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AERONAUTICAL TELECOMMUNICATIONS NETWORK PANEL(ATNP)

WORKING GROUP 3 - APPLICATIONS AND UPPER LAYERS

Langen, 23-26 June 1997 (tenth meeting)

Agenda Item x : Ground-Ground Applications

WP/10-__ : Draft Guidance Material for ATSMHS (Version 0.4p)

Prepared by ATSMHS SARPs Editor

Summary

This document is the proposed Guidance Material on ATS Message Handling Services (ATSMHS). It complements ICAO Version 1.1 of the Draft SARPs for ATS Message Handling Services (ATSMHS).

New or amended material since Version 0.3 is identified by change bars on the side of the relevant sections. However, those editorial changes which are limited to a few words in a paragraph, unless of a particular significance, are not identified by change bars.

WG3 is invited to adopt this material as Version 0.4 of the ATSMHS GM to be presented to the ATNP WGW/2, and to provide guidance on the further development of this material towards Version 1.0.

Document Control Log

Section(s)	Date	New Version	Reason for change
All	09/04/96	0.1 (provisional)	
All	21/06/96	0.2 (provisional)	incorporation of the Brussels SG1 (8th) and WG3 (6th) meeting conclusions
All	24/09/96	0.3 (provisional)	incorporation of the Munich WG3 (7th) meeting conclusions
All	04/10/96	0.3	approval by the Toulouse SG1 (9th) meeting
All	12/06/97	0.4 (provisional)	inclusion of additional material requested by SG1 and WG3 since the 9th SG1 WG3 meeting

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1. OVERVIEW

1.1 INTRODUCTION

1.1.1 Purposes of the SARPs

The Draft ATN SARPs for ATS Message Handling Services (ATSMHS) define two applications which allow ATS Messages to be exchanged between service users. These two ATS Message Handling Services are generic messaging services over the ATN Internet:

a) the ATS Message Service, which is a store-and-forward messaging service over the ATN Internet; and
b) the ATN Pass-Through Service, which is a transmission facility over the ATN Internet for AFTN messages.

Three categories of ATN End Systems are defined for the support of the ATS Message Service. They are the ATS Message Server, the ATS Message User Agent and the AFTN/AMHS Gateway. Together, they provide connectivity between users at ATN End Systems and users at AFTN Stations in three different end-to-end configurations:

a) from an AFTN Station to another AFTN Station over the ATN;
b) from an AFTN Station to an ATN End System, and vice-versa;
c) from an ATN End System to another ATN End System.

A single category of ATN End System is defined for the support of the ATN Pass-Through Service. It is the AFTN/ATN Type A Gateway. The use of two peer AFTN/ATN Type A Gateways interconnected over the ATN Internet provides an end-to-end connectivity between two users at AFTN Stations over the ATN Internet.

These two aspects are depicted in Figure 1-1.

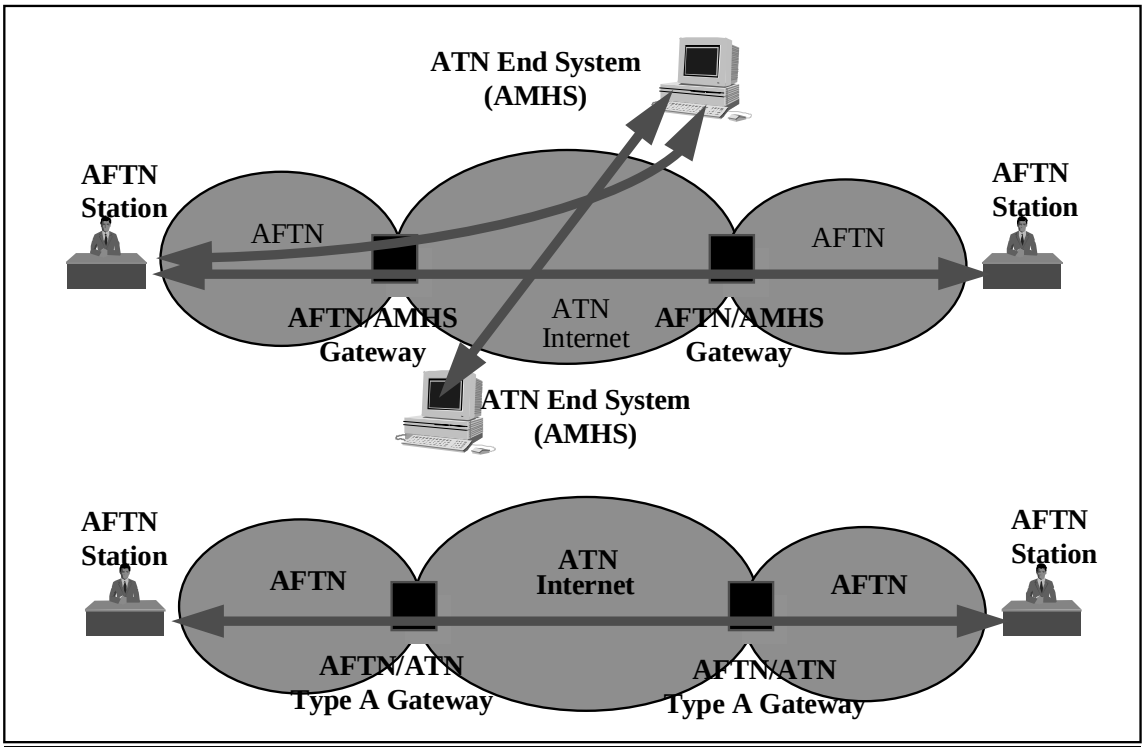

Figure 1-1 : ATSMHS Traffic flows

The implementation of the ATS Message Service is mandatory for conformance with the SARPs. However, as a matter of organisations' policy, interim conformance may be achieved with the implementation of the ATN Pass-Through Service. The choice to implement the ATN Pass-Through Service as an interim solution does not replace the requirement to implement the ATS Message Service at the earliest possible date.

The choice to implement the ATN Pass-Through Service also implies the requirement to provide the interoperability facilities to the ATS Message Service implementations. Such facilities between the ATS Message service and the ATN Pass-Through Service are a local implementation matter, provided that the behaviour exhibited externally to the facility is identical to that of an AFTN/AMHS Gateway and of an AFTN/ATN Type A Gateway, respectively.

1.1.2 Background

The Aeronautical Fixed Service (AFS) Systems Planning for Data Interchange Panel (ASPP), at its ASPP/3 meeting, included, among other things, the following work items in its future work programme:

a) Monitoring of implementation of AFTN and development of solutions to related problems, including the changes required to support the mixed AFTN/ATN environment; and

b) implications of the proposed ATN concept.

These work items resulted in the production by the ASPP Working Group of a draft Manual on ATS Message Handling over the ATN. This draft Manual included material concerning ATS Message Handling and the related AFTN/ATN Gateway. Subsequent to the ASPP dissolution, and to the re-incorporation of the ASPP terms of reference in those of the Aeronautical Telecommunication Panel (ATNP), this material was presented to ATNP/1.

The ATNP/1 meeting concluded that this material was sufficiently mature and recommended that the draft Manual on ATS message handling over the ATN be published as an ICAO Manual. Furthermore, this draft Manual was recognized as the basis for the future development of the Draft SARPs for ATS Message Handling Services.

The draft Manual included the specification of two ATS Message Protocol Stacks called Type A and Type B. These two protocol stacks have led to the definition of the applications comprised in ATS Message Handling Services, the ATS Message Service and the ATN Pass-Through Service, which implement the ATS Message Protocol Stack Type B and the ATS Message Protocol Stack Type A, respectively.

1.1.3 Scope, purpose and structure of the document

This document provides guidance material for implementors, service providers and users of ATS Message Handling Services.

It has been developed as a companion document to the ATSMHS SARPs. It may be read alongside the SARPs, and for this purpose the structure of this document has been aligned on the structure of the SARPs for Chapters. When possible, i.e. in Chapter 2, this has also been done for level 2 sections. This means that, e.g. section 2.1 of this document provides guidance on the subjects adressed in section 3.1.2.1 of the SARPs (where 3.1 identifies the ATSMHS SARPs in the overall ATN SARPs).

1.2 APPLICATION FUNCTIONALITIES

1.2.1 ATS Message Service Overview

Two levels of service are defined within the ATS Message Service:
a) the Basic ATS Message Service.
b) the Extended ATS Message Service.

The Basic ATS Message Service meets the basic requirements of the MHS Profiles published by ISO as International Standardized Profiles (ISPs), and it incorporates additional features to support the service offered by the AFTN. The Basic ATS Message Service is further specified in section 2.2.1.3. This includes the specification of which ISPs apply in this context.

The Extended ATS Message Service will provide functionalities in addition to those of the Basic ATS Message Service which are either one or several of the following:
a) functionalities which are optional in the ISPs applying in the context of the Basic ATS Message Service.
b) functionalities included in ISPs which do not apply in the context of the Basic ATS Message Service.
c) functionalities included in future editions of the ISO/IEC and ITU-T MHS Standards and Recommendations.

An example of a) could be that the Extended ATS Message Service mandates the use of a Functional Group (e.g. Use of Directory) which is optional in the Basic ATS Message Service. An example of b) could be that the Extended ATS Message Service is based on a different category of service (e.g. EDIMS) defined in the MHS profiles. An example of c) could be the "business-class user extensions" currently under discussion at ISO and ITU-T, which define standard extensions to the IPM Heading fields, among which some could potentially be used for the conveyance of items such as the filing time and the optional heading information currently carried in the ATS-Message-Header (i.e. in the body) of an AMHS IPM.

The detailed specification of the Extended ATS Message Service is not included in these SARPs. It is for further study and inclusion in future issues of the SARPs.

The term ATS Message Service refers to the service which includes both the Basic and the Extended ATS Message Service where no distinction between these is necessary.

The ATS Message Service is the long-term solution amongst the ATS Message Handling Services defined over the ATN. This means that in the long-term, the ATS Message Service is aimed at becoming the single generic messaging service over the ATN.

1.2.2 ATN Pass-Through Service Overview

The ATN Pass-Through Service encapsulates and decapsulates AFTN messages at an AFTN/ATN type A Gateway.

Messages with multiple addressees are address-stripped in the AFTN/ATN Type A Gateway, and directed to different gateways as appropriate.

After determination of the destination gateway(s) as described above, the AFTN message is transparently conveyed without specific processing over the ATN Internet.

The upper layer protocol architecture used between two AFTN/ATN Gateways is the ATN Upper Layer Architecture as defined in Sub-Volume 4 of the SARPs.

2. ATS MESSAGE SERVICE GUIDANCE

2.1 SYSTEM LEVEL GUIDANCE

2.1.1 ATS Message service users

Two categories of users of the ATS Message Service are defined in the SARPs:

a) direct users;
b) indirect users.

Direct users are those who make use of an ATS Message User Agent to access the ATS Message Service. The use of a UA gives them a potential access to:

a) the MHS Elements of Service supported in the Basic ATS Message Service (see 2.2.1.3),
b) optional MHS Elements of Service in addition to those which are mandatory in the Basic ATS Message Service.

Direct users may belong to two subgroups as follows:

a) human users who interact with the ATS Message Service by means of a human-machine interface with an ATS Message User Agent connected to an ATS Message Server; and
b) host users which are computer applications running on ATN end systems and interacting with the ATS Message Service by means of application programme interfaces. Such APIs are out of the scope of the SARPs.

Indirect users are those users located at an AFTN station which can only reach the AMHS via an AFTN/AMHS Gateway. Such users therefore have access only to the AMHS functionalities which have a direct equivalent in the AFTN.

2.1.2 AMHS Model

2.1.2.1 AMHS Functional model

2.1.2.1.1 Model components

The set of ATS Message Servers, ATS Message User Agents and AFTN/AMHS gateways is known collectively as the ATS Message Handling System (AMHS). The set of protocols implemented between ATS Message Servers and/or AFTN/AMHS Gateways is called the ATS Message Protocol Stack Type B. From the ATN Internet perspective, these three categories of systems are ATN End Systems.

Since the AMHS operates in a store-and-forward mode, the number of ATN End Systems involved in an end-to-end message transfer in the AMHS depends on each message being transferred, i.e. on its originator and recipient, as well as on the routing adopted for that message by the involved ATS Message Servers, at the moment of its conveyance.

In the case of a single message end-to-end conveyance in the AMHS, a number of ATS Message Servers and two systems among ATS Message UAs and AFTN/AMHS gateways are involved. Following the concepts of the MHS Standards, it is necessary here to distinguish between the following components, or "building bricks", of the ATS Message Servers, and of the AFTN/AMHS gateways which all handle the ATS Message Protocol Stack Type B:

a) **message transfer agent** (MTA) which handles the "P1 protocol" (MTS transfer protocol) for the message exchange between a pair of MTAs. A set of interconnected MTAs forms a "message transfer system" (MTS).
b) **user agent** (UA) which is the interface between the user of the AMHS and the MTS. For the support of the Basic ATS Message Service, UAs provide the "interpersonal messaging (IPM) service", exchanging messages across the MTS from UA to UA by means of the "P2 protocol" (interpersonal messaging protocol).
c) **message store** (MS) which provides the MTA with a storage capability and which offers services allowing the UA to retrieve messages stored in the MS at its convenience. There are usually several UAs or MSs served by one MTA.
d) **access unit** (AU) which in the AFTN/AMHS gateway provides the conversion capability supporting the interworking between the AFTN and the UAs of the AMHS. In the general MHS environment, AUs define how UA users can communicate with users of non-MHS technologies (e.g. telex). However, for the AMHS no use of such standardized AU types is made.

2.1.2.1.2 ATS Message Server overview

An **ATS Message Server** comprises a MTA and optionally one or several MSs. As far as upper layer MTA-to-MTA communications are concerned, i.e. above the transport layer, the SARPs only require compliance with the AMH22 Profile and support of the IPM Distribution List Functional Group. This means that at this level, there is no "ATN-specific" requirement in the ATS Message Server specification. The interface between the ATS Message Server and the UAs it serves, either directly or through an MS, has been left open in the SARPs since this is often an implementation matter local to each Management Domain (see section 2.1.2.1.3 for more details).

If the ATS Message Server comprises any optional MS, then this MS is an IPM-MS. At the level of the IPM-MS the "ATN-specific" structured body is internal to the IPM body, and therefore it has no implication on the MS.

Figure 2-1 gives a simplified functional view of the ATS Message Server.

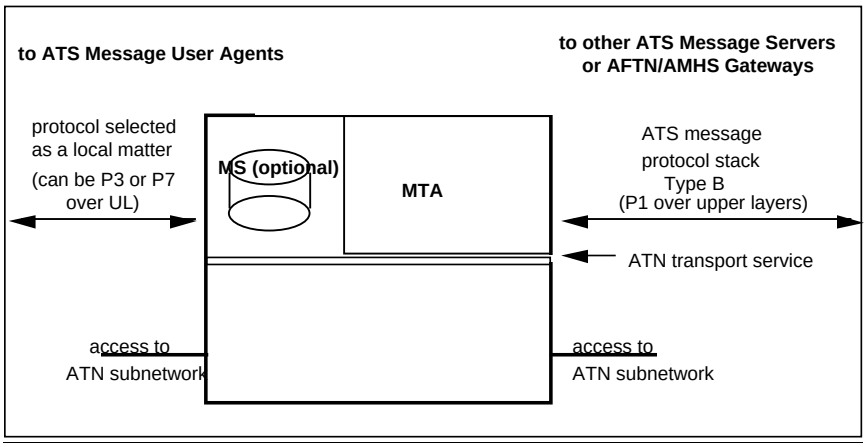

Figure 2-1 : Functional view of the ATS Message Server

2.1.2.1.3 ATS Message User Agent overview

An **ATS Message User Agent** comprises a UA. In the Basic ATS Message Service, this UA is an IPM-UA which supports additional "ATN-specific" features in order to comply with the mandatory requirement of AFTN interworking. These additional requirements are related to the structure of the IPM body, they are detailed in 2.2.2.1.

As mentioned above, the interface between the ATS Message UA and the ATS Message Server at the level of upper layer UA-to-MTA communications (and vice-versa) are concerned, i.e. above the transport layer, is a local implementation matter. The options at this level are as follows:

a) use the P3 protocol, if no MS is implemented in the ATS Message Server. In such a case, the use of the AMH23 Profile as specified in ISO/IEC ISP 12062-4 is the preferred implementation choice;
b) use the P7 protocol, if MSs are implemented in the ATS Message Server. In such a case, the use of the AMH24 Profile as specified in ISO/IEC ISP 12062-5 is the preferred implementation choice; and
c) use a locally-defined protocol, in the case of logically co-located UAs.

An ATS Message User Agent is by definition an ATN End System. The existence of this definition does not preclude the implementation, as a local matter, of UAs supporting a service identical to the Basic ATS Message Service without making use of the ATN for the interconnection between the UA and an ATS Message Server. Such UAs are also considered as logically co-located. In all cases logically co-located UAs in the AMHS are IPM-UAs supporting the structured IPM body defined in 2.2.2.1.

2.1.2.1.4 AFTN/AMHS Gateway overview

An AFTN/AMHS Gateway implements a MTA, and an AU. As further described in 2.3, the MTA forms the ATN Component of the AFTN/AMHS Gateway, and the AU is the Message Transfer and Control Unit of the AFTN/AMHS Gateway.

An AFTN/AMHS Gateway also implements an AFTN Component, however in strict terms this component does not pertain to the AMHS.

Finally an AFTN/AMHS Gateway includes a control position, which is the functional device where out-of-line situations and certain cases of non-delivery are handled by a human operator. Since it is a local component dedicated to system management, the control position is only conceptually defined in the SARPs.

Figure 2-2 gives a functional view of the AFTN/AMHS Gateway.

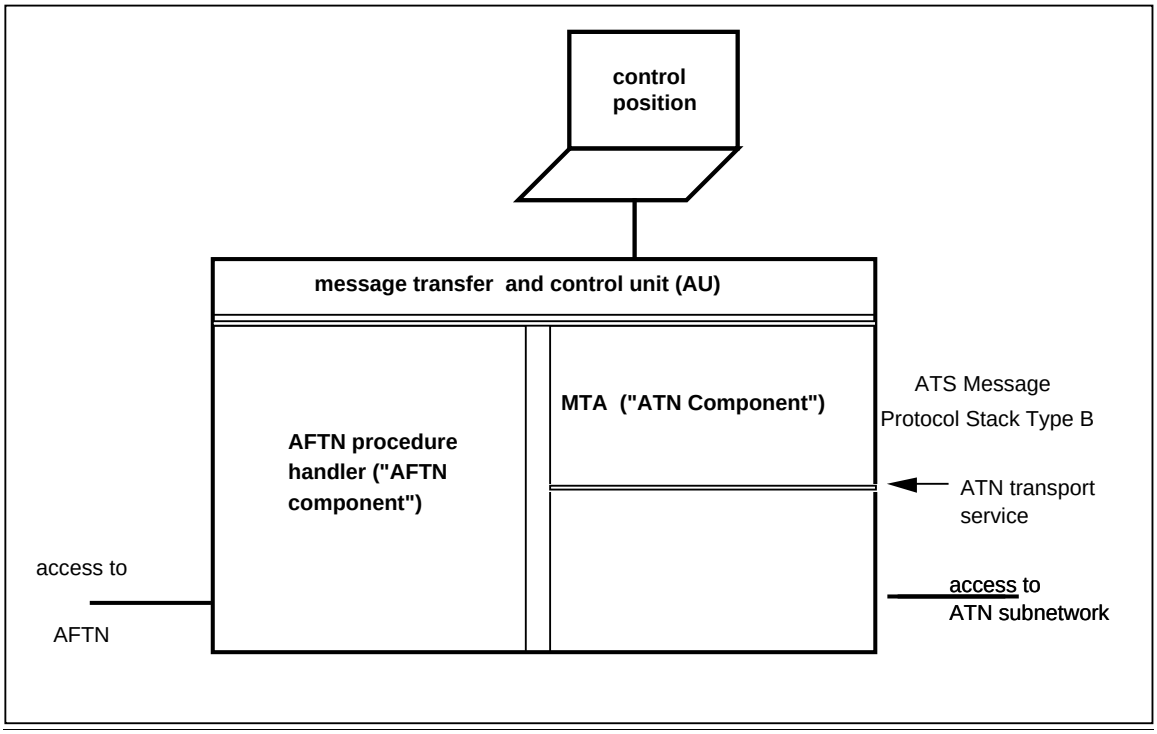

Figure 2-2 : Functional view of the AFTN/AMHS Gateway

2.1.2.1.5 Interaction between AMHS systems

Figure 2-3 illustrates different potential relationships together with examples of message flows between the systems which are part of the AMHS.

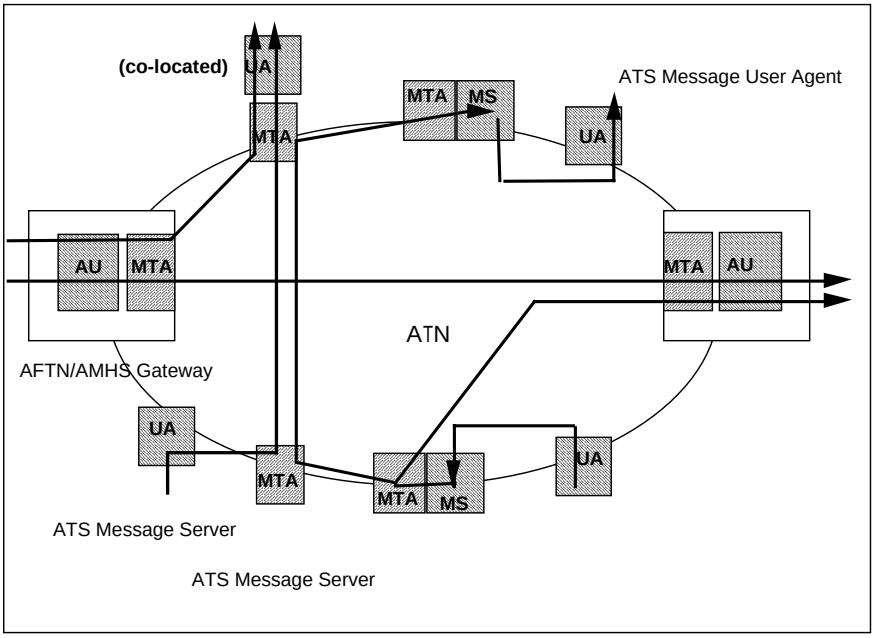

Figure 2-3 : Examples of AMHS message flows

Other configurations are also possible, for example an MTA+AU+MS/UA may also be obtained by co-location of an AFTN/AMHS Gateway, an ATS Message Server and one or several UAs.

Figure 2.3 illustrates that functions such as routing ("relaying") and multiple dissemination of messages to different recipients are performed by the MTAs included either in an ATS Message Server or in an AFTN/AMHS Gateway.

2.1.2.2 AMHS information model

In conformance with ISO/IEC 10021-2 three categories of information objects are conveyed in the AMHS: message, probe and report.

2.1.2.2.1 Messages

Messages are composed of two parts, the envelope and the content.

An envelope is generated by an ATS Message User Agent or an AFTN/AMHS Gateway when entering the AMHS. The envelope bears all the information necessary for the conveyance of the message by the ATS Message Servers towards its destination. The information carried by the envelope varies along the conveyance of the message towards its destination.

The type of envelope which is used for the submission/delivery of a message between an ATS Message User Agent and an ATS Message Server is related to the protocol implemented between the two systems. Therefore it is out of the scope of the SARPs (see 2.1.2.1.3).

In consequence, the specifications included in the SARPs deal only with Transfer Envelopes, used from MTA to MTA, i.e. either between two ATS Message Servers, between two AFTN/AMHS Gateways or between an ATS Message Server and an AFTN/AMHS Gateway.

The content of the message is an information object which the MTAs neither examines nor modifies, except for conversion, during its conveyance of the message. Messages generated in the Basic ATS Message Service are always Inter-Personal Messages (IPM). Two types of content conversion may be performed in the AMHS:

a) conversion of the content encoded-information-types, as specified in the base standards. Such a conversion is optional in the AMHS since there is no clause mandating the support of the Conversion Optional Functional Group as specified in the ISPs. It may be implemented in the MTAs, as a local matter; and
b) message content conversion in an AFTN/AMHS Gateway for a message conveyed from the AMHS to the AFTN. Such a conversion capability is necessary for interworking between the two messaging environments. It is further detailed in the AFTN/AMHS Gateway specification (see 2.3.5).

2.1.2.2.2 Probes

A probe is a class of message containing only an envelope which is conveyed by the MTAs from one user up to the MTA serving other users. It may be used to determine the deliverability of messages.

In the AMHS, probes are generated, if supported, at an ATS Message User Agent. An AFTN/AMHS Gateway does not generate probes. However, upon reception of probes, the AFTN/AMHS Gateway will process it and respond to it as appropriate.

2.1.2.2.3 Reports

A report is an information object generated by a MTA in order to report on the outcome or progress of a message or probe in the set of interconnected MTAs pertaining to the AMHS.

In the AMHS, reports are generated by an ATS Message Server or by an AFTN/AMHS Gateway. Within an AFTN/AMHS Gateway, the report may be generated either by the MTA comprised in the ATN Component (as usual for any MTA), or by the Access Unit (see 2.3.2.5).

2.1.2.3 AMHS Security model

The MHS standards include Elements of Service (EoS) related to security. However, for the support of the Basic ATS Message Service, their implementation is optional. It is expected that these EoS will be used in future Packages to ensure the AMHS security.

Therefore, in the Basic ATS Message Service, security is deemed a local issue, to be addressed as appropriate at each ATN End System pertaining to the AMHS by the authority in charge of the system. It may be noted that also in the MHS standards and ISPs, certain Security EoSs such as the Access Management between UA and MTA are specified as "local matter".

2.1.2.4 AMHS Management model

In the Basic ATS Message Service, management is limited to the logging provisions which are defined with two main goals:

a) ensuring message traceability, i.e. with the objective of keep track of the information objects which passed in, through and out of an ATN End System pertaining to the AMHS, and of the action taken thereon;
b) maintaining a long-term traffic log of the entire traffic upon origination, for safety and administrative purposes, e.g.in case an investigation would be necessary.

In the AFTN, this function is called long-term retention, and the retention duration is specified as being 30 days. Similar provisions are included in the ATSMHS SARPs, with the goal of offering the same level of functionality (traceability and originated traffic recording) as currently provided in the AFTN.

Within a given AMHS Management Domain (see 2.1.3.1 for the definition of this concept), the place where the originated traffic is recorded is a local matter. This may be done e.g. at the originating ATS Message Server (at its Submission/Delivery port), at the originating ATS Message User Agent, at the ATS Message Server where the message exits the AMHS Management Domain (at its exit Transfer port), or at a specifically dedicated system by ad-hoc means. At an AFTN/AMHS Gateway, there is no need to record the entire generated AMHS messages, since a message generated at an AFTN/AMHS Gateway as the result of the conversion of an AFTN message has already been logged in the AFTN for long-term retention.

For any piece of information, for which a logging requirement is present in the SARPs, the way in which the information specified is logged is an implementation matter, which is out of the scope of the SARPs. Also the way in which the information specified is retrieved, exchanged and used is an implementation matter, which is out of the scope of the SARPs.

2.1.3 AMHS Organization

2.1.3.1 AMHS Management Domains

For purposes of organization, addressing, routing etc. it is necessary to define an organizational structure for the AMHS.

MHS Standards require the organization of an MHS into domains which govern its management.

The organizational structure of the AMHS is aligned on these concepts without further refinement. This means that organizationally, the AMHS is made of AMHS Management Domains each of them compliant with the definition of a MHS Management Domain as may be found in the MHS standards.

Flexibility is given to the organizations participating in the AMHS, by the possible choice for an AMHS Management Domain to operate either as an ADMD or as a PRMD.

Each AMHS Management Domain is responsible, among other things, for:

a) carrying out the relevant administrative procedures such as MD-registration;
b) managing the equipment required to provide the ATS Message Service in its area of responsibility, among which at least one MTA, included either in an ATS Message Server or in an AFTN/AMHS Gateway;
c) managing the O/R Names and O/R Addresses (MF-Addresses) of all its service-users, allowing these users to be uniquely identified in the AMHS;
d) managing the routing internal to the Management Domain and the multilateral agreements related to inter-Management Domain routing;
e) performing the long-term logging of the entirety of messages (envelope and content) originated by its direct AMHS users; and
f) defining the various policies specified as a matter of local policy in the SARPs.

2.1.3.2 Relations between AMHS Management Domains

Each AMHS Management Domain must be interconnected over the ATN with at least one other AMHS Management Domain, which is then called "adjacent". The concept of adjacent domains is not related to geographical considerations, but to a direct telecommunications relationship over the ATN between resources belonging to these organizations.

The communication between two AMHS Management Domains is always MTA to MTA, i.e. either:

a) from ATS Message Server to ATS Message Server;
b) from ATS Message Server to AFTN/AMHS Gateway; or
c) from AFTN/AMHS Gateway to AFTN/AMHS Gateway.

This means that the protocol implemented between two AMHS Management Domains is P1. For messages generated in the Basic ATS Message Service, these messages are IPMs including the structured body defined for the AMHS. However at the level of Message Transfer this is not considered by the AMHS systems (ATS Message Server or AFTN/AMHS Gateway) involved in the "point-to-point" communication between the two AMHS Management Domains.

2.1.4 AMHS Naming and Addressing

2.1.4.1 AMHS Naming

AMHS naming encompasses two different aspects:

a) naming of AMHS users, which is made by means of O/R names,
b) naming of the application processes and application entities in the ATN End Systems participating in the AMHS.

2.1.4.1.1 Naming of AMHS users

An O/R name identifies uniquely in the global MHS the name of a particular user. This name may take two forms, which are either the form of a Directory Name of the form of an O/R Address.

In the AMHS as defined in these SARPs, since the Use of Directory is optional in the Basic ATS Message Service, O/R names of AMHS users, when crossing the boundary between two AMHS Management Domains, can only take the form of an O/R Address, which is denominated a MF-address in the AMHS (see 2.1.4.2.1).

2.1.4.1.2 Upper Layer naming

Each application entity participating in the AMHS may be identified with a unique name which is an Application Entity Title. An Application Entity Title comprises an Application Process Title and an Application Entity Qualifier.

This AET may be used at the establishment of the association between two communicating MHS applications. It is an optional parameter of the A-Associate service primitive of ACSE, for both the calling entity and the called entity.

2.1.4.2 AMHS Addressing

Like naming, AMHS addressing encompasses two different aspects:

a) addressing of AMHS users, which is used for message routing from an AMHS user and delivery to another AMHS user, among the MTAs pertaining to the AMHS. This is made by means of O/R addresses; and
b) addressing of the upper layer entities in the ATN End Systems participating in the AMHS.

2.1.4.2.1 Addressing of AMHS users

Two address forms are defined to identify users in the AMHS, which are as follows:

a) an AF-Address is used to locate AMHS users, either direct or indirect, in the AFTN address space;
b) a MF-Address is used to locate a direct or indirect AMHS user in the AMHS address space.

An AF-Address (AFTN-form) is an ICAO AFTN 8-letter addressee indicator.

A MF-Address (MHS-form) is a MHS O/R address without particular restrictions or specifications other than those relative to the AMHS Management Domain which the user belongs to.

By definition, an indirect user has an AF-Address. If a direct user needs to communicate with indirect users, it is required that an AF-Address be allocated to him. The way in which this AFTN address is allocated is an administrative matter outside the scope of the SARPs.

The selection of the AMHS Addressing Scheme is usually a matter of policy local to each AMHS Management Domain. This addressing scheme may be either a local one or a Common AMHS Addressing Scheme, or a combination of these. Common AMHS Addressing Schemes are common schemes established at the level of ICAO. The adoption of a scheme, or the decision that every AMHS Management Domain within ICAO should use one or another Common AMHS Addressing Scheme is an institutional matter, which is therefore out of the scope of SARPs.

One single Common AMHS Addressing Scheme is defined in this version of the SARPs. It is called the XF-Addressing Scheme and it is the preferred addressing scheme for indirect users, unless, for any particular reason, a more user-friendly O/R address is desired.

An XF-Address comprises exclusively the following attributes:

a) C = either of the following:
   1) two-character alphabetical country-indicator as specified in ISO 3166;
   2) three-digits data-country-code as specified in CCITT recommendation X.121; or
   3) the two-letter alphabetical value reserved for international registration;
b) A = admd-name or single-space
c) P = prmd-name (present only if the AMHS Management Domain operates as a PRMD)
d) O = "AFTN"
e) OU1 = 8-letter addressee indicator (AF-address of the user).

2.1.4.2.2 Upper Layer addressing

Upper layer addresses include:
a) the TSAP address which identifies the Transport Service-user, i.e. the session entity in an AMHS system. It comprises the NSAP address of the ATN End System complemented with a T-Selector;
b) the SSAP address which identifies the Session Service-user, i.e. the presentation entity in an AMHS system. It comprises the TSAP address complemented with a S-Selector;
c) the PSAP address which identifies the Presentation Service-user, i.e. the presentation entity in an AMHS system. It comprises the SSAP address complemented with a P-Selector.

The allocation of the NSAP address obeys to the rules defined in Sub-Volume 5. The allocation of T-, S- and P-selectors is considered as a local matter for the organisation responsible for an AMHS system, and consequently for each AMHS Management Domain.

2.1.4.3 Relationships between these concepts

AMHS systems are by essence ground fixed systems. Therefore the mapping of an AET onto a PSAP address is unambiguous and static, unless in case of reconfiguration.

When trying to route an AMHS message (or probe, or report) in an ATS Message Server, the routing tables of the MTA are analysed to determine either of the following, based on the MF-Address of the message recipient:

a) the upper layer address of the recipient's UA, if the ATS Message Server is the delivering MTA, i.e. the last MTA in the sequence of MTAs in the end-to-end communication from UA (or Gateway) to UA (or Gateway); or
b) the upper-layer address of the next hop MTA if the recipient is not local to the current ATS Message Server.

In the first case, the UA's upper layer address which is found in the routing tables depends on the type of protocol implemented between the UA and the ATS Message Server, which is a local matter in the AMHS.

In the latter case, the mapping, which is performed using the static MTA routing tables, usually derives a mta-name from the recipient O/R address, and the PSAP address corresponding to the mta-name. The AET of the next hop MTA, if configured, may also be found in the table. These parameters are used to establish an association, or use an existing one, with the determined next hop MTA.

When submitting an AMHS message (or probe) at an ATS Message User Agent, the situation is different since a UA usually communicates with one single MTA, which is always the same unless in case of reconfiguration. Therefore no mapping nor routing is required, since static parameters are simply configured and used in the considered UA.

2.2 ATS MESSAGE SERVICE DESCRIPTION

2.2.1 Specification Scheme

2.2.1.1 Introduction to MHS Profiles

The specifications on which the AMHS is based are very extensive and contain many functions which do not need to be implemented in the AMHS. For this reason, it is necessary to specify a "profile" which describes the functions to be included. Such profiles which have been standardized by ISO are known as ISPs (international standardized profiles).

Profiles standardize the use of options and other variations in the base standards, and provide a basis for the development of uniform, internationally recognized system tests.

Implementations may then claim conformance with the ISPs, which in this way promote system interoperability without the users having to specify their own combination of functions among those made available by the base standards.

ISPs are classified in ISO/IEC TR 10000:1992, which is the Framework and Taxonomy of International Standardized Profiles. In this document, the ISO MOTIS is arranged under Application Profiles: Message Handling (AMH). For Common Messaging, i.e. for the Message Transfer System (MTS), for the MTS-Access and for the MS-Access the profiles AMH1n (n=1 to 3) are relevant; for the Interpersonal Messaging Service (IPMS) the profiles AMH2n (n=1 to 4) are relevant, while for the Electronic Data Interchange Messaging Service (EDIMG Service) the profiles AMH3n (n=1 to 4) are relevant. Figure 2-4 depicts, for each of the AMH set of profiles, where each AMHnn applies.

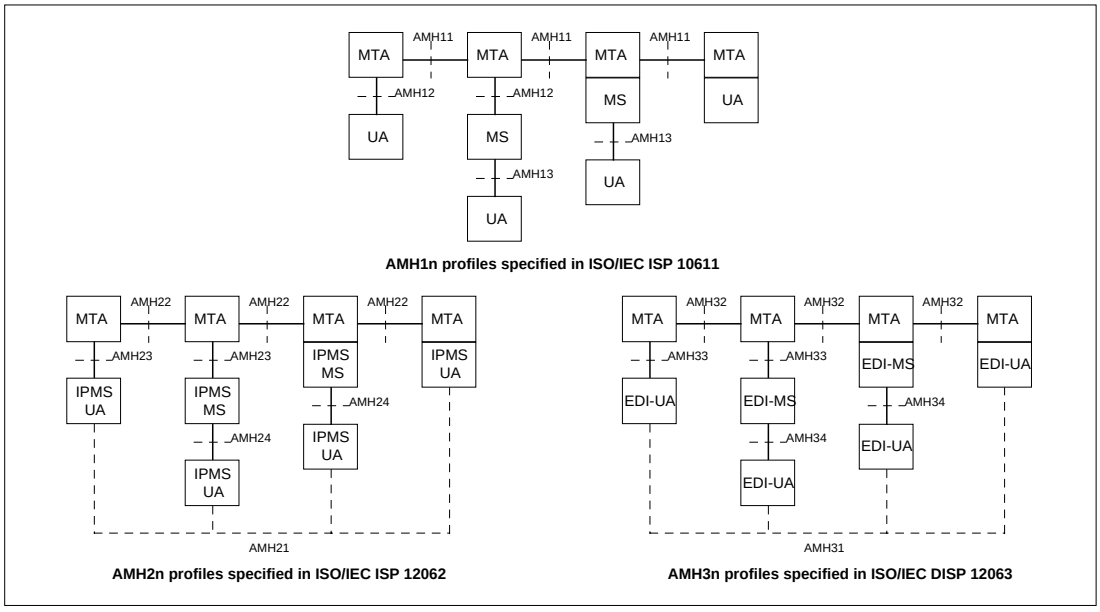

Figure 2-4 : Applicability of AMH Profiles

Additionally, each of the ISPs includes a first part to describe the overall specifications of the support of the Elements of Service (EoS) and associated functionalities which are not appropriate for consideration only from the perspective of a single MHS protocol.

In the context of the Basic ATS Message Service, the AMH2n set of Profiles are those which are applicable.

2.2.1.2 Classification of requirements

The specification scheme is based on sets of Elements of Service (EoS). An EoS is a well-defined MHS function provided by a MHS functional object such as MTA, UA, MS or AU or by the MTS (i.e. the set of interconnected MTAs) and is defined in ISO/IEC 10021. An element of service usually leads to the inclusion of specific fields in the protocol data units.

The AMHS profiles make reference to Part 1 of the ISPs for the general specification of the supported EoS, and also to the relevant AMH profiles for the protocols supported by the AMHS.

The ISPs define the terms "basic requirements" and "functional group". The "basic requirements" are Elements of Service and associated features (e.g. protocol elements) which are required to be supported by all MHS implementations. A "functional group" is a set of one or several EoS which are related to each other, and the associated features, which together support a significant optional area of MHS functionality.

An EoS which is part of a functional group may be optionally supported by an implementation claiming only conformance to the basic requirements. On the other hand, an implementation claiming conformance for support of the optional functional group means that it is supported as a whole, i.e. all EoS and associated features part of the functional group are implemented.

In some cases, the partial support of an EoS may be included in the basic requirements, while its "full support" is part of an optional functional group. This may happen for example, to allow the proper end-to-end "transport" of a functionality across the MTS when this optional functionality is implemented.

The basic requirements together with the complete set of optional functional groups, as specified in ISO/IEC ISP 10611 (Common Messaging), make up the complete set of MHS functions related to common messaging, i.e. non content-dependent specific functionalities. This is illustrated in Figure 2-5.

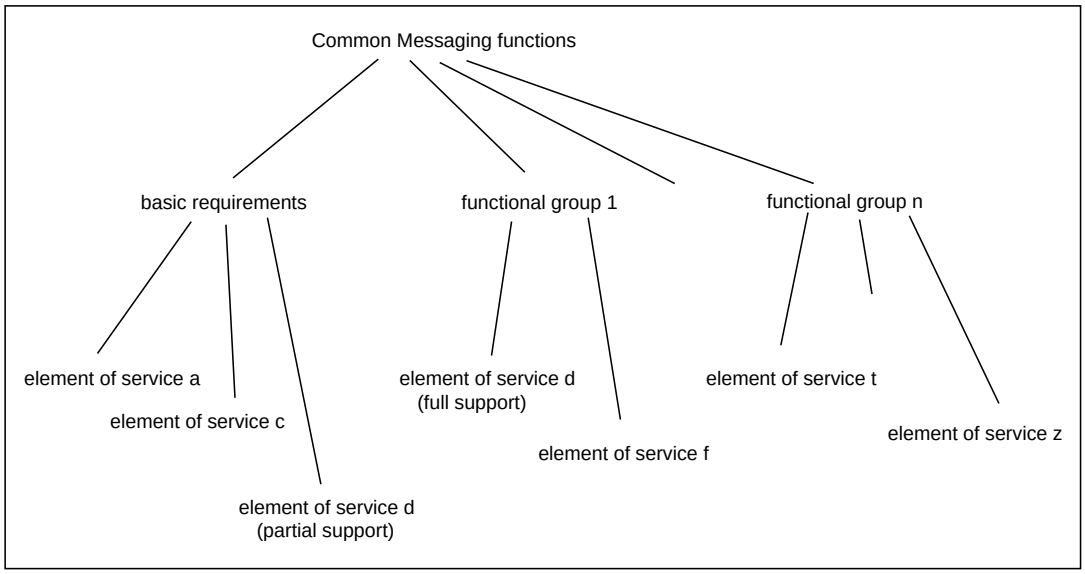

Figure 2-5 : Relationship of elements of service and functional groups.

The elements of service of the optional functional groups may be implemented, but by definition they do not have to be implemented. If they are implemented, then the implementation must conform to the base definitions in ISO/IEC 10021 and to the clauses of ISO/IEC ISP 10611 and the EoS must be treated as if it were specified as mandatory support. If they are not implemented, then the functions corresponding to the elements of service are simply not carried out. However the absence of the functions may not cause a protocol error to be generated when a protocol data unit referring to a non-implemented element of service is received. This requirement allows a basic compatibility among all ATS Message Servers even when these have different levels of functionality, for example between the ATS Message Servers which implement the Basic ATS Message Service and those which, in the future, will implement the Extended ATS Message Service. Such optional functional groups could, for example, be usefully employed within an area administered by one authority (AMHS Management Domain) or between pairs of AMHS Management Domains based on bilateral agreements.

It is expected that in the future, i.e. in the Extended ATS Message Service, the Security (SECn) and Use of Directory (DIR) Functional Groups could be used, since they would bring useful functionality to ensure the AMHS security and to ease the management of O/R names.

2.2.1.3 AMHS service characteristics for support of the Basic ATS Message Service

As already introduced in section 2.1.2.1, the AMHS includes a set of UAs, AUs together with the MTS. When supporting the Basic ATS Message Service, the service performed by UAs and AUs is the Interpersonal Messaging Service (IPM Service) as defined in the MHS Standards.

The AMH21 Profile, as specified in ISO/IEC ISP 12062-2: 1994, applies on an end-to-end basis between the UAs and, by extension, the AUs belonging to the AMHS, which are implemented in the ATS Message User Agents and AFTN/AMHS Gateways, and which support the Basic ATS Message Service.

The IPM Service characteristics, as supported by the AMH21 Profile for the requirements of the AMHS in the context of the Basic ATS Message Service, are described in the context of the ATS Message User Agent in section 2.2.2. This description also includes the additional requirements necessary for interworking with the AFTN.

The AMH22 Profile, as specified in ISO/IEC ISP 12062-3: 1994, applies between ATS Message Servers, between an ATS Message Server and an AFTN/AMHS Gateway, and between two AFTN/AMHS Gateways. It may be noted that this implies that the AMH11 Profile, as specified in ISO/IEC ISP 10611-3, is also applicable between the ATS Message Servers and AFTN/AMHS Gateways.

The MT Service characteristics, as supported by the AMH22 Profile for the requirements of the AMHS in the context of the Basic ATS Message Service, are described in the context of the ATS Message Server in section 2.2.3.

The use of the AMH Profiles as presented above is illustrated in Figure 2-6.

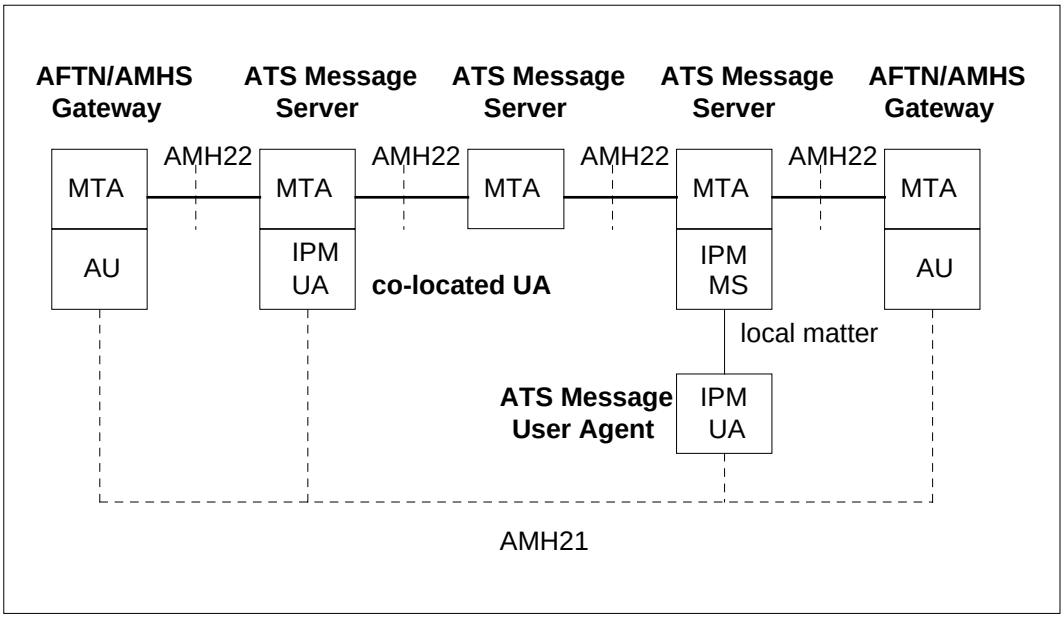

Figure 2-6 : Use of AMH Profiles in the AMHS

2.2.2 ATS Message User Agent Profile Description

The AMHS Profile for an ATS Message User Agent includes only the specification of the Message Content, i.e. the support of AMH21 as introduced in 2.2.1.3, and additional requirements related to the interworking with the AFTN.

These additional requirements are related to:

a) the contents of the ia5-text or general-text body part; and
b) the support of receipt-notification-requests which is mandatory in origination, while it is optional in AMH21.

2.2.2.1 Body part contents

As mentioned in 2.1.2.1.3, an ATS Message User Agent uses a structured body part to convey message components which are necessary for AFTN interworking.

This structured body part comprises:

a) an ATS-Message-Header element, which conveys the AFTN parameters which have no direct equivalent in MHS standards,
b) an ATS-Message-Text element, which conveys the text of the message itself.

The parameters conveyed by means of the ATS-Message-Header are the following:

a) priority indicator, which is conveyed in a structure called ATS-Message-Priority,
b) filing time, which is conveyed in a structure called ATS-Message-Filing-Time, and

c) optional-heading-information, which is conveyed in a structure called ATS-Message-Optional-Heading-Info.

For conformance with the SARPs, an ATS Message User Agent must include the static capability to support these parameters. This means that the ATS Message User Agent must be able to generate the mandatory elements, which are the ATS-Message-Priority and the ATS-Message-Filing-Time, and may be able to optionally generate the ATS-Message-Optional-Heading-Info. Like for most of the IPM Heading Fields, the ATS Message User Agent is not mandated to generate these parameters for each submitted message, but only to have the capability to generate them. However, the ATS-Message-Priority and the ATS-Message-Filing-Time parameters are mandatory for messages directed to the AFTN, and their absence in a message will cause rejection at an AFTN/AMHS Gateway.

The ATS-Message-Header is composed of uppercase IA5IRV characters, including prompts to allow a reader to identify easily the included parameters. When displayed using a human-machine-interface which does not interpret the ATS-Message-Header, the external appearance of the body of an AMHS Message would be as in the following example:

PRI: FF
FT: 281120
OHI: DEFG2345... (if present)
(blank line)
(Beginning of message text)

Furthermore the ATS-Message-Header starts with a non-printable character which is SOH (which may be typed in, if required, using the Alt-1 keys in an MS-DOS or Windows environment) and ends with another non-printable character which is STX (which may be typed in, if required, using the Alt-2 keys in an MS-DOS or Windows environment).

This structured header may be generated by different means, such as:

a) it may be directly typed in within the body part, by a direct user at an off-the-shelf UA. This allows to use standard off-the-shelf UAs with their default human-machine interface without particular additions for the AMHS;
b) it may be generated by an additional input/display grid placed in the human-machine interface of the UA. In such a case the user would for example only type in the value of the priority-indicator and of the filing-time. Syntactic checks on these values may also be incorporated in the add-on in this case;
c) other approaches are possible, e.g. to generate automatically the filing time, etc.

The reasons for the conveyance of these parameters are the following:

a) there is a need for complete transparency for messages conveyed in the AFTN, then converted to the AMHS, and then converted back to the AFTN;
b) the AFTN priority indicator has five possible values, which bear different semantic meanings, and which are therefore not strictly equivalent to the three MHS priority levels, although in the AFTN there are only three transmission priority levels;
c) in the Aeronautical Fixed Service (AFS), the filing time bears a semantic value which may be different from that of the MHS submission-time;
d) for interworking purposes, there is a need to convey towards the AMHS message recipient the optional heading information, if present, which was carried in the AFTN Heading of a message converted from the AFTN to the AMHS.

2.2.2.2 Use of priority-indicators and notification-requests

In the AMHS, the MHS priority value "urgent" is reserved for distress messages, i.e. messages with the highest priority level, which priority indicator is "SS" in the AFTN and the ATS-Message-Priority element.

Furthermore, notification requests are used exclusively for messages with this highest priority level, in line with the principles adopted in the AFTN, where positive message acknowledgements only exist for SS messages. In such a case the notification-request parameter takes the value "rn". For this purpose, an ATS Message User Agent must be able to generate such a notification request, although this is only optional in AMH21.

This means that three parameters are correlated in an AMHS message, and may be used only in conjunction with one another. They are the following:

a) the MHS *priority* element of the Message Transfer Envelope,
b) the priority-indicator in the ATS-Message-Header, and
c) the notification-requests in the primary-recipients, copy-recipients and blind-copy-recipients fields of the IPM Heading.

The mapping table between the MHS priority, which may take three different values, and the AFTN priority (or priority-indicator in the ATS-Message-Header), which may take five different values, is expressed in Table , where each row represents a valid set of parameters to be used together in a given AMHS message, depending on the message category as defined in Annex 10, Volume II.

Table 2-1 : message priorities and receipt notifications

message category	priority-indicator value (in the ATS-Message-Header)	MHS priority element value (in the Message Transfer Envelope)	notification-request value (in each recipient specifier in the IPM Heading)
distress messages	SS	urgent	rn
urgency messages	DD	normal	default (none), nrn or ipm-return
flight safety messages	FF	normal	default (none), nrn or ipm-return
meteorological messages, flight regularity messages, aeronautical information services (AIS) messages	GG	non-urgent	default (none), nrn or ipm-return
aeronautical administrative messages	KK	non-urgent	default (none), nrn or ipm-return

The correlation between these parameters may be done either automatically, using the add-on functionality implemented at the human-machine interface of an UA, or manually, with the potentiality of generating errors if the consistency is not properly ensured by the human end-user.

2.2.3 ATS Message Server Profile Description

2.2.3.1 Upper layer profile

The AMHS Profile for an ATS Message Server includes only the specification of the AMH profile as specified in ISO/IEC ISP 12062, which in turn implies several conformance requirements, in accordance with the principles described in 2.2.1.

The applicable profile is AMH22, which implies conformance with AMH111. The only additional requirement relates to the mandatory support of the IPM DL Functional Group, so as to include in the AMHS a functionality equivalent to that of PDAIs in the AFTN.

An important option, which is left as a matter of policy local to each AMHS Management Domain, is the question of the conformance to CCITT X.400. An AMHS Management Domain may be required to such conformance, e.g. under the following circumstances:

a) to comply with national regulation when registration by the national registration authority is requested;
b) to interconnect with public MHS ADMDs which are by definition CCITT X.400-84 compliant, and which may additionally be X.400-88 compliant.

If conformance to CCITT X.400 is required, this implies for the ATS Message Server the additional conformance to Profile AMH112. Support of AMH112 corresponds to the additional support of the mts-transfer-protocol and mts-transfer-protocol-84 application contexts, and to the support of the 84IW Functional Group.

A further consequence of the support of AMH112 is that the support of RTSE and ACSE in X.410-84 is then required.

2.2.3.2 Use of the Transport Service

2.2.3.2.1 Use of the ATN Transport Service

An ATS Message Server by definition uses the ATN Transport Service to communicate with other ATS Message Server.

Several parameters need to be given to the transport service provider, when requesting a transport connection to be established. These parameters are specified in Sub-Volume 5.

For most of these parameters, a single value is selected, either in the SARPs or as a local matter, to be used when establishing a transport connection between two ATS Message Servers.

More specifically, the base MHS standards used in these SARPs do not allow for the establishment of different transport connections with different quality of service parameters, based on the distinction between application level MHS priorities. This is due to the absence of a QoS parameter in the MTA-Bind abstract-operation and in the RT-OPEN service. Thus a single transport priority, conveying messages with different application-level priorities is used.

The way to request the use of the specified parameters to the Transport Service provider is an implementation matter which is out of the scope of the SARPs.

2.2.3.2.2 Use of the Transport Service for the AMH112 Profile

If profile AMH112 is supported, then the ATS Message Server shall implement an ISO 8073 Class 0 Transport protocol. This cannot be implemented over the ATN, it is therefore out of the scope of the SARPs. However it is required, for example, if interconnection with a public X.400 ADMD is the local policy of a given AMHS Management Domain.

In such a situation, the co-existence of the support of Classes 0 and 4 of the ISO 8073 Transport protocol is an implementation matter, which is out of the scope of the SARPs.

Furthermore, the parameters specified in 2.2.3.2.1 concerning the use of the ATN Transport Service are not applicable in such a context.

2.2.3.2.3 Implementation options

For those MHS off-the-shelf implementations which do not intrinsically support the use of the ATN Transport Service, the AMHS compliant upper layers and application entities may be integrated as follows with the lower layers of an ATN end system.

At the lower boundary below the AMHS upper layers and application implementation, a transport service interface may be specified to intercept the transport service primitives, and to map these onto ATN Transport Service primitives using the intercepted data and additional parameter values which cannot be passed from the AMHS upper layers.

The consolidated ATN Transport Service primitive can then be passed to the transport service provider which provides the ATN Internet Communication Services.

The parameters required by the ATN Transport Service Provider for the establishment of an ATN transport connection are specified in section 5.5.1 of the SARPs. They are as follows:

a) called and calling TSAP addresses;
b) whether or not the expedited data option is required;
c) the required residual error rate (RER) to determine whether of non-use of the transport checksum is allowed;
d) the Application Service Priority to be mapped into the resulting CLNP NPDUs;
e) the ATN Security Label.

The ATN Security Label and the requested Transport Connection Priority are examples of additional parameters which cannot be passed from the AMHS upper layers.

Such an implementation architecture is depicted in Figure 2-7.

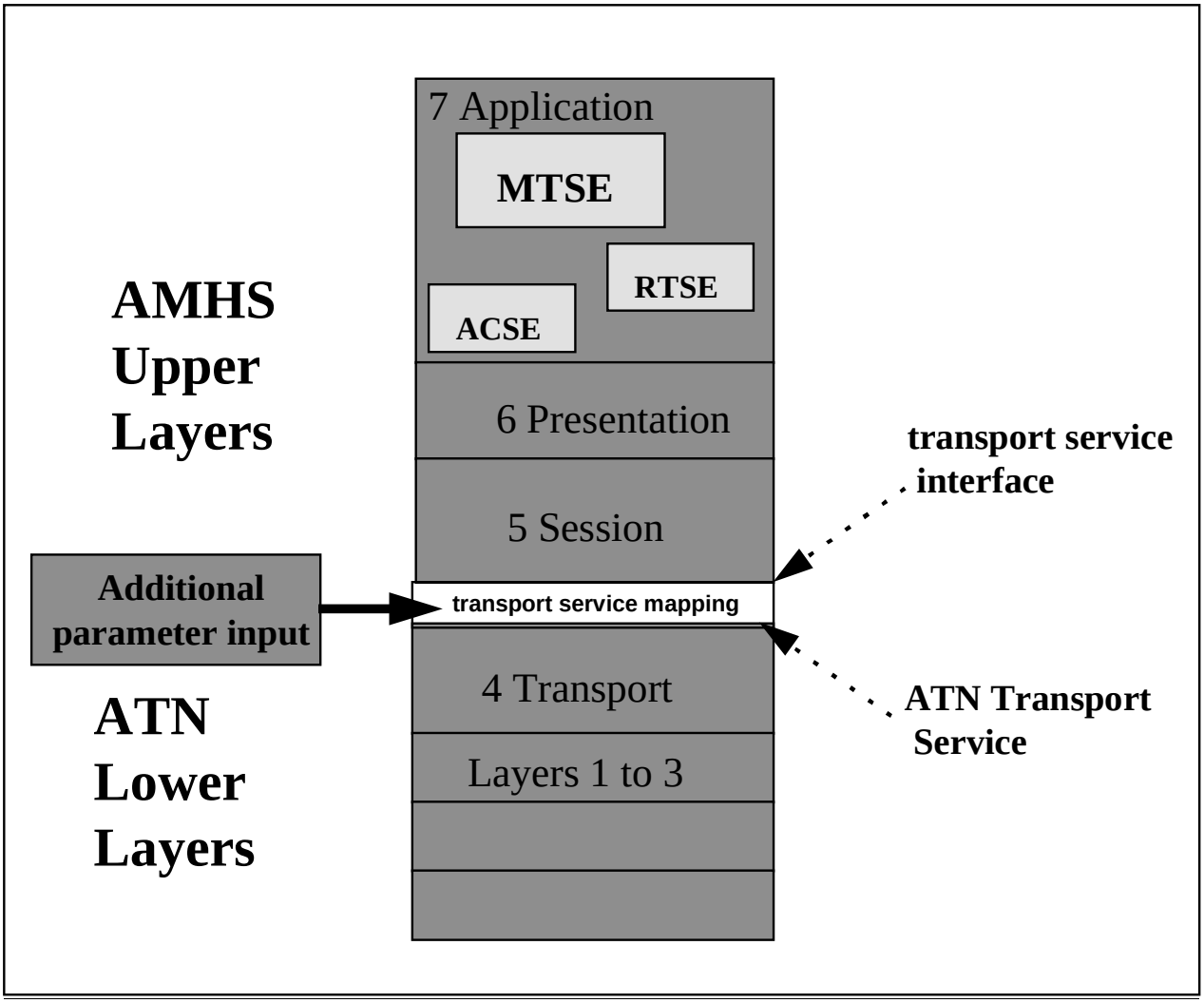

Figure 2-7 : AMHS over ATN Transport Service implementation architecture

A similar mapping mechanism between a lower boundary interface and the transport service interface offered by the actual transport service providers may also be implemented in case of co-existence of different transport protocol stacks within a single system (e.g. ATN Transport Service and ISO TP0 over X.25 for connectivity towards a public ADMD).

2.2.3.3 Logging functions at an ATS Message Server

The SARPs specify the minimum logging requirements at an ATS Message Server. These long-term logging requirements are related to the administrative and legal requirement for the record of communications as specified in Annex 10, Volume II, 3.5. The SARPs requirements make it possible to perform message tracking through the AMHS, for example when an investigation is needed.

However, for an efficient management of the AMHS systems within one AMHS Management Domain, it could be useful to record more information, in particular about events not directly related to message transmissions but in relation with a good system operations.

The following events may be recorded for such management purposes:

a) MTA-bind (to or from another MTA) operation successful completion;
b) MTA-unbind (to or from another MTA); and
c) MTA-bind (to or from another MTA) error.

The information recorded in relation with the events above may include the following parameters which are either arguments, results or errors of the abstract operations:

a) *initiator-name* (if present);
b) *initiator-credentials* (if present);
c) *security-context* (if present);
d) *responder-name* (if present);
e) *responder-credentials* (if present); and
f) *bind-errors* (if any).

Additionally, to maintain a traffic log reflecting the entire traffic flows through an ATS Message Server, and actions taken by an ATS Message Server, it may be required to record events related to the following events:

a) Probe Submission operation (successful or error);
b) Probe Transfer in successful operation;
c) Probe Transfer out operation (successful or error);
d) Message Submission error;
e) Message Delivery error;
f) Report Delivery error.

2.3 AFTN/AMHS GATEWAY DESCRIPTION

2.3.1 General presentation

A gateway is a communication device that permits message traffic to be transferred between two dissimilar communication systems. The gateway must perform its special operations transparently to function as an ordinary device in each of the two interconnected communication systems.

Note.- In the following, the AFTN/AMHS Gateway is modeled as a stand-alone facility. The alternative integration in an AFTN Centre is considered as an implementation matter.

The AFTN/AMHS Gateway has been conceived and designed as a technical tool to facilitate the transition from the world-wide AFTN to the new technology of ATS Message Handling Services over the ATN, namely the AMHS. To be useful, the gateway must be simple and reliable. It must also be easy to develop, deploy and maintain until it has achieved its purpose and has been withdrawn from use. Every effort has been directed towards developing a conceptual design that is fundamentally complete and does not attempt to correct AFTN deficiencies or to provide for services that are not absolutely required.

The AFTN/AMHS gateway is a device that must live in two worlds at once; the AFTN and the AMHS. In order to achieve this it must have two essential characteristics: transparency and isolation. Transparency allows the gateway to hide the fact that it is a gateway altogether and to appear to be a normal member of the AFTN and of the AMHS. Isolation hides the existence of each messaging system from the other.

2.3.2 Functional breakdown

The functional model used to define the requirements for the AFTN/AMHS gateway has been presented in Figure 2.2. This model provides an abstract view that facilitates the definition of the components of the gateway and the assignment of functions to each component.

The three major components of the gateway, the AFTN Component, the ATN Component and the message transfer and control unit, are interconnected as shown in Figure 2.2 to provide an architecture that assures isolation and transparency. The functions assigned to each component are presented in the following sections.

2.3.2.1 AFTN Component

The “access to AFTN” in Figure 2.2 represents a point of connection to an external AFTN Centre. Send and receive functions are incorporated into the AFTN Component to establish a complete AFTN circuit connection to the AFTN Centre. The gateway must provide a sufficiently complete set of AFTN procedures to appear to be an AFTN Station. This imposes several special requirements and restrictions. Some functions in addition to those of an AFTN Station are necessary in the AFTN Component, due to its particular status as part of an AFTN/AMHS Gateway. However this does not alter the external appearance of the AFTN Component, as it may be seen from the AFTN Centre to which it is connected.

An AFTN address must be allocated to the AFTN Component, it is required in particular for the handling of the AFTN procedure between the AFTN Component and the AFTN Centre to which it is connected. Also to appear as an AFTN Station, this address is equally required.

Since the AFTN Component operates in a manner which is indistiguishable from an AFTN Station by the AFTN Centre to which it is connected, the AFTN Component is not required to have any diversion routing capability. Diversion routing is generally implemented in the AFTN Centre to which the AFTN/AMHS Gateway is connected. An implication of this situation is that an AFTN/AMHS Gateway is connected to a single AFTN Centre, if communicating with the AFTN side through an AFTN circuit.

However, from an implementation viewpoint, it is likely that in many occasions an AFTN/AMHS Gateway will be co-located with an AFTN Centre. Such a co-location may also be logical, which means that the AFTN/AMHS Gateway and the AFTN Centre do not communicate through an AFTN circuit, but rather using ad-hoc procedures eg. on a local area network. In such a case, some of the functions specified for the AFTN Component may not be required (eg. discarding of channel-check transmissions). It is then sufficient that:

a) the co-located AFTN Component and the AFTN Centre together fulfill the required functions;
b) the AFTN Component provides the Message Transfer and Control Unit of the AFTN/AMHS Gateway with an interface identical to that specified in the SARPs.

2.3.2.2 ATN Component

The ATN Component allows the gateway to function as an end system on the ATN. It incorporates an MTA in a manner equivalent to that of an ATS Message Server.

This MTA must implement the DL Functional Group, in compliance with the ATS Message Server specification. If the AMHS Management Domain operating the AFTN/AMHS Gateway additionally desires to implement other optional Functional Groups, this may be done in the ATN Component. For example, the ATN Component is the part of an AFTN/AMHS Gateway where the AMHS rerouting and/or redirection capability of the gateway, if any, is implemented.

2.3.2.3 Message Transfer and Control Unit

The remaining component, as shown in Figure 2.2, is named the "Message Transfer and Control Unit". In an AFTN/AMHS Gateway, this is the MHS Access Unit (AU) which provides application level functions that are not part of either the AFTN Component or of the ATN Component. These functions bind and integrate the other two components and are essential to the operation of the gateway. They include:

a) general provisions, which themselves cover two main subjects:
   1) traffic logging,
   2) address look-up tables which include the information necessary for the address conversion process between the two address spaces of the AMHS and of the AFTN to be performed;
b) AMHS to AFTN conversion, for the conversion of information objects received from the AMHS for potential conveyance in the AFTN. Because the AMHS level of functionality is higher than that of the AFTN, this function includes all the necessary processing to determine the gateway ability to convert the information object, and the necessary actions related to the potential rejection if the AFTN cannot convey the received information object;
c) AFTN to AMHS conversion, for the conversion of messages received from the AFTN for potential conveyance in the AMHS. For isolation purposes,the AFTN/AMHS Gateway converts in an automated manner only those AFTN service messages which have an end-to-end significance and which have an equivalent in the AMHS.

Although it communicates with the ATN Component through a transfer interface (see 2.3.2.5), the Message Transfer and Control Unit is not required to implement the functionalities associated with any of the optional functional groups defined in the ISP. More specifically the MTCU is not supposed to perform any DL-expansion. If supported in an AFTN/AMHS Gateway, such functionalities are implemented in the ATN Component, which incorporates a MTA equivalent to that of an ATS Message Server.

2.3.2.4 Control Position

Each gateway also includes an operator control position, or other input-output devices to accomplish the same function. The control position provides a method to load, initialize and control the operation of the gateway. The terminal is also used to display or record transient conditions and out-of-line situations, including error reports related to the gateway processing. Finally it is also the place where AMHS non-delivery reports are conveyed, when they cannot be processed in an automated manner by the gateway.

The control position enables interventions by the operator, permitting bidirectional communication with the human operator.

In summary, the control position therefore provides an operator interface where exception cases which could not be handled in an automated manner by the AFTN/AMHS Gateway components, may be handled and reacted upon. Also, it is a matter of policy local to the AMHS Management Domain operating the AFTN/AMHS Gateway, to decide whether certain categories of exception cases are handled automatically or with the assistance of the control position.

The format used by the AFTN Component, the ATN Component and the Message Transfer and Control Unit of an AFTN/AMHS Gateway to report errors and to convey non-delivery reports to the control position is a matter of policy local to the AMHS Management Domain operating the AFTN/AMHS Gateway. For a better interpretation of a given error situation at the control position, the subject information object may be sent in conjunction with the error reported to the control position.

For some categories of error situations the SARPs specify the actions to be taken, e.g. message rejection and generation of an appropriate service message (to the AFTN) or non-delivery report (to the AMHS). The specified actions aim at minimizing the assistance of the control position. However it may be a matter of policy local to the AMHS Management Domain operating an AFTN/AMHS Gateway to try to reduce the occurrence of message rejection with the assistance of the control position.

2.3.2.5 Interface between the ATN Component and the Message Transfer and Control Unit

The exchange of information at the interface between the ATN Component and the Message Transfer and Control Unit is made using Transfer Envelopes, i.e. an interface to the Message Transfer service.

Other specifications are possible for an MHS AU. In particular, the selection of a Submission/Delivery interface would also have been possible. The reason to select a transfer interface is the possibility which is then given to the Message Transfer and Control Unit to generate non-delivery reports and delivery-reports. Such a possibility would not have been available if a submission/delivery interface had been selected. The ability to generate NDRs is considered particularly useful for the mapping certain AFTN service messages, i.e. those which indicate that the specified message recipient is unknown.

In terms of implementation, a message transfer API (which also allows to transfer reports) may then be used between the ATN Component and the Message Transfer and Control Unit when developing an AFTN/AMHS Gateway.

Flow control mechanisms may be implemented in both directions between the gateway components, e.g. to ensure that no messages in excess are passed to the ATN Component when it is unable to transfer them to the ATS Message Server or AFTN/AMHS Gateway to which it is connected. Such mechanisms, including the triggering criteria, are an implementation matter which is out of the scope of the SARPs.

2.3.2.6 Interface between the AFTN Component and the Message Transfer and Control Unit

Likewise, the Message Transfer and Control Unit has the possibility in an AFTN/AMHS Gateway to generate AFTN Service Messages with end-to-end significance and to pass them over to the AFTN Component, upon receipt of a NDR indicating an unknown recipient specification in a subject message.

As mentioned above, flow control mechanisms may also be implemented in both directions between these gateway components, e.g. to ensure that no messages in excess are passed to the AFTN Component when it is unable to transfer them to the AFTN Centre to which it is connected. Such mechanisms, including the triggering criteria, are an implementation matter which is out of the scope of the SARPs.

2.3.3 Traffic Logging in an AFTN/AMHS Gateway

In general, the way in which the specified information is logged is an implementation matter. The way in which the logged information is retrieved and used is an implementation or operational matter, respectively. Therefore such aspects are out of the scope of the SARPs.

2.3.3.1 AFTN Component traffic logging

This function is where the behaviour of the AFTN Component differs from that of an AFTN Station.

Upon reception of a message from the AFTN, the AFTN Component behaves as an AFTN Station.

Upon generation of an AFTN message in the AFTN Component, long-term retention of the message in its entirety is performed in the AFTN Component. This may only happen for service messages, since otherwise the AFTN Component is not supposed to generate any message.

Messages received by the AFTN Component from the Message Transfer and Control Unit do not need to be logged in their entirety since the AFTN Component is not the initial originator of the message. Therefore, in this case, the logging requirement placed on the AFTN Component is equivalent to that of an AFTN Centre, that is to retain only the message heading, address and origin parts, and the action taken thereon.

2.3.3.2 ATN Component traffic logging

The traffic logging to be performed in the ATN Component of an AFTN/AMHS Gateway is equivalent to that of an ATS Message Server.

2.3.3.3 Message Transfer and Control Unit traffic logging

The main goal of the logging to be performed in the Message Transfer and Control Unit is to keep track of all information objects which have passed through the Message Transfer and Control Unit, and in particular to be able to identify the relationship between e.g. a received AMHS message and the converted AFTN message, for traceability purposes.

In case of duplication of information with either the traffic log of the ATN Component or of the AFTN Component, there is no requirement to implement different logs, provided that adequate mechanisms are implemented to allow the use of these traffic logs by the Message Transfer and Control Unit or in relation with the Message Transfer and Control Unit.

The nature of the information which is logged (and the way in which it is logged) in case of error situations in the Message Transfer and Control Unit is an implementation matter which depends on the way such situations are handled on a local basis.

2.3.3.4 Relationship between these traffic logs

In implementation terms, it is not necessary to implement three different logs in an AFTN/AMHS Gateway. In case of duplication of information between the Message Transfer and Control Unit traffic log and either the traffic log of the ATN Component or of the AFTN Component, it is only necessary that adequate mechanisms are implemented to allow the use of these traffic logs by the Message Transfer and Control Unit.

2.3.4 Address conversion in an AFTN/AMHS Gateway

An AF-address may be converted in two different manners in an AFTN/AMHS Gateway:

a) if a corresponding MF-address including any combination of O/R address attributes has been allocated to the user identified by the AF-address, then a mapping process using fully configured look-up tables is necessary;
b) if no such address has been allocated, then the default conversion process for such an AF-address in an AFTN/AMHS Gateway (or more specifically in the Message Transfer and Control Unit of an AFTN/AMHS Gateway) aims at converting the AF-address into an XF-address, by means of a partly algorithmic method.

Case b) may occur for both indirect or direct users. In such a case, a look-up table is still necessary to identify the address attributes of the AMHS Management Domain to which the user belongs.

The term look-up table is used above and in the SARPs to describe in a simple manner the role of the function. However, many solutions can be envisaged when implementing such a function. For example, it is not necessary to implement two different look-up tables for the two mapping processes, a) and b) identified above.

Also other types of data structures, e.g. relational databases, may be used to implement the required function.

2.3.5 Conversion functions of an AFTN/AMHS Gateway

These functions are performed by the Message Transfer and Control Unit. In the SARPs, the specification of these functions is split in accordance with the flow direction through the AFTN/AMHS Gateway. The conversion function in the direction from AFTN to AMHS is specified in section 3.1.2.3.4 of the SARPs and the conversion function in the direction from AMHS to AFTN is specified in section 3.1.2.3.5 of the SARPs.

The entire set of information objects processed by an AFTN/AMHS Gateway, together with the section of the SARPs where the relevant processing is specified, is depicted in Figure 2-8.

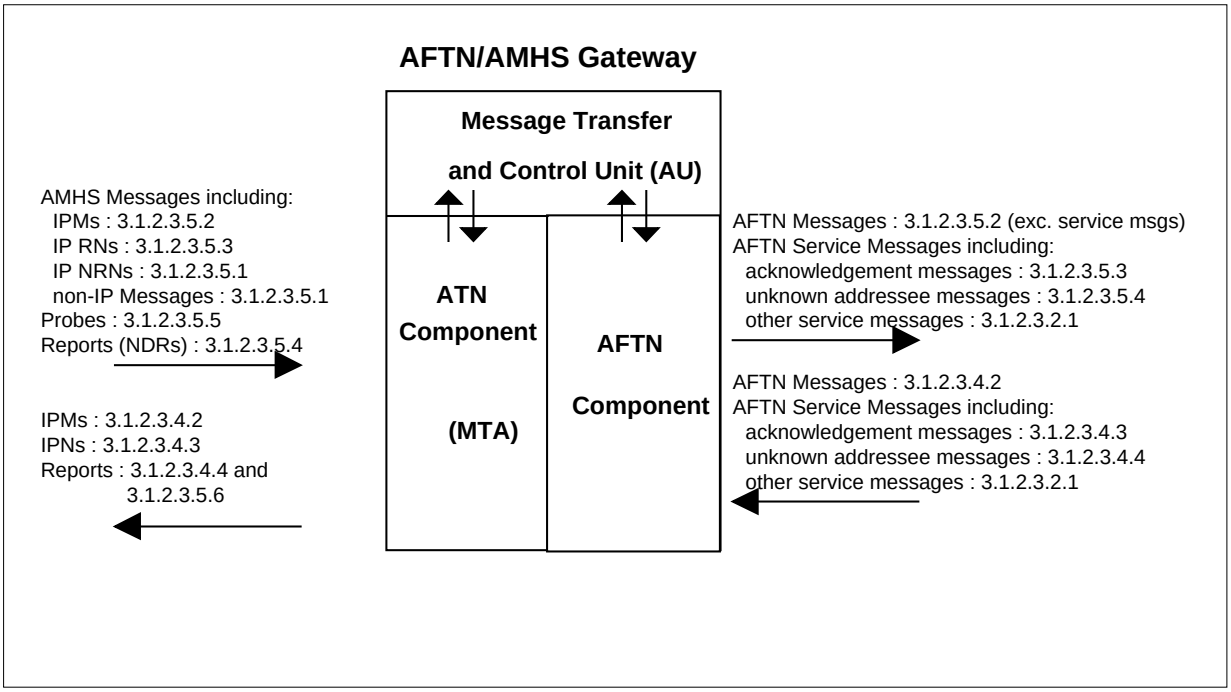

Figure 2-8 : Information objects processed by the gateway

2.3.5.1 Scenarios for the AFTN/AMHS gateway operation

2.3.5.1.1 Elementary scenarios

An elementary scenario is a scenario describing the gateway behaviour upon receipt of a single information object.

Depending on the direction of the considered traffic flow and on the nature of the received information object, the different elementary scenarios which may occur at an AFTN/AMHS Gateway are depicted from Figure 2-9 to Figure 2-16.

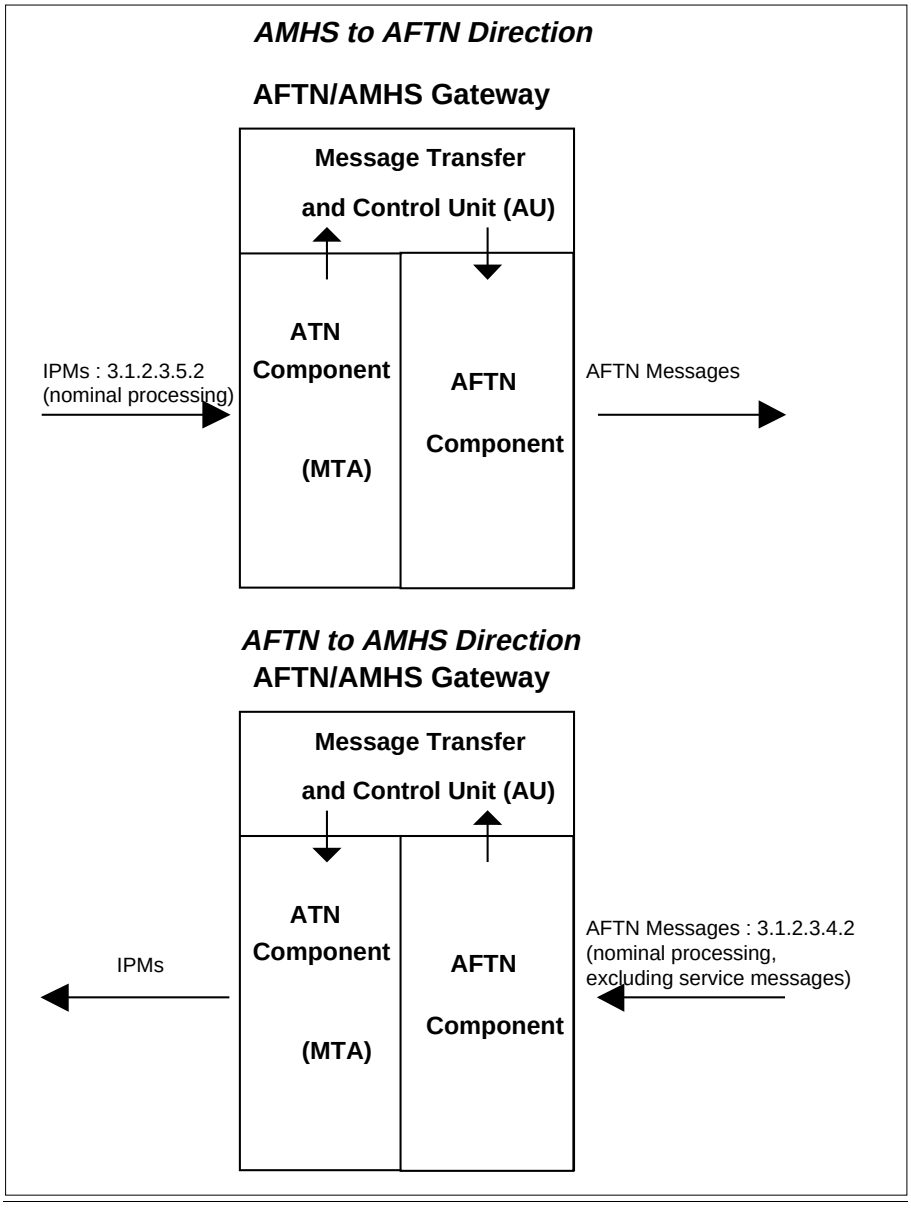

Figure 2-9 : Conversion between an AMHS IPM and an AFTN Message

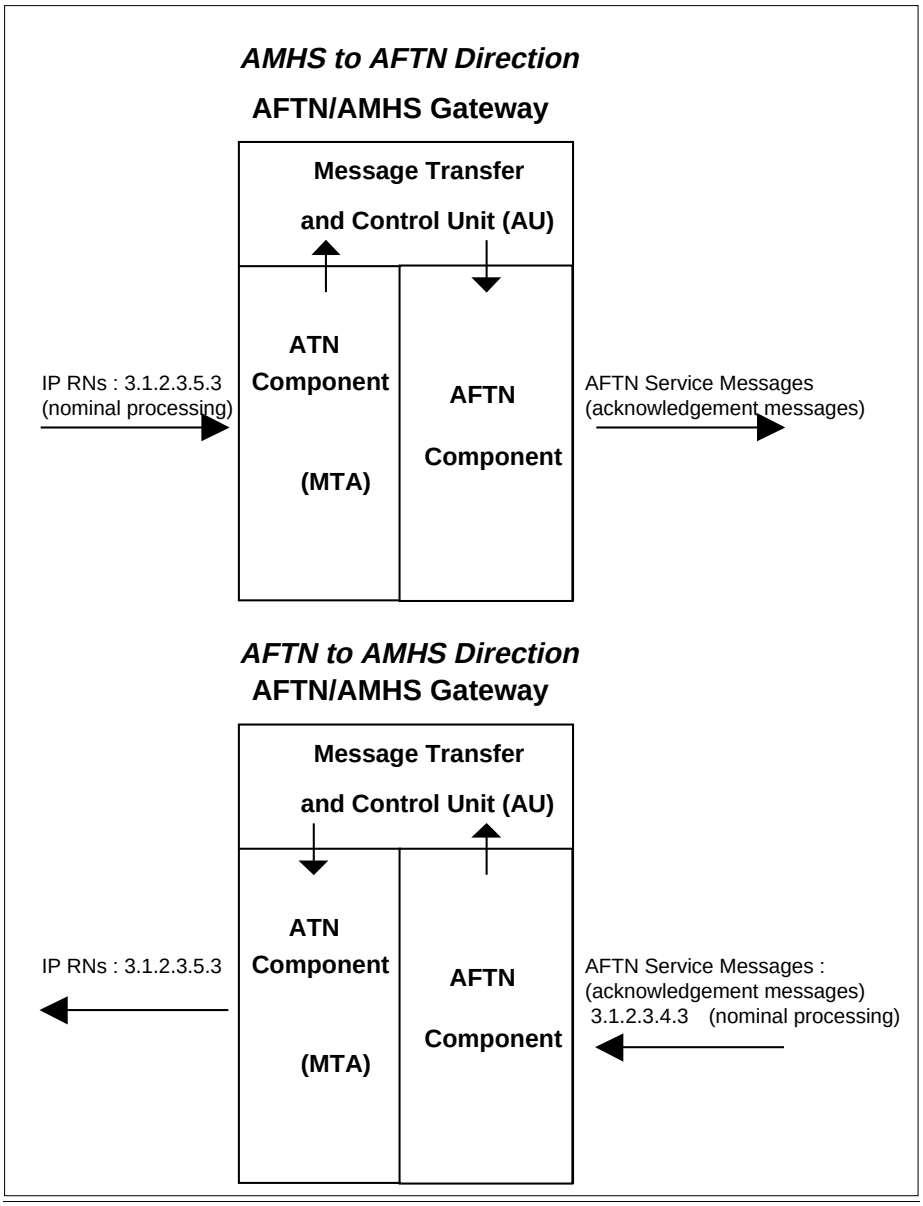

Figure 2-10 : Conversion between an AMHS IP RN and an AFTN acknowledgement message

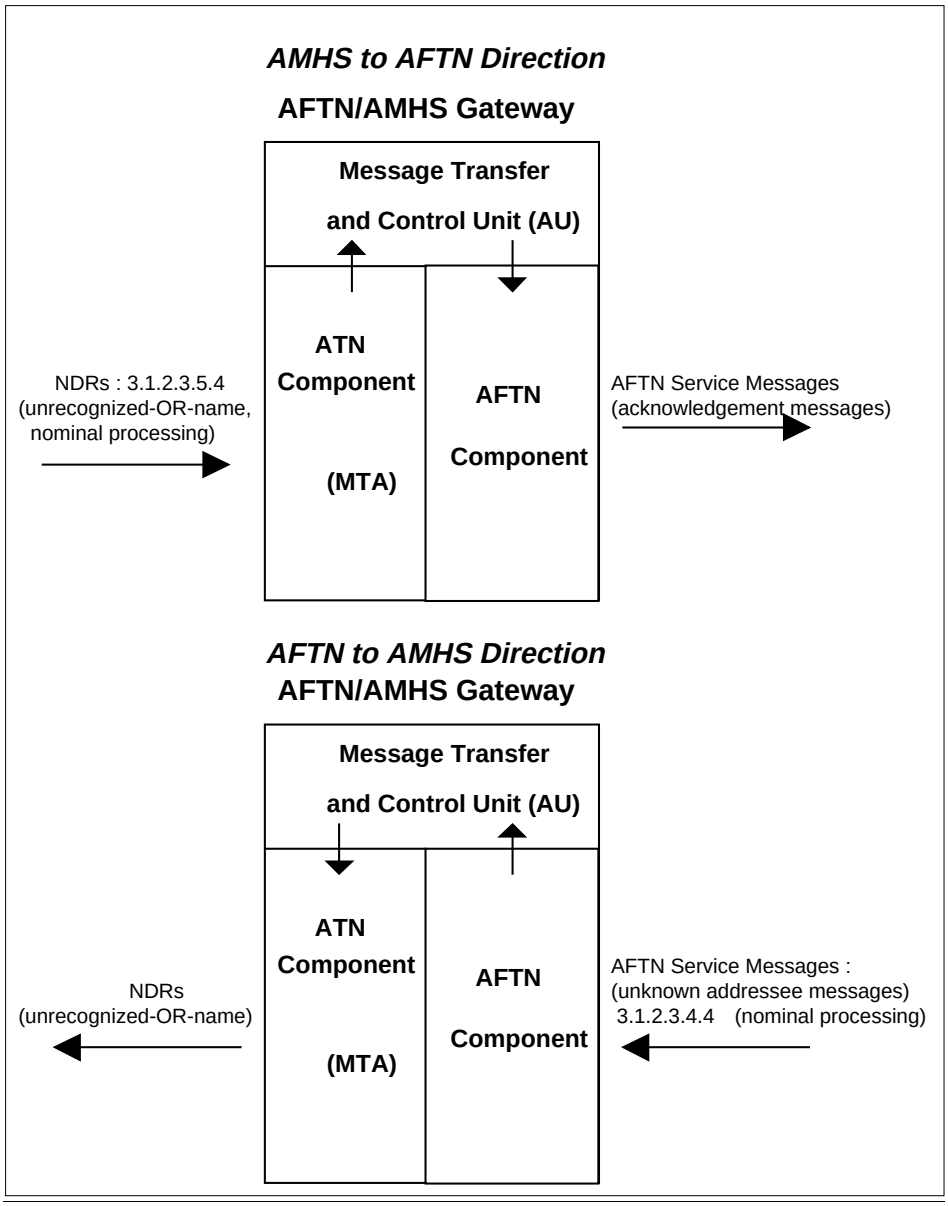

Figure 2-11 : Conversion between an AMHS NDR (unrecognized O/R name) and an AFTN unknown addressee service message

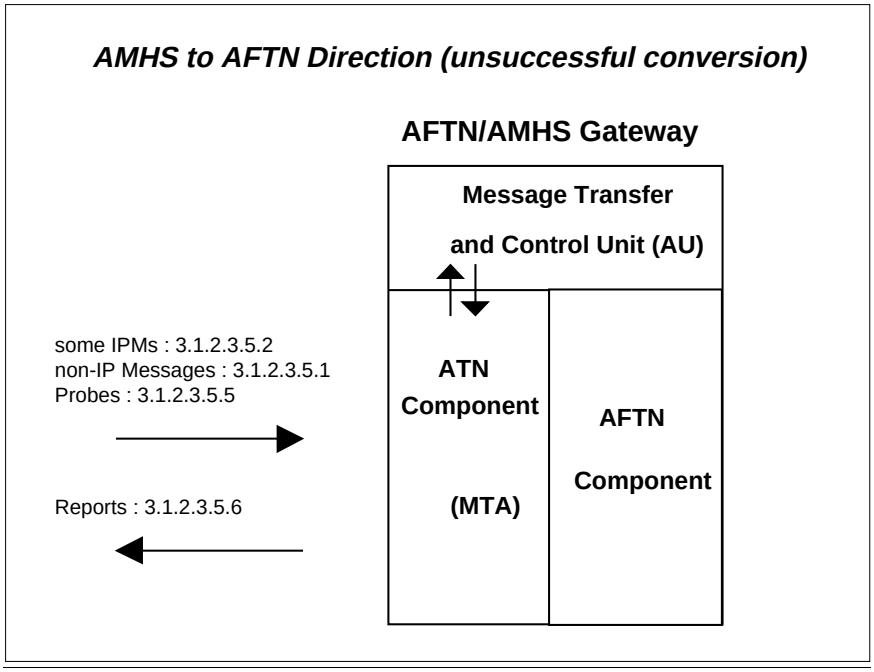

Figure 2-12 : Unsuccessful conversion of incoming AMHS information objects in the MTCU

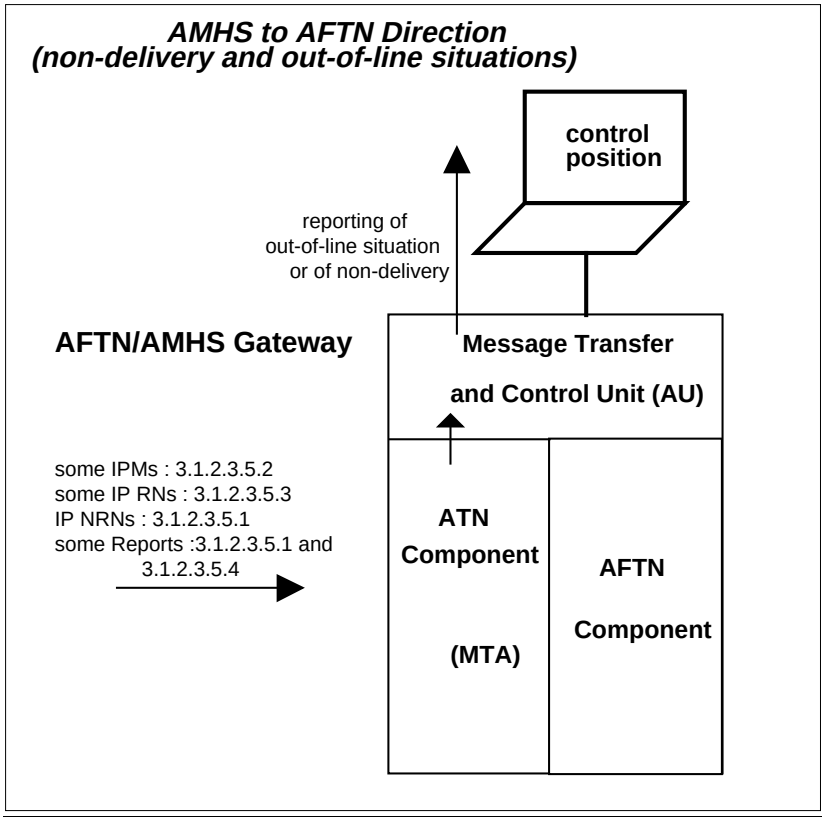

Figure 2-13 : AMHS non-delivery and out-of-line situations

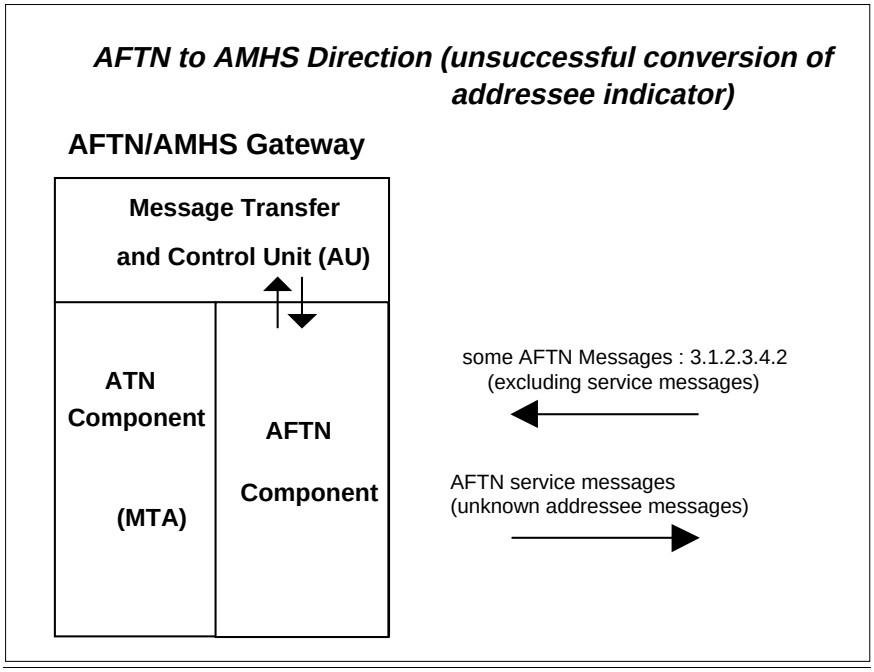

Figure 2-14 : Unsuccessful conversion of addressee indicator in incoming AFTN message

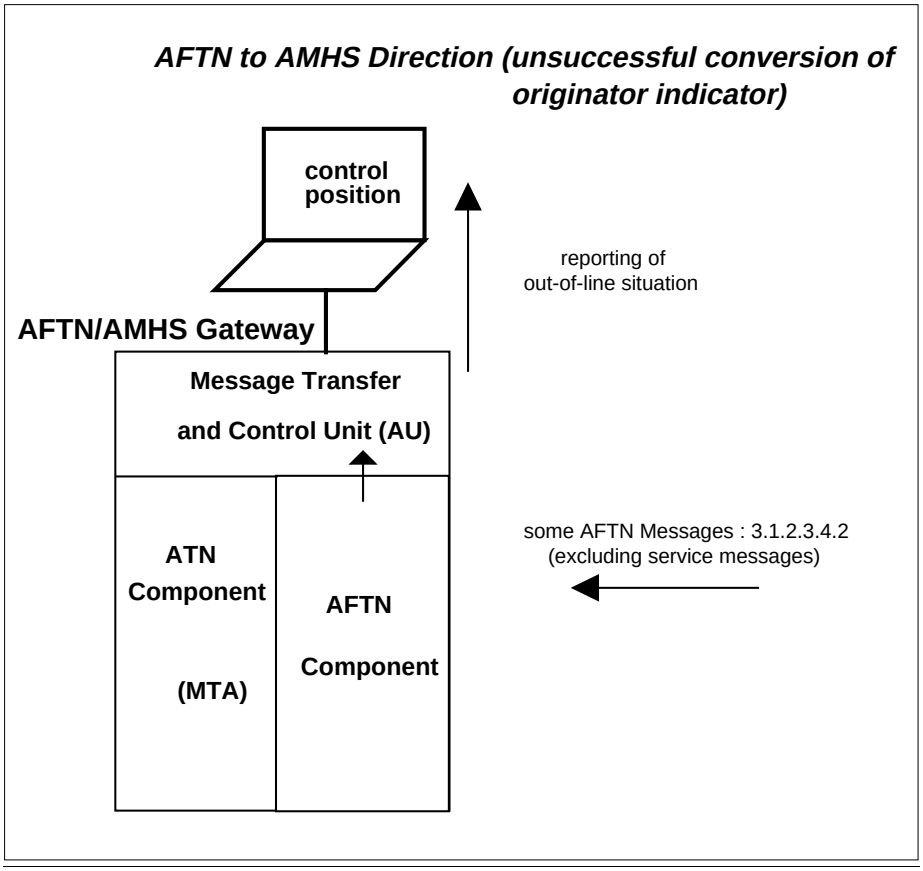

Figure 2-15 : Unsuccessful conversion of originator indicator in incoming AFTN message

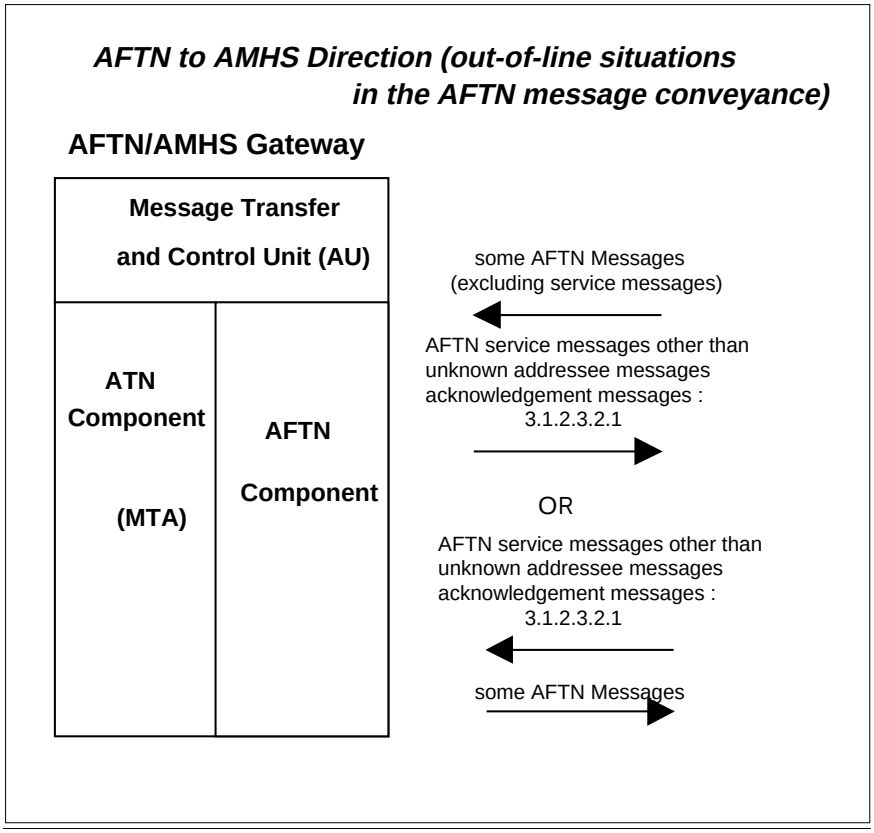

Figure 2-16 : Out-of-line situations in relation with incoming AFTN messages

2.3.5.1.2 Combined scenarios

A combined scenario is a scenario describing the gateway behaviour in cases where the gateway is involved several times in an overall information exchange, due to the use of AFTN service messages, and AMHS reports or notifications.

The scenarios described hereafter include only nominal processing by the gateway. They address the following cases:

a) acknowledgement of SS-priority messages; and
b) message rejection due to the use of an unknown addressee indicator or recipient O/R address.

They are illustrated by Figure 2-17 and Figure 2-18, respectively.

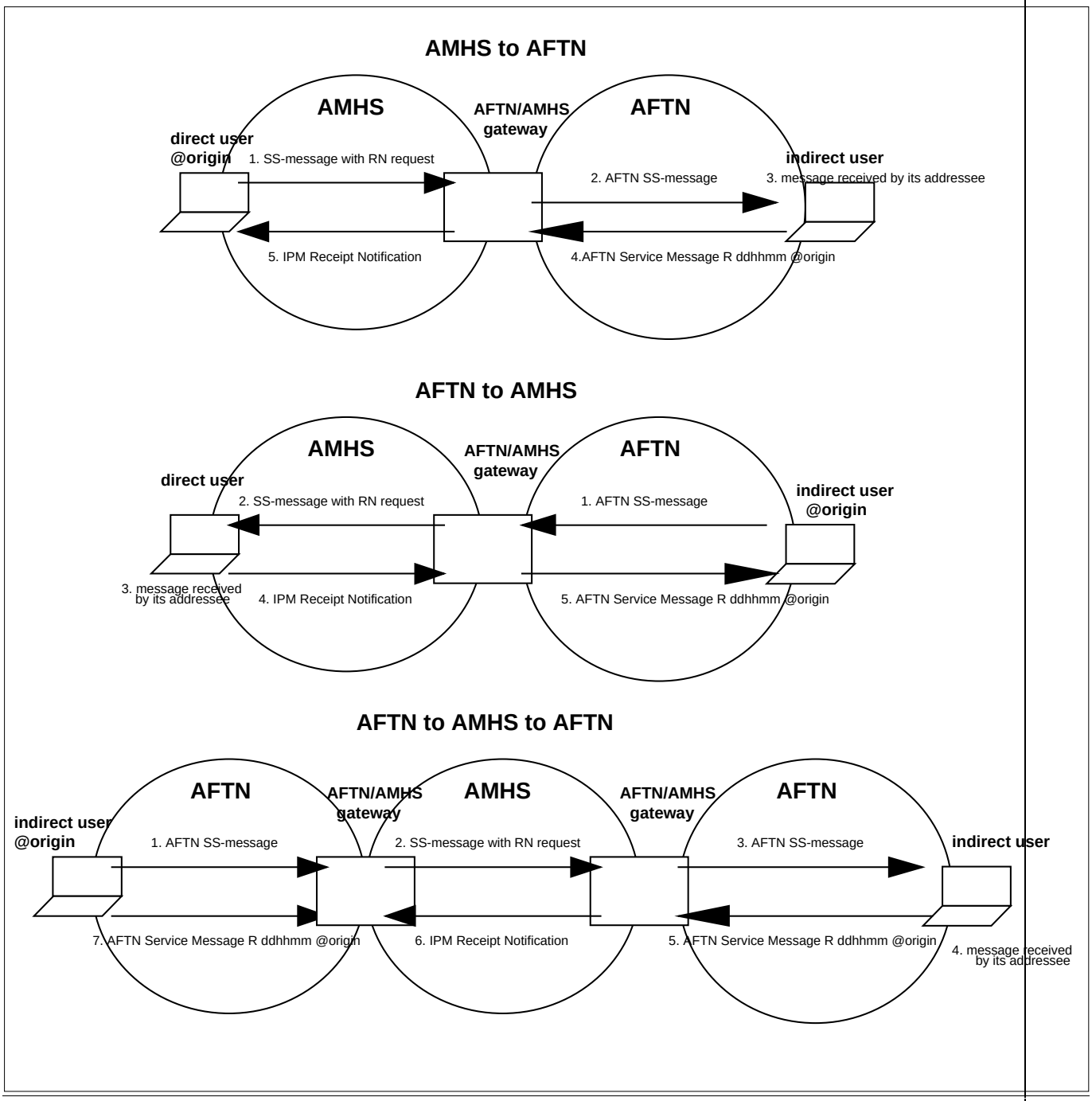

Figure 2-17 : Acknowledgement of SS-priority messages

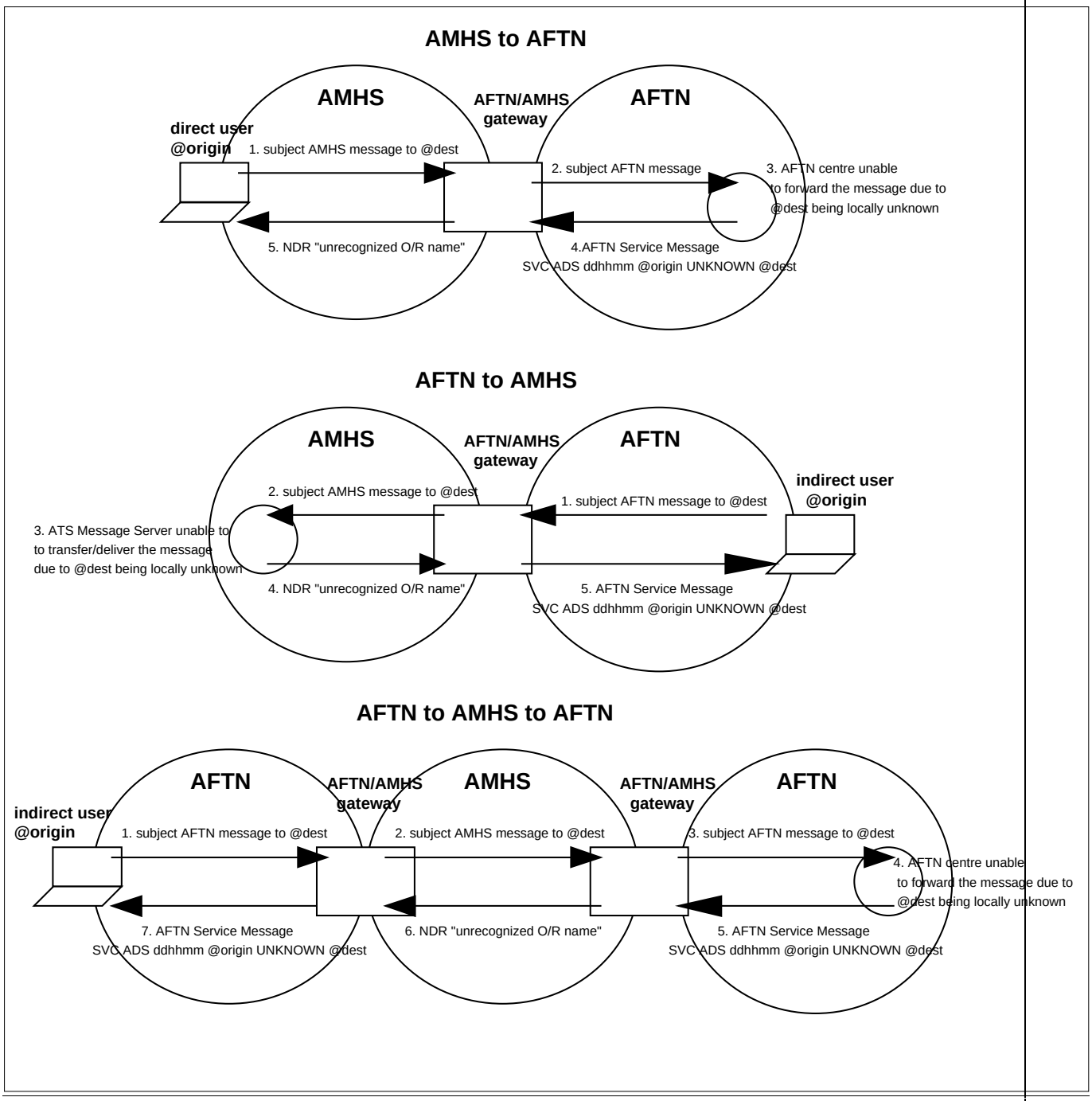

Figure 2-18 : message rejection due to the use of an unknown addressee indicator or recipient O/R address

2.3.5.2 AFTN to AMHS Conversion

2.3.5.2.1 Converted information objects

In this direction, the way to process the AFTN message may be determined from the contents of the first line of the message text. This first line refers to the string of characters included between the first character in a message text and the first CARRIAGE RETURN found therein.

An acknowledgement message (an AFTN service message acknowledging another AFTN message, then called « subject message ») is characterized by its text which includes exclusively "R ddhhmm AFADDRES", where ddmmhh is a filing time as defined in Annex 10, Vol. II, 4.4.16.2.2.1 and AFADDRES is an AF-address.

An AFTN service message indicating that an addressee indicator in the subject message is unknown is characterized by its text which includes "SVC ADS ddhhmm AFADDRES", where ddmmhh is a filing time as defined in Annex 10, Vol. II, 4.4.16.2.2.1 and AFADDRES is an AF-address.

All other AFTN service messages are handled in the AFTN component only. In the particular case of AFTN service messages requesting correction by the originator of a message received mutilated, such messages are handled on the basis of a local specification, since no automated process can be specified due to:

a) the absence of an equivalent message in the MHS base standards. In effect, message mutilation, if it occurs in the AMHS, is automatically detected during the conveyance and reacted upon by means of MHS protocols; there is thus no need to request repetition from the originator, and
b) the difficulty to determine in an automated manner whether the AFTN/AMHS Gateway is in possession of an unmutilated copy of the message.

2.3.5.2.2 Guidance on error situations

Error situations may be reported for further actions to the control position in the following cases, classified in relation with the type of AFTN message received at the gateway:

a) "general" AFTN messages (excluding service messages)
   1) in case of conversion failure (general) in the MTCU or in case of transfer failure between the MTCU and the other components (3.1.2.3.4.1.3);
   2) if the originator indicator of an AFTN message cannot be converted into an MF-Address (nor into an XF-Address) (3.1.2.3.4.2.1.4.1);
b) AFTN acknowledgement service messages
   1) if the AFTN acknowledgement message refers to a subject AFTN message which has not passed through the AFTN/AMHS Gateway (3.1.2.3.4.3.1.1, 3.1.2.3.4.4.1.1);
   2) if the AFTN acknowledgement message refers to an IPM received without RN request;
c) AFTN unknown addressee service messages
   1) if the AFTN unknown addressee message refers to a subject AFTN message which has not passed through the AFTN/AMHS Gateway (3.1.2.3.4.3.1.1, 3.1.2.3.4.4.1.1);
   2) if, in the AFTN unknown addressee message, the unknown addressee indicator cannot be determined or mapped into a MF-Address (3.1.2.3.4.4.1.2, 3.1.2.3.4.4.1.3);
   3) if the AFTN unknown addressee message is relative to a subject message which already caused the generation of a delivery-report by the AFTN/AMHS Gateway (3.1.2.3.4.4.1.4).
d) AFTN message repetition service messages
   1) if the AFTN message repetition message refers to a subject AFTN message which has not passed through the AFTN/AMHS Gateway (3.1.2.3.4.3.1.1, 3.1.2.3.4.4.1.1);

2) if the AFTN message repetition message refers to a subject AFTN message of which an unmutilated copy is not available at the gateway (3.1.2.3.4.3.1.1, 3.1.2.3.4.4.1.1).

In each of these cases, guidance may be given about the actions to be undertaken at the control position. Possible actions include:

a) the manual correction of the considered AFTN message before passing the message again for conversion to the MTCU;
b) the generation of an IPM carrying AFTN service information. This is requested by the SARPs in some of the cases listed above, but it may also be performed in other situations where this is not mandated by the SARPs. This action may only be performed when the out-of-line situation relates to an AFTN service message;
c) the generation of an AFTN message requesting repetition of the AFTN message being considered This action may only be performed when the out-of-line situation relates to an AFTN service message;
d) the transfer of conversion to another gateway. This action may only be performed when the out-of-line situation relates to an AFTN service message. The AFTN service message is then manually redirected to the gateway which initially converted the subject message, if this gateway and its AFTN address can be determined.

Furthermore, in certain cases, these actions should be undertaken only after appropriate actions have been performed to resolve the out-of-line situation.

The options available at the control position in each of the error situations identified above are summarized in Table 2-2.

Table 2-2 : actions at the control position upon receipt of AFTN service messages

category of considered AFTN message / out-of-line situation	Options available at control position				
	corrective action requested at control position to :	AND / OR	manual message correction	generation of "service" IPM	repetition request to AFTN originator
"general" AFTN message					
• unspecified conversion failure	correct conversion failure cause	and	yes		
• transfer failure between gateway components	correct transfer failure cause				
• failure of originator address conversion	check address mapping tables	and/or	yes		yes
AFTN acknowledgement message					
• GW did not forward subject message	cancel re-routing reason	and		yes (SARPs)	
• no RN-request	advise originator of subject message on the need to request RN	and		yes (SARPs)	
AFTN unknown addressee message					
• GW did not forward subject message	cancel re-routing reason	and		yes (SARPs)	
• unknown addressee(s) invalid				yes (SARPs)	
• failure of unknown addressee address conversion	check address mapping tables	and		yes (SARPs)	
• delivery report already sent				yes (SARPs)	
AFTN request repetition message					
• GW did not forward subject message	cancel re-routing reason	and		yes	
• unmutilated copy of subject message not available				yes	

2.3.5.3 AMHS to AFTN Conversion

2.3.5.3.1 Converted Information objects

The processing applied to a received AMHS information object by the Message Transfer and Control Unit is either of the following, depending on the category of information object (message, probe or report) and content-type (interpersonal messaging, other):

a) process the object for conversion, or at least for further testing aiming at the determination of the gateway ability to convert the object based on envelope or contents parameter values,
b) rejection of the object, and generation of a non-delivery report, or
c) discard the message and report of an error situation. Such an event cannot normally happen under normal operating circumstances.

As indicated in the AFTN/AMHS Gateway overview, it is the role of the gateway to isolate the AFTN from any AMHS information object which has no AFTN equivalent. Therefore, the gateway behaviour must be specified for any standard MHS information object, since it may be received at the gateway.

This means that the gateway must be able to react upon reception of the following information objects:

a) messages, which content-type is built-in of any value (IPM-84 or IPM-88, EDI, voice or unidentified);
b) messages, which content-type is externally defined (external, specified by means of an Object Identifier);
c) probes, which content-type parameter has any of the aforementioned values;
d) reports, either delivery-reports or non-delivery-reports.

In the Basic ATS Message Service, only the IPM content-type (interpersonal-messaging-1984 or interpersonal-messaging-1988) is supported. Thus messages of any other built-in content-type, either unidentified (0), edi-messaging (35), or voice-messaging (40), or of any externally defined content-type, are rejected by an AFTN/AMHS Gateway.

Delivery reports are discarded by the Message Transfer and Control Unit. This is due to the fact that a Message Transfer and Control Unit requests non-delivery-reports, but never delivery-reports when generating AMHS messages.

For IP messages, many different body-part types are defined in the base standards. These include body-parts defined as "basic", and others defined as "extended". Extended body-part types are Externally Defined, however some of them are defined in the base standards.

Since, at some point in time, an IPM with any of these body-part types may reach an AMHS/AFTN Gateway, it is necessary to define the gateway behaviour upon receipt of an IPM with any kind of body-part defined in the base standards. It is likely that the reception of certain body-part types will not occur, since an IPM which body-part is, for example videotex, is not supposed to reach the gateway for onward transmission in the AFTN. Thus, the receipt of such an information object is an out-of-line situation which should happen only mistakenly. Furthermore, only some UA implementations are capable of generating IPMs with some of the defined body-part types. However, the AFTN/AMHS Gateway specification must be comprehensive with respect to the base standards, and the gateway specification in the SARPs includes provisions related to all defined body part types.

For IP Messages,the only body part types supported by the Message Transfer and Control Unit in reception are the following:

a) basic ia5-text,
b) basic message (if the forwarded message initially was an IPM),
c) extended ia5-text-body-part,
d) extended general-text-body-part,
e) extended message-body-part (if the forwarded message initially was an IPM).

Cases b) and e) may result of a subject IPM having been forwarded at a receiving AMHS UA, or sequentially forwarded at several UAs. In the latter case the innermost content is used to determine if the initial message was an IPM.

Editor's Note: *a PDR has been submitted to the ATNP CCB, suggesting that IPM-forwarded messages should be rejected at an AFTN/AMHS Gateway, on the basis that an equivalent concept does not exist in the AFTN. Bullets b) and e), and the above paragraph are therefore to be confirmed, depending on the outcome of the CCB discussion.*

2.3.5.3.2 Behaviour upon receipt of non-delivery reports

When a non-delivery report (NDR) is received from the AMHS at an AFTN/AMHS Gateway, this report cannot be forwarded in the AFTN unless its non-delivery-diagnostic-code is "unrecognised-OR-name" (re. 3.1.2.3.5.1.3). This may happen in particular for a subject message which was initially converted by the gateway. Thus, the NDR is passed to the control position for appropriate action. This scenario is depicted in Figure 2-19.

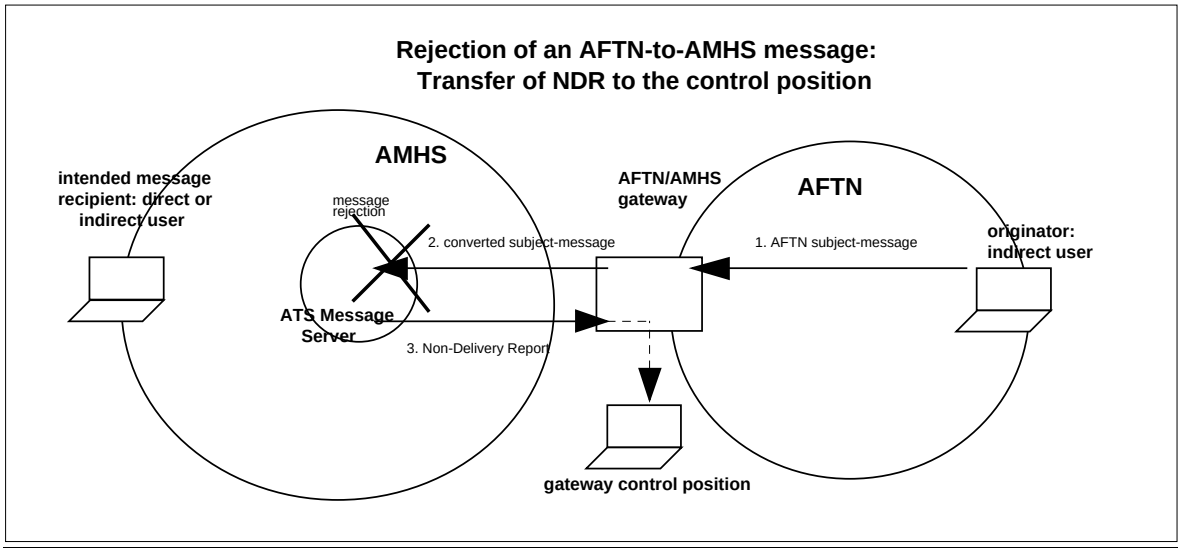

Figure 2-19 : Rejection of an AFTN-to-AMHS message : Transfer of NDR to the control position

Under circumstances where routing is not symmetrical, i.e. where reports about a subject message are not routed along the same path in the opposite direction as the subject message itself, a NDR may be also be received by an AFTN/AMHS Gateway which did not convert the subject message. This section is general in nature and also addresses such a scenario, however some specific actions at the control position may be required in such a case.

A NDR includes two parameters giving indications about the causes of the non-delivery of the subject message. These are:

a) the non-delivery-reason-code (NDRC) element, which is mandatory in a NDR. It may take 8 different values;

b) the non-delivery-diagnostic-code (NDDC) element, which is optional in a NDR. It may take 48 different values. If present, it further refines the reason given in the NDRC.

The base standards specify the meaning of each abstract-value of these parameters. For some of these values (but not all) the base standards also specify, in the description of the MTA procedures, which value to use in which rejection circumstances.

The action undertaken at the control position should be based on the values of these parameters in the received NDR. In summary, the non-delivery of the subject message may result from three main types of situations :

a) an out-of-line situation in the AMHS, e.g. MTS congestion, or unability to transfer due to a MTA failure duration exceeding the repetition conditions at the previous MTA;
b) an out-of-line situation due to the subject message itself; or
c) a mismatch between the subject message and the capabilities of the intended recipient, e.g. if the message recipient does not support the encoded-information-types (EIT) of the subject message.

Situations b) and c) above are not supposed to occur under normal circumstances, for a subject message sent from an AFTN/AMHS Gateway to an ATS Message User Agent. Such situations are normally prevented to happen if both systems comply with the SARPs. However, guidelines may be given for behaviour at the control position, in case this would happen as the result of an out-of-line situation.

Potential actions are among the following, they may be combined as appropriate:

a) if the NDR indicates an error condition in the AMHS, undertake the appropriate action for the correction of the error, or check that the out-of-line situation has been resolved;
b) if the subject message originator is a person (as opposed to a computer application), send an AFTN " free text message " to the originator informing him that the subject message could not be delivered,
c) request subject message repetition to the message originator, by means of an AFTN service message ("SVC QTA RPT... "), or repeat subject message from traffic log, if available.

If the subject message had not been converted initially by the AFTN/AMHS Gateway which received the NDR, it cannot be guaranteed that this gateway will be able to convert automatically the MF-Address of the NDR recipient, i.e. the MF-Address of the subject message originator, into the corresponding AF-Address. In such a case, either actions b) and c) above are excluded, or a preliminary investigation is necessary to determine manually the AF-Address.

Actions which should be preferred for each category of non-delivery causes are indicated in Table 2-3.

Table 2-3 : actions at the control position upon receipt of AMHS NDRs

action at control position / non-delivery cause	undertake action for error correction / check resolution	send AFTN free text message to originator	request subject message repetition to originator or repeat message if available
out-of-line situation in AMHS	•		• [1]
out-of-line situation in subject message		•	
mismatch between subject message and intended recipient capabilities	• [2]	• [2]	• [1]

[1] should be performed only after correction of error
[2] one out of both, depending on mismatch type

2.3.5.3.3 Guidance on error situations

Error situations may be reported for further actions to the control position in the following cases:

a) if a NRN is received (3.1.2.3.5.1.2);
b) if the received information object is not among the objects to be converted, nor within the objects to be explicitly rejected (3.1.2.3.5.1.5, last instance rejection);
c) if a message is received which priority-indicator in the ATS-Message-Header is "SS" and which does not request a RN (3.1.2.3.5.2.3.3);
d) if a RN is received relative to a subject IPM which priority-indicator in the ATS-Message-Header differs from "SS" (3.1.2.3.5.3.1.2); and
e) if a RN is received relative to a subject IPM which had not been generated by the AFTN/AMHS Gateway (3.1.2.3.5.3.1.1).

In each of these cases, guidance may be given about the actions to be undertaken at the control position.

2.3.5.3.3.1 Receipt of NRN

The reception of a NRN usually indicates that the originator of the NRN, i.e. one of the intended recipients of the subject IPM, did not receive the subject IPM although the message was delivered to him. The NRN conveys a parameter which is the *Non-receipt Reason*, optionally supplemented with two other parameters, which are the *Discard Reason* and the *Auto-forward Comment*. These parameters refine the explanation given by the non-receipt reason.

Depending on the values of these parameters, possible actions at the control position are as follows:

a) ignore the NRN, for example if the auto-forward comment indicates that the subject IPM has been forwarded to an eventual recipient which replaces the intended recipient;
b) handle the NRN as if it were a NDR, in accordance with the guidance given in section 0;
c) undertake an appropriate action to avoid that other non-receipts occur for the same recipient.

2.3.5.3.3.2 Receipt of information objects which cannot be converted

The receipt of an information object which is not among the objects to be converted, nor within the objects to be explicitly rejected, is clearly an error of which the repetition should be avoided.

Two types of action may be undertaken at the control position:

a) inform the message originator, by means of an IPM conveying service information, that the information object received at the gateway cannot be conveyed in the AFTN and has consequently be received mistakenly at the gateway;
b) undertake appropriate action to prevent, by policy and/or technical means (e.g. routing, delivery capabilities, etc.) such information objects from being conveyed to the gateway or to the MTCU in the gateway.

2.3.5.3.3.3 Receipt of an SS message uncompliant with AMHS receipt notification request rules

This situation corresponds to case c) under section 2.3.5.3.3. It means that the message parameters contradict the rules specified in the SARPs and explained in section 2.2.2.2 (Use of priority-indicators and notification-requests).

Since the SS message does not request a RN, the SARPs specify that the AFTN/AMHS Gateway must send back a "service IPM" to the message originator, upon receipt of the AFTN acknowledgement service message for the SS message. This service IPM contains the text of the AFTN acknowledgement service message.

The receipt of such a message is already an indication to the originator, that the specification was not complied with. However, an additional action by the control position is possible, consisting in recalling explicitly to the message originator that an SS message should be sent with a RN-request.

2.3.5.3.3.4 Receipt of a RN relative to a non-SS message

This situation corresponds to case d) under section 2.3.5.3.3. The receipt of a RN for a non SS-message means that the subject message has been generated by another AFTN/AMHS Gateway, mistakenly requesting a receipt notification, although the message has a priority different from SS.

This leads to the interpretation that:

a) the gateway which generated the subject message does not comply with the SARPs;
b) routing in the AMHS was not symmetrical at the moment of conveying the subject message and the considered RN.

Under such circumstances, the following actions can be undertaken at the control position of the gateway which received the RN:

a) discard the RN; and/or
b) advise the control position of the AFTN/AMHS gateway which originated the subject message about the detected uncompliance. This may require a manual investigation to determine which gateway is concerned.

2.3.5.3.3.5 Receipt of a RN relative to a subject IPM generated by another gateway

This situation corresponds to case e) under section 2.3.5.3.3.

The SARPs specify that the AFTN/AMHS Gateway must return a NDR to the RN originator.

Under such circumstances, the following actions can be additionally undertaken at the control position of the gateway which received the RN:

a) ignore the RN, and leave it to the recipient of the subject message (RN originator) to acknowledge the receipt of the subject message; or
b) advise the control position of the AFTN/AMHS gateway which originated the subject message. This may require a manual investigation to determine which gateway is concerned.

3. ATN PASS-THROUGH SERVICE GUIDANCE

3.1 INTRODUCTION

When implementing the AFTN/ATN Type A Gateway, consideration should be given in creating separate code modules for each of the three components specified in the SARPs:

a) AFTN component,
b) ATN component, and
c) Message Transfer and Control Unit (MCU).

3.2 AFTN COMPONENT

The AFTN component of the AFTN/AFTN Type A Gateway is the part of the gateway which interfaces with AFTN. The purpose of the AFTN component is to isolate all AFTN specific functions in a common module or code section.

In implementing the AFTN component, consideration should be given to implement the gateway in a manner that allows the AFTN component to be implemented and tested separately from the remainder of the gateway.

3.2.1 Message Retention

There are two types of message retention (or logging) that are required by the SARPs:

a) short term, and
b) long term.

Short term retention must be accomplished, e.g. by maintaining the message in memory, until it can be ascertained that the message has been received by the remote AFTN centre or station. At that time, the short term retention of the message may be terminated.

Long term retention requires that the AFTN component store the message in a file or some other long-term storage. The simplest method of achieving this requirement is to immediately copy all messages to a file as soon as they are received. The writing of the file; and the maintenance of the file will satisfy the retention requirements.

3.2.2 Addressing

The AFTN component is responsible for analyzing AFTN addresses and determining the appropriate AFTN centre for forwarding. In the simplest case, the AFTN component is connected to a single AFTN centre and all AFTN messages go over that link. In a more complicated situation, the AFTN addresses will need to be analyzed and compared against an AFTN address to link mapping table.

3.3 ATN COMPONENT

The ATN component is the interface between the MTCU and the ATN. It is designed as a single service primitive which provides the communication with the MTCU.

3.3.1 GA-Data request service primitive

The GA-Data request primitive is used to pass information from the MTCU to the ATN. The user data parameter is used to pass a complete AFTN message in the IA5 character set.

The called and calling addresses are required and are the 8 character facility designator.

The priority parameter may be included by the MTCU and it may only contain the priority of the AFTN message as determined during AFTN message processing.

The ATN component must take the parameters in the GA-Data request and turn that into a D-Start request. This mapping is the role of ATN Component Control Function (CF), as defined in section 3.1.3.3.2.4 of the SARPs.

3.3.2 CF

The SARPs specify that the CF should use an already existing Dialogue if one exists. However, implementations are likely to be easier to develop and manage if a new dialogue is opened for each AFTN message transferred. This approach is therefore recommended to implementors.

3.4 MTCU

The MTCU performs the central task of mapping from AFTN to ATN and ATN to AFTN.

3.4.1 Message Logging

The SARPs specify that the MTCU must log all messages. This can be combined with the message retention requirements specified for the AFTN component and does not mean that separate logs are required.

3.4.2 Address Mapping

The central feature of the MTCU is the address mapping from one addressing plan to the other.

To map from the AFTN addresses to ATN addresses:

a) the AFTN message must be analyzed to determine addresses;
b) parse the address line and find an AFTN station address, look that address up in the mapping table and find the facility designator of the ATN end system which will be the receiver; repeat this step this step except: if the ATN end system is different, make a copy of the message removing the other addresses and continue.In other words create a separate message for each ATN end system.

To map from the ATN address to the AFTN addresses nothing needs to be done. The address of the destination(s) is located in the AFTN message and is handled transparently by the AFTN component.

3.5 EXCEPTION HANDLING

to be developed