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

**Part 7:**  
**Interpersonal Messaging System**

**AMENDMENT 3: Message Store Extensions**

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

*Partie 7: Système de messagerie de personne à personne*

*AMENDEMENT 3: Extensions de dépôt de message*



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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.

Amendment 3 to International Standard ISO/IEC 10021-7:1990 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee 18, *Document processing and related communication*.

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

## Part 7: Interpersonal Messaging System Amendment 3: Message Store Extensions

### 0 Introduction

*This clause provides an introduction to this amendment. The text in this clause is not intended for inclusion in ISO/IEC 10021-7.*

The scope of the Message Store Abstract-service defined in ISO/IEC 10021-5:1990 and ISO/IEC 10021-7:1990 is limited to the storage of delivered messages and their subsequent retrieval by the MS-user. This document extends the functionality offered by the IPMS Message Store to equip it to satisfy a broader range of service requirements. These include the provision of services for the storage of submitted messages, the correlation of replies and IPNs, the modification by the MS-user of certain attributes of stored messages, and the logging of submission and delivery operations.

### 2.1 Open Systems Interconnection

*Replace existing clause 2.1 with the following:*

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

- |                                 |  |
|---------------------------------|--|
| ISO/IEC 8824-1: <sup>1)</sup> , | <i>Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1):<br/>Specification of Basic Notation.</i>          |
| ISO/IEC 8824-2: <sup>1)</sup> , | <i>Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1):<br/>Information Object Specification.</i>         |
| ISO/IEC 8824-3: <sup>1)</sup> , | <i>Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1):<br/>Constraint Specification.</i>                 |
| ISO/IEC 8824-4: <sup>1)</sup> , | <i>Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1):<br/>Parameterization of ASN.1 Specifications.</i> |
| ISO/IEC 8825-1: <sup>1)</sup> , | <i>Information technology - Open Systems Interconnection - Specification of ASN.1 Encoding Rules:<br/>Basic Encoding Rules (BER).</i>              |

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<sup>1)</sup> To be published.

## 2.2 Message Handling Systems

*Replace existing clause 2.2 with the following:*

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

- ISO/IEC 10021-1:1990, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 1: System and service overview.*
- ISO/IEC 10021-1/Amd.1:1994, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 1: System and service overview - Amendment 1: Message Store Extensions.*
- ISO/IEC 10021-2:1990, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 2: Overall Architecture.*
- ISO/IEC 10021-2/Amd.1:1994, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 2: Overall Architecture - Amendment 1: Representation of O/R addresses for human exchange.*
- ISO/IEC 10021-2/Amd.2:1994, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 2: Overall Architecture - Amendment 2: Minor Enhancements - Multinational organizations and terminal-form addresses.*
- ISO/IEC 10021-2/Amd.3:<sup>1)</sup> *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 2: Overall Architecture - Amendment 3.*
- ISO/IEC 10021-4:1990, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 4: Message Transfer System: Abstract Service Definition and Procedures.*
- ISO/IEC 10021-4/Amd.1:1994, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 4: Message Transfer System: Abstract Service Definition and Procedures - Amendment 1: Minor Enhancements: Notification type and Directory substitution.*
- ISO/IEC 10021-4/Amd.2:<sup>1)</sup> *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 4: Message Transfer System: Abstract Service Definition and Procedures - Amendment 2: ASN.1 and P3 extensions.*
- ISO/IEC 10021-5:1994, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 5: Message Store - Abstract Service Definition.*
- ISO/IEC 10021-6:1990, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 6: Protocol Specifications.*
- ISO/IEC 10021-6/Amd.1:1994, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 6: Protocol Specifications - Amendment 1: Message Store Extensions.*
- ISO/IEC 10021-7:1990, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 7: Interpersonal messaging system.*
- ISO/IEC 10021-7/Amd.1:1994, *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 7: Interpersonal messaging system - Amendment 1: Minor Enhancements: File transfer body part and auto-submission indication.*

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<sup>1)</sup> To be published.

ISO/IEC 10021-7/Amd.2: 1), *Information technology—Text Communication - Message Oriented Text Interchange Systems (MOTIS) - Part 7: Interpersonal messaging system - Amendment 2: Voice body part and new ASN.1.*

## 2.3 Directory Systems

*Replace existing clause 2.3 with the following:*

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

ISO/IEC 9594-2: 1), *Information technology—Open Systems Interconnection—The Directory: Models.*

ISO/IEC 9594-6: 1), *Information technology—Open Systems Interconnection—The Directory: Selected Attribute Types.*

## 5.1 ASN.1

*Replace bullet f) of 5.1 with the following:*

f) To define IPMS-MS attributes, the ATTRIBUTE information object class of ISO/IEC 10021-5.

The abstract-syntax defined in this part of ISO/IEC 10021 may be mapped to that used in previous editions as follows. All ASN.1 definitions of object sets and Enumerated types which contain the ASN.1 extensions marker ("...") are treated as if any extension additions following the marker are absent. For definitions where the extension marker is not used, the ASN.1 comment "-- 1994 extension --" has a similar interpretation. See 5.7 of ISO/IEC 10021-5. The effect of this is that certain attribute-types, matching-rules, and auto-actions are not standardized for use in 1988 Application Contexts.

*Replace the last sentence of 5.1 with the following:*

Except for Annex J, ASN.1 tags are implicit throughout the ASN.1 module the annex defines; the module is definitive in that respect.

*Replace Table 1 with the following:*

**Table 1**  
**Uses of the ASN.1 Notation**

Subject Matter	Exposition	Reference
Object Identifiers	-	Annex C
Abstract information objects	section two	Annex D
Functional objects	clauses 10, 11, 16	Annex E
Abstract service	clauses 12-13	Annex F
Heading extensions	Annex A	Annex G
Extended body part types	Annex B	Annex H
Message store attributes	clause 19	Annex I
Message store auto-actions	clause 19	Annex J
Upper bounds	-	Annex K

1) To be published

## 5.4 Conventions for attribute-types used in Table 5

*Insert the following new clause:*

This part of ISO/IEC 10021 uses the conventions listed below in its definition of the attribute-types for the IPMS-MS abstract-service.

For the column headed 'Single/Multi-valued' the following values can occur:

S	single-valued
M	multi-valued.

For the column headed 'Source' the following values can occur:

IPM	Originate-IPM, Receive-IPM abstract-operations;
Mod	Modify abstract-operation;
MS	IPMS Message Store;
NRN	Originate-NRN, Receive-NRN abstract-operations;
ON	Originate other-notifications, Receive other-notifications;
RN	Originate-RN, Receive-RN abstract-operations.

## 19 Message Store Operation

*Replace the whole of existing clause 19 with the following:*

ISO/IEC 10021-5 defines the abstract service for a general content-independent Message Store (MS). This is an optional component in MHS, whose purpose is to provide a continuously available storage medium to take delivery of messages on the UA's behalf and to enable their subsequent retrieval by the UA. In addition, the MS provides the UA with facilities for the storage of submitted messages, the classification of stored messages, the correlation of reports with the messages to which they refer, the modification by the MS-user of certain attributes of stored messages, and the logging of submission and delivery operations. The MS can also perform certain predefined auto-actions on the MS-user's behalf.

All the entry-classes, abstract-operations, general attribute-types and general auto-actions defined in ISO/IEC 10021-5 are available for use in Interpersonal Messaging.

An MS must perform certain Interpersonal Messaging-specific functions to qualify as an IPMS-MS and thus distinguish itself from a generic MS. These functions are the subject of the present clause.

### NOTES

1. Because the MS is an optional system component in MHS, use of the word "shall" with respect to MS specifications should not be construed as mandating the provision of an MS or the services it provides. Use of the word "shall" with respect to MS specifications should be construed as mandating the specifications of an MS, if one is provided, and the relevant service component is supported.
2. In this part of ISO/IEC 10021 the description of the IPMS-MS abstract-service assumes that all defined entry-classes are available for use. In practice, the behaviour of a given IPMS-MS implementation will depend on its support for optional service components (e.g., the optional entry-classes, attribute-types, matching-rules, and auto-actions) and on subscription.
3. Several new service components have been introduced in the 1994 edition of this part of ISO/IEC 10021. However, all basic and essential optional requirements defined for the IPMS Message Store are the same as those defined for editions published prior to 1994. Consequently, all enhanced facilities introduced in the 1994 edition are additional optional.

### 19.1 Binding to the IPMS-MS

The IPMS-MS-user binds to the IPMS-MS as described in 7.1 of ISO/IEC 10021-5. The following should be noted when using the MS for Interpersonal Messaging.



### 19.1.1 MS-bind-argument

The following components of the fetch-restrictions parameter defined in 7.1.1 of ISO/IEC 10021-5 have particular significance in this part of ISO/IEC 10021:

- a) **Allowed-content-types:** The names of the Object Identifiers for the IPM content types defined in this part of ISO/IEC 10021 are id-mct-p2-1984 and id-mct-p2-1988. See Annex C.
- b) **Allowed-EITs:** The names of the Object Identifiers for the encoded-information-types defined in this part of ISO/IEC 10021 are enumerated in Annex C. See also 20.4.

NOTE - An extension to the MS-bind abstract-operation for the IPMS-MS is defined in 19.5.1.

### 19.1.2 MS-bind-result

The **available-auto-actions** parameter defined in 7.1.2 of ISO/IEC 10021-5 has particular significance in this part of ISO/IEC 10021. Where this indicates support for the IPM auto-forward auto-action, this shall operate as defined in 19.8.2; where support for the IPM auto-acknowledgement auto-action is indicated, this shall operate as defined in 19.8.3; where support for the IPM auto-correlate auto-action is indicated, this shall operate as defined in 19.8.4; where support for the IPM auto-discard auto-action is indicated, this shall operate as defined in 19.8.5.

## 19.2 Creation of Information Objects

An IPMS-MS shall satisfy the following requirements related to the information objects it maintains:

- a) The IPMS-MS shall maintain a separate information object for each (message containing an) IPM or IPN that is submitted to it or delivered to it.
- b) The IPMS-MS shall maintain as a separate information object not only each (message containing a) forwarding IPM (pursuant to Item a) but also each (message containing a) forwarded IPM (recursively).
- c) The IPMS-MS shall maintain as a separate information object the Returned IPM which may be present in an NRN.

### 19.2.1 Mapping an IPMS Message to an MS entry

When an IPM or IPN is stored in the IPMS-MS, a corresponding MS entry is created in the appropriate entry-class. The attributes of such an entry are derived from various sources:

- a) some attributes, such as Sequence-number and Creation Time, are generated by the MS for administrative purposes;
- b) some attributes are derived from components of the MHS Envelope;
- c) some attributes summarize the contents of the IPM;
- d) some attributes are derived from the Heading fields of the IPM;
- e) some attributes are derived from the body parts of the IPM;
- f) some attributes are derived from the component fields of the IPN;
- g) some attributes correlate IPMs and IPNs with other messages to which they are related;
- h) some attributes are created by the IPMS-MS-user by means of the Modify abstract-operation.

Besides these direct mappings, the IPMS-MS shall also create attributes corresponding to the complete Envelope, the complete Content, and the complete IPM Heading. Thus the same information may be logically present in more than one attribute.

Figure 5 illustrates the mapping of an IPM to an MS entry.

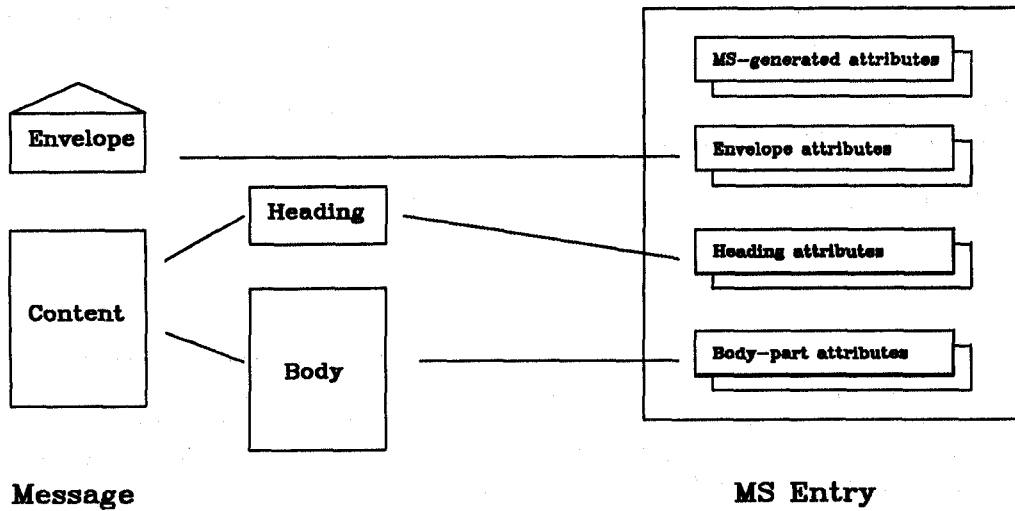


Figure 5 - Mapping an IPM to an MS entry

### 19.2.2 Mapping of forwarding messages in the IPMS-MS

The IPMS-MS shall model a forwarding IPM as a main-entry with one child-entry for each forwarded IPM the message contains. A simple illustration of this mapping is shown in Figure 6.

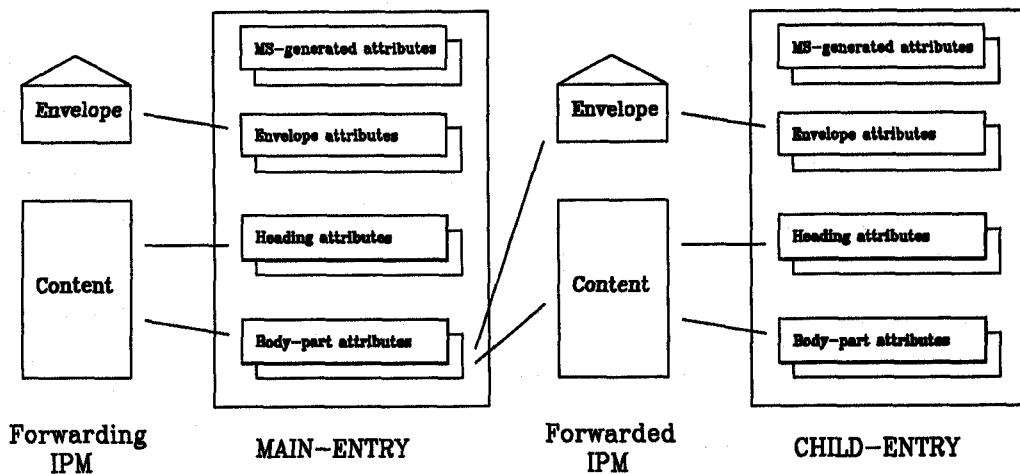


Figure 6 - Mapping a Forwarding message to an IPMS-MS entry

### 19.2.3 Presence of General-attributes in child-entries

The following general attribute-types shall be present in the child-entries of an IPM or NRN when stored in an entry-class for which the attribute is defined: content-length, content-type, creation-time, entry-type, parent-sequence-number, retrieval-status, sequence-number. The absence of a delivery envelope precludes the generation of other general attribute-types whose presence is defined as mandatory in Table 2 of ISO/IEC 10021-5 for the following types of child-entry:

- a) the Returned IPM optionally present in an NRN;
- b) the Message body-part (i.e. the forwarded IPM) of a forwarding IPM where the Parameters component of the body part is absent.

In the case where a child-entry is generated from an IPM's Message body part in which the Parameters component is present:

- a) if Delivery-time is present in Parameters then the message-delivery-time general-attribute-type shall be present;
- b) if Delivery-envelope is present in Parameters then all the other mandatory general-attribute-types defined for a delivered-message entry shall be present except for message-delivery-envelope and message-delivery-identifier which shall be absent.

The entry-type general-attribute of child-entries in the Delivery and Delivery-log entry-classes shall have the value *delivered-message*, except those containing returned content which shall have the value *returned-content*. The entry-type general-attribute of child-entries present in the Submission and Submission-log entry-classes shall have the value *submitted-message*.

The example in Table 2 illustrates the use of child-entries in the Delivery entry-class. This table shows four sets of entries corresponding, respectively, to a delivered IPM, a delivered RN, a delivered NRN, and a delivered report concerning a previously submitted IPM.

Table 2 - Example of the use of child-entries

Sequence-number	Entry-type	Child-sequence-numbers	Parent-sequence-number	IPM entry-type	Notes
100	delivered-message	101, 102	-	IPM	Delivered IPM containing two message body parts
101	delivered-message	-	100	IPM	Message body part 1
102	delivered-message	-	100	IPM	Message body part 2
120	delivered-message	-	-	RN	No child-entries possible
130	delivered-message	131	-	NRN	Contains a returned IPM
131	delivered-message	132	130	IPM	Contains one message body part
132	delivered-message	-	131	IPM	Message body part
140	delivered-report	141	-	-	Contains at least one non-delivery report
141	returned-content	142	140	IPM	Contains one message body part
142	delivered-message	-	141	IPM	Message body part

## 19.3 Maintenance of Attributes

An IPMS-MS shall satisfy the following requirements related to the MS attributes which it supports:

- a) For each IPM or IPN it holds, including the child-entry of a delivery report containing Returned-content, the IPMS-MS shall support the attributes defined in 19.6.
- b) For each body part type present in a stored IPM, the IPMS-MS shall maintain an Extended body part attribute (and, when appropriate, an attribute corresponding to the Parameters component of that body part type) such that it

contains all body parts of that type regardless of whether they were conveyed to the IPMS-MS as basic or Extended body parts of the IPM.

- c) For each IPM it holds, the IPMS-MS shall give the following meanings to the defined values of the MS retrieval-status general-attribute:
- i) *new*: No attribute values have been conveyed to the UA.
  - ii) *listed*: At least one attribute value has been conveyed to the UA, and at least one body part has not been conveyed.
  - iii) *processed*: All body parts (the body parts as single attributes, or the data component only from all body parts, or the Body attribute, or the Content general-attribute) have been conveyed to the UA.
- NOTE - The IPMS-MS-user may use the Modify abstract-operation to change the value of the retrieval-status attribute, provided that its existing value is *listed* and replacement value is *processed*. See 11.2.68 of ISO/IEC 10021-5.
- d) For each IPN it holds, the IPMS-MS shall give the following meanings to the defined values of the MS retrieval-status general-attribute:
- i) *new*: No attribute values have been conveyed to the UA.
  - ii) *listed*: At least one attribute value has been conveyed to the UA, and at least one attribute other than Returned IPM has not been conveyed.
  - iii) *processed*: All attributes, with the possible exception of Returned IPM, have been conveyed to the UA.
- e) When the MS retrieval-status general-attribute is retrieved in the result of an abstract-operation, the value returned shall reflect the state of affairs prior to the execution of that abstract operation.
- f) The performance of the IPM auto-forward auto-action shall cause the MS retrieval-status general-attribute of the auto-forwarded entry to be set to *processed*.
- g) The content-type attribute of each (message containing an) IPM or IPN that is stored in the IPMS-MS shall have the value *id-mct-p2-1984* or *id-mct-p2-1988* (see Annex C), as appropriate, depending upon the content type of the message (see 20.2).

The general (content independent) attributes that may occur in the MS entry-classes are documented in ISO/IEC 10021-5. All content independent MS attributes can be used for the content defined in this part of ISO/IEC 10021. The IPMS specific attributes are defined in 19.6. All general attribute types classified as mandatory in Tables 2 and 3 of ISO/IEC 10021-5 shall be supported.

#### 19.4 Notification of Non-receipt

When it deletes an IPM while performing the Delete abstract-operation or the Auto-delete auto-action of the MS Abstract Service, the IPMS-MS shall generate an NRN if, and only if, one is requested by means of the Notification-requests component of the subject recipient specifier of the deleted IPM, and the IPM's entry-status has the value *listed*. In the case of the Delete abstract-operation, the NRN shall not be generated if prevent-NRN-generation is specified in the delete-extensions parameter of the Delete abstract-operation which deletes the IPM (see 19.5.3).

The NRN shall have the common fields prescribed for the performance of auto-acknowledgement (see 18.5.2.1).

The NRN shall have the following non-receipt fields:

- a) *Non-receipt reason*: The value *ipm-discarded*.

- b) *Discard reason*: The value *ipm-deleted*.
- c) *Auto-forward comment*: Omitted.
- d) *Returned IPM*: If the return of the IPM is requested by means of the Notification-requests component of its subject recipient specifier, and the Converted-encoded-information-types component of Message Delivery's Envelope argument is absent, the IPM. Omitted otherwise.

The IPMS-MS shall submit the NRN by invoking MS-message-submission. Message Submission's Envelope argument shall be as prescribed for auto-acknowledgement (see 18.5.2.2), except that notification-type may be set to type 2, its Content argument determined from the NRN as specified in 20.1. If the IPM auto-correlate auto-action is in effect then the IPMS-MS shall add the sequence-number of the submitted IPN to the AC Submitted IPNs attribute of the entry representing the deleted IPM in the Message-log entry-class; in addition, that entry's AC Submitted IPN Status attribute is given the value *ipm-discarded*.

## 19.5 IPMS-MS abstract-operation extensions

The MS abstract-service defined in ISO/IEC 10021-5 provides a general mechanism for extending various abstract-operations and errors, in order to satisfy additional requirements specific to particular content-types. The extensions used by the IPMS-MS are defined below.

With the exception of the forwarding-request extension, each extension is defined as an instance of the MS-EXTENSION information object class (see 6.6 of ISO/IEC 10021-5).

### 19.5.1 MS-bind extensions

The IPMS-MS-user may make use of the bind-extensions parameter of the MS-bind abstract-operation (see 7.1.1 of ISO/IEC 10021-5) to cause the suspension of the IPM auto-acknowledgement auto-action, as defined in 19.8.3. The suspend-auto-acknowledgement information object is defined as follows:

```
suspend-auto-acknowledgement MS-EXTENSION ::= {
  NULL IDENTIFIED BY id-mst-suspend-auto-acknowledgement }
```

The presence of this object in the bind-extensions parameter of the MS-bind abstract-operation causes the suspension of the IPM auto-acknowledgement auto-action for entries whose retrieval-status becomes *processed* during the abstract-association. There are no parameters. Where an IPMS-MS does not provide the IPM auto-acknowledgement auto-action, it shall ignore the presence of the suspend-auto-acknowledgement bind-extension.

NOTE - Where a UA itself generates RNs, it should select suspend-auto-acknowledgement, to avoid the interference which could arise if the user employs another UA which, by registration, has activated the IPM-auto-acknowledgement auto-action.

### 19.5.2 MS-message-submission extensions

The IPMS-MS provides two methods for incorporating stored IPMs in the body of a submitted IPM. If a 1988 Application Context is in use, the forwarding-request extension enables the IPMS-MS-user to nominate a delivered IPM for forwarding; see 19.5.2.1.

If a 1994 Application Context is in use, the IPM-submission-options enables an IPMS-MS-user to nominate any stored IPM or IPM body part for inclusion in the Body of a submitted IPM; see 19.5.2.2.

#### 19.5.2.1 Forwarding-request extension

If a 1988 Application Context is in use (see 5.7 of ISO/IEC 10021-5) then an IPMS-MS supports the forwarding-request extension as specified in 8.3.1.1 of ISO/IEC 10021-5. The IPMS-MS-user may submit an IPM, including Heading and Body, using the MS-message-submission abstract-operation, and identify by means of the forwarding-request extension, a

message that is already stored in the IPMS-MS which is to be combined with the submitted message Body for forwarding to the message's recipient(s).

The submitted message Body and the forwarded message are then combined by inserting the forwarded message as a Message body part into the submitted message Body. The Message body part becomes the last body part of the submitted message Body.

### 19.5.2.2 IPM Submission Options

The submission-options argument of the MS-message-submission abstract-operation defined in 8.3.1.1 and 8.1.6 of ISO/IEC 10021-5 allows for the specification of MS-submission-extensions. The IPMS-MS makes use of this argument when performing the MS-message-submission abstract-operation, in order to support the incorporation of stored IPMs and stored body parts in submitted IPMs.

The IPM-submission-options information object is defined as follows:

```

ipm-submission-options MS-EXTENSION ::= {
    IPMSubmissionOptions IDENTIFIED BY id-mst-submission-options }

IPMSubmissionOptions ::= SET {
    assembly-instructions [0] BodyPartReferences }

BodyPartReferences ::= SEQUENCE OF BodyPartReference

BodyPartReference ::= CHOICE {
    stored-entry           [0] SequenceNumber,
    stored-content         [1] SequenceNumber,
    submitted-body-part    [2] INTEGER (1..MAX),
    stored-body-part       [3] SEQUENCE {
        message-entry      SequenceNumber,
        body-part-number    INTEGER (1..MAX) } }

```

The single component of IPM-submission-options has the following meaning:

**Assembly-instructions (M):** This component instructs the IPMS-MS to assemble stored body parts or stored IPMs with the present submitted IPM, before submitting the resulting IPM to the MTS (or storing it as a draft-message entry). The IPMS-MS shall construct the new Body by assembling body parts in the order specified in the argument, i.e. the sequence of body parts which forms the new Body is determined by the sequence of body-part-references. If **stored-entry** is specified, it may identify an IPM, IPN, or Report. The new body part constructed from the stored-entry will be, respectively, a Message body part, a Notification body part, or a Report body part. If **stored-content** is specified, the new body part constructed from the identified entry will be a Forwarded Content body part. If **submitted-body-part** is specified, the new body part is a body part of the present submitted IPM (identified by number). If **stored-body-part** is specified, the new body part is copied from the entry identified by message-entry, with the body-part-number indicated. Body parts are numbered starting at '1'.

In a Message body part constructed from a stored IPM which represents a delivered-message entry, the Parameters component shall contain delivery-time and should contain delivery-envelope. In a Message body part constructed from a stored IPM which represents a submitted-message entry or draft-message entry, the Parameters component shall not contain delivery-time.

#### NOTES

1. The presence of delivery-envelope in the Parameters component of a Message body part does not imply that the body part was derived from a delivered-message. This derivation is implied (but not verified) by the presence of delivery-time.
2. The assembly of body-parts from entries with content-type other than IPM is possible only for body parts whose definition is compatible with IPM (as stated in the relevant content-type Specification), or for which rules of conversion into IPM body parts are defined.

The actions performed by an IPMS-MS when the IPM-submission-options parameter is present in an MS-message-submission argument are defined in 19.9.2.

### 19.5.2.3 IPM submission errors

When an IPMS-MS performs the MS-message-submission abstract-operation of ISO/IEC 10021-5, the IPMS-specific errors defined below may be reported. These are reported as MS-extension-errors, as defined in 9.12 of ISO/IEC 10021-5.

The **IPM-submission-errors** information object set comprises the submission errors defined for the IPMS-MS:

```
IPMSubmissionErrors MS-EXTENSION ::= {
    invalid-assembly-instructions |
    invalid-ipn,
    ... -- For future extension additions -- }
```

The **invalid-assembly-instructions** error shall be reported where the assembly-instructions component of IPM-submission-options is present, but the message submitted is not an IPM, or the assembly-instructions component contains a reference to an entry whose content-type is not compatible with IPM, or contains a reference to a body part not present in the submitted or stored message. The invalid body-part-references are reported in the error.

```
invalid-assembly-instructions MS-EXTENSION ::= {
    BodyPartReferences IDENTIFIED BY id-mst-invalid-assembly-instructions }
```

The **invalid-IPN** error shall be reported if the UA submits an IPN concerning a message for which an IPN has already been sent, except that an RN may be generated for an auto-forwarded IPM where an NRN indicating IPM-auto-forwarded has already been sent.

```
invalid-ipn MS-EXTENSION ::= {
    NULL IDENTIFIED BY id-mst-invalid-ipn }
```

### 19.5.3 Delete extensions

The IPMS-MS-user may make use of the delete-extensions parameter of the Delete abstract-operation (see 8.2.4.1 of ISO/IEC 10021-5) to prevent the generation of an NRN when an IPM is deleted, as defined in 19.4. The prevent-NRN-generation extension is defined as follows:

```
prevent-nrn-generation MS-EXTENSION ::= {
    NULL IDENTIFIED BY id-mst-prevent-nrn-generation }
```

NOTE - This may be used to prevent the automatic generation of NRNs where a UA implementation itself generates NRNs.

## 19.6 IPMS-MS Attributes

As described in ISO/IEC 10021-5, an MS maintains and provides access to certain attributes of each information object it holds. An attribute comprises a type and, depending upon the type, one or more values. Attributes that may assume several values simultaneously (all pertaining to one object) are termed multi-valued, those that may assume just one value, single-valued. Some attributes pertain to information objects of all kinds; others only to those of certain kinds (e.g., those of section two).

This clause defines the MS attributes specific to Interpersonal Messaging. Each IPMS-MS attribute is defined as an instance of the ATTRIBUTE information object class (see 6.3.3.3 of ISO/IEC 10021-5).

All the IPMS-MS attributes defined in this part of ISO/IEC 10021, except those corresponding to Extended body part types (which cannot be enumerated; see 19.6.3.3), are listed alphabetically, for reference, in the first column of Table 5 in 19.6.7. Table 3 indicates their presence in IPM, NRN, RN, and ON entries of the Stored-message, Submission-log, and Delivery-log entry-classes of the MS. For entries of the Submission-log and Delivery-log entry-classes the Body attributes (see 19.6.3) shall not be present. Table 3 also indicates whether the attribute is single-valued or multi-valued, and whether it is available for retrieval by the List and Summarize abstract-operations. Rules for the presence and maintenance of general-attributes in the IPMS-MS are defined in 19.2 and 19.3. No requirements are placed on the IPMS-MS-user for the support of any of the IPMS-MS attributes.