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Information technology — Message Handling Systems (MHS)

Part 1:
System and service overview

Technologies de l'information — Systèmes de messagerie (MHS)

Partie 1: Présentation générale du système et des services

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 10021-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

This part of ISO/IEC 10021 is technically aligned with ITU-T Recommendation F.400/X.400 (1999) but is not published as identical text.

This second edition cancels and replaces the first edition (ISO/IEC 10021-1:1990), which has been technically revised. It also incorporates Technical Corrigenda 1 to 7 and consolidates Amendment 1:1994.

ISO/IEC 10021 consists of the following parts, under the general title *Information technology — Message Handling Systems (MHS)*:

— *Part 1: System and service overview*

— *Part 2: Overall architecture*

— *Part 4: Message transfer system — Abstract service definition and procedures*

— *Part 5: Message store: Abstract service definition*

— *Part 6: Protocol specifications*

— *Part 7: Interpersonal messaging system*

— *Part 8: Electronic Data Interchange Messaging Service*

— *Part 9: Electronic Data Interchange Messaging System*

— *Part 10: MHS routing*

— *Part 11: MHS Routing — Guide for messaging systems managers* [Technical Report]

Introduction

This document is one of a set of Recommendations | International Standards for Message Handling. The entire set provides a comprehensive specification for a Message Handling System (MHS) comprising any number of co-operating open systems.

Message Handling Systems and Services enable users to exchange messages on a store-and-forward basis. A message submitted by one user, the originator, is conveyed by the Message Transfer System (MTS), the principal component of a larger Message Handling System (MHS), and is subsequently delivered to one or more additional users, the message's recipients.

An MHS comprises a variety of interconnected functional entities. Message Transfer Agents (MTAs) co-operate to perform the store-and-forward message transfer function. Message Stores (MSs) provide storage for messages and enable their submission, retrieval and management. User Agents (UAs) help users access MHS. Access Units (AUs) provide links to other communication systems and Services of various kinds (e.g., Telematic Services, Postal Services).

This part of ISO/IEC 10021 specifies the overall system and service description of Message Handling capabilities.

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Information technology — Message Handling Systems (MHS) —

Part 1:
System and service overview

1   Scope

This part of ISO/IEC 10021 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 parts of ISO/IEC 10021. The structure of ISO/IEC 10021 (all parts) defining the Message Handling System and Services is shown in Table 1.

The technical aspects of MHS are defined in other parts of ISO/IEC 10021. The overall system architecture of MHS is defined in ISO/IEC 10021-2:2003.

2   Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model*

ISO/IEC 8649:1996, *Information technology – Open Systems Interconnection – Service definition for the Association Control Service Element*

ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

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)*

ISO/IEC 9066-1:1989, *Information processing systems – Text communication – Reliable Transfer – Part 1: Model and service definition*

ISO/IEC 13712-1:1995, *Information technology – Remote Operations: Concepts, model and notation*

ISO/IEC 9594 (all parts), *Information technology – Open Systems Interconnection – The Directory*

ISO/IEC 10021-2:2003, *Information technology – Message Handling Systems (MHS) – Part 2: Overall architecture*

ISO/IEC 10021-4:2003, *Information technology – Message Handling Systems (MHS) – Part 4: Message transfer system: Abstract service definition and procedures*

ISO/IEC 10021-5:1999, *Information technology – Message Handling Systems (MHS) – Part 5: Message store: Abstract service definition*

ISO/IEC 10021-6:2003, *Information technology – Message Handling Systems (MHS) – Part 6: Protocol specifications*

ISO/IEC 10021-7:2003, *Information technology – Message Handling Systems (MHS) – Part 7: Interpersonal messaging system*

ISO/IEC 10021-8:1999, *Information technology – Message Handling Systems (MHS) – Part 8: Electronic Data Interchange Messaging Service*

ISO/IEC 10021-9:1999, *Information technology – Message Handling Systems (MHS) – Part 9: Electronic Data Interchange Messaging System*

ISO/IEC 10021-10:1999, *Information technology – Message Handling Systems (MHS) – Part 10: MHS routing*

ISO/IEC 10021-11:1999, *Information technology – Message Handling Systems (MHS) – Part 11: MHS Routing – Guide for messaging systems managers*

ISO/IEC 11588-1:1996, *Information technology – Message Handling Systems (MHS) management – Part 1: Model and architecture*

ISO/IEC 11588-3:1997, *Information technology – Message Handling Systems (MHS) management – Part 3: Logging information.*

ISO/IEC 11588-8:1997, *Information technology – Message Handling Systems (MHS) management – Part 8: Message Transfer Agent management.*

CCITT Recommendation F.423:1992, *Message handling services: Intercommunication between the interpersonal messaging service and the telefax service*

CCITT Recommendation F.440:1992, *Message handling services: The voice messaging service*

CCITT Recommendation T.330:1988, *Telematic access to interpersonal messaging system*

CCITT Recommendation X.408 (1988), *Message handling systems: Encoded information type conversion rules*

CCITT Recommendation X.440 (1992), *Message handling systems: Voice messaging system*

Table 1 – Structure of MHS Standards

Short title	Joint MHS		Joint support		ITU-T only	
	ISO/IEC	ITU-T	ISO/IEC	ITU-T	System	Service
MHS: System and service overview	10021-1	X.400				F.400
MHS: Overall architecture	10021-2	X.402				
MHS: Encoded information type conversion rules					X.408	
MHS: MTS: Abstract service definition and procedures	10021-4	X.411				
MHS: MS: Abstract -service definition	10021-5	X.413				
MHS: Protocol specifications	10021-6	X.419				
MHS: Interpersonal messaging system	10021-7	X.420				
Telematic Access to IPMS						
MHS: EDI messaging service	10021-8	F.435			T.330	
MHS: EDI messaging system	10021-9	X.435				
MHS: Voice messaging service						
MHS: Voice messaging system					F.440	
MHS: Routing	10021-10	X.412			X.440	
MHS: Routing: Guide for Messaging System Managers	10021-11	X.404				
MHS: Naming and addressing for public MH services						F.401
MHS: The public message transfer service						F.410
MHS: Intercommunication with public physical delivery services						F.415
MHS: The public IPM service						F.420
MHS: Intercommunication between IPM service and Telex						F.421
MHS: Intercommunication between IPM service and Telefax						F.423
OSI: Basic Reference Model			7498-1	X.200		
OSI: Specification of Abstract Syntax Notation One (ASN.1)			8824-1	X.680		
OSI: Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)			8825-1	X.690		
OSI: Association Control: Service Definition			8649	X.217		
OSI: Association Control: Protocol Specification			8650-1	X.227		
OSI: Reliable Transfer: Model and service definition			9066-1	X.218		
OSI: Reliable Transfer: Protocol Specification			9066-2	X.228		
OSI: Remote Operations: Concepts, Model & Notation			13712-1	X.880		
OSI: Remote Operations: Service Definition			13712-2	X.881		
OSI: Remote Operations: Protocol Specification			13712-3	X.882		

3 Terms and definitions

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

3.1 Open Systems Interconnection

This part of ISO/IEC 10021 makes use of the following terms defined in ISO/IEC 7498-1:

a) Application Layer;

b) application-process;

c) Open Systems Interconnection;

d) OSI Reference Model.

3.2 Directory Systems

This part of ISO/IEC 10021 makes use of the following terms defined in ISO/IEC 9594-1:

a)   directory entry;

b)   directory system agent;

c)   Directory System;

d)   directory user agent.

This part of ISO/IEC 10021 makes use of the following terms defined in ISO/IEC 9594-2:

e)   attribute;

f)   group;

g)   name.

4   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
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
PM	Per-message
PR	Per-recipient
PRMD	Private Management Domain

PTLXAU   Public Telex Access Unit

RPOA   Recognized Private Operating Agency

TLMA   Telematic Agent

TLXAU   Telex Access Unit

UA   User Agent

5   Conventions

In this Standard, the expression "Administration" is used to indicate a telecommunication Administration, a recognized private operating agency, and, in the case of intercommunication with Public Delivery Service, a Postal Administration.

6   Purpose

This part of ISO/IEC 10021 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 part of ISO/IEC 10021 overviews the capabilities of an MHS that are used for the provision of 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) (ISO/IEC 7498-1) 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 MT Service for specific applications that are defined bilaterally.

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 International Standards 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 an 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).

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).

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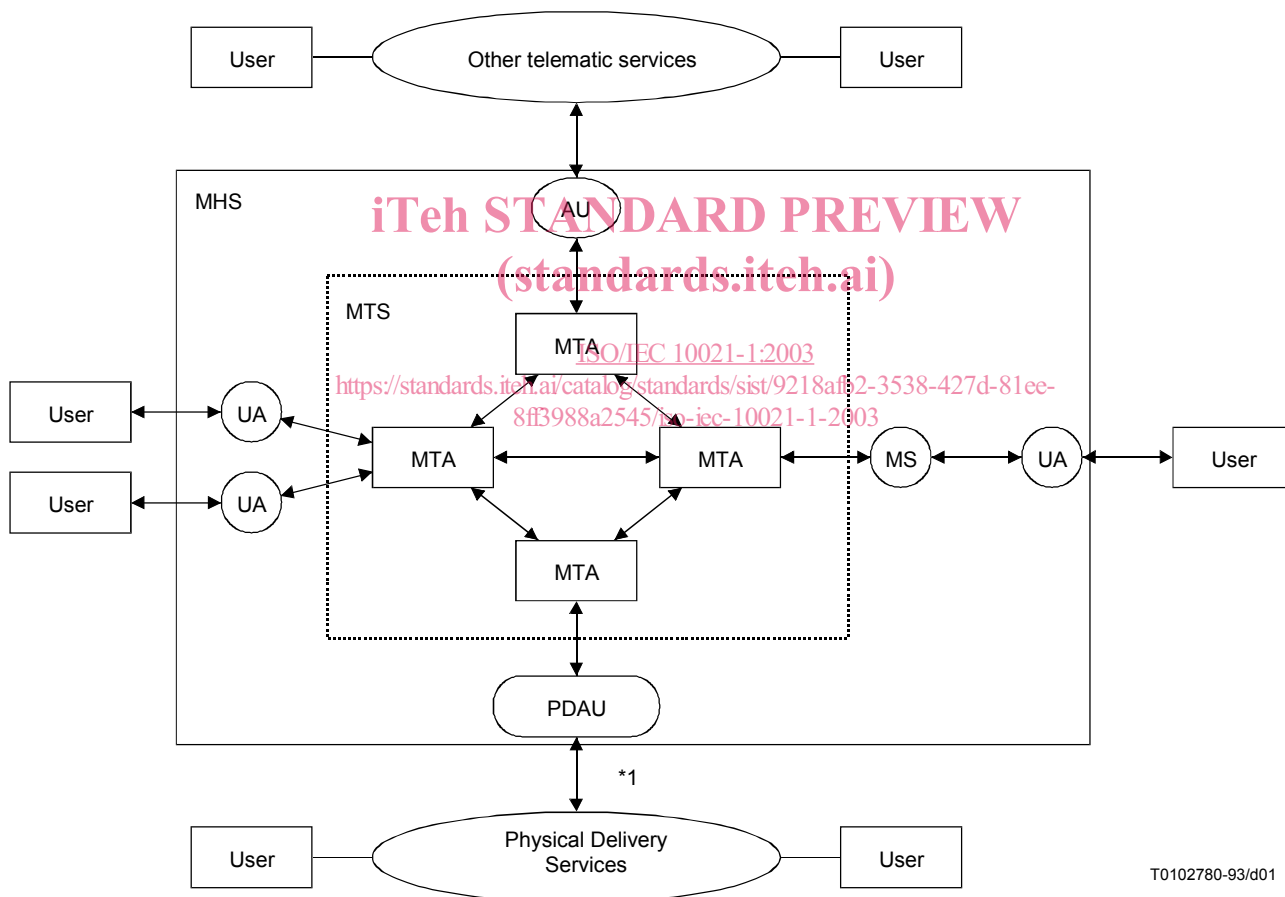
* 1) Message input from PDS to MHS is not currently possible. Flow from PD services to the PDAU shown is for the purpose of notifications.

Figure 1 – MHS Functional Model
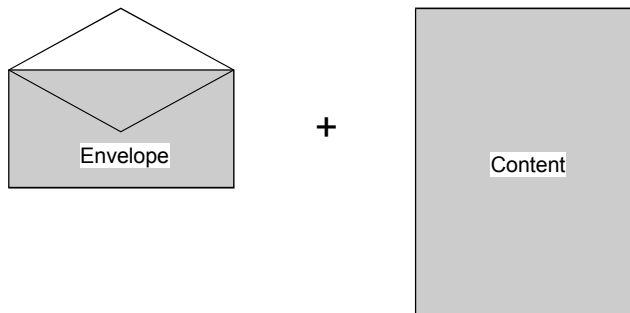
Figure 2 – Basic Message Structure

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.
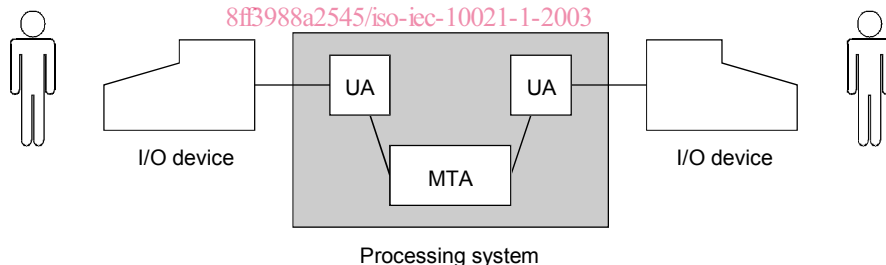
Figure 3 – Co-resident UA and MTA
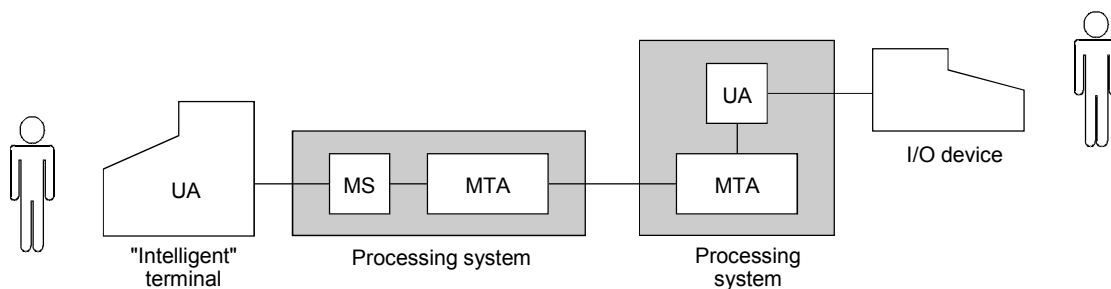
Figure 4 – Stand-alone UA and Co-resident MS/MTA and UA/MTA

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 constitutes a Management Domain (MD). An MD provides Message Handling Services in accordance with the classification of Elements of Service as described in clause 19. A Management Domain may be classified as either an Administration Management Domain (ADMD) or a Private Management Domain (PRMD) with the definitions given in Annex A. The relationship between Management Domains is 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.

An Administration can provide access for its users to the ADMD in one or more of the following ways:

–   user to Administration provided UA;

–   private UA to Administration MTA;

–   private UA to Administration MS;

–   private MTA to Administration MTA;

–   user to Administration provided AU.

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

Administration provided UAs can exist as part of an intelligent terminal that the user can use to access MHS. They can also exist as part of Administration resident equipment being part of MHS, in which 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 Administration 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 Administration provided AUs described in clauses 10 and 11.

7.3.4 Private Management Domain

An organization other than an Administration 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.

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 G of ISO/IEC 10021-2 for guidance in the case of multinational PRMDs.

7.4   The Message Store

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.

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.

The scope of the MS services defined in CCITT Recommendation F.400 (1988) and (1992) | ISO/IEC 10021-1:1990 was mainly limited to the storage of delivered messages and reports and their subsequent retrieval by the MS-user. The 1994 version of this part of ISO/IEC 10021 defines new extensions to provide a broader range of service facilities. These enhanced facilities particularly apply in those environments where the MS is used as a personal data base to store, retrieve, modify, and classify a user's messages, often with frequent and long-lasting interaction between the MS-user and MS. Examples of such environments might be found in local area networks, or in environments where the user employs different User Agent implementations at different locations to access one MS. In other environments where the MS is used mainly as a temporary storage system, to take delivery of messages and reports and provide for their retrieval by infrequent and short-lasting interactions, these enhanced facilities may not be required. In this latter case, some enhanced facilities may be provided locally by the MS-user itself.