



MIDAMC STG/8 AND CNS SG/12

EIGHT MEETING

(Amman, 1 - 4 May 2023)

Agenda Item x: **AFS to SWIM transition matters??**

AMHS/SWIM GATEWAY TECHNICAL SPECIFICATION

(Presented by SWAMWAY Study Group)



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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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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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

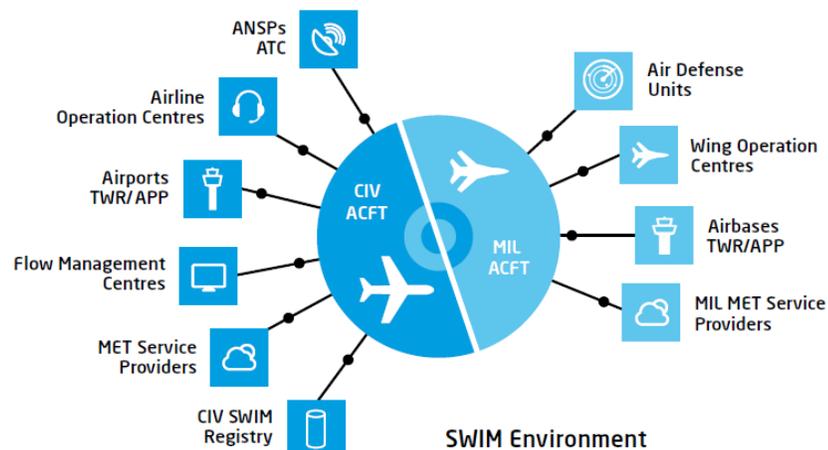
- ✓ End users
 - ✓ Users of the AMHS/SWIM Gateway → AMHS users, as well as SWIM users
 - ✓ Important considerations to bear in mind:
 - ✓ AMHS users may follow Basic or Extended profiles → the AMHS/SWIM Gateway shall accept both profiles
 - ✓ SWIM users do not know upfront the capabilities of AMHS users → 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





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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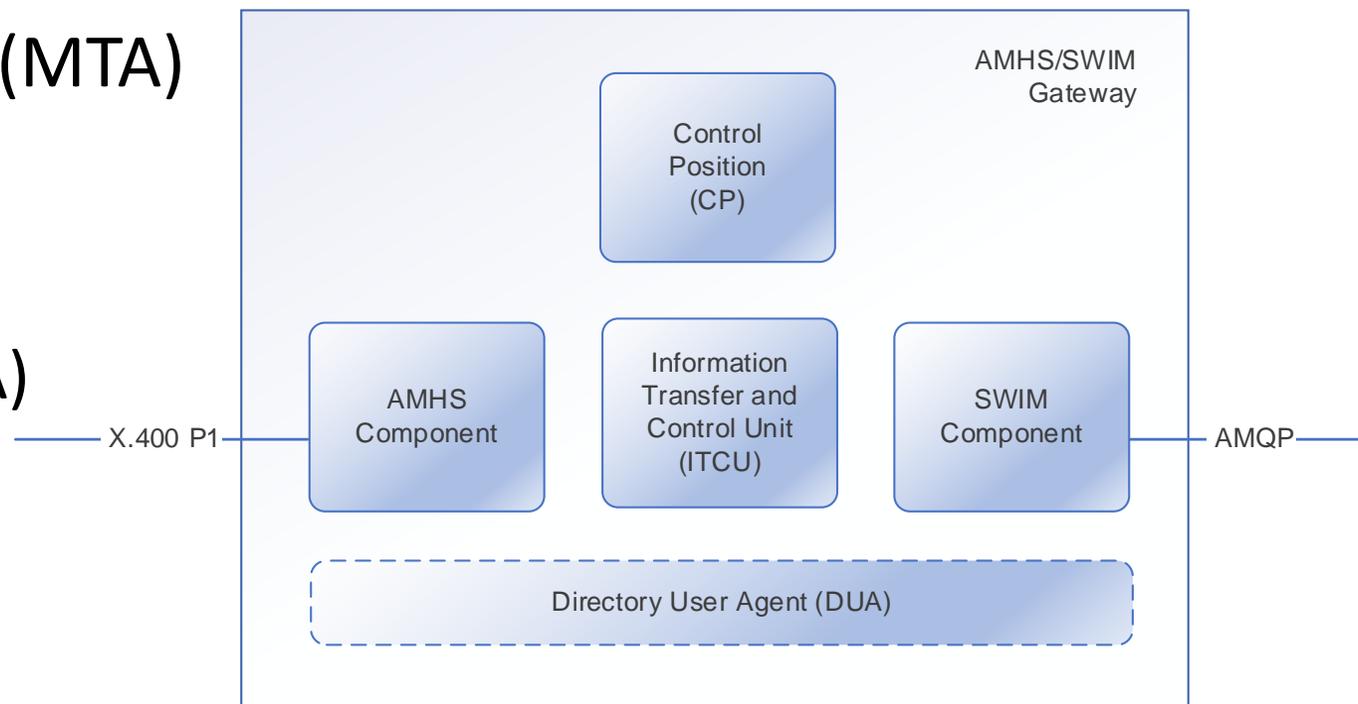
Chapter 2 – System Level Provisions

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



Chapter 2 – Functional Model – AMHS

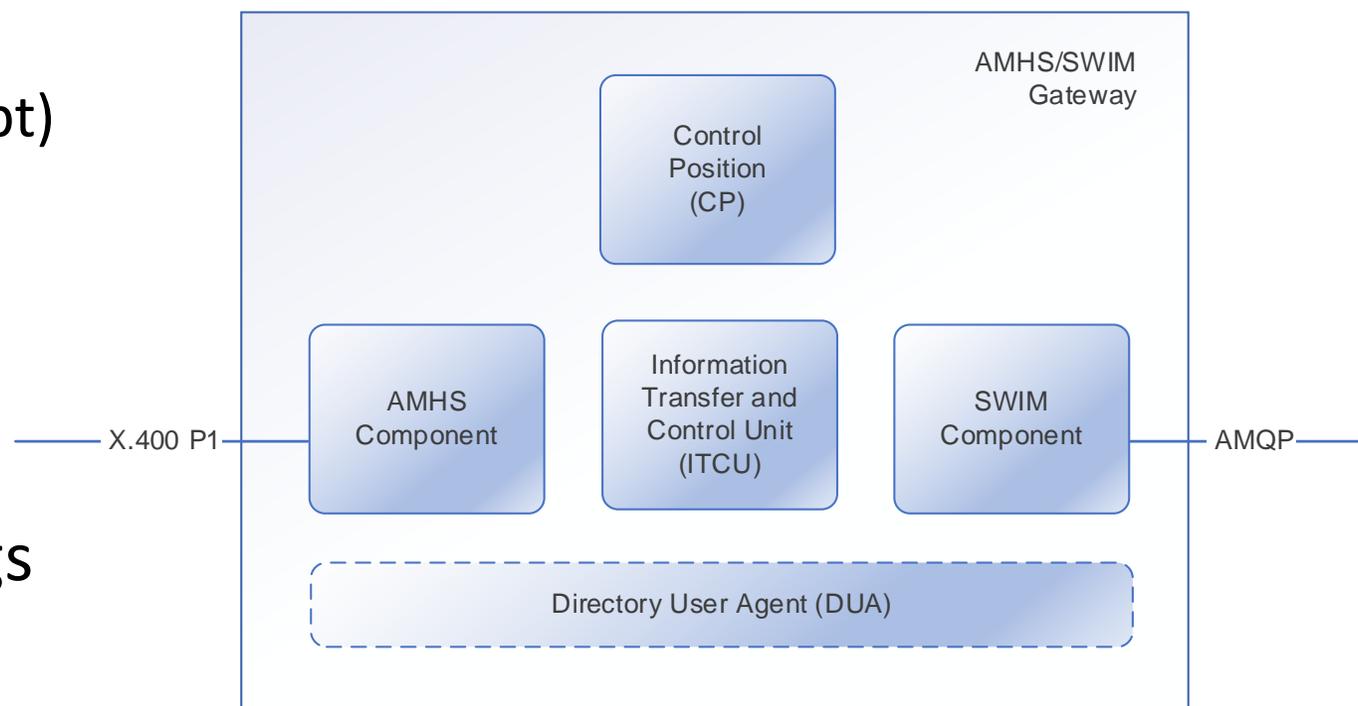
- Message transfer agent (MTA)
 - ✓ AMHS Component
- Access unit (AU)
 - ✓ ITCU
- Directory user agent (DUA)
Optional





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



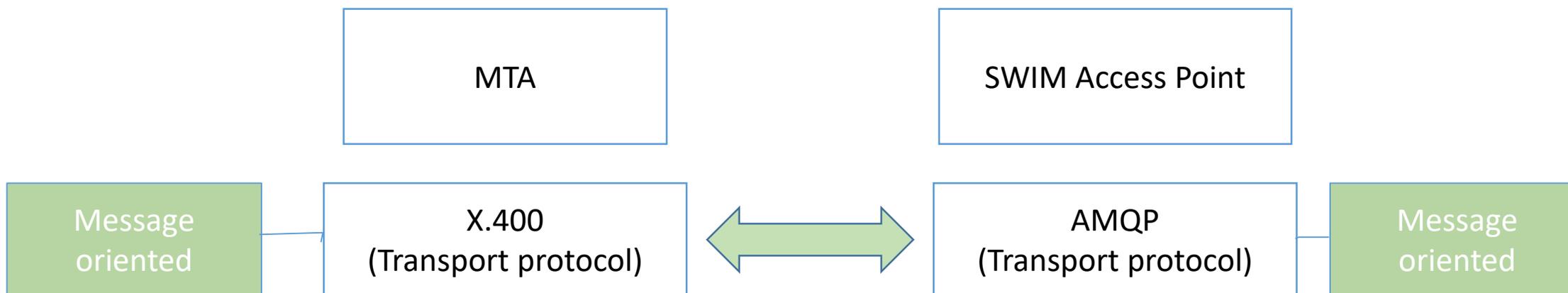
Chapter 2 – Functional Model – SWIM – Why AMQP?

- 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)



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

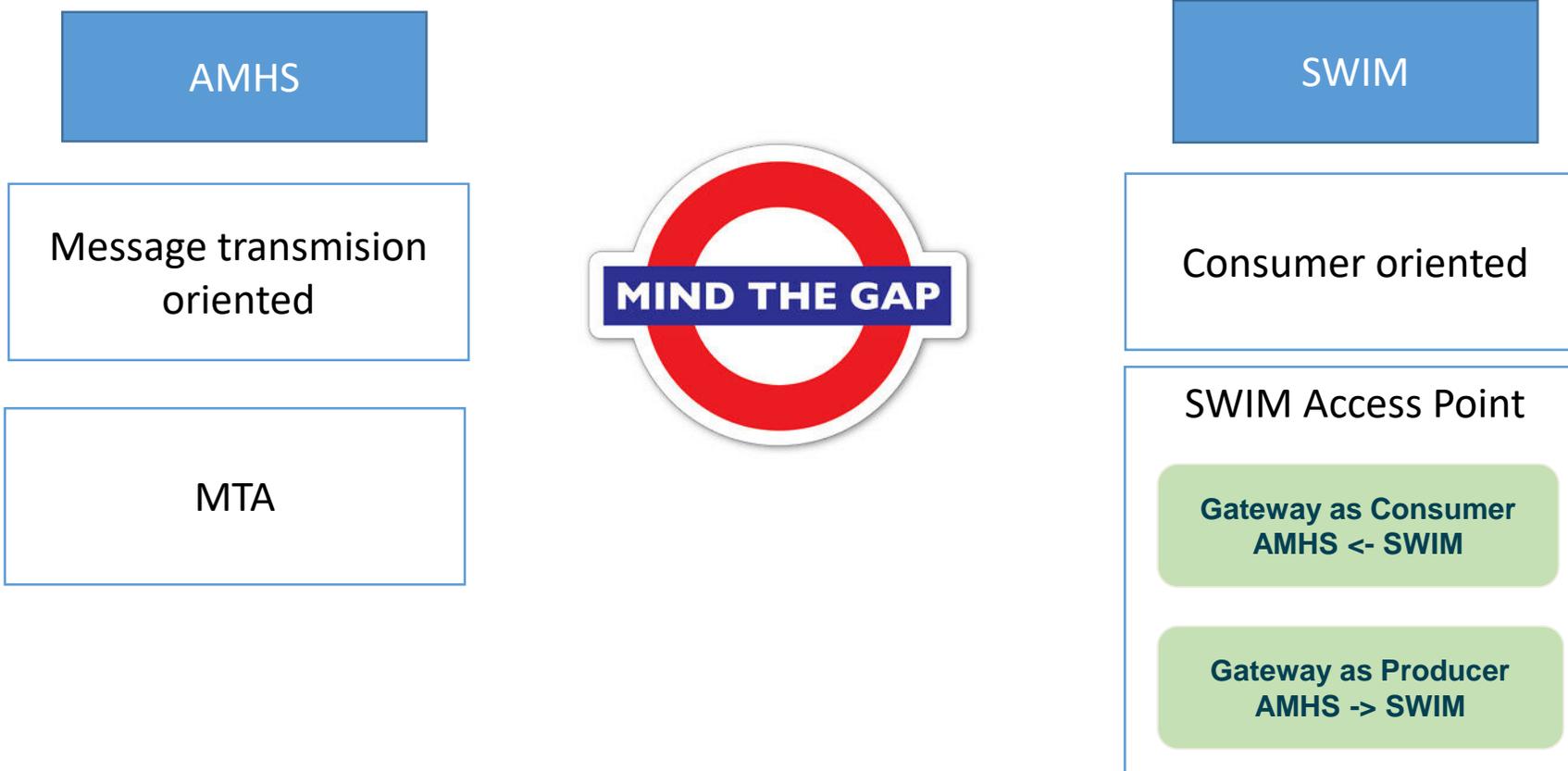


Chapter 2 – Naming and addressing

- 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 \leftrightarrow AMQP message queue



Chapter 2 – Naming and addressing



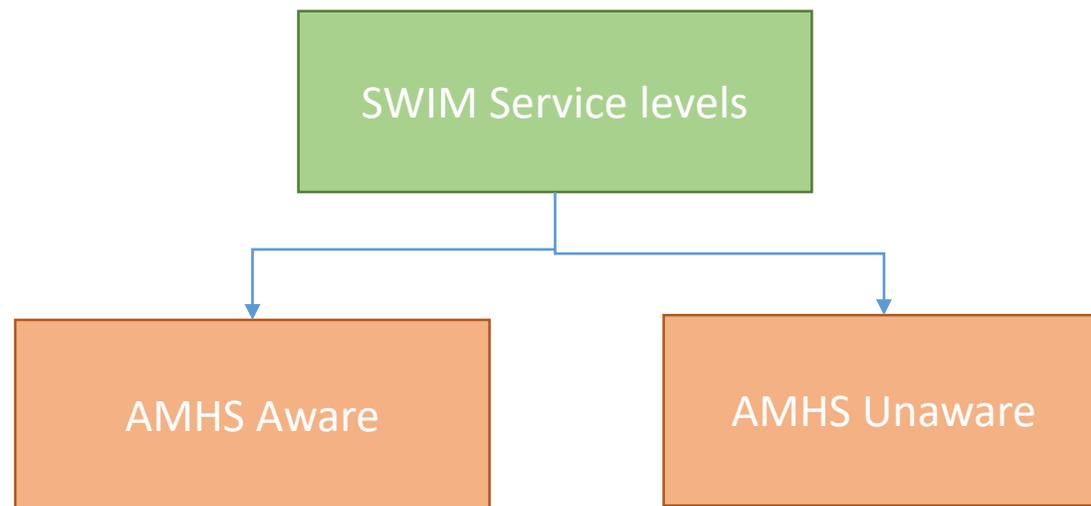


Chapter 2 – Level of support - AMHS

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 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.		



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 these 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 these 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

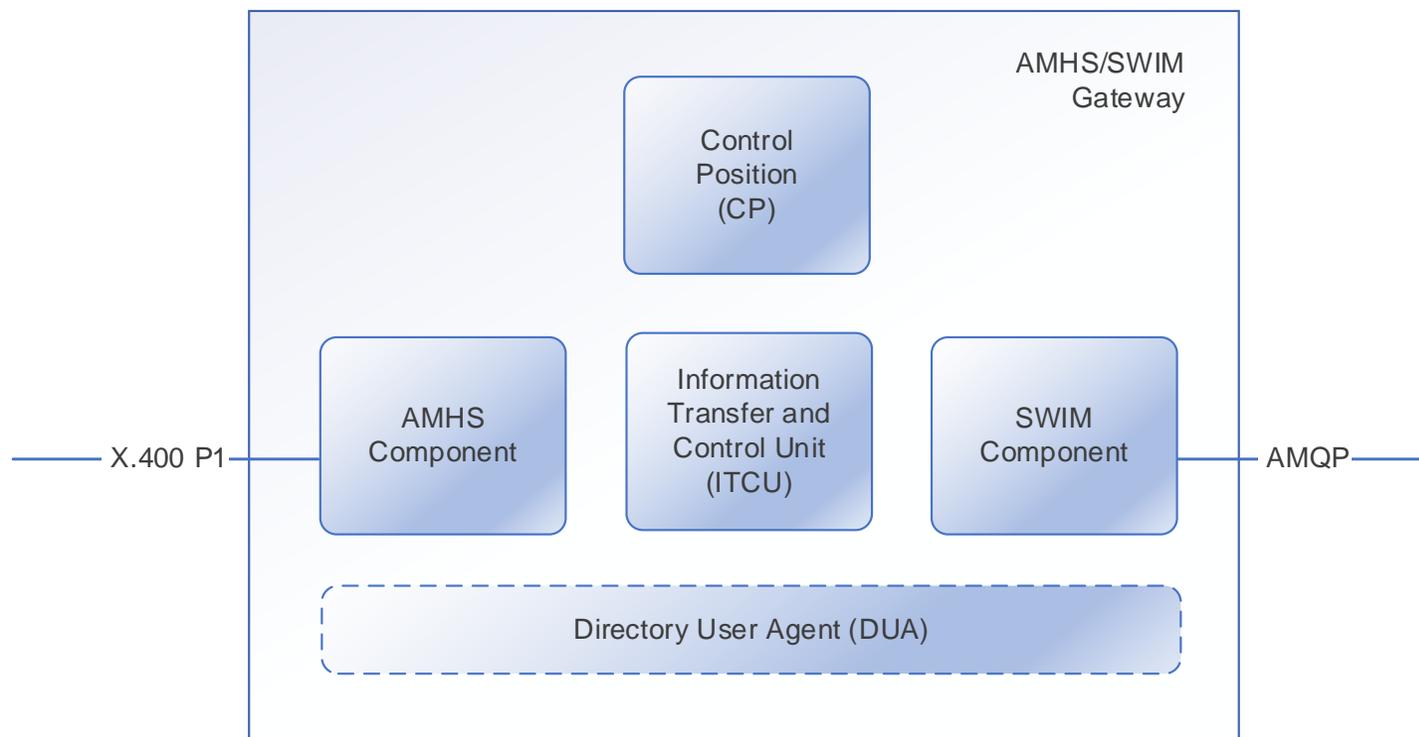


Chapter 4 – General & Gateway components

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



Chapter 4 – General & Gateway components





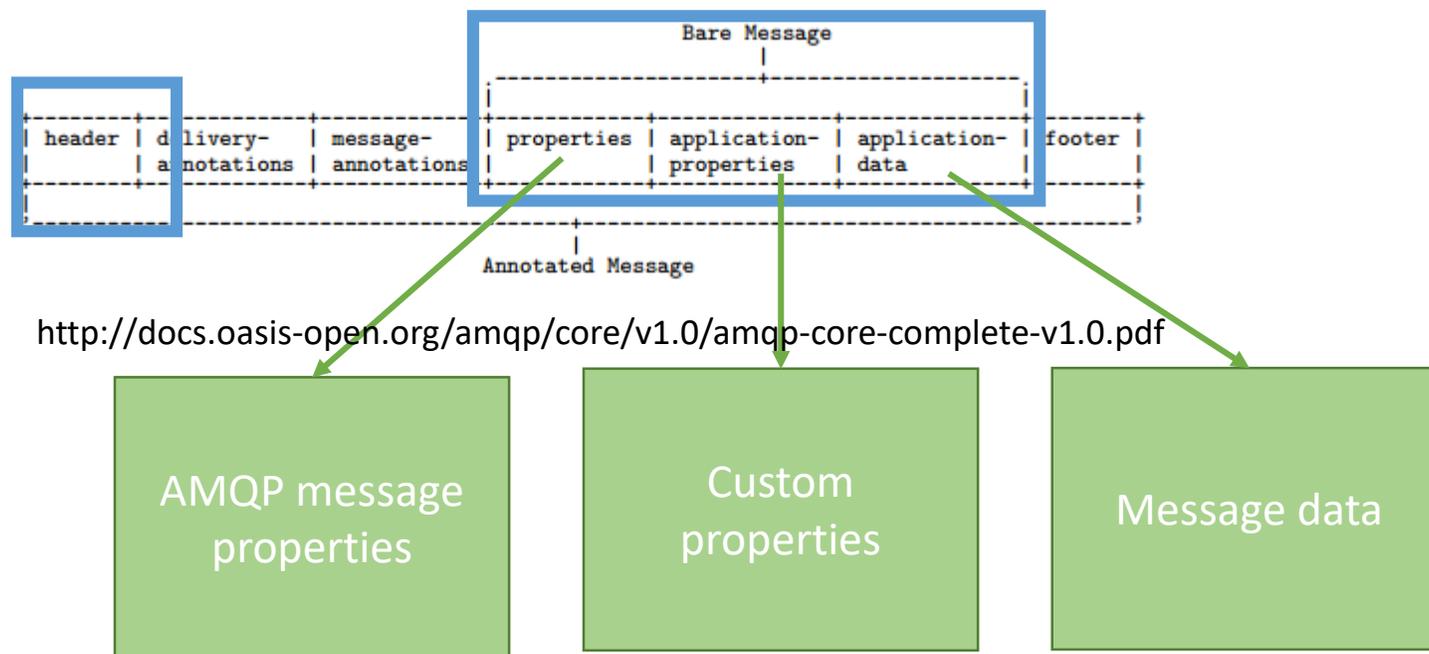
Chapter 4 – General Functions

- 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

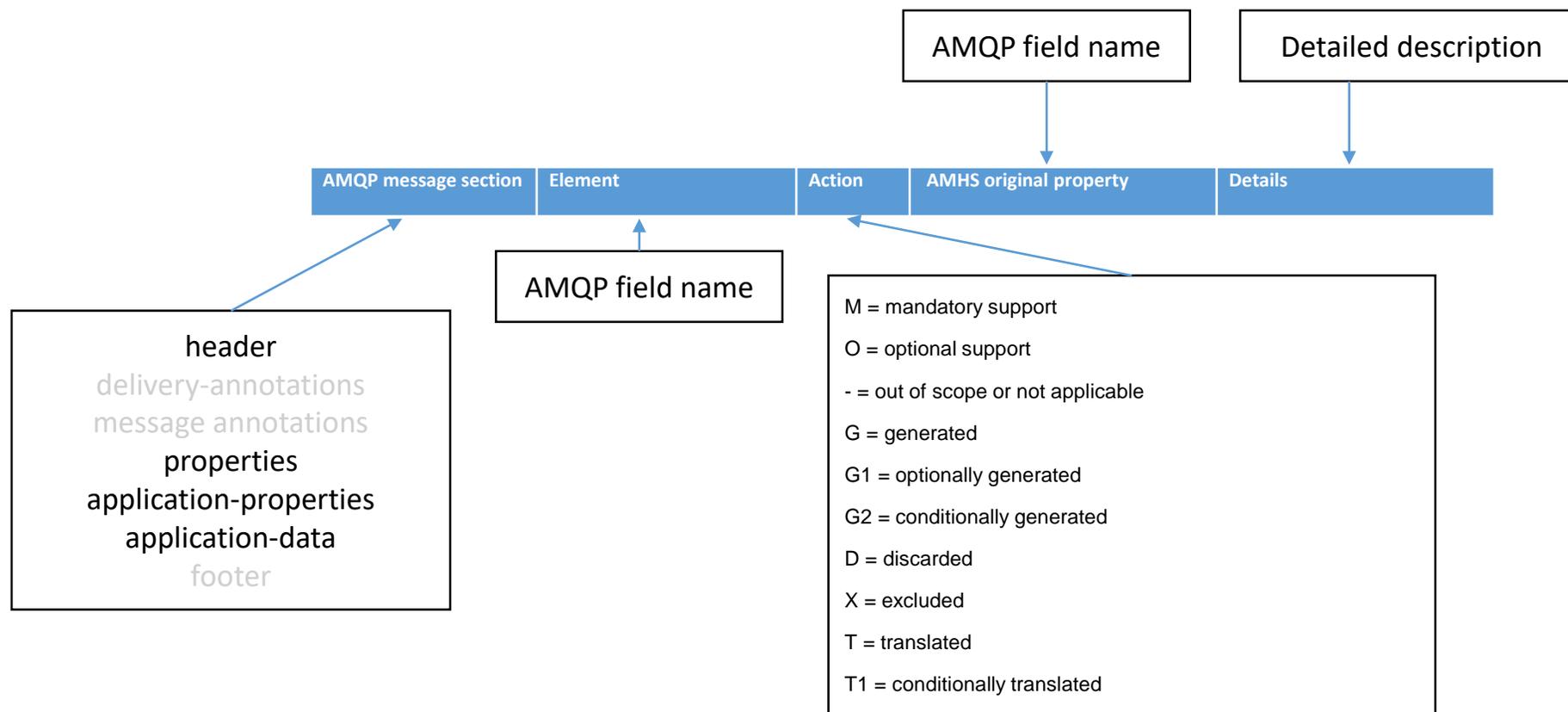


Chapter 4 – AMHS to SWIM – AMQP Message





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



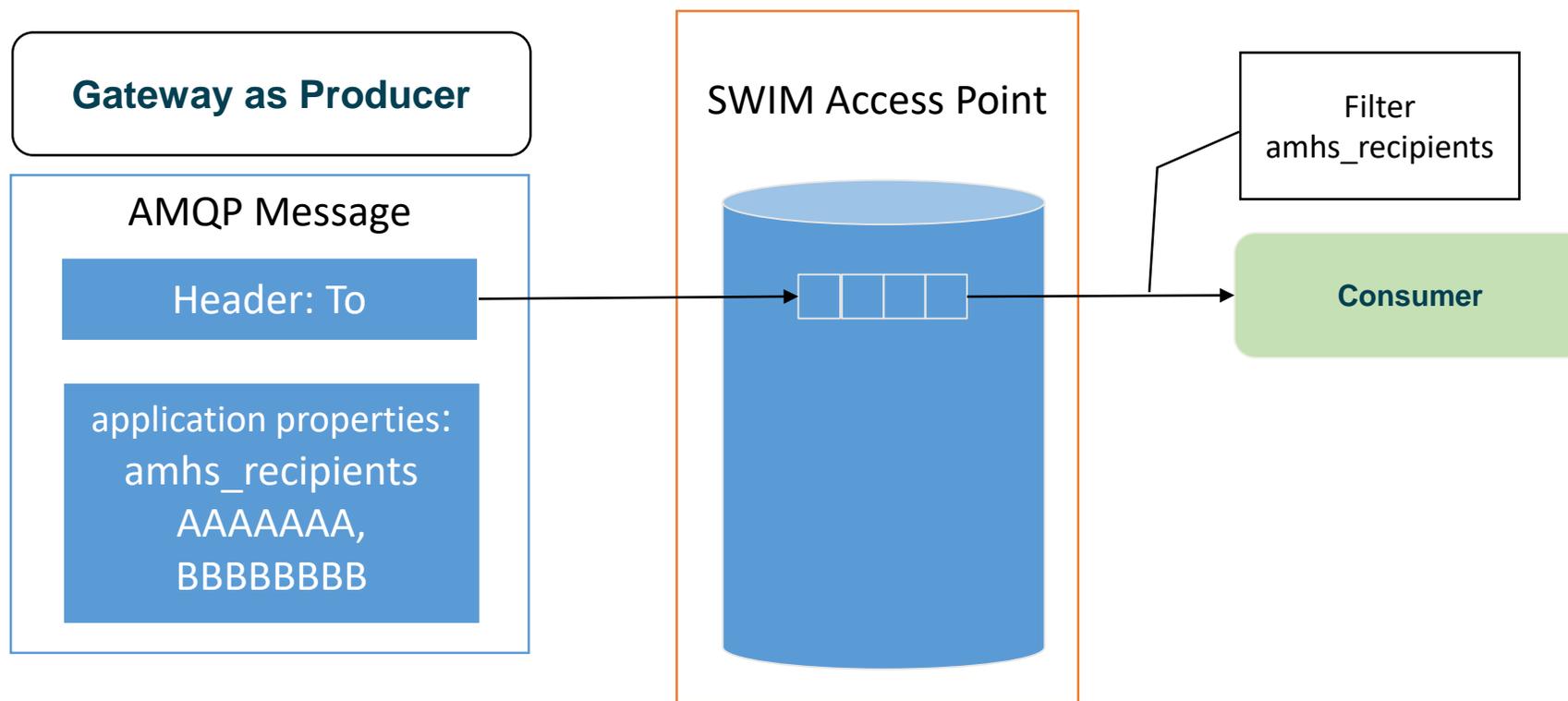
Chapter 4 – AMHS to SWIM – Recipients

- 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

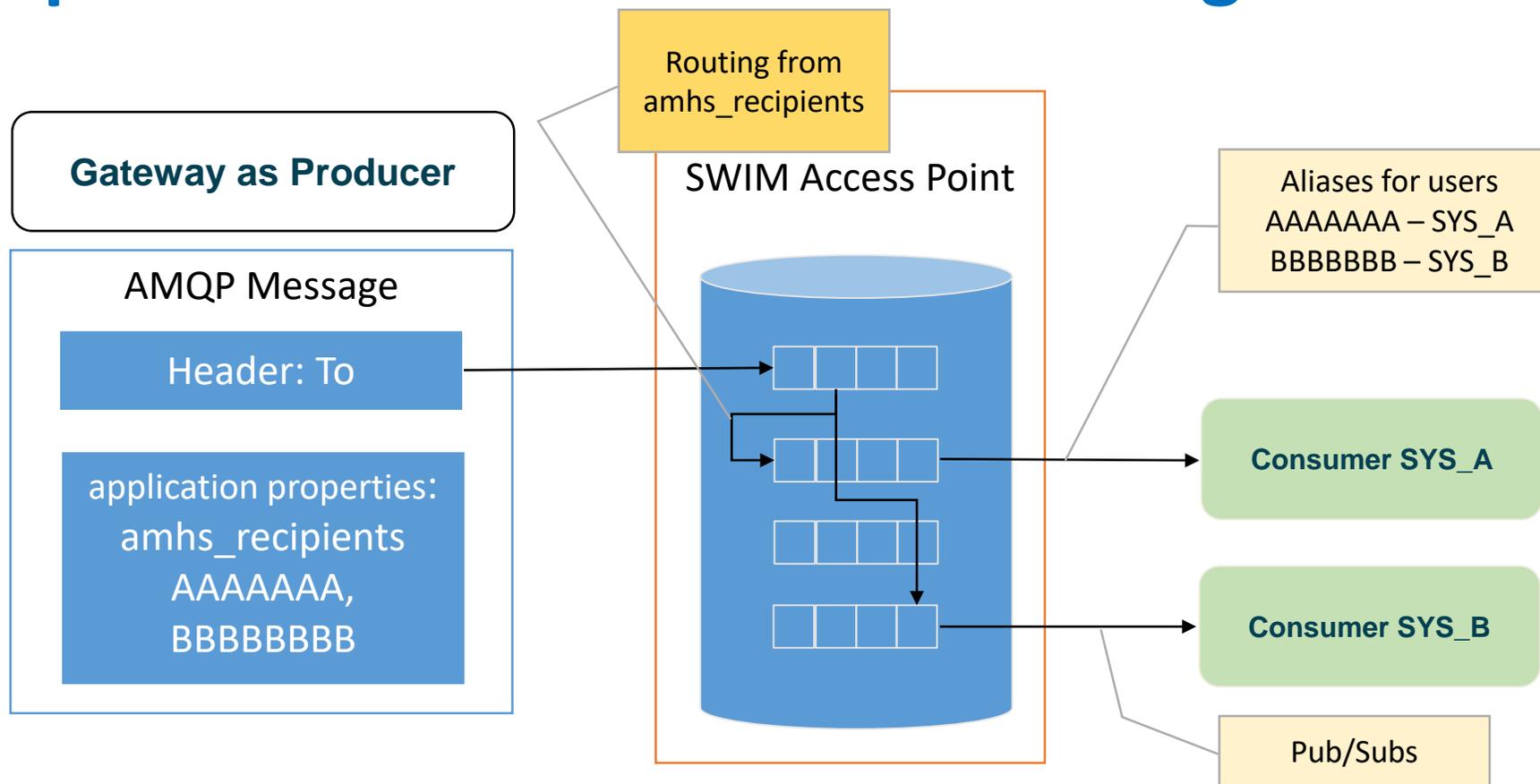


Chapter 4 – AMHS to SWIM – Routing on SWIM



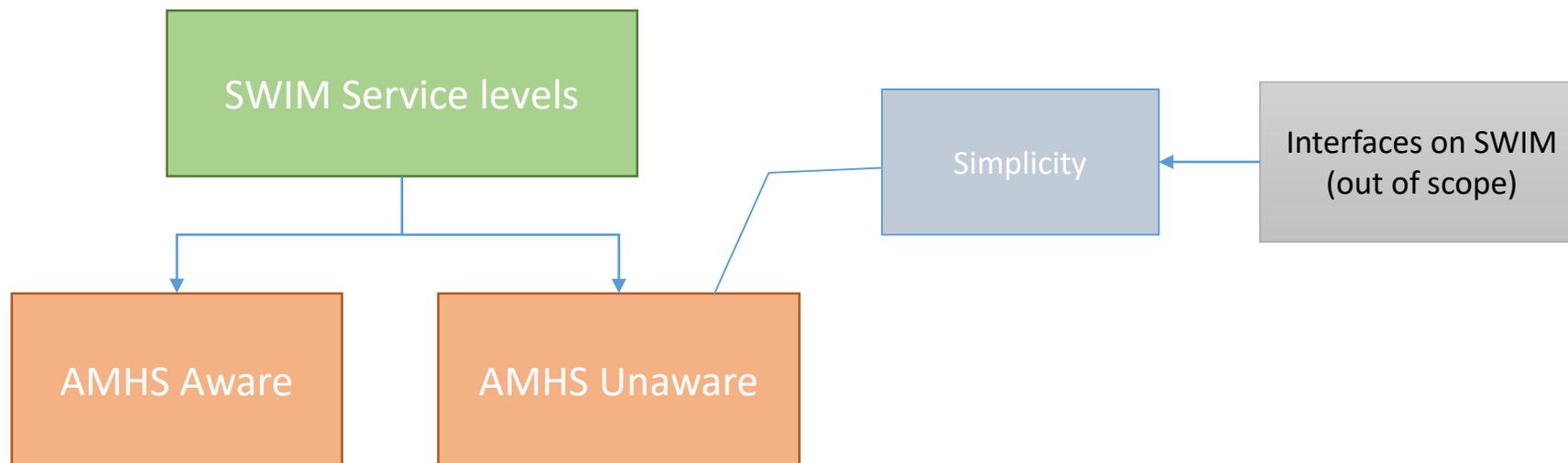


Chapter 4 – AMHS to SWIM – Routing on SWIM





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.



