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Information technology — Text Communication — Message-Oriented Text Interchange Systems (MOTIS) —

Part 6: Protocol Specifications

*Technologies de l'information — Communication de texte — Systèmes d'échange
de texte en mode message —*

Partie 6: Spécification de protocole



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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. 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.

International Standard ISO/IEC 10021-6 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 10021-6 consists of the following parts, under the general title: *Information technology — Text Communication — Message-Oriented Text Interchange Systems (MOTIS)* —

- *Part 1: System and Service Overview*
- *Part 2: Overall Architecture*
- *Part 3: Abstract Service Definition Conventions*
- *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*

Annexes A and B form an integral part of this part of ISO/IEC 10021. Annexes C, D and E are for information only.

Introduction

This part of ISO/IEC 10021 is one of a number of parts of ISO/IEC 10021 (the International Standards for Message-Oriented Text Interchange Systems (MOTIS)).

MOTIS provides for the exchange of messages between users on a store-and-forward basis. A message submitted by one user (the *originator*) is transferred through the Message Transfer System (MTS) and delivered to one or more other users (the *recipients*). A user may interact directly with the MTS, or indirectly via a message store (MS).

The MTS comprises a number of message-transfer-agents (MTAs), which transfer messages and deliver them to their intended recipients.

This International Standard was developed jointly by CCITT and ISO/IEC. The equivalent CCITT document is CCITT Recommendation X.419.

Information technology - Text Communication - Message-Oriented Text Interchange Systems (MOTIS) - Part 6 : Protocol Specifications

Section one - Introduction

1 Scope

This part of ISO 10021 specifies the MTS Access Protocol (P3) used between a remote user-agent and the MTS to provide access to the MTS Abstract Service defined in ISO/IEC 10021-4.

This part of ISO/IEC 10021 also specifies the MS Access Protocol (P7) used between a remote user-agent and a message-store (MS) to provide access to the MS Abstract Service defined in ISO/IEC 10021-5.

This part of ISO/IEC 10021 also specifies the MTS Transfer Protocol (P1) used between MTAs to provide the distributed operation of the MTS as defined in ISO/IEC 10021-4.

ISO/IEC 10021-2 identifies the other International Standards which define other aspects of Message Handling Systems.

Section two of this part of ISO/IEC 10021 specifies the MHS Access Protocols (P3 and P7). Clause 6 provides an overview of the MHS Access Protocols. Clause 7 defines the abstract-syntax of the MTS Access Protocol (P3). Clause 8 defines the abstract-syntax of the MS Access Protocol (P7). Clause 9 defines the mapping of the MHS Access Protocols onto used services. Clause 10 specifies conformance requirements for systems implementing the MHS Access Protocols.

Section three of this part of ISO/IEC 10021 specifies the MTS Transfer Protocol (P1). Clause 11 provides an overview of the MTS Transfer Protocol (P1). Clause 12 defines the abstract-syntax of the MTS Transfer Protocol (P1). Clause 13 defines the mapping of the MTS Transfer Protocol (P1) onto used services. Clause 14 specifies conformance requirements for systems implementing the MTS Transfer Protocol (P1).

Annex A provides a reference definition of the MHS protocol object identifiers cited in the ASN.1 modules in the body of this part of ISO/IEC 10021.

Annex B describes protocol rules for interworking with implementations of the CCITT Recommendation X.411 (1984) using the MTS Transfer Protocol (P1).

Annex C identifies the differences between the CCITT Recommendation X.411 (1984) and this part of ISO/IEC 10021.

Annex D identifies the technical differences between the ISO/IEC and CCITT versions of CCITT Recommendations X.419 and ISO/IEC 10021-6.

Annex E provides an index to this part of ISO/IEC 10021, categorised into: Abbreviations; Terms; Information Items; ASN.1 modules; ASN.1 macros; ASN.1 types; and ASN.1 values.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 10021. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 10021 are

encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of ISO and IEC maintain registers of currently valid International Standards.

2.1 Open Systems Interconnection

This part of ISO/IEC 10021 cites the following OSI specifications:

- ISO 8649:1988, *Information processing systems - Open Systems Interconnection - Service definition for the Association Control Service Element.*
- ISO 8822:1988, *Information processing systems - Open Systems Interconnection - Connection oriented presentation service definition.*
- ISO 8824:1990, *Information processing systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1).*
- ISO/IEC 9066:1989, *Information processing systems - Text communication - Reliable Transfer -*
Part 1: Model and service definition.
Part 2: Protocol specification.
- ISO/IEC 9072:1989, *Information processing systems - Text communication - Remote operations -*
Part 1: Model, notation and service definition.
Part 2: Protocol specification.

2.2 Message Handling Systems

This part of ISO/IEC 10021 cites the following Message Handling System specifications:

- ISO/IEC 10021:1990, *Information technology - Text communication - Message-Oriented Text Interchange Systems (MOTIS) -*
Part 1: Service and system overview.
Part 2: Overall architecture.
Part 3: Abstract service definition conventions.
Part 4: Message transfer system : Abstract service definition and procedures.
Part 5: Message store : Abstract service definition.
Part 7: Interpersonal messaging system.

2.3 Directory Systems

This part of ISO/IEC 10021 cites the following Directory System specification:

- ISO/IEC 9594-2:1990, *Information technology - Open Systems Interconnection - The Directory*
Part 2: Models.

3 Definitions

For the purposes of this part of ISO/IEC 10021 the definitions given in ISO/IEC 10021-2 apply.

4 Abbreviations

For the purposes of this part of ISO/IEC 10021 the abbreviations given in ISO/IEC 10021-2 apply.

5 Conventions

This International Standard uses the descriptive conventions described below.

5.1 Terms

Throughout this part of ISO/IEC 10021 the words of defined terms, and the names and values of service parameters and protocol fields, unless they are proper names, begin with a lower-case letter and are linked by a hyphen thus: defined-term. Proper names begin with an upper-case letter and are not linked by a hyphen thus: Proper Name.

5.2 Abstract Syntax Definitions

This part of ISO/IEC 10021 defines the abstract-syntax of the MHS protocols using the abstract syntax notation (ASN.1) defined in ISO 8824 and the remote operations notation defined in ISO/IEC 9072-1.

Section two - Message Handling System Access Protocol Specifications

6 Overview of the MHS Access Protocols

6.1 MHS Access Protocol Model

Clause 6 of ISO/IEC 10021-4 describes an abstract model of the Message Transfer System (MTS), and the MTS Abstract Service which it provides to its MTS-users.

Clause 6 of ISO/IEC 10021-5 describes an abstract model of a Message Store (MS), and the MS Abstract Service which it provides to its MS-user.

This clause describes how the MTS Abstract Service and the MS Abstract Service are supported by instances of OSI communication when an abstract-service user and an abstract-service provider are realised as application-processes located in different open systems.

In the OSI environment, communication between application-processes is represented in terms of communication between a pair of application-entities (AEs) using the presentation-service. The functionality of an application-entity is factored into a set of one or more application-service-elements (ASEs). The interaction between AEs is described in terms of their use of the services provided by the ASEs.

Access to the MTS Abstract Service is supported by three application-service-elements, each supporting a type of port paired between an MTS-user and the MTS in the abstract model. The Message Submission Service Element (MSSE) supports the services of the submission-port; the Message Delivery Service Element (MDSE) supports the services of the delivery-port; and the Message Administration Service Element (MASE) supports the services of the administration-port. The MSSE, MDSE and MASE are asymmetric-ASEs; that is, the MTS-user ASEs act as the consumer, and the MTS ASEs act as the supplier, of the MTS Abstract Service.

Similarly, access to the MS Abstract Service is supported by three application-service-elements: the Message Submission Service Element (MSSE) supports the indirect-submission-port; the Message Retrieval Service Element (MRSE) supports the services of the retrieval-port; and the Message Administration Service Element (MASE) supports the services of the administration-port. The MS-user ASEs act as the consumer, and the MS ASEs act as the supplier, of the MS Abstract Service.

These application-service-elements are in turn supported by other application-service-elements.

The Remote Operations Service Element (ROSE) supports the request/reply paradigm of the abstract operations that occur at the ports in the abstract model. The MSSE, MDSE, MRSE and MASE provide the mapping function of the abstract-syntax notation of an abstract-service onto the services provided by the ROSE.

Optionally, the Reliable Transfer Service Element (RTSE) may be used to reliably transfer the application-protocol-data-units (APDUs) that contain the parameters of the operations between AEs.

The Association Control Service Element (ACSE) supports the establishment and release of an application-association between a pair of AEs. Associations between an MTS-user and the MTS may be established by either the MTS-user or the MTS. Associations between an MS-user and an MS may be established only by the MS-user. Only the initiator of an established association can release it.

The combination of one or more of the MSSE, MDSE, MRSE and MASE, together with their supporting ASEs, defines the application-context of an application-association. Note that a single application-association may be used to support one or more port types paired between two objects in the abstract model.

Table 1 identifies the application-contexts defined in this part of ISO/IEC 10021 for the MTS Access Protocol and MS Access Protocol.

Table 1
MHS Access Protocol Application Contexts

Application Context	Message Handling ASEs				Supporting ASEs		
	MSSE	MDSE	MRSE	MASE	ROSE	RTSE	ACSE
<u>MTS Access Protocol</u>							
mts-access	C	C	-	C	x	-	x
mts-forced-access	S	S	-	S	x	-	x
mts-reliable-access	C	C	-	C	x	x	x
mts-forced-reliable-access	S	S	-	S	x	x	x
<u>MS Access Protocol</u>							
ms-access	C	-	C	C	x	-	x
ms-reliable-access	C	-	C	C	x	x	x

- Legend -							
x	present	C	present with initiator the consumer				
-	absent	S	present with initiator the supplier				

If the MTS Access Protocol (P3) is supported, then support for the **mts-access** and **mts-forced-access** application-contexts is mandatory for an MTA. If an MTA supports the **mts-reliable-access** application-context, it shall also support the **mts-forced-reliable-access**, and vice versa. Support for each of the MTS Access Protocol (P3) application-contexts is optional for an MTS-user.

If the MS Access Protocol (P7) is supported, then support for the **ms-access** application-context is mandatory for an MS, and support for the **ms-reliable-access** application-context is optional. Support for each of the MS Access Protocol (P7) application-contexts is optional for an MS-user.

Figure 1 models an application-context between an MTS-user and the MTS. The consumer role of the MTS-user ASEs, and the supplier role of the MTS ASEs, is indicated by a subscript 'c', or 's', respectively.

Similarly, Figure 2 models an application-context between an MS-user and the MS.

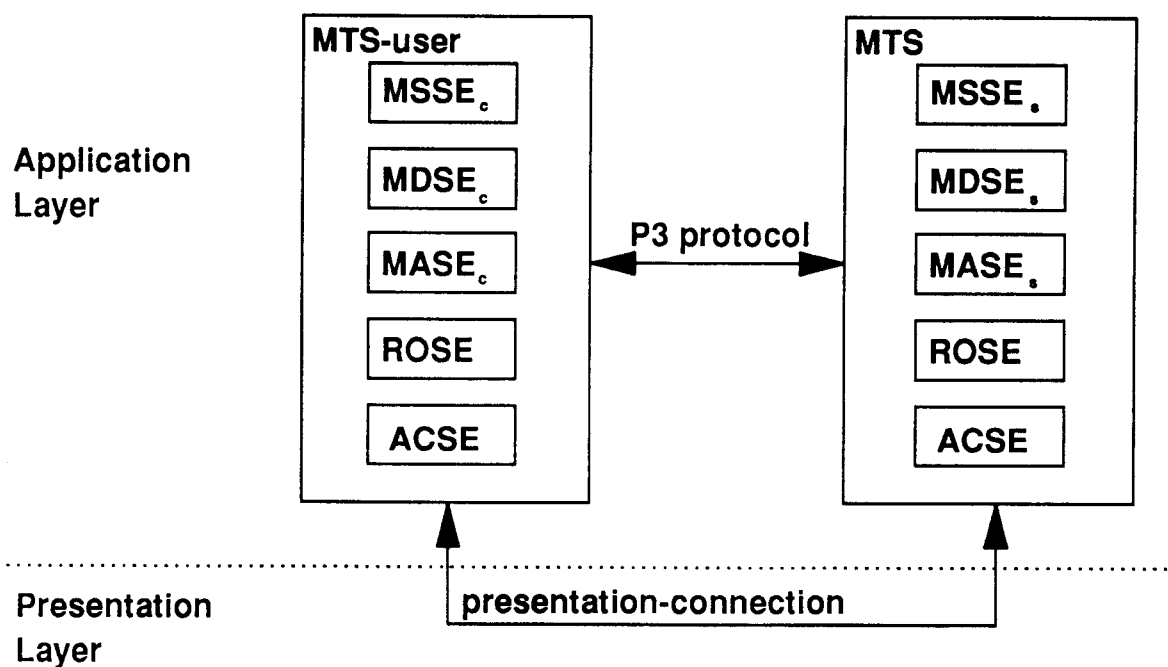


Figure 1
MTS Access Protocol Model

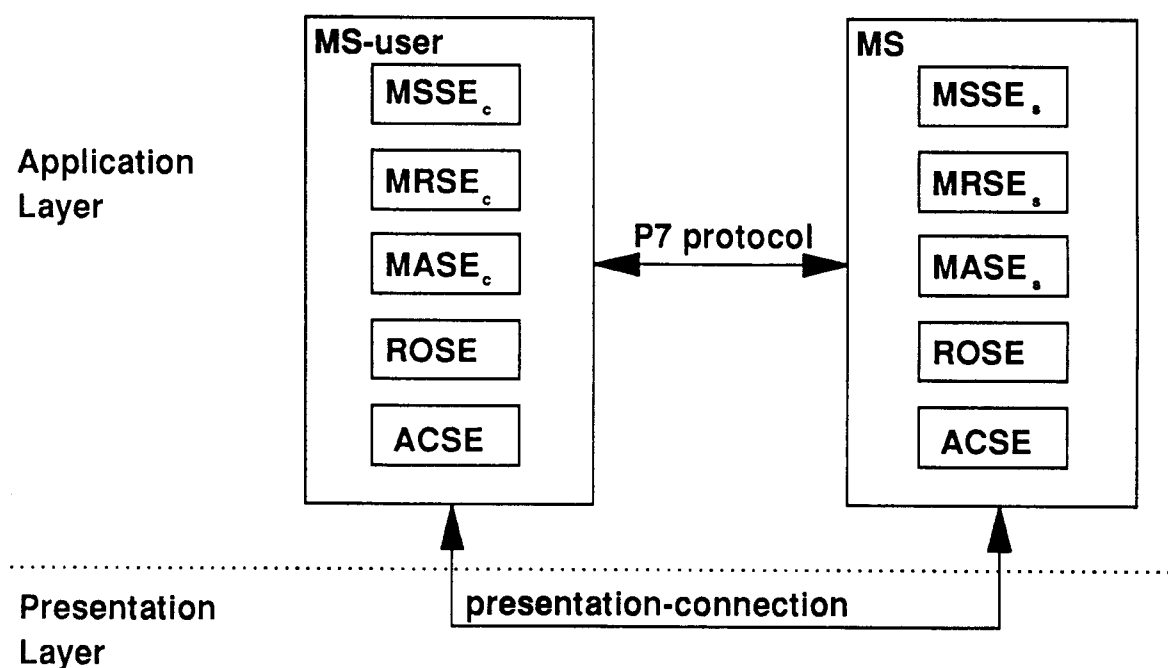


Figure 2
An MS Access Protocol Model

6.2 Services Provided by the MTS Access Protocol

The MTS Access Protocol (P3) comprises the following operations which provide the services defined in ISO/IEC 10021-4:

MTS-bind and MTS-unbind

- a) MTS-bind
- b) MTS-unbind

Message Submission Service Element (MSSE)

- c) Message-submission
- d) Probe-submission
- e) Cancel-deferred-delivery
- f) Submission-control

Message Delivery Service Element (MDSE)

- g) Message-delivery
- h) Report-delivery
- i) Delivery-control

Message Administration Service Element (MASE)

- j) Register
- k) Change-credentials.

6.3 Services Provided by the MS Access Protocol

The MS Access Protocol (P7) comprises the following operations which provide the services defined in ISO/IEC 10021-5:

MS-bind and MS-unbind

- a) MS-bind
- b) MS-unbind

Message Submission Service Element (MSSE)

- c) Message-submission
- d) Probe-submission
- e) Cancel-deferred-delivery
- f) Submission-control

Message Retrieval Service Element (MRSE)

- g) Summarize
- h) List
- i) Fetch
- j) Delete
- k) Register-MS
- l) Alert

Message Administration Service Element (MASE)

- m) Register
- n) Change-credentials.

6.4 Use of Underlying Services

The MHS Access Protocols make use of underlying services as described below.

6.4.1 Use of ROSE Services

The Remote Operations Service Element (ROSE) is defined in ISO/IEC 9072-1.

The ROSE supports the request/reply paradigm of remote operations.

The MSSE, MDSE, MRSE and MASE are the sole users of the RO-INVOKE, RO-RESULT, RO-ERROR, RO-REJECT-U and RO-REJECT-P services of the ROSE.

The remote operations of the MTS Access Protocol (P3) and the MS Access Protocol (P7) are Class 2 (asynchronous) operations.

6.4.2 Use of RTSE Services

The Reliable Transfer Service Element (RTSE) is defined in ISO/IEC 9066-1.

The RTSE provides for the reliable transfer of application-protocol-data-units (APDUs). The RTSE ensures that each APDU is completely transferred exactly once, or that the sender is warned of an exception. The RTSE recovers from communication and end-system failure and minimises the amount of retransmission needed for recovery.

Alternative application-contexts with and without RTSE are defined to support the MHS Access Protocols.

The RTSE is used in the normal mode. The use of the normal mode of the RTSE implies the use of the normal mode of the ACSE and the normal mode of the presentation-service.

If the RTSE is included in an application-context, the MHS Access Protocol MTS-bind and MTS-unbind (or MS-bind and MS-unbind) are the sole users of the RT-OPEN and RT-CLOSE services of the RTSE. The ROSE is the sole user of the RT-TRANSFER, RT-TURN-PLEASE, RT-TURN-GIVE, RT-P-ABORT and RT-U-ABORT services of the RTSE.

6.4.3 Use of ACSE Services

The Association Control Service Element (ACSE) is defined in ISO 8649.

The ACSE provides for the control (establishment, release, abort) of application-associations between AEs.

If the RTSE is not included in an application-context, the MHS Access Protocol MTS-bind and MTS-unbind (or MS-bind and MS-unbind) are the sole users of the A-ASSOCIATE and A-RELEASE services of the ACSE in normal mode. The ROSE is the user of the A-ABORT and A-P-ABORT services of the ACSE.

If the RTSE is included in the application-context, the RTSE is the sole user of the A-ASSOCIATE, A-RELEASE, A-ABORT and A-P-ABORT services of the ACSE. The use of the normal mode of the RTSE implies the use of the normal mode of the ACSE and the normal mode of the presentation-service.

6.4.4 Use of the Presentation-service

The presentation-service is defined in ISO 8822.

The Presentation Layer co-ordinates the representation (syntax) of the Application Layer semantics that are to be exchanged.

In normal mode, a different presentation-context is used for each abstract-syntax included in the application-context.

The ACSE is the sole user of the P-CONNECT, P-RELEASE, P-U-ABORT and P-P-ABORT services of the presentation-service.

If the RTSE is not included in the application-context, the ROSE is the sole user of the P-DATA service of the presentation-service.

If the RTSE is included in the application-context, the RTSE is the sole user of the P-ACTIVITY-START, P-DATA, P-MINOR-SYNCHRONIZE, P-ACTIVITY-END, P-ACTIVITY-INTERRUPT, P-ACTIVITY-DISCARD, P-U-EXCEPTION-REPORT, P-ACTIVITY-RESUME, P-P-EXCEPTION-REPORT, P-TOKEN-PLEASE and P-CONTROL-GIVE services of the presentation-service. The use of the normal mode of the RTSE implies the use of the normal mode of the ACSE and the normal mode of the presentation-service.

7 MTS Access Protocol Abstract Syntax Definition

The abstract-syntax of the MTS Access Protocol (P3) is defined in Figure 3.

The abstract-syntax of the MTS Access Protocol (P3) is defined using the abstract syntax notation (ASN.1) defined in ISO 8824, and the remote operations notation defined in ISO/IEC 9072-1.

The abstract-syntax definition of the MTS Access Protocol (P3) has the following major parts:

Prologue: declarations of the exports from, and imports to, the MTS Access Protocol (P3) module (Figure 3 Part 1).

Application Contexts: definitions of application-contexts that may be used between an MTS-user and the MTS (Figure 3 Parts 1 and 2).

Message Submission Service Element: definitions of the Message Submission Service Element (MSSE) and its remote operations and errors (Figure 3 Part 3).

Message Delivery Service Element: definitions of the Message Delivery Service Element (MDSE) and its remote operations and errors (Figure 3 Part 4).

Message Administration Service Element: definitions of the Message Administration Service Element (MASE) and its remote operations and errors (Figure 3 Part 4).