark it as "*Invalid Signature*"

3.5 AUTHORIZATION

3.5.1 The Authorization parameters control which messages are deemed to be authorized to be converted from one domain to the other.

3.5.2 By default, there shall be no authorization restrictions, all messages that can be converted by the AMHS/SWIM Gateway shall be converted.

3.5.3 Authorized AMHS Users

3.5.3.1 The "*Authorized AMHS Users*" parameter controls which AMHS users are allowed to use the AMHS/SWIM Gateway. In this context, AMHS users are defined by the originator O/R address of a message.

3.5.3.2 These shall be the possible options for the parameter:

1. All AMHS users that can reach the AMHS/SWIM Gateway are authorized. This is the default value.
2. All AMHS users whose O/R addresses match a set of authorized PRMDs are authorized.
3. Only AMHS users whose O/R addresses belong to a set of authorized O/R addresses are authorized

3.5.3.3 The configuration of the authorized user is beyond the scope of this specification.

3.5.4 Authorized SWIM Users and SWIM Enterprises

3.5.4.1 The "*Authorized SWIM Users*" parameter controls which SWIM users are allowed to use the AMHS/SWIM Gateway.

3.5.4.2 These shall be the possible options for the parameter:

1. All SWIM users and SWIM Enterprises that can reach the AMHS/SWIM Gateway are authorized. This is the default value.
2. Only the SWIM users that belong to a set of authorized SWIM users are authorized.
3. Only the SWIM Enterprises that belong to a set of authorized SWIM Enterprises are authorized.

3.5.4.3 The configuration of the authorized user is beyond the scope of this specification.

3.6 DIRECTORY SERVICES

3.6.1 Directory Services (an X.500 DSA) can be optionally used by the AMHS/SWIM Gateway to perform the conversion of AFTN addresses to AMHS and vice-versa. One such example of a Directory Service is EDS.

3.6.2 The DSA parameters control the configuration of the DSA and the ICAO MD Registry data.

3.6.3 Directory Service Presentation Address

3.6.3.1 The “Directory Service Presentation Address “ parameter is the Presentation Address of the DSA, in String format.

3.6.3.2 The absence of this parameter indicates that the Directory Services will not be used by the AMHS/SWIM Gateway.

3.6.4 Directory Service User DN

3.6.4.1 The directory-name parameter “*Directory Service User DN*” is used to represent the DN of the DSA user, in String format.

3.6.4.2 The “*Directory Service User DN*” parameter shall be used by the AMHS/SWIM Gateway to attempt to perform a Simple Bind to the DSA.

3.6.4.3 In absence of this parameter, the AMHS/SWIM Gateway may attempt an anonymous bind to the DSA.

3.6.5 Directory Service User password

3.6.5.1 The String parameter “*Directory Service User Password*” is used to represent the password associated to the Directory Service User DN.

3.6.5.2 In the absence of this parameter, the AMHS/SWIM Gateway may attempt an anonymous bind to the DSA.

3.6.5.3 When this parameter is set, the AMHS/SWIM Gateway shall attempt a simple bind to the DSA using the parameter “*Directory Service User DN*” and the parameter “*Directory Service User Password*”.

3.6.6 ICAO MD Registry DN

3.6.6.1 The directory-name parameter “*ICAO MD Registry DN*” is used to represent the DN of the ICAO MD Registry of the place in the DIT where the mapping information resides.

3.6.6.2 If the value is empty, the Directory Services will not be used by the AMHS/SWIM Gateway.

3.6.6.3 If the value is set, the DN shall be used as the place in the DIT from where to obtain the data for the address conversion.

4 AMHS/SWIM GATEWAY SPECIFICATION

4.1 GENERAL

4.1.1 An AMHS/SWIM Gateway shall provide for interworking between the SWIM and the AMHS.

4.1.2 An AMHS/SWIM Gateway shall consist of the following logical components:

c) AMHS Component;

d) SWIM Component;

e) Information Transfer and Control Unit (ITCU);

f) Control Position; and

g) Directory User Agent (DUA) (optional).

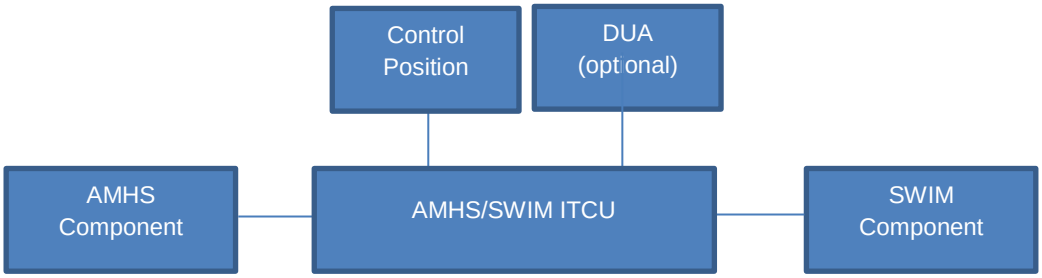


Figure 2. AMHS/SWIM Gateway logical components

4.1.3 This division into logical components is a convenient way of specifying functions of a gateway. There is no requirement for an AMHS/SWIM Gateway to be implemented according to this structure.

4.1.4 An AMHS/SWIM Gateway shall be able to perform actions upon receipt of any category of AMHS information object by its AMHS component.

4.1.5 An AMHS/SWIM Gateway shall be able to perform actions upon receipt of any type of AMQP message by its SWIM component.

4.1.6 An AMHS/SWIM Gateway shall support basic and extended ATSMHS service level from both directions, AMHS to SWIM and SWIM to AMHS.

4.2 GATEWAY COMPONENTS

4.2.1 AMHS component

4.2.1.1 The AMHS component shall allow the AMHS/SWIM Gateway to function as an end system on the ATN.

4.2.1.2 The AMHS component shall handle the interface to AMHS and provide an interface to the ITCU.

4.2.1.3 The AMHS component consists of an X.400 Message Transfer Agent (MTA) exchanging messages with the AMHS using the X.400 Message Transfer Protocol (P1). An implementation of the AMHS/SWIM Gateway may incorporate an MTA or share an already existing MTA. MTA implementation shall comply with the service level specifications included in ICAO Doc 9880 Part II [1].

4.2.2 SWIM component

4.2.2.1 An implementation of the AMHS/SWIM Gateway may incorporate a SWIM Access Point or share capabilities of an already existing SWIM infrastructure.

4.2.2.2 The SWIM component shall perform long-term retention of the heading, address and origin parts of all information objects received from the SWIM, with the message receipt-time and the action taken thereon, for a period of at least thirty days.

4.2.2.3 The SWIM component shall perform long-term retention of all SWIM information objects that it generates, in their entirety, for a period of at least thirty days.

4.2.2.4 The SWIM component shall perform long-term retention of the heading, address and origin parts of all messages received from the ITCU and the action taken thereon for a period of at least thirty days.

4.2.2.5 If, for any reason, the ITCU is unable to accept SWIM information objects passed by the SWIM component, the SWIM component shall handle this situation notifying to the Control Position. The error condition shall be logged and reported to a Control Position.

4.2.3 Information transfer and control unit (ITCU)

4.2.3.1 The ITCU in an AMHS/SWIM Gateway shall provide a bi-directional conversion facility between the AMHS component and the SWIM component, consisting of:

h) a set of general functions as specified in 4.3; and

i) AMHS/SWIM conversion functions specified in 4.4 for the AMHS to SWIM conversion and in 4.5 for the SWIM to AMHS conversion, respectively.

4.2.3.2 The ITCU in an AMHS/SWIM Gateway shall pass all AMHS information objects which it constructs in application of 4.5 (SWIM to AMHS) to the AMHS component of the gateway, for further conveyance in the AMHS.

4.2.3.3 The ITCU in an AMHS/SWIM Gateway shall pass all SWIM information objects which it constructs in application of 4.4 (AMHS to SWIM) to the SWIM component of the AMHS/SWIM Gateway, for further conveyance in SWIM.

4.2.3.4 The ITCU shall handle the information objects specified in Chapter 2.

4.2.3.5 If the ITCU receives any report, the ITCU shall handle this situation notifying to a Control Position. The error condition shall be logged and reported to a Control Position.

4.2.3.6 The ITCU shall ensure that all the AMHS information objects which it constructs comply with Section 7 (for IPMs) of ISO/IEC 10021-7 [6], complemented by the additional requirements included in Chapter 2, and with the Section 12.2.1.1 of ISO/IEC 10021-4 [5] (for messages) and Section 12.2.1.3 of ISO/IEC 10021-4 [5] (for reports).

4.2.3.7 If the DUA component is supported, the ITCU of an AMHS/SWIM Gateway shall interface with the DUA component of the gateway as detailed in 4.2.7.2.

4.2.3.8 For the generation of AMHS messages and reports and the processing of received AMHS messages, probes and reports, the Information Transfer and Control Unit shall have the capability to interpret the semantics and to perform actions related to the ISO/IEC 10021 elements of service which are part of the basic requirements of the MT service as specified in ISO/IEC ISP 12062-3:1995 (or a later edition).

4.2.4 Interface between the AMHS component and the ITCU

4.2.4.1 The AMHS component shall exchange information objects with the ITCU via its MTA transfer port as specified in ISO/IEC 10021-4, Section 12.2 [5].

4.2.4.2 The AMHS component shall invoke the message-transfer, report-transfer and probe-transfer abstract operations, respectively, to pass AMHS messages, reports and probes to the ITCU.

4.2.4.3 The ITCU shall invoke the message-transfer and report-transfer abstract operations, respectively, to pass AMHS messages and reports to the AMHS component.

4.2.5 Interface between the SWIM component and the ITCU

4.2.5.1 The SWIM component shall exchange SWIM information objects with the ITCU using the message queue/s defined between them.

4.2.5.2 A SWIM information object passed by the SWIM component to the ITCU shall be formatted as an AMQP message using the application-properties section to include the relevant aeronautical information according to 4.5.2.

4.2.5.3 The SWIM component shall return to the ITCU, as the result of the transfer operation described in 4.4, the message-identifier (see 4.5.2.3), constructed by the SWIM component for the transmission of the message over the SWIM environment.

4.2.6 AMHS/SWIM Gateway Control Position

4.2.6.1 The AMHS/SWIM Gateway Control Position shall be used as the place where errors which occurred in the AMHS/SWIM Gateway and certain non-deliveries which occurred in the AMHS are reported for appropriate action.

4.2.6.2 The appropriate action to be undertaken on reporting of an error or a non-delivery to an AMHS/SWIM Gateway Control Position shall be either:

a) a matter of policy which is local to the management domain operating the AMHS/SWIM Gateway; or

b) subject to multilateral agreements.

For some categories of error situations, this manual specifies the actions to be taken. The specified actions aim to minimize the assistance of the Control Position. However, it may be a matter of policy local to the AMHS management domain operating the AMHS/SWIM Gateway to try to reduce the occurrence of information objects rejection with the assistance of the Control Position.

4.2.7 DUA component

4.2.7.1 Directory User Agent component is optional.

4.2.7.2 If the DUA component is supported, the ITCU of the AMHS/SWIM Gateway shall interface with the DUA component of the gateway, for example to:

a) determine the level of ATSMHS supported by the intended recipients of the AMHS IPMs which it constructs; or

b) allow retrieval of security information from the ATN directory; or

c) allow retrieval of address information from the ATN directory for the purpose of address conversion, if the DUA component is used for this purpose.

Note. If the implementation of the AMHS/SWIM Gateway does not use a DUA component it may incorporate any other mechanism for retrieval of address information for the purpose of address conversion.

4.2.7.3 The DUA component in an AMHS/SWIM Gateway shall comply with the DUA specification as included in ICAO Doc 9880 Part IV.

Note. The interface between the DUA component and other gateway components (AMHS component, ITCU, Control Position) is a matter of implementation outside of the scope of this manual.

4.3 GENERAL FUNCTIONS

4.3.1 Traffic logging

4.3.1.1 The ITCU shall perform long-term logging as specified in this section for a period of at least thirty days, of information related to the following exchanges of information objects with the AMHS component and the SWIM component:

a) AMHS message transfer out (to the AMHS component);

b) AMHS report transfer out (to the AMHS component);

c) AMHS message transfer in (from the AMHS component);

d) AMHS report transfer in (from the AMHS component);

e) AMQP message conveyance out (to the SWIM component);

f) AMQP message conveyance in (from the SWIM component);

4.3.1.2 For the long-term logging of information related to an AMHS message transfer in and AMQP message conveyance out, the following parameters relating to the messages shall be logged by the ITCU:

a) input MTS-Identifier;

b) IPM-identifier, if any;

c) common-fields and either receipt-fields or non-receipt-fields of the IPN, if any;

d) action taken thereon (reject with non-delivery-reason-code and non-delivery-diagnostic-code, convert as AMQP message)

e) event date/time;

f) message-identifier (see 4.5.2.3) of AMQP message if returned by the SWIM component.

4.3.1.3 For the long-term logging of information related to AMQP message conveyance in and AMHS message transfer out, the following parameters relating to the messages shall be logged by the ITCU:

a) identification of AMQP Message, if any;

b) originator address;

c) action taken thereon (reject with rejection cause, convert as IPM);

d) event date/time;

e) MTS-identifier, if any; and

f) IPM-identifier, if any.

4.3.1.4 For the long-term logging of information related to an AMHS message report in the following parameters relating to the report shall be logged by the ITCU:

a) report-identifier (if report in);

b) subject-mts-identifier (if report in);

c) action taken thereon if report;

d) event date/time;

4.3.2 Address look-up tables

The address look-up tables specified in ICAO Doc 9880 Part II [1] paragraph 4.3.2 for the AFTN/AMHS Gateway shall be used by the AMHS/SWIM Gateway for address conversion.

4.4 AMHS TO SWIM CONVERSION

Note-. This section specifies the actions to be performed by an AMHS/SWIM Gateway upon reception of messages from AMHS for conveyance in SWIM.

4.4.1 Control Function

4.4.1.1 Upon reception by the ITCU of an AMHS message passed by the AMHS component, the received message shall be processed in one of the following manners, depending on the abstract-value of the content-type element in the message transfer envelope:

a) processing as specified in 4.4.1.2 if the abstract-value of the element is “interpersonal-messaging-1988”; or

b) if the abstract-value of the element is not “interpersonal-messaging-1988”:

1) rejection of the message for all the message recipients for which the responsibility element of the per-recipient-indicators has the abstract-value “responsible”; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-type-not-supported” for the non-delivery-diagnostic-code.

4.4.1.1.1 The message recipients towards which the ITCU conveys the message are those identified by a recipient-name element in the per-recipient-fields element of the message transfer envelope, and for which the responsibility element in the per-recipient-indicators element has the abstract-value “responsible”. In this section, the term “message recipient” refers to such a recipient.

4.4.1.2 Upon reception by the ITCU of an AMHS message whose content-type is “interpersonal-messaging-1988” passed from the AMHS component, the message shall be processed for conversion into an AMQP message in one of two mutually exclusive manners, depending on the nature of the content:

a) processing for conversion into an AMQP message as specified in 4.4.2.1, if the content is an IPM;

b) unsuccessful termination of the procedure if the content is other than IPM:

1) logging of the situation and reporting to a control position; and

2) storage of the message for appropriate processing at the control position

4.4.1.3 Upon reception by the ITCU of an AMHS probe passed by the AMHS component, the received probe shall be processed in one of the following manners, depending on the abstract-value of the content-type element in the probe transfer envelope:

a) processing for conveyance test as specified in 4.4.6 if the abstract-value of the element is “interpersonal-messaging-1988”; or

b) if the abstract-value of the element is not “interpersonal-messaging-1988”:

1) rejection of the probe for all the probe recipients for which the responsibility element of the per-recipient-indicators had the abstract-value “responsible”; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-type-not-supported” for the non-delivery-diagnostic-code.

4.4.1.4 Upon completion by the ITCU of the processing specified in 4.4.1.1 to 4.4.1.2 above, the resulting AMQP message, if any, shall be passed to the SWIM component, for conveyance over the SWIM.

4.4.1.5 If the generation of a report is required in relation with the result of the processing specified in 4.4.1.1 to 4.4.1.2 above, due to message rejection by the ITCU, an appropriate AMHS report shall be generated as specified in 4.4.8.

4.4.2 Initial processing of AMHS messages

4.4.2.1 Upon reception by the ITCU of an IPM, the received message shall be processed in one of the following manners, depending on the abstract-value of the current encoded-information-types, determined as either the abstract-value of the latest converted-encoded-information-types, if existing, in the trace information element, or as the abstract-value of the original-encoded-information-types element if the previous does not exist:

a) Processing as specified in 4.4.2.2 if the abstract-value of the current encoded-information-types is “unspecified” or includes exclusively one or several of the following values

1) Basic “ia5-text”

2) externally-defined “ia5-text”, which corresponds to OID {id-eit-ia5-text} as specified in ISO/IEC 10021-4 Annex A [5];

3) OID {id-cs-eit-authority 1}, identifying the C0 control character set ISO-IR 0, as described in ISO/IEC 10021-7 [6];

4) OID {id-cs-eit-authority 2}, identifying the G0 graphical character set ISO-IR 2 (known as International Reference Version of ISO 646), as described in ISO/IEC 10021-7 [6];

5) OID {id-cs-eit-authority 6}, identifying the G0 graphical character set ISO-IR 6 (known as US Version of ISO 646), as described in ISO/IEC 10021-7 [6]; or

6) OID {id-cs-eit-authority 100}, identifying the G1 graphical character set ISO-IR 100 (ISO 8859-1, Latin Alphabet No. 1), as described in ISO/IEC 10021-7 [6];

b) if the abstract-value includes any value different from the values indicated in a) above:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “encoded-information-types-unsupported” for the non-delivery-diagnostic-code.

4.4.2.2 A message which was not rejected as the result of 4.4.2.1 shall be processed in one of the following manners:

a) Processing as specified in 4.4.2.3 if there is a single body part in the IPM body; or

b) Processing as specified in 4.4.2.4 if there are two body parts in the IPM body; or

c) if there are more than two body parts in the IPM body:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-syntax-error” for the non-delivery-diagnostic-code; and

iii. “unable to convert to AMQP due to multiple body parts” for the supplementary-information

4.4.2.3 A message which was not rejected as the result of 4.4.2.2 shall be processed in one of the following manners:

a) Processing as specified in 4.4.2.5 if the body part type is one of the following:

1) a basic body part type “ia5-text”;

2) a standard extended body part type “ia5-text-body-part”;

3) a standard extended body part type “general-text-body-part” of which the character set description is Basic (ISO 646); or

4) a standard extended body part type “general-text-body-part” of which the character set description is Basic-1 (ISO 8859-1) ; or

5) a standard extended body part type “file-transfer-body part”

b) if the body part type is different from the body part types body part types 1) to 5) under a) above:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-syntax-error” for the non-delivery-diagnostic-code

iii. “unable to convert to AMQP due to unsupported body part type” for the supplementary-information

4.4.2.4 A message which was not rejected as the result of 4.4.2.2 shall be processed in one of the following manners:

a) Processing as specified in 4.4.3.5 if one of the body part types is a standard extended body part type “file-transfer-bodypart” and the other is a basic body part type “ia5-text”.

Note.- the ATS-Message-Text of the text body part will be ignored.

b) Otherwise:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-syntax-error” for the non-delivery-diagnostic-code

iii. “unable to convert to AMQP due to unsupported body part types” for the supplementary-information

4.4.2.5 A message which was not rejected as the result of 4.4.2.3 or 4.4.2.4 shall be processed in one of the following manners:

a) Processing as specified in 4.4.2.6 if the text element in the text body part includes an ATS message header as specified in ICAO Doc 9880 Part II [1] paragraph 3.3.3.3, or if the IPM includes IPM heading fields and recipient extensions as specified in ICAO Doc 9880 Part II [1] paragraph 3.3.4; or:

Note.- If both elements, ATS-Message-Header and IPM heading fields and recipient extensions are present, then IPM heading fields and recipient extensions shall take precedence.

b) if the text does not include an ATS message header as specified in ICAO Doc 9880 Part II [1] paragraph 3.3.3 and the IPM does not include IPM heading fields and recipient extensions as specified in ICAO Doc 9880 Part II [1] paragraph 3.3.4:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-syntax-error” for the non-delivery-diagnostic-code; and

iii. “unable to convert to AMQP due to ATS-message-Header or Heading Fields syntax error” for the supplementary-information

Note.- ICAO Doc 9880 Part II [1] paragraphs 4.5.2.1.5.1 and 4.5.2.1.5.1 here apply as well.

4.4.2.6 A message which was not rejected as the result of 4.4.2.5 shall be processed in one of the following mutually exclusive manners:

a) Processing as specified in 4.4.2.7 if the size of the payload in bytes of the AMHS message does not exceed the maximum value specified in the AMHS/SWIM gateway’s configuration parameter “Maximum message data size”;

b) If the size of the payload in bytes of the AMHS message exceeds the maximum value in the AMHS/SWIM gateway’s configuration parameter “Maximum message data size”:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-too-long” for the non-delivery-diagnostic-code; and

iii. “unable to convert to AMQP due to the content size” for the supplementary-information"

4.4.2.7 A message which was not rejected as the result of 4.4.2.6 shall be processed in one of the following mutually exclusive manners:

a) Processing as specified in 4.4.3 to 4.4.5 if the number of message recipients towards which the ITCU is responsible for conveyance of the message does not exceed the maximum value defined for the SWIM component in the AMHS/SWIM gateway’s configuration parameter “Maximum message number of recipients”;

b) if this number exceeds the maximum value defined for the SWIM component:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-too-long” for the non-delivery-diagnostic-code; and

iii. “unable to convert to AMQP due to number of recipients” for the supplementary-information

4.4.3 Generation of AMQP message

4.4.3.1 Each message resulting from the processing specified in 4.4.2 shall be converted by the ITCU into an AMQP message composed of elements as specified in Table 2 AMQP message generation. Those elements, which are classified as “G”, “G1” or “G2” in the column “action”, shall be generated according to column “Details”. Elements which are classified as “T” or “T1” in the column “Action” shall be converted from the AMHS parameter specified in the column “AMHS original property” and according to the specification in the provision referred to in the column “Details”.

Table 2. AMQP message generation

I	Element	Action	AMHS original property	Details
Header	durable	G	-	See 4.4.3.2.1
Header	priority	T	X.400 priority (envelope) or ATS-message-priority or precedence	See 4.4.3.2.2
Header	ttl	G2	-	See 4.4.3.2.3
Header	first-acquirer	X	-	
Header	delivery-count	X	-	
delivery annotations		X	-	
message annotations		X	-	
properties	message-id	G	-	See 4.4.3.3.1
properties	user-id	X	-	
properties	To	G	-	See 4.4.3.3.2
properties	subject	X	-	
properties	reply-to	X	-	
properties	correlation-id	X	-	
properties	content-type	G	-	See 4.4.3.3.3
properties	content-encoding	D	-	See 4.4.3.3.4
properties	absolute-expiry-time	X	-	
properties	creation-time	G	-	See 4.4.3.3.5
properties	group-id	X	-	
properties	group-sequence	X	-	
properties	reply-to-group-id	X	-	
application properties	amhs_ipm_id	T	IPM identifier	See 4.4.3.4.1
application properties	amhs_ftbp_file_name	T1	FTBP- incomplete-pathname	See 4.4.3.4.2
application properties	amhs_ftbp_object_size	T1	FTBP- actual-values	See 4.4.3.4.2
application properties	amhs_ftbp_last_mod	T1	FTBP-date-and-time-of-last-modification	See 4.4.3.4.2
application properties	amhs_ats_pri	T	ATS-message-priority OR precedence	See 4.4.3.4.3

application properties	amhs_recipients	T	Recipient-name of per-recipient-fields (Envelope)	See 4.4.3.4.4
application properties	amhs_ats_ft	T	ATS-message-filing-time OR Authorization-time (IPM heading)	See 4.4.3.4.5
application properties	amhs_ats_ohi	T1	ATS-message-Optional-Heading-Info OR originators-reference (IPM heading)	See 4.4.3.4.6
application properties	amhs-originator	T	originator-name (envelope)	See 4.4.3.4.7
application properties	amhs-subject	T1	Subject (IPM heading)	See 4.4.3.4.8
application properties	amhs_bodypart_type	T	Body part type	See 4.4.3.4.9
application properties	amhs_content_encoding	T1	Character set	See 4.4.3.4.9
application properties	amhs_message_signed	T1		See4.4.3.4.10
application properties	swim_compression	G1	Used for compression	See 4.4.3.4.11
application data	data	G2	FTBP data	See 4.4.3.5.1
application data	amqp-sequence	D	-	
application data	amqp-value	G2	ATS-message-text	See 4.4.3.5.2
footer		D	-	
	M = mandatory support O = optional support - = out of scope or not applicable G = generated G1 = optionally generated G2 = conditionally generated D = discarded X = excluded T = translated T1 = conditionally translated (See 1)			

Note. Application properties use snake case notation because the use of '-' in the name of properties used by JMS APIs could be restricted.

4.4.3.2 Header

4.4.3.2.1 Durable

4.4.3.2.1.1 This element shall be generated as “true”.

4.4.3.2.2 Priority

4.4.3.2.2.1 The value of the priority element of the header of the converted AMQP message shall be mapped and converted from:

a) the precedence element in the recipient-extensions in any of the recipient-specifier elements included in the IPM, in compliance with the mapping specified in Table 3 if this element is present in at least one of the recipient-specifier elements included in the IPM; or

b) the value of the priority-indicator of the ATS-message-priority element of the AMHS message, in compliance with the mapping specified in Table 3 if this element is present

Note. The default AMQP priority is 4

Table 3. ATS Priority to AMQP Priority conversion

ATS-message-priority	IPM precedence	AMQP Priority
SS	107	6
DD	71	5
FF	57	4
GG	28	3
KK	14	2

4.4.3.2.3 ttl

4.4.3.2.3.1 Generate conditionally. It shall be determined from the X.400 latest-delivery-time, if available. Otherwise, property is absent.

4.4.3.3 Message properties

4.4.3.3.1 message-id

4.4.3.3.1.1 Globally unique message identifier. This element shall be:

a) generated by the SWIM component rather than by the ITCU; and

b) returned to the ITCU as the result of the operation transferring the generated AMQP message from the ITCU to the SWIM component

4.4.3.3.2 to

4.4.3.3.2.1 This element contains destination queue or topic. This element shall be generated by the SWIM component using the destination queue or topic in the message broker.

4.4.3.3.3 content-type

4.4.3.3.3.1 This element shall have either of the two following values:

<text/plain; charset="utf-8”>

<application/octet-stream>

4.4.3.3.3.2 Different body part types will be mapped following mapping specified in additional application properties. See 4.4.3.4.

4.4.3.3.4 content-encoding

4.4.3.3.4.1 It is primarily used to allow a document to be compressed without losing the identity of its underlying content type. Since not all the implementations of the AMQP clients can change this value, the recommendation at generation time to compress content is to use application property swim_compression with value “gzip” and compress/decompress content at application level. See 4.4.3.4.11

4.4.3.3.5 creation-time

4.4.3.3.5.1 This element shall be generated by the SWIM component with the time when the message is converted to AMQP.

4.4.3.4 Application properties

4.4.3.4.1 amhs_ipm_id

4.4.3.4.1.1 This property shall contain the IPM Identifier.

4.4.3.4.2 amhs_ftbp_file_name, amhs_ftbp_object_size, amhs_ftbp_last_mod

4.4.3.4.2.1 These elements will only be filled in case the AMHS message contains a FTBP. All of them are optional.

4.4.3.4.2.2 The SWIM application properties related to message file properties are translated in accordance with file transfer parameters as shown in Table 4.

Table 4. SWIM file related properties

SWIM-application	Parameter in FTBP
amhs_ftbp_file_name	incomplete-pathname
amhs_ftbp_object_size	actual-values (bytes)
amhs_ftbp_last_mod	date-and-time-of-last-modification (YYYYMMDDhhmmssZ or YYYYMMDDhhmmss+0000)

4.4.3.4.3 amhs_ats_pri

4.4.3.4.3.1 The value of the element of the application property amhs_ats_pri shall be mapped and converted from:

a) the highest precedence element of the recipient-extensions of the recipient-specifier elements included in the IPM, in compliance with the mapping specified in Table 5 if this element is present in at least one of the RecipientSpecifier included in the IPM; or

b) the value of the priority-indicator of the ATS-message-priority element of the AMHS message, in compliance with the mapping specified in Table 4 if this element is present;

Table 5. amhs_ats_pri ATS-message-priority and IPM precedence equivalency

IPM precedence	ATS-message-priority	amhs_ats_pri

107	SS	SS
71	DD	DD
57	FF	FF
28	GG	GG
14	KK	KK

4.4.3.4.4 amhs_recipients

4.4.3.4.4.1 This element shall be composed by the different entries of the recipient-name in each of the per-recipient-fields that have the responsibility element set to “responsible”. It will contain message destinations (AFTN addresses) separated by “,”. The AFTN addresses shall be converted from an MF-address as specified in ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.7.

4.4.3.4.4.2 The use of CC recipients and BCC recipients should be avoided. If these elements are present in an AMHS IPM, they shall be handled as primary recipients.

4.4.3.4.5 amhs_ats_ft

4.4.3.4.5.1 This element shall be mapped from ATS-filing-time if the message is in Basic ATSMHS service level or with Authorization-time if it is extended. Both dates must be converted to format: DDhhmm

4.4.3.4.6 amhs_ats_ohi

4.4.3.4.6.1 This element shall be mapped from originators-reference if the message uses the extended ATSMHS service level or from the ATS-message-Optional-Heading-Info if it issues the basic ATSMHS service level.

4.4.3.4.7 amhs-originator

4.4.3.4.7.1 It is the message originator AFTN address (8 letters). It shall be mapped from the envelope in alignment with recipient addresses. The value of amhs-originator (AFTN address) shall be converted from an MF-address as specified in ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.6.

4.4.3.4.8 amhs-subject

4.4.3.4.8.1 This element shall be mapped from Subject (IPM heading) element.

4.4.3.4.9 amhs_bodypart_type, amhs_content_encoding

4.4.3.4.9.1 These elements will be mapped from AMHS body part types and character sets using the following table:

Table 6. AMHS body part types translation to SWIM

AMHS Body part type	Repertoire	AMQP Message content-type	amhs_bodypart_type	amhs_content_encoding
ia5-text	ia5	<text/plain; charset="utf-8”>	ia5-text	IA5
ia5-text-body-part	ia5	<text/plain; charset="utf-8”>	ia5-text-body-part	IA5
general-text-body-part	Basic (ISO-646)	<text/plain; charset="utf-8”>	general-text-body-part	ISO-646
general-text-body-part	Basic-1 (ISO-8859-1)	<text/plain; charset="utf-8”>	general-text-body-part	ISO-8859-1
file-transfer-body-part	-	<application/octet-stream>	file-transfer-body-part	-

4.4.3.4.9.2 Upon reception of a message with two body parts, one file-transfer-body part and one text body part, the extended body part shall be conveyed as described in this table and the text body part type shall be ignored.

4.4.3.4.10 amhs_message_signed

4.4.3.4.10.1 This element is used to describe if the original AMHS message was signed.

4.4.3.4.10.2 The values of this parameter are determined as the result of the enforcement of the AMHS security policy (see 4.4.5.1 and 0)

4.4.3.4.10.3 Valid values are:

a) signed

b) unsigned

c) invalid-signature

4.4.3.4.11 swim_compression

4.4.3.4.11.1 Used to denote that message content is compressed at the application level. Note that not all clients can compress messages. The brokers shall detect this issue and compress or decompress messages for any client. On this situation, compression at the application level could be an alternative (using our own application property). Expected value is “gzip”. Other values should be bilaterally-defined.

4.4.3.5 Application Data

4.4.3.5.1 data

4.4.3.5.1.1 For messages that contain a FTBP, the data of the FTBP shall be used. See Table 6 for encoding information.

4.4.3.5.2 amqp-value

4.4.3.5.2.1 If the message contains an ia5-text, or an ia5-text-body-part or a general-text-body-part this element shall contain the ATS-message-text.

4.4.4 Use of IPM elements

4.4.4.1 Each of the elements of an IPM in an AMHS message to be converted into an AMQP message by the ITCU shall be processed as specified in the column “Action” of Table 7. The elements of the IPM shall be used according to the specification in the provision referred to in the column “Mapping”.

4.4.4.2 All body part types other than basic “ia5-text”, extended “ia5-text-body-part”, extended “general-text-body-part” and “file-transfer-body-part” are excluded as the result of 4.4.2.3.

4.4.4.3 This body part type may be either excluded or translated, depending on whether or not it is a standard extended body part type, and if yes, depending on the type of extended body part type, as specified in Part 4 of the Table 7 and as the result of 4.4.2.3.

4.4.4.4 If the priority-indicator of a received AMHS message has the value “SS” and if the responsibility element of the corresponding per-recipient-fields of the message transfer envelope has the value “responsible”, then this situation shall be logged and reported to a control position for appropriate action.

4.4.4.5 The components of a general-text body part shall be used as follows for the conversion of the IPM body into the text of the AMQP message:

a) the parameters component identifies the character set used for the message, as specified in ISO/IEC 10021-7, B.2 [6]; and

b) the data component of a general-text body part is used for the generation of the converted AMQP message as specified in Part 6 of Table 7.

Table 7. Use of IPM elements

Ref	Element	Reception Basic / extended ATSMHS Support	Action	Mapping
Part 1: AMH21/A.1.1 Supported information objects				
1	Interpersonal message (IPM)	M	T	see Part 1/1.1 and 1.2
1.1	heading	M	T	see Part 2
1.2	body	M	T	see Part 3
2	Interpersonal notification (IPN)	M	-	out of the scope of this provision
Part 2: AMH21/A.1.2 IPM heading fields				
1	this-IPM	M	D	-
2	originator	M	D	-
3	authorizing-users	M	D	-
4	primary-recipients	M	D	see Part 5/1
5	copy-recipients	M	D	see Part 5/1
6	blind-copy-recipients	M	D	see Part 5/1
7	replied-to-IPM	M	D	-
8	obsoleted-IPMs	M	D	-
9	related-IPMs	M	D	-
10	subject	M	T	see 4.4.3.4.8
11	expiry-time	M	D	-
12	reply-time	M	D	-
13	reply-recipients	M	D	-
14	importance	M	D	-
15	sensitivity	M	D	-
16	auto-forwarded	M	D	-
17	extensions	M	D	-
17.1	incomplete-copy	M	D	-
17.2	languages	M	D	-
17.3	auto-submitted	I	D	-
17.4*	body-part-signatures	O	D	-
17.5*	ipm-security-label	O	D	-
17.6*	authorization-time	M	T1	see 4.4.3.4.5
17.7*	circulation-list-recipients	M	D	-

17.8*	distribution-codes	M	D	-
17.9*	extended-subject	M	D	-
17.10*	information-category	M	D	-
17.11*	manual-handling-instructions	M	D	-
17.12*	originators-reference	M	T1	See 4.4.3.4.6
17.13*	precedence-policy-identifier	M	D	-
Part 3: AMH21/A.1.3 IPM body				
1	ia5-text	M	T	see Part 3/1.1 and Part 1.2
1.1	parameters	M	D	-
1.1.1	repertoire	M	T	see 4.4.3.4.9
1.2	data	M	T	see Part 6
2	voice	I	X	see 4.4.4.2
3	g3-facsimile	O	X	see 4.4.4.2
4	g4-class-1	O	X	see 4.4.4.2
5	teletex	O	X	see 4.4.4.2
6	videotex	O	X	see 4.4.4.2
7	encrypted	O	X	see 4.4.4.2
8	message	M	X	see 4.4.4.2
9	mixed-mode	O	X	see 4.4.4.2
10	bilaterally-defined	C1	X	see 4.4.4.2
11	nationally-defined	O	X	see 4.4.4.2
12	extended	M	X/T	see 4.4.4.2
Part 4: AMH21/A.1.3.1 Extended body part support				
1	ia5-text-body-part	M	T	see Part 3/1
2	g3-facsimile-body-part	O	X	see 4.4.4.2
3	g4-class1-body-part	O	X	see 4.4.4.2
4	teletex-body-part	O	X	see 4.4.4.2
5	videotex-body-part	O	X	see 4.4.4.2
6	encrypted-body-part	O	X	see 4.4.4.2
7	message-body-part	M	X	see 4.4.4.2
8	mixed-mode-body-part	O	X	see 4.4.4.2
9	bilaterally-defined-body-part	O	X	see 4.4.4.2
10	nationally-defined-body-part	O	X	see 4.4.4.2
11	general-text-body-part	M	T/X	see 4.4.2.3 and 4.4.4.5 and Part 6
12	file-transfer-body-part	M	T	see 4.4.4.1

13	voice-body-part	O	X	see 4.4.4.1
14	oda-body-part	O	X	see 4.4.4.1
15*	report-body-part	M	X	see 4.4.4.1
16*	notification-body-part	M	X	see 4.4.4.1
17*	content-body-part	M	X	see 4.4.4.1
18*	pkcs7-body-part	O	X	see 4.4.4.1
Part 5: AMH21/A.1.5 Common data types				
1	RecipientSpecifier			
1.1	recipient	M	D	-
1.2	notification-requests	M	D	see Part 5/1.2.1-1.2.3
1.2.1	rn	O	D	see 4.4.4.4
1.2.2	nrn	M	D	-
1.2.3	ipm-return	O	D	-
1.3	reply-requested	M	D	-
1.4*	recipient-extensions	M	T1	see Part 5/1.4.3
1.4.1*	recipient-security-request	O	D	-
1.4.2*	circulation-list-indicator	O	D	-
1.4.3*	precedence	M	T1	see 4.4.3.4.3
Part 6: IPM support of the basic ATSMHS				
1	ATS-message-Header	M	T1	see Part 6/1.1-1.5
1.1	start-of-heading	M	-	-
1.2	ATS-message-Priority	M	T	see Part 6/1.2.1-1.2.3
1.2.1	priority-prompt	M	-	-
1.2.2	priority-indicator	M	T	see 4.4.3.4.3 and 4.4.4.4
1.2.3	priority-separator	M	-	-
1.3	ATS-message-Filing-Time	M	T	see Part 6/1.3.1-1.3.3
1.3.1	filing-time-prompt	M	-	-
1.3.2	filing-time	M	T	see 4.4.3.4.5
1.3.3	filing-time-separator	M	-	-
1.4	ATS-message-Optional-Heading-Info	M	T1	see Part 6/1.4.1-1.4.3
1.4.1	OHI-prompt	M	-	-
1.4.2	optional-heading-information	M	T	see 4.4.3.4.6
1.4.3	OHI-separator	M	-	-
1.5	start-of-text	M	-	-
2	ATS-message-Text	M	T	

D = discarded
I = out of scope
M = mandatory support
O = optional support
T = translated
T1 = conditionally translated
X = excluded (not used)
* = requirement applicable only if the AMHS/SWIM gateway supports the extended ATSMHS
- = not applicable

4.4.5 Use of message transfer envelope parameters

(paragraph “Use of message transfer envelope parameters” of ICAO Doc 9880 Part II [1], replacing AMHS/SWIM Gateway instead of AFTN/AMHS Gateway), adding these considerations.

4.4.5.1 If the AMHS message is not digitally signed, action taken will depend on the value of the configuration parameter “Action to take on reception of unsigned AMHS messages”, that is:

a) If the value is “Convert the message to SWIM”, then the message shall be processed for further conveyance in the AMQP,

b) The value “Reject the message with an NDR”, shall result in the rejection for all the message recipients, notification to the control position and generation of a non-delivery report as specified in 4.4.6 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

1) “transfer-failure-for-security-reason” for the non-delivery-reason-code; and

2) “secure-messaging-error” for the non-delivery-diagnostic-code; and

3) “unable to convert to AMQP due to missed signature” for the supplementary-information

c) If the value is “Convert the message to SWIM and mark it as Unsigned”, then the message shall be processed for further conveyance in the AMQP and setting the “amhs_message_signed” element of application-properties section in the AMQP message mappings to “unsigned” if AMHS message is not digitally signed (see 4.4.3.4.10).

4.4.5.2 If the AMHS message is digitally signed and verification of the signature/s is invalid, action taken will depend on the value of the configuration parameter “Action to take on reception of signed AMHS messages that fails validation”, that is:

a) The value “Reject the message with an NDR” shall result in the rejection for all message recipients, notification to the control position and generation of a non-delivery report as specified in 4.4.6 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

1) “transfer-failure-for-security-reason” for the non-delivery-reason-code; and

2) “secure-messaging-error” for the non-delivery-diagnostic-code; and

3) “unable to convert to AMQP due to missed signature” for the supplementary-information

b) If the value is “Convert the message to SWIM and mark it as *Invalid Signature*”, then the message shall be processed for further conveyance in the AMQP and setting the

"amhs_message_signed" element of application-properties section in the AMQP message mappings to "invalid-signature" if verification of the signature is unsuccessful (see 4.4.3.4.10).

4.4.5.3 If the AMHS message is digitally signed and verification of the signature/s is correct, then the message shall be processed for further conveyance in the AMQP, setting the "amhs_message_signed" element of application-properties section in the AMQP message mappings to "signed" (see 4.4.3.4.10).

4.4.6 Action upon reception of AMHS probe

4.4.6.1 Upon reception by the ITCU of an AMHS probe for which content type is "interpersonal-messaging-1988", the received probe shall be processed in one of the following manners, depending on the abstract-value of the current-encoded-information-types, determined as either the abstract-value of the latest converted-encoded-information-types, if existing, in the trace-information element, or as the abstract-value of the original-encoded-information-types element in the probe transfer envelope if the former does not exist:

a) Processing as specified in 4.4.6.2 if the abstract-value of the current encoded-information-types is "unspecified" or includes exclusively one of the following values

1) Basic "ia5-text"

2) externally-defined "ia5-text", which corresponds to OID {id-eit-ia5-text} as specified in ISO/IEC 10021-4 Annex A [5];

3) OID {id-cs-eit-authority 1}, identifying the C0 control character set ISO-IR 0, as described in ISO/IEC 10021-7 [6];

4) OID {id-cs-eit-authority 2}, identifying the G0 graphical character set ISO-IR 2 (known as International Reference Version of ISO 646), as described in ISO/IEC 10021-7 [6];

5) OID {id-cs-eit-authority 6}, identifying the G0 graphical character set ISO-IR 6 (known as US Version of ISO 646), as described in ISO/IEC 10021-7 [6]; or

6) OID {id-cs-eit-authority 100}, identifying the G1 graphical character set ISO-IR 100 (ISO 8859-1, Latin Alphabet No. 1), as described in ISO/IEC 10021-7 [6];

b) if the abstract-value includes any value different from the values indicated in a) above:

1) rejection of the message for all the message recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. "unable-to-transfer" for the non-delivery-reason-code; and

ii. "encoded-information-types-unsupported" for the non-delivery-diagnostic-code.

4.4.6.2 A probe which was not rejected as the result of 4.4.6.2 shall be processed in one of the following mutually exclusive manners:

a) Processing as specified in 4.4.6.3 if the length of the element content-length in the probe transfer envelope does not exceed the maximum value defined for the SWIM component in the AMHS/SWIM gateway's configuration parameter "Maximum message data size";

b) If the length of the element content-length in the probe transfer envelope exceeds the maximum value defined for the SWIM component:

1) rejection of the probe for all the probe recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. "unable-to-transfer" for the non-delivery-reason-code; and

ii. "content-too-long" for the non-delivery-diagnostic-code; and

iii. “unable to convert to AMQP due to the content size” for the supplementary-information"

4.4.6.3 A probe which was not rejected as the result of 4.4.6.2 shall be processed in one of the following mutually exclusive manners:

a) Processing as specified in 4.4.6.4 if the number of probe recipients towards which the ITCU is responsible for conveyance of the probe does not exceed the maximum value defined for the SWIM component in the AMHS/SWIM gateway’s configuration parameter “Maximum message number of recipients”;

b) if this number exceeds the maximum value defined for the SWIM component:

1) rejection of the probe for all the probe recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “content-too-long” for the non-delivery-diagnostic-code; and

iii. “unable to convert to AMQP due to number of recipients” for the supplementary-information

4.4.6.4 A probe which was not rejected as the result of 4.4.6.3 shall be processed in one of the following manners, depending on the ability of the ITCU to translate the originator-name element of the probe transfer envelope into an AF-address:

a) processing as specified in 4.4.6.5 if address conversion into an AF-address as specified in ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.6 a), b) or c) can be achieved; or

b) if address conversion into an AF-address as specified in ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.6 a), b) and c) cannot be achieved, then:

1) rejection of the probe for all the probe recipients; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in all the per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “invalid-arguments” for the non-delivery-diagnostic-code; and

iii. “unable to convert to AMQP due to unrecognized originator O/R address” for the supplementary-information.

4.4.6.5 For each probe recipient, a probe which was not rejected as the result of 4.4.6.4 shall be processed in one of the following manners, depending on the ability of the ITCU to translate the considered recipient-name element of the probe transfer envelope into an AF-address:

a) processing as specified in 4.4.6.6 if address conversion into an AF-address as specified in ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.7 a), b) or c) can be achieved, or

b) if address conversion into an AF-address as specified in ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.7 a), b) and c) cannot be achieved, then:

1) rejection of the probe for the considered recipient; and

2) generation of a non-delivery report as specified in 4.4.8 with the following elements taking the following abstract-values in the corresponding per-recipient-fields of the report:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “unrecognised-OR-name” for the non-delivery-diagnostic-code.

4.4.6.6 For the probe recipients which were not rejected as the result of 4.4.6.5, a delivery-report shall be generated as specified in 4.4.8, if requested, to indicate the successful result of the probe conveyance test.

4.4.7 Action upon reception of AMHS RN

4.4.7.1 Upon reception by the information transfer and control unit of an RN passed from the ATN component, the received RN shall be processed in one of the following manners:

a) processing as specified in 4.4.7.2 if the subject IPM has been previously generated by the information transfer and control unit; or

b) unsuccessful termination of the procedure if the subject IPM has not been previously generated by the information transfer and control unit, resulting in:

logging of the error situation and reporting to a control position;

storage of the RN for appropriate action at the control position; and

generation of a non-delivery report as specified in 4.5.6 with the following elements taking the following abstract-values:

i. “unable-to-transfer” for the non-delivery-reason-code; and

ii. “invalid-arguments” for the non-delivery-diagnostic-code; and

iii. “unable to notify RN to SWIM due to misrouted RN” for the

supplementary-information.

4.4.7.2 For an AMHS RN passed from the ATN component to the information transfer and control unit and not rejected as the result of 4.4.7.1, the received RN shall be processed in one of the following manners:

a) processing as specified in 4.4.7.3 if the value of the priority indicator of the subject SWIM message was “SS”; or

unsuccessful termination of the procedure if the value of the priority indicator was different from “SS”, resulting in:

logging of the error situation and reporting to a control position; and

storage of the RN for appropriate action at the control position.

4.4.7.3 An AMHS RN passed from the ATN component to the information transfer and control unit and not rejected as the result of 4.4.7.2 shall be logged and reported to the Control Position.

4.4.8 Generation of AMHS reports

As specified in ICAO Doc 9880 Part II [1] paragraph 4.5.6, understanding AMHS/SWIM Gateway instead of AFTN/AMHS Gateway.

4.4.9 Error management

Any error situation shall be logged to de Control Position.

4.5 SWIM TO AMHS CONVERSION

For AMHS unaware service level, the minimum information necessary to transfer SWIM Information Objects to AMHS is:

a) priority element in header section;

b) message-id element in properties section;

c) creation-time element in properties section

d) data or amqp-value element in application data section;

e) amhs_recipients in application properties section; and

f) amhs_originator in application properties section;

g) content-type element in properties section;

Note: applications properties amhs_recipients and amhs_originator may be determined by the SWIM Access Point considering the supplier of the information.

4.5.1 Control functions

4.5.1.1 Upon reception by the ITCU of an AMQP message passed from the SWIM component to be conveyed to the AMHS, the received message shall be processed in one of the following manners, depending on the value of the priority in the header section:

a) processing as specified in 4.5.1.2 if the value of the element priority is present; or

b) if the value of the element priority is not present then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.2 A message which was not rejected as the result of 4.5.1.1 shall be processed in one of the following manners:

a) processing as specified in 4.5.1.3 if the value of the element message-id is present; or

b) if the value of the element message-id is not present then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.3 A message which was not rejected as the result of 4.5.1.2 shall be processed in one of the following manners:

a) processing as specified in 4.5.1.4 if the value of the element creation-time is present; or

b) if the value of the element creation-time is not present then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.4 A message which was not rejected as the result of 4.5.1.3 shall be processed in one of the following manners:

a) processing as specified in 4.5.1.5 if the value of the element data or the value of the amqp-value element is present; or

b) if the value of the element data and the value of the amqp-value are not present then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.5 A message which was not rejected as the result of 4.5.1.4 shall be processed in one of the following manners:

a) processing as specified in 4.5.1.6 if the value of the application property amhs_recipients is present; or

b) if the value of the application property amhs_recipients is not present then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.6 A message which was not rejected as the result of 4.5.1.5 shall be processed in one of the following manners:

a) processing as specified in 4.5.1.10 if the value of the application property amhs_originator is present; or

b) if the value of the application property amhs_originator is not present then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.7 A message which was not rejected as the result of 4.5.1.6 shall be processed in one of the following manners:

a) processing as specified in 4.5.1.10 if the value of the property content-type is present and has a valid value as described in 4.4.3.3.3.1; or

b) if the value of the property content-type is not present then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.8 A message which was not rejected as the result of 4.5.1.74.4.2.5 shall be processed in one of the following mutually exclusive manners:

a) Processing as specified in 4.5.1.10 if the size of the payload in bytes of the AMQP message does not exceed the maximum value in the AMHS/SWIM gateway's configuration parameter "Maximum message data size";

b) If the size of the payload in bytes of the AMQP message exceeds the maximum value specified in the AMHS/SWIM gateway's configuration parameter "Maximum message data size", then the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.9 A message which was not rejected as the result of 4.5.1.84.4.2.5 shall be processed in one of the following mutually exclusive manners:

a) Processing as specified in 4.5.1.10 if the number of recipients specified in the application property amhs_recipients of the AMQP message does not exceed the maximum value in the AMHS/SWIM gateway's configuration parameter "Maximum message number of recipients";

b) If the number of recipients specified in the application property amhs_recipients of the AMQP message exceeds the maximum value specified in the AMHS/SWIM gateway's configuration parameter "Maximum message number of recipients", the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.1.10 Upon reception by the ITCU of an AMQP message passed from the SWIM component to be conveyed to the AMHS, this AMQP message shall be converted into an AMHS message for transfer by the AMHS component in accordance with the following:

a) The specification of how the elements of the AMQP message are used for mapping onto the AMHS message parameters, as specified in paragraph 4.5.2.

b) Generation of the IPM as specified in 4.5.3.

c) Generation of the message transfer envelope as specified in 4.5.4.

4.5.2 Use of AMQP message elements

4.5.2.1 Each element of an AMQP message shall be processed as specified in the column "action" of Table 8. These elements which are classified as "T" or "T1" in the column action shall be translated into the AMHS parameter specified in the column "Generated AMHS property" and according to the specification in the provision referred to in the column "Mapping".

Table 8. Use of AMQP message elements

AMQP message section	Element	Action	Generated AMHS property	Mapping
Header	durable	D	-	
Header	priority	T	X.400 priority (envelope) or ATS-message-priority or precedence	see 4.5.2.2
Header	ttl	D	-	
Header	first-acquirer	D	-	
Header	delivery-count	D	-	
delivery annotations		D	-	
message annotations		D	-	
Properties	message-id	D	Message-identifier (envelope) user-relative-identifier (IPM heading elements)	see 4.5.2.3
Properties	user-id	D	-	
Properties	to	D	-	
Properties	subject	T1	Subject (IPM heading elements)	see 4.5.2.4
Properties	reply-to	D	-	
Properties	correlation-id	D	-	
Properties	content-type	T1	Body part type and character set	see 4.5.2.5
Properties	content-encoding	D	-	
Properties	absolute-expiry-time	D	-	
Properties	creation-time	T1	ATS-message-Filing-Time AND/OR authorization-time (IPM heading)	see 4.5.2.10
Properties	group-id	-	-	
Properties	group-sequence	-	-	
Properties	reply-to-group-id	-	-	
application properties	amhs_ipm_id	-	-	
application properties	amhs_ftbp_file_name	T1	FTBP-pathname	see 4.5.2.6
application properties	amhs_ftbp_object_size	T1	FTBP- object-size	see 4.5.2.7
application properties	amhs_ftbp_last_mod	T1	FTBP-date-and-time-of-last-modification	see 4.5.2.8
application properties	amhs_ats_pri	T1	ATS-message-priority AND/OR precedence	see 4.5.2.2
application properties	amhs_recipients	T	Recipient-name of per-recipient-fields (envelope)	see 4.5.2.9
application properties	amhs_ats_ft	T1	ATS-message-Filing-Time AND/OR Authorization-time (IPM heading)	see 4.5.2.10
application properties	amhs_ats_ohi	T1	ATS-message-Optional-Heading-Info AND/OR originators-reference (IPM heading)	see 4.5.2.11
application properties	amhs_originator	T	originator-name (envelope)	see 4.5.2.12

application properties	amhs_subject	T1	Subject (IPM heading)	see 4.5.2.4
application properties	amhs_bodypart_type	T1	Body part type	see 4.5.2.5
application properties	amhs_content_encoding	T1	Character set	see 4.5.2.5
application properties	amhs_message_signed	-		
application properties	swim_compression	D		
application data	data	T1	ATS-message-text (IPM heading) OR FTBP data	see 4.5.2.13
application data	amqp-sequence	-	-	
application data	amqp-value	T1	ATS-message-text (IPM heading)	see 4.5.2.14
Footer		-	-	
	D = discarded T = translated T1 = conditionally translated - = not applicable			

Note. Application properties use snake case notation because the use of '-' in the name of properties used by JMS APIs could be restricted.

4.5.2.2 The element used for the mapping to the AMHS priority shall be:

a) The application property amhs_ats_pri if it is present and valid in the AMQP message; if it is not present, then

b) the priority in the AMQP message header if it is present.

The message shall be logged and reported to the Control Position if a) and b) elements are not present or have invalid values.

4.5.2.2.1 As a result of 4.5.2.2 the element to be used shall:

a) be mapped into the abstract-value of the priority element of the message transfer envelope of the converted AMHS message as specified in the third column of Table 9; and

b) be converted into the value of the priority indicator in the ATS-message-Priority element of the ATS message text of the converted AMHS message as specified in the fourth column of Table 9 (Basic ATSMHS), if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using basic ATSMHS service level; or

c) be mapped into one of the authorized values of the precedence element of the recipient extensions of the recipient-specifier, as specified in the fifth column of Table 9 (Extended ATSMHS), if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using extended ATSMHS service level.

Table 9. Mapping of AMQP priority

AMQP Priority	amhs_ats_pri	AMHS message transfer envelope priority	ATS-message-priority	IPM precedence
>=6	SS	Urgent	SS	107
5	DD	Normal	DD	71

4	FF	Normal	FF	57
3	GG	Non-urgent	GG	28
<=2	KK	Non-urgent	KK	14

~~4.5.2.3 The value of the property message-id shall be conveyed into the value of the element local-identifier in the MTS-identifier of the envelope of the AMHS message and into the user-relative-identifier in the this-IPM heading field. If message-id element is not present, this error situation shall be logged and reported to the Control Position.~~

4.5.2.4 The value of the application property amhs-subject is used for the mapping into the AMHS subject if the element is present on the AMQP message. If the application property amhs-subject is not present on the AMQP message, then the property subject of the AMQP message is used for the mapping. The selected property shall:

a) be mapped into the subject field of the IPM heading fields of the AMHS message.

b) be trimmed if the size of the value exceeds 128 characters

c) be omitted in the AMHS message resulting from the conversion if the property subject and the amhs-subject application property are not present in the AMQP message.

4.5.2.5 The property content-type of the AMQP Message and application properties amhs_bodypart_type and amhs_content_encoding shall be converted into the AMHS body part type and Character set elements of the IPM as follows:

a) In case amhs_bodypart_type and amhs_content_encoding application properties are present, as follows:

Table 10. Mapping of AMQP Message (AMHS aware)

AMQP Message content-type	amhs_bodypart_type	amhs_content_encoding	AMHS Body part type	Character set
<text/plain; charset="utf-8”>	ia5-text	IA5	ia5-text	ia5
<text/plain; charset="utf-8”>	ia5-text-body-part	IA5	ia5-text-body-part	ia5
<text/plain; charset="utf-8”>	general-text-body-part	ISO-646	general-text-body-part	Basic (ISO-646)
<text/plain; charset="utf-8”>	general-text-body-part	ISO-8859-1	general-text-body-part	Basic-1 (ISO-8859-1)
<application/octet-stream>	file-transfer-body-part	-	file-transfer-body-part	-

b) In case neither application properties are present, the property content-type of the AMQP message shall:

1) be mapped as a general-text-body-part Basic-1 (ISO-8859-1) if the value of the content-type is <text/plain; charset="utf-8”> or

2) be mapped as a file-transfer-body-part if the value of the content-type is <application/octet-stream>

Table 11. Mapping of AMQP Message (AMHS unaware)

AMQP Message content-type	amhs_bodypart_type	amhs_content_encoding	AMHS Body part type	Character set
<text/plain; charset="utf-8”>	-	-	general-text-body-part	(ISO-8859-1)
<application/octet-stream>	-	-	file-transfer-body-part	-

4.5.2.6 The application property amhs_ftbp_file_name of the AMQP message shall be:

a) conveyed as the value of the incomplete-pathname element of the file transfer parameters of the AMHS message, if the amhs_ftbp_file_name is present in the AMQP message; or

b) omitted in the resulting AMHS message, if the amhs_ftbp_file_name property is not present in the AMQP message.

4.5.2.7 The application property amhs_ftbp_object_size of the AMQP message shall be:

a) conveyed as the value of the actual-values element of the IPM file transfer parameters of the AMHS message, if the amhs_ftbp_object_size is present in the AMQP message; or

b) omitted in the resulting AMHS message, if the amhs_ftbp_object_size property is not present in the AMQP message.

4.5.2.8 The application property amhs_ftbp_last_mod of the AMQP message shall be:

a) conveyed as the value of the date-and-time-of-last-modification element of the IPM file transfer parameters of the AMHS message, following the date format YYYYMMDDhhmmssZ, if the amhs_ftbp_object_size is present in the AMQP message; or

b) omitted in the converted AMHS message, if the amhs_ftbp_last_mod property is not present in the AMQP message or if the value is not in the date format YYYYMMDDhhmmssZ.

4.5.2.9 If the application property amhs_recipients contains addressee indicators of eight letters, where each indicator is separated by a ",", then:

a) Each addressee indicator in the application property amhs_recipients shall be translated into the MF-address included in a recipient-name of the resulting AMHS message (ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.7). The unsuccessful termination for one or several addressee indicators results in the logging and reporting to the Control Position.

b) Otherwise, the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.2.10 The element used for the mapping of the AMHS filing time shall be:

a) The value of the application property amhs_ats_ft if the element is present in the AMQP message and it is a date-time group consisting of six numerical characters, the first two digits representing the day of the month and the last four digits the hours and minutes if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using basic ATSMHS service level. if it has wrong format, it isn't present or the ATSMHS-service-level makes the AMHS message to be conveyed using extended ATSMHS service level, then

b) the property creation time of the AMQP message is used for the mapping

An error situation shall be logged and reported to the Control Position if the elements as in a) and b) are absent or have invalid values.

4.5.2.10.1 As a result of 4.5.2.10, the selected element shall:

a) be converted as the value of the ATS-message-Filing-Time element of the IPM text of the converted AMHS message (Basic ATSMHS), if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using basic ATSMHS service level; or

b) be conveyed into the value of the authorization-time heading field extension of the IPM (Extended ATSMHS) as specified in ISO/IEC 10021-7:2003, Section A.1.6 [6], which is of ASN.1 type GeneralizedTime, if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using extended ATSMHS service level..

4.5.2.11 The application property amhs_ats_ohi shall

a) be conveyed as the value of the optional heading information element in the ATS-message-Optional-Heading-Info element of the IPM text of the converted AMHS message (Basic ATSMHS), if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using basic ATSMHS service level; or

b) be conveyed as the value of the originators-reference of the IPM heading (Extended ATSMHS), if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using extended ATSMHS service level; or

c) be omitted if the property amhs_ats_ohi is not present in the AMQP message or it does not represent a character string; or

d) be trimmed down to 53 characters if the property amhs_ats_ohi is a character string of a length greater than 53 characters if the AMQP message priority is less than "6"; or

e) be trimmed down to 48 characters be omitted if the property amhs_ats_ohi is a character string of a length greater than 48 if the AMQP message priority is "6" or greater.

4.5.2.12 If the application property amhs_recipients contains addressee indicators of eight letters, then:

a) The value of the application property amhs-originator shall be converted into a MF-address following conversion of AFTN/AMHS addresses (ICAO Doc 9880 Part II [1] paragraph 4.5.2.2.6) into the value of the originator and this-IPM elements of the IPM and into the originator-name of the envelope of the AMHS message.

b) Otherwise, the AMQP message shall be rejected, logged and reported to the Control Position.

4.5.2.13 The data of the AMQP message shall:

a) be conveyed in its entirety to the data element of each of the file transfer body part type if the data element is present on the AMQP message; or

b) be omitted in the converted AMHS message if the data element is not present in the AMQP message.

4.5.2.14 The amqp-value of the AMQP message shall:

a) be conveyed in its entirety to the data element of each of the possible text body part types if the amqp-value element is present on the AMQP message; or

b) be omitted in the converted AMHS message if the amqp-value element is not present in the AMQP message.

4.5.3 Generation of IPM

4.5.3.1 Each of the elements composing the IPM resulting from the conversion of an AMQP message in the ITCU shall be processed as specified in the column "action" of Table 12. These elements, which are classified as "G", "G1", "T" or "T1" in the column "action", shall be either generated or translated according to the specification in the provision referred to in the column "mapping".

Table 12. IPM Generation

Ref	Element	ATSMHS Origination	Action	Mapping/notes
Part 1: AMH21/A.1.1 Supported information objects				
1	Interpersonal message (IPM)	M	T	See Part 1/1.1 and 1.2
1.1	heading	M	T	See Part 2
1.2	body	M	T	See Part 3
2	Interpersonal notification (IPN)	M	-	Out of scope
Part 2: AMH21/A.1.2 IPM heading fields				
1	this-IPM	M	T	See Part 5/3
2	originator	M	T	See 4.5.3.2 and Part 5/2
3	authorizing-users	O	X	
4	primary-recipients	M	T	See 4.5.3.3 and Part 5/1
5	copy-recipients	M	X	
6	blind-copy-recipients	O	X	
7	replied-to-IPM	O	X	
8	obsoleted-IPMs	M	X	
9	related-IPMs	O	X	
10	subject	M	T1	
11	expiry-time	O	X	
12	reply-time	O	X	
13	reply-recipients	O	X	
14	importance	O	X	
15	sensitivity	O	X	
16	auto-forwarded	O	X	
17	extensions		T1	See 4.5.3.7
17.1	incomplete-copy	O	X	
17.2	languages	O	X	
17.3	auto-submitted	O	X	
17.4*	body-part-signatures	O	X	
17.5*	ipm-security-label	O	X	
17.6*	authorization-time	M	T1	See 4.5.2.10
17.7*	circulation-list-recipients	O	X	
17.8*	distribution-codes	O	X	
17.9*	extended-subject	M	X	
17.10*	information-category	O	X	

17.11*	manual-handling-instructions	O	X	
17.12*	originators-reference	M	T1	See 4.5.2.12
17.13*	precedence-policy-identifier	M	G2	See 4.5.3.8
Part 3: AMH21/A.1.3 IPM body				See 4.5.2.5
1	ia5-text	M	T	
1.1	parameters	M	G	
1.1.1	repertoire	O	G	
1.2	data	M	T	
2	voice	I	X	
3	g3-facsimile	O	X	
4	g4-class-1	O	X	
5	teletex	O	X	
6	videotex	O	X	
7	encrypted	O	X	
8	message	O	X	
9	mixed-mode	O	X	
10	bilaterally-defined	C1	X	
11	nationally-defined	O	X	
12	externally-defined/extended	M	X	
Part 4: AMH21/A.1.3.1 Extended body part support				See 4.5.2.5
1	ia5-text-body-part	M	T1	
2	g3-facsimile-body-part	O	X	
3	g4-class1-body-part	O	X	
4	teletex-body-part	O	X	
5	videotex-body-part	O	X	
6	encrypted-body-part	O	X	
7	message-body-part	O	X	
8	mixed-mode-body-part	O	X	
9	bilaterally-defined-body-part	O	X	
10	nationally-defined-body-part	O	X	
11	general-text-body-part	M	T1	
12	file-transfer-body-part	M	T1	
13	voice-body-part	O	X	
14	oda-body-part	O	X	
15*	report-body-part	O	X	
16*	notification-body-part	O	X	

17*	content-body-part	O	X	
18*	pkcs7-body-part	O	X	
Part 5: AMH21/A.1.5 Common data types				
1	RecipientSpecifier			
1.1	recipient	M	T	See 4.5.3.3 and Part 5/2
1.2	notification-requests	M	G2	See Part 5/1.2.1-1.2.3
1.2.1	rn	M	G2	see 4.5.3.4
1.2.2	nrn	M	G2	see 4.5.3.4
1.2.3	ipm-return	O	X	
1.3	reply-requested	O	X	
1.4*	recipient-extensions	M	T1	See 4.5.3.7
1.4.1*	recipient-security-request	O	X	
1.4.2*	circulation-list-indicator	O	X	
1.4.3*	precedence	M	T1	See 4.5.2.2
2	ORDescriptor			
2.1	formal-name	M	T	See 4.5.3.5
2.2	free-form-name	O	X	
2.3	telephone-number	O	X	
3	IPMIdentifier			
3.1	User	M	T	See 4.5.3.6
3.2	user-relative-identifier	M	G	See 4.5.2.3
Part 6: IPM support of the basic ATSMHS				
1	ATS-message-Header	M	T1	See Part 6/1.1-1.5 and 4.5.3.9
1.1	start-of-heading	M	-	
1.2	ATS-message-Priority	M	T	See Part 6/1.2.1-1.2.3
1.2.1	priority-prompt	M	-	
1.2.2	priority-indicator	M	T	See 4.5.2.2
1.2.3	priority-separator	M	-	
1.3	ATS-message-Filing-Time	M	T	See Part 6/1.3.1-1.3.3
1.3.1	filing-time-prompt	M	-	
1.3.2	filing-time	M	T	See 4.5.2.10
1.3.3	filing-time-separator	M	-	
1.4	ATS-message-Optional-Heading-Info	M	T	See Part 6/1.4.1-1.4.3
1.4.1	OHI-prompt	M	-	
1.4.2	optional-heading-information	M	T	See 4.5.2.11

1.4.3	OHI-separator	M	-	
1.5	start-of-text	M	-	
2	ATS-message-Text	M	T	See 4.5.2.13
	C1 = if the AMHS/SWIM Gateway supports the extended ATSMHS then M else O G = generated G2 = conditionally generated I = out of scope M = mandatory support M1 = mandatory O/R name minimal support O = optional support T = translated T1 = conditionally translated X = excluded (not used) * = requirement applicable only if the AMHS/SWIM Gateway supports the extended ATSMHS - = not applicable			

4.5.3.2 The originator heading field shall:

a) identify the AFTN address of the user who originated the AMQP message; and

b) be structured as specified in Table 12/Part 5/2.

4.5.3.3 The element(s) recipient in the primary-recipients heading field shall:

a) identify the AFTN addresses of the recipient(s) of the AMQP message; and

b) be structured as specified in Table 12/Part 5/1.

4.5.3.4 The values “rn” and “nrn” shall be taken simultaneously by the element notification-requests if, and only if the element priority-indicator included in the message, as specified Table 12/Part 5/1.2.2, has the value “SS”.

4.5.3.5 The element formal-name shall:

a) take the form of an MF-address; and

b) be converted as specified in ICAO Doc 9880 Part II [1] paragraph 4.4.2.1.4.

4.5.3.6 The element user in the this-IPM heading field shall:

a) be the MF-address of the user who originated the AMQP message; and

b) be converted as specified in ICAO Doc 9880 Part II [1] paragraph 4.4.2.1.4.1.

4.5.3.7 The IPM heading fields and recipient extensions (authorization-time, originators-reference, precedence-policy-identifier, precedence) shall:

a) be generated by translation of AMQP message elements, if AMHS/SWIM Gateway’s configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using extended ATSMHS service level.

4.5.3.8 The element precedence-policy-identifier of the IPM heading field extensions shall:

a) be generated if AMHS/SWIM Gateway’s configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using extended ATSMHS service level; and

b) take the object-identifier value specified in {iso (1) identified-organisation (3) icao (27) atn-amhs (8) parameters (0) amhs-precedence-policy (0)}.

4.5.3.9 The ATS-Message-Header shall be generated by translation of AMQP message elements, if AMHS/SWIM Gateway's configuration parameter ATSMHS-service-level makes the AMHS message to be conveyed using basic ATSMHS service level.

4.5.3.10 The element document-type-name of the file transfer parameters shall:

a) be always generated

b) take its default value in conformance with ISO/IEC 10021-7:2003 clause 7.4.12 [6], which is the OID value {iso(1) standard(0) 8571(8571) document-type(5) unstructured-binary(3)}.

4.5.4 Generation of message transfer envelope

4.5.4.1 Each of the elements composing the message transfer envelope conveyed with an IPM resulting from the conversion of an AMQP message shall be processed as specified in the column "action" of Table 13. These elements, which are classified as "G", "G1" and "T" in the column "action", shall be handled according to the specification in the provision referred to in the column "mapping".

Table 13. Message transfer conveyance of an IPM

Ref	Element	ATSMHS Origination	Action	Mapping/notes
Part 1: AMH11/A.1.4.2 Message transfer				
1	MessageTransferEnvelope	M	T	see Part 1/1.1 and 1.2
1.1	(per-message-fields)			
1.1.1	message-identifier	M	G	see Part 2/1
1.1.2	originator-name	M	T	see 4.5.4.6
1.1.3	original-encoded-information-types	M-	G	see 4.5.4.7 and Part 2/3
1.1.4	content-type	M-	G	see 4.5.4.8 and Part 2/8
1.1.5	content-identifier	M	G1	see 4.5.4.9
1.1.6	Priority	M	T	see 4.5.2.2
1.1.7	per-message-indicators	M	G	see Part 2/4
1.1.8	deferred-delivery-time	M-	X	-
1.1.9	per-domain-bilateral-information	M-	G1	see 4.5.4.10 and Part 2/5
1.1.10	trace-information	M	G	see Part 2/6
1.1.11	Extensions	M	G	see 4.5.4.11 and Part 3/1
1.1.11.1	recipient-reassignment-prohibited	M	X	-
1.1.11.2	dl-expansion-prohibited	M	X	-
1.1.11.3	conversion-with-loss-prohibited	M	X	-
1.1.11.4	latest-delivery-time	M-	X	-
1.1.11.5	originator-return-address	M-	X	-
1.1.11.6	originator-certificate	M-	G1	see 4.5.4.2
1.1.11.7	content-confidentiality-algorithmidentifier	M-	X	-
1.1.11.8	message-origin-authentication-check	M-	G1	see 4.5.4.2
1.1.11.9	message-security-label	M-	X	-
1.1.11.10	content-correlator	M	G1	see 4.5.4.9
1.1.11.11	dl-expansion-history	M-	X	see4.5.4.12
1.1.11.12	internal-trace-information	M	G	see Part 3/5
1.1.11.13*	certificate-selector	M-	X	-
1.1.11.14*	multiple-originator-certificates	M-	X	-
1.1.11.15*	dl-exempted-recipients	M-	X	-
1.1.11.16*	PrivateExtensions	M-	X	-
1.2	per-recipient-fields	M	T	see Part 1/1.2.1-1.2.5
1.2.1	recipient-name	M	T	See 4.5.4.13
1.2.2	originally-specified-recipient-number	M	G	see 4.5.4.14
1.2.3	per-recipient-indicators	M	G	see 4.5.4.15

1.2.4	explicit-conversion	M-	X	-
1.2.5	Extensions	M	X	-
1.2.5.1	originator-requested-alternate-recipient	M-	D	
1.2.5.2	requested-delivery-method	M-	D	
1.2.5.3	physical-forwarding-prohibited	M-	X	
1.2.5.4	physical-forwarding-address-request	M-	X	
1.2.5.5	physical-delivery-modes	M-	X	
1.2.5.6	registered-mail-type	M-	X	
1.2.5.7	recipient-number-for-advice	M-	X	
1.2.5.8	physical-rendition-attributes	M-	X	
1.2.5.9	physical-delivery-report-request	M-	X	
1.2.5.10	message-token	M-	G1	see 4.5.4.2
1.2.5.11	content-integrity-check	M-	G1	see 4.5.4.2
1.2.5.12	proof-of-delivery-request	M-	D/X	
1.2.5.13	redirection-history	M-	D	
2	Content	M	T	See 4.5.3
Part 2: AMH11/A.1.5 Common data types				
1	MTSIdentifier			
1.1	global-domain-identifier	M	G	see 4.5.4.16 and Part 2/2
1.2	local-identifier	M	G	see 4.5.4.17
2	GlobalDomainIdentifier			
2.1	country-name	M	G	see 4.5.4.18
2.2	administration-domain-name	M	G	see 4.5.4.19
2.3	private-domain-identifier	M	G	see 4.5.4.20
3	EncodedInformationTypes			-
3.1	built-in-encoded-information-types	M	G	see 4.5.4.7
3.2	(non basic parameters)	M-	X	-
3.3	extended-encoded-information-types	M	X	-
4	PermessageIndicators			
4.1	disclosure-of-other-recipients	M	G	see 4.5.4.21
4.2	implicit-conversion-prohibited	M	G	see 4.5.4.22
4.3	alternate-recipient-allowed	M	G	see 4.5.4.23
4.4	content-return-request	M-	X	see 4.5.4.24
4.5	Reserved	M-	X	-
4.6	bit-5	M-	X	-
4.7	bit-6	M-	X	-

4.8	service-message	M-	X	-
5	PerDomainBilateralInformation			
5.1	country-name	M-	G1	see 4.5.4.25
5.2	administration-domain-name	M-	G1	see 4.5.4.25
5.3	private-domain-identifier	M-	G1	see 4.5.4.25
5.4	bilateral-information	M-	G1	see 4.5.4.26
6	TraceInformation			
6.1	TraceInformationElement	M	G	see Part 2/6.1.1 and 6.1.2
6.1.1	global-domain-identifier	M	G	see 4.5.4.27 and Part 2/2
6.1.2	domain-supplied-information	M	G	see Part 2/6.1.2.1-6.1.2.4
6.1.2.1	arrival-time	M	G	see 4.5.4.28
6.1.2.2	routing-action	M	G	see Part 2/6.1.2.2.1 and 6.1.2.2.2
6.1.2.2.1	Relayed	M	G	see 4.5.4.29
6.1.2.2.2	Rerouted	C1	X	see 4.5.4.4
6.1.2.3	attempted-domain	C1	X	see 4.5.4.4
6.1.2.4	(additional actions)			
6.1.2.4.1	deferred-time	C2	X	-
6.1.2.4.2	converted-encoded-information-types	M-	X	-
6.1.2.4.3	other-actions	M-	X	-
6.1.2.4.3.1	Redirected	M-	X	see 4.5.4.5
6.1.2.4.3.2	dl-operation	M-	X	see 4.5.4.2
8	ContentType			
8.1	built-in	M-	G	See 4.5.4.8
8.2	Extended	M-	X	-
Part 3: AMH11/A.1.6 Extension data types				
1	ExtensionField			
1.1	Type	M	G	see Part 3/1.1.1 and 1.1.2
1.1.1	standard-extension	M	G	see 4.5.4.11
1.1.2	private-extension	M-	X	-
1.2	Criticality	M	G	see 4.5.4.11
1.3	Value	M	G	see 4.5.4.11
5	InternalTraceInformation			
5.1	global-domain-identifier	M	G	see 4.5.4.16 and Part 2/2
5.2	mta-name	M	G	see 4.5.4.30

5.3	mta-supplied-information	M	G	see Part 3/5.3.1-5.3.4
5.3.1	arrival-time	M	G	see 4.5.4.28
5.3.2	routing-action	M	G	see Part 3/5.3.2.1-5.3.2.2
5.3.2.1	Relayed	M	G	see 4.5.4.29
5.3.2.2	Rerouted	C1	X	see 4.5.4.4
5.3.3	attempted-domain	C1	X	see 4.5.4.4
5.3.4	(additional actions)			
5.3.4.1	deferred-time	C2	X	-
5.3.4.2	converted-encoded-information-types	M-	X	-
5.3.4.3	other-actions	M-	X	-
5.3.4.3.1	Redirected	M-	X	see 4.5.4.5
5.4.3.3.2	dl-operation	M-	X	See 4.5.4.3
	C1 = if re-routing is supported then M else M- C2 = if deferred delivery is supported then M else M- G = generated G1 = optionally generated I = out of scope M = mandatory support M- = mandatory minimal support O = optional support 'T = translated X = excluded (not used) * = requirement applicable only if the AMHS/SWIM Gateway supports the extended ATSMHS - = not applicable			

4.5.4.2 If the parameter "Digitally sign all AMHS messages" has the value "true", then all the messages by the generated gateway will be signed conforming to the AMHS SEC Functional Group, specified in Doc 9880, Part II.

4.5.4.3 The DL-expansion capability of an AMHS/SWIM gateway is implemented in the AMHS component rather than in the ITCU.

4.5.4.4 The rerouting capability of an AMHS/SWIM gateway, if any, is implemented in the AMHS component rather than in the ITCU.

4.5.4.5 The redirection capability of an AMHS/SWIM gateway, if any, is implemented in the AMHS component rather than in the ITCU.

4.5.4.6 The value of the element originator-name shall:

a) be the AFTN address of the user who originated the AMQP message;

b) take the form of an MF-address; and

c) be converted as specified in ICAO Doc 9880 Part II [1] paragraph 4.4.2.1.4.1.

4.5.4.7 The element original-encoded-information-types shall:

a) take one or several of the abstract values of the column Original Encoded Information Type, according to the AMHS Body part types generated for the AMHS Message:

AMHS Body part type	Repertoire	Original Encoded Information Type
ia5-text	ia5	Ia5-text
ia5-text-body-part	ia5	id-eit-ia5-text
general-text-body-part	Basic (ISO-646)	id-cs-eit-authority 1 id-cs-eit-authority 6
general-text-body-part	Basic-1 (ISO-8859-1)	id-cs-eit-authority 1 id-cs-eit-authority 6 id-cs-eit-authority 100
file-transfer-body-part	-	id-eit-file-transfer(0)

b) be formed as specified in Table 13/Part 2/3.

4.5.4.8 The element content-type shall:

a) take the abstract-value “interpersonal-messaging-1988”, which is a value of type BuiltInContentType; and

b) be formed as specified in Table 13/Part 2/8.

4.5.4.9 The generation of content-identifier and content-correlator element shall be optional, as a matter of policy local to the AMHS management domain operating the AMHS/SWIM gateway.

4.5.4.10 The element per-domain-bilateral-information shall be:

a) optionally generated, as a matter of policy local to the AMHS management domain operating the AMHS/SWIM gateway; and

b) if present, structured as specified in Table 13/Part 2/5.

4.5.4.11 The only extensions used shall:

a) belong to the type “standard-extension”;

b) contain the following elements:

1) content-correlator, if used; and

2) internal-trace-information;

c) take a criticality value as specified in ISO/IEC 10021-4 [5], Figure 2; and

d) take values as specified in 4.5.4.9 and Table 13/Part 3/5, respectively.

4.5.4.12 The non-use of the elements recipient-reassignment-prohibited, dl-expansion-prohibited and conversion-with- loss-prohibited implies, in compliance with ISO/IEC 10021-4 [5], that they are assumed to take their default abstract-values, which are “recipient-reassignment allowed”, “DL-expansion-allowed” and “conversion-with-loss-allowed”, respectively.

4.5.4.13 The value of the element recipient-name in each of the per-recipient-fields elements shall:

a) be the address of each addressee indicated in the AMQP message respectively;

b) take the form of an MF-address; and

c) be converted as specified in ICAO Doc 9880 Part II [1] paragraph 4.4.2.1.4.2.

4.5.4.14 The value of the element originally-specified-recipient-number in each of the per-recipient-fields elements shall be generated by the ITCU as specified in ISO/IEC 10021-4, 12.2.1.1.1.5 [5].

4.5.4.15 The components of the element per-recipient-indicators in each of the per-recipient-fields elements shall be generated taking the following abstract-values:

a) “responsible” for the responsibility element;

b) “non-delivery-report” for the originating-MTA-report-request element; and

c) “non-delivery-report” for the originator-report-request element.

4.5.4.16 The element global-domain-identifier in the MTS-identifier shall:

a) identify the AMHS management domain operating the AMHS/SWIM gateway; and

be composed as specified in Table 13/Part 2/2.

4.5.4.17 The element local-identifier in the MTS-identifier shall be generated locally so as to ensure that it distinguishes the message from all other messages, probes or reports generated in the AMHS management domain operating the AMHS/SWIM gateway.

4.5.4.18 The element country-name in the global-domain-identifier element of the MTS-identifier and of the first trace-information element shall be the country-name element of the identifier of the AMHS management domain operating the AMHS/SWIM gateway as specified in ICAO Doc 9880 Part II [1] paragraph 2.5.1.3.

4.5.4.19 The element administration-domain-name in the global-domain-identifier element of the MTS-identifier and of the first trace-information element shall be the administration-domain-name element of the identifier of the AMHS management domain operating the AMHS/SWIM gateway as specified in ICAO Doc 9880 Part II [1] paragraph 2.5.1.3.

4.5.4.20 The element private-domain-identifier in the global-domain-identifier element of the MTS-identifier and of the first trace-information element shall be the private-domain-identifier element of the identifier part of the identification of the AMHS management domain operating the AMHS/SWIM gateway as specified in ICAO Doc 9880 Part II [1] paragraph 2.5.1.3.

4.5.4.21 The element disclosure-of-other-recipients shall take its default abstract-value, which is “disclosure-of-other- recipients-prohibited”.

4.5.4.22 The element implicit-conversion-prohibited shall take its default abstract-value, which is “implicit-conversion- allowed”.

4.5.4.23 The element alternate-recipient-allowed shall take the abstract-value “alternate-recipient-allowed”.

4.5.4.24 The element content-return-request shall take its default abstract-value, which is “content-return-not-requested”.

4.5.4.25 The elements country-name, administration-domain-name and private-domain-identifier shall together identify the AMHS management domain for which the bilateral-information is intended if, and only if, the element bilateral-information as specified in 4.5.4.26 is present.

4.5.4.26 The generation of this element shall be optional, as a matter of bilateral agreement between the AMHS management domain operating the AMHS/SWIM gateway and another AMHS management domain.

4.5.4.27 The element global-domain-identifier in the trace-information or in the internal-trace-information shall:

a) identify the AMHS management domain operating the AMHS/SWIM gateway; and

b) be composed as specified in Table 13/Part 2/2.

4.5.4.28 The element arrival-time in the first element of trace-information or of internal-trace-information shall take the semantic value of the time when the message was received by the ITCU for conveyance in the AMHS.

4.5.4.29 The element routing-action in the first element of trace-information or of internal-trace-information shall take the abstract-value “relayed”.

4.5.4.30 The element mta-name in the first element of internal-trace-information shall be the mta-name assigned to the ITCU included in the AMHS/SWIM gateway.

4.5.4.31 The structure of the mta-name of the ITCU included in an AMHS/SWIM gateway within an AMHS management domain is a matter of policy internal to the AMHS management domain.