EUR Doc 035

AMHS/Third Party Interconnection Architecture

Third Party Gateways in a mixed AFTN/AMHS environment	
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Scope of the Document

This document has been developed by a Subgroup of the AFSG Operations Group in order to fulfil Task 26 "Study operational issues and potential solutions for the operation of a SITA Type-X gateway in a mixed AFTN/AMHS environment" assigned by the 16th Meeting of the ICAO EUR Aeronautical Fixed Service Group (AFSG).

It provides a description of the current and future gateway architecture and analyses the different communication scenarios and potential solutions for the required address conversion.

Finally, a preferred solution is proposed and a list of resulting requirements is provided in order to ensure further communication between the AFTN/AMHS and the SITA Network based on modern communication protocols.

In April 2013 the document was approved by AFSG/17 and the AFSG Operations Group was tasked to support and monitor the implementation and propose updates to the document as needed.

In April 2015 the document was amended by AFSG/19 in order to reflect the real AMHS/SITA Gateway implementation.

Further refinements of sections, the communication scenarios from SITA Type B via AMHS to AFTN and vice versa, resulting AFTN/AMHS Routing requirements, the validation process of SITA User AFTN Addresses and findings of the AFSG/SITA workshop were incorporated and should be approved by AFSG/20 in April 2016.

The document was renamed in order to reflect the common principles, which are valid for all third-party providers communicating with the ICAO AMHS network, was approved by AFSG/20 in April 2016 and the status of an EUR Document (EUR Doc 035) was assigned.

In 2019 the document was updated in order to reflect the discussion during AFSG/23 and according to COG/74&RCOG/11 Decision /4 to rename the Group into the AFS to SWIM Transition Task Force (AST TF).

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References

ICAO Documentation

[1] ICAO Annex 10 – Aeronautical Telecommunications, Volume II and Volume III

[2] ICAO Doc 9880-AN/466: Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Part II – Ground-Ground Applications - Air Traffic Services Message Handling Services (ATSMHS), First Edition – 2010

[3] ICAO Doc 9880-AN/466: Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Part III – Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS), , First Edition – 2010

[4] ICAO Doc 9880-AN/466: Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Part IV – Directory Services, Security and Systems Management, First Edition – 2010

[5] ICAO Doc 9896-AN/469: Manual on the Aeronautical Telecommunication Network (ATN) using Internet Protocol Suite (IPS) Standards and Protocols, First Edition – 2010

[6] ICAO Doc 7910, Location Indicators

[7] ICAO Doc 8585, Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services

[8] EUR Doc 020 – EUR AMHS Manual, including Appendices A - G

[9] EUR Doc 021 – ATS Messaging Management Manual

[10] EUR Doc 027 (Provisional) – IP Infrastructure Test Guidelines for EUR AMHS

[11] Air Transport & Travel Industry, “TypeX Messaging Specification”, (System Communications & Reference Volume7), v2.0 First Publication - Sept 2009

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. Introduction

.. Purpose of the document

... The purpose of the document was to "Study operational issues and potential solutions for the operation of a SITA Type-X gateway in a mixed AFTN/AMHS environment" as it was assigned by the 16th Meeting of the ICAO EUR Aeronautical Fixed Service Group (AFSG) to the AFSG Operations Group.

... This document provides information about the current and future gateway architecture, discussed the different communication scenarios and considered potential solutions for the required address conversion.

... The target of the document was to provide a baseline for the selection and promotion of the most appropriate solution in order to ensure future communication between the AFTN/AMHS and the SITA Network based on modern communication protocols.

... The document was updated with additional information and requirements resulting from the initial actual implementations of interconnection between the AMHS and SITA networks.

... The status of an EUR document was assigned and the document provides now the common principles for the communication of third-party providers with the ICAO AMHS network as well as the AFTN/AMHS Routing requirements and the requirements for the validation process of SITA User AFTN Addresses especially and Third-Party User AFTN Addresses in general.

... In 2019 the ICAO EUR Aeronautical Fixed Service Group (AFSG) was replaced by ICAO EUR AFS to SWIM Transition Task Force (AST TF) according to COG/74&RCOG/11 Decision /4.

.. Document Structure

... *Chapter* . presents the purpose and the structure of the document.

... *Chapter* . contains a description of communication environment between AFTN and SITA Network.

... *Chapter* . describes the communication environment between AMHS and SITA Type X Network.

... *Chapter* . discusses the options how the representation of the SITA Type X user by its AFTN address could be defined in order to ensure a seamless communication in a mixed AFTN/AMHS environment.

... *Chapter* . contains the communication requirements for the AMHS/SITA Type X Gateway from the view point of AMHS.

... *Chapter* . lists the requirements concerning Underlying IP Infrastructure between the AMHS in EUR and the AMHS/SITA Type X Gateway.

... *Chapter* . describes the migration scenarios from the current AFTN/SITA Type B network interconnections to the future target architecture of interconnected AMHS and SITA Type X networks.

... *Chapter* . contains the road map for the interconnection between AMHS and the SITA Type X network.

... *Chapter* . describes the structure of the implemented AMHS/SITA Type X Gateway extended by an AFTN/AMHS Gateway (MTCU and AFTN component) and lists resulting requirements for the implementation and testing. Furthermore, the communication scenario between AMHS and Type B, the current and future interconnection topology, routing requirements, routing advices and the validation process for SITA User AFTN addresses were added.

... Attachment A provides the change control mechanism of the document.

... Attachment B provides the following tables:

- B.1 Conversion Table AFTN to SITA Type B addresses (IX Table)
- B.2 Conversion table SITA to AFTN addresses (XA Table)
- B.3 List of AFTN addresses for AFTN origin validation
- B.4 SITA User addresses for AMHS Interoperability Testing

. Present Communication architecture between AFTN and SITA

.. Overview

... SITA has been operating AFTN/SITA Type B Gateways for over 40 years. The gateways are currently connected via low and medium speed connections to AFTN COM Centres in several States.

... These inter-connections allow SITA customers to communicate with the AFS Network (AFTN/CIDIN) using the message type of their network. The AFTN/SITA Type B Gateway provides the necessary message conversion to enable seamless data exchange between both networks.

... Currently SITA operates 32 AFTN/SITA Type B Gateway connections. 15 gateway connections are provided in Europe.

... Approximately forty thousand messages are exchanged between SITA and the AFS network on a daily basis.

	Received by SITA from AFTN	**Transmitted by SITA to AFTN**	**Total**
Worldwide	18,883	16,394	35,277
EUR/NAT Region	12,803	7,089	19,892
One typical AFTN/SITA Type B Gateway connection in EUR	3,788	3,242	7,030

Table 1: Average traffic exchanged between AFTN and SITA network

... Globally approximately 1400 SITA addresses, including their allocated AFTN addresses, are configured in the AFTN/SITA Type B Gateways. These pair entries are used for the address translation SITA to AFTN and vice versa in the gateways for the messages sent to and/or received from the AFTN.

... An AFTN address table was implemented in the AFTN/SITA Type B Gateways which should provide AFTN originator validation for messages issued by SITA customers. The usage of this function is currently not sufficient.

.. European AFTN/SITA Type B Gateway connections in 2012

... The AFTN/SITA Type B Gateway connections in the EUR/NAT Region are provided with COM Centres in:

- Belgium
- Denmark
- France (2)

- Germany
- Greece
- The Netherlands (2)
- Portugal
- Russian Federation (2)
- Switzerland (2)
- Ukraine (2)

... The SITA customers with their dedicated AFTN addresses which are served by the AFTN/SITA Type B Gateways are listed in Attachment B, B.3.

... The AFTN/SITA Type B Gateways and their respective connections (X.25, low speed) are reaching the end of their lifetime.

.. Function of the AFTN/SITA Type B Gateway

... A typical interconnection of AFTN and SITA Network by an AFTN/SITA Type B Gateway is shown in Figure 1.

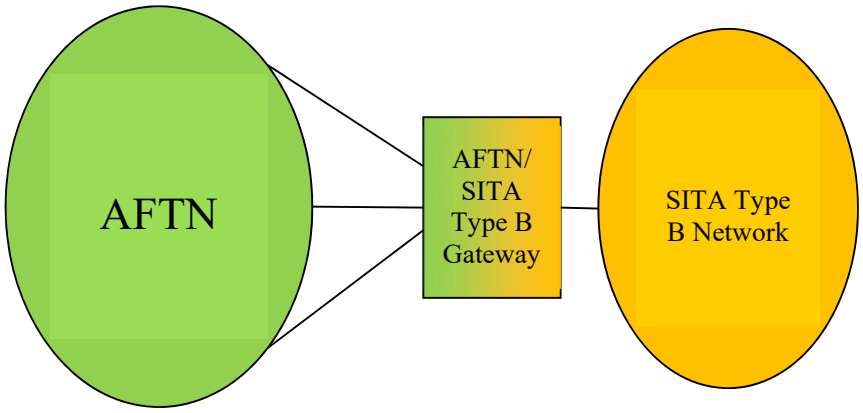

Figure 1: Typical interconnection of AFTN and SITA Network by an AFTN/SITA Type B Gateway

... Within the SITA Type B Network the SITA users transmit and receive messages in IATA Type B format.

... Within the AFTN the AFS users transmit and receive messages in AFTN format.

... The AFTN/SITA Type B Gateways allow SITA users to communicate to the AFTN and convert the messages into the correct format for the respective network.

... The function of the AFTN/SITA Type B Gateway is the conversion of addresses and message header from AFTN to SITA Type B and vice versa.

.. Message conversion in the AFTN/SITA Type B Gateway

... Outgoing conversion methods (from AFTN/SITA Type B Gateway to AFTN)

.... Envelope method

..... A SITA customer creates a message which is intended to be sent to an AFS user in AFTN format. This message is sent to the AFTN/SITA Type B Gateway directly (addressed to HDQYFXS) by means of a SITA Type B message-envelope. The embedded AFTN message is formally the "text" of the SITA Type B message.

..... The AFTN/SITA Type B Gateway strips the SITA Type B envelope before the embedded AFTN message is transmitted from the SITA side to AFTN.

..... The embedded AFTN message is routed to the "most appropriate" AFTN/SITA Type B Gateway connection. This means that the routing is performed according the "Routing on Origin" principle to the "nearest" COM Centre related to the AFTN originator address of the embedded AFTN message.

..... The following example illustrates the "envelope method":

Message generated by a SITA customer:

QU HDQYFXS .ZRHKKAF 220834	SITA Type B header with HDQYFXS as AFTN/SITA Type B Gateway address
FF LSSSYFYX 220834 LSAZAFRK text =	Embedded AFTN Message

Message sent to AFTN:

FF LSSSYFYX 220834 LSAZAFRK text	AFTN Message

Example 1: "Conversion" of a message from SITA network to AFTN

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

..... In case of Example 1 the "most appropriate" AFTN/SITA Type B Gateway is the gateway in Geneva; the AFTN originator address belongs to LSAZ – Zurich Area, ICAO Nationality Letter: LS, Switzerland.

..... The relation between the AFTN originator address of the embedded AFTN message and the origin in the SITA Type B header was not checked (no consistency check). This was under the responsibility of the SITA customer itself. Meanwhile a consistency check is introduced in order to ensure that only registered originators can sent messages to the AMHS.

..... However, the gateway checks the syntax of AFTN addresses and compares on SITA Type B site the addresses with specific lists in terms of address and access validity (which should mean that the address is allowed as an originator indicator).

.... Message conversion method

..... A SITA customer creates a message which is intended to be sent to an AFS user in AFTN format. In the SITA network this message is routed to the AFTN/SITA Type B Gateway because the SITA Type B address is known as an AFS user outside the SITA Type B network.

..... In order to derive the related AFTN Destination addresses e a mapping table (XA Table – mapping SITA to AFTN addresses, see Attachment B, B.2) is used in the AFTN/SITA Type B Gateway.

..... If the SITA Type B Originator exists in the mapping table, the associated AFTN address is used as AFTN Originator. Otherwise, as Originator address, the AFTN address of the respective gateway is used.

..... The AFTN/SITA Type B Gateway creates the AFTN message header and attaches the SITA Type B message as message text.

..... A typical message looks like:

Message generated by a SITA customer:

QN ATLXTNW .JAOXTXS 123456 FREE TEXT	SITA Type B header with ATLXTNW as Destination address routed to the AFTN/SITA Type B Gateway plus message text (FREE TEXT)

Message sent to AFTN:

GG KATLNMAZ 123456 WSSSSITX	AFTN Message header
QN ATLXTNW .JAOXTXS 123456 FREE TEXT	attached SITA Message

Example 2: Message conversion from SITA to AFTN

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

... Incoming conversion methods (from AFTN to AFTN/SITA Type B Gateway)

.... Envelope method

..... A message received from AFTN and addressed direct to the AFTN/SITA Type B Gateway (WSSSSITX) contains an embedded SITA Type B message. The embedded SITA Type B message is formally the "text" of the AFTN message.

..... The AFTN/SITA Type B Gateway strips the AFTN envelope before the embedded SITA Type B message is transmitted to the SITA Type B network.

..... The embedded SITA Type B message is routed to the clients listed in their address line.

..... The following example illustrates the "envelope method":

Message received from AFTN:

GG WSSSSITX 120123 VTBBZTZX	AFTN header with WSSSSITX as AFTN/SITA Type B Gateway address
QU SINXTSQ .ATLXTDL 121212 TEXT TEXT	embedded SITA Type B message

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

Message sent to an airline (SITA customer):

QU SINXTSQ .ATLXTDL 121212 TEXT TEXT	SITA Type B message

Example 3: "Conversion" of a message from AFTN to SITA network

..... The relation between the SITA originator address of the embedded SITA Type B message and the origin in the AFTN message header is not checked (no consistency check). This is under the responsibility of the AFTN originator itself.

..... However, the gateway checks the syntax of Type B message and the SITA Type B address validity.

.... Message conversion method (normal AFTN messages)

..... A normal message received from AFTN will be embedded into a SITA Type B envelope by the AFTN/SITA Type B Gateway.

..... The SITA address line is deduced from the ICAO priority and the AFTN Destination Address(es) found in the incoming AFTN message.

..... The SITA origin line is composed of:

- the SITA Service Address of the AFTN/SITA Type B Gateway connection from where the message has been received,
- the date/time group corresponding to the reception time of the AFTN message, and
- the information "AFTN" to indicate origin of the message.

..... The following example illustrates the "conversion method":

Message received from AFTN:

GG LFPSSITE 100525 LOOOYFYX text	AFTN Message

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

Message sent to an airline (SITA customer):

QN PARAEXS .PARYFXS 100530/AFTN	generated SITA Type B header
GG LFPSSITE 100525 LOOOYFYX text =	Embedded AFTN Message

Example 4: "Conversion" of a message from AFTN to SITA network

..... The AFTN Destination Addresses are converted by means of the IX Table (mapping AFTN to SITA addresses) (see Attachment B, B.1).

..... AFTN Destination Addresses which cannot be converted are intercepted as unknown AFTN addresses. The related AFTN COM Centre is informed by an AFTN SVC "ADS UNKNOWN" in order to make corrections or purge.

.... Message conversion method (addressing of a Pilot Address, e.g. WSSSSITA)

..... AFTN messages addressed to a Pilot Address (e.g. WSSSSITA) are converted by the AFTN/SITA Type B Gateway as follows:

..... First, the Pilot address, here WSSSSITA, is replaced by the addresses taken out from the first line of the message text.

..... Then, the Type B header is generated as described in .... – Message conversion method (normal AFTN messages).

..... The SITA address line is deduced from the ICAO priority and the AFTN Destination Address(es) found in the processed AFTN message. The AFTN Destination Addresses are converted by means of the IX Table (mapping AFTN to SITA addresses) (see Attachment B, B.1).

..... The SITA origin line is composed of:

- the SITA Service Address of the AFTN/SITA Type B Gateway connection from where the message has been received (e.g. SINXAXS),
- the date/time group corresponding to the reception time of the AFTN message, and
- the information "AFTN" to indicate origin of the message.

..... The following example illustrates the "conversion method":

Message received from AFTN:

GG WSSSSITA 120123 VTBBZTZX	AFTN Message header
YBBBQFAX TEXT TEXT	AFTN Message text

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

Message sent to an airline (SITA customer):

QN BNEXTQF .SINXAXS 120123AFTN	generated SITA Type B header
GG YBBBQFAX 120123 VTBBZTZX TEXT TEXT	processed AFTN Message

Example 5: "Conversion" of a message from AFTN to SITA network

.. Communication scenarios

... Introduction

.... The following communication scenarios describe the typical message flows in the current AFTN/SITA Type B environment.

.... The descriptions should help to identify future potential communication requirements.

.... In the scenarios the following communication partners are involved:

- SITA Type B user: The Operations manager of Lufthansa in Frankfurt. His SITA Type B address is FRA2OLH.
- AFTN (AFS) user: The Operator in Tower Heathrow. Its AFTN Address is EGLLZTZX.

.... A fictive message exchange between both communication partners is the base of the following scenarios:

... Scenario from SITA to AFTN

.... Message flow

..... The SITA Type B user wishes to send a message from his SITA Terminal to the Tower in Heathrow in order to inform them about an event which is not related to IFPS. Figure 2 shows the expected message flow.

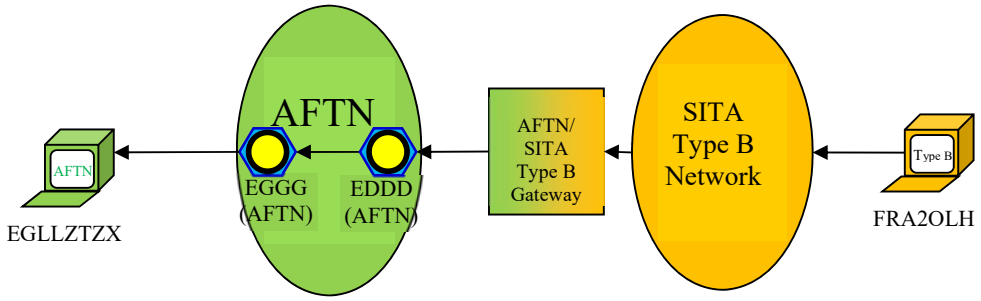

Figure 2: Message flow from a SITA Type B to an AFTN Terminal

.... Generation of the message

..... The following message is generated by the Operations manager of Lufthansa in Frankfurt:

```
QU HDQYFXS                                  } SITA Type B header
.FRA2OLH 220944
GG EGLLZTZX                                 }
220944 EDDFDLHO                             }
PLEASE CONFIRM THE FOLLOWING                } Embedded AFTN
TEXT                                        } Message
text                                        }
=
```

Example 6: Embedded AFTN message

..... The message is routed within the SITA Type B network to the AFTN/SITA Type B Gateway.

.... Conversion of the message in the AFTN/SITA Type B Gateway

..... The AFTN/SITA Type B Gateway removes the SITA envelope, identifies the appropriate Gateway connection following the principle "Routing by Originator" and finally sends the following AFTN message to the COM Centre Frankfurt:

```
GG EGLLZTZX                                 }
220944 EDDFDLHO                             }
PLEASE CONFIRM THE FOLLOWING                } AFTN Message
TEXT                                        }
text                                        }
```

Example 7: Converted AFTN message

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

.... Switching of the AFTN message by COM Centres EDDD and EGGG

..... The COM Centre Frankfurt receives the above message and delivers it via the AFS (COM Centre London) finally to the AFTN Terminal of the Tower of Heathrow EGLLZTZX.

... Scenario from AFTN to SITA

.... Message flow

..... Due to the content of the AFTN message received, the Operator in the Heathrow Tower will send back to the origin the requested confirmation. Figure 3 shows the expected message flow.

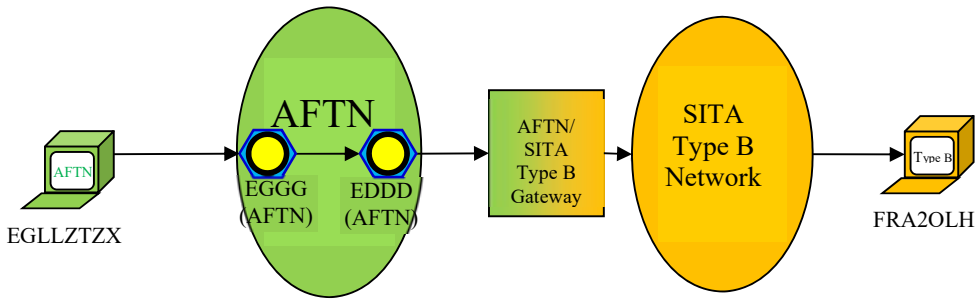

Figure 3: Message flow from an AFTN to a SITA Type B terminal

.... Generation of the message

..... The Operator in the Heathrow Tower generates the following AFTN message:

```
ZCZC ...
GG EDDFDLHO
220954 EGLLZTZX
CONFIRM RECEPTION OF YR 220944
EDDFDLHO
BRGDS EGLLZTZX
NNNN
```

AFTN Message

Example 8: Generated reply AFTN message

.... Switching of the AFTN message by the COM Centre EGGG and EDDD

..... The COM Centre Frankfurt receives the above message via the AFS (COM Centre London) from the AFTN Terminal of the Tower of Heathrow EGLLZTZX.

..... Due to the fact that the COM Centre Frankfurt knows the AFTN address EDDFDLHO as a SITA Type B user, the above message is routed to the AFTN/SITA Type B Gateway interconnected with Frankfurt.

..... Within the AFTN Routing Table of COM Centre Frankfurt approximately 15 different AFTN Addresses for SITA Type B users are currently configured and routed to the AFTN/SITA Type B Gateway.

.... Conversion of the message in the AFTN/SITA Type B Gateway

..... The AFTN/SITA Type B Gateway derives the necessary attributes for the SITA envelope from the AFTN message and generates the respective SITA Type B message.

..... The AFTN address EDDFDLHO is known in the Gateway and the equivalent SITA Type B address FRA2OLH is derived (table-oriented address conversion, see IX Table Attachment B, B.1).

..... The SITA Type B network will deliver the message to the addressed SITA Type B user.

..... The addressed SITA Type B user receives the following SITA Type B message:

```
QN FRA2OLH                                          } SITA Type B
.FRAYFXS 220956/AFTN                                }   header
FF EDDFDLHO                                         }
220954 EGLLZTZX                                     }
CONFIRM RECEPTION OF YR 220944                      } embedded AFTN
EDDFDLHO                                            }   Message
BRGDS EGLLZTZX                                      }
=
```

Example 9: Embedded AFTN message (Reply)

.... Address conversion principle in the AFTN/SITA Type B Gateway

..... In the AFTN/SITA Type B Gateway the following address conversion principle within message conversion from AFTN to SITA Type B is used:

AFTN Address (8 letter)	**into**	**SITA Type B address (7 letter)**
Location indicator (4 letter, position 1-4**)**	→	**IATA Location code** (3 letter, position 1-3**)**
Three letter designator (3 letter, position 5-7)	→	**IATA Airline code** (2 letter, position 6-7)
Filler letter "X" or letter representing a department or division within the organization addressed (1 letter, position 8)	→	**Department code** (2 letter, position 4-5)

Table 2: Address conversion principle AFTN into SITA Type B

..... The address conversion tables for both directions of the AFTN/SITA Type B Gateway as of December 2012 are provided in Attachment B.

... Remarks regarding the message flow in the communication scenarios

.... For the message flow from AFTN to SITA, the AFTN COM Centres with interconnection to a SITA Type B Gateway have configured in their AFTN Routing Tables only the AFTN addresses of those SITA Type B users which are served locally.

.... AFTN addresses for SITA Type B users served by other COM Centres are not known and therefore not configured. Today, there is no specific indication in an AFTN address identifying a SITA Type B user in the AFTN.

.... For handling of exceptional cases, some COM Centres agreed special procedures bilaterally with adjacent COM Centres to ensure a coordinated routing of AFTN addresses for "other local" SITA Type B users.

.. Other European AFTN/SITA connections

Besides the AFTN/SITA Type B Gateways operated by SITA, two other kinds of interconnection between AFTN and SITA exist:

- AFTN connections to dedicated systems on SITA sites; and
- AFTN/SITA Type B Gateways operated by ANSPs or Organisations

... AFTN connections to dedicated systems on SITA sites

.... As an example for this kind of AFTN connections, the AFTN low speed connection between the UK message switch of COM Centre London and the SITA MET data servers is mentioned. On this connection circa 40,000 messages are transmitted daily.

.... The AFTN addresses used for sending data to the SITA MET system are UK addresses configured in the COM Centre London to be routed to SITA.

.... Currently no other connection of this kind exists in Europe. A second one is established to the COM Centre operated by NAV Canada.

.... Even if such connections are separated from the current Type B messaging environment and not used for exchanges between SITA Type B users and AFS users, it is extremely important to be aware of any AFTN links that are in place.

.... Due to the global nature of the interconnections between AFS and SITA these connections have to be known and taken into account in the planning of any future migration.

... Non-SITA AFTN/SITA Type B Gateways

.... Additional to the AFTN/SITA Type B Gateways operated by SITA as mentioned in the previous Sections .. to .., a number of AFTN/SITA Type B Gateways are operated under the responsibility of ANSPs, Organisations and/or State COM Centres.

.... The functions of these gateways are identical to the functions described in Section ...

.... These Gateways are connected directly to the SITA Type B messaging environment using the SITA Type B messaging format.

.... The AFTN routing to the Gateway is a local matter and transparent for the international network. The AFTN addresses used for the message exchange (AFTN addresses representing SITA users and the AFTN addresses of AFS users) are locally known and configured.

.... The number of existing Gateways in Europe and worldwide is not documented at the AFS side. However, due to the global nature of the interconnections between AFS and SITA these gateway connections have to be respected in the planning of any future migration.

.... A special case is the Access Node to the SITA Type B network operated by EUROCONTROL, Network Manager (NM).

.... Currently it is ensured that between the both networks, AFTN and SITA Type B, no interconnection is established. The concerned applications (IFPS[1] and ETFMS[2]) are operating independently with the separated networks.

.... This separation shall be continued from the AFS point of view when the AFTN/CIDIN communication of the EUROCONTROL, Network Manager (NM) applications is migrating to AMHS.

[1] Initial Flight Plan Processing System

[2] Enhanced Tactical Flow Management System

. Description of future architecture

.. Evolution of the SITA messaging environment

... The evolution of the SITA messaging environment is based on the IATA Type X Messaging Specification [11], which is a messaging standard based on XML and Web service technologies ratified by IATA in September 2009.

... IATA Type X standard supports message delivery between SITA Type X users.

... The communication between SITA Type X users and users outside of the Type X environment is ensured via dedicated Type X Gateways. In case of AMHS, the dedicated gateway is called for the purpose of this document "AMHS/SITA Type X Gateway".

... All addresses in the Type X Messaging environment (Destination and Originator addresses) are of ***TXM_Address*** type composed of three elements according to [11], 4.5:

- One TypeX_address,
- Zero or one ***SubAddress,***
- Zero or one FreeFormName.

... The ***TypeX_address*** is the logical address of a specific user. The ***SubAddress*** is specified for nodes that are not addressable directly by a Type X address (the ***SubAddress*** carries the actual originator or receiver address in its own messaging environment). The ***FreeFormName*** associates an optional name. ([11], 4.5)

... In the context of AMHS only the ***TypeX_address*** is relevant which consists of:

- one ***City*** field to identify a city code (or location code),
- one ***Department*** field to identify a department code,
- one ***Airline*** field to identify an airline or more generally an organisation code,
- ***Auxiliary*** field (to identify an organisation using a shared airline code).
  This field is not used for AMHS communication.

... The relevant fields of the Type X address itself consists of:

- City Code: on 3 or 4 alphabetic characters (IATA or ICAO code)
- Department Code: on 1 to 3 alphanumeric characters
- Airline Code on 2 or 3 alphanumeric characters (IATA or ICAO code)

... Type X City, Department and Airline codes correspond to the current Type B address city, department and airline codes, keeping the possibility to increase each field by 1 character. ([11], 14.1)

... A Type X Address (***TypeX_address***) is defined in XML as:

<TYPEX_Address>

<Airline>airlinecode</Airline>
<City>citycode</City>
<Department>departmentcode</Department>

</TYPEX_Address>

... From the above Type X Address (***TypeX_address***) other address elements are derived to ensure an optimal routing of the messages in the Type X environment (e.g. the Type X gateway address used in the transport header for identifying the target Type X node). The full address of the end user is composed of the Type X gateway address completed by the end user address in its own messaging environment. (see [11], 14.1)

... The routing of the message is performed according to the Type X gateway address up to the gateway. (see 4.3 and 4.4 of [11])

... In the context of communication to and from AMHS, the Type X addresses always represents AFTN Addresses both as Destination and as Originator. Therefore, in a message sent to AMHS the originator address consists of the Type X address representing the AFTN address of the SITA user, which could be the same as used today in the SITA Type B environment.

... To ensure the correct routing within the SITA Type X network, all Type X addresses with 4 letters in the address attribute "City" (ICAO code) are listed in tables in which for the full qualified AFTN address the corresponding target Type X node (Type X gateway address) is assigned. Such a target Type X node (Type X gateway address) can be either the AMHS/SITA Type X Gateway (if AFS users are addressed) or the Type X node serving the SITA user.

... More comprehensive details could be found in [11].

.. AMHS/SITA Type X Gateway

... The AMHS/SITA Type X Gateway is the "bridge" between AMHS and the SITA Type X messaging environment. The typical interconnection between the existing and future networks is shown in Figure 4.

... The AMHS/SITA Type X Gateway can be connected to an AMHS COM Centre which also provides, during the transition, AFTN/AMHS Gateway services for AFTN/CIDIN users. In such a configuration the AMHS/SITA Type X Gateway is not only connected to the AMHS - it is connected to an AFTN/AMHS Gateway as well.

... SITA plans to establish two AMHS/SITA Type X Gateways with one connection to Europe and one to Asia (see Figure 4).

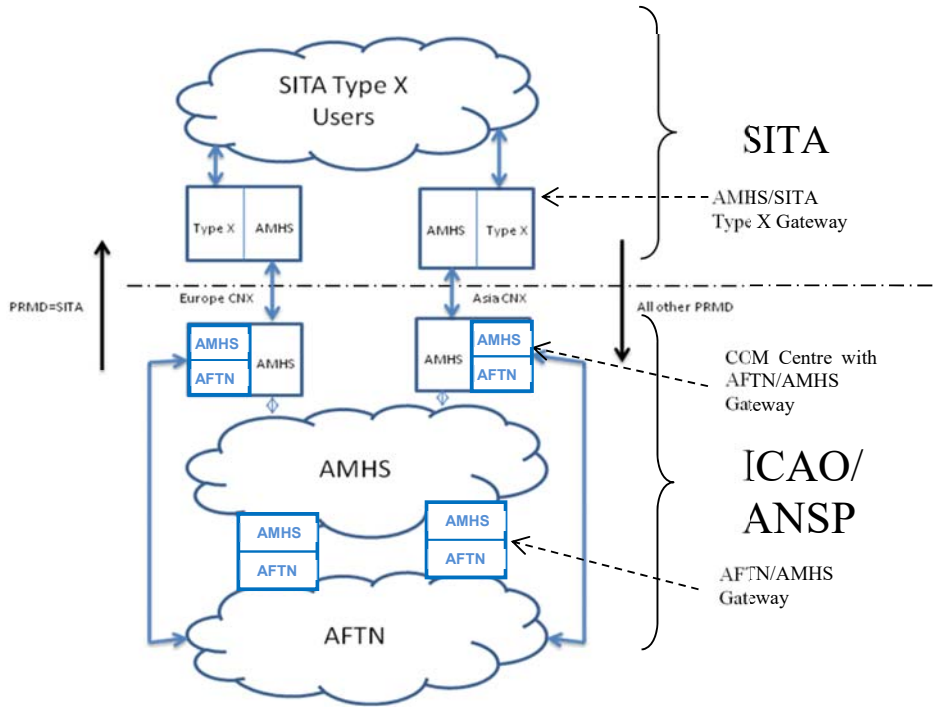

Figure 4: Planned interconnections between AFTN, AMHS and SITA Type X Network

.. Message and address conversion in the AMHS/SITA Type X Gateway

... The move to the new communication environment at SITA side (Type X) requires interconnection to AMHS in the near future to enable continued support of data exchange between ATS Organizations using AMHS and SITA customers using Type X communication.

... The guiding principle should be to provide address transparency to both kind of users (AMHS and SITA Type X).

... An AMHS user within the AMHS network should be able to address a SITA Type X user using its AMHS address (SITA Type X users are being seen as AMHS user with PRMD=SITA).

... A SITA Type X user within the SITA Type X network should be able to address an AMHS user using the corresponding Type X address (AMHS users are being seen in the SITA Type X environment as SITA Type X users in principle, with an ICAO code in the Type X address element "City". All Type X address elements are derived from the AFTN address within the O/R address – either common-name or organisational-unit-name-1 depending on the addressing scheme).

... The AMHS originator address of a SITA Type X user will be created in the AMHS/SITA Type X Gateway. In accordance with the addressing scheme declared by SITA, the generic resulting O/R address representing the SITA Management Domain (PRMD=SITA) will look like:

CAAS: /C=XX/A=ICAO/P= SITA/O= TYPE-X/OU1=<LOC1>/CN=<AFTNADDR>/

Where <AFTNADDR> – AFTN address representing the SITA Type X user and
<LOC1> – first four letters of the <AFTNADDR>

... The AMHS/SITA Type X Gateway supports the conversion of message delivery reports which could be mapped to equivalent AMHS delivery reports and vice versa, facilitating end to end delivery assurance and tracking in an interconnected environment.

.. Communication scenarios in a mixed AFTN/AMHS environment

... Introduction

.... The following communication scenarios describe typical expected message flows between a SITA Type X Gateway and two different AFS environments:

1. a pure AMHS communication environment,

2. a mixed AFTN/AMHS communication environment.

.... Resulting potential requirements for future communication will be summarised in Chapter ..

.... In the scenarios following communication partners are involved:

- SITA Type X user: The Station manager of Air France in Paris Charles de Gaulle airport. His SITA Type X address in XML format (TypeX_address – Type X Address) is:
  <Airline>AFR</Airline>
  <City>LFPG</City>
  <Department>X</Department>
  which is equivalent to the AFTN address LFPGAFRX representing the SITA user in the AFTN environment.

- Direct AMHS User: The Operator of Tower in Madrid
  His AMHS O/R address is /C=XX/A=ICAO/P=SPAIN /O=LEEE/OU1=LEMA/CN=LEMAZTZX/.
  His AFTN Address is LEMAZTZX.

- AFTN (AFS) user: The Operator of Tower in Ibiza. His AFTN Address is LEIBZTZX.
  His indirect AMHS user address (O/R address) is:
  /C=XX/A=ICAO/P=SPAIN /O=LEEE/OU1=LEIB/CN=LEIBZTZX/.

.... A fictive message exchange among them is the base of the following scenarios:

... Scenario from SITA Type X to AMHS

.... Message flow

..... The SITA Type X user wishes to send a message from its SITA Type X Terminal to the Direct AMHS User in order to inform him about a special event which requires an active answer.

..... Figure 5 shows the Message flow from a SITA Type X terminal to an AMHS User Agent (UA) via the involved network elements. The switching nodes within the AMHS are the MTAs (Message transfer agents) while at SITA side Type X nodes are used.

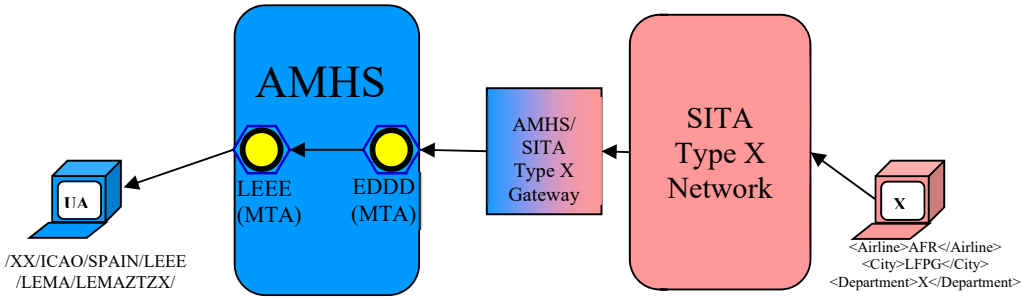

Figure 5: Message flow from a SITA Type X terminal to an AMHS UA

.... Generation of the message

..... The following message is generated by the Station manager of Air France in Paris Charles de Gaulle airport (SITA Type X user).

<Airline>AFR</Airline> <City>LFPG</City> <Department>X</Department>	SITA Type X Originator address
<Airline>ZTZ</Airline> <City>LEMA</City> <Department>X</Department>	SITA Type X Destination Address
PLEASE CONFIRM THE FOLLOWING TEXT text =	Message text

Example 10: Type X message

Note.– In this example only a part of the Type X message schema is shown. For the full Type X message schema see [11].

..... The SITA Type X Destination Address (***TypeX_address***) defines the targeted receiver.

..... In this example the SITA Type X message is routed within the SITA Type X network to the AMHS/SITA Type X Gateway, due to the ICAO code in the Type X address attribute "City" and the resulting mapping of the full Type X address.

.... Conversion of the message in the AMHS/SITA Type X Gateway

..... The AMHS/SITA Type X Gateway converts the Type X message and its attributes into an AMHS (X.400) message.

..... The following main AMHS attributes / X.400 message elements form the AMHS Message:

/C=XX/A=ICAO/P=SPAIN/O=LEEE/OU1=LEMA/CN=LEMAZTZX/ /C=XX/A=ICAO/P=SITA/O=TYPE-X/OU1=LFPG/CN=LFPGAFRX/ GG 220944 PLEASE CONFIRM THE FOLLOWING TEXT text	- X.400 Recipient address - X.400 Originator address - Message Priority - Filing time } Message text

Example 11: Main attributes of an AMHS message

Note.– LFPGAFRX represents the AFTN address of the SITA Type X user.

..... The converted message (AMHS) is sent from the AMHS/SITA Type X Gateway MTA to the MTA of the adjacent COM Centre; in this scenario MTA-EDDD-1.

Note.– The AMHS/SITA Type X Gateway needs to include an MTA in order to be able to communicate with AMHS COM Centres.

.... Switching of the AMHS message by the MTA of the involved COM Centres EDDD and LEEE

Note.– In AMHS a COM Centre will be represented technically by its MTA.

..... The MTA-EDDD-1will receive the above message and forward the message to MTA-LEEE-1 (PRMD=SPAIN) which will deliver the message to the User Agent (UA) of the Madrid Tower – /C=XX/A=ICAO/P=SPAIN/O=LEEE/OU1=LEMA/CN=LEMAZTZX/.

... Scenario from SITA to AFTN via AMHS

.... Message flow

..... Assume that the above SITA Type X user (Station manager of Air France in Paris Charles de Gaulle airport) has addressed the Tower of Ibiza equipped with an AFTN Terminal (LEIBZTZX) instead of the Direct AMHS User “Madrid Tower”. Figure 6 shows the expected message flow.

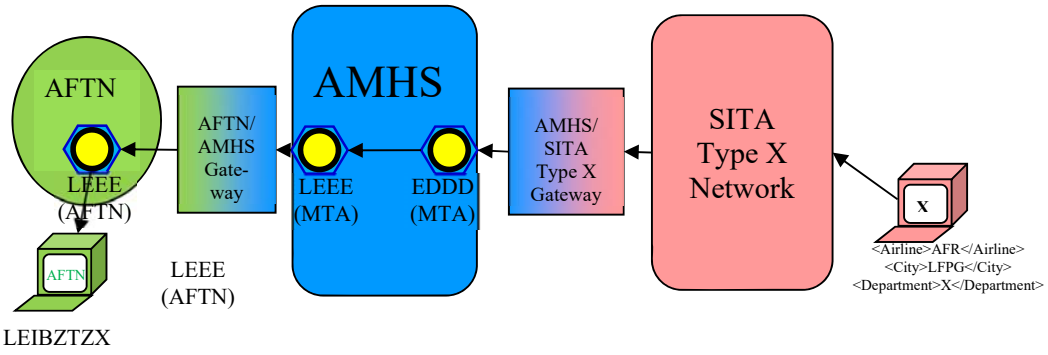

Figure 6: Example for a Message flow from SITA Type X to AFTN via AMHS

..... In this case, the message flow is the same till MTA-LEEE-1 as described in the previous flow, but the MTA-LEEE-1 will route the message to the MTCU of the AFTN/AMHS Gateway of COM Centre LEEE.

.... Conversion of the message in the AFTN/AMHS Gateway

..... The AFTN/AMHS Gateway of COM Centre LEEE converts the message to an AFTN message using the described AMHS message attributes:

/C=XX/A=ICAO/P=SPAIN/O=LEEE/OU1=LEIB/CN=LEIBZTZX/	- X.400 Recipient address
/C=XX/A=ICAO/P=SITA/O=TYPE-X/OU1=LFPG/CN=LFPGAFRX/	- X.400 Originator address
GG	- Message Priority
220944	- Filing time
PLEASE CONFIRM THE FOLLOWING TEXT text	} Message text

Example 12: Main attributes of the AMHS message to "Ibiza Tower"

..... The following AFTN message is generated by the AFTN/AMHS Gateway of COM Centre LEEE:

ZCZC GG LEIBZTZX 220944 LFPGAFRX PLEASE CONFIRM THE FOLLOWING TEXT text NNNN	} AFTN Message

Example 13: Converted AFTN message to "Ibiza Tower"

..... The AFTN part of the COM Centre LEEE receiving the above message from the AFTN/AMHS Gateway forwards it to the AFTN Terminal of the Tower of Ibiza LEIBZTZX.

... Scenario from AMHS to SITA

.... Message flow

..... Due to the content of the AMHS message received, the Operator in the Madrid Tower sends back to the originator the requested confirmation. Figure 7 shows the expected message flow.

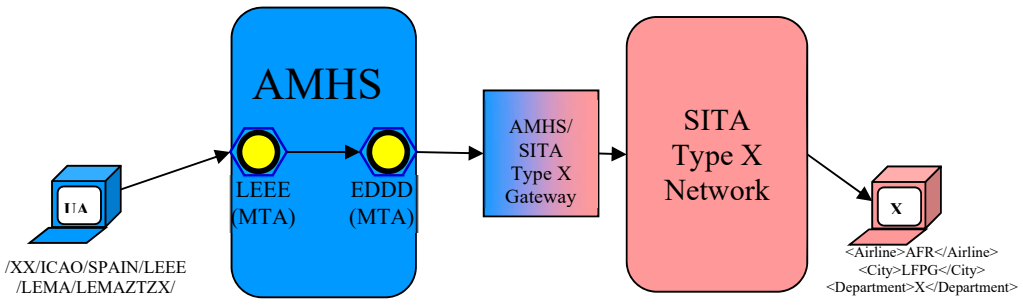

Figure 7: Example for a Message flow from SITA Type X to AMHS

.... Generation of the message from a UA

..... The Operator in the Madrid Tower creates an AMHS message with following AMHS/X.400 attributes at his User Agent (UA):

/C=XX/A=ICAO/P=SITA/O=TYPE-X/OU1=LFPG/CN=LFPGAFRX/	- X.400 Recipient address
/C=XX/A=ICAO/P=SPAIN/O=LEEE/OU1=LEMA/CN=LEMAZTZX/	- X.400 Originator address
GG	- Message Priority
220954	- Filing time
CONFIRM RECEPTION OF YR 220944 LFPGAFRX BRGDS LEMAZTZX	} Message text

Example 14: Main attributes of the AMHS message from UA

..... The User Agent (UA) submits the AMHS message to MTA-LEEE-1.

.... Switching of the AMHS message by the COM Centre MTAs (LEEE, EDDD)

..... The MTA-LEEE-1 routes PRMD=SITA to MTA-EDDD-1while MTA-EDDD-1 routes PRMD=SITA to the MTA of the AMHS/SITA Type X Gateway.

..... In the X.400 Routing Tables of all MTAs a routing entry for PRMD=SITA is provided. This is also valid for each other PRMD name.

.... Conversion of the message in the AMHS/SITA Type X Gateway

..... The AMHS/SITA Type X Gateway derives all necessary information for the SITA Type X message from the AMHS message attributes.

..... The addressed SITA Type X user receives the following SITA Type X message:

<Airline>ZTZ</Airline> <City>LEMA</City> <Department>X</Department>	} SITA Type X Originator address
<Airline>AFR</Airline> <City>LFPG</City> <Department>X</Department>	} SITA Type X Recipient address
CONFIRM RECEPTION OF YR 220944 LFPGAFRX BRGDS LEMAZTZX =	} Message text

Example 15: Converted Type X message

.... Address conversion principle in the AMHS/SITA Type X Gateway

..... In the AMHS/SITA Type X Gateway following mapping for the address conversion from AMHS to SITA Type X is used:

AFTN address (example: LEMAZTZX)	→	**SITA Type X address (8 letter)**
Location indicator (4 letters)	→	<City>LEMA</City>
Three letter designator (3 letters)	→	<Airline>ZTZ</Airline>
Filler letter "X" or letter representing a department or division within the organization addressed (1 letter)	→	<Department>X</Department>

Table 3: Address conversion principle AMHS into SITA Type X

..... In the AMHS/SITA Type X Gateway the validity and access rights of the converted addresses are checked using the table based approach.

... Scenario from AFTN via AMHS to SITA

.... Message flow

..... Different to the above scenario, the Tower of Ibiza (Indirect AMHS User) replies to the message provided in ... from its AFTN Terminal (LEIBZTZX). Figure 8 shows the expected message flow.

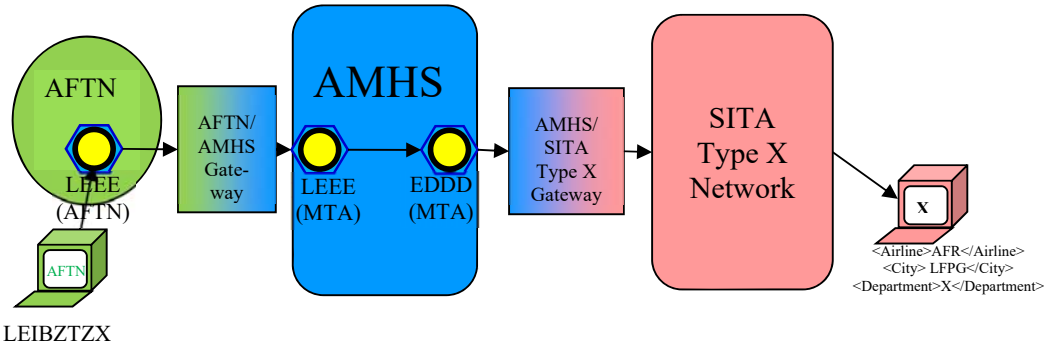

Figure 8: Example for a Message flow from AFTN to SITA Type X via AMHS

.... Generation of the message from an AFTN terminal

..... The Tower Operator of Ibiza (Indirect AMHS User) creates from its AFTN Terminal following responding AFTN message:

```
ZCZC ...
GG LFPGAFRX
220954 LEIBZTZX
CONFIRM RECEPTION OF YR 220944
LFPGAFRX
BRGDS LEIBZTZX
NNNN
```

AFTN Message

Example 16: Generated AFTN message from "Ibiza Tower"

.... Switching of the AFTN message by the COM Centre serving LEIBZTZX

..... The AFTN part of the COM Centre in Madrid receiving the above message from the AFTN Terminal of the Tower of Ibiza LEIBZTZX forwards the message to the AFTN/AMHS Gateway.

..... **Attention:** The above AFTN message with Destination Address LFPGAFRX is only routed to the AFTN/AMHS Gateway in Madrid, if a full qualified entry for LFPGAFRX in the AFTN Routing Table exists pointing to the AFTN/AMHS Gateway. In all other cases the message will be routed in accordance with the routing of the Nationality Letters LF to the COM Centre of France in Bordeaux.

.... Message conversion in the AFTN/AMHS Gateway

..... The AFTN/AMHS Gateway converts the AFTN message into an AMHS message with following AMHS message attributes:

/C=XX/A=ICAO/P=SITA/O=TYPE-X/OU1=LOC1/CN=LFPGAFRX/	- X.400 Recipient address
/C=XX/A=ICAO/P=SPAIN/O=LEEE/OU1=LEIB/CN=LEIBZTZX/	- X.400 Originator address
GG	- Message Priority
220954	- Filing time
CONFIRM RECEPTION OF YR 220944 LFPGAFRX BRGDS LEIBZTZX	} Message text

Example 17: Main attributes of the AMHS message from "Ibiza Tower"

..... **Attention:** The address conversion of the AFTN Address "LFPGAFRX" into an O/R address of PRMD=SITA is only possible if the AFTN/AMHS Gateway is able to identify this address as an address representing a SITA Type X user. Otherwise this address would be converted into a "national" (French) O/R address and routed accordingly. In that case the message would never reach the AMHS/SITA Type X Gateway and so never reach the intended SITA Type X user.

.... Switching of the AMHS message by the involved COM Centre MTAs

..... In the positive case that the AFTN/AMHS Gateway has converted the AFTN message correctly in an AMHS message, the MTA-LEEE-1 routes PRMD=SITA to MTA-EDDD-1 while MTA-EDDD-1 routes PRMD=SITA to the MTA of the AMHS/SITA Type X Gateway.

.... Conversion of the message in the AMHS/SITA Type X Gateway

..... The message is converted as described in .... and finally delivered to the addressed SITA Type X user.

.. Transitional aspects from SITA Type B to SITA Type X

... With the evolution of the SITA messaging environment by creating the SITA Type X network, a Type B/Type X Gateway is in operation on SITA side in order to ensure the reachability of former Type B users migrated to Type X capabilities.

... There are two migration scenarios in the SITA messaging environment:

- migration of the end users from Type B to Type X capabilities; and

- migration from AFTN Type B to AMHS Type X gateways.

... The Type B/Type X Gateway will be used during both migration scenarios on SITA side which is seen as a longer process.

... From the view point of the AFS (either AFTN or AMHS) the Type B/Type X Gateway ensures that a SITA user remains reachable independent of an AFTN/SITA Type B Gateway or an AMHS/SITA Type X Gateway being used for communication.

... This configuration matter is under the responsibility of SITA and will be ensured in line with the progress of the different migration scenarios.

. Representation of SITA Type X users by their AFTN addresses

.. Introduction

... In a mixed AFTN/AMHS environment it is essential – as described in ..... (AFTN Routing) and ..... (Address Conversion) – that all AFTN addresses representing SITA Type X users can be identified as such.

... In the following Section the options will be discussed how an AFTN Address could be identified to represent a SITA Type X user. Two principle options are seen:

- Table based identification of SITA Type X users
- Use of a unique first letter in the AFTN address for SITA Type X users

.. Discussion of the options

... Option 1: Table based identification of SITA Type X users in AFTN

.... Principle

..... All SITA Type X users are listed with their AFTN addresses and O/R addresses (PRMD=SITA) in a special table.

..... This table will be used in:

- AFTN COM Centres to configure the exceptional AFTN Routing for all AFTN addresses representing SITA Type X users, and
- AFTN/AMHS gateways to configure the respective User address look-up table.

.... Exceptional routing of AFTN addresses representing SITA Type X users

..... In the AFS all messages with AFTN addresses representing SITA Type X users have to be routed towards the nearest AMHS island with a AMHS/SITA Type X connection (either in Europe or in Asia).

..... In order to fulfil this AFTN Routing requirement, certain AFTN COM Centres need additional entries in their AFTN Routing table for SITA Type X users. These entries are required in the AFTN COM Centre to ensure that the messages addressed to SITA are forwarded to an AFTN/AMHS Gateway.

..... The exceptional AFTN Routing must be configured in the following categories of AFTN COM Centres:

a) AFTN COM Centres of States with AFTN addresses of SITA users;

b) COM Centres with AFTN/AMHS Gateways;

c) AFTN COM Centres which are in the routing path between an AFTN COM Centre corresponding to case a) above, and the nearest COM Centre corresponding to case b) above.

..... In an environment with few AFTN/AMHS Gateways, it could be needed to configure the exceptional routing in all AFTN Centres. Conversely, category c) is not required, if all COM Centres of category a) above either include an AFTN/AMHS Gateway or are adjacent to a COM Centre with an AFTN/AMHS Gateway.

.... Address conversion of AFTN addresses representing SITA Type X users

..... In the table based option the table mentioned in ... provides the mapping of AFTN addresses of SITA Type X users to the O/R address with PRMD=SITA.

..... In the AFTN/AMHS Gateways the table based address conversion is done by means of the User address look-up table.

..... The mapping of AFTN addresses of SITA Type X users to the PRMD=SITA can only ensure that those messages are routed correctly to the AMHS/SITA Type X Gateway within the AMHS network.

..... As an example, if not contained in the User address look-up table, the AFTN address LFPSSITN would be converted in the AFTN/AMHS gateway according to standard conversion rule for French AFTN addresses to : /C=XX/A=ICAO/P=FRANCE/O=LFFF/OU1=LFPS/CN=LFPSSITN/.

..... However LFPSSITN is actually an AFTN address associated with a SITA Type X user so that it shall be routed to the AMHS/SITA Type X Gateway. Therefore, considering the above SITA – AMHS addressing scheme, LFPSSITN must be converted to /C=XX/A=ICAO/P=SITA/O=TYPE-X/OU1=LFPS/CN=LFPSSITN/ by use of the respective User address look-up table entry.

..... The same User address look-up table entries must be configured in all AFTN/AMHS gateways worldwide.

.... Pros

- No change of AFTN addresses representing SITA Type X users is required; all current SITA users can maintain their AFTN addresses.
- The principle of the address conversion option is described in the AMHS documentation (Doc 9880) and implemented in the AFTN/AMHS Gateways.
- This option is aligned with a fully transitioned AMHS solution.
- No update of any ICAO documentation (i.e. Doc 9880, Doc 7910) is required.
- This option is a solution which could be introduced quickly and without any risk.
- In a later stage, the big amount of information used in the User address look-up tables could be provided automatically via the European Directory Service (EDS), if available.

.... Cons

- The option will require the maintenance of a large User address look-up table in each AMHS COM Centre operating an AFTN/AMHS Gateway.

- Those AMHS COM Centres have to configure in their AFTN Routing tables the exceptional routing for all AFTN addresses present in the User address look-up table in direction to their MTCU.

- Other AFTN COM Centres may also have to configure an exceptional routing but in direction to a COM Centre nearby or related to an AFTN/AMHS Gateway to ensure that SITA Type X user related AFTN addresses are finally routed to a Gateway correctly.

- The EDS is not yet available.

... Option 2: Use of a unique first letter in the AFTN address for SITA Type X users

.... Principle

..... The AFTN Address representing a SITA Type X will start with a unique first letter, e.g. "X" which means de facto the allocation of an AFS Routing Area "X".

..... The AFTN addresses with a unique first letter have the following structure:

AFTN Address (8 letter)	**derived from**	**SITA Type X address (7 letter)**
"X" first letter of Location indicator		
2nd-4th letter of Location indicator	←	IATA Airport code (3 letter)
Three letter designator (3 letter)	←	ICAO Airline code (3 letter)
Filler letter "X" or letter representing a department or division within the organization addressed (1 letter)	←	Department code (1 letter)

Table 4: AFTN address structure of a SITA Type X user in option 2

..... The AFTN Address representing a SITA Type X could be assigned easily in the AMHS/SITA Type X Gateway as follows:

SITA Type X user	SITA Type X address	Assigned AFTN address
Operations manager of Lufthansa in Frankfurt	<Airline>DLH</Airline> <City>FRA</City> <Department>O</Department>	XFRADLHO
Station manager of Air France in Paris Charles de Gaulle airport	<Airline>AFR</Airline> <City>CDG</City> <Department>T</Department>	XCDGAFRT

Table 5: SITA Type X and AFTN addresses of SITA Type X users in option 2

.... Routing of AFTN addresses representing SITA Type X users

..... All AFTN addresses representing SITA Type X users can be routed towards the nearest AMHS island with an AMHS /SITA Type X connection by the routing indicator "X".

..... In order to fulfil this AFTN routing requirement in all AFTN COM Centres only one additional entry (X for routing to the next AFTN/AMHS Gateway) is required.

.... Address conversion of AFTN addresses representing SITA Type X users

..... In the AFTN/AMHS Gateway the address conversion would be done as for other AFTN addresses.

..... Only one additional entry needs to be inserted into the MD Look-up table and in the CAAS table. No entries are required in the **User address look-up table.**

..... All SITA Type X users communicating with the AFTN are identified by the AFTN address starting with "X". The address conversion is done with one general rule in the AFTN/AMHS Gateway. All AFTN addresses belonging to the AFS Routing Area "X" are converted to /C=XX/A=ICAO/P=SITA/O=TYPE-X/OU1= .../CN=.../ with the Location indicator in OU1 and the AFTN address in CN.

AFTN address	O/R address
XFRADLHO	/C=XX/A=ICAO/P=SITA/O=TYPE-X/OU1=XFRA/CN=XFRADLHO/

Example 18: Conversion of XFRADLHO into O/R address

.... Pros

- The AFTN/AMHS address conversion could be employed for either XF or CAAS addressing as it is done for all other AFTN addresses.
- Each user from outside the AFTN and reachable via a dedicated Gateway is uniquely (one-to-one) identified within the AFTN.
- The routing tables in all AFTN COM Centres worldwide require only one additional entry (to route 'X'...).

- Traditional AFTN routing could be employed, no exceptional routing entries required.

.... Cons

- A general change of all AFTN addresses for SITA users (currently used and locally known AFTN addresses become invalid).
- This option needs to be discussed in ICAO level. It has to be taken into account that this option has already been rejected by ICAO once.
- An update of Doc 7910 is required to introduce the new AFS Routing Area (the SITA "locations" are listed yet – IATA code) and to introduce the resulting new AFTN address structure.
- The institutional changes could take too much time with unknown result and might not meet the time constrains for the replacement of X.25, low speed lines and other equipment.

.. Proposed solution

... First conclusions

.... The option to use of a unique first letter in the AFTN address for SITA Type X users (allocation of a Routing area) seems to be too complicated to meet the time constrains mentioned above.

.... Especially the administrative problems in ICAO level are not calculable.

.... Therefore, the Group discussed another approach based in principle on option 1 in order to limit the drawbacks to all COM Centres worldwide.

... Principle of the proposed solution

.... The table based approach (use of User address look-up table) is the preferred option but with a number of slight modifications to the plan initially presented by SITA.

.... **First**, the current topology of the interconnections between AFTN and SITA should remain in the first phase of the migration to AMHS. That means that the migration from the AFTN/SITA Type B Gateways to the AMHS/SITA Type X Gateways should be done step by step, starting with the most needed replacement of an existing AFTN/SITA Type B Gateway connection by an AMHS/SITA Type X one.

.... The advantage of such an approach is that in this stage only one COM Centre is involved and an urgent need could be satisfied. Only minor drawbacks to others could occur.

.... Due to the fact that most of the EUR COM Centres today serving a SITA Type B Gateway have proven AMHS capabilities, such a replacement could be continued.

.... One precondition is that the AFTN/SITA Type B Gateways and the AMHS/SITA Type X Gateways can operate in parallel for a longer time during which the possible target topology could be defined.

.... **Second,** the former planned two AMHS/SITA Type X connections have to be expanded to a larger number so that all ICAO Regions are served sufficiently and independently. It has to be clarified how many Regional interconnections AMHS/SITA Type X will be required.

.... Multiple inter-Regional connections would allow limiting the exceptional routing to Regional level. In consequence, not all SITA Type X user AFTN addresses have to be configured everywhere (not in all AFTN COM Centres worldwide).

.... The target topology should be discussed on Regional level. So the potential AFTN routing issues remain under Regional responsibility. On Regional level it could be decided how many connections would be sufficient.

.... In parallel to the stepwise replacement of the AFTN/SITA Type B Gateways, the target architecture could be discussed between the Regions not affecting the deployment of the AMHS/SITA Type X rollout. This global coordination should be seen as an optimisation process.

.... **Third,** SITA had chosen to use a CAAS addressing scheme. In this sense the request for allocation of a PRMD named SITA under the ADMD of ICAO was made at ICAO HQ level. However, if the table based approach is used for identifying of SITA Type X users in AFTN, the selection of the addressing scheme CAAS or XF has no relevance.

.... It doesn't really matter in the User address look-up table, if the corresponding O/R address for a SITA Type X user is in accordance with XF or CAAS. Within the AMHS the routing will be performed by the PRMD=SITA only. No other attribute has routing relevance.

.... In the User address look-up table more attributes have to be maintained correctly if the CAAS addressing scheme is used in the future. The XF addressing scheme needs the minimum required attributes only:

XF: /C=XX/A=ICAO/P=SITA/O=AFTN/OU1=<AFTNADDR>/

Where <AFTNADDR> – AFTN address representing the SITA Type X user

.... **Therefore,** it is recommended that the XF schema shall be used for the O/R addresses of the SITA Type X users. The User address look-up table entries can be created easier compared to CAAS.

.... Once address mapping information became available through Directory services such as the European Directory Service (EDS), a Directory-based solution would ease distribution of address mapping information.

. Communication requirements for the AMHS/SITA Type X Gateway

.. Technical requirements

... Requirement 1: The AMHS/SITA Type X Gateway shall be interconnected to AMHS COM Centres by use of the X.400 Message Transfer Protocol (P1) over IPv4 or IPv6.

... Requirement 2: Based on the requirements for long-term logging at the AFTN/AMHS Gateway, the AMHS/SITA Type X Gateway shall perform traffic logging as per ICAO Doc 9880, Part II, section 4.3.1.

... Requirement 3: Before the AMHS/SITA Type X Gateway will be interconnected to an AMHS COM Centre in the EUR Region, the gateway system shall pass an AMHS Conformance Tests based on the EUR AMHS Manual, Appendix D provisions.

... Requirement 4: Any further operational testing shall be based on the AMHS Interoperability and AMHS Pre-operational Tests laid down in the EUR AMHS Manual, Appendices E and F.

.. Operational requirements

... Requirement 5: At minimum two AMHS/SITA Type X Gateway operators (main and backup) shall participate in AMC (ATS Messaging Managements Centre) Operations. They will be registered in AMC as External COM Operators.

... Requirement 6: SITA has to ensure that qualified Operators are nominated as External COM Operator participating and acting actively in order to ensure an up-to-date data base in the AMC and resulting in the AMHS/SITA Type X Gateways.

... Requirement 7: The address conversion in the AMHS/SITA Type X Gateway shall be based on the actual AMHS Address Managements Tables provided by the AMC on regular basis (AIRAC cycle). Later on, the Address Management data should be downloaded from EDS (European Directory Service) when operational.

.. Specific operational requirements

... Requirement 8: The AMHS/SITA Type X Gateways shall ensure that only those SITA Type X users communicate with the AMHS which are registered, trained and published as indirect AMHS users.

... Requirement 9: The AMHS/SITA Type X Gateways shall ensure that each generated AMHS message contains as originator address only those SITA Type X users addresses listed in the User address look-up table. All messages with SITA Type X users addresses not listed in the User address look-up table shall be suppressed and never reach the AMHS.

... Requirement 10: The responsible AMHS/SITA Type X Gateway operator shall maintain the User address look-up table in the AMC with all SITA Type X users allowed to communicate with AMHS containing their SITA Type X address as AFTN address and the corresponding O/R address with PRMD=SITA.

... Requirement 11: The responsible AMHS/SITA Type X Gateway operator shall maintain the User Capabilities of the SITA Type X users communicating with AMHS via the AMHS/SITA Type X Gateways in the AMC (AMHS User Capabilities Table).

... Requirement 12: The responsible AMHS/SITA Type X Gateway operator shall ensure that the tables in the AMHS/SITA Type X Gateways are consistent with the tables maintained in AMC at any time of operations.

... Requirement 13: For this purpose, the AMHS/SITA Type X Gateways shall support the "versioning" of the operational tables as provided by AMC and later on by EDS.

... Requirement 14: The responsible AMHS/SITA Type X Gateway operator shall ensure good coordination practices and processes are in place by adopting the recommended best practices detailed in the EUR Doc 021 ATS Messaging Management Manual, Section 5.1.10: Third Party Gateway Coordination of AMHS User Addresses Guidelines.

. Requirements concerning Underlying IP Infrastructure

.. Requirement 15: The IPv4 connection between an AMHS/SITA Type X Gateway and an AMHS COM Centre shall be redundant. That means that such an IP connection will not be interrupted by single hardware faults. Any SPOFs (single point of failure) have to be avoided.

.. Requirement 16: The final acceptance tests of the IP infrastructure between an AMHS/SITA Type X Gateway and an AMHS COM Centre have to be performed in line with the principles laid down in provisional EUR Doc 027 – IP Infrastructure Test Guidelines for EUR AMHS.

.. Requirement 17: Especially the recovery time after single outages of one component of a redundant connection (router, firewall or others) shall be measured and should be in a range of 10 seconds.

.. Requirement 18: The dimensioning of the connection (bandwidth) has to be done based on the real traffic figures. Potential growing of the traffic as well as additional bandwidth for recover scenarios has to be taken into account.

. Migration scenario

.. Precondition for the start of the migration is completion of the AMHS/SITA Type X Gateway specification and the successful implementation documented by the Acceptance Tests and the AMHS Conformance Tests.

.. The migration should be started by defined pilot connections in close cooperation with the foreseen first COM Centre(s) in the EUR Region.

.. It is recommended to agree on a schedule of the required steps as there are:

- Completion and test of the IP infrastructure;
- Planning of the AMHS Interoperability Tests;
- Coordination of the Operational procedures between the AMHS COM Centres and the SITA Type X Gateways;
- Planning of the Pre-operational Tests;
- Date of operation.

.. In parallel the SITA Type X Gateway operators shall setup the required tables in the AMC as there are:

- User address look-up table, and
- AMHS user Capabilities Table.

.. From the very beginning the complete tables shall be maintained by the SITA Type X Gateway operators (not tailored or shortened tables) in order to ensure the setup of the required AFTN/AMHS Gateway tables and the X.400 and AFTN routing tables in the COM Centres worldwide.

.. If the pilot implementation is finished successfully the next connections should be replaced.

.. In line with the discussions with the other ICAO Regions and their results the replacement of AFTN/SITA Type B Gateway connections by AMHS/SITA Type X Gateway connections should be performed.

.. The AMC Operator will assist and monitor the progress in cooperation with the assigned SITA Type X Gateway Operator.

.. The Operations Group of AST TF (AST OG) will monitor the migration and offer support.

. Road map

.. The replacement of the current AFTN/SITA Type B connections by AMHS/SITA Type X ones has become very urgent in the last months due to the announced decommissioning of low speed links by the telecom providers in several European States by end of 2014.

.. A further driving factor is the need to be prepared for XML based information exchange such as digital NOTAMs (AIXM), Flight plans (FIXM) and meteorological messages (WXXM).

.. The following road map coordinated with SITA should be envisaged in order to meet the above mentioned communication requirements:

Adoption of the AMHS/SITA Type X concept by AFSG/17	2013 April
Completion of AMHS/SITA Type X Gateway Specification	2013
Definition of the pilot replacements of AFTN/SITA Type B by AMHS/SITA Type X connections in EUR	2013
Definition of the target topology	2013
Discussion of the AMHS/SITA Type X concept with other ICAO Regions	2013
Factory Acceptance testing including AMHS Conformance Tests	2013
First AMHS Interoperability Test in the EUR Region	2014
Completion of the Operational procedures (Cooperation of the AMHS COM Centres and SITA Type X Gateways)	2014
Initial data entry in AMC (User address look-up table)	2014
Definition of the replacements of AFTN/SITA Type B by AMHS/SITA Type X connections in other ICAO Regions	2014
First Pre-operational Tests in the EUR Region	2014

Date of operation in the EUR Region	2014/2015
Continued replacement of AFTN/SITA Type B by AMHS/SITA Type X connections in EUR and other ICAO Regions	2015

. AMHS/SITA Type X Gateway implementation

.. Structure of the AMHS/SITA Type X Gateway

... Mid 2014 the AMHS/SITA Type X Gateway was implemented in Atlanta and the first AMHS Interoperability Test were planned between Switzerland and SITA as well as Germany and SITA.

... Due to the urgent need to replace the low speed AFTN connection of the SITA Type B Gateway and the delayed transition of SITA Type B users towards SITA Type X, an AFTN/AMHS Gateway component was added to the AMHS/SITA Type X Gateway. Figure 9 shows the initial AMHS connections and the structure of the AMHS/SITA Type X Gateway extended by an AFTN/AMHS Gateway (MTCU and AFTN component).

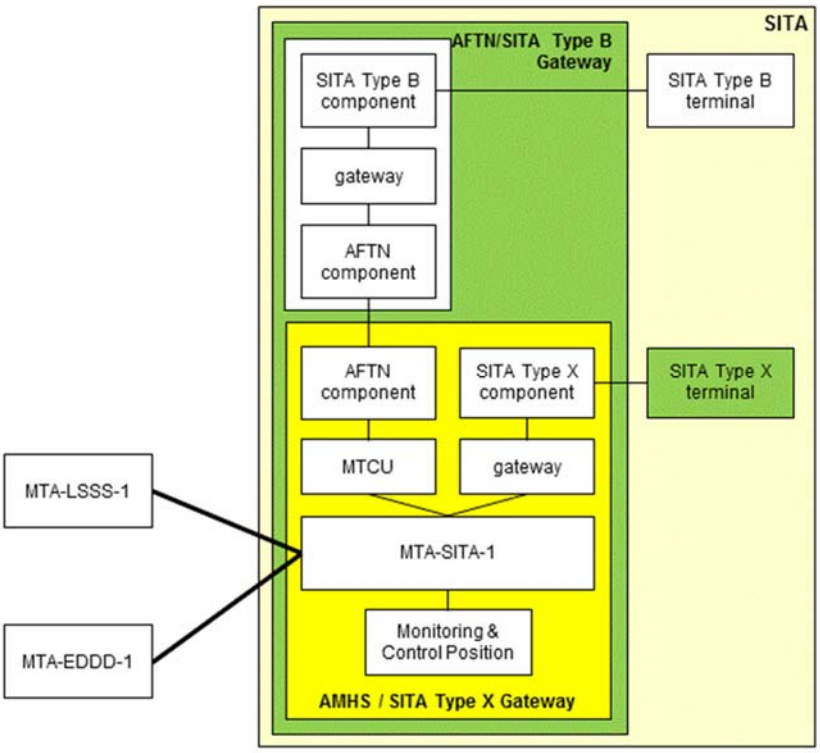

Figure 9: Extended structure of the AMHS/SITA Type X Gateway

.. Additional operational requirements

... Due to the deviation from the former approved concept the Requirement 3 (see ...) has to be extended in such a way that both Gateways (MTCU to Type B and "gateway" to Type X) shall pass AMHS Conformance Tests based on the EUR AMHS Manual, Appendix D.

... The AMHS Interoperability Tests (IOT) have to be extended as well in order to cover the new structure of the AMHS/SITA Type X Gateway. The recommended IOT address space for the AMHS/SITA Type X Gateway is provided in B.4.

... The priority mapping form SITA Type X towards AMHS shall be performed as follows:

SITA Type X Priority	X.400 Priority	Priority in ATS Message Header (option 1)	Priority in ATS Message Header(option 2)
0	urgent	SS	SS
1	normal	DD	FF
2	normal	FF	FF
3	non-urgent	GG	GG
Without priority	non-urgent	KK	GG

Table 6: Priority mapping

... The use of priorities shall be in line with the provisions of Annex 10, Volume II especially for:

Message category	*Priority indicator*
distress messages (*see* 4.4.1.1.1 [1])	SS
urgency messages (*see* 4.4.1.1.2 [1])	DD
flight safety messages (*see* 4.4.1.1.3 [1])	FF
meteorological messages (*see* 4.4.1.1.4 [1])	GG
flight regularity messages (*see* 4.4.1.1.5 [1])	GG
aeronautical information services messages (*see* 4.4.1.1.6 [1])	GG
aeronautical administrative messages (*see* 4.4.1.1.7 [1])	KK
service messages (see 4.4.1.1.9 [1])	(as appropriate)

Table 7: Annex 10 priority provisions

.. Checking of originator address of incoming messages

... According to ... the AMHS/SITA Type X Gateways shall ensure that each generated AMHS message contains as originator address one of the SITA Type X users addresses listed in the User address look-up table. All messages with SITA Type X users addresses not listed in the User address look-up table shall be suppressed and never reach the AMHS.

... In order to ensure that the above requirement is fulfilled during daily operations each SITA interconnected COM Centre shall check the originator addresses of messages on the incoming X.400 P1 connection.

... Only messages with originator addresses of SITA Users agreed and listed in the User address look-up table of AMC shall be accepted and routed into the AMHS; all other messages shall be refused by an NDR with supplementary information “originator not listed”.

.. Communication scenarios in the current SITA Type B / AFTN / AMHS environment

... Introduction

.... During the transition period from the current SITA Type B network towards the future SITA Type X network additional communication scenarios need to be considered parallel to those described in Section ...

.... Resulting potential requirements for this type of communications are summarised in Section ....

.... The following communication scenarios describe typical expected message flows between specific SITA Type B Users on the one hand and indirect AMHS Users on the other hand.

.... In the example following communication partners are involved:

- SITA Type B User: The Operations Manager of Lufthansa in Frankfurt.

  His SITA Type B address should be: FRAOOLH.
  His assigned AFTN address should be EDDFDLHO
  (published in AMC - User Address Look-up Table)

- Direct AMHS User: An User Agent in Vienna with the AMHS (O/R) address: /C=XX/A=ICAO/P=AUSTRIA/O=LOVV/OU1=LOWW/CN=LOWWYRYX/.

- Indirect AMHS User (AFTN User): The Operator of Tower in Berlin-Tegel.
  His AFTN Address is EDDBZTZX.
  His AMHS (O/R) address is: /C=XX/A=ICAO/P=GERMANY
  /O=EDWW/OU1=EDDB/CN=EDDBZTZX/.

.... A fictive message exchange among them is the base of the following scenarios:

- from SITA Type B to AMHS, and

- from AMHS to SITA Type B

... Scenario from SITA Type B to AMHS

.... Message flows

..... Figure 10 shows the Message flow from a SITA Type B terminal to an AMHS User Agent (UA) and an AFTN Terminal via the involved network elements. The switching nodes within the AMHS are the MTAs (Message transfer agents).
At the SITA side an AFTN/AMHS Gateway as well as an AMHS/SITA Type X Gateway and an AFTN/SITA Type B Gateway are used.

..... The SITA Type B (FRAOOLH) user wishes to send a message from its SITA Type B Terminal to a Direct AMHS User (LOWWYRYX) and to an Indirect AMHS User (EDDBZTZX).

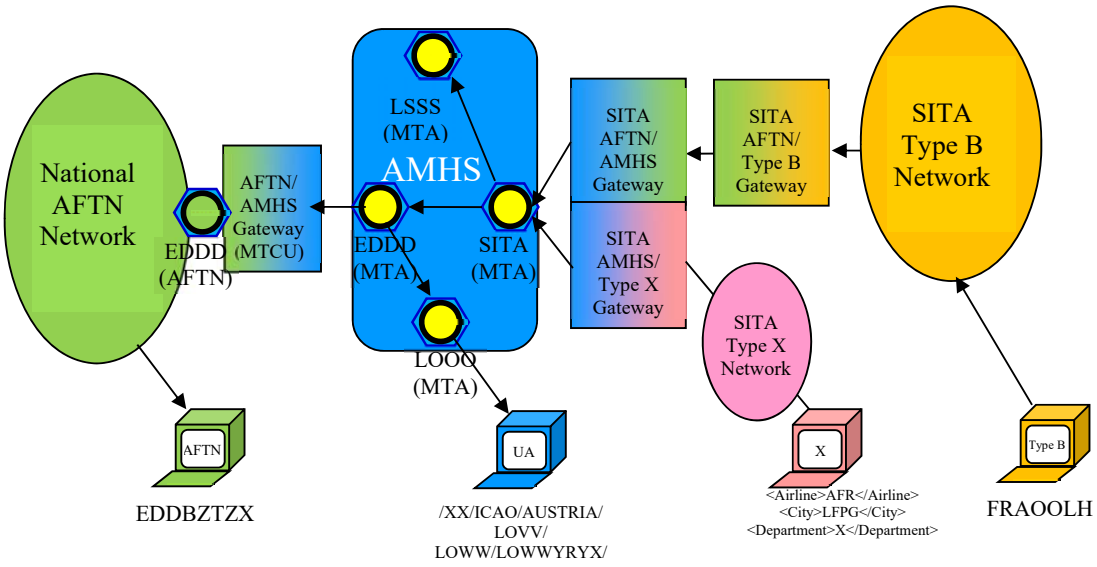

Figure 10: Message flow from a SITA Type B Terminal to AMHS (UA and AFTN Terminal)

.... Generation of the messages

..... Depending on the method used (also see ..), the SITA Type B User (here the Operations manager of Lufthansa in Frankfurt) can generate the following messages:

a) The following example illustrates the "envelope method" (embedded AFTN message, see also ....):

```
QU HDQYFXS                                  } SITA Type B header
.FRAOOLH 220944                             }
GG EDDBZTZX LOWWYRYX                        }
220944 EDDFDLHO                             }
PLEASE CONFIRM THE FOLLOWING TEXT           } Embedded AFTN Message
<text>                                      }
=                                           }
```

Example 19: Type B message with embedded AFTN message

b) The following example illustrates the "conversion method" (see also ....:

```
QN BERXXZT                                  } SITA Type B header with BERXXZT as
.FRAOOLH 123456                             } Destination address is routed to the
FREE TEXT                                   } AFTN/SITA Type B Gateway plus
                                            } message text (FREE TEXT)
```

Example 20: Type B message to be converted from SITA to AFTN

..... In both cases the SITA Type B message will be routed to the AFTN/SITA Type B Gateway.

.... Conversion of messages in the AFTN/SITA Type B Gateway

..... In case the "envelope method" is used (Example 19), the AFTN/SITA Type B Gateway removes the SITA envelope and forwards the "embedded" AFTN message direct to the SITA AFTN/AMHS Gateway. No further tables are required.

```
GG EDDBZTZX LOWWYRYX
220944 EDDFDLHO
PLEASE CONFIRM THE FOLLOWING TEXT
<text>
```

AFTN Message

Example 21: Embedded AFTN message

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

..... In case the "conversion method" is used (Example 20), the AFTN/SITA Type B Gateway converts the Type B message into an AFTN message by creating the AFTN message header and attaching the SITA Type B message as message text.

..... For the conversion, the AFTN/SITA Type B Gateway uses the XA Table, which provides the mapping of SITA Type B addresses to AFTN Destination addresses. In this specific case the entries of the XA table would be:

	SITA Address	AFTN Address	Remark
	...	...	
	BERXXZT	EDDBZTZX	used as Destination address
	...	...	
	FRA0OLH	EDDFDLH0	used as SITA Originator address
	...	...	

Table 8: Required XA Table entries for Example 20

..... As Originator address, either the AFTN address of the respective gateway or the converted (mapped) SITA Type B originator address is used.

..... In the mentioned Example 20 the converted AFTN messages should look like:

```
GG EDDBZTZX
123456 EDDFDLHO
QN BERXXZT
.FRAOOLH 123456
FREE TEXT
```

AFTN Message header

attached SITA Message

Example 22: Converted AFTN messages

Note.– The appropriate Heading and Ending parts of the AFTN message are not shown in the examples.

..... In both cases, the taken over or converted AFTN message priorities have to be in line with the provisions of Annex 10 as described in ... (Table 7).

..... The messages are routed directly to the SITA AFTN/AMHS Gateway (interconnection between the AFTN/SITA Type B Gateway and the SITA AFTN/AMHS Gateway).

.... Conversion of messages in the SITA AFTN/AMHS Gateway

..... The SITA AFTN/AMHS Gateway converts the AFTN messages into AMHS messages with the following AMHS message attributes:

- X.400 Recipient addresses
- X.400 Originator address
- Message Priority
- Filing time
- Message text

..... The address conversion will be performed according to the provisions of ICAO Doc 9880 by using the three specified Address Look-up Tables (Doc 9880, Part II, 4.3.2):

- MD look-up table (AMHS Management Domain Register),
- CAAS look-up table (CAAS Table), and
- User address look-up table (User Address Table),

..... In order to assign the correct O/R address (especially the correct PRMD attribute) all "SITA User Addresses" have to be listed in the User address look-up table. Therefore the following entries are required for the given example:

User Short Name	AFTN Addr Indicator	O/R Address
…	…	/XX/ICAO/SITA/AFTN/ … /
FRAOOLH	EDDFDLHO	/XX/ICAO/SITA/AFTN/EDDFDLHO/
…	…	/XX/ICAO/SITA/AFTN/ … /

Table 9: Required User address look-up table entries for Example 21 and Example 22

Note.– All AFTN Address Indicators used for SITA users have to be coordinated with the States concerned before entering in the AMC User address look-up table.

..... The address conversion of the AFTN addresses of ANSPs and ATS Organisations are performed normally by algorithm using the MD look-up table (AMHS Management Domain Register) and CAAS look-up table (CAAS Table).

..... The resulting X.400 O/R addresses of the given example are the following:

AFTN Addr Indicator	O/R Address	Remark

EDDBZTZX	/XX/ICAO/GERMANY/EDWW/EDDB/EDDBZTZX/	X.400 Recipient
EDDFDLHO	/XX/ICAO/SITA/AFTN/EDDFDLHO/	X.400 Originator
LOWWYRYX	/XX/ICAO/AUSTRIA/LOVV /LOWW/LOWWYRYX	X.400 Recipient

Table 10: Resulting O/R addresses for the given examples

..... The other Attributes of the AFTN message are mapped one-to-one to the AMHS Message Attributes.

..... As a typical example, the main attributes of the AMHS message resulting from the conversion of the "embedded" AFTN message (Example 21) are shown below:

```
/C=XX/A=ICAO/P=GERMANY/O=EDWW/OU1=EDDB                - 1. X.400 Recipient address
/CN=EDDBZTZX/
/C=XX/A=ICAO/P=AUSTRIA/O=LOVV                        - 2. X.400 Recipient address
/OU1=LOWW/CN=LOWWYRYX /
/C=XX/A=ICAO/P=SITA/O=AFTN/OU1=EDDFDLHO/             - X.400 Originator address
GG                                                   - Message Priority
220944                                               - Filing time
PLEASE CONFIRM THE FOLLOWING TEXT                    } Message text
<text>
```

Example 23: Main attributes of the converted AMHS message

..... The main attributes of the AMHS message resulting from the conversion of the Type B message are shown below (Example 20/Example 22):

```
/C=XX/A=ICAO/P=GERMANY/O=EDWW/OU1=EDDB                - X.400 Recipient address
/CN=EDDBZTZX/
/C=XX/A=ICAO/P=SITA/O=AFTN/OU1=EDDFDLHO/             - X.400 Originator address
GG                                                   - Message Priority
123456                                               - Filing time
QN BERXXZT                                           } Message text
.FRAOOLH 123456
FREE TEXT
```

Example 24: Main attributes of the converted AMHS message

.... Switching of the AMHS message by SITA MTA and COM Centre EDDD MTA

..... According to the AMHS Routing Table every AMHS (X.400) message is transferred to the adjacent MTA or to the Gateways, if any. In case of the SITA MTA, two internal Gateways exist and a certain number of adjacent MTAs are planned to each ICAO Region (4 to EUR, 2 to ASIA etc.).

..... In the given example the AMHS message will be transferred to Germany while the German MTA transfers the message to the own AFTN/AMHS Gateway and to the Austrian MTA in Vienna.

..... It should be assumed that the Austrian MTA in Vienna is serving a User Agent (UA) and the AMHS message is delivered to the addressed recipient directly.

..... In case of Germany the AMHS message is converted back to an AFTN message, forwarded to the German Domestic Network (AFTN) and finally delivered to the addressed AFTN Station.

... Scenario from AMHS to SITA Type B

.... Message flows

..... Figure 11 shows the opposite Message flow as above from an AMHS User Agent (UA) and an AFTN Terminal to a SITA Type B terminal via the involved network elements. The switching nodes within the AMHS are the MTAs (Message transfer agents).

..... The Direct AMHS User (LOWWYRYX) and the Indirect AMHS User (EDDBZTZX) wish to send a message from their respective Terminals to a SITA Type B user (FRAOOLH).

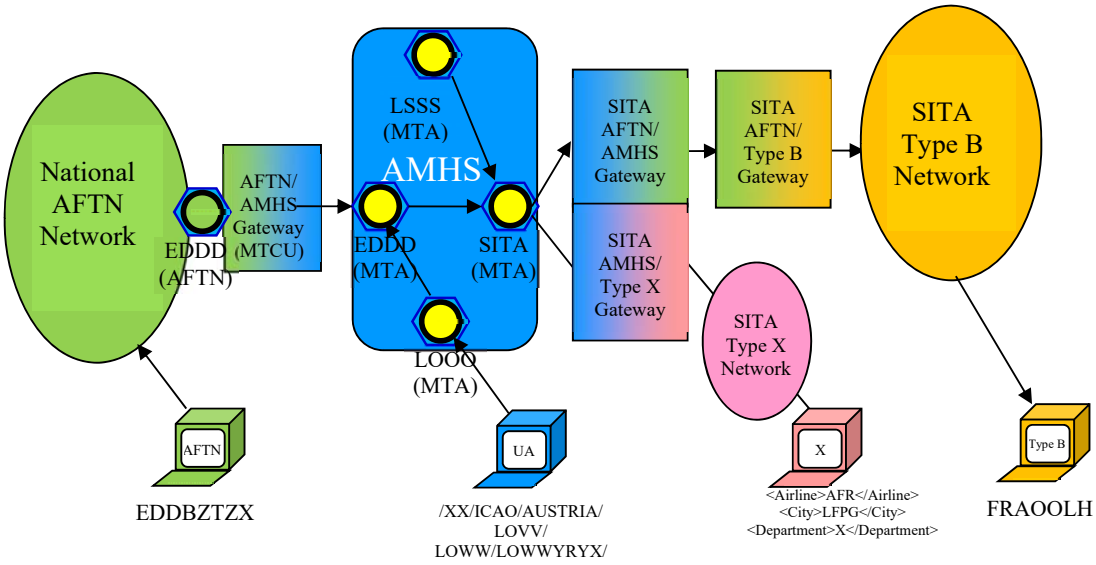

Figure 11: Message flow from UA and AFTN Terminal to SITA Type B Terminal via AMHS

..... While the Direct AMHS User (LOWWYRYX) generates an AMHS message the Indirect AMHS User (EDDBZTZX) generates an AFTN message.

.... Generation of the AMHS messages by the User Agent

..... An example of an AMHS message (typical X.400 Attributes) generated in line with this scenario is provided below:

/C=XX/A=ICAO/P=SITA/O=AFTN/OU1=EDDFDLHO/	- X.400 Recipient address
/C=XX/A=ICAO/P=AUSTRIA/O=LOVV /OU1=LOWW/CN=LOWWYRYX /	- X.400 Originator address
GG	- Message Priority
221035	- Filing time
CONFIRM RECEPTION OF YR 220944 EDDFDLHO BRGDS LOWWYRYX	} Message text

Example 25: Main attributes of the AMHS message sent by a User Agent

..... The AMHS message with the recipient address of the SITA User (PRMD=SITA) will be routed via MTA EDDD to the SITA MTA. There are no specific AMHS Routing requirements.

.... Generation of the AFTN messages by the AFTN Terminal

..... An example of the AFTN message generated by the AFTN Terminal in line with this scenario is provided below:

GG EDDFDLHO 221040 EDDBZTZX	} AFTN Message header
CONFIRM RECEPTION OF YR 220944 EDDFDLHO BRGDS EDDBZTZX	} AFTN message text

Example 26: AFTN messages generated by an AFTN Terminal

..... The path of the AFTN message is more complicated. Due to the fact that this message has to reach the German AFTN/AMHS Gateway (MTCU) an exceptional routing must be defined in the German National network. Otherwise the AFTN message will be routed to an AFTN terminal in Frankfurt.

AFTN Routing Indicator	Main route	Alternate	Remark
EDDB	EDDB_TOWER		Normal routing
EDDF*	EDDF_TOWER		Normal routing
EDDFDLHO	MTCU		Exceptional routing

Table 11: Exceptional Routing entry for the given example

..... It is therefore important to conclude that in national AFTN environments, for each national assigned SITA User AFTN Address an exceptional AFTN Routing entry has to be defined either towards the MTCU or to the adjacent AFTN COM Centre serving an MTCU.

..... In the latter case the exceptional routing in the adjacent COM Centre has to be coordinated by the first COM Centre generating the exceptional traffic flow.

.... Conversion of the AFTN message in the AFTN/AMHS Gateway

..... The AFTN/AMHS Gateway converts the AFTN messages into AMHS messages with following AMHS message attributes:

- X.400 Recipient addresses
- X.400 Originator address
- Message Priority
- Filing time
- Message text

..... The address conversion will be performed according to the provisions of ICAO Doc 9880 by using the three specified Address Look-up Tables (Doc 9880, Part II, 4.3.2):

- MD look-up table (AMHS Management Domain Register),
- CAAS look-up table (CAAS Table), and
- User address look-up table (User Address Table).

..... The other Attributes of the AFTN message are mapped one-to-one to the AMHS Message Attributes.

..... The converted AMHS message (typical X.400 Attributes) is provided below:

/C=XX/A=ICAO/P=SITA/O=AFTN/OU1=EDDFDLHO/	- X.400 Recipient address
/C=XX/A=ICAO/P=GERMANY/O=EDWW/OU1=EDDB /CN=EDDBZTZX/	- X.400 Originator address
GG	- Message Priority
221040	- Filing time
CONFIRM RECEPTION OF YR 220944 EDDFDLHO BRGDS EDDBZTZX	} Message text

Example 27: Main attributes of the converted AMHS message (Example 26)

..... The converted AMHS message with the recipient address of the SITA User (PRMD=SITA) will be routed from the MTCU via MTA EDDD to the SITA MTA. There are no specific AMHS Routing requirements.

.... Switching of the incoming AMHS message by the SITA MTA

..... According to the AMHS Routing Table, every AMHS (X.400) message addressed to PRMD=SITA will be transferred primarily to the SITA AFTN/AMHS Gateway (MTCU). Later on, when the SITA Type X users are addressed the local AMHS Routing Tables of the SITA MTA will have to provide for distinction between the Gateways (either the SITA AFTN/AMHS Gateway – MTCU or the AMHS/SITA Type X Gateway).

..... In the given examples, the AMHS message will be transferred to the SITA AFTN/AMHS Gateway.

.... Conversion of messages in the SITA AFTN/AMHS Gateway

..... The SITA AFTN/AMHS Gateway converts the incoming AMHS messages into AFTN messages as follows:

1. Message coming from Austria (Example 25):

```
GG EDDFDLHO                          } AFTN Message header
221035 LOWWYRYX                      }
CONFIRM RECEPTION OF                 }
YR 220944 EDDFDLHO                   } AFTN message text
BRGDS LOWWYRYX
```

Example 28: Converted AFTN messages from the User Agent

2. Message coming from Germany (Example 27):

```
GG EDDFDLHO                          } AFTN Message header
221040 EDDBZTZX                      }
CONFIRM RECEPTION OF                 }
YR 220944 EDDFDLHO                   } AFTN message text
BRGDS EDDBZTZX
```

Example 29: Converted AFTN messages from the AFTN Terminal

..... The converted AFTN messages are routed to the AFTN/SITA Type B Gateway directly.

.... Conversion of messages in the AFTN/SITA Type B Gateway

..... Normally, the AFTN/SITA Type B Gateway converts the incoming AFTN messages into Type B message by creating the SITA Type B message header and attaching the AFTN message.

..... For the address conversion the AFTN/SITA Type B Gateway uses the IX Table, which provides the mapping of AFTN Destination addresses to SITA Type B addresses. In the specific cases, the entries of the IX table will be:

	AFTN Address	**SITA Address**	**Remark**
	...	...	
	EDDFDLHO	FRAOOLH	used as SITA Destination
	...	...	

Table 12: Required IX Table entries for Example 20

..... As SITA Originator is used: the SITA Service Address of the AFTN/SITA Type B Gateway connection from where the message has been received.

..... The resulting SITA Type B message from the AFTN Message (Example 28) will look like:

QN FRAOOLH .FRAXAXS 221035AFTN	SITA Type B header
GG EDDFDLHO 221035 LOWWYRYX CONFIRM RECEPTION OF YR 220944 EDDFDLHO BRGDS LOWWYRYX =	Added AFTN message

Example 30: Type B message converted from AFTN to SITA

..... The resulting SITA Type B message from the AFTN Message (Example 29) will look like:

QN FRAOOLH .FRAXAXS 221035AFTN	SITA Type B header
GG EDDFDLHO 221040 EDDBZTZX CONFIRM RECEPTION OF YR 220944 EDDFDLHO BRGDS EDDBZTZX =	Added AFTN message

Example 31: Type B message converted from AFTN to SITA

.... Switching of the incoming SITA Type messages within the Type B network

..... All messages entering the SITA Type B network via the AFTN/SITA Type B Gateway are routed according to their addresses and finally delivered to the addressed SITA Type B Terminals.

... Examples of message conversion from AMHS to Type B and vice versa

.... AMHS to Type B (conversion method – AFTN message / no Type B payload)

..... Incoming AMHS message at the SITA AFTN/AMHS Gateway:

```
Originator:   /C=XX/A=ICAO/P=THAILAND/O=VTBB/OU1=VTBB/CN=VTBBZTZX
Recipient[1]: /C=XX/A=ICAO/P=SITA/O=AFTN/OU1=RPLLPALX
PRI:          GG
FT:           120123
Message text: CONFIRM RECEPTION OF YR 120122 RPLLPALX
              BRGDS VTBBZTZX
```

..... AFTN Message leaving the SITA AFTN/AMHS Gateway (RPLLPALX being routed to SITA AFTN/Type B Gateway):

```
GG RPLLPALX
120123 VTBBZTZX
CONFIRM RECEPTION OF YR 120122 RPLLPALX
BRGDS VTBBZTZX
```

..... Message leaving the SITA AFTN/Type B Gateway (RPLLPALX being translated to MNLXTPR [IX Table] and SLCXAXS being the Type B service address of the input connection.):

```
QN MNLXTPR
.SLCXAXS 120123AFTN
GG RPLLPALX
120123 VTBBZTZX
CONFIRM RECEPTION OF YR 120122 RPLLPALX
BRGDS VTBBZTZX
```

.... AMHS to Type B (Envelope method – Message text = Type B message)

..... Incoming AMHS message at the SITA AFTN/AMHS Gateway:

```
Originator:    /C=XX/A=ICAO/P=THAILAND/O=VTBB/OU1=VTBB/CN=VTBBZTZX
Recipient[1]:  /C=XX/A=ICAO/P=SITA/O=AFTN/OU1=WSSSSITX
PRI:           GG
FT:            120123
Message text:  QU SINXTSQ
               .ATLXTDL 121212
               TEXT 1
               TEXT 1
```

..... AFTN Message leaving the SITA AFTN/AMHS Gateway (WSSSITX being routed to the SITA AFTN/Type B Gateway):

```
GG WSSSSITX
120123 VTBBZTZX
QU SINXTSQ
.ATLXTDL 121212
TEXT 1
TEXT 1
```

..... Message leaving the SITA AFTN/Type B Gateway (The AFTN Header being stripped off resulting into a pure Type B message):

```
QU SINXTSQ
.ATLXTDL 121212
TEXT 1
TEXT 1
```

.... AMHS to Type B (Conversion method – addressed Pilot Address, WSSSSITA)

..... Incoming AMHS message at the SITA AFTN/AMHS Gateway:

```
Originator:    /C=XX/A=ICAO/P=THAILAND/O=VTBB/OU1=VTBB/CN=VTBBZTZX
Recipient[1]:  /C=XX/A=ICAO/P=SITA/O=AFTN/OU1=WSSSSITA
PRI:           GG
FT:            120123
Message text:  YBBBQFAX
               TEXT 2
               TEXT 2
```

..... AFTN Message leaving the SITA AFTN/AMHS Gateway (WSSSITA being routed and to SITA AFTN/Type B Gateway):

```
GG WSSSSITA
120123 VTBBZTZX
YBBBQFAX
TEXT 2
TEXT 2
```

..... Message leaving the SITA AFTN/Type B Gateway (The Pilot address, WSSSSITA, is replaced by the first line of text, then a the Type B header is generated as in message with non-type B payload, YBBBQFAX being translated to BNEXTQF and SLCXAXS being the type B service address of the input connection and sent to Type B user.):

```
QN BNEXTQF
.SLCXAXS 120123AFTN
GG YBBBQFAX
120123 VTBBZTZX
TEXT 2
TEXT 2
```

.... Type B to AMHS (Conversion method – with non-AFTN Payload)

..... The Type B Message with Type B address IEVYAPS is routed to the SITA AFTN/Type B Gateway (known translation to UKKAYAYF):

```
QN IEVYAPS
.SINXTSQ 120123
TEXT 3
TEXT 3
```

..... AFTN Message leaving the SITA AFTN/AMHS Gateway (if Type B Originator exists in the XA translation table [say SINXTSQ=WSSSSIAX], the AFTN originator is the translation of the type B originator. Otherwise, WSSSSITX, the AFTN address of the SITA AFTN/AMHS Gateway is used).

```
GG UKKAYAYF
120124 WSSSSIAX
QN IEVYAPS
.SINXTSQ 120123
TEXT 3
TEXT 3
```

..... AMHS message leaving the SITA AFTN/AMHS Gateway:

```
Originator:   /C=XX/A=ICAO/P=SITA/O=AFTN/OU1=WSSSSIAX
Recipient[1]: /C=XX/A=ICAO/P=UKRAINE/O=AFTN/OU1=UKKAYAYF
PRI:          GG
FT:           120124
Message text: QN IEVYAPS
              .SINXTSQ 120123
              TEXT 3
              TEXT 3
```

.... Type B to AMHS (Envelop method – with AFTN payload)

..... The Type B Message with Type B address HDQYFXS is routed to the SITA AFTN/Type B Gateway:

```
QN HDQYFXS
.SINXTSQ 120124
GG UKKAYAYF
120124 WSSSSIAX
AFTN TEXT
```

..... AFTN Message leaving the SITA AFTN/Type B Gateway (The Type B header is stripped):

```
GG UKKAYAYF
120124 WSSSSIAX
AFTN TEXT
```

..... AMHS message leaving the SITA AFTN/AMHS Gateway:

```
Originator:    /C=XX/A=ICAO/P=SITA/O=AFTN/OU1=WSSSSIAX
Recipient[1]: /C=XX/A=ICAO/P=UKRAINE/O=AFTN/OU1=UKKAYAYF
PRI:           GG
FT:            120124
Message text: AFTN TEXT
```

... Resulting potential requirements

.... Within the described communication paths (both directions) three different conversion tables are used. The entries of these tables shall be consistent (Requirement 19).

.... An entry in the User address look-up table, if it represents a SITA Type B User, shall correspond at least with one entry in the XA or IX Table. If this entry corresponds to both tables (XA and IX) the values shall be identical (Requirement 20).

Example:

User Address look-up table

User Short Name	AFTN Addr Indicator	O/R Address
…	…	/XX/ICAO/SITA/AFTN/ … /
FRAOOLH	EDDFDLHO	/XX/ICAO/SITA/AFTN/EDDFDLHO/
…	…	/XX/ICAO/SITA/AFTN/ … /

XA Table

	SITA Address	AFTN Address	Remark
	…	…	
	FRAOOLH	EDDFDLHO	used as SITA Origin
	…	…	

IX Table

	AFTN Address	SITA Address	Remark
	…	…	
	EDDFDLHO	FRAOOLH	used as SITA Destination
	…	…	

Example 32: Consistent entries in the three conversion tables

.. Topology and Routing requirements for COM Centres and SITA

... Current Topology and Routing principle SITA Type B to AFTN

.... Currently (August 2015), nine interconnections between the AFTN/AMHS and SITA Type B network are still in operation using AFTN protocol over XoT or IP. The SITA AFTN/Type B Gateway is connected to the following COM Centres:

- EDDD – FRANKFURT/MAIN INTL COM AFTN CENTRE, Germany
- EHAM – AMSTERDAM/SCHIPHOL, Netherlands
- FAOR – JOHANNESBURG INTERNATIONAL AIRPORT, South Africa
- LGGG – ATHINAI (ACC,FIC,COM,SAR,FIR/HELLAS ,UIR), Greece
- LPPT – LISBOA, Portugal
- LSSS – COM CENTRE SUISSE (GENEVE), Switzerland
- KATL – HARTSFIELD - JACKSON ATLANTA INTL, United States
- WSSS – SINGAPORE/CHANGI, Singapore
- YBBB – BRISBANE (FIR/FIC/ACC/COM/MET/NOF), Australia

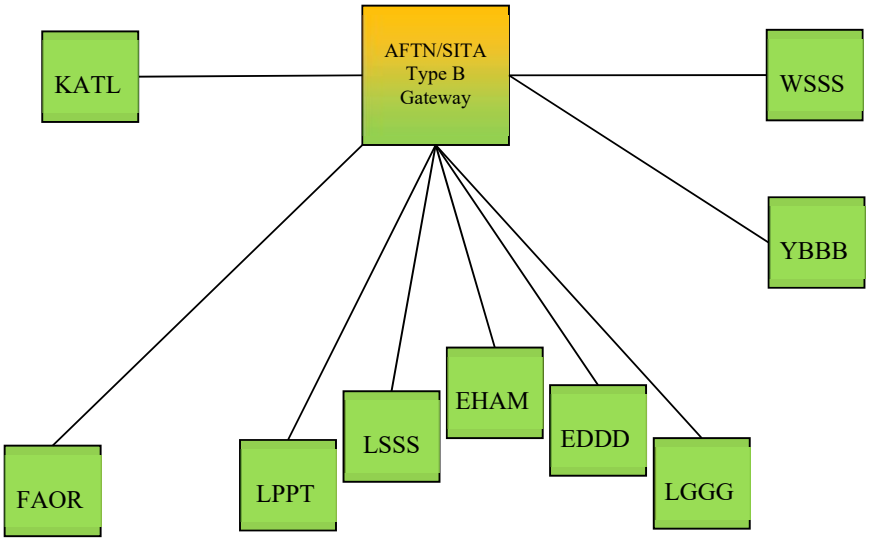

Figure 12: Current interconnection topology AFTN – SITA

.... In order to avoid that AFTN messages coming from the AFTN/SITA Type B Gateway are injected in the EUR AFS Network with non-EUR Originator addresses the principle "routing by Origin" was developed and introduced by SITA.

.... As the consequence of this principle all messages coming from an AFTN/SITA Type B Gateway are originated from the correct ICAO Region when reaching the AFTN. This is in line with the ICAO AFTN principles laid down in ANNEX 10. The example in Figure 13 should illustrate the principle.

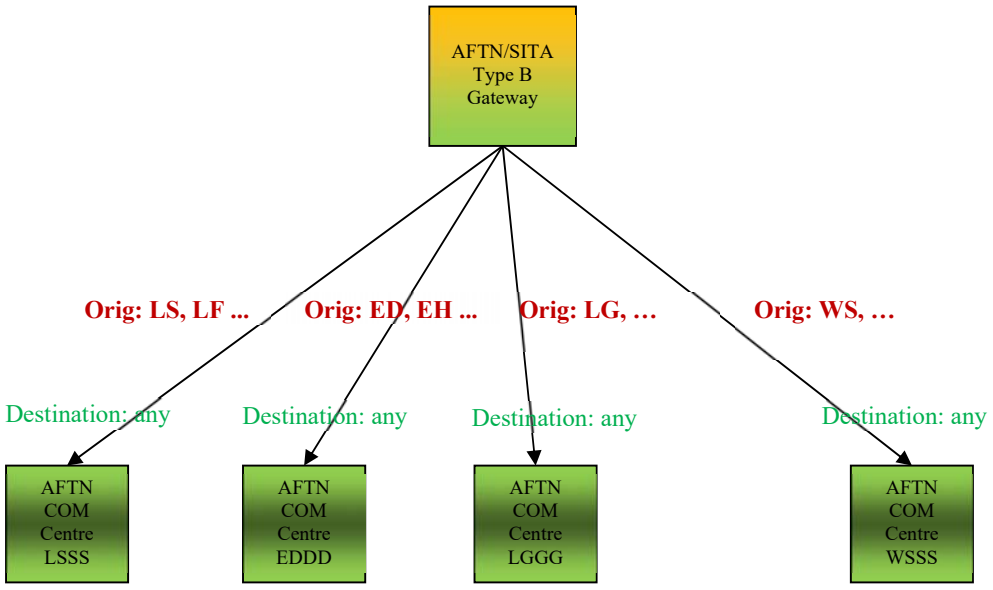

Figure 13: Routing by Origin

.... The receiving AFTN COM Centre forwards the incoming AFTN message in accordance with the Destination Addresses in the AFTN address line either to the interconnected AFTN station or to the responsible adjacent COM Centre.

... Target AMHS Topology and Routing principle

.... Section ... concluded that the former planned two AMHS/SITA Type X connections have to be expanded to a larger number so that all ICAO Regions are served sufficiently and independently.

.... At the AFSG – SITA Workshop in Atlanta (August 2015) SITA presented the planned regional AMHS interconnections to the ICAO Regions (. The SITA Network should be interconnected by at least two connections in each Region.

.... Due to lack of information from the ICAO AFI Region an initial approach was presented considering that three North African States (Algeria, Morocco and Tunisia) are moving to ICAO EUR/NAT Region, and two (Libya and Egypt) to ICAO MID Region. Two AMHS interconnection in this Region should be sufficient for cover all traffic of the AFI Region.

.... From the current point of view following connections from SITA into the ICAO Regions are targeted:

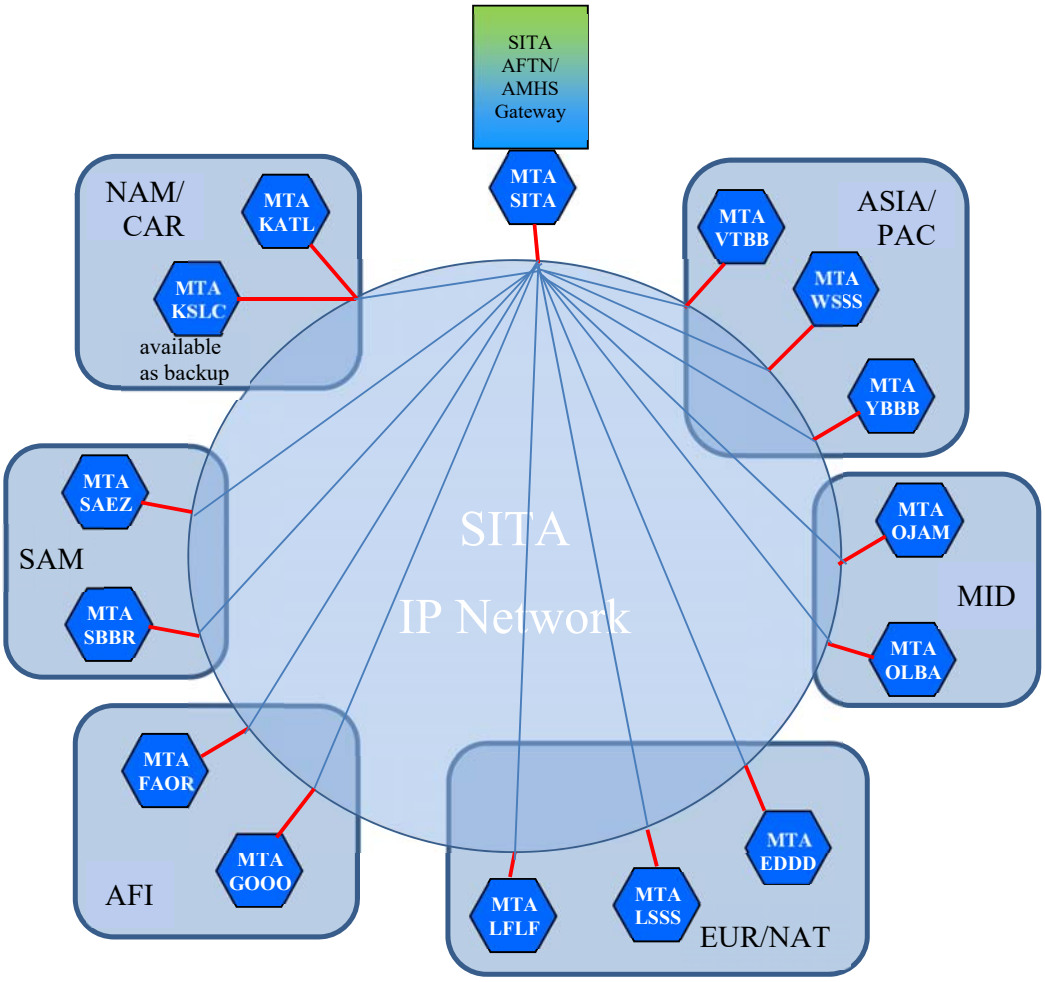

Figure 14: Interconnections between the ICAO Regions and the AMHS/SITA Type X Gateway

ICAO Region	COM Centres/States
AFI	FAOR - JOHANNESBURG INTERNATIONAL AIRPORT, South Africa GOOO - DAKAR (FIC,ACC,COM,NOF), Senegal
ASIA/PAC	VTBB - BANGKOK (ACC/FIC/COM CENTRE), Thailand WSSS - SINGAPORE/CHANGI, Singapore YBBB - BRISBANE (FIR/FIC/ACC/COM/MET/NOF), Australia
EUR/NAT	EDDD - FRANKFURT/MAIN INTL COM AFTN CENTRE, Germany LFLF - BORDEAUX (COM), France LSSS - COM CENTRE SUISSE (GENEVE), Switzerland
MID	OJAM - AMMAN/MARKA, Jordan OLBA – RAFFIC HARIRI INTL BEIRUT, Lebanon

ICAO Region	COM Centres/States
NAM/CAR	KATL - HARTSFIELD - JACKSON ATLANTA INTL, United States KSLC - SALT LAKE CITY INTL, United States (available as backup)
SAM	SBBR – BRASILIA/PRES. JUSCELINO KUBITSCHEK, DF, Brazil SAEZ – EZEIZA/MINISTRO PISTARINI (BA), Argentina

Table 13: Interconnections to the ICAO Regions

.... Within the AMHS, the standard message routing principle applies. AMHS Messages coming from the SITA Gateways are transferred by the SITA MTA to the adjacent MTAs in accordance with the AMHS Routing table coordinated with the AMC. This ensures that only those messages reaching an ICAO Region, which are addressed to recipients of this Region.

.... The originator O/R address of an incoming AMHS message is related to PRMD=SITA only, but the AFTN addresses in the OU1 attribute, which are assigned to the SITA User, could be from any ICAO Region. The example in Figure 15 illustrates the principle.

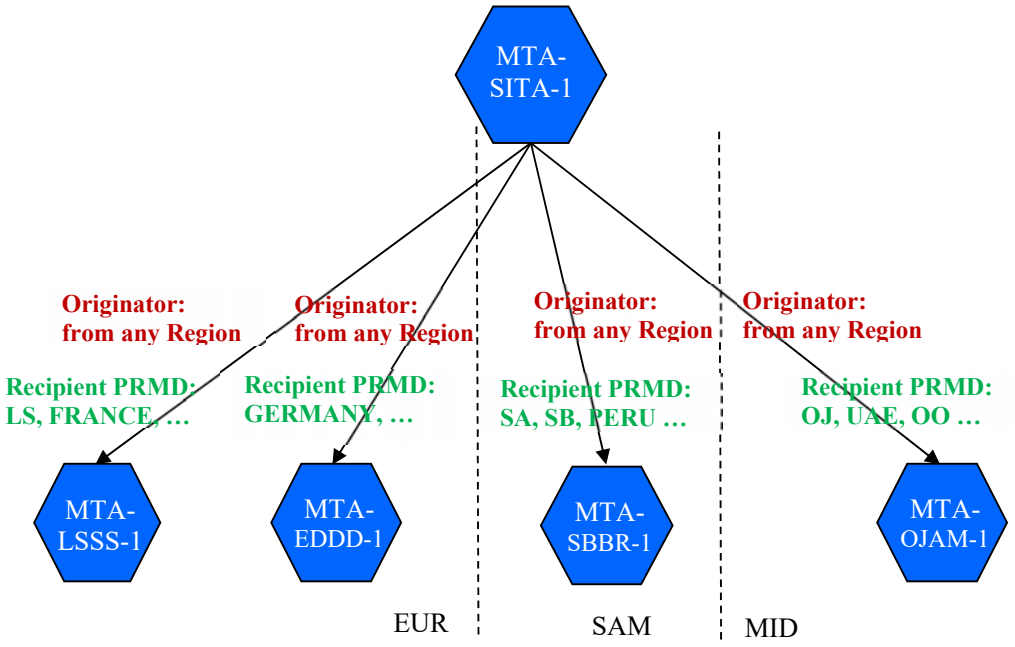

Figure 15: Routing by Recipient address

.... In accordance with Section .. the interconnected COM Centre (MTA) shall check the validity of the Originator address of all messages coming from SITA (MTA). This checking is performed against the entries in the User address look-up table provided by the AMC (White List).

.... It is important to highlight that due to the mandatory Originator checking the content of the White List (User address look-up table) must contain all SITA User entries from all ICAO Regions (cf. Figure 15). Any missing SITA Originator address will result in an NDR for the incoming AMHS message from SITA.

... AMHS and AFTN Routing requirements

.... Introduction

..... With the first publication of any SITA user address in AMC (User Address Table) each AMHS COM Centre worldwide has to be aware that AMHS messages with O/R addresses assigned to PRMD=SITA could occur in the AMHS network due to the use of the three AMC Address Managements tables (AMHS MD Register, CAAS Table and User Address Table) in the MTCU for address conversion.

..... This means that before any publication of SITA User addresses in AMC can be made, in all AMHS COM Centres worldwide the respective AMHS Routing for the Global Domain Identifier GDI=/XX/ICAO/SITA/ has to be setup otherwise associated Non-delivery Reports (NDRs) could be expected.

..... But, not only the AMHS Routing is effected also the AFTN Routing tables of all COM Centres worldwide might respect the potential routing requirements for SITA User AFTN addresses.

..... In the following a general and specific routing advice for AMHS and AFTN is provided.

.... General AMHS Routing advice for COM Centres in all ICAO Regions

..... In all COM Centres with AMHS capabilities the AMHS Routing for the Global Domain Identifier GDI=/XX/ICAO/SITA/ has to be setup as follows:

- direct to the SITA MTA, if a direct AMHS connection is available for that COM Centre (e.g. as the Gateway COM Centres KATL and LSSS to SITA in Figure 16), or

- to the MTA of the adjacent AMHS COM Centre if a AMHS routing path to SITA from there is available (e.g. as the COM Centres LIII and LOOO to LSSS in Figure 16), or

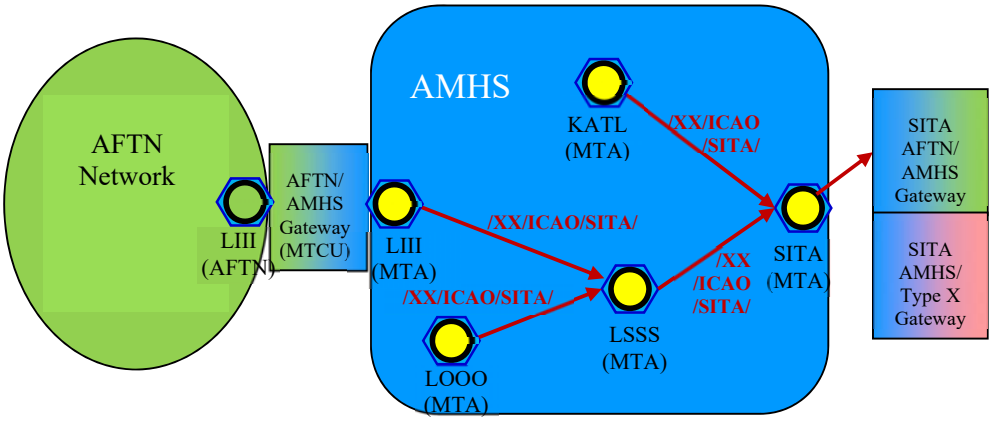

Figure 16: Routing example for GDI=/XX/ICAO/SITA/

- to the own MTCU if the message has to be forwarded via AFTN (in such a case an exceptional AFTN Routing might be required – see ....)

..... Specific Regional AMHS Routing advice for the Global Domain Identifier GDI=/XX/ICAO/SITA/ is provided in Section .... to .....

.... General AFTN Routing advice for COM Centres in all ICAO Regions

..... In general, three different categories of AFTN routing entries can be found in AFTN Routing tables of the COM Centres worldwide:

- **Global AFTN routing**
  Entries of this category are related to AFTN Routing Indicators which are assigned to "other" Regions (not to the own Region). Those entries are represented mostly by one letter only (Routing area, e.g. A, E, K, Y, Z). In Regions with multiple interregional Gateway COM Centres to another Region exceptional AFTN Routing entries could be defined in the COM Centres concerned in order to separate the traffic as required (L*, LA, LB, LR which means: L except LA, LB, LR).

- **Regional AFTN routing**
  Entries of this category are related to AFTN Routing Indicators which are assigned to the own Region. Those entries are represented mostly by two letters (Nationality Letters). Within a Region exceptional AFTN Routing entries could occur at this level as well depending on the location of the COM Centres concerned and its connectivity (e.g. in EUR to separate traffic to the "Nordic States" – E*, EF, EK, EN, ES).

- **Local AFTN routing**
  Entries of this category are related to AFTN Routing Indicators representing locations of the own State (Area of responsibility) or specific destinations. Those entries are represented by four letters (location Indicators), five, six, seven and up to eight letters. Often, exceptional AFTN Routing entries are used to minimise the number of local Routing entries.

- **Routing requirements for SITA User AFTN addresses**
  Generally, SITA User AFTN addresses has to be routed to the SITA Network.
  In AFTN COM Centre with an SITA interconnection dedicated local AFTN routing entries are defined to fulfil the previous requirement. These could include exceptional AFTN Routing entries for adjacent COM Centres (e.g. LG*, LGAVAFLX, if LGAVAFLX is an SITA User AFTN address which has to be routed different as other LG addresses). In such an case, the adjacent COM Centre concerned has to route the own SITA User AFTN addresses to the COM Centre with the SITA connection (c.f. Figure 17).

..... With the publication of the SITA users in AMC (User Address Table) each COM Centre worldwide is able to identify AFTN Addresses assigned to SITA Users. The routing direction of SITA User AFTN addresses and the routing direction of normal AFTN addresses starting with the same Nationality Letters (AFTN Routing Indicator) are mostly identical. Those destination addresses has to be routed to the State concerned (normal AFTN addresses routed by Routing Area/ Nationality Letters). Therefore, for the majority of the COM Centres it is not required to introduce additional AFTN routing entries (exceptional AFTN routing) for SITA User AFTN addresses.

..... But each COM Centre should check its **Regional AFTN routing** whether a need for exceptional AFTN Routing for AFTN addresses assigned to a SITA User (listed in the User Address table) exists. If normal AFTN addresses and AFTN Addresses listed in the User Address table require different routing paths than exceptional AFTN routing arrangements shall be coordinated between the COM Centres concerned. See also example in Figure 17.

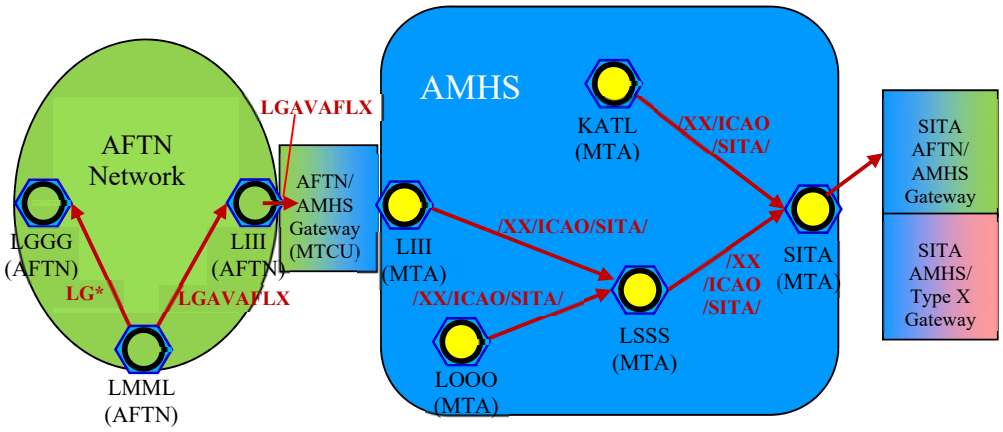

Figure 17: Exceptional AFTN Routing example for a SITA User AFTN address *)

*) The COM Centre LMML routes the AFTN address LGAVAFLX of a Greek SITA User to COM Centre LIII by exceptional AFTN routing while other AFTN addresses starting with LG are routed to COM Centre LGGG.
COM Centre LIII shall setup as well an exceptional AFTN Routing for LGAVAFLX towards its MTCU.

.... Specific AMHS Routing advice in the AFI Region

..... Currently, no specific AMHS routing requirements for the Global Domain Identifier GDI=/XX/ICAO/SITA/ exist. The AMHS routing for PRMD=SITA shall be set to default (MTCU).

..... With the future rollout of AMHS in the AFI Region the two envisaged main Gateway COM Centres to SITA will collect and distribute the traffic to and from SITA. Therefore, respective AMHS routing paths has to be setup to:

- FAOR – Johannesburg, South Africa; or
- GOOO – Dakar, Senegal.

.... Specific AMHS Routing advice in the ASIA/PAC Region

..... The AMHS COM Centres in the ASIA/PAC Region should define AMHS routing paths for the Global Domain Identifier GDI=/XX/ICAO/SITA/ to one of the designated Gateway COM Centres to SITA as there are:

- VTBB – Bangkok, Thailand;
- WSSS – Singapore, Singapore; or
- YBBB – Brisbane, Australia.

.... Specific Routing advice for the EUR/NAT Region

..... The AMHS routing advice for the COM Centres in the EUR/NAT Region is provided by the AMC in accordance with the Routing Update procedure of AMC.

..... The COM Centres in the EUR/NAT Region has to ensure that the AMHS Routing tables as coordinated and published in AMC are activated at AIRAC date, 11:00 UTC.

.... Specific Routing advice for the MID Region

..... The AMHS COM Centres in the MID Region should define AMHS routing paths for the Global Domain Identifier GDI=/XX/ICAO/SITA/ to one of the designated Gateway COM Centres to SITA as there are:

- OJAM – Amman, Jordan; or
- OLBA – Beirut, Lebanon.

..... The AMHS routing advice for the COM Centres in the MID Region is provided by the MID-AMC in accordance with the procedures of the MID-AMC.

..... The COM Centres in the MID Region has to ensure that the AMHS Routing tables as coordinated and published in the MID-AMC are activated at AIRAC date, 11:00 UTC.

.... Specific Routing advice for the NAM/CAR Region

..... The AMHS COM Centres in the NAM/CAR Region should define AMHS routing paths for the Global Domain Identifier GDI=/XX/ICAO/SITA/ to one of the designated Gateway COM Centres to SITA as there are:

- KATL – Atlanta, United States; or
- KSLC – Salt Lake City, United States.

.... Specific Routing advice for the SAM Region

..... The AMHS COM Centres in the NAM/CAR Region should define AMHS routing paths for the Global Domain Identifier GDI=/XX/ICAO/SITA/ to one of the designated Gateway COM Centres to SITA as there are:

- SBBR – Brasilia, Brazil; or
- SAEZ – Ezeiza, Argentina.

.. Validation of the AFTN Addresses of SITA Users in AMC

... Any AFTN address of a SITA user which is listed in the User Address Table in AMC shall be validated by the External COM Operator/CCC Operator of the concerned State. This means that the External COM Operator/CCC Operator has to check and finally to confirm the assignment of the AFTN address of his area of responsibility to an User of PRMD=SITA.

... The following example should illustrate the validation of the AFTN Addresses of SITA Users in AMC by the External COM Operator/CCC Operator.

Figure 18 shows a User Address Table of Greece with three entries.

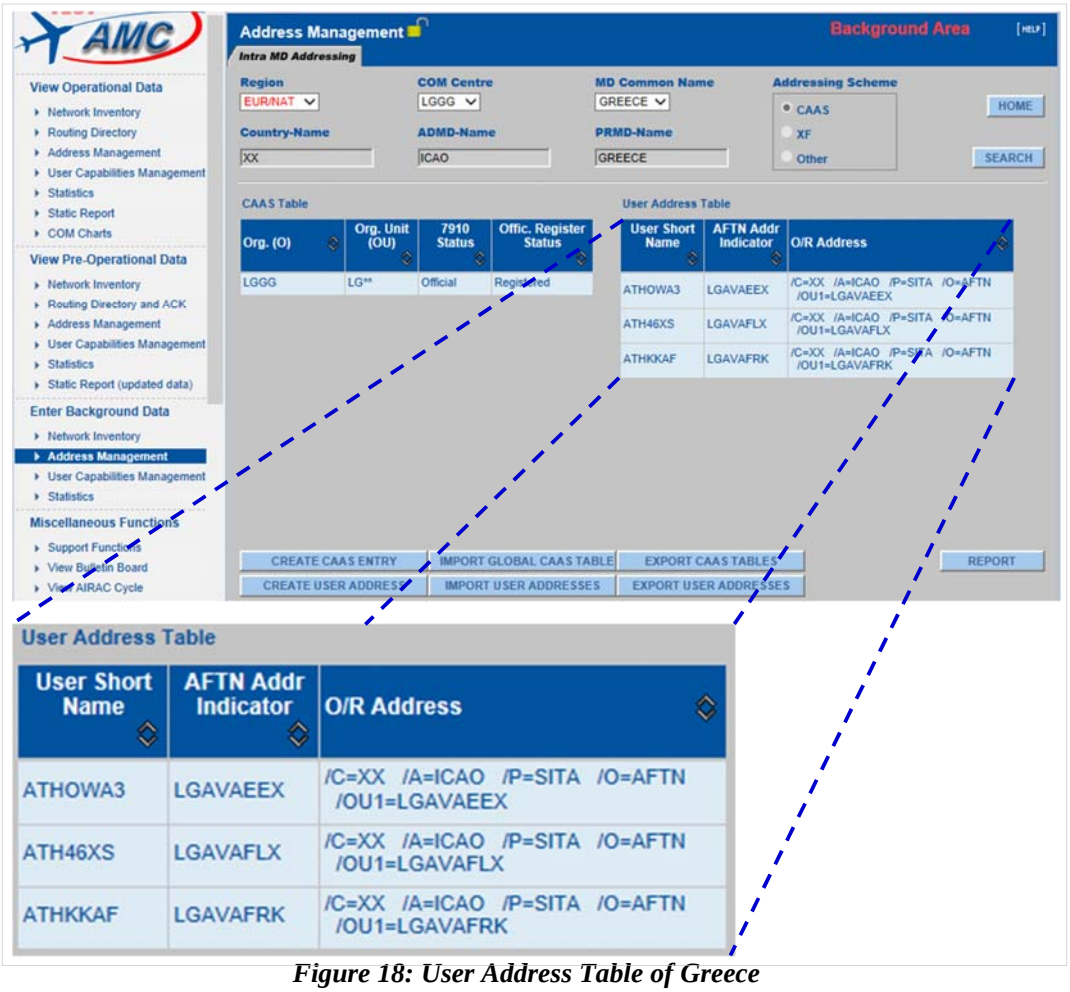

Figure 18: User Address Table of Greece

The task of the CCC Operator of Greece is to validate these three entries. Therefore, he has to check for each entry that the "AFTN Addr Indicator" and the associated "User Short Name" are correct (coordinated with the State concerned – in this case with Greece). He should check that the assigned PRMD is correct as well (in this case P=SITA).

If all entries are acceptable no further actions are required.

If modifications are required the CCC Operator of Greece should coordinate with the SITA External COM Operator which change has to be performed and who will execute the change in AMC.

Unacceptable entries can be deleted by the CCC Operator of Greece according EUR Doc 021 – ATS Messaging Management Manual, Section 5.1.5, Note in "Description". (This drastic measure should be avoided by coordination in advance).

Attachment A: Change Control Mechanism of the document

A.0.1 The change control mechanism provides two categories:

- Defect Report (DR), and
- Change Proposal (CP)

A.0.2 Proposals to introduce changes to the AMHS/SITA Interconnection Architecture document itself may arise from users, implementers or manufacturers.

A.0.3 The procedure for submission and processing of a Defect Report (DR) or a Change Proposal (CP) involves the following steps:

A.1 Procedure for Defect Report (DR)

A.1.1 A problem is detected, which is reflected in the AMHS/SITA Interconnection Architecture document and may be attributed to implement procedures and/or inconsistencies in this document.

A.1.2 The problem is reported to the Rapporteur of the Operation Group of AST TF (AST OG), by submission of a defect report (DR). A standard reporting format is used (see attached template in A.3).

A.1.3 The Rapporteur assigns a number and priority to the defect report and introduces it to the agenda of an upcoming meeting of the OG. If necessary, he refers to the Planning Group (PG) Rapporteur.

A.1.4 The OG evaluates the report and either adopts it as a working item or rejects it. The party, which submitted the defect report, is notified accordingly.

A.1.5 Experts of the OG are assigned to the problem when adopted (Status: accepted) and milestone dates are set. Outside expertise may be invited to participate, as appropriate.

A.1.6 The OG develops proposals for resolving the problem and submits them to the AST TF for approval.

A.1.7 The AST TF approves or rejects the presented proposals. In case of the latter, the subject is referred back to the OG (step A.1.5) or discarded.

A.1.8 The OG drafts appropriate text for amendment of the AMHS/SITA Interconnection Architecture document and submits it to the AST TF for approval.

A.1.9 The AST TF approves or rejects the proposed material. In case of the latter, the subject is referred back to the OG (step A.1.8).

A.1.10 The proposed amendments to the AMHS/SITA Interconnection Architecture document are presented to the EASPG for approval.

A.1.11 Solutions are implemented.

Note.– Steps A.1.6 and A.1.8 may run in parallel.

A.2 Procedure for Change Proposal (CP)

A.2.1 The same structured procedure, with the exception of steps (A.1.6) and (A.1.7) applies in case of proposed enhancements to the AMHS/SITA Interconnection Architecture document or inconsistencies with relevant existing documentation.

A.2.2 In this case, a change proposal (CP) should be submitted to the OG. The format of the CP is similar to that of the DR.

A.3 Template for Defect Reports / Change Proposals

TEMPLATE FOR DEFECT REPORTS / CHANGE PROPOSALS

DR-TPIA-yy-nnn **CP-TPIA-yy-nnn**

Title:	Short, indicative textual name
Reference:	Number assigned by the OG Rapporteur
Originator reference:	Provided by the originator
Submission date:	
Submitting State/Organisation:	
Author:	
Contact Information:	e-mail, fax, telephone and postal address
Experts involved:	
Status:	Assigned by the OG Rapporteur
Priority:	Assigned by the OG Rapporteur
Document reference:	Affected section(s) of the AMHS/Third Party Interconnection Architecture document
Description of defect:	Nature of the problem in detail Reason(s) for requesting changes
Assigned expert(s):	
Task history:	Working Papers and Information Papers Produced on the subject
Proposed solution:	Including amendments to the text, if feasible

DR/CP STATUS control sheet				
Event	**Date**	**Status**		**Remark**
DR or CP received submission date		Set to submitted		
discussion at OG/ ...		Set to accepted	Set to rejected	
Date for development of proposals/ solutions				Responsible:
discussion at OG/ ...		Set to resolved		
presentation to AST TF/ ...		Set to adopted	Set to rejected	
Date for development of amendment to the TPIA document				Responsible:
discussion at PG/		Set to approved		
presentation to AST TF/ ...		Set to approved for application		
Additional DATES and comments				

END of Attachment A

Attachment B

B.1 Conversion Table AFTN to SITA Type B addresses (IX Table)

Publication suspended

B.2 Conversion table SITA to AFTN addresses (XA Table)

Publication suspended

B.3 List of AFTN addresses for AFTN origin validation

The AFTN addresses assigned to SITA Users will be published in the EUR ATS Messaging Management Centre (AMC).

B.4 SITA User addresses for AMHS Interoperability Testing

The following addresses have to be provided in the AMHS User Lookup Table of the systems involved in AMHS Interoperability Testing in order to ensure a correct address conversion of the SITA User addresses to PRMD=SITA.

AFTN Address	User short name	O/R Address
KATLDLED	ATLDLLO	XX/ICAO/SITA/AFTN/KATLDLED
KATLDLRE	ATLDLRE	XX/ICAO/SITA/AFTN/KATLDLRE
KATLMHSA	ATLTAXS	XX/ICAO/SITA/AFTN/KATLMHSA
KATLMHSB	ATLTBXS	XX/ICAO/SITA/AFTN/KATLMHSB
KATLMHSC	ATLTCXS	XX/ICAO/SITA/AFTN/KATLMHSC
KATLMHSD	ATLTDXS	XX/ICAO/SITA/AFTN/KATLMHSD
KATLMHSE	ATLTEXS	XX/ICAO/SITA/AFTN/KATLMHSE
KATLMHSF	ATLTFXS	XX/ICAO/SITA/AFTN/KATLMHSF
KATLMHSG	ATLTGXS	XX/ICAO/SITA/AFTN/KATLMHSG
KATLMHSH	ATLTHXS	XX/ICAO/SITA/AFTN/KATLMHSH
KATLMHSI	ATLTIXS	XX/ICAO/SITA/AFTN/KATLMHSI
KATLMHSJ	ATLTJXS	XX/ICAO/SITA/AFTN/KATLMHSJ
KATLMHSK	ATLTKXS	XX/ICAO/SITA/AFTN/KATLMHSK
KATLMHSL	ATLTLXS	XX/ICAO/SITA/AFTN/KATLMHSL
KATLMHSM	ATLTMXS	XX/ICAO/SITA/AFTN/KATLMHSM
KATLMHSN	ATLTNXS	XX/ICAO/SITA/AFTN/KATLMHSN

AFTN Address	User short name	O/R Address
KATLMHSO	ATLTOXS	XX/ICAO/SITA/AFTN/KATLMHSO
KATLMHSP	ATLTPXS	XX/ICAO/SITA/AFTN/KATLMHSP
KATLMHSQ	ATLTQXS	XX/ICAO/SITA/AFTN/KATLMHSQ
KATLMHSR	ATLTRXS	XX/ICAO/SITA/AFTN/KATLMHSR
KATLMHSS	ATLTSXS	XX/ICAO/SITA/AFTN/KATLMHSS
KATLMHST	ATLTTXS	XX/ICAO/SITA/AFTN/KATLMHST
KATLMHSU	ATLTUXS	XX/ICAO/SITA/AFTN/KATLMHSU
KATLMHSV	ATLTVXS	XX/ICAO/SITA/AFTN/KATLMHSV
KATLMHSW	ATLTWXS	XX/ICAO/SITA/AFTN/KATLMHSW
KATLMHSX	ATLTXXS	XX/ICAO/SITA/AFTN/KATLMHSX
KATLMHSY	ATLTYXS	XX/ICAO/SITA/AFTN/KATLMHSY
KAXSMHSA	ATLXAXS	XX/ICAO/SITA/AFTN/KAXSMHSA
KAXSMHSB	ATLXBXS	XX/ICAO/SITA/AFTN/KAXSMHSB
KAXSMHSC	ATLXCXS	XX/ICAO/SITA/AFTN/KAXSMHSC
KAXSMHSD	ATLXDXS	XX/ICAO/SITA/AFTN/KAXSMHSD
KAXSMHSE	ATLXEXS	XX/ICAO/SITA/AFTN/KAXSMHSE
KAXSMHSF	ATLXFXS	XX/ICAO/SITA/AFTN/KAXSMHSF
KAXSMHSG	ATLXGXS	XX/ICAO/SITA/AFTN/KAXSMHSG
KAXSMHSH	ATLXHXS	XX/ICAO/SITA/AFTN/KAXSMHSH
KAXSMHSI	ATLXIXS	XX/ICAO/SITA/AFTN/KAXSMHSI
KAXSMHSJ	ATLXJXS	XX/ICAO/SITA/AFTN/KAXSMHSJ
KAXSMHSK	ATLXKXS	XX/ICAO/SITA/AFTN/KAXSMHSK
KAXSMHSL	ATLXLXS	XX/ICAO/SITA/AFTN/KAXSMHSL
KAXSMHSM	ATLXMXS	XX/ICAO/SITA/AFTN/KAXSMHSM
KAXSMHSN	ATLXNXS	XX/ICAO/SITA/AFTN/KAXSMHSN
KAXSMHSO	ATLXOXS	XX/ICAO/SITA/AFTN/KAXSMHSO
KAXSMHSP	ATLXPXS	XX/ICAO/SITA/AFTN/KAXSMHSP
KAXSMHSQ	ATLXQXS	XX/ICAO/SITA/AFTN/KAXSMHSQ
KAXSMHSR	ATLXRXS	XX/ICAO/SITA/AFTN/KAXSMHSR
KAXSMHSS	ATLXSXS	XX/ICAO/SITA/AFTN/KAXSMHSS
KAXSMHST	ATLXTXS	XX/ICAO/SITA/AFTN/KAXSMHST
KAXSMHSU	ATLXUXS	XX/ICAO/SITA/AFTN/KAXSMHSU
KAXSMHSV	ATLXVXS	XX/ICAO/SITA/AFTN/KAXSMHSV
KAXSMHSW	ATLXWXS	XX/ICAO/SITA/AFTN/KAXSMHSW
KAXSMHSX	ATLXXXS	XX/ICAO/SITA/AFTN/KAXSMHSX
KAXSMHSY	ATLXYXS	XX/ICAO/SITA/AFTN/KAXSMHSY
ETTTSITA	BERTAXS	XX/ICAO/SITA/AFTN/ETTTSITA
ETTTSITB	BERTBXS	XX/ICAO/SITA/AFTN/ETTTSITB

AFTN Address	User short name	O/R Address
ETTTSITC	BERTCXS	XX/ICAO/SITA/AFTN/ETTTSITC
ETTTSITD	BERTDXS	XX/ICAO/SITA/AFTN/ETTTSITD
ETTTSITE	BERTEXS	XX/ICAO/SITA/AFTN/ETTTSITE
ETTTSITF	BERTFXS	XX/ICAO/SITA/AFTN/ETTTSITF
ETTTSITG	BERTGXS	XX/ICAO/SITA/AFTN/ETTTSITG
ETTTSITH	BERTHXS	XX/ICAO/SITA/AFTN/ETTTSITH
ETTTSITI	BERTIXS	XX/ICAO/SITA/AFTN/ETTTSITI
ETTTSITJ	BERTJXS	XX/ICAO/SITA/AFTN/ETTTSITJ
ETTTSITK	BERTKXS	XX/ICAO/SITA/AFTN/ETTTSITK
ETTTSITL	BERTLXS	XX/ICAO/SITA/AFTN/ETTTSITL
ETTTSITM	BERTMXS	XX/ICAO/SITA/AFTN/ETTTSITM
ETTTSITN	BERTNXS	XX/ICAO/SITA/AFTN/ETTTSITN
ETTTSITO	BERTOXS	XX/ICAO/SITA/AFTN/ETTTSITO
ETTTSITP	BERTPXS	XX/ICAO/SITA/AFTN/ETTTSITP
ETTTSITQ	BERTQXS	XX/ICAO/SITA/AFTN/ETTTSITQ
ETTTSITR	BERTRXS	XX/ICAO/SITA/AFTN/ETTTSITR
ETTTSITS	BERTSXS	XX/ICAO/SITA/AFTN/ETTTSITS
ETTTSITT	BERTTXS	XX/ICAO/SITA/AFTN/ETTTSITT
ETTTSITU	BERTUXS	XX/ICAO/SITA/AFTN/ETTTSITU
ETTTSITV	BERTVXS	XX/ICAO/SITA/AFTN/ETTTSITV
ETTTSITW	BERTWXS	XX/ICAO/SITA/AFTN/ETTTSITW
ETTTSITX	BERTXXS	XX/ICAO/SITA/AFTN/ETTTSITX
ETTTSITY	BERTYXS	XX/ICAO/SITA/AFTN/ETTTSITY
LSTTSITA	GVATAXS	XX/ICAO/SITA/AFTN/LSTTSITA
LSTTSITB	GVATBXS	XX/ICAO/SITA/AFTN/LSTTSITB
LSTTSITC	GVATCXS	XX/ICAO/SITA/AFTN/LSTTSITC
LSTTSITD	GVATDXS	XX/ICAO/SITA/AFTN/LSTTSITD
LSTTSITE	GVATEXS	XX/ICAO/SITA/AFTN/LSTTSITE
LSTTSITF	GVATFXS	XX/ICAO/SITA/AFTN/LSTTSITF
LSTTSITG	GVATGXS	XX/ICAO/SITA/AFTN/LSTTSITG
LSTTSITH	GVATHXS	XX/ICAO/SITA/AFTN/LSTTSITH
LSTTSITI	GVATIXS	XX/ICAO/SITA/AFTN/LSTTSITI
LSTTSITJ	GVATJXS	XX/ICAO/SITA/AFTN/LSTTSITJ
LSTTSITK	GVATKXS	XX/ICAO/SITA/AFTN/LSTTSITK
LSTTSITL	GVATLXS	XX/ICAO/SITA/AFTN/LSTTSITL
LSTTSITM	GVATMXS	XX/ICAO/SITA/AFTN/LSTTSITM
LSTTSITN	GVATNXS	XX/ICAO/SITA/AFTN/LSTTSITN
LSTTSITO	GVATOXS	XX/ICAO/SITA/AFTN/LSTTSITO

AFTN Address	User short name	O/R Address
LSTTSITP	GVATPXS	XX/ICAO/SITA/AFTN/LSTTSITP
LSTTSITQ	GVATQXS	XX/ICAO/SITA/AFTN/LSTTSITQ
LSTTSITR	GVATRXS	XX/ICAO/SITA/AFTN/LSTTSITR
LSTTSITS	GVATSXS	XX/ICAO/SITA/AFTN/LSTTSITS
LSTTSITT	GVATTXS	XX/ICAO/SITA/AFTN/LSTTSITT
LSTTSITU	GVATUXS	XX/ICAO/SITA/AFTN/LSTTSITU
LSTTSITV	GVATVXS	XX/ICAO/SITA/AFTN/LSTTSITV
LSTTSITW	GVATWXS	XX/ICAO/SITA/AFTN/LSTTSITW
LSTTSITX	GVATXXS	XX/ICAO/SITA/AFTN/LSTTSITX
LSTTSITY	GVATYXS	XX/ICAO/SITA/AFTN/LSTTSITY

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