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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

Reference number
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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: [1], *Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1): Specification of Basic Notation.*

ISO/IEC 8824-2: [1], *Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1): Information Object Specification.*

ISO/IEC 8824-3: [1], *Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1): Constraint Specification.*

ISO/IEC 8824-4: [1], *Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 Specifications.*

ISO/IEC 8825-1: [1], *Information technology - Open Systems Interconnection - Specification of ASN.1 Encoding Rules: Basic Encoding Rules (BER).*

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[1] To be published.

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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:[1)], *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: [1)], *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.*

[1)] To be published.

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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

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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.

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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.

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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.

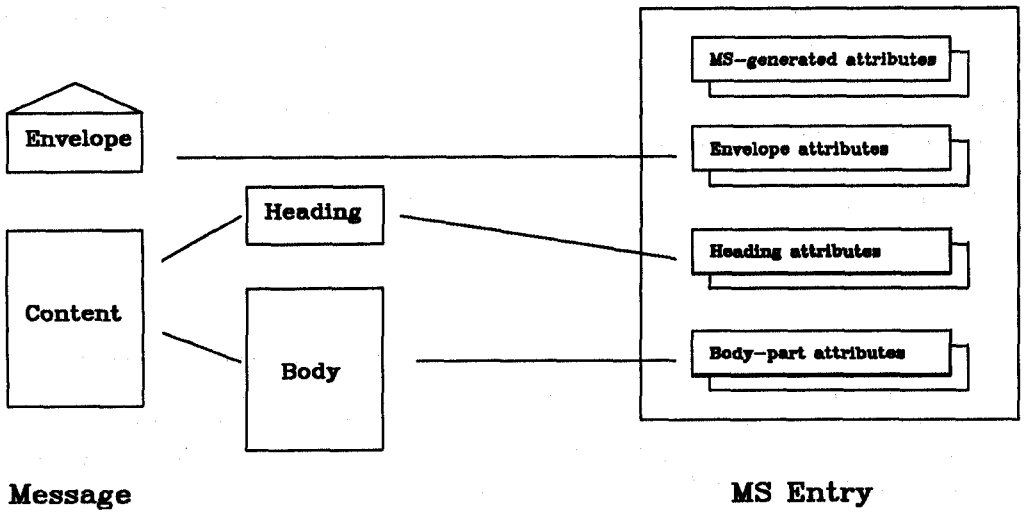

Figure 5 - Mapping an IPM to an MS entry

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.

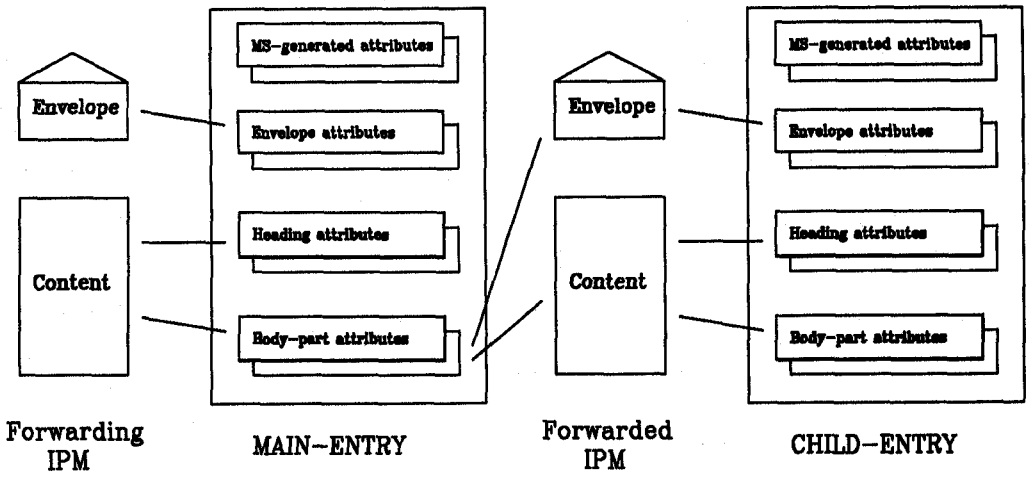

Figure 6 - Mapping a Forwarding message to an IPMS-MS entry

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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

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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*.

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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

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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.

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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.

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Where a delivery report contains returned content, the child-entry so created shall possess the attributes indicated for an IPM, NRN, RN, or ON as appropriate. Where an NRN contains a returned IPM, the child-entry so created shall possess the attributes indicated for an IPM. Where an IPM (whether submitted, delivered, in the returned content of a delivery report, or present in an NRN), contains a Message body part, the child-entry so created shall possess the attributes indicated for an IPM.

Table 3 applies to all entries except those of the Auto-action-log entry-class. There are no IPMS-specific attributes defined for the Auto-action-log entry-class. See 5.2 of ISO/IEC 10021-5 for an elaboration of the table's legend.

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Table 3
Summary of IPMS-specific common attributes

Attribute	V	Support Sm	Dl	Sl	P IPM	NRN	RN	ON	L	S
A										
Acknowledgment Mode	S	O	O	O	-	-	P	-	Y	Y
Authorizing Users	M	O	M	M	C	-	-	-	Y	N
Auto-forward Comment	S	O	O	O	-	C	-	-	Y	N
Auto-forwarded	S	O	O	O	P	-	-	-	Y	Y
Auto-submitted	S	O	O	O	C	-	-	-	Y	N
B										
Bilaterally Defined Body Parts	M	O	-	-	C	-	-	-	N	N
Blind Copy Recipients	M	O	O	M	C	-	-	-	Y	N
Body	S	M	-	-	P	-	-	-	N	N
Body Part Summary*	M	O	O	O	P	-	-	-	Y	N
C										
Conversion EITs	M	O	O	O	-	C	C	C	Y	N
Copy Recipients	M	O	O	M	C	-	-	-	Y	N
D										
Discard Reason	S	O	O	O	-	C	-	-	Y	Y
E										
Encrypted Body Parts	M	O	-	-	C	-	-	-	N	N
Encrypted Data	M	O	-	-	C	-	-	-	N	N
Encrypted Parameters	M	O	-	-	C	-	-	-	N	N
Expiry Time	S	O	O	O	C	-	-	-	Y	N
Extended Body Part Types	M	O	-	-	C	-	-	-	Y	Y
G										
G3 Facsimile Body Parts	M	O	-	-	C	-	-	-	N	N
G3 Facsimile Data	M	O	-	-	C	-	-	-	N	N
G3 Facsimile Parameters	M	O	-	-	C	-	-	-	N	N
G4 Class 1 Body Parts	M	O	-	-	C	-	-	-	N	N
H										
Heading	S	M	-	-	P	-	-	-	N	N
I										
IA5 Text Body Parts	M	O	-	-	C	-	-	-	N	N
IA5 Text Data	M	O	-	-	C	-	-	-	N	N
IA5 Text Parameters	M	O	-	-	C	-	-	-	N	N
Importance	S	O	O	O	P	-	-	-	Y	Y
Incomplete Copy	S	O	O	O	C	-	-	-	Y	N
IPM Auto-discarded*	S	-	O	-	C	-	-	-	Y	N
IPM Entry Type	S	M	M	M	P	P	P	P	Y	Y
IPM Intended Recipient	S	O	O	O	-	C	C	C	Y	N
IPM Synopsis	S	O	O	O	P	-	-	-	N	N
IPN Originator	S	O	O	O	-	C	C	C	Y	N
L										
Languages	M	O	O	O	C	-	-	-	Y	N
M										
Message Body Parts	M	O	-	-	C	-	-	-	N	N
Message Data	M	O	-	-	C	-	-	-	N	N
Message Parameters	M	O	-	-	C	-	-	-	N	N
Mixed-mode Body Parts	M	O	-	-	C	-	-	-	N	N
N										
Nationally Defined Body Parts	M	O	-	-	C	-	-	-	N	N
Non-receipt Reason	S	O	O	O	-	P	-	-	Y	Y
Notification Extensions*	M	O	O	O	-	C	C	C	Y	N
NRN Extensions*	M	O	O	O	-	C	-	-	Y	N
NRN Requestors	M	O	O	-	C	-	-	-	Y	N
O										
Obsoleted IPMs	M	O	O	O	C	-	-	-	Y	N
Originator	S	O	M	O	C	-	-	-	Y	N
Other Notification Type Fields*	M	O	O	O	-	-	-	P	Y	N
P										
Primary Recipients	M	O	O	M	C	-	-	-	Y	N
R										
Receipt Time	S	O	O	O	-	-	P	-	Y	N
Related IPMs	M	O	O	O	C	-	-	-	Y	N
Replied-to IPM	S	O	O	O	C	-	-	-	Y	N
Reply Recipients	M	O	O	O	C	-	-	-	Y	N
Reply Requestors	M	O	O	-	C	-	-	-	Y	N
Reply Time	S	O	O	O	C	-	-	-	Y	N
Returned IPM	S	O	-	-	-	C	-	-	Y	N
RN Extensions*	M	O	O	O	-	-	C	-	Y	N
RN Requestors	M	O	O	-	C	-	-	-	Y	N

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Table 3 (Concluded)

Attribute	V	Support Sm	Dl	Sl	P IPM	NRN	RN	ON	L	S
- S										
Sensitivity	S	O	O	O	C	-	-	-	Y	Y
Subject	S	O	M	M	C	-	-	-	Y	N
Subject IPM	S	M	M	M	-	P	P	P	Y	N
Suppl Receipt Info	S	O	O	O	-	-	C	-	Y	N
- T										
Teletex Body Parts	M	O	-	-	C	-	-	-	N	N
Teletex Data	M	O	-	-	C	-	-	-	N	N
Teletex Parameters	M	O	-	-	C	-	-	-	N	N
This IPM	S	M	M	M	P	-	-	-	Y	N
- V										
Videotex Body Parts	M	O	-	-	C	-	-	-	N	N
Videotex Data	M	O	-	-	C	-	-	-	N	N
Videotex Parameters	M	O	-	-	C	-	-	-	N	N

- Legend
  - V — Single/multi valued
  - Support — Support level by IPMS-MS:
    - Sm — for Stored-message entry-class
    - Dl — for Delivery-log entry-class
    - Sl — for Submission-log entry-class
  - P — Presence in each IPM-entry-type
  - L — Available for List, Alert
  - S — Available for Summarize
  - * — Not defined for 1988 Application Contexts

Table 4 indicates the presence of the correlation attributes (see 19.6.5) in IPM entries of the Stored-message and Message-log entry-classes. None of the attributes listed in Table 4 are defined for 1988 Application Contexts. These attributes shall not be present in entries representing IPNs.

Table 4
Summary of IPMS-specific correlation attributes

Attribute	V	L	Del IPM	Sub IPM	L	S
AC Correlated Delivered IPNs	M	O	-	C	Y	N
AC Correlated Delivered Replies	M	O	-	C	Y	N
AC Delivered IPN Summary	M	O	-	C	Y	Y
AC Delivered Replies Summary	M	O	-	C	Y	Y
AC Forwarded IPMs	M	O	C	C	Y	N
AC Forwarding IPMs	M	O	C	C	Y	N
AC IPM Recipients	M	O	-	C	Y	N
AC Obsoleted IPMs	M	O	C	C	Y	N
AC Obsoleting IPMs	M	O	C	C	Y	N
AC Related IPMs	M	O	C	C	Y	N
AC Relating IPMs	M	O	C	C	Y	N
AC Replied-to IPM	S	O	C	C	Y	N
AC Replying IPMs	M	O	C	C	Y	N
AC Submitted IPN Status	S	O	C	-	Y	Y
AC Submitted IPNs	M	O	C	-	Y	N
AC Submitted Reply Status	S	O	C	-	Y	Y
Revised Reply Time	S	O	C	-	Y	N

- Legend
  - V — Single/multi valued
  - L — Support level by IPMS-MS
  - Del IPM — Presence in delivered IPM
  - Sub IPM — Presence in submitted IPM
  - L — Available for List
  - S — Available for Summarize

19.6.1 Summary Attributes

Some attributes summarize an Interpersonal Messaging information object. These attributes are defined and described below.

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19.6.1.1 IPM Entry Type

The **IPM Entry Type** attribute identifies an information object's type.

```
ipm-entry-type ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     IPMEntryType,
      EQUALITY MATCHING-RULE    integerMatch,
      NUMERATION                single-valued,
      ID                        id-sat-ipm-entry-type }

IPMEntryType ::= ENUMERATED {
      ipm         (0),
      rn          (1),
      nrn         (2),
      on          (3),
      ...             }
```

This attribute may assume any one of the following values:

a) *ipm*: The information object is an IPM.

b) *rn*: The information object is an RN.

c) *nrn*: The information object is an NRN.

d) *on*: The information object is an ON.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the Message-log entry for such an object) if, and only if, that object is a message whose content is an IPM or IPN.

19.6.1.2 IPM Synopsis

The **IPM Synopsis** attribute gives the structure, characteristics, size, and processing status of an IPM at the granularity of individual body parts.

```
ipm-synopsis ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     IPMSynopsis,
      NUMERATION                single-valued,
      ID                        id-sat-ipm-synopsis }
```

The synopsis of an IPM comprises a synopsis of each of its body parts. The synopses appear in the order in which the body parts appear.

```
IPMSynopsis ::= SEQUENCE OF BodyPartSynopsis
```

The synopsis of a body part takes one of two forms depending upon whether the body part is of type Message. This enables the synopsis of a forwarding IPM to encompass the body parts of each forwarded IPM (recursively), as well as those of the forwarding IPM itself.

```
BodyPartSynopsis ::= CHOICE {
      message       [0]  MessageBodyPartSynopsis,
      non-message   [1]  NonMessageBodyPartSynopsis}

MessageBodyPartSynopsis ::= SEQUENCE {
      number        [0]  SequenceNumber,
      synopsis      [1]  IPMSynopsis}

NonMessageBodyPartSynopsis ::= SEQUENCE {
      type          [0]  OBJECT IDENTIFIER,
      parameters    [1]  ExtendedParameters OPTIONAL,
      size          [2]  INTEGER,
      processed     [3]  BOOLEAN DEFAULT FALSE}
```

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The synopsis of a Message body part has the following components:

a) **Number** (M): The sequence-number that the IPMS-MS assigns to the entry that the Message body part represents.

b) **Synopsis** (M): The synopsis of the IPM that forms the content of the message that the body part represents.

The synopsis of a body part of type other than Message has the following components. For the purposes of this synopsis, the body part is considered to be of type Extended, whether or not it was so conveyed to the IPMS-MS (see B.1 for definitions of Extended body part types equivalent to the basic body part types):

a) **Type** (M): The body part's Extended type, i.e., the &id field of the body part's Data component. An Object Identifier.

b) **Parameters** (C): The body part's format and control parameters, i.e., the body part's Parameters component. An instance of TYPE-IDENTIFIER. This conditional component shall be present if, and only if, a Parameters component is defined for this type of body part.

c) **Size** (M): The size in octets of the encoding of the Encoding component of the body part's Data component when the Basic Encoding Rules of ISO/IEC 8825-1 are followed. If those rules permit several (e.g., both primitive and constructed) encodings of the component, the size may reflect any one of them. An Integer.

d) **Processed** (D *false*): An indication of whether or not the body part (as a single attribute or the Data component only) has been conveyed to the UA by means of the IPMS-MS's Fetch abstract operation, or has been processed by an auto-action whose definition causes the body part to become *processed*. A Boolean.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the Message-log entry for such an object) if, and only if, that object is a message whose content is an IPM.

NOTE - As a consequence of its variability, the value of the Size component should be considered only an estimate of the body part's size.

19.6.1.3 Body Parts Summary

The **Body Parts Summary** attribute, which is multi-valued, provides a summary of the body parts present in an IPM. One value of body-part-descriptor shall be present for each body part present in the IPM. Body-part-descriptors shall appear in the same order in the attribute as body parts appear in the IPM.

```
body-parts-summary ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     BodyPartDescriptor,
      NUMERATION                multi-valued,
      ID                        id-sat-body-parts-summary }

BodyPartDescriptor ::= SEQUENCE {
      data              [0]  OBJECT IDENTIFIER,
      parameters        [1]  OBJECT IDENTIFIER OPTIONAL,
      this-child-entry  [2]  SequenceNumber OPTIONAL,
      position          [3]  INTEGER,
      size              [4]  INTEGER,
      processed         [5]  BOOLEAN DEFAULT FALSE }
```

For the purpose of this summary, body parts are considered to be of type Extended, whether or not they were so conveyed to the IPMS-MS. See B.1 for definitions of the Extended body part types equivalent to the basic body part types.

The body-part-descriptor has the following components:

a) **Data** (M): The body part's Extended type, i.e. the &id field of the body part's Data component (see 19.6.3.3). This Object Identifier identifies the attribute generated for the Data component of the body part.

b) **Parameters** (C): The Extended type of the body part's Parameters, i.e. the &id field of the body part's Parameters component (see 19.6.3.3). This Object Identifier identifies the attribute generated for the Parameters component of the body part. This conditional component shall be present if, and only if, a Parameters component is defined for this type of body part.

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c) **This-child-entry** (C): Identifies the sequence-number of the child-entry that constitutes this body part. This shall be present for body part types for which child-entries are generated (e.g., Message body parts).

d) **Position** (M): Indicates the position of this body part within the sequence of values that constitutes the Extended Body Part attributes (Data and Parameters) for this Extended body part type.

e) **Size** (M): The size in octets of the encoding of the Encoding component of the body part's Data component when the Basic Encoding Rules of ISO/IEC 8825-1 are followed. If those rules permit several (e.g., both primitive and constructed) encodings of the component, the size may reflect any one of them. An Integer.

f) **Processed** (D *false*): An indication of whether the body part (as a single attribute or the Data component only) has been conveyed to the UA by means of the IPMS-MS's Fetch abstract-operation, or has been processed by an auto-action whose definition causes the body part to become *processed*. A Boolean.

NOTES

1. As a consequence of its variability, the value of the Size component should be considered only an estimate of the body part's size.

2. This attribute may be used in preference to the IPM Synopsis attribute where the IPM comprises many recursive levels of forwarded IPM, or where the Parameters components are large, or where a summary of only a single body part is required.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the Message-log entry for such an object) if, and only if, that object is a message whose content is an IPM. An IPMS-MS that supports this attribute shall also support the IPM Synopsis attribute.

19.6.1.4 IPM Auto-discarded

The **IPM Auto-discarded** attribute may be present in entries of the Delivery-log entry-class, and indicates whether the corresponding entry of the Delivery entry-class was deleted as a result of the performance of the IPM auto-discard auto-action.

```
ipm-auto-discarded ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     BOOLEAN,
      EQUALITY MATCHING-RULE    booleanMatch,
      NUMERATION                single-valued,
      ID                        id-sat-ipm-auto-discarded }
```

An IPMS-MS that supports this attribute shall maintain it for an information object if, and only if, that object is a Delivery-log entry corresponding to a delivered IPM which was deleted by the performance of the IPM auto-discard auto-action.

19.6.2 Heading Attributes

Some attributes are derived from the Heading of an IPM. These attributes are defined and described below.

19.6.2.1 Heading

The **Heading** attribute is the (entire) Heading of an IPM.

```
heading ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     Heading,
      NUMERATION                single-valued,
      ID                        id-hat-heading }
```

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds if, and only if, that object is a message whose content is an IPM.

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19.6.2.2 Heading Analyses

Some attributes have as their values OR-descriptors selected after analysis of the Heading. They identify the "primary", "copy", and "blind copy" recipients of an IPM of whom an RN, NRN, or reply is requested.

```
rn-requestors ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      ORDescriptor,
      EQUALITY MATCHING-RULE     oRDescriptorMatch,
      NUMERATION                 multi-valued,
      ID                         id-hat-rn-requestors }

nrn-requestors ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      ORDescriptor,
      EQUALITY MATCHING-RULE     oRDescriptorMatch,
      NUMERATION                 multi-valued,
      ID                         id-hat-nrn-requestors }

reply-requestors ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      ORDescriptor,
      EQUALITY MATCHING-RULE     oRDescriptorMatch,
      NUMERATION                 multi-valued,
      ID                         id-hat-reply-requestors }
```

An IPMS-MS that supports one of these attributes shall maintain it for an information object that it holds (and the Message-log entry for such an object) if, and only if, that object is a delivered message whose content is an IPM whose Heading requests, of at least one user or DL, an RN, NRN, or reply, respectively. It shall maintain one attribute value for every recipient specifier in the IPM's Primary, Copy, or Blind Copy Recipients field whose Notification-requests component includes the value rn (in the case of the first attribute) or nrn (in the case of the second), or whose Reply-requested component signifies that a reply is requested (in the case of the third). The value shall be the recipient specifier's Recipient component.

NOTE - These attributes exist for historical reasons, predating those defined to support IPM auto-correlation.

19.6.2.3 Heading Fields

Some attributes bear the names of heading fields and have those fields as their values.

```
this-ipm ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      ThisIPMField,
      EQUALITY MATCHING-RULE     iPMIdentifierMatch,
      NUMERATION                 single-valued,
      ID                         id-hat-this-ipm }

originator ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      OriginatorField,
      EQUALITY MATCHING-RULE     oRDescriptorMatch,
      OTHER MATCHING-RULES       {oRDescriptorElementsMatch | oRDescriptorSubstringElementsMatch},
      NUMERATION                 single-valued,
      ID                         id-hat-originator }

replied-to-IPM ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      RepliedToIPMField,
      EQUALITY MATCHING-RULE     iPMIdentifierMatch,
      NUMERATION                 single-valued,
      ID                         id-hat-replied-to-IPM }

subject ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      SubjectField,
      EQUALITY MATCHING-RULE     mSStringMatch,
      SUBSTRINGS MATCHING-RULE   mSSubstringsMatch,
      NUMERATION                 single-valued,
      ID                         id-hat-subject }
```


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```
expiry-time ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      ExpiryTimeField,
      EQUALITY MATCHING-RULE     uTCTimeMatch,
      ORDERING MATCHING-RULE     uTCTimeOrderingMatch,
      NUMERATION                 single-valued,
      ID                         id-hat-expiry-time }

reply-time ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      ReplyTimeField,
      EQUALITY MATCHING-RULE     uTCTimeMatch,
      ORDERING MATCHING-RULE     uTCTimeOrderingMatch,
      NUMERATION                 single-valued,
      ID                         id-hat-reply-time }

importance ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      ImportanceField,
      EQUALITY MATCHING-RULE     integerMatch,
      ORDERING MATCHING-RULE     integerOrderingMatch, -- not defined for 1988 Application Contexts --
      NUMERATION                 single-valued,
      ID                         id-hat-importance }

sensitivity ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      SensitivityField,
      EQUALITY MATCHING-RULE     integerMatch,
      ORDERING MATCHING-RULE     integerOrderingMatch, -- not defined for 1988 Application Contexts --
      NUMERATION                 single-valued,
      ID                         id-hat-sensitivity }

auto-forwarded ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      AutoForwardedField,
      EQUALITY MATCHING-RULE     booleanMatch,
      NUMERATION                 single-valued,
      ID                         id-hat-auto-forwarded }
```

An IPMS-MS that supports one of these attributes shall maintain it for an information object that it holds (and the Message-log entry for such an object) if, and only if, that object is a message whose content is an IPM whose Heading contains the field whose name the attribute bears.

19.6.2.4 Heading Sub-fields

Some attributes bear the names of heading fields and have sub-fields of those fields as their values.

```
authorizing-users ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      AuthorizingUsersSubfield,
      EQUALITY MATCHING-RULE     oRDescriptorMatch,
      OTHER MATCHING-RULES       {oRDescriptorElementsMatch | oRDescriptorSubstringElementsMatch},
      NUMERATION                 multi-valued,
      ID                         id-hat-authorizing-users }

primary-recipients ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      PrimaryRecipientsSubfield,
      EQUALITY MATCHING-RULE     recipientSpecifierMatch,
      OTHER MATCHING-RULES       {recipientSpecifierElementsMatch |
                                  recipientSpecifierSubstringElementsMatch},
      NUMERATION                 multi-valued,
      ID                         id-hat-primary-recipients }

copy-recipients ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      CopyRecipientsSubfield,
      EQUALITY MATCHING-RULE     recipientSpecifierMatch,
      OTHER MATCHING-RULES       {recipientSpecifierElementsMatch |
                                  recipientSpecifierSubstringElementsMatch},
      NUMERATION                 multi-valued,
      ID                         id-hat-copy-recipients }
```

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```
blind-copy-recipients ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     BlindCopyRecipientsSubfield,
      EQUALITY MATCHING-RULE    recipientSpecifierMatch,
      OTHER MATCHING-RULES      {recipientSpecifierElementsMatch |
                                 recipientSpecifierSubstringElementsMatch},
      NUMERATION                multi-valued,
      ID                        id-hat-blind-copy-recipients }

obsoleted-IPMs ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     ObsoletedIPMsSubfield,
      EQUALITY MATCHING-RULE    iPMIdentifierMatch,
      NUMERATION                multi-valued,
      ID                        id-hat-obsoleted-IPMs }

related-IPMs ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     RelatedIPMsSubfield,
      EQUALITY MATCHING-RULE    iPMIdentifierMatch,
      NUMERATION                multi-valued,
      ID                        id-hat-related-IPMs }

reply-recipients ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     ReplyRecipientsSubfield,
      EQUALITY MATCHING-RULE    oRDescriptorMatch,
      OTHER MATCHING-RULES      {oRDescriptorElementsMatch | oRDescriptorSubstringElementsMatch},
      NUMERATION                multi-valued,
      ID                        id-hat-reply-recipients }
```

An IPMS-MS that supports one of these attributes shall maintain it for an information object that it holds (and the Message-log entry for such an object) if, and only if, that object is a message whose content is an IPM whose Heading contains the field whose name the attribute bears. It shall maintain one attribute value for each sub-field.

19.6.2.5 Heading Extensions

Some attributes bear the names of heading extensions and have as their values the values of those extensions or a part thereof.

```
incomplete-copy ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     IncompleteCopy,
      NUMERATION                single-valued,  -- An equality match is specified for 1988
                                                -- Application Contexts --
      ID                        id-hat-incomplete-copy }

languages ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     Language,
      EQUALITY MATCHING-RULE    mSStringMatch,
      SUBSTRINGS MATCHING-RULE  mSSubstringsMatch, -- Not defined for 1988 Application Contexts --
      NUMERATION                multi-valued,
      ID                        id-hat-languages }

auto-submitted ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     AutoSubmitted,
      EQUALITY MATCHING-RULE    integerMatch,
      NUMERATION                single-valued,
      ID                        id-hat-auto-submitted }
```

An IPMS-MS that supports one of these attributes shall maintain it for an information object that it holds (and the Message-log entry for such an object) if, and only if, that object is a message whose content is an IPM whose Heading contains the extension whose name the attribute bears. In the case of the Languages attribute, the IPMS-MS shall maintain one attribute value for each language the extension identifies.

NOTE - Each value of Languages comprises a language code, followed optionally by a country code. The Languages attribute's substrings matching rule may be used to select values of a given language code, regardless of the presence, or value of the optional country code; see A.2.

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19.6.3 Body Attributes

Some attributes are derived from the Body of an IPM. These attributes are defined and described below.

NOTE - The attributes defined in 19.6.3.4, 19.6.3.5, and 19.6.3.6 exist for historical reasons. When using a 1994 Application Context only the Extended body parts attributes should be used.

19.6.3.1 Body

The **Body** attribute is the (entire) Body of an IPM.

```
body ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     Body,
      NUMERATION                single-valued,
      ID                        id-bat-body }
```

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds if, and only if, that object is a message whose content is an IPM.

19.6.3.2 Extended Body Part Types

The **Extended Body Part Types** attribute identifies the Extended body part types represented in an IPM. For the purposes of this attribute, all body parts of an IPM are considered to be of type Extended regardless of whether they were so conveyed to the IPMS-MS.

```
extended-body-part-types ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX     OBJECT IDENTIFIER,
      EQUALITY MATCHING-RULE    objectIdentifierMatch,
      NUMERATION                multi-valued,
      ID                        id-bat-extended-body-part-types }
```

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds if, and only if, that object is a message whose content is an IPM whose Body contains one or more body parts. It shall maintain one attribute value for every type of body part present. The value shall denote the type as specified in 7.3.12.

NOTE - Each value of this attribute identifies both an Extended body part type represented in the IPM and the attribute generated for the Data component(s) of the body part(s) of that body part type, as specified in 19.6.3.3.

19.6.3.3 Extended Body Parts

Some attributes, unnamed, have as their values the value components of the Sequence type associated with the instance-of type that constitutes the Data (and Parameters) components of Extended body parts. See 7.3.12 above, and C.7 of ISO/IEC 8824-2. For the purposes of these attributes, all body parts of an IPM are considered to be of type Extended regardless of whether they were so conveyed to the IPMS-MS; see 19.3, item (b).

To each Extended body part type there corresponds two attributes. The first attribute is denoted by the Object Identifier that is the &id field of the TYPE-IDENTIFIER object that constitutes the Data component of a body part of that type. The content of this first attribute is the value component of the Sequence type associated with the instance-of type for that Data component. The second attribute is denoted by the Object Identifier that is the &id field of the TYPE-IDENTIFIER object that constitutes the Parameters component of a body part of that type. The content of this second attribute is the value component of the Sequence type associated with the instance-of type for that Parameters component.

Where a Parameters type is defined for an Extended body part type, the sequence of values in the attribute generated from the Data components of body parts of that Extended body part type corresponds to the sequence of values in the attribute generated from the Parameters components of the same body parts. Thus the value created for the Data component of a body part occupies the same position in the first attribute as the value created for the Parameters component occupies in the second attribute.

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An IPMS-MS that supports one of these body parts shall maintain the first attribute, and, if defined, the second attribute, for an information object that it holds if, and only if, that object is a message whose content is an IPM whose Body contains one or more body parts of the type that corresponds to that attribute. It shall maintain one value of the first attribute, and, if defined, the second attribute for each such body part. The order of values shall reflect the order of appearance of body parts of that type in the IPM.

The Data and Parameters attributes of Extended body parts may be derived from the following parameterized object assignments:

```
extended-body-part-data-attribute{EXTENDED-BODY-PART-TYPE:ebpt} ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      [0] EXPLICIT ebpt.&data.&Type,
      NUMERATION                 multi-valued,
      ID                         ebpt.&data.&id }

extended-body-part-parameters-attribute{EXTENDED-BODY-PART-TYPE:ebpt} ATTRIBUTE ::= {
      WITH ATTRIBUTE-SYNTAX      [0] EXPLICIT ebpt.&parameters.&Type,
      NUMERATION                 multi-valued,
      ID                         ebpt.&parameters.&id }
```

EXAMPLES

For example, the Data attribute for the IA5 Text Extended body part type may be derived as follows:

```
ia5-text-extended-data-attribute ATTRIBUTE ::=
                  extended-body-part-data-attribute {ia5-text-body-part}
```

This is equivalent to the following assignment:

```
ia5-text-extended-data-attribute ATTRIBUTE ::=
      WITH ATTRIBUTE-SYNTAX      [0] EXPLICIT IA5TextData,
      NUMERATION                 multi-valued,
      ID                         id-et-ia5-text }
```

The Data attribute for the 'Simple Spreadsheet' Extended body part type used as an example in 7.3.12 may be derived as follows:

```
simple-spreadsheet-extended-data-attribute ATTRIBUTE ::=
                  extended-body-part-data-attribute {simple-spreadsheet-body-part}
```

This is equivalent to the following assignment:

```
simple-spreadsheet-extended-data-attribute ATTRIBUTE ::=
      WITH ATTRIBUTE-SYNTAX      [0] EXPLICIT OCTET STRING,
      NUMERATION                 multi-valued,
      ID                         {local-object-identifier 1} }
```

NOTES

1. The Extended body parts attributes cannot be enumerated because the Extended body part types cannot be so enumerated.

2. The Extended Body Part Types attribute (see 19.6.3.2) indicates the types of the Extended body part attributes present in the entry representing an IPM.

19.6.3.4 Basic Body Parts

Some attributes bear the names of basic body part types and have, with one exception, such body parts as their values.

NOTE - The attributes defined below exist for historical reasons. When using a 1994 Application Context, only the (Extended) body parts attributes of 19.6.3.3 should be used.

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