

INTERNATIONAL STANDARD

ISO/IEC 10021-7

First edition
1990-12-01

AMENDMENT 3
1994-12-15

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
ISO/IEC 10021-7:1990/Amd.3:1994(E)

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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*.

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). |

¹⁾ 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.3:¹⁾, *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.

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.

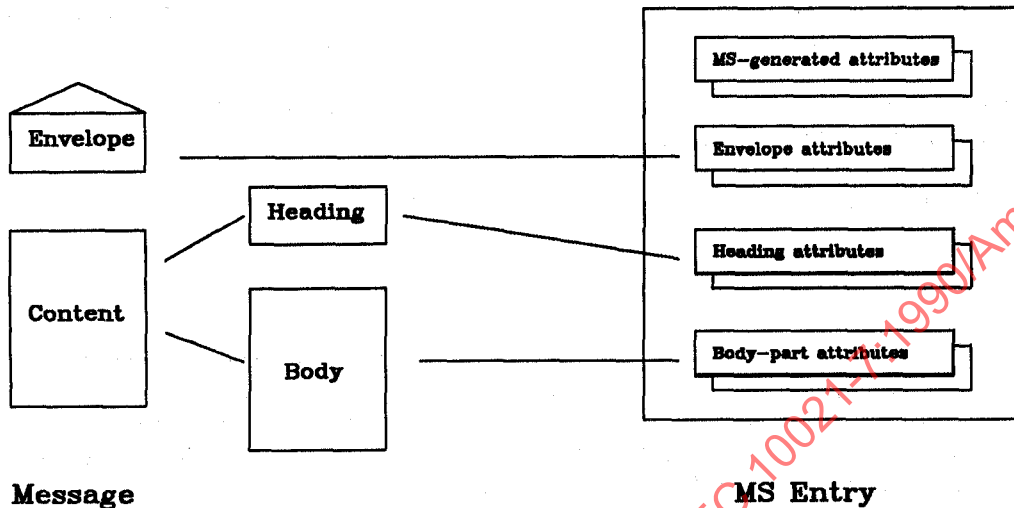


Figure 5 - Mapping an IPM to an MS entry

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.

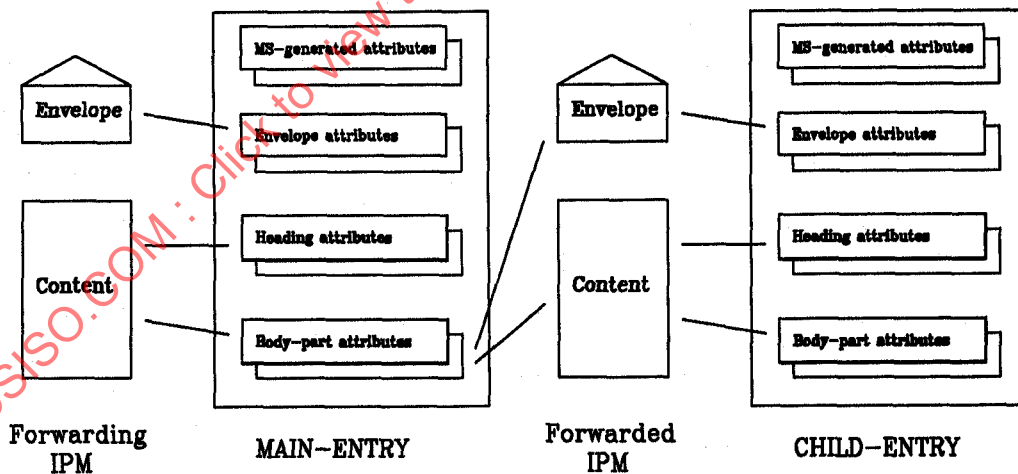


Figure 6 - Mapping a Forwarding message to an IPMS-MS entry

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:

- the Returned IPM optionally present in an NRN;
- 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:

- if Delivery-time is present in Parameters then the message-delivery-time general-attribute-type shall be present;
- 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:

- 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.
- 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.

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	IPM	P 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						
Obsolete 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

Table 3 (Concluded)

Attribute	V	Support			IPM	P	NRN	RN	ON	L	S
S		Sm	Dl	Sl							
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	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 Obsolete IPMs	M	O	C	C	Y	N
AC Obsolete 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.

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}
```

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.

- 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.

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 }

```

```

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 }

```

```

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.

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.

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.

An IPMS-MS holds each forwarded IPM (i.e., each Message body part) as an information object in its own right, separate from the forwarding IPM. That information object is a message whose content is an IPM. The Message Body Parts attribute below has as its values the sequence-numbers the IPMS-MS assigns to those messages.

```

ia5-text-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    IA5TextBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-ia5-text-body-parts }

g3-facsimile-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    G3FacsimileBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-g3-facsimile-body-parts }

g4-class1-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    G4Class1BodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-g4-class1-body-parts }

teletex-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    TeletexBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-teletex-body-parts }

videotex-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    VideotexBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-videotex-body-parts }

encrypted-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    EncryptedBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-encrypted-body-parts }

message-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    SequenceNumber,
    NUMERATION               multi-valued,
    ID                       id-bat-message-body-parts }

mixed-mode-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    MixedModeBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-mixed-mode-body-parts }

bilaterally-defined-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    BilaterallyDefinedBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-bilaterally-defined-body-parts }

nationally-defined-body-parts ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    NationallyDefinedBodyPart,
    NUMERATION               multi-valued,
    ID                       id-bat-nationally-defined-body-parts }

```

An IPMS-MS that supports one of these attributes 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 of the type whose name the attribute bears. It shall maintain one attribute value for each such body part. The order of values shall reflect the order of appearance of body parts of that type in the IPM.

19.6.3.5 Basic Body Part Parameters Components

Some attributes bear the names of basic body part types and have the Parameters components of 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.

```

ia5-text-parameters ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      IA5TextParameters,
    NUMERATION                  multi-valued,
    ID                          id-bat-ia5-text-parameters }

g3-facsimile-parameters ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      G3FacsimileParameters,
    NUMERATION                  multi-valued,
    ID                          id-bat-g3-facsimile-parameters }

teletex-parameters ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      TeletexParameters,
    NUMERATION                  multi-valued,
    ID                          id-bat-teletex-parameters }

videotex-parameters ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      VideotexParameters,
    NUMERATION                  multi-valued,
    ID                          id-bat-videotex-parameters }

encrypted-parameters ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      EncryptedParameters,
    NUMERATION                  multi-valued,
    ID                          id-bat-encrypted-parameters }

message-parameters ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      MessageParameters,
    NUMERATION                  multi-valued,
    ID                          id-bat-message-parameters }

```

An IPMS-MS that supports one of these attributes 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 of the type whose name the attribute bears. It shall maintain one attribute value for each such body part. The order of values shall reflect the order of appearance of body parts of that type in the IPM.

19.6.3.6 Basic Body Part Data Components

Some attributes bear the names of basic body part types and have the Data components of 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.

```

ia5-text-data ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      IA5TextData,
    NUMERATION                  multi-valued,
    ID                          id-bat-ia5-text-data }

g3-facsimile-data ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      G3FacsimileData,
    NUMERATION                  multi-valued,
    ID                          id-bat-g3-facsimile-data }

teletex-data ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      TeletexData,
    NUMERATION                  multi-valued,
    ID                          id-bat-teletex-data }

videotex-data ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      VideotexData,
    NUMERATION                  multi-valued,
    ID                          id-bat-videotex-data }

encrypted-data ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      EncryptedData,
    NUMERATION                  multi-valued,
    ID                          id-bat-encrypted-data }

```

```

message-data ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      MessageData,
  EQUALITY MATCHING-RULE     multi-valued,
  NUMERATION                 id-bat-message-data }
ID

```

An IPMS-MS that supports one of these attributes 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 of the type whose name the attribute bears. It shall maintain one attribute value for each such body part. The order of values shall reflect the order of appearance of body parts of that type in the IPM.

19.6.4 Notification Attributes

Some attributes are derived from an IPN. These attributes are defined and described below.

19.6.4.1 Common Fields

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

```

subject-ipm ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SubjectIPMField,
  EQUALITY MATCHING-RULE     ipmIdentifierMatch,
  NUMERATION                 single-valued,
  ID                         id-nat-subject-ipm }

ipn-originator ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      IPNOriginatorField,
  EQUALITY MATCHING-RULE     orDescriptorMatch,
  OTHER MATCHING-RULES      {orDescriptorElementsMatch | orDescriptorSubstringElementsMatch},
  NUMERATION                 single-valued,
  ID                         id-nat-ipn-originator }

ipm-intended-recipient ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      IPMIntendedRecipientField,
  EQUALITY MATCHING-RULE     orDescriptorMatch,
  OTHER MATCHING-RULES      {orDescriptorElementsMatch | orDescriptorSubstringElementsMatch},
  NUMERATION                 single-valued,
  ID                         id-nat-ipm-intended-recipient }

conversion-eits ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      MS-EIT,
  EQUALITY MATCHING-RULE     objectIdentifierMatch,
  NUMERATION                 multi-valued,
  ID                         id-nat-conversion-eits }

notification-extensions ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      IPMSExtension,
  NUMERATION                 multi-valued,
  ID                         id-nat-notification-extensions }

```

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 IPN that contains the field whose name the attribute bears.

19.6.4.2 Non-receipt Fields

Some attributes bear the names of non-receipt fields and have those fields as their values.

```

non-receipt-reason ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      NonReceiptReasonField,
  EQUALITY MATCHING-RULE     integerMatch,
  NUMERATION                 single-valued,
  ID                         id-nat-non-receipt-reason }

```

```

discard-reason ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      DiscardReasonField,
  EQUALITY MATCHING-RULE    integerMatch,
  NUMERATION                 single-valued,
  ID                         id-nat-discard-reason }

auto-forward-comment ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      AutoForwardCommentField,
  EQUALITY MATCHING-RULE    mSStringMatch,
  SUBSTRINGS MATCHING-RULE  mSSubstringsMatch,
  NUMERATION                 single-valued,
  ID                         id-nat-auto-forward-comment }

returned-ipm ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      ReturnedIPMField,
  NUMERATION                 single-valued,
  ID                         id-nat-returned-ipm }

nrn-extensions ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      IPMSExtension,
  NUMERATION                 multi-valued,
  ID                         id-nat-nrn-extensions }

```

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 NRN that contains the field whose name the attribute bears. The Returned IPM attribute shall not be present in entries of either the submission-log or delivery-log.

19.6.4.3 Receipt Fields

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

```

receipt-time ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      ReceiptTimeField,
  EQUALITY MATCHING-RULE    uTCTimeMatch,
  ORDERING MATCHING-RULE    uTCTimeOrderingMatch,
  NUMERATION                 single-valued,
  ID                         id-nat-receipt-time }

acknowledgment-mode ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      AcknowledgmentModeField,
  EQUALITY MATCHING-RULE    integerMatch,
  NUMERATION                 single-valued,
  ID                         id-nat-acknowledgment-mode }

suppl-receipt-info ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SupplReceiptInfoField,
  EQUALITY MATCHING-RULE    mSStringMatch,
  SUBSTRINGS MATCHING-RULE  mSSubstringsMatch,
  NUMERATION                 single-valued,
  ID                         id-nat-suppl-receipt-info }

rn-extensions ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      IPMSExtension,
  NUMERATION                 multi-valued,
  ID                         id-nat-rn-extensions }

```

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 RN that contains the field whose name the attribute bears.

19.6.4.4 Other Notification Type Fields

The **Other Notification Type Fields** attribute contains values of the field whose name it bears.

```
other-notification-type-fields ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      IPMSExtension,
  NUMERATION                 multi-valued,
  ID                         id-nat-other-notification-type-fields }
```

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 ON.

19.6.5 Correlation Attributes

Some attributes correlate messages which are interrelated in various ways:

- a) an IPM and the IPMs generated in reply;
- b) an IPM and the IPNs notifying receipt or non-receipt;
- c) an IPM and the IPMs which subsequently forward it, or obsolete it, or are related to it.

Some attributes are relevant to all submitted and delivered messages which contain replies and notifications; others are specific to submitted-message entries, and correlate the delivered replies and IPNs received in response to a submitted message; others still are specific to delivered-message entries, and correlate the replies and IPNs generated by this IPMS-MS-user in response to a delivered message. All the Correlation attributes defined in this clause are generated by the IPMS-MS.

The deletion of an entry referred to by one of the correlation attributes has no effect on the value of that attribute.

19.6.5.1 Common attributes

Some attributes, common to the entries of both the Submission and Delivery entry-classes (and corresponding entries of the Message-log entry-class), correlate an IPM with the IPMs which indicate in their Heading fields that they render it obsolete, or are related to it, or are replies to it, or have forwarded it.

19.6.5.1.1 AC Forwarding IPMs

The **AC Forwarding IPMs** attribute, which is multi-valued, contains the sequence-numbers of the submitted IPM entries that bear the present IPM as a Message body-part. One value of the attribute shall be generated for each occasion on which it is forwarded by this IPMS-MS-user, or auto-forwarded by the IPMS-MS. The attribute values are stored in ascending order of the forwarding entries' creation times.

```
ac-forwarding-ipms ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SequenceNumber,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                 multi-valued,
  ID                         id-cat-forwarding-ipms }
```

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, which has been the subject of forwarding by, or on behalf of, this IPMS-MS-user.

19.6.5.1.2 AC Forwarded IPMs

The AC Forwarded IPMs attribute, which is multi-valued, contains the sequence-numbers of the stored IPMs contained as Message body-parts of the present IPM. One value of the attribute shall be generated for each stored IPM contained as a Message body part of the present IPM. The attribute values are stored in the same order as the corresponding Message body parts appear in the IPM.

```
ac-forwarded-ipms ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SequenceNumber,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                  multi-valued,
  ID                          id-cat-forwarded-ipms }
```

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 submitted message whose content is an IPM, which contains one or more Message body parts which correspond to IPMs already present in the IPMS-MS.

NOTE - This attribute records only the immediate Message body parts of the IPM, not those which may be encapsulated within a Message body part of the IPM.

19.6.5.1.3 AC Obsoleting IPMs

The AC Obsoleting IPMs attribute, which is multi-valued, contains the sequence-numbers of the IPM entries that indicate, by means of their Obsoleted IPMs heading field, that they render obsolete the present IPM. The attribute values are stored in ascending order of the obsoleting entries' creation times.

```
ac-obsoleting-ipms ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SequenceNumber,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                  multi-valued,
  ID                          id-cat-obsoleting-ipms }
```

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, to which at least one IPM refers in its Obsoleted IPMs heading field.

19.6.5.1.4 AC Obsoleted IPMs

The AC Obsoleted IPMs attribute, which is multi-valued, contains the sequence-numbers of the IPM entries identified by the Obsoleted IPMs heading field of the present IPM. The attribute values are stored in the same order as the corresponding values of the heading field.

```
ac-obsoleted-ipms ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SequenceNumber,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                  multi-valued,
  ID                          id-cat-obsoleted-ipms }
```

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, which identifies in its Obsoleted IPMs heading field one or more IPMs present in the IPMS-MS.

19.6.5.1.5 AC Relating IPMs

The AC Relating IPMs attribute, which is multi-valued, contains the sequence-numbers of the IPM entries which indicate, by means of their Related IPMs heading field, that they are related to the present IPM. The attribute values are stored in ascending order of the relating entries' creation times.

```

ac-relating-ipms ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      SequenceNumber,
    EQUALITY MATCHING-RULE     integerMatch,
    ORDERING MATCHING-RULE     integerOrderingMatch,
    NUMERATION                 multi-valued,
    ID                         id-cat-relating-ipms }

```

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, to which at least one IPM refers in its Related IPMs heading field.

19.6.5.1.6 AC Related IPMs

The AC Related IPMs attribute, which is multi-valued, contains the sequence-numbers of the IPM entries identified by the Related IPMs heading field of the present IPM. The attribute values are stored in the same order as the corresponding values of the heading field.

```

ac-related-ipms ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      SequenceNumber,
    EQUALITY MATCHING-RULE     integerMatch,
    ORDERING MATCHING-RULE     integerOrderingMatch,
    NUMERATION                 multi-valued,
    ID                         id-cat-related-ipms }

```

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, which identifies in its Related IPMs heading field one or more IPMs present in the IPMS-MS.

19.6.5.1.7 AC Replied-to IPM

The AC Replied-to IPM attribute contains the sequence-number of the IPM entry to which the present IPM is a reply.

```

ac-replied-to-ipm ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      SequenceNumber,
    EQUALITY MATCHING-RULE     integerMatch,
    ORDERING MATCHING-RULE     integerOrderingMatch,
    NUMERATION                 single-valued,
    ID                         id-cat-replied-to-ipm }

```

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, and which contains a Replied-to IPM heading field. Its value shall be the sequence-number of the entry identified by the Replied-to IPM heading field.

19.6.5.1.8 AC Replying IPMs

The AC Replying IPMs attribute, which is multi-valued, contains the sequence-numbers of the IPM entries which indicate, by means of their Replied-to IPM heading field, that they were sent in reply to the present IPM. The attribute values are stored in ascending order of the replying entries' creation times.

```

ac-replying-ipms ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX      SequenceNumber,
    EQUALITY MATCHING-RULE     integerMatch,
    ORDERING MATCHING-RULE     integerOrderingMatch,
    NUMERATION                 multi-valued,
    ID                         id-cat-replying-ipms }

```

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, and at least one reply to that IPM has been submitted or delivered.

19.6.5.2 Submitted message correlation

Some attributes correlate IPMs submitted by this IPMS-MS-user with the replies and notifications subsequently delivered in response, and provide a summary of the responses requested and those received.

NOTE - If a non-delivery-report is received concerning an intended recipient of a submitted message then no reply or IPN will be generated by that recipient. The UA can determine when this applies by examining the MS AC-report-summary attribute and correlating the recipients identified in the MS Recipient-names and AC IPM Recipients attributes.

For any given entry, the number of values of each of the submitted message correlation attributes, defined below, shall be the same. The ordering of values in the attributes is aligned, such that all values at a given order position within the sequence of attribute-values refer to one of the intended recipients of the IPM. The AC IPM Recipients attribute shall be supported if any of the other attributes defined in 19.6.5.2 are supported.

19.6.5.2.1 AC IPM Recipients

The AC IPM Recipients attribute, which is multi-valued, contains one value for each distinct Primary, Copy, and Blind Copy Recipient of the submitted IPM. Where two or more recipient specifiers contain the same value of OR-name (i.e. the Formal-name component of the Recipient component of recipient specifier) a value is generated only for the first of these. Fields are inspected in the order Primary, Copy, and Blind Copy Recipients.

The order of values in this attribute is aligned with the order of values in the other attributes defined in 19.6.5.2.

NOTE - For example, the value containing the OR-descriptor for a given recipient occupies the same position in this attribute as the position occupied by the value containing the delivered-reply-status for the same recipient in the AC Delivered Replies Summary attribute.

The initial values of this attribute are drawn from the corresponding recipient specifiers, as determined by the procedure indicated above.

```
ac-ipm-recipients ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      ORDescriptor,
  EQUALITY MATCHING-RULE     orDescriptorMatch,
  OTHER MATCHING-RULES       {orDescriptorElementsMatch | orDescriptorSubstringElementsMatch},
  NUMERATION                  multi-valued,
  ID                          id-cat-ipm-recipients }
```

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the submission-log entry for such an object) if, and only if, that object is a submitted message whose content is an IPM. It shall maintain one attribute value for each distinct recipient specifier in the IPM's Primary, Copy, and Blind Copy Recipients fields. The values shall be the recipient specifiers' Recipient components.

19.6.5.2.2 AC Delivered Replies Summary

The AC Delivered Replies Summary attribute, which is multi-valued, records whether replies have been solicited from each of the AC IPM Recipients of a submitted IPM and whether replies have been received. The initial value of the attribute is set for each of the AC IPM Recipients according to whether a reply was requested of that recipient. The order of values in this attribute is aligned with the order of values in the other attributes defined in 19.6.5.2.

```
ac-delivered-replies-summary ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      DeliveredReplyStatus,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                  multi-valued,
  ID                          id-cat-delivered-replies-summary }
```

```
DeliveredReplyStatus ::= INTEGER {
  no-reply-requested      (0) -- reply not requested --,
  reply-outstanding       (1) -- reply requested -- ,
  reply-received          (2) }
```

For each value present in the AC IPM Recipients attribute, this attribute may assume any one of the following values:

- a) *no-reply-requested*: No reply was requested of this recipient and none has been received. This is a possible initial value of the attribute.
- b) *reply-outstanding*: A reply was requested of this recipient and none has been received. This is a possible initial value of the attribute.
- c) *reply-received*: One or more replies originated by this recipient have been received.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the submission-log entry for such an object) if, and only if, that object is a submitted message whose content is an IPM. It shall maintain one attribute value for each value of the AC IPM Recipients attribute. The initial values shall reflect the values of the recipient specifiers' Reply-requested components.

19.6.5.2.3 AC Correlated Delivered Replies

The AC Correlated Delivered Replies attribute, which is multi-valued, identifies the delivered IPMs which were originated by an intended recipient of a submitted IPM, and which indicate, by means of their Replied-to IPM heading field, that they were sent in reply to the submitted IPM. The initial value of the attribute is set for each of the AC IPM Recipients and indicates that no reply has been received. The order of values in this attribute is aligned with the order of values in the other attributes defined in 19.6.5.2.

```
ac-correlated-delivered-replies ATTRIBUTE ::= {
    WITH ATTRIBUTE-SYNTAX    CorrelatedDeliveredReplies,
    NUMERATION               multi-valued,
    ID                       id-cat-correlated-delivered-replies }

CorrelatedDeliveredReplies ::= CHOICE {
    no-reply-received        [0] NULL,
    received-replies         [1] SEQUENCE OF SequenceNumber }
```

The components of **correlated-delivered-replies** have the following meaning:

- a) **No-reply-received (C)**: No reply has been received from this intended recipient of the submitted IPM. This is the initial value of the attribute.
- b) **Received-replies (C)**: This identifies the sequence-numbers of the one or more IPMs received by this IPMS-MS-user in reply to a previously submitted IPM. The sequence-numbers are present in ascending order of the corresponding entries' creation times.

Each value of this attribute indicates that no reply has been received, or identifies each delivered-message entry which contains a reply, whose subject is the originally submitted IPM, and whose originator was an intended recipient of the IPM.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the submission-log entry for such an object) if, and only if, that object is a submitted message whose content is an IPM. It shall maintain one attribute value for each value of the AC IPM Recipients attribute. The initial values shall be *no-reply-received*.

19.6.5.2.4 AC Delivered IPN Summary

The AC Delivered IPN Summary attribute, which is multi-valued, contains a summary of the IPNs requested of, and generated by, or on behalf of, the AC IPM Recipients of a submitted message. The initial values of AC Delivered IPN Summary are set according to the values of the Notification-requests component of each of the IPM Recipient's recipient specifier, and each value is updated as each IPN is received (with the condition that the new value is greater than the value it replaces). The order of values in this attribute is aligned with the order of values in the other attributes defined in 19.6.5.2.

```

ac-delivered-ipn-summary ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      DeliveredIPNStatus,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                  multi-valued,
  ID                          id-cat-delivered-ipn-summary }

DeliveredIPNStatus ::= INTEGER (
  no-ipn-requested           (0),
  nrn-requested              (5),
  rn-requested               (10),
  ipm-auto-forwarded         (15),
  ipm-discarded              (20),
  rn-received                 (25) )

```

For each value present in the AC IPM Recipients attribute, this attribute may assume any one of the following values:

- a) *no-ipn-requested*: No notification-requests were made of this recipient. This is a possible initial value of the attribute.
- b) *nrn-requested*: Non-receipt-notification was requested of this recipient and no such notification has been received. This is a possible initial value of the attribute.
- c) *rn-requested*: Receipt notification was requested of this recipient and no such notification has been received. This is a possible initial value of the attribute.
- d) *ipm-auto-forwarded*: A non-receipt-notification generated by, or on behalf of, this recipient has been received which indicates that the IPM was auto-forwarded; see 8.2.1.
- e) *ipm-discarded*: A non-receipt-notification generated by, or on behalf of, this recipient has been received which indicates that the IPM was discarded; see 8.2.1.
- f) *rn-received*: An IPN generated by, or on behalf of, this recipient has been received which confirms the receipt of the submitted IPM.

NOTE - A future version of this part of ISO/IEC 10021 may specify additional values of AC Delivered IPN Summary for ONs.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the submission-log entry for such an object) if, and only if, that object is a submitted message whose content is an IPM. It shall maintain one attribute value for each value of the AC IPM Recipients attribute. The initial values shall reflect the values of the recipient specifiers' Notification-requests components.

19.6.5.2.5 AC Correlated Delivered IPNs

The AC Correlated Delivered IPNs attribute, which is multi-valued, identifies the delivered IPNs that have been correlated with each of the AC IPM Recipients of a submitted IPM. The initial value of the attribute is set for each of the AC IPM Recipients and indicates that no IPNs have been received. The order of values in this attribute is aligned with the order of values in the other attributes defined in 19.6.5.2.

```

ac-correlated-delivered-ipns ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      CorrelatedDeliveredIPNs,
  NUMERATION                  multi-valued,
  ID                          id-cat-correlated-delivered-ipns }

CorrelatedDeliveredIPNs ::= CHOICE (
  no-ipn-received            [0] NULL,
  ipns-received              [1] SEQUENCE OF SequenceNumber )

```

The components of correlated-delivered-IPNs have the following meaning:

- a) **No-IPN-received (C)**: No IPN has been received from this intended recipient or from an actual recipient acting on his behalf. This is the initial value of the attribute.

- b) **IPNs-received (C):** This identifies the sequence-numbers of the IPN entries received from this intended recipient or the actual recipient acting on his behalf. The sequence-numbers are present in ascending order of the corresponding entries' creation times.

Each value of this attribute indicates that no IPN has been received, or identifies each delivered-message entry which contains an IPN, whose subject is the originally submitted IPM, and whose originator received the IPM as, or on behalf of, an intended recipient.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the submission-log entry for such an object) if, and only if, that object is a submitted message whose content is an IPM. It shall maintain one attribute value for each value of the AC IPM Recipients attribute. The initial values shall be *no-IPN-received*.

19.6.5.3 Delivered message correlation

Some attributes correlate IPMs delivered to this IPMS-MS-user with the replying IPMs and IPNs subsequently submitted by the IPMS-MS-user, and provide a summary of the responses requested and those generated.

19.6.5.3.1 AC Submitted Reply Status

The AC Submitted Reply Status attribute indicates whether a reply to a delivered IPM was requested and whether one has been sent.

```
ac-submitted-reply-status ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SubmittedReplyStatus,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                  single-valued,
  ID                          id-cat-submitted-reply-status }

SubmittedReplyStatus ::= INTEGER {
  no-reply-requested          (0),
  no-reply-intended           (1),
  reply-pending               (2),
  reply-sent                   (3) }
```

This attribute may assume any one of the following values:

- a) *no-reply-requested*: The delivered IPM does not contain a request for this recipient to generate a reply. This is a possible initial value of the attribute. If the subject recipient specifier of the delivered IPM cannot be identified, this value is assumed.
- b) *no-reply-intended*: This recipient has determined not to generate a reply to the delivered IPM (regardless of whether one was requested).
- b) *reply-pending*: The delivered message contains a request for this recipient to generate a reply, or this recipient has declared an intention to generate a reply. The action is still outstanding. This is a possible initial value of the attribute.
- c) *reply-sent*: A reply to the delivered IPM has been generated.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the delivery-log entry for such an object) if, and only if, that object is a delivered message whose content is an IPM. The initial value of the attribute is set in accordance with the reply-requested component of the subject recipient specifier. The attribute is subject to modification by means of the Modify abstract-operation and the Auto-modify auto-action.

19.6.5.3.2 AC Submitted IPN Status

The AC Submitted IPN Status attribute indicates whether an interpersonal notification for a delivered message was requested and whether one has been sent.

```
ac-submitted-ipn-status ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SubmittedIPNStatus,
  EQUALITY MATCHING-RULE     integerMatch,
  ORDERING MATCHING-RULE     integerOrderingMatch,
  NUMERATION                  single-valued,
  ID                          id-cat-submitted-ipn-status }

SubmittedIPNStatus ::= INTEGER(
  no-ipn-requested           (0),
  nrn-requested              (5),
  nrn-with-ipm-return-requested (10),
  rn-requested               (15),
  rn-with-ipm-return-requested (20),
  ipm-auto-forwarded         (25),
  ipm-discarded              (30),
  rn-sent                    (35) )
```

This attribute may assume any one of the following values:

- a) *no-ipn-requested*: The delivered message contains no notification-requests for this IPMS-MS-user. This is a possible initial value of the attribute. If the subject recipient specifier of the delivered IPM cannot be identified, this value is assumed.
- b) *nrn-requested*: The delivered message contains a non-receipt notification request for this IPMS-MS-user. This is a possible initial value of the attribute.
- c) *nrn-with-ipm-return-requested*: The delivered message contains a request for non-receipt notification with return of IPM for this IPMS-MS-user. This is a possible initial value of the attribute.
- d) *rn-requested*: The delivered message contains a receipt notification request for this IPMS-MS-user. This is a possible initial value of the attribute.
- e) *rn-with-ipm-return-requested*: The delivered message contains a request for receipt notification with return of IPM in the event of non-receipt by this IPMS-MS-user. This is a possible initial value of the attribute.
- f) *ipm-auto-forwarded*: A non-receipt-notification which indicates that the IPM was auto-forwarded has been sent; see 8.2.1.
- g) *ipm-discarded*: A non-receipt-notification which indicates that the IPM was discarded has been sent; see 8.2.1.
- h) *rn-sent*: A receipt notification has been sent.

NOTE - The specification of additional values of AC Submitted IPN Status for ONs may be the subject of future standardization.

An IPMS-MS that supports this attribute shall maintain it for an information object that it holds (and the delivery-log entry for such an object) if, and only if, that object is a delivered message whose content is an IPM. The initial value of the attribute is set in accordance with Notification-requests component of the subject recipient specifier.

19.6.5.3.3 AC Submitted IPNs

The AC Submitted IPNs attribute, which is multi-valued, identifies the IPNs submitted in response to a delivered IPM. The IPMS-MS shall record, by means of this attribute, any IPN submitted by the IPMS-MS-user, and any NRN caused by the invocation of the Delete abstract-operation (see 19.4), or caused as a consequence of auto-actions performed by the IPMS-MS. The attribute values are stored in ascending order of the IPN entries' creation times.

```
ac-submitted-ipns ATTRIBUTE ::= {
  WITH ATTRIBUTE-SYNTAX      SequenceNumber,
  EQUALITY MATCHING-RULE    integerMatch,
  ORDERING MATCHING-RULE    integerOrderingMatch,
  NUMERATION                 multi-valued,
  ID                         id-cat-submitted-ipns }
```

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

19.6.5.3.4 Revised Reply Time

The **Revised Reply Time** attribute enables the IPMS-MS-user to maintain a modified version of the **Reply Time** attribute. The IPMS-MS-user may generate this attribute using the **Modify** abstract-operation.

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

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

19.6.6 The IPMS-attribute-table information object class

For the IPMS-MS, the members of the **IPMS-attribute-table** information object set are regarded as objects populating the **Content-specific-attributes** information object set defined in 11.3 of ISO/IEC 10021-5. It is defined as follows:

```
IPMSAttributeTable ATTRIBUTE ::= {
  acknowledgment-mode | authorizing-users | auto-forward-comment | auto-forwarded |
  auto-submitted | bilaterally-defined-body-parts | blind-copy-recipients | body |
  conversion-eits | copy-recipients | discard-reason | encrypted-body-parts | encrypted-data |
  encrypted-parameters | expiry-time | extended-body-part-types | g3-facsimile-body-parts |
  g3-facsimile-data | g3-facsimile-parameters | g4-class1-body-parts | heading |
  ia5-text-body-parts | ia5-text-data | ia5-text-parameters | importance | incomplete-copy |
  ipm-entry-type | ipm-intended-recipient | ipm-synopsis | ipn-originator | languages |
  message-body-parts | message-data | message-parameters | mixed-mode-body-parts |
  nationally-defined-body-parts | non-receipt-reason | nrn-requestors | obsoleted-IPMs |
  originator | primary-recipients | receipt-time | related-IPMs | replied-to-IPM |
  reply-recipients | reply-requestors | reply-time | returned-ipm | rn-requestors |
  sensitivity | subject | subject-ipm | suppl-receipt-info | teletex-body-parts |
  teletex-data | teletex-parameters | this-ipm | videotex-body-parts | videotex-data |
  videotex-parameters,
  ... -- 1994 extension additions -- ,
  ac-correlated-delivered-ipns | ac-correlated-delivered-replies | ac-delivered-ipn-summary |
  ac-delivered-replies-summary | ac-forwarded-ipms | ac-forwarding-ipms | ac-ipm-recipients |
  ac-obsoleted-ipms | ac-obsoleting-ipms | ac-related-ipms | ac-relating-ipms |
  ac-replied-to-ipm | ac-replying-ipms | ac-submitted-ipn-status | ac-submitted-ipns |
  ac-submitted-reply-status | body-parts-summary | ipm-auto-discarded |
  notification-extensions | nrn-extensions | other-notification-type-fields |
  revised-reply-time | rn-extensions }
```

19.6.7 Generation of the IPMS-specific Attributes

Table 5 summarizes the rules governing the generation of the IPMS-specific attributes. See 5.4 for a description of the classifications used. The definitive rules for the generation of attributes is given in 19.6 and 19.9.

Table 5 - Generation of the IPMS attribute-types

Attribute-type name	Single/ multi valued	Source	Generation rules
AC Correlated Delivered IPNs	M	MS	A value is generated for each delivered IPN which has been correlated with an intended recipient of the submitted IPM.
AC Correlated Delivered Replies	M	MS	A value is generated for each delivered reply which has been correlated with an intended recipient of the submitted IPM.
AC Delivered IPN Summary	M	MS	Summarizes the notification requests in a submitted IPM, correlated with the IPNs received. One value is generated for each of the IPM recipients.
AC Delivered Replies Summary	M	MS	Summarizes the reply requests in a submitted IPM, correlated with the replies received. One value is generated for each of the IPM recipients.
AC Forwarded IPMs	M	MS	The attribute-values are the sequence-numbers of the IPMs contained as Message body parts of the present IPM.
AC Forwarding IPMs	M	MS	The attribute-values are the sequence-numbers of the IPMs which bear the present IPM as a Message body part.
AC IPM Recipients	M	MS	A value is generated for each recipient of the submitted IPM.
AC Obsolete IPMs	M	MS	A value is generated for each stored IPM referred to in the Obsolete IPMs Heading field of the present IPM.
AC Obsolete IPMs	M	MS	A value is generated for each IPM which refers to the present IPM in its Obsolete IPMs Heading field.
AC Related IPMs	M	MS	A value is generated for each stored IPM referred to in the Related IPMs Heading field of the present IPM.
AC Relating IPMs	M	MS	A value is generated for each IPM which refers to the present IPM in its Related IPMs Heading field.
AC Replied-to IPM	S	MS	The attribute-value is the sequence-number of the IPM to which the present IPM refers in its Replied-to IPM Heading field.
AC Replying IPMs	M	MS	The attribute-values are the sequence-numbers of IPMs which refer to the present IPM in their Replied-to IPM Heading fields.
AC Submitted IPN Status	S	MS	The attribute-value is initially set to the value of notification-requests pertaining to this IPMS-MS-user. Assigned by auto-correlation.
AC Submitted IPNs	M	MS	The attribute-values are the sequence-numbers of IPNs whose subject IPM is this entry. Assigned by auto-correlation.
AC Submitted Reply Status	S	MS, Mod	The attribute-value is initially set to the value of reply-requested pertaining to this IPMS-MS-user. The IPMS-MS updates this value if the IPMS-MS-user generates a reply.
Acknowledgment Mode	S	RN	The attribute-value is the value of the Receipt field of the same name.
Authorizing Users	M	IPM	The attribute-values are the values of the sub-fields of the Heading field of the same name. One value is generated for each sub-field present.
Auto-forward Comment	S	NRN	The attribute-value is the value of the Non-receipt field of the same name.
Auto-forwarded	S	IPM	The attribute-value is the value of the Heading field of the same name.
Auto-submitted	S	IPM	The attribute-value is the value of the Heading Extension of the same name.
Bilaterally Defined Body Parts	M	IPM	The attribute-values are the values of the Bilaterally Defined basic body parts present in the IPM. One value is generated for each such body part.

Table 5 (continued)

Attribute-type name	Single/ multi valued	Source	Generation rules
Blind Copy Recipients	M	IPM	The attribute-values are the values of the sub-fields of the Heading field of the same name. One value is generated for each sub-field present.
Body	S	IPM	The attribute-value is generated from the Body of the IPM.
Body Part Summary	M	MS	The value is generated for each body part present in the IPM.
Conversion EITs	M	RN, NRN, ON	The attribute-values are derived from the values of the Notification common field of the same name.
Copy Recipients	M	IPM	The attribute-values are the values of the sub-fields of the Heading field of the same name. One value is generated for each sub-field present.
Discard Reason	S	NRN	The attribute-value is the value of the Non-receipt field of the same name.
Encrypted Body Parts	M	IPM	The attribute-values are the values of the Encrypted basic body parts present in the IPM. One value is generated for each such body part.
Encrypted Data	M	IPM	The attribute-values are the values of the Data components of the Encrypted basic body parts present in the IPM. One value is generated for each such body part.
Encrypted Parameters	M	IPM	The attribute-values are the values of the Parameters components of the Encrypted basic body parts present in the IPM. One value is generated for each such body part.
Expiry Time	S	IPM	The attribute-value is the value of the Heading field of the same name.
Extended Body Part Types	M	IPM	The attribute-values identify the Extended body part types represented in the IPM. (All body part types are considered to be of type Extended, regardless of whether they were so conveyed to the IPMS-MS.). One value is generated for each such type present.
G3 Facsimile Body Parts	M	IPM	The attribute-values are the values of the G3 Facsimile basic body parts present in the IPM. One value is generated for each such body part.
G3 Facsimile Data	M	IPM	The attribute-values are the values of the Data components of the G3 Facsimile basic body parts present in the IPM. One value is generated for each such body part.
G3 Facsimile Parameters	M	IPM	The attribute-values are the values of the Parameters components of the G3 Facsimile basic body parts present in the IPM. One value is generated for each such body part.
G4 Class 1 Body Parts	M	IPM	The attribute-values are the values of the G4 Class 1 basic body parts present in the IPM. One value is generated for each such body part.
Heading	S	IPM	The attribute-value is the value of the Heading of the IPM.
IA5 Text Body Parts	M	IPM	The attribute-values are the values of the IA5 Text basic body parts present in the IPM. One value is generated for each such body part.
IA5 Text Data	M	IPM	The attribute-values are the values of the Data components of the IA5 Text basic body parts present in the IPM. One value is generated for each such body part.
IA5 Text Parameters	M	IPM	The attribute-values are the values of the Parameters components of the IA5 Text basic body parts present in the IPM. One value is generated for each such body part.

Table 5 (continued)

Attribute-type name	Single/ multi valued	Source	Generation rules
Importance	S	IPM	The attribute-value is the value of the Heading field of the same name.
Incomplete Copy	S	IPM	The attribute-value is the value of the Heading Extension of the same name.
IPM Auto-discarded	S	MS	Set <i>false</i> when the entry is created; set <i>true</i> if the IPM is subsequently auto-discarded.
IPM Entry-type	S	IPM, RN, NRN, ON	The attribute-value is generated according to the abstract-operation which caused the entry to be created (see 12.1 and 12.2).
IPM Intended Recipient	S	RN, NRN, ON	The attribute-value is the value of the Notification common field of the same name.
IPM Synopsis	S	MS	The value is generated from an analysis of the structure and types of the body parts present in the IPM.
IPN Originator	S	RN, NRN, ON	The attribute-value is the value of the Notification common field of the same name.
Languages	M	IPM	The attribute-values are the values of the Heading Extension of the same name.
Message Body Parts	M	IPM	The attribute-values are the sequence-numbers of the child-entries containing Message Body Parts. One such value is generated for each such body part in the IPM.
Message Data	M	IPM	The attribute-values are the values of the Data components of the Message basic body parts present in the IPM. One value is generated for each such body part.
Message Parameters	M	IPM	The attribute-values are the values of the Parameters components of the Message basic body parts present in the IPM. One value is generated for each such body part.
Mixed-mode Body Parts	M	IPM	The attribute-values are the values of the Mixed-mode basic body parts present in the IPM. One value is generated for each such body part.
Nationally Defined Body Parts	M	IPM	The attribute-values are the values of the Nationally Defined basic body parts present in the IPM. One value is generated for each such body part.
Non-receipt Reason	S	NRN	The attribute-value is the value of the Non-receipt field of the same name.
Notification Extensions	M	RN, NRN, ON	The attribute-values are the values of the Notification common field of the same name.
NRN Extensions	M	NRN	The attribute-values are the values of the Non-receipt field of the same name.
NRN Requestors	M	MS	The attribute-values are generated from Heading analysis.
Obsoleted IPMs	M	IPM	The attribute-values are the values of the sub-fields of the Heading field of the same name. One value is generated for each sub-field present.
Originator	S	IPM	The attribute-value is the value of the Heading field of the same name.
Other Notification Type Fields	M	ON	The attribute-values are the values of the Notification common field of the same name.

Table 5 (concluded)

Attribute-type name	Single/ multi valued	Source	Generation rules
Primary Recipients	M	IPM	The attribute-values are the values of the sub-fields of the Heading field of the same name. One value is generated for each sub-field present.
Receipt Time	S	RN	The attribute-value is the value of the Receipt field of the same name.
Related IPMs	M	IPM	The attribute-values are the values of the sub-fields of the Heading field of the same name. One value is generated for each sub-field present.
Replied-to IPM	S	IPM	The attribute-value is the value of the Heading field of the same name.
Reply Recipients	M	IPM	The attribute-values are the values of the sub-fields of the Heading field of the same name. One value is generated for each sub-field present.
Reply Requestors	M	MS	The attribute-values are generated from Heading analysis.
Reply Time	S	IPM	The attribute-value is the value of the Heading field of the same name.
Returned IPM	S	NRN	The attribute-value is the value of the Non-receipt field of the same name.
Revised Reply Time	S	Mod	The IPMS-MS-user may create, and subsequently modify the contents of this attribute.
RN Extensions	M	RN	The attribute-values are the values of the Receipt field of the same name.
RN Requestors	M	MS	The attribute-values are generated from Heading analysis.
Sensitivity	S	IPM	The attribute-value is the value of the Heading field of the same name.
Subject	S	IPM	The attribute-value is the value of the Heading field of the same name.
Subject IPM	S	RN, NRN, ON	The attribute-value is the value of the Notification common field of the same name.
Suppl Receipt Info	S	RN	The attribute-value is the value of the Receipt field of the same name.
Teletex Body Parts	M	IPM	The attribute-values are the values of the Teletex basic body parts present in the IPM. One value is generated for each such body part.
Teletex Data	M	IPM	The attribute-values are the values of the Data components of the Teletex basic body parts present in the IPM. One value is generated for each such body part.
Teletex Parameters	M	IPM	The attribute-values are the values of the Parameters components of the Teletex basic body parts present in the IPM. One value is generated for each such body part.
This IPM	S	IPM	The attribute-value is the value of the Heading field of the same name.
Videotex Body Parts	M	IPM	The attribute-values are the values of the Videotex basic body parts present in the IPM. One value is generated for each such body part.
Videotex Data	M	IPM	The attribute-values are the values of the Data components of the Videotex basic body parts present in the IPM. One value is generated for each such body part.
Videotex Parameters	M	IPM	The attribute-values are the values of the Parameters components of the Videotex basic body parts present in the IPM. One value is generated for each such body part.

19.6.8 Attributes Subject to Modification

The Modify abstract-operation and Auto-modify auto-action of the MS may be applied to the following IPMS-specific attribute-types:

- a) AC Submitted Reply Status
- b) Revised Reply Time

19.7 IPMS-MS matching rules

A matching-rule allows entries to be selected by making an assertion about their attribute-values. Each attribute definition indicates which matching-rules (if any) can be used to make assertions about values of that attribute-type. A number of matching rules used in this part of ISO/IEC 10021 are defined in ISO/IEC 10021-5, ISO/IEC 9594-2, and ISO/IEC 9594-6. In addition to these general matching-rules which may apply to attributes of any content-type, some matching-rules are defined for use with the IPMS-specific attributes. These are defined as instances of the MATCHING-RULE information object class; see 6.3.9.3 of ISO/IEC 10021-5. For the IPMS-MS, the elements of the IPM-matching-rule-table information object set are regarded as objects populating the Content-specific-matching-rules information object set defined in 12.6 of ISO/IEC 10021-5. It is defined as follows:

```
IPMMatchingRuleTable MATCHING-RULE ::= {
  iPMIdentifierMatch | oRDescriptorMatch | recipientSpecifierMatch,
  ... -- 1994 extension additions --,
  oRDescriptorElementsMatch | oRDescriptorSubstringElementsMatch |
  recipientSpecifierElementsMatch | recipientSpecifierSubstringElementsMatch }
```

19.7.1 IPM-identifier-match

The IPM-identifier-match compares for equality a presented value with attribute-values of type IPM-identifier.

```
iPMIdentifierMatch MATCHING-RULE ::= {
  SYNTAX    IPMIdentifier
  ID        id-mr-ipm-identifier }
```

The rule returns *true* if, and only if, the user component of IPM identifier is present in both or absent in both values, and corresponding components match. The user component matches according to the OR-name-match rule, and the user-relative-identifier matches according to the MS-string-match rule.

19.7.2 OR-descriptor-match

The OR-descriptor-match compares for equality a presented value with attribute-values of type OR-descriptor.

```
oRDescriptorMatch MATCHING-RULE ::= {
  SYNTAX    ORDescriptor
  ID        id-mr-or-descriptor }
```

The rule returns *true* if, and only if, one of the following conditions is fulfilled for the presented value and at least one value of the attribute:

- a) the formal-name component of OR-descriptor is present in both values, and matches according to the OR-name-match rule;
- b) formal-name component of OR-descriptor is absent in either (or both) values, but free-form-name is present in both, and matches according to the MS-string-match rule.

Otherwise, the rule returns *false*.

NOTE - The telephone-number component of OR-descriptor is not considered by this matching-rule.

19.7.3 OR-descriptor-elements-match

The OR-descriptor-elements-match determines whether a presented value is a subset of the elements present in some value of an attribute of type OR-descriptor.

```
oRDescriptorElementsMatch MATCHING-RULE ::= {
  SYNTAX    ORDescriptor
  ID        id-mr-or-descriptor-elements }
```

The rule is identical to the OR-descriptor-match rule except that the formal-name component of OR-descriptor matches using the OR-name-elements-match rule rather than the OR-name-match rule.

19.7.4 OR-descriptor-substring-elements-match

The OR-descriptor-substring-elements-match rule determines whether a presented value is a subset of the elements present in some value of an attribute of type OR-descriptor, where each presented string value is a substring of the corresponding stored value.

```
oRDescriptorSubstringElementsMatch MATCHING-RULE ::= {
  SYNTAX    ORDescriptor
  ID        id-mr-or-descriptor-substring-elements }
```

This rule is identical to the OR-descriptor-elements-match rule except that:

- the formal-name component matches using the OR-name-substring-elements-match rule;
- the free-form-name component matches using the MS-single-substring-match rule;
- if neither the formal-name nor free-form-name is present in both values, and the telephone-number component of OR-descriptor is present in both values, the rule returns *true* if the telephone-numbers match according to the Telephone Number Substrings Match rule, defined in ISO/IEC 9594-6. The presented value is treated as the sole any component of the substring assertion.

19.7.5 Recipient-specifier-match

The Recipient-specifier-match compares for equality a presented value with the O/R-descriptor components of attribute-values of type recipient specifier.

```
recipientSpecifierMatch MATCHING-RULE ::= {
  SYNTAX    RecipientSpecifier
  ID        id-mr-recipient-specifier }
```

The rule is identical to the OR-descriptor-match rule as applied to the recipient component of the presented and stored values of recipient specifier. The other components of recipient specifier are not considered.

19.7.6 Recipient-specifier-elements-match

The Recipient-specifier-elements-match determines whether a presented value is a subset of the elements present in some value of an attribute of type recipient specifier.

```
recipientSpecifierElementsMatch MATCHING-RULE ::= {
  SYNTAX    RecipientSpecifier
  ID        id-mr-recipient-specifier-elements }
```

The rule is identical to the OR-descriptor-elements-match rule as applied to the recipient component of the presented and stored values of recipient specifier. The other components of recipient specifier are not considered.

19.7.7 Recipient-specifier-substring-elements-match

The Recipient-specifier-substring-elements-match determines whether a presented value is a subset of the elements present in some value of an attribute of type recipient specifier, where each presented string value is a substring of the corresponding stored value.

```
recipientSpecifierSubstringElementsMatch MATCHING-RULE ::= {
  SYNTAX    RecipientSpecifier
  ID        id-mr-recipient-specifier-substring-elements }
```

The rule is identical to the OR-descriptor-substring-elements-match rule as applied to the recipient component of the presented and stored values of recipient specifier. The other components of recipient specifier are not considered.

19.8 IPMS-MS auto-actions

The IPMS-MS shall perform the general-auto-actions as specified in clause 13 of ISO/IEC 10021-5. In addition, this part of ISO/IEC 10021 defines four auto-actions that are specific to the IPMS-MS:

- a) IPM auto-forward;
- b) IPM auto-acknowledgement;
- c) IPM auto-correlate;
- d) IPM auto-discard.

Each IPMS-MS auto-action is defined as an instance of the AUTO-ACTION information object class (see 6.5.1 of ISO/IEC 10021-5). For the IPMS-MS, the elements of the IPM-auto-actions information object set are regarded as objects populating the Content-specific-auto-actions information object set defined in clause 13 of ISO/IEC 10021-5. It is defined as follows:

```
IPMAutoActions AUTO-ACTION ::= {
  ipm-auto-forward,
  ... -- 1994 extension additions -- ,
  ipm-auto-acknowledgement |
  ipm-auto-correlate |
  ipm-auto-discard }
```

Each auto-action-error that may be generated by the IPM auto-actions is defined as an instance of the AUTO-ACTION-ERROR information object class. For the IPMS-MS, the elements of the IPM-auto-action-error-table information object set are regarded as objects populating the Content-specific-auto-action-errors information object set defined in clause 13 of ISO/IEC 10021-5. It is defined as follows:

```
IPMAutoActionErrorTable AUTO-ACTION-ERROR ::= {
  ... -- 1994 extension additions -- ,
  submission-control-violated |
  element-of-service-not-subscribed |
  originator-invalid |
  recipient-improperly-specified |
  inconsistent-request |
  security-error |
  unsupported-critical-function |
  remote-bind-error |
  auto-forwarding-loop |
  duplicate-ipn |
  ipm-auto-discard-error }
```

The IPMS-MS-user may register and deregister auto-actions by subscription, or, in certain cases, by means of the Register-MS abstract-operation as described in 8.2.5 of ISO/IEC 10021-5. An auto-action-registration-parameter is associated with the registration of an auto-action and contains the parameters required by the IPMS-MS to perform the registered auto-action.

The operation of IPM auto-actions may be affected by the implementation of a security policy.

19.8.1 Auto-action performance

Table 6 shows the various events which may cause the creation of an entry in the IPMS-MS, and indicates which general and IPM-specific auto-actions are performed consequently for each type of event, and their order of execution (reading left to right).

Table 6 - Order of auto-action execution

Event	Auto-action					
	Auto-correlate-reports	IPM auto-correlate	Auto-modify	IPM auto-forward	IPM auto-discard	Auto-alert
IPM delivery	-	Y	Y	Y	Y	Y
IPN delivery	-	Y	Y	-	-	Y
Report delivery	Y	-	Y	-	-	Y
Submit IPM	Y	Y	Y	-	-	-
Submit IPN	Y	Y	Y	-	-	-
Submit probe	Y	-	Y	-	-	-
Create draft	-	-	Y	-	-	-

Legend	
Y	auto-action performed
-	not performed

NOTES

1. The Submit IPN event arises both from the submission of an IPN by the IPMS-MS-user and from the submission of an IPN by the IPMS-MS as a secondary consequence of the performance of an abstract-operation (Fetch, Modify, Delete) or an auto-action (IPM auto-forward, IPM auto-acknowledgement, IPM auto-discard, Auto-delete).
2. The Submit IPM event arises both from the submission of an IPM by the IPMS-MS-user and from the submission of an auto-forwarding IPM by the IPMS-MS.
3. The IPM auto-discard auto-action is present in Table 6 only in regard to its effect when an obsoleting IPM is delivered; the effect of the auto-action on expired IPMs is not directly reflected in Table 6 (except that it may result in a Submit IPN event).
4. The IPM auto-acknowledgement, IPM auto-discard (of expired IPMs), and Auto-delete auto-actions are not performed as a consequence of the events recorded in Table 6, and are not part of the sequence of auto-action executions shown in the Table. However, all may give rise to a Submit IPN event.

19.8.2 IPM Auto-forward

The **IPM auto-forward** auto-action enables the IPMS-MS-user to instruct the IPMS-MS to automatically forward any subsequently delivered message to another recipient or recipients. The auto-action is performed when an IPM is delivered to the IPMS-MS.

The IPM auto-forward auto-action allows one or more sets of IPM-auto-forward-registration-parameters to be registered with the IPMS-MS, each identified by its IPM-auto-forward registration-identifier. Each auto-forward-registration-parameter specifies criteria, by means of its filter parameter, to determine whether it applies to a particular delivered IPM, and if so, the IPM is auto-forwarded using the Message-submission abstract-operation. If the IPM matches the criteria of more than one auto-forward registration, it is auto-forwarded for each such registration.

The IPM-auto-forward-registration-parameter specifies whether the main-entry (and any associated child-entries) corresponding to the message shall be deleted after auto-forwarding. If any of the registered parameters acted upon indicates no deletion (or if any of the submissions fail), then the entry is not deleted.

If so requested, the IPMS-MS shall submit an NRN to the delivered IPM's originator.

```

ipm-auto-forward AUTO-ACTION ::= {
    REGISTRATION PARAMETER IS IPMAutoForwardRegistrationParameter
    ERRORS
        {submission-control-violated | recipient-improperly-specified |
         element-of-service-not-subscribed | originator-invalid |
         inconsistent-request | security-error | remote-bind-error |
         unsupported-critical-function | auto-forwarding-loop}
    IDENTIFIED BY
        id-act-ipm-auto-forward }

IPMAutoForwardRegistrationParameter ::= SET {
    filter [0] Filter OPTIONAL,
    auto-forward-arguments [1] AutoForwardArguments,
    delete-after-auto-forwarding [2] BOOLEAN DEFAULT FALSE,
    forwarding-information CHOICE {
        ms-1988 [3] EncodedForwardingInformation
        -- shall only be used in 1988 Application Contexts --
        -- 1994 extension --
        ms-1994 [4] ForwardingInformation1994
        -- shall only be used in 1994 Application Contexts -- } OPTIONAL,
        -- 1994 extension --
    submission-options [5] MSSubmissionOptions OPTIONAL }

AutoForwardArguments ::= SET {
    COMPONENTS OF PerMessageAutoForwardFields,
    per-recipient-fields [1] IMPLICIT SEQUENCE SIZE (1..ub-recipients) OF
        PerRecipientAutoForwardFields }

PerMessageAutoForwardFields ::= SET {
    originator-name OriginatorName,
    content-identifier ContentIdentifier OPTIONAL,
    priority Priority OPTIONAL,
    per-message-indicators PerMessageIndicators OPTIONAL,
    deferred-delivery-time [0] IMPLICIT DeferredDeliveryTime OPTIONAL,
    extensions [2] IMPLICIT SET OF ExtensionField{
        {PerMessageSubmissionExtensions}} DEFAULT {} }

PerRecipientAutoForwardFields ::= SET {
    recipient-name RecipientName,
    originator-report-request [0] IMPLICIT OriginatorReportRequest,
    explicit-conversion [1] IMPLICIT ExplicitConversion OPTIONAL,
    extensions [2] IMPLICIT SET OF ExtensionField{
        {PerRecipientMessageSubmissionExtensions}} DEFAULT {} }

```

The components of the IPM-auto-forward-registration-parameter have the following meaning:

- a) **Filter (O):** This is a set of criteria which a new entry representing a delivered message shall satisfy for the IPMS-MS to auto-forward it using this set of parameters.

If this component is absent, then all new entries are auto-forwarded.
- b) **Auto-forward-arguments (M):** This is a set of arguments registered to be used for each Message-submission abstract-operation (see 8.2.1.1.1 of ISO/IEC 10021-4). Any argument which is not registered, not mandatory, and not specifically mentioned below, will be absent from each Message-submission.

If conversion-with-loss-prohibited is registered with the value conversion-with-loss-allowed, either by explicit registration of the value, or if it is not registered and thus assumes this value by default, the value used for each Message-submission abstract-operation shall be the value of the corresponding Message-delivery argument. If it is registered with the value conversion-with-loss-prohibited, this value shall be used for each Message-submission abstract-operation.

If implicit-conversion-prohibited is registered with the value 'zero', indicating that implicit conversion is allowed, or if no value is registered, the value used for each Message-submission abstract-operation shall be the value of the

corresponding Message-delivery argument. If it is registered with the value 'one', indicating that implicit-conversion is prohibited, this value shall be used for each Message-submission abstract-operation.

If the following arguments are not registered, their presence as Message-submission arguments depends upon the presence of the corresponding Message-delivery arguments, their values being transformed where appropriate: message-token, content-confidentiality-algorithm-identifier, content-integrity-check, message-origin-authentication-check, message-security-label, and priority.

Certain Message-submission arguments shall not be registered. These are: proof-of-submission-request, original-encoded-information-types, content-type, and content.

NOTE - The ability to register deferred-delivery-time is provided for historical reasons.

- c) **Delete-after-auto-forwarding (O):** If the component is *true*, the delivered IPM shall be deleted after successful auto-forwarding. If the component is *false*, the delivered IPM shall not be deleted.
- d) **Forwarding-information (O):** This component specifies additional values used to construct the NRN and the forwarding IPM. The IPMS-MS shall submit an NRN if, and only if, one is requested by means of the Notification-requests component of the delivered IPM's subject recipient specifier. The non-receipt-reason is given the value *ipm-auto-forwarded*, and the auto-forward-comment is copied from auto-forwarding-comment, if present.

The This-IPM-prefix, if present, shall prefix the User-relative-identifier component of the This IPM field of the forwarding IPM's heading. The cover-note, if present, shall form the forwarding message's first body part. When using a 1988 Application Context to register the auto-action, forwarding-information shall be further encoded as an Octet String using ASN.1's Basic Encoding Rules, and cover-note shall be an IA5 Text body part (the IA5-cover-note).

```
ForwardingInformation1994 ::= SET {
    auto-forwarding-comment [0] IMPLICIT AutoForwardComment OPTIONAL,
    cover-note [1] IMPLICIT BodyPart OPTIONAL,
    this-ipm-prefix [2] IMPLICIT PrintableString (SIZE (1..ub-ipm-identifier-suffix))
                           OPTIONAL }
```

```
EncodedForwardingInformation ::= OCTET STRING -- contains ForwardingInformation1988 --
```

```
ForwardingInformation1988 ::= SET {
    auto-forwarding-comment [0] IMPLICIT AutoForwardComment OPTIONAL,
    ia5-cover-note [1] IMPLICIT IA5TextBodyPart OPTIONAL,
    this-ipm-prefix [2] IMPLICIT PrintableString (SIZE (1..ub-ipm-identifier-suffix))
                           OPTIONAL }
```

Where a registration-status-request requesting auto-action-registrations is present in Register-MS-argument, the IPMS-MS shall return forwarding-information in a form appropriate to the Application Context then in effect, regardless of the Application Context in effect at the time when the registration was made. Cover-note shall be omitted if a 1988 Application Context is in effect and the registered cover-note is not an IA5 Text body part. See 8.2.5.1 of ISO/IEC 10021-5.

- e) **Submission-options (C):** This component contains submission-options which shall apply to the forwarding IPM and to the submitted NRN (if one is requested), and which are specific to MS operation (see 8.1.6 of ISO/IEC 10021-5). The value *draft* is not permitted for the object-entry-class component; the MS-submission-extensions component shall be disregarded. If the component is omitted, it assumes the value of submission-defaults, as registered by means of Register-MS; see 8.2.5.1 of ISO/IEC 10021-5.

The additional procedures necessary to support this auto-action are defined in 18.5.3 and 19.9.1.2.

The performance of the IPM auto-forward auto-action may cause the creation of an entry in the Auto-action-log entry-class, subject to subscription to the Auto-action-log entry-class. The auto-action-errors associated with the IPM auto-forward auto-action correspond to the abstract-errors of the Message Submission abstract-operation; see 8.2.1.1.3 of ISO/IEC 10021-4. In addition, the following auto-action-error is generated if an auto-forwarding loop is detected (see 18.5.3.1):

```
auto-forwarding-loop AUTO-ACTION-ERROR ::= {
  CODE      global:id-aae-auto-forwarding-loop }
```

Support of the IPM auto-forward auto-action by an IPMS-MS or UA accessing an IPMS-MS requires that it supports the registration of the IPM-auto-forward-registration-parameter by means of the Register-MS abstract-operation.

19.8.3 IPM Auto-acknowledgement

The IPM auto-acknowledgement auto-action enables the IPMS-MS-user to instruct the IPMS-MS to automatically originate RNs on the user's behalf. The auto-action is performed when the retrieval-status of an IPM entry in the Delivery entry-class changes to *processed*. The RN is originated only if RN was requested of this user for this IPM by means of the Notification-requests component of the subject recipient specifier. The RN shall not be generated if suspend-auto-acknowledgement was specified in the bind-extensions parameter of the MS-bind abstract-operation which established the present abstract-association (see 19.5.1). The RN shall have the common fields and receipt fields as prescribed in 18.5.2.1 and shall be submitted as prescribed in 18.5.2.2.

NOTES

1. No RN should be generated for an IPM which has been the subject of DL-expansion.
2. An RN is not originated for an entry whose retrieval-status changes to *processed* as a consequence of IPM auto-forwarding.
3. An abstract-association might terminate abnormally after an RN has been submitted by the IPMS-MS, but before the fetch-result that caused the IPM auto-acknowledgement has been received by the IPMS-MS-user. The IPMS-MS has no detection or recovery mechanisms for this case.

The IPM-auto-acknowledgement-registration-parameter may specify the Suppl Receipt Info field of each RN generated by IPM auto-acknowledgement, and the submission-options that shall apply (see 8.1.6 of ISO/IEC 10021-5). In submission-options, the value *draft* is not permitted for the object-entry-class component; the MS-submission-extensions component shall be absent. If the submission-options parameter is omitted, it assumes the value of submission-defaults, as registered by means of Register-MS; see 8.2.5.1 item (h) of ISO/IEC 10021-5.

```
ipm-auto-acknowledgement AUTO-ACTION ::= {
  REGISTRATION PARAMETER IS IPMAutoAcknowledgementRegistrationParameter
  ERRORS                    {submission-control-violated | recipient-improperly-specified |
                             element-of-service-not-subscribed | originator-invalid |
                             inconsistent-request | security-error | remote-bind-error |
                             unsupported-critical-function | duplicate-ipn}
  IDENTIFIED BY             id-aa-ipm-auto-acknowledgement }

IPMAutoAcknowledgementRegistrationParameter ::= SET {
  auto-acknowledge-suppl-receipt-info [0] SupplReceiptInfoField OPTIONAL,
  submission-options                  [1] MSSubmissionOptions OPTIONAL }
```

The performance of the IPM auto-acknowledgement auto-action may cause the creation of an entry in the Auto-action-log entry-class, subject to subscription to the Auto-action-log entry-class. Where an IPN has already been generated for a delivered IPM, (except for an auto-forwarded IPM where an NRN indicating IPM-auto-forwarded has already been sent), IPM auto-acknowledgement fails and generates the following error:

```
duplicate-ipn AUTO-ACTION-ERROR ::= {
  CODE      global:id-aae-duplicate-ipn }
```

Support of the IPM auto-acknowledgement auto-action by an IPMS-MS, or UA accessing an IPMS-MS, requires that it supports a single registration of the IPM-auto-acknowledgement-registration-parameter by means of the Register-MS abstract-operation. The registration-identifier component of auto-action-registration shall be absent when registration is

requested. The IPM auto-acknowledgement auto-action shall not be subscribed to unless the AC Submitted-IPN-Status attribute is also subscribed to.

An IPMS-MS which supports the IPM auto-acknowledgement auto-action shall support the suspend-auto-acknowledgement extension defined in 19.5.1.

19.8.4 IPM Auto-correlate

The **IPM auto-correlate** auto-action correlates IPMs and IPNs related in the following ways:

- a) an IPM and the IPMs generated in reply;
- b) an IPM and the IPNs notifying receipt or non-receipt;
- c) an IPM and the IPMs which subsequently forward it, or obsolete it, or are related to it.

The auto-action also correlates response requests made of the IPMS-MS-user with any corresponding replies or IPNs subsequently generated by this user, or by the IPMS-MS in the performance of some other auto-action. The auto-action is performed whenever an IPM or IPN is submitted or delivered. The IPM auto-correlate auto-action is provided by subscription only, and not by registration using the Register-MS abstract-operation of ISO/IEC 10021-5.

```
ipm-auto-correlate AUTO-ACTION ::= {
    IDENTIFIED BY      id-aa-ipm-auto-correlate }
```

The IPMS-specific attributes which support IPM auto-correlate are defined in 19.6.5, and the additional procedures necessary for the support of this auto-action are defined in 19.9.1.1. The performance of the IPM auto-correlate auto-action shall not cause the creation of an entry in the Auto-action-log entry-class.

19.8.5 IPM Auto-discard

The **IPM auto-discard** auto-action enables the IPMS-MS-user to instruct the IPMS-MS to automatically delete a delivered IPM entry (and any child-entries associated with it) when the date and time denoted by its Expiry Time field has passed or when a subsequently delivered IPM renders it obsolete. IPM auto-discard shall not be performed while an abstract-association exists between the IPMS-MS and the IPMS-MS-user. When it auto-discards an IPM, the IPMS-MS originates an NRN on the user's behalf if, and only if, an NRN is requested of this user by means of the Notification-requests component of the subject recipient specifier and the retrieval-status does not have the value *processed*. The NRN shall have the common fields and non-receipt fields as prescribed in 18.5.1.2 and shall be submitted as prescribed in 18.5.1.3.

```
ipm-auto-discard AUTO-ACTION ::= {
    REGISTRATION PARAMETER IS IPMAutoDiscardRegistrationParameter
    ERRORS                    {submission-control-violated | recipient-improperly-specified |
                                element-of-service-not-subscribed | originator-invalid |
                                inconsistent-request | security-error | remote-bind-error |
                                unsupported-critical-function | ipm-auto-discard-error}
    IDENTIFIED BY              id-aa-ipm-auto-discard }
```

```
IPMAutoDiscardRegistrationParameter ::= SET {
    filter                                [0] Filter OPTIONAL,
    submission-options                    [1] MSSubmissionOptions OPTIONAL,
    auto-discard-expired-ipms             [2] BOOLEAN,
    auto-discard-obsolete-ipms            [3] BOOLEAN,
    restrict-obsolete-to-originator       [4] BOOLEAN }
```

The components of IPM-auto-discard-registration-parameter have the following meaning:

- a) **Filter (O):** This specifies a filter which an expired or obsoleted message shall satisfy before IPM auto-discard is performed; if omitted, all expired and obsoleted IPMs are auto-discarded (subject to Items c, d, and e).

NOTE - The IPMS-MS-user may prevent IPM auto-discard from acting on entries with MS retrieval-status *new*, by constructing a Filter which excludes such entries.

- b) **Submission-options (O):** This specifies submission requests for the submitted NRN (see 8.1.6 of ISO/IEC 10021-5). The value *draft* is not permitted for the object-entry-class component; the MS-submission-extensions component shall be absent. If the submission-options is omitted, it assumes the value of general-submission-defaults, as registered by means of Register-MS; see 8.2.5.1 of ISO/IEC 10021-5.
- c) **Auto-discard-expired-IPMs (M):** If *true*, and if the filter is satisfied, then expired IPMs shall be auto-discarded.
- d) **Auto-discard-obsolete-IPMs (M):** If *true*, and if the filter is satisfied, then obsolete IPMs shall be auto-discarded.
- e) **Restrict-obsolete-to-originator (M):** If *true*, then an IPM shall be deemed to be obsolete only if the obsolete IPM and the IPM carrying the obsoleting-indication were originated by the same user.

The performance of the IPM auto-discard auto-action may cause the creation of an entry in the Auto-action-log entry-class, subject to subscription to the Auto-action-log entry-class. Where an IPM is not auto-discarded because the restrict-obsolete-to-originator component is *true*, the IPMS-MS shall assign an IPM-auto-discard-error with the value *not-obsolete-by-originator* to the auto-action-error attribute in the corresponding Auto-action-log entry:

```

ipm-auto-discard-error AUTO-ACTION-ERROR ::= {
  PARAMETER      SET {
    problem      [0] AutoDiscardProblem }
  CODE          global:id-aae-auto-discard-error }

AutoDiscardProblem ::= INTEGER {
  not-obsolete-by-originator (0) }

```

If an IPM is auto-discarded and the Message-log entry-class is subscribed to then an IPM-auto-discarded attribute is added to the Message-log entry and assigned the value *true*.

Support for the IPM auto-discard auto-action by an IPMS-MS, or UA accessing an IPMS-MS, requires that it supports the registration of the IPM-auto-discard-registration-parameter by means of the Register-MS abstract-operation.

19.9 Procedures for the IPMS-MS

The procedures for a general (content-independent) MS are described in clauses 15 and 16 of ISO/IEC 10021-5. Additional procedures required to support the operation of an IPMS-MS are defined here.

19.9.1 Additional procedures for Message-delivery

The performance of the Message-delivery abstract-operation is described in 15.1.1 of ISO/IEC 10021-5. Additions to item (c) in that subclause, required for the support of this abstract-operation in Interpersonal Messaging, are described in 19.9.1.1 - 19.9.1.3.

19.9.1.1 Additional procedures for IPM auto-correlate

If the IPM auto-correlate auto-action is subscribed to, the IPMS-MS performs the following actions:

- a) If the delivered message contains an IPM whose Replied-to IPM heading field is present, the IPMS-MS shall attempt to locate the entry identified by the Replied-to IPM field by searching main-entries of all the entry-classes except the Draft and Auto-action-log entry-classes. If this entry is found (the replied-to entry), its sequence-number is recorded in the AC Replied-to IPM attribute of the present entry. Similarly, the replied-to entry has its AC Replying IPMs attribute updated to reference the present entry.

If the replied-to entry described above is located in the Submission or Submission-log entry-class, the following additional actions are taken. The Originator of the present IPM is matched against the list of recipients held in the replied-to entry's AC IPM Recipients attribute. If a match is found, then the IPMS-MS shall update the value

corresponding to that recipient in the replied-to entry's AC Correlated Delivered Replies attribute to cause it to reference the present IPM. In addition, the value corresponding to the same recipient in the replied-to entry's AC Delivered Replies Summary attribute shall be updated to record that a reply was received from that recipient.

NOTE - If no match is found for the Originator, the IPMS-MS may attempt to match one of the OR-names in DL-expansion-history, if present in the delivered IPM, against the list of recipients held in the replied-to entry's AC IPM Recipients attribute.

- b) If the delivered message contains an IPM, then each of the recipient specifier values present in its Primary, Copy, and Blind Copy Recipients fields is examined. If any recipient specifier identifies the present IPMS-MS-user, and the recipient specifier's reply-requested component indicates that a reply is requested, then the IPMS-MS shall create an AC Submitted Reply Status attribute containing the value *reply-pending*; otherwise the value *no-reply-requested* is assigned. If any recipient specifier identifies the present IPMS-MS-user, and the recipient specifier's Notification-requests component indicates that an IPN is requested, then the IPMS-MS shall create an AC Submitted IPN Status attribute containing the value *nrn-requested*, *nrn-with-ipm-return-requested*, *rn-requested*, or *rn-with-ipm-return-requested* as appropriate; otherwise the value *no-ipn-requested* is assigned.

NOTE - If the IPMS-MS is unable to identify the present IPMS-MS-user in any of the recipient specifiers, it should not attempt to find a relevant recipient specifier by examination of the IPM's DL-expansion-history and redirection-history attributes.

- c) If the delivered message contains an IPM which itself contains one or more Message body parts, the IPMS-MS shall attempt to identify the IPM entries corresponding to the Message body parts by searching main-entries of all the entry-classes, except the Draft and Auto-action-log entry-classes, and matching on IPM identifier. For each entry found, the IPMS-MS shall add the sequence-number of the delivered (forwarding) message to those entries' AC Forwarding IPMs attribute. In addition, the AC Forwarded IPMs attribute of the delivered message entry is updated to record the sequence-numbers of the forwarded IPMs.
- d) If the delivered message contains an IPM whose Related IPMs heading field is present, the IPMS-MS shall attempt to locate the entries identified by the Related IPMs field by searching entries of all the entry-classes except the Draft and Auto-action-log entry-classes. If any such entries are found, each has its AC Relating IPMs attribute updated to record the sequence-number of the delivered message entry. In addition, the AC Related IPMs attribute of the delivered message entry is updated to record the sequence-numbers of the related IPMs.
- e) If the delivered message contains an IPM whose Obsolete IPMs heading field is present, the IPMS-MS shall attempt to locate the entries identified by the Obsolete IPMs field by searching entries of all the entry-classes except the Draft and Auto-action-log entry-classes. If any such entries are found, each has its AC Obsolete IPMs attribute updated to record the sequence-number of the delivered message entry. In addition, the AC Obsolete IPMs attribute of the delivered message entry is updated to record the sequence-numbers of the obsoleted IPMs.
- f) If the delivered message contains an IPN, the IPMS-MS shall attempt to locate an entry corresponding to the IPN's subject IPM by searching the Submission (and Submission-log) entry-classes. If the subject IPM entry is found, the IPMS-MS shall perform the following actions. The IPN's IPM Intended Recipient field (or, if this field is absent, the IPN's IPN Originator field) is compared against the list of recipients recorded in the subject IPM's AC IPM Recipients attribute. If a match is found, then the IPMS-MS shall update the value corresponding to that recipient in the subject IPM's AC Correlated Delivered IPNs attribute to cause it to reference the present entry. In addition, the corresponding value in the subject IPM's AC Delivered IPN Summary attribute is updated to indicate that an IPN has been received from that recipient (or from the IPN originator to whom delivery of the subject IPM occurred as a consequence of its being addressed to that recipient).

19.9.1.2 Additional procedures for IPM auto-forward

If the IPM auto-forward auto-action is subscribed to the IPMS-MS performs the following actions:

- a) If one or more IPM auto-forward auto-actions have been registered, the delivered IPM is matched against the selection criteria specified in each IPM-auto-forward-registration-parameter. For each registration for which the entry satisfies the selection criteria it is auto-forwarded.

NOTE: IPM auto-forwarding is suppressed if the delivered IPM itself contains a forwarded IPM previously created by, or on behalf of, the IPMS-MS-user. See 18.5.3.1.

- b) In constructing the forwarding IPM, the IPMS-MS creates the first body part from the cover-note, optionally present in the forwarding-information component. In addition, the IPMS-MS prefixes the User-relative-identifier component of the This IPM field of the forwarding IPM's heading with, if present, the This-ipm-prefix. An auto-forwarded heading field with value *true* is added to the forwarding IPM. The IPMS-MS invokes the Message-submission abstract operation with the forwarding message as its argument.
- c) An entry is created in the Auto-action-log entry-class. If the submission fails, the error is recorded by attaching an auto-action-error attribute to the auto-action-event entry (see 6.5.3 of ISO/IEC 10021-5), and processing of this IPM auto-action terminates. The IPMS-MS then resumes processing of other IPM-auto-forward auto-actions.
- d) The IPMS-MS inspects the registered value of submission-options (see 19.8.2) to determine whether to store the forwarding message in the Submission (or Submission-log) entry-class. Where the creation of an entry is requested, the following attributes are attached to it:
 - 1) AC IPM Recipients shall contain one value for each recipient specified in Auto-forward-arguments;
 - 2) AC Correlated Delivered Replies shall contain the same number of values, each of which shall indicate that no reply has been received from the corresponding member of AC IPM Recipients;
 - 3) AC Delivered Replies Summary shall contain the same number of values, each of which shall indicate that no reply was requested of the corresponding member of AC IPM Recipients;
 - 4) AC Correlated Delivered IPNs shall contain the same number of values, each of which shall indicate that no IPN has been received from the corresponding member of AC IPM Recipients;
 - 5) AC Delivered IPN Summary shall contain the same number of values, each of which shall indicate that no notification was requested of the corresponding member of AC IPM Recipients.
 - 6) The MS-originated general-attribute is created and assigned the value *true*.
- e) If the IPM auto-correlate auto-action is subscribed to, and an entry for the forwarding message was created in the stored-Message or Message-log entry-class, the entry's sequence-number is added to the AC Forwarding IPMs attribute of the delivered message.
- f) The IPMS-MS shall construct an NRN if, and only if, one is requested by means of the Notification-requests component of the IPM's subject recipient specifier. The NRN is submitted regardless of whether a copy of the forwarded IPM is retained. The IPMS-MS draws the NRN's Auto-forward Comment field, if present, from the registered Forwarding Information parameter.
- g) MS-message-submission is invoked using the submission-options parameter registered for this IPM auto-forward auto-action, and the procedures defined in 19.9.2 are followed.
- h) If at least one of the IPM-auto-forward auto-actions is performed successfully, and all of the IPM-auto-forward-registration-parameters whose criteria were satisfied by the delivered IPM requested delete-after-auto-forwarding, then the IPMS-MS deletes the delivered message. If the delivered IPM was auto-forwarded, its MS retrieval-status attribute is set to *processed*, but the IPM auto-acknowledgement auto-action shall not be performed consequently.

19.9.1.3 Additional procedures for IPM auto-discard

If the IPM auto-discard auto-action is subscribed to, and the IPMS-MS-user has registered at least one which requests auto-discard of obsoleted IPMs, the IPMS-MS performs the following actions:

- a) If the delivered message contains an IPM whose Obsoleted IPMs heading field is present, the IPMS-MS shall attempt to identify an entry corresponding to each Obsoleted IPM by searching entries of the Stored-message entry-class. If any such entries are found, only those which satisfy the IPM auto-discard Filter shall be considered further.

If restrict-obsoleting-to-originator has been set to *true*, then the originator-name attribute of each such entry shall be compared for equality with the originator-name attribute of the delivered message and only those entries which match shall be considered further. For each occasion on which matching fails, the IPMS-MS shall generate an Auto-action-log entry and assign an IPM-auto-discard-error with the value *not-obsoleted-by-originator* to its auto-action-error attribute.

- b) For each entry selected in step (a) that has a retrieval-status of *new* or *listed* then the IPMS-MS shall construct an NRN as specified in 18.5.1.2 if, and only if, one is requested by means of the Notification-requests component of the IPM's subject recipient specifier. The NRN is submitted by invoking MS-message-submission, using the submission-options parameter registered for the IPM auto-discard auto-action, and the procedures defined in 19.9.2 are followed.
- c) Each of the entries selected in step (a) shall be deleted by the IPMS-MS. If the Message-log entry-class is subscribed to then an IPM-auto-discarded attribute is added to the corresponding Message-log entry and assigned the value *true*.

NOTE - If the IPMS-MS is able to determine that the delivery of an IPM, now auto-discarded, caused an alert condition that is still outstanding, and would not be in effect but for that delivered IPM, it may set the alert-indication to *false*; see 7.1.2 of ISO/IEC 10021-5.

- d) Auto-discard auto-action processing continues until all the obsoleted IPMs have been deleted, or all the registrations which contain a request to auto-discard obsoleted IPMs have been processed.

19.9.2 Additional Procedures for MS-message-submission

Procedures for the invocation of the Message-submission abstract-operation and for the performance of the MS-message-submission abstract-operation are defined in 15.2.1 and 16.2.1, respectively, of ISO/IEC 10021-5.

The following two items are additions to 16.2.1 (a) and (b) of ISO/IEC 10021-5, and apply where the IPMS-MS-user invokes MS-message-submission:

- a) If a 1994 Application Context is in use and the submitted message contains an IPM, and the submission-options parameter of the MS-message-submission argument contains an assembly-instructions parameter, then the IPMS-MS shall verify that each stored-IPM specified in the assembly-instructions parameter refers to an IPM entry, and that each body-part-number specified is present either in the associated stored-entry or in the submitted IPM, as indicated. The forwarding IPM's Body is constructed as indicated in 19.5.2.2.
- b) If a 1988 Application Context is in use, and the submitted message contains an IPM, the IPMS-MS examines the MS-message-submission argument for the presence of a forwarding-request parameter. If present, the IPMS-MS verifies that the entry to be forwarded is a delivered IPM and constructs the forwarding IPM's Body as indicated in 19.5.2.1.

If the IPM auto-correlate auto-action is subscribed to, then the following additions are required to 16.2.1 (f) of ISO/IEC 10021-5, and apply both in the case where the IPMS-MS-user invokes MS-message-submission, and where the IPMS-MS invokes Message-submission as a consequence of auto-action processing. It is assumed that the creation of an entry in the Submission-log (and possibly the Submission) entry-class for the submitted message was requested.

- c) If the submitted message contains an IPN, the IPMS-MS shall attempt to locate the entry identified by the Subject IPM field by searching entries of the Delivery and Delivery-log entry-classes. If such an entry is found, the sequence-number of the submitted IPN is added to the subject IPM's AC Submitted IPNs attribute. In addition, that entry's AC Submitted IPN Status attribute is given the value *ipm-discarded*, *ipm-auto-forwarded* or *rn-sent* as appropriate. If the IPN was submitted as the result of an IPMS-MS auto-action, an MS-originated general-attribute is attached to the entry and assigned the value *true*.

- d) If the submitted message contains an IPM, the IPMS-MS shall attach the following attributes to the entries created in the Submission and Submission-log entry-classes:
- 1) AC IPM Recipients shall contain one value for each distinct recipient specified in the Primary, Copy, and Blind Copy Recipients fields;
 - 2) AC Correlated Delivered Replies shall contain the same number of values, each of which shall indicate that no reply has been received from the corresponding member of AC IPM Recipients;
 - 3) AC Delivered Replies Summary shall contain the same number of values, each of which shall indicate whether a reply was requested of the corresponding member of AC IPM Recipients;
 - 4) AC Correlated Delivered IPNs shall contain the same number of values, each of which shall indicate that no IPN has been received from the corresponding member of AC IPM Recipients;
 - 5) AC Delivered IPN Summary shall contain the same number of values, each of which shall indicate whether an RN, or NRN, or no notification was requested of the corresponding member of AC IPM Recipients.
- e) If the submitted message contains an IPM whose Replied-to IPM heading field is present, the IPMS-MS shall attempt to locate the entry identified by the Replied-to IPM field by searching main-entries of the Delivery and Delivery-log entry-classes. If this entry is found (the replied-to entry), its sequence-number is recorded in the AC Replied-to IPM attribute of the present entry. Similarly, the replied-to entry has its AC Replying IPMs attribute updated to reference the present entry. In addition, that entry's AC Submitted Reply Status attribute is given the value *reply-sent*.
- f) If the submitted message contains an IPM which itself contains one or more Message body parts, the IPMS-MS shall attempt to locate the IPM entries corresponding to the Message body parts by searching main-entries of all the entry-classes, except the Draft and Auto-action-log entry-classes, and matching on IPM identifier. For each entry found, the IPMS-MS shall add the sequence-number of the submitted (forwarding) message to those entries' AC Forwarding IPMs attribute. In addition, the AC Forwarded IPMs attribute of the submitted message entry is updated to record the sequence-numbers of the forwarded IPMs.
- g) If the submitted message contains an IPM whose Related IPMs heading field is present, the IPMS-MS shall attempt to locate the entries identified by the Related IPMs field by searching main-entries of all the entry-classes except the Draft and Auto-action-log entry-classes. If any such entries are found, each has its AC Relating IPMs attribute updated to record the sequence-number of the submitted message entry. In addition, the AC Related IPMs attribute of the submitted message entry is updated to record the sequence-numbers of the related IPMs.
- h) If the submitted message contains an IPM whose Obsolete IPMs heading field is present, the IPMS-MS shall attempt to locate the entries identified by the Obsolete IPMs field by searching main-entries of the Stored-message and Message-log entry-classes. If any such entries are found, each has its AC Obsolete IPMs attribute updated to record the sequence-number of the submitted message entry. In addition, the AC Obsolete IPMs attribute of the submitted message entry is updated to record the sequence-numbers of the obsolete IPMs.

19.9.3 Additional Procedures for Fetch

If the IPM auto-acknowledgement auto-action is subscribed to and the suspend-auto-acknowledgement bind-extensions parameter was not present in the MS-bind-argument which established the present abstract-association, the IPMS-MS performs the following action:

- a) When the performance of Fetch causes the retrieval-status of an IPM to change to *processed*, the IPMS shall construct an RN if, and only if, one is requested by means of the Notification-requests component of the IPM's subject recipient specifier. The IPMS-MS draws the Suppl Receipt Info field from the auto-acknowledge-suppl-receipt-info field of IPM-auto-acknowledgement-registration-parameter if present, and constructs other RN fields as specified in 18.5.2.1.

- b) MS-message-submission is invoked using the submission-options parameter registered for the IPM auto-acknowledgement auto-action, and the procedures defined in 19.9.2 are followed.
- c) The performance of the IPM auto-acknowledgement auto-action shall cause the creation of an entry in the Auto-action-log entry-class, if subscribed to. If the performance causes an auto-action-error, the IPMS-MS shall attach an auto-action-error attribute indicating the nature of the error to the Auto-action-log entry, and shall set the auto-action-error-indication, which is reported to the IPMS-MS-user when the next abstract-association is established.

19.9.4 Additional Procedures for Delete and Auto-delete

When performing the Delete abstract-operation or the Auto-delete auto-action, the IPMS-MS shall generate an NRN if the entry contains a delivered IPM whose retrieval-status is *listed*, and an NRN was requested of this user by means of the Notification-requests component of the subject recipient specifier, as specified in 19.4. In the case of the Delete abstract-operation, an NRN is not 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).

MS-message-submission is invoked with the submission-options parameter drawn from general submission-defaults (as registered by means of Register-MS), and the procedures defined in 19.9.2 are followed.

19.9.5 Auto-discard of expired IPMs

If the IPM auto-discard auto-action is subscribed to and the user has registered at least one IPM auto-discard auto-action whose registration-parameter contains an auto-discard-expired-IPMs value of *true*, the IPMS-MS performs the following actions:

- a) The IPMS-MS shall identify each entry in the Delivered-message entry-class with an expiry-time attribute containing a date and time which has passed. If any such entries are found, only those which satisfy the IPM auto-discard Filter shall be considered further.
- b) If any entries selected in step (a) have a retrieval-status of *new* or *listed* then the IPMS-MS shall construct an NRN as specified in 18.5.1.2 if, and only if, one is requested by means of the Notification-requests component of the IPM's subject recipient specifier.
- c) MS-message-submission is invoked using the submission-options parameter registered for the IPM auto-discard auto-action, and the procedures defined in 19.9.2 are followed.
- d) Each of the entries selected in step (a) shall be deleted by the IPMS-MS. If the Delivery-log entry-class is subscribed to then an IPM-auto-discarded attribute is added to the corresponding Delivery-log entry and assigned the value *true*.

NOTE - If the IPMS-MS is able to determine that the delivery of an IPM, now auto-discarded, caused an alert condition that is still outstanding, and would not be in effect but for that delivered IPM, it may set the alert-indication to *false*; see 7.1.2 of ISO/IEC 10021-5.

- e) The performance of the IPM auto-discard auto-action shall cause the creation of an entry in the Auto-action-log entry-class, if subscribed to. If the performance causes an auto-action-error, the IPMS-MS shall attach an auto-action-error attribute indicating the nature of the error to the Auto-action-log entry, and shall set the auto-action-error-indication, which is reported to the IPMS-MS-user when an abstract-association is next established.

Relabel existing Table 2 as Table 8. In existing clause 20.4, bullet (d), replace "Table 2" with "Table 8".

22.2 Statement Requirements

In the existing clause 22.2 replace bullet (d) (as inserted by Technical Corrigendum 4) with the following:

- d) In the case of an IPMS-MS, or an IPMS UA accessing an IPMS-MS, those IPMS-specific auto-actions and matching-rules for which it claims conformance.

In the existing clause 22.3, bullet (b), replace "annex C" with "Table 3".

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Annex C

Reference Definition of Object Identifiers

Delete Annex C. In existing Annex D (here renumbered C) replace the line:

```
IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0) }
```

with:

```
IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0)
                        version-1994(0) }
```

Add the following to the end of --Categories:

id-cat	ID ::= {id-ipms 13}	-- correlation attributes
id-mr	ID ::= {id-ipms 14}	-- matching-rules
id-aa	ID ::= {id-ipms 15}	-- auto-actions
id-aae	ID ::= {id-ipms 16}	-- auto-action errors
id-mst	ID ::= {id-ipms 17}	-- message store types

Add the following to the end of --Modules:

id-mod-auto-actions	ID ::= {id-mod 13}	-- not definitive
---------------------	--------------------	-------------------

Add the following to the end of -- Summary attributes:

id-sat-body-parts-summary	ID ::= {id-sat 2}
id-sat-ipm-auto-discarded	ID ::= {id-sat 3}

Add the following to the end of -- Notification attributes:

id-nat-notification-extensions	ID ::= {id-nat 11}
id-nat-nrn-extensions	ID ::= {id-nat 12}
id-nat-rn-extensions	ID ::= {id-nat 13}
id-nat-other-notification-type-fields	ID ::= {id-nat 14}

Add the following before -- Message content types:

-- Correlation attributes

id-cat-correlated-delivered-ipns	ID ::= {id-cat 0}
id-cat-correlated-delivered-replies	ID ::= {id-cat 1}
id-cat-delivered-ipn-summary	ID ::= {id-cat 2}
id-cat-delivered-replies-summary	ID ::= {id-cat 3}
id-cat-forwarded-ipms	ID ::= {id-cat 4}
id-cat-forwarding-ipms	ID ::= {id-cat 5}
id-cat-ipm-recipients	ID ::= {id-cat 6}
id-cat-obsolete-ipms	ID ::= {id-cat 7}
id-cat-obsolete-ipms	ID ::= {id-cat 8}
id-cat-related-ipms	ID ::= {id-cat 9}
id-cat-relating-ipms	ID ::= {id-cat 10}
id-cat-replied-to-ipm	ID ::= {id-cat 11}
id-cat-replying-ipms	ID ::= {id-cat 12}
id-cat-revised-reply-time	ID ::= {id-cat 13}
id-cat-submitted-ipn-status	ID ::= {id-cat 14}
id-cat-submitted-ipns	ID ::= {id-cat 15}
id-cat-submitted-reply-status	ID ::= {id-cat 16}

Add the following before the END of IPMSObjectIdentifiers:

-- Matching-rules

id-mr-ipm-identifier	ID ::= {id-mr 0}
id-mr-or-descriptor	ID ::= {id-mr 1}
id-mr-or-descriptor-elements	ID ::= {id-mr 2}
id-mr-or-descriptor-substring-elements	ID ::= {id-mr 3}
id-mr-recipient-specifier	ID ::= {id-mr 4}
id-mr-recipient-specifier-elements	ID ::= {id-mr 5}
id-mr-recipient-specifier-substring-elements	ID ::= {id-mr 6}

-- Auto-actions

id-aa-ipm-auto-acknowledgement	ID ::= {id-aa 0}
id-aa-ipm-auto-correlate	ID ::= {id-aa 1}
id-aa-ipm-auto-discard	ID ::= {id-aa 2}

-- Auto-action-errors

id-aae-auto-discard-error	ID ::= {id-aae 0}
id-aae-auto-forwarding-loop	ID ::= {id-aae 1}
id-aae-duplicate-ipn	ID ::= {id-aae 2}

-- Message Store types

id-mst-invalid-assembly-instructions	ID ::= {id-mst 0}
id-mst-invalid-ipn	ID ::= {id-mst 1}
id-mst-submission-options	ID ::= {id-mst 2}
id-mst-suspend-auto-acknowledgement	ID ::= {id-mst 3}
id-mst-prevent-nrn-generation	ID ::= {id-mst 4}

Annex D

Reference Definition of Abstract Information Objects

In existing Annex E (here renumbered D) replace the line:

```
IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) information-objects(2) }
```

with:

```
IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) information-objects(2)
                        version-1994(0) }
```

Delete "ub-ipm-identifier-suffix," from the IMPORTS clause and add the following:

-- MS Abstract Service

MS-EXTENSION, SequenceNumber

```
-----
FROM MSAbstractService {joint-iso-ccitt mhs-motis(6) ms(4) modules(0) abstract-service(1)
                        version-1994(0) }
```

-- IPMS Object Identifiers

id-mst-invalid-assembly-instructions, id-mst-invalid-ipn, id-mst-submission-options,
id-mst-suspend-auto-acknowledgement, id-mst-prevent-nrn-generation

```
-----
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0)
                        object-identifiers(0) version-1994(0) }
```

Replace the last production in the Module (ForwardedInfo) with the following:

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

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

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

```
IPMSSubmissionOptions ::= 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) } }
```

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

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

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

Annex E

Reference Definition of Functional Objects

In the IMPORTS clause of existing Annex F (here renumbered E) replace the line:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0) }
```

with:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0)  
version-1994(0) }
```

Annex F

Reference Definition of Abstract Service

In the IMPORTS clause of Annex G (here renumbered F) replace the line:

```
FROM IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0)
                             information-objects(2)}
```

with:

```
FROM IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) information-objects(2)
                             version-1994(0)}
```

and replace the line:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0)}
```

with:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0)
                             version-1994(0)}
```

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Annex G

Reference Definition of Heading Extensions

In the IMPORTS clause of existing Annex H (here renumbered G) replace the line:

```
FROM IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0)
                             information-objects(2)}
```

with:

```
FROM IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) information-objects(2)
                             version-1994(0)}
```

and replace the line:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0) }
```

with:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0)
                             version-1994(0) }
```

Annex H

Reference Definition of Extended Body Part Types

In existing Annex I (here renumbered H) renumber the clauses I.1-3 as H.1-3.

In the IMPORTS clauses in I.1, I.2 and I.3 (as inserted by Amendment 1) of existing Annex I (here renumbered H) replace the line:

```
FROM IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0)
                             information-objects(2)}
```

with:

```
FROM IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) information-objects(2)
                             version-1994(0) }
```

and replace the line:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0) }
```

with:

```
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) object-identifiers(0)
                             version-1994(0) }
```

Annex I

Reference Definition of Message Store Attributes

(normative)

Replace existing Annex J (here renumbered I) with the following:

This annex, a supplement to 19.6, defines for reference purposes the MS attributes and matching rules specific to Interpersonal Messaging. It uses the ATTRIBUTE information object class definition of ISO/IEC 10021-5.

```
IPMSMessageStoreAttributes {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0) message-store-attributes(8)
                             version-1994(0)}
```

```
DEFINITIONS IMPLICIT TAGS ::=
BEGIN
```

```
-- Prologue
```

```
-- Exports everything.
```

```
IMPORTS
```

```
-- IPMS Heading Extensions
```

```
AutoSubmitted, IncompleteCopy, Language
```

```
FROM IPMSHeadingExtensions {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0)
                             heading-extensions(6) version-1994(0)}
```

```
-- IPMS Information Objects
```

```
AcknowledgmentModeField, AuthorizingUsersSubfield, AutoForwardCommentField, AutoForwardedField,
BilaterallyDefinedBodyPart, BlindCopyRecipientsSubfield, Body, ConversionEITsField,
CopyRecipientsSubfield, DiscardReasonField, EncryptedBodyPart, EncryptedData, EncryptedParameters,
ExpiryTimeField, EXTENDED-BODY-PART-TYPE, ExtendedParameters, G3FacsimileBodyPart, G3FacsimileData,
G3FacsimileParameters, G4Class1BodyPart, Heading, IA5TextBodyPart, IA5TextData, IA5TextParameters,
ImportanceField, IPMIdentifier, IPMIntendedRecipientField, IPMSExtension, IPNOriginatorField,
MessageBodyPart, MessageData, MessageParameters, MixedModeBodyPart, NationallyDefinedBodyPart,
NonReceiptReasonField, ObsoleteIPMsSubfield, ORDescriptor, OriginatorField,
PrimaryRecipientsSubfield, ReceiptTimeField, RecipientSpecifier, RelatedIPMsSubfield,
RepliedToIPMField, ReplyRecipientsSubfield, ReplyTimeField, ReturnedIPMField, SensitivityField,
SubjectField, SubjectIPMField, SupplReceiptInfoField, TeletexBodyPart, TeletexData,
TeletexParameters, ThisIPMField, VideotexBodyPart, VideotexData, VideotexParameters
```

```
FROM IPMSInformationObjects {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0)
                             information-objects(2) version-1994(0)}
```

```
-- IPMS Object Identifiers
```

```
id-bat-bilaterally-defined-body-parts, id-bat-body, id-bat-encrypted-body-parts,
id-bat-encrypted-data, id-bat-encrypted-parameters, id-bat-extended-body-part-types,
id-bat-g3-facsimile-body-parts, id-bat-g3-facsimile-data, id-bat-g3-facsimile-parameters,
id-bat-g4-class1-body-parts, id-bat-ia5-text-body-parts, id-bat-ia5-text-data,
id-bat-ia5-text-parameters, id-bat-message-body-parts, id-bat-message-data,
id-bat-message-parameters, id-bat-mixed-mode-body-parts, id-bat-nationally-defined-body-parts,
id-bat-teletex-body-parts, id-bat-teletex-data, id-bat-teletex-parameters,
id-bat-videotex-body-parts, id-bat-videotex-data, id-bat-videotex-parameters,
id-cat-correlated-delivered-ipms, id-cat-correlated-delivered-replies,
id-cat-delivered-ipn-summary, id-cat-delivered-replies-summary, id-cat-forwarded-ipms,
id-cat-forwarding-ipms, id-cat-ipm-recipients, id-cat-obsolete-ipms, id-cat-obsolete-ipms,
id-cat-related-ipms, id-cat-relating-ipms, id-cat-replied-to-ipm, id-cat-replying-ipms,
id-cat-revised-reply-time, id-cat-submitted-ipn-status, id-cat-submitted-ipms,
id-cat-submitted-reply-status, id-hat-authorizing-users, id-hat-auto-forwarded,
id-hat-auto-submitted, id-hat-blind-copy-recipients, id-hat-copy-recipients, id-hat-expiry-time,
id-hat-heading, id-hat-importance, id-hat-incomplete-copy, id-hat-languages, id-hat-nrn-requestors,
id-hat-obsolete-IPMs, id-hat-originator, id-hat-primary-recipients, id-hat-related-IPMs,
```

```

id-hat-replied-to-ipm, id-hat-reply-recipients, id-hat-reply-requestors, id-hat-reply-time,
id-hat-rn-requestors, id-hat-sensitivity, id-hat-subject, id-hat-this-ipm, id-mr-ipm-identifier,
id-mr-or-descriptor, id-mr-or-descriptor-elements, id-mr-or-descriptor-substring-elements,
id-mr-recipient-specifier, id-mr-recipient-specifier-elements,
id-mr-recipient-specifier-substring-elements, id-nat-acknowledgment-mode,
id-nat-auto-forward-comment, id-nat-conversion-eits, id-nat-discard-reason,
id-nat-ipm-intended-recipient, id-nat-ipn-originator, id-nat-non-receipt-reason,
id-nat-notification-extensions, id-nat-nrn-extensions, id-nat-other-notification-type-fields,
id-nat-receipt-time, id-nat-returned-ipm, id-nat-rn-extensions, id-nat-subject-ipm,
id-nat-suppl-receipt-info, id-sat-body-parts-summary, id-sat-ipm-auto-discarded,
id-sat-ipm-entry-type, id-sat-ipm-synopsis

```

```

-----
FROM IPMSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) ipms(1) modules(0)
object-identifiers(0) version-1994(0)}

```

-- MS Abstract Service

```

ATTRIBUTE, MS-EIT, SequenceNumber

```

```

-----
FROM MSAbstractService {joint-iso-ccitt mhs-motis(6) ms(4) modules(0) abstract-service(1)
version-1994(0)}

```

-- MS matching-rules

```

mSStringMatch, mSSubstringsMatch

```

```

-----
FROM MSMatchingRules {joint-iso-ccitt mhs-motis(6) ms(4) modules(0)
general-matching-rules(5)}

```

-- MTS Abstract Service

```

EncodedInformationTypes

```

```

-----
FROM MTSAbstractService {joint-iso-ccitt mhs-motis(6) mts(3) modules(0)
mts-abstract-service(1) version-1994(0)}

```

-- Directory Information Framework

```

objectIdentifierMatch, MATCHING-RULE

```

```

-----
FROM InformationFramework {joint-iso-ccitt ds(5) modules(1) informationFramework(1) 2}

```

-- Directory Abstract Service

```

booleanMatch, integerMatch, integerOrderingMatch, uTCTimeMatch, uTCTimeOrderingMatch

```

```

-----
FROM SelectedAttributeTypes {joint-iso-ccitt ds(5) modules(1)
selectedAttributeTypes(5) 2};

```

```

Time ::= UTCTime

```

-- IPMS attribute table information object set

```

IPMSAttributeTable ATTRIBUTE ::= {
    acknowledgment-mode | authorizing-users | auto-forward-comment | auto-forwarded | auto-submitted |
    bilaterally-defined-body-parts | blind-copy-recipients | body | conversion-eits | copy-recipients |
    discard-reason | encrypted-body-parts | encrypted-data | encrypted-parameters | expiry-time |
    extended-body-part-types | g3-facsimile-body-parts | g3-facsimile-data | g3-facsimile-parameters |
    g4-class1-body-parts | heading | ia5-text-body-parts | ia5-text-data | ia5-text-parameters |
    importance | incomplete-copy | ipm-entry-type | ipm-intended-recipient | ipm-synopsis |
    ipn-originator | languages | message-body-parts | message-data | message-parameters |
    mixed-mode-body-parts | nationally-defined-body-parts | non-receipt-reason | nrn-requestors |
    obsoleted-IPMs | originator | primary-recipients | receipt-time | related-IPMs | replied-to-IPM |
    reply-recipients | reply-requestors | reply-time | returned-ipm | rn-requestors | sensitivity |
    subject | subject-ipm | suppl-receipt-info | teletex-body-parts | teletex-data |
    teletex-parameters | this-ipm | videotex-body-parts | videotex-data | videotex-parameters,
    ... -- 1994 extension additions -- ,
    ac-correlated-delivered-ipns | ac-correlated-delivered-replies | ac-delivered-ipn-summary |
    ac-delivered-replies-summary | ac-forwarded-ipms | ac-forwarding-ipms | ac-ipm-recipients |
    ac-obsoleted-ipms | ac-obsoleting-ipms | ac-related-ipms | ac-relating-ipms | ac-replied-to-ipm |
    ac-replying-ipms | ac-submitted-ipn-status | ac-submitted-ipns | ac-submitted-reply-status |
    body-parts-summary | ipm-auto-discarded | notification-extensions | nrn-extensions |
    other-notification-type-fields | revised-reply-time | rn-extensions }

```

-- SUMMARY ATTRIBUTES**-- IPM entry 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),
    ...
}

```

-- IPM synopsis

```

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

```

```

IPMSynopsis ::= SEQUENCE OF BodyPartSynopsis

```

```

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}

```

-- Body part summary

```

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

```