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ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

F.400/X.400

(06/1999)

SERIES F: NON-TELEPHONE TELECOMMUNICATION SERVICES

Message handling services

SERIES X: DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

Message handling systems

Message handling system and service overview

ITU-T Recommendation F.400/X.400

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Message handling system and service overview

Summary

This revision of ITU-T Rec. F.400/X.400 is a consolidation of Recommendation F.400/X.400 (07/96) and Amendment 1 (09/98). This Recommendation provides an overview of system and service of Message Handling Systems (MHS). It should be considered in conjunction with the F.400-series and X.400-series of Recommendations.

Source

Following ITU-T decision to publish new editions of the set of Message Handling Recommendations this edition of ITU-T Recommendation F.400/X.400, dated 18 June 1999, consolidates F.400/X.400 (07/96) and F.400/X.400 Amendment 1 (09/98).

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSC Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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Message handling system and service overview

1 Scope

This Recommendation defines the overall system and service of an MHS and serves as a general overview of MHS.

Other aspects of message handling systems and services are defined in other Recommendations. The layout of Recommendations defining the message handling system and services is shown in Table 1. The public services built on MHS, as well as access to and from the MHS for public services are defined in the F.400-series Recommendations.

The technical aspects of MHS are defined in the X.400-series Recommendations. The overall system architecture of MHS is defined in ITU-T Rec. X.402 | ISO/IEC 10021-2.

2 Normative references

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- CCITT Recommendation F.60 (1992), *Operational provisions for the international telex service*.
- ITU-T Recommendation F.160 (1993), *General operational provisions for the international public facsimile services*.
- ITU-T Recommendation F.300 (1993), *Videotex service*.
- CCITT Recommendation F.401 (1992), *Naming and addressing for public message handling services*.
- CCITT Recommendation F.410 (1992), *The public message transfer service*.
- CCITT Recommendation F.415 (1988), *Intercommunication with public physical delivery services*.
- CCITT Recommendation F.420 (1992), *The public interpersonal messaging service*.
- CCITT Recommendation F.421 (1988), *Intercommunication between the IPM service and the telex service*.
- CCITT Recommendation F.423 (1992), *Intercommunication between the interpersonal messaging service and the telefax service*.
- ITU-T Recommendation F.435 (1999), *Electronic data interchange messaging service*.
- ISO/IEC 10021-8:1999, *Information technology – Text Communication – Message Handling Systems (MHS) – Part 8: Electronic Data Interchange Messaging Service*.
- CCITT Recommendation F.440 (1992), *The voice messaging service*.
- CCITT Recommendation T.330 (1988), *Telematic access to interpersonal message system*.
- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*.
- ITU-T Recommendation X.207 (1993) | ISO/IEC 9545:1994, *Information technology – Open Systems Interconnection – Application layer structure*.
- ITU-T Recommendation X.217 (1995) | ISO/IEC 8649:1996, *Information technology – Open Systems Interconnection – Service definition for the Association Control Service Element*.
- ITU-T Recommendation X.218 (1993), *Reliable transfer: Model and service definition*.
- ISO/IEC 9066-1:1989, *Information processing systems – Text communication – Reliable Transfer – Part 1: Model and service definition*.
- CCITT Recommendation X.219 (1988), *Remote Operations: Model, notation and service definition*.

ISO/IEC 9072-1:1989, *Information processing systems – Text communication – Remote Operations – Part 1: Model, notation and service definition*.

- ITU-T Recommendation X.402 (1999) | ISO/IEC 10021-2:2003, *Information technology – Message Handling Systems (MHS): Overall architecture*.
- CCITT Recommendation X.407 (1988), *Message handling systems: Abstract service definition conventions*.
- ISO/IEC 10021-3:1990, *Information technology – Text communication – Message-Oriented Text Interchange Systems (MOTIS) – Part 3: Abstract Service Definition Conventions*.
- CCITT Recommendation X.408 (1988), *Message handling systems: Encoded information type conversion rules*.
- ITU-T Recommendation X.411 (1999) | ISO/IEC 10021-4:2003, *Information technology – Message Handling Systems (MHS): Message transfer system: Abstract service definition and procedures*.
- ITU-T Recommendation X.413 (1999) | ISO/IEC 10021-5:1999, *Information technology – Message Handling Systems (MHS): Message store – Abstract service definition*.
- ITU-T Recommendation X.419 (1999) | ISO/IEC 10021-6:2003, *Information technology – Message Handling Systems (MHS): Protocol specifications*.
- ITU-T Recommendation X.420 (1999) | ISO/IEC 10021-7:2003, *Information technology – Message Handling Systems (MHS): Interpersonal messaging system*.
- ITU-T Recommendation X.435 (1999) | ISO/IEC 10021-9:1999, *Information technology – Message Handling Systems (MHS): Electronic data interchange messaging system*.
- ITU-T Recommendation X.440 (1999), *Message handling systems: Voice messaging system*.
- ITU-T Recommendation X.460 (1995) | ISO/IEC 11588-1:1996, *Information technology – Message Handling Systems (MHS) management: Model and architecture*.
- ITU-T Recommendation X.500 (1997) | ISO/IEC 9594-1:1998, *Information technology – Open Systems Interconnection – The Directory: Overview of concepts, models and services*.
- ITU-T Recommendation X.501 (1997) | ISO/IEC 9594-2:1998, *Information technology – Open Systems Interconnection – The Directory: Models*.
- ITU-T Recommendation X.509 (1997) | ISO/IEC 9594-8:1998, *Information technology – Open Systems Interconnection – The Directory: Authentication framework*.
- ITU-T Recommendation X.511 (1997) | ISO/IEC 9594-3:1998, *Information technology – Open Systems Interconnection – The Directory: Abstract service definition*.
- ITU-T Recommendation X.518 (1997) | ISO/IEC 9594-4:1998, *Information technology – Open Systems Interconnection – The Directory: Procedures for distributed operation*.
- ITU-T Recommendation X.519 (1997) | ISO/IEC 9594-5:1998, *Information technology – Open Systems Interconnection – The Directory: Protocol specifications*.
- ITU-T Recommendation X.520 (1997) | ISO/IEC 9594-6:1998, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types*.
- ITU-T Recommendation X.521 (1997) | ISO/IEC 9594-7:1998, *Information technology – Open Systems Interconnection – The Directory: Selected object classes*.
- ITU-T Recommendation X.525 (1997) | ISO/IEC 9594-9:1998, *Information technology – Open Systems Interconnection – The Directory: Replication*.
- ITU-T Recommendation X.680 (1997) | ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.
- ITU-T Recommendation X.690 (1997) | ISO/IEC 8825-1:1998, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*.
- ITU-T Recommendation X.880 (1994) | ISO/IEC 13712-1:1995, *Information technology – Remote Operations: Concepts, model and notation*.
- ITU-T Recommendation X.881 (1994) | ISO/IEC 13712-2:1995, *Information technology – Remote Operations: OSI realizations – Remote Operations Service Element (ROSE) service definition*.
- ITU-T Recommendation X.882 (1994) | ISO/IEC 13712-3:1995, *Information technology – Remote Operations: OSI realizations – Remote Operations Service Element (ROSE) protocol specification*.

**Table 1/F.400/X.400 – Structure of ITU-T Recommendations and ISO/IEC International Standards
for Message Handling Systems (MHSs)**

Short title		Joint MHS		Joint support		ITU-T only	
		ITU-T	ISO/IEC	ITU-T	ISO/IEC	System	Service
MHS:	System and service overview	F.400/ X.400 X.402	10021-1			X.408	
MHS:	Overall architecture		10021-2				
MHS:	Encoded information type conversion rules						
MHS:	MTS: Abstract service definition and procedures	X.411	10021-4				
MHS:	MS: Abstract service definition	X.413	10021-5				
MHS:	Protocol specifications	X.419	10021-6				
MHS:	Interpersonal messaging system	X.420	10021-7				
MHS:	Electronic data interchange messaging system	X.435	10021-9			X.440 T.330	
MHS:	Voice messaging system						
MHS:	Telematic access to interpersonal message system						
MHS:	MHS routing	X.412	10021-10				
MHS:	MHS routing: Guide for messaging systems managers	X.404	10021-11				
MHS:	Naming and addressing for public message handling services						F.401
MHS:	The public message transfer service						F.410
MHS:	Intercommunication with public physical delivery services						F.415
MHS:	The public interpersonal messaging service						F.420
MHS:	Intercommunication between the IPM service and the telex service						F.421
MHS:	Intercommunication between the interpersonal messaging service and the telefax service						F.423
MHS:	Electronic data interchange messaging service		10021-8				F.435
MHS:	The voice messaging service						F.440
OSI:	Basic reference model: The basic model			X.200	7498-1		
ASN.1:	Specification of basic notation			X.680	8824-1		
ASN.1 encoding rules:	Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)			X.690	8825-1		
OSI:	Service definition for the association control service element			X.217	8649		
OSI:	Reliable transfer: Model and service definition			X.218	9066-1		
Remote Operations:	Concepts, model and notation			X.880	13712-1		
Remote Operations:	OSI realizations – Remote Operations Service Element (ROSE) service definition			X.881	13712-2		
OSI:	Connection-oriented protocol for the association control service element: Protocol specification			X.227	8650-1		
OSI:	Reliable transfer: Protocol specification			X.228	9066-2		
Remote Operations:	OSI realizations – Remote Operations Service Element (ROSE) protocol specification			X.882	13712-3		

3 Definitions

For the purposes of this Recommendation, the definitions given in Annex A and the following definitions apply.

Definitions of the elements of service applicable to MHS are contained in Annex B.

3.1 Open Systems Interconnection

This Recommendation makes use of the following terms defined in ITU-T Rec. X.200 | ISO/IEC 7498-1:

- a) application layer;
- b) application-process;
- c) Open Systems Interconnection;
- d) OSI reference model.

3.2 Directory systems

This Recommendation makes use of the following terms defined in ITU-T Rec. X.500 | ISO/IEC 9594-1:

- a) directory entry;
- b) directory system agent;
- c) directory system;
- d) directory user agent.

This Recommendation makes use of the following terms defined in ITU-T Rec. X.501 | ISO/IEC 9594-2:

- e) attribute;
- f) group;
- g) name.

4 Abbreviations

This Recommendation uses the following abbreviations:

A	Additional
ADMD	Administration Management Domain
AU	Access Unit
CA	Contractual Agreement
DL	Distribution List
DSA	Directory System Agent
DUA	Directory User Agent
E	Essential
EDI	Electronic Data Interchange
EIT	Encoded Information Type
EMS	Express Mail Service
I/O	Input/Output
IP	Interpersonal
IPM	Interpersonal Messaging
IPMS	Interpersonal Messaging System
MD	Management Domain
MH	Message Handling
MHS	Message Handling System
MS	Message Store
MT	Message Transfer
MTA	Message Transfer Agent

MTS	Message Transfer System
N/A	Not applicable
OR	Originator/Recipient
OSI	Open Systems Interconnection
PD	Physical Delivery
PDAU	Physical Delivery Access Unit
PDS	Physical Delivery System
PFAXAU	Public Telefax Access Unit
PM	Per-message
PR	Per-recipient
PRMD	Private Management Domain
PTLXAU	Public Telex Access Unit
ROA	Recognized Operating Agency
TLMA	Telematic Agent
TLXAU	Telex Access Unit
UA	User Agent

5 Conventions

In this Recommendation the expression "Administration" is used for shortness to indicate a telecommunication administration, a recognized operating agency, and, in the case of intercommunication with public physical delivery service, a postal administration.

6 Purpose

This Recommendation is one of a set of Recommendations which describes the system model and elements of service of the Message Handling System (MHS) and services. This Recommendation overviews the capabilities of an MHS that are used by Service providers for the provision of public message handling (MH) services to enable users to exchange messages on a store-and-forward basis.

The message handling system is designed in accordance with the principles of the reference model of Open Systems Interconnection (OSI Reference Model) for ITU-T applications (ITU-T Rec. X.200) and uses the presentation layer services and services offered by other, more general, application service elements. An MHS can be constructed using any network fitting in the scope of OSI. The message transfer service provided by the MTS is application independent. An example of a standardized application is the IPM service. End systems can use the message transfer (MT) service for specific applications that are defined bilaterally.

Message handling services provided by service providers belong to the group of telematic services defined in the F-series Recommendations.

Various telematic services and telex (see ITU-T Recs. F.60, F.160, F.200, F.300, etc.), data transmission services (see ITU-T Rec. X.1), or physical delivery services (see ITU-T Rec. F.415) gain access to, and intercommunicate with, the IPM service or intercommunicate with each other, via access units.

Elements of service are the service features provided through the application processes. The elements of service are considered to be components of the services provided to users and are either elements of a basic service or they are *optional user facilities*, classified either as *essential optional user facilities*, or as *additional optional user facilities*.

7 Functional model of MHS

The MHS functional model serves as a tool to aid in the development of Recommendations for MHS, and aids in describing the basic concepts that can be depicted graphically. It comprises several different functional components that work together to provide MH services. The model can be applied to a number of different physical and organizational configurations.

7.1 Description of the MHS model

A functional view of the MHS model is shown in Figure 1. In this model, a user is either a person or a computer process. Users are either direct users (i.e. engage in message handling by direct use of MHS), or are indirect users [i.e. engage in message handling through another communication system (e.g., a physical delivery system) that is linked to MHS]. A user is referred to as either an originator (when sending a message) or a recipient (when receiving a message). Message handling elements of service define the set of message types and the capabilities that enable an originator to transfer messages of those types to one or more recipients.

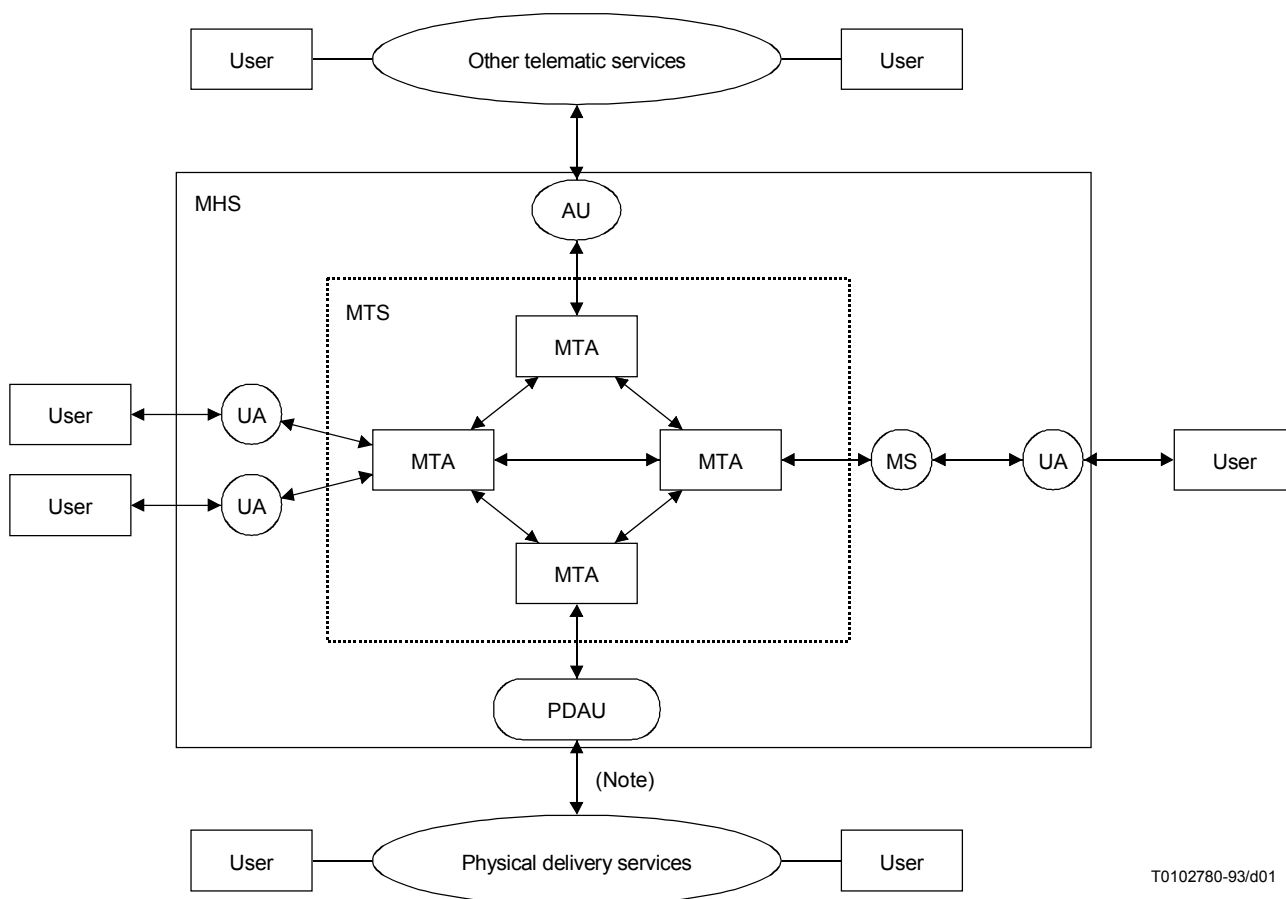
An originator prepares messages with the assistance of his user agent. A user agent (UA) is an application process that interacts with the message transfer system (MTS) or a message store (MS), to submit messages on behalf of a single user. The MTS delivers the messages submitted to it, to one or more recipient UAs, access units (AUs), or MSs, and can return notifications to the originator. Functions performed solely by the UA and not standardized as part of the message handling elements of service are called local functions. A UA can accept delivery of messages directly from the MTS, or it can use the capabilities of a MS to receive delivered messages for subsequent retrieval by the UA.

The MTS comprises a number of message transfer agents (MTAs). Operating together, in a store-and-forward manner, the MTAs transfer messages and deliver them to the intended recipients.

Access by indirect users of MHS is accomplished by AUs. Delivery to indirect users of MHS is accomplished by AUs, such as in the case of physical delivery, by the physical delivery access unit (PDAU).

The message store (MS) is an optional general purpose capability of MHS that acts as an intermediary between the UA and the MTA. The MS is depicted in the MHS functional model as shown in Figure 1. The MS is a functional entity whose primary purpose is to store delivered, and, optionally, submitted messages and permit their retrieval by the MS-user (UA). The MS also allows for submission from, and alerting to the MS-user.

The collection of UAs, MSs, AUs and MTAs is called the message handling system (MHS).



NOTE – Message input from PDS to MHS is for further study. Flow from PD services to the PDAU shown is for the purpose of notifications.

Figure 1/F.400/X.400 – MHS functional model

7.2 Structure of messages

The basic structure of messages conveyed by the MTS is shown in Figure 2. A message is made up of an envelope and a content. The envelope carries information that is used by the MTS when transferring the message within the MTS. The content is the piece of information that the originating UA wishes to be delivered to one or more recipient UAs. The MTS neither modifies nor examines the content, except for conversion (see clause 16).

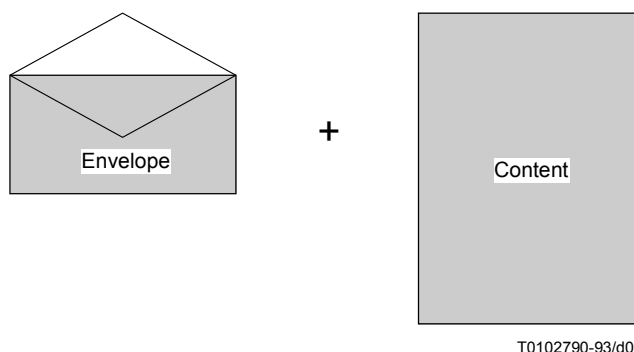


Figure 2/F.400/X.400 – Basic message structure

7.3 Application of the MHS model

7.3.1 Physical mapping

Users access UAs for message processing purposes, for example, to create, present, or file messages. A user can interact with a UA via an input/output (I/O) device or process (e.g., keyboard, display, printer etc.). A UA can be implemented as a (set of) computer process(es) in an intelligent terminal.

A UA and MTA can be co-located in the same system, or a UA/MS can be implemented in physically separate systems. In the first case, the UA accesses the MT elements of service by interacting directly with the MTA in the same system. In the second case, the UA/MS will communicate with the MTA via standardized protocols specified for MHS. It is also possible for an MTA to be implemented in a system without UAs or MSs.

Some possible physical configurations are shown in Figures 3 and 4. The different physical systems can be connected by means of dedicated lines or switched network connections.

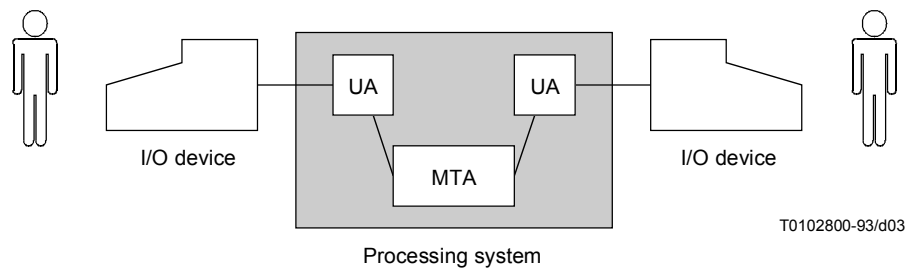


Figure 3/F.400/X.400 – Co-resident UA and MTA

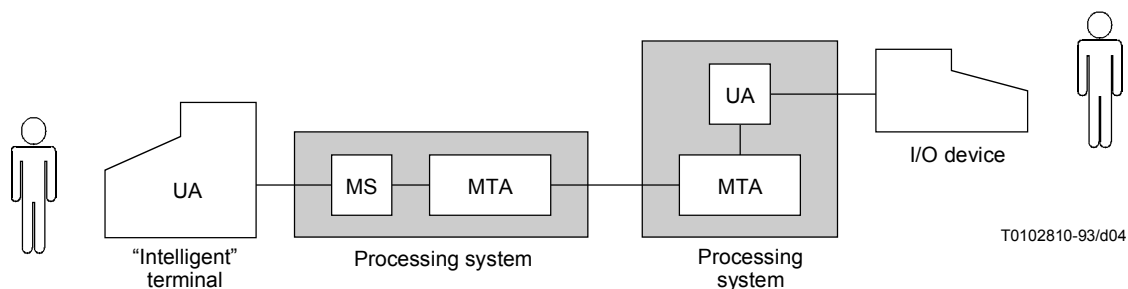


Figure 4/F.400/X.400 – Stand-alone UA and co-resident MS/MTA and UA/MTA

7.3.2 Organizational mapping

An Administration or organization can play various roles in providing message handling services. An organization in this context can be a company or a non-commercial enterprise.

The collection of at least one MTA, zero or more UAs, zero or more MSs, and zero or more AUs operated by a service provider or organization constitutes a management domain (MD). An MD managed by a service provider is called an administration management domain (ADMD). An MD managed by an organization other than a service provider is called a private management domain (PRMD). An MD provides message handling services in accordance with the classification of elements of service as described in clause 19. The relationships between management domains are shown in Figure 5.

7.3.3 Administration management domain

In one country, one or more ADMDs can exist. An ADMD is characterized by its provision of relaying functions between other management domains and the provision of the message transfer service for the applications provided within the ADMD.

A service provider can provide access for its users to the ADMD in one or more of the following ways:

- user to service provider-provided UA;
- private UA to service provider MTA;
- private UA to service provider MS;

- private MTA to service provider MTA;
- user to service provider-provided AU.

See also the examples of configurations shown in Figures 3 and 4.

Service provider-provided UAs can exist as part of an intelligent terminal that the user can use to access the MHS. They can also exist as part of service provider resident equipment which itself is part of the MHS. In this case the user obtains access to the UA via an I/O device.

In the case of a private UA, the user has a private stand-alone UA which interacts with the service provider-provided MTA or MS, using submission, delivery and retrieval functions. A private, stand-alone UA can be associated with one or more MDs, provided that the required naming conventions are preserved.

A private MTA as part of a PRMD can access one or more ADMDs in a country, following national regulations.

Access can also be provided by service provider-provided AUs described in clauses 10 and 11.

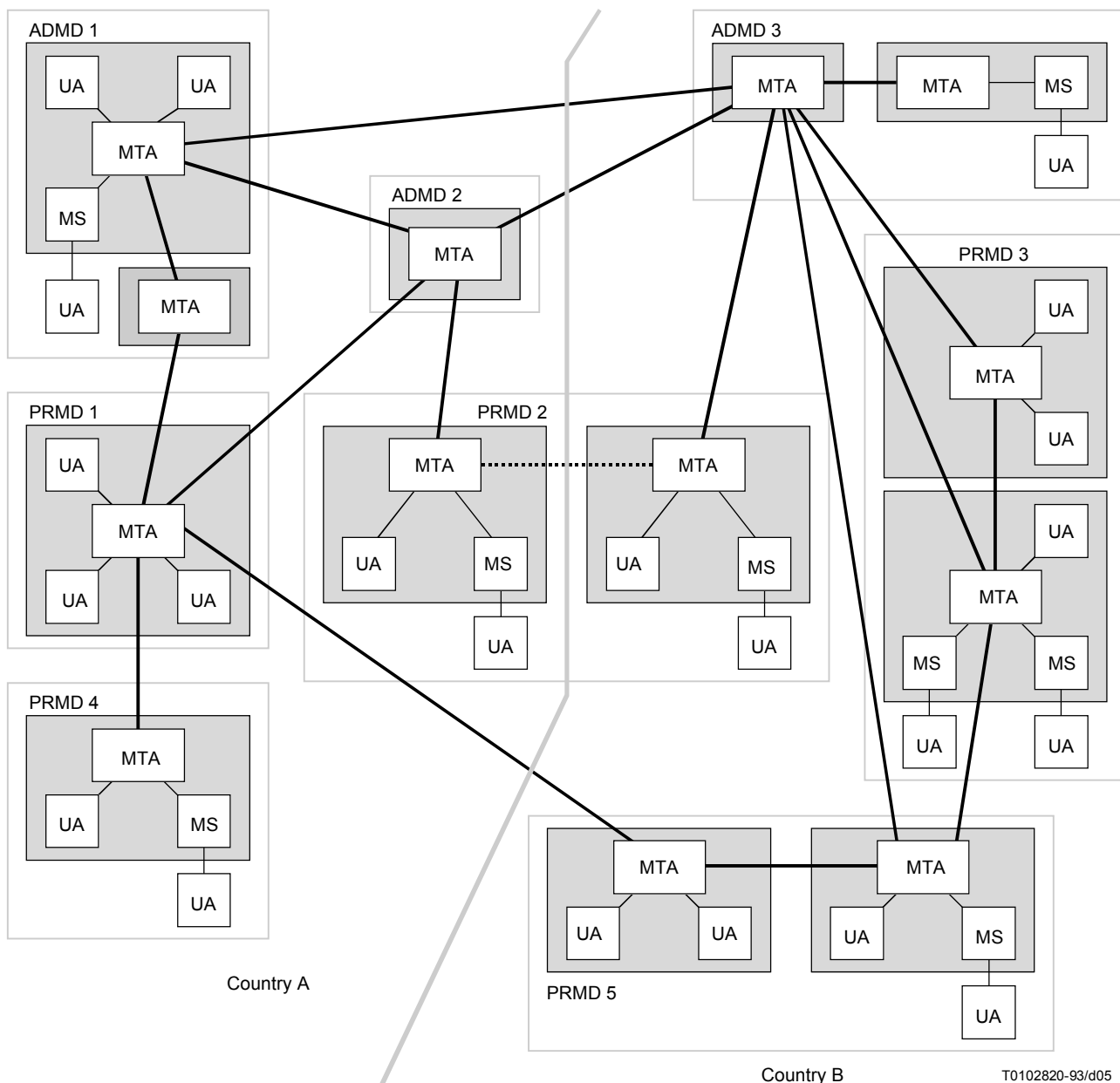
7.3.4 Private management domain

An organization other than a service provider can have one or more MTA(s), and zero or more UAs, AUs and MSs forming a PRMD which can interact with an ADMD (or other PRMD) on an MD-to-MD (MTA-to-MTA) basis. A PRMD is characterized by the provision of messaging functions within that management domain.

A PRMD can have access to one or more ADMDs as shown in Figure 5. However, in the case of a specific interaction between a PRMD and an ADMD (such as when a message is transferred between MDs), the PRMD is considered to be associated only with that ADMD. A PRMD may act as a relay to other MDs if national regulations and bilateral agreements permit.

In the interaction between a PRMD and an ADMD, the ADMD takes responsibility for the actions of the PRMD which are related to the interaction. In addition to ensuring that the PRMD properly provides the message transfer service, the ADMD is responsible for ensuring that the accounting, logging, quality of service, uniqueness of names, and related operations of the PRMD are correctly performed. As a national matter, the name of a PRMD can be either nationally unique or relative to the associated ADMD. If a PRMD is associated with more than one ADMD, the PRMD can have more than one name.

See Annex E for guidance in the case of multinational PRMDs.



NOTE 1 – This diagram gives examples of possible interconnections. It does not attempt to identify all possible configurations. This Recommendation places no restrictions on interconnections between MDs, although these may be the subject of regulatory agreements within and between countries.

NOTE 2 – PRMD 1 has connections to two ADMDs within country A;

PRMD 2 spans a country border, and has connections to an ADMD in each country;

PRMD 3 has multiple connections to ADMD 3;

PRMD 4 is only connected to other MDs by relaying through PRMD 1;

PRMD 5 has connections to other PRMDs, both within the same country (to PRMD 3) and internationally (to PRMD 1)

NOTE 3 – The lines between MTAs represent logical connections, which implies that the MTAs have the ability to establish associations between themselves when required, using supporting OSI layers over any physical medium.

NOTE 4 – The shaded boxes surrounding logical components (e.g., UAs, MTAs) represent examples of physically co-located systems.

Figure 5/F.400/X.400 – Relationships between management domains

7.4 Message store (MS)

Remote UAs can be implemented on a wide variety of equipment, including personal computers of varying capabilities. The MS service can complement a remote UA by providing continuously available storage and delivery services on behalf of a user, for example.

One MS acts on behalf of only one user, i.e. it does not provide a common or shared MS capability to several users. See also PRMD 3 of Figure 5.

The MS will store delivered messages and reports. As an option it may also store submitted messages, submitted probes, and draft messages. The MS may also keep a history of messages by storing extracts of previously and currently stored messages in logs. Messages may be grouped in a user-defined and potentially hierarchical structure.

The MS retrieval capability provides users who subscribe to an MS with basic message retrieval capabilities potentially applicable to all information held by the MS. Figure 6 shows the delivery, and subsequent retrieval of messages that are delivered to an MS, and the submission of messages via the MS.

When a user subscribes to an MS, all messages destined for the user are delivered to the MS only. The MS-user, if on line, may receive Alerts that announce the delivery of certain messages to the MS. Messages delivered to an MS are considered delivered from the MTS perspective.

The basic MS is independent of application specific services (see 8.7) and may store messages with all types of content, the type of content being dependent on the type of service. However, it may provide additional capabilities depending on the type of content.

When an MS-user submits a message, the MS conveys the submission request to the MTS and reports the outcome returned by the MTS to the MS-user. If requested by the MS-user, the MS may expand the message by forwarding parts of delivered or submitted messages that are currently stored in the MS before conveying the submission to the MTS. The MS may also store a copy of the message submitted to the MTS if the submission is successful. The MS service allows the user to transfer a message to the MS for storage as a draft message. The draft message may subsequently be retrieved, or the MS may include its body-parts in a message submitted to the MTS when requested in a message submitted by the MS-user.

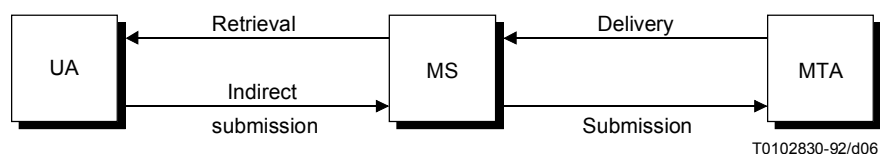


Figure 6/F.400/X.400 – Submission and delivery with an MS

The MS-user may be provided with the capability to request the MS service to forward selected messages automatically upon delivery. The MS may also provide automatic deletion of messages after a user specified period of time, or when the message expires, or when the message is rendered obsolete by another message.

The MS may automatically attach information to a previously submitted message concerning its delivery or non-delivery. The MS may also generate content-specific notifications, acknowledging receipt or acceptance when requested by the user or when the user has retrieved the message.

The elements of service describing the features of the MS are defined in Annex B and classified in clause 19. Users are provided with the capability based on various criteria, to get counts and lists of messages, to fetch messages, and to delete messages, currently held in the MS.

Figure 7 depicts a simplified model of the information types stored in the MS, and the functions the MS fulfils.

7.4.1 Physical configurations

The MS can be physically located with respect to the MTA in a number of ways. The MS can be collocated with the UA, collocated with the MTA, or stand-alone. From an external point of view, a collocated UA and MS are indistinguishable from a stand-alone UA. Colocating the MS with the MTA offers significant advantages which will probably make it the predominant configuration.

7.4.2 Organizational configurations

Either ADMDs or PRMDs can operate MSs. In the case of service provider-supplied MSs, the subscriber either provides his own UA or makes use of a service provider-supplied UA via an I/O device. In either case, all the subscriber's messages are delivered to the MS for subsequent retrieval.

The physical and organizational configurations described above are examples only and other equally valid cases can exist.

8 Message transfer service

The MTS provides the general, application independent, store and forward message transfer service. The elements of service describing the features of the MT service are defined in Annex B, and classified in clause 19. Provision of the public message transfer service by service providers is described in ITU-T Rec. F.410.

8.1 Submission and delivery

The MTS provides the means by which UAs exchange messages. There are two basic interactions between MTAs and UAs, or AUs, or MSs:

- 1) The submission interaction is the means by which an originating UA, AU or MS transfers to an MTA the content of a message and the submission envelope. The submission envelope contains the information that the MTS requires to provide the requested elements of service.
- 2) The delivery interaction is the means by which the MTA transfers to a recipient UA, AU or MS the content of a message plus the delivery envelope. The delivery envelope contains information related to delivery of the message.

In the submission and delivery interactions, responsibility for the message is passed between the MTA and the UA, AU or MS.

8.2 Transfer

Starting at the originator's MTA, each MTA transfers the message to another MTA until the message reaches the recipients' MTA, which then delivers it to the recipient UA or MS using the delivery interaction.

The transfer interaction is the means by which one MTA transfers to another MTA the content of a message plus the transfer envelope. The transfer envelope contains information related to the operation of the MTS plus information that the MTS requires to provide elements of service requested by the originating UA.

MTAs transfer messages containing any type of binary coded information. MTAs neither interpret nor alter the content of messages except when performing a conversion.

8.3 Notifications

Notifications in the MT service comprise the delivery and non-delivery notifications. When a message, or probe, cannot be delivered by the MTS, a non-delivery notification is generated and returned to the originator in a report signifying this. In addition, an originator can specifically ask for acknowledgment of successful delivery through use of the delivery notification element of service on submission.

8.4 User agent

The UA uses the MT service provided by the MTS. A UA is a functional entity by means of which a single direct user engages in message handling.

UAs are grouped into classes based on the type of content of messages they can handle. The MTS provides a UA with the ability to identify its class when sending messages to other UAs. UAs within a given class are referred to as cooperating UAs since they cooperate with each other to enhance the communication amongst their respective users.

NOTE – A UA can support more than one type of message content, and hence belong to several UA classes.

8.5 Message store

The message store (MS) uses the MT Service provided by the MTS. An MS is a functional entity associated with a user's UA. The user may submit messages through the MS and retrieve messages that have been either delivered to the MS, or submitted by the user.

8.6 Access unit

An access unit (AU) uses the MT service provided by the MTS. An AU is a functional entity associated with an MTA to provide for intercommunication between the MHS and another system or service.

8.7 Use of the MTS in the provision of various services

The MTS is used by application specific services for the provision of message handling services of various types. The interpersonal messaging service, described in clause 9, is one example of this. Other examples are the Electronic Data Interchange (EDI) messaging service described in ITU-T Rec. F.435, and the voice messaging service described in ITU-T Rec. F.440. Other services (e.g., asynchronous group communications) can be built on the foundation of the MTS, either with corresponding Recommendations or as private applications.

9 IPM service

The interpersonal messaging (IPM) service provides a user with features to assist in communicating with other IPM service users. The IPM service uses the capabilities of the MT service for sending and receiving interpersonal messages. The elements of service describing the features of the IPM service are defined in Annex B, and classified in clause 19. The provision of public interpersonal messaging service by service providers is described in ITU-T Rec. F.420.

9.1 IPM service functional model

Figure 8 shows the functional model of the IPM service. The UAs used in the IPM service (IPM-UAs) comprise a specific class of cooperating UAs. The optional access units shown (TLMA, PTLXAU, PFAXAU) allow for telex, and telefax users to intercommunicate with the IPM service. The optional physical delivery access unit (PDAU) allows IPM users to send messages to users outside the IPM service who have no access to MHS. The message store can optionally be used by IPM users to take delivery of messages on their behalf.

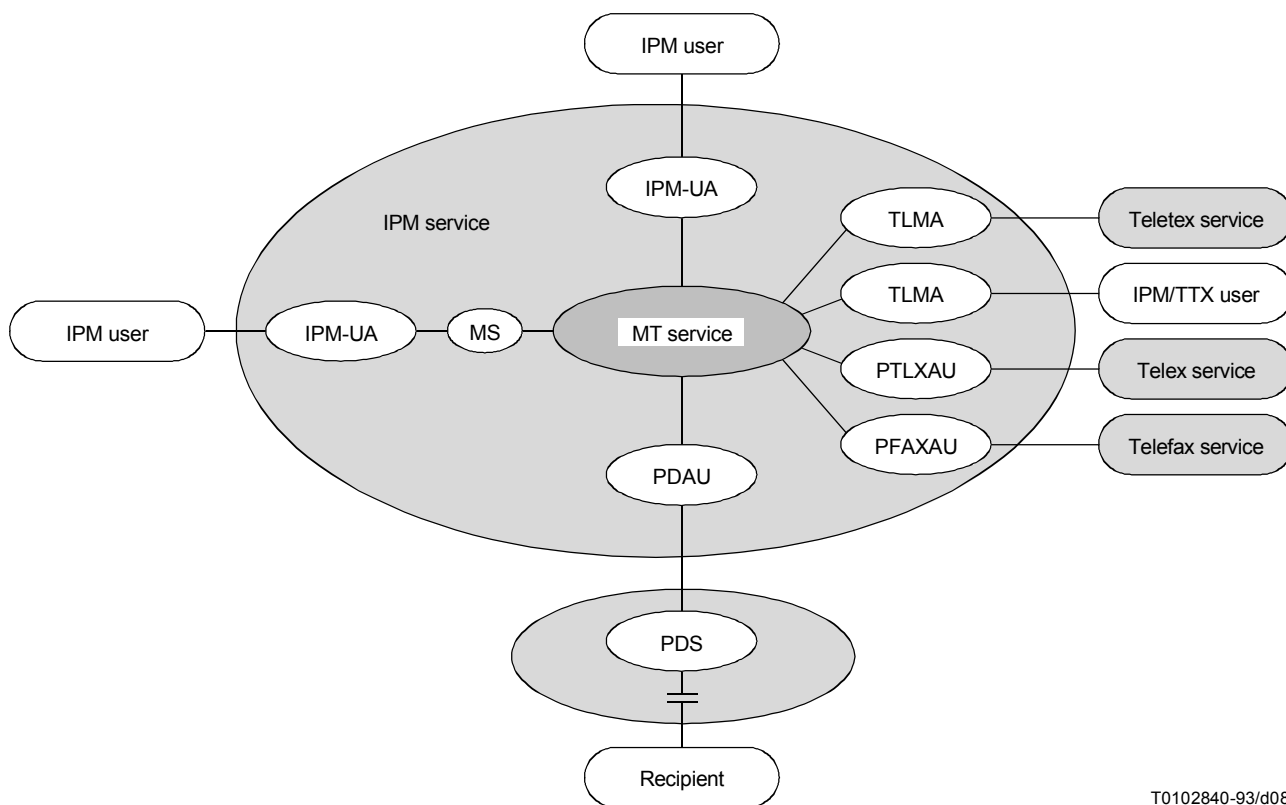
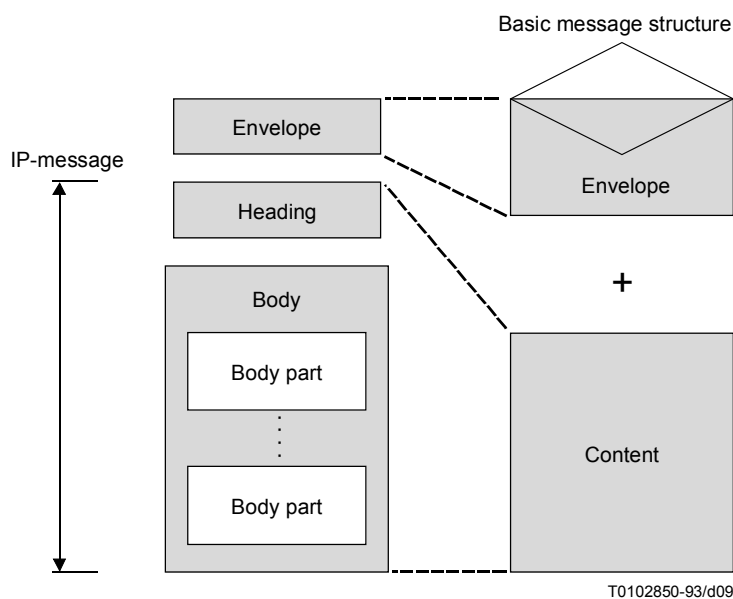


Figure 8/F.400/X.400 – IPM service functional model

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9.2 Structure of IP-messages

The IPM class of UAs create messages containing a content specific to the IPM. The specific content that is sent from one IPM-UA to another is a result of an originator composing and sending a message, called an IP-message. The structure of an IP-message as it relates to the basic message structure of MHS is shown in Figure 9. The IP-message is conveyed with an envelope when being transferred through the MTS.



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Figure 9/F.400/X.400 – IP-message structure

Figure 10 shows an analogy between a typical office memo, and the corresponding IP-message structure. The IP-message contains information (e.g., To, cc, Subject) provided by the user which is transformed by the IPM-UA into the heading of the IP-message. The main information that the user wishes to communicate (the body of the memo) is contained within the body of the IP-message. In the example shown, the body contains two types of encoded information: text and facsimile, which form what are called, body parts. In general, an IP-message body can consist of a number of body parts, each of which can be of a different encoded information type, such as voice, text, files, facsimile and graphics.

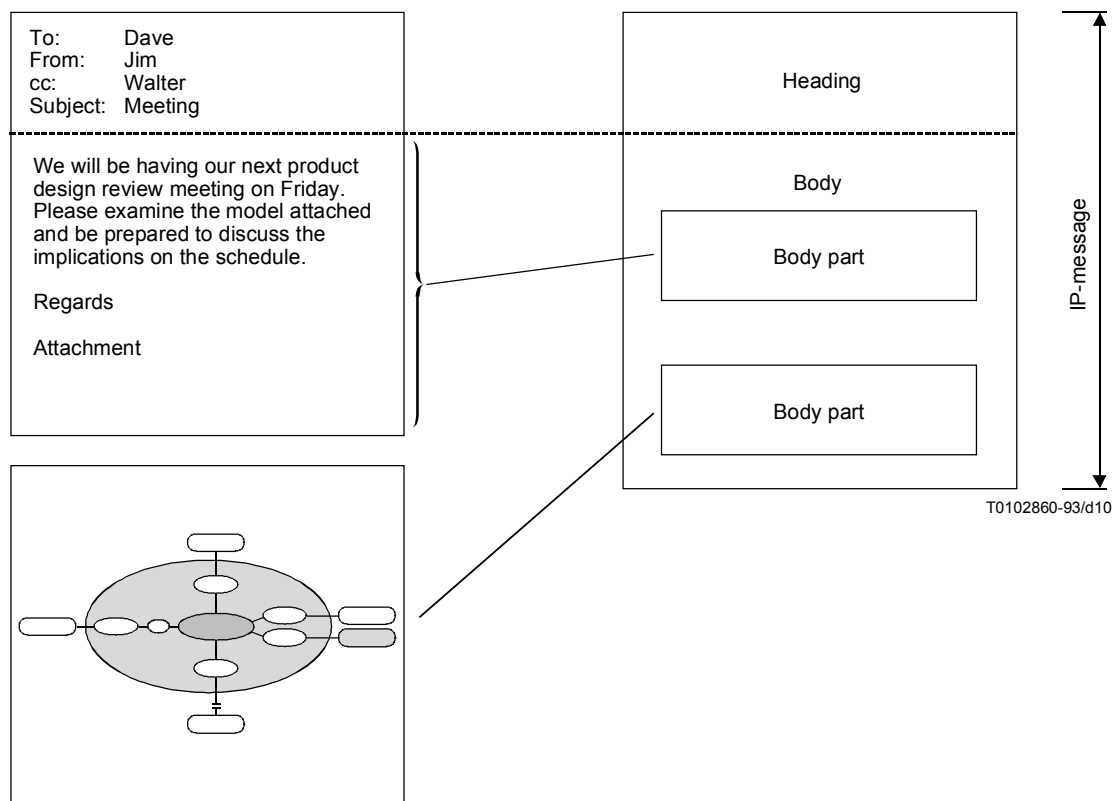


Figure 10/F.400/X.400 – IP-message structure for a typical memo

9.3 IP-notifications

In the IPM service, a user can request a notification of receipt or non-receipt of a message by a recipient. These notifications are requested by an originator and are generated as a result of some recipient action (such as reading/not reading the message). In certain cases, the non-receipt notification is generated automatically by the recipient's UA.

10 Intercommunication with physical delivery services

10.1 Introduction

The value of message handling systems can be increased by connecting them to physical delivery (PD) systems such as the traditional postal service. This will allow for the physical (e.g., hard copy) delivery of messages originated within MHS to recipients outside of MHS, and in some cases will allow for the return of notifications from the PD service to an MHS originator. The ability for origination of messages in the PD service for submission to MHS through the PDAU is for further study. The capability of intercommunication between PD and MH services is an optional capability of MHS, and is applicable to any application such as IPM. All users of MHS will have the ability to generate messages for subsequent physical delivery. Figure 11 shows the functional model of this interworking. Provision of intercommunication between public message handling services offered by service providers and PD services is described in ITU-T Rec. F.415. The elements of service describing the features of this intercommunication are defined in Annex B and classified in clause 19.

A physical delivery system is a system, operated by a management domain, that transports and delivers physical messages. A physical message is a physical object comprising a relaying envelope and its content. An example of a physical delivery system (PDS) is the postal service. An example of a physical message is a paper letter and its enclosing paper envelope.

A physical delivery access unit (PDAU) converts an MH user's message to physical form, a process called physical rendition. An example of this is the printing of a message and its automatic enclosure in a paper envelope. The PDAU passes the physically rendered message to a PDS for further relaying and eventual physical delivery.

A PDAU can be viewed as a set of UAs, each UA being identified by a postal address. To perform its functions, a PDAU must support submission (Notifications) and delivery interactions with the MTS, and also cooperate with other UAs. MH/PD service intercommunication is thus provided as part of the message transfer service.

To enable MH users to address messages to be delivered physically by a PDS, an appropriate address format is described in clause 12.

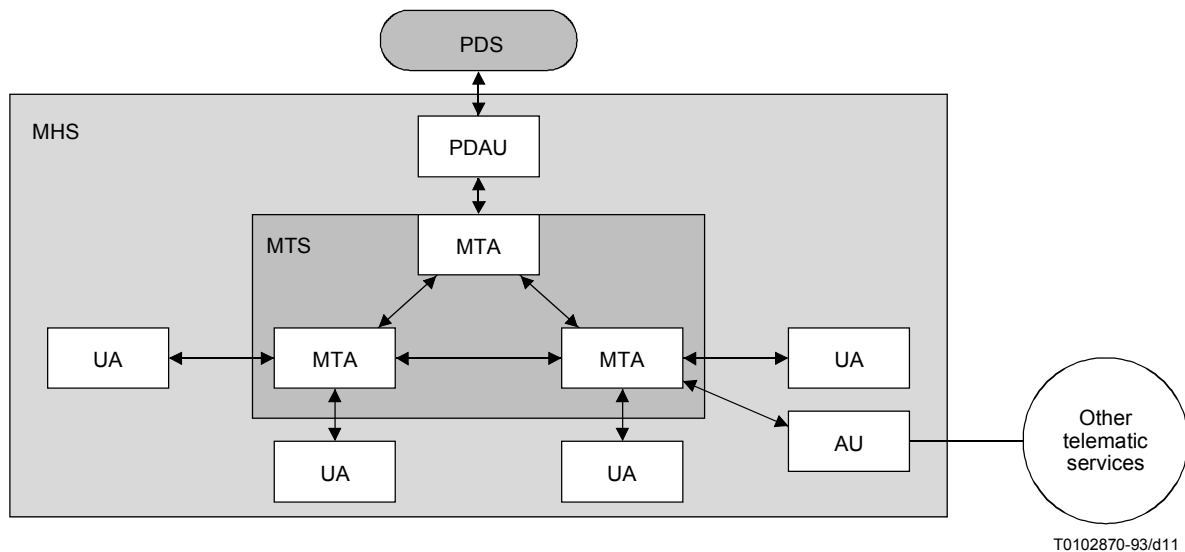


Figure 11/F.400/X.400 – Functional model MHS-PDS interworking

10.2 Organizational configurations

Possible organizational mappings of the functional model described above are shown in Figure 12. In each model (A and B), the term PD domain denotes the domain of responsibility of an organization providing a PD service. In A, the PD domain comprises an MD and a PDS. The boundary between the PD domain and the rest of MHS is a boundary between MDs. In B, the PD domain comprises only the PDS; the PDAU is not part of the PD domain. The boundary between the PD domain and MHS lies at the point where the PDAU passes physical messages to the PDS.

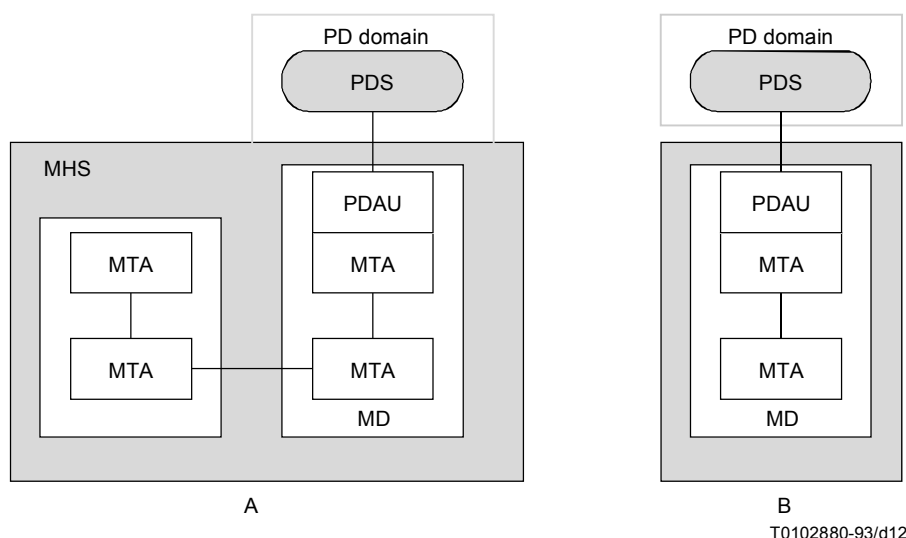


Figure 12/F.400/X.400 – Configurations for MH/PD service intercommunication

11 Specialized access

11.1 Introduction

The functional model of MHS (see Figure 1) contains access units (AUs) to allow access between MHS and other communication systems and services. The model shows a generic access unit between MHS and telematic services.

Also shown is a physical delivery access unit to allow for physical delivery of MHS messages to recipients without the need for terminal access to MHS. The access to physical delivery services is available to any application carried by the MTS, through a PDAU described in clause 10.

Other forms of access are described below.

NOTE – The use of the word "public" in these descriptions refers only to the concept of unrestricted access by any user without advanced registration, in contrast to registered use. The term is not intended to imply that these access units are only provided as part of a public service; they may equally be provided within a private system.

11.2 Telex access

11.2.1 Registered access to the IPM service

A telex access unit (TLXAU) is defined in Recommendations to allow the intercommunication between IPM users and telex users. To provide a service with this type of AU is a national matter.

11.2.2 Non-registered (public) access to the IPM service

A specialized access unit is defined to allow the intercommunication between IPM users and telex users. This AU provides for public access to the IPM service for telex users who are not registered users of the IPM service, and is called a public telex access unit (PTLXAU). This is shown in Figure 8. The telex users are not subscribers to the IPM service, but use some of the features of the IPM service to pass messages to IPM users. IPM users can also send messages to telex users via this AU. The intercommunication between the IPM service and the telex service is defined in ITU-T Rec. F.421.

11.3 Facsimile access

11.3.1 Non-registered (public) access from the IPM service

A specialized access unit is defined to allow the intercommunication between IPM users and telefax users. This AU provides for access from the IPM service to telefax users who are not registered users of the IPM service, and is called a public telefax access unit (PFAXAU). This is shown in Figure 8. IPM users can send messages to telefax users via this AU. Operation of the PFAXAU in the direction telefax to IPM is for further study. The intercommunication between the IPM service and telefax services is defined in ITU-T Rec. F.423.