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Information technology — Message Handling Systems (MHS): Protocol specifications

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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*, Subcommittee SC 18, *Document processing and related communication*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation X.419.

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This second edition cancels and replaces the first edition (ISO/IEC 10021-6:1990), which has been technically revised. It also incorporates Amendment 1:1994, Technical Corrigendum 1:1991, Technical Corrigendum 2:1991, Technical Corrigendum 3:1992, Technical Corrigendum 4:1992, Technical Corrigendum 5:1992, Technical Corrigendum 6:1993 and Technical Corrigendum 7:1994.

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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 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*

— *Part 8: Electronic Data Interchange Messaging Service*

— *Part 9: Electronic Data Interchange Messaging System*

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

Introduction

This Protocol Specification is one of a set of Recommendations | International Standards defining Message Handling in a distributed open systems environment.

Message Handling 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 Protocol Specification was developed jointly by ITU-T and ISO/IEC. It is published as common text as ITU-T Rec. X.419 | ISO/IEC 10021-6.

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – MESSAGE HANDLING SYSTEMS (MHS): PROTOCOL SPECIFICATIONS

SECTION 1 – INTRODUCTION

1 Scope

This Recommendation | International Standard 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 ITU-T Rec. X.411 and ISO/IEC 10021-4.

This Recommendation | International Standard 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 ITU-T Rec. X.413 and ISO/IEC 10021-5.

This Recommendation | International Standard also specifies the MTS Transfer Protocol (P1) used between MTAs to provide the distributed operation of the MTS as defined in ITU-T Rec. X.411 and ISO/IEC 10021-4.

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ITU-T Rec. X.402 and ISO/IEC 10021-2 identify the other Recommendations | International Standards which define other aspects of Message Handling Systems.

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Section 2 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 3 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 Recommendation | International Standard.

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

Annex C identifies the differences between Recommendation X.411 (1984) and this Recommendation | International Standard.

Annex D identifies the technical differences between the ISO/IEC and ITU-T versions of ITU-T Rec. X.419 and ISO/IEC 10021-6.

Annex E provides an index to this Recommendation | International Standard, categorized into: Abbreviations; Terms; Information Items; ASN.1 modules; ASN.1 information object classes; ASN.1 types; and ASN.1 values.

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent

edition of the Recommendations and Standards listed below. Members of ISO and IEC maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Open Systems Interconnection

This Protocol Specification cites the following ITU-T Recommendations and International Standards:

2.1.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.216 (1994) | ISO/IEC 8822:1994, *Information technology – Open Systems Interconnection – Presentation service definition.*
- 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.680 (1994) | ISO/IEC 8824-1:1995, *Information technology – Abstract Syntax Notation One (ASN.1) – Specification of basic notation.*
- ITU-T Recommendation X.681 (1994) | ISO/IEC 8824-2:1995, *Information technology – Abstract Syntax Notation One (ASN.1) – Information object specification.*
- ITU-T Recommendation X.682 (1994) | ISO/IEC 8824-3:1995, *Information technology – Abstract Syntax Notation One (ASN.1) – Constraint specification.*
- ITU-T Recommendation X.683 (1994) | ISO/IEC 8824-4:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*
- 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.*

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2.1.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.218 (1988), *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.228 (1988), *Reliable transfer: Protocol specification.*

  ISO/IEC 9066-2:1989, *Information processing systems – Text communication – Reliable Transfer – Part 2: Protocol specification.*

2.2 Message Handling Systems

This Protocol Specification cites the following Message Handling System specifications:

2.2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.402 (1995) | ISO/IEC 10021-2:1996, *Information technology – Message Handling Systems (MHS) – Overall architecture.*

- ITU-T Recommendation X.411 (1995) | ISO/IEC 10021-4:1996, *Information technology – Message Handling Systems (MHS): Message transfer system – Abstract service definition and procedures.*
- ITU-T Recommendation X.413 (1995) | ISO/IEC 10021-5:1996, *Information technology – Message Handling Systems (MHS): Message store: Abstract service definition.*
- ITU-T Recommendation X.420 (1996) | ISO/IEC 10021-7:1996, *Information technology – Message Handling Systems (MHS): Interpersonal messaging system.*

2.2.2 Paired Recommendations | International Standards equivalent in technical content

- ITU-T Recommendation F.400/X.400 (1993), *Message handling services: Message handling system and service overview.*

  ISO/IEC 10021-1:1990, *Information technology – Text Communication – Message-oriented Text Interchange Systems (MOTIS) – Part 1: System and Service Overview.*
- CCITT Recommendation X.408 (1988), *Message handling systems: Encoded information type conversion rules.*

2.3 Directory Systems

This Protocol Specification cites the following Directory System specification:

2.3.1 Additional references

- ITU-T Recommendation X.501 (1993) | ISO/IEC 9594-2:1995, *Information technology – Open Systems Interconnection – The Directory: Models.*

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3 Definitions

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For the purposes of this Protocol Specification the definitions given in ITU-T Rec. X.402 | ISO/IEC 10021-2 apply.

4 Abbreviations

For the purposes of this Protocol Specification the abbreviations given in ITU-T Rec. X.402 | ISO/IEC 10021-2 apply.

5 Conventions

This Protocol Specification uses the descriptive conventions described below.

5.1 Terms

Throughout this Protocol Specification 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. The names and values of the parameters of the MTS Abstract Service and the MTA Abstract Service (including components of O/R address defined in ITU-T Rec. X.402 | ISO/IEC 10021-2) are printed in **bold**.

5.2 Abstract Syntax Definitions

This Protocol Specification defines the abstract-syntax of the MHS protocols using the Abstract Syntax Notation (ASN.1) defined in ITU-T Rec. X.680 | ISO/IEC 8824-1, ITU-T Rec. X.681 | ISO/IEC 8824-2, ITU-T Rec. X.682 | ISO/IEC 8824-3 and ITU-T Rec. X.683 | ISO/IEC 8824-4 and the remote operations notation defined in ITU-T Rec. X.880 | ISO/IEC 13712-1, ITU-T Rec. X.881 | ISO/IEC 13712-2 and ITU-T Rec. X.882 | ISO/IEC 13712-3.

SECTION 2 – MESSAGE HANDLING SYSTEM ACCESS PROTOCOL SPECIFICATIONS

6 Overview of the MHS Access Protocols

6.1 MHS Access Protocol model

Clause 6 of ITU-T Rec. X.411 | 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 ITU-T Rec. X.413 | 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 realized 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 realized by the pairing of three ports between the MTS and the MTS-user. Each port is supported by an application-service-element; for some port types more than one version of the application-service-element is defined. The Message Submission Service Element (MSSE) supports the services of the submission-port. The Message Delivery Service Element 1988 (MDSE-88) and Message Delivery Service Element 1994 (MDSE-94) support the services of the delivery-port. The Message Administration Service Element 1988 (MASE-88) and Message Administration Service Element 1994 (MASE-94) support the services of the administration-port.

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Similarly, access to the MS Abstract Service is realized by the pairing of three ports between the MS and the MS-user. Each port is supported by an application-service-element; for each port type more than one version of the application-service-element is defined. The Message Submission Service Element (MSSE) and the MS Message Submission Service Element (MS-MSSE) support the services of the MS-submission-port. The Message Retrieval Service Element 1988 (MRSE-88) and the Message Retrieval Service Element 1994 (MRSE-94) support the services of the retrieval-port. The Message Administration Service Element 1988 (MASE-88) and Message Administration Service Element 1994 (MASE-94) support 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, MS-MSSE, MDSE-88, MDSE-94, MRSE-88, MRSE-94, MASE-88, and MASE-94 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, MS-MSSE, MDSE-88, MDSE-94, MRSE-88, MRSE-94, MASE-88, and MASE-94, together with their supporting ASEs, defines the application-context of an application-association. 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 Protocol Specification for the MTS Access Protocol and MS Access Protocol.

Table 1 – MHS Access Protocol Application Contexts

Application context	Message Handling ASEs								Supporting ASEs		
	MSSE	MS-MSSE	MDSE -88	MDSE -94	MASE -88	MASE -94	MRSE -88	MRSE -94	ROSE	RTSE	ACSE
MTS Access Protocol											
mts-access-88	C	–	C	–	C	–	–	–	X	–	X
mts-forced-access-88	S	–	S	–	S	–	–	–	X	–	X
mts-reliable-access-88	C	–	C	–	C	–	–	–	X	X	X
mts-forced-reliable-access-88	S	–	S	–	S	–	–	–	X	X	X
mts-access-94	C	–	–	C	–	C	–	–	X	–	X
mts-forced-access-94	S	–	–	S	–	S	–	–	X	–	X
mts-reliable-access-94	C	–	–	C	–	C	–	–	X	X	X
mts-forced-reliable-access-94	S	–	–	S	–	S	–	–	X	X	X
MS Access Protocol											
ms-access-88	C	–	–	–	C	–	C	–	X	–	X
ms-reliable-access-88	C	–	–	–	C	–	C	–	X	X	X
ms-access-94	–	C	–	–	–	C	–	C	X	–	X
ms-reliable-access-94	–	C	–	–	–	C	–	C	X	X	X

X Present
– Absent
C Present with initiator the consumer
S Present with initiator the supplier

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If the 1994 version of the MTS Access Protocol (P3) is supported, then support for the **mts-access-94** and **mts-forced-access-94** application-contexts is mandatory for an MTA. If the 1988 version of the MTS Access Protocol (P3) is supported, then support for the **mts-access-88** and **mts-forced-access-88** application-contexts is mandatory for an MTA. If an MTA supports the **mts-reliable-access-94** application-context, it shall also support the **mts-forced-reliable-access 94**, and vice versa. If an MTA supports the **mts-reliable-access-88** application-context, it shall also support the **mts-forced-reliable-access-88**, and vice versa. Support for each of the MTS Access Protocol (P3) application-contexts is optional for an MTS-user. The 1994 versions of these application-contexts were introduced to provide revised versions of the Delivery-control and Register operations.

If the MS Access Protocol (P7) is supported, then support for the **ms-access-88** application-context is mandatory for an MS, and support for the **ms-reliable-access-88** **ms-access-94**, and **ms-reliable-access-94** application-contexts is optional. If an MS supports the **ms-reliable-access-94** application-context, it shall also support the **ms-reliable-access-88** and **ms-access-94** application-contexts. Support for each of the MS Access Protocol (P7) application-contexts is optional for an MS-user. The **ms-access-94** and **ms-reliable-access-94** application-contexts were introduced in the 1994 version of this Protocol Specification in order to offer a broader range of Message Store services (see 7.4 of ITU-T Rec. F.400 (1993) and ISO/IEC 10021-1 : 1990). These 1994 application-contexts may be used to offer both the original (1988) range of services and the enhanced range of services. Nevertheless, these two application-contexts are intended to stay optional in the next version of this Protocol Specification.

NOTE – An MS which supports one of the 1994 MS Access Protocols may be required to interwork with the MTS using one of the 1988 MTS Access Protocols. If the MS-user invokes Register (a 1994 operation), the MS should attempt to downgrade the Register argument to a Register-88 argument, and invoke the Register-88 operation over its association with the MTS. If this is not possible, the MS returns a register-rejected error to the 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. This illustrates only one of the possible application-contexts supporting the MTS Access Protocol; in the 1988 version of the MTS Access Protocol, the MDSE-88 replaces the MDSE-94, and the MASE-88 replaces the MASE-94.

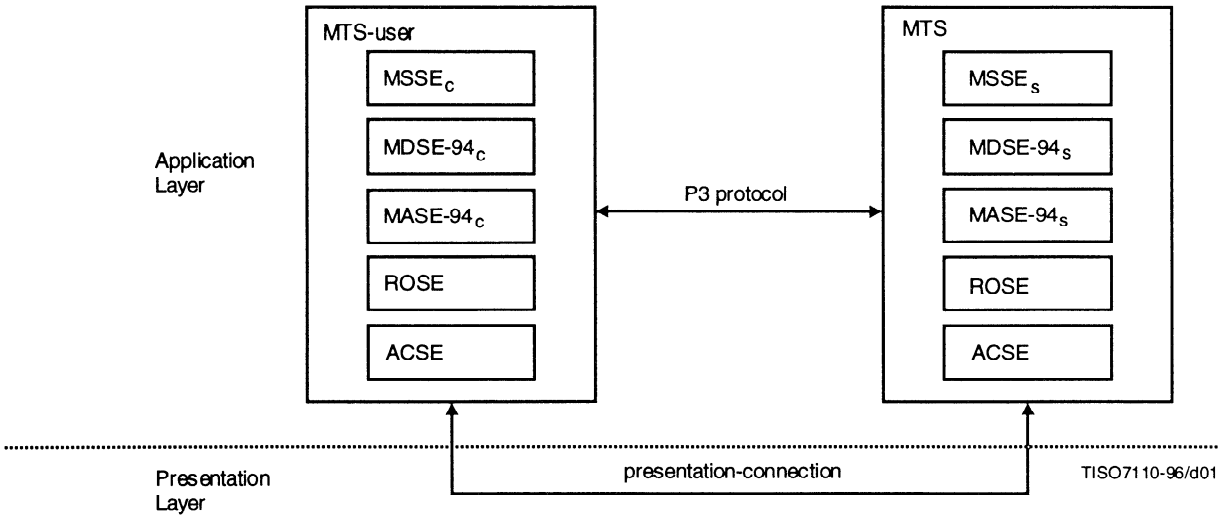

Figure 1 – MTS Access Protocol model

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Similarly, Figure 2 models an application-context between an MS-user and the MS. This illustrates only one of the possible application-contexts supporting the MS Access Protocol, in the 1988 version of the MS Access Protocol, the MSSE replaces the MS-MSSE, the MRSE-88 replaces the MRSE-94, and the MASE-88 replaces the MASE-94.

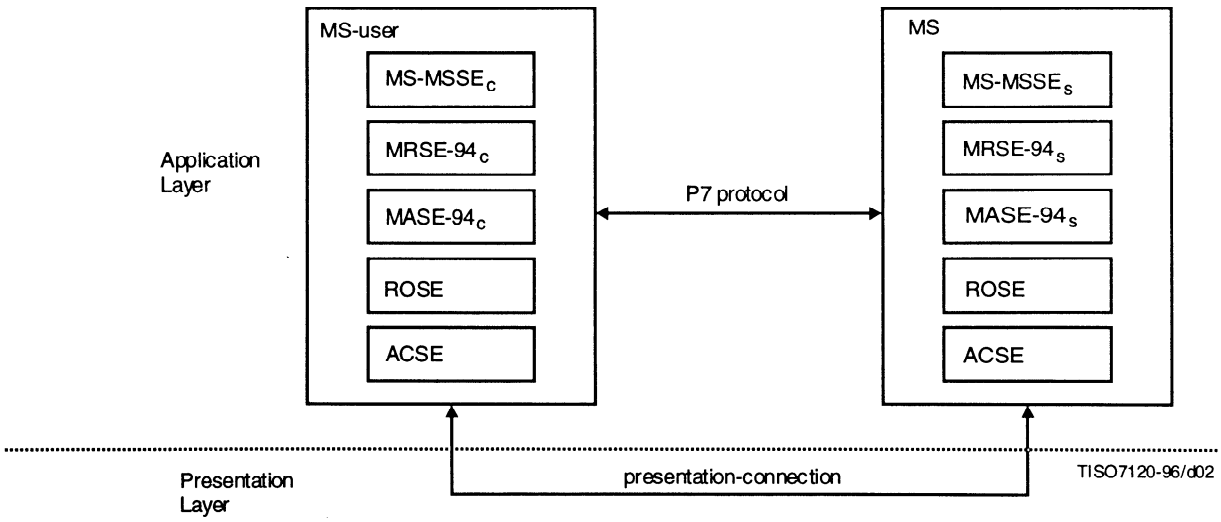

Figure 2 – An MS Access Protocol model

6.2 Services provided by the MTS Access Protocol

The MTS Access Protocol (P3) comprises the following operations which provide the services defined in ITU-T Rec. X.411 | 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 1988 (MDSE-88)

g) Message-delivery;

h) Report-delivery;

i) Delivery-control-88.

Message Administration Service Element 1988 (MASE-88)

j) Register-88;

k) Change-credentials.

In the 1994 version of the MTS Access Protocol, the Message Delivery Service Element 1988 and Message Administration Service Element 1988 are replaced by the following:

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Message Delivery Service Element 1994 (MDSE-94)

l) Message-delivery;

m) Report-delivery;

n) Delivery-control.

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Message Administration Service Element 1994 (MASE-94)

o) Register;

p) 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 ITU-T Rec. X.413 | 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 1988 (MRSE-88)

g) Summarize;

h) List;

i) Fetch;