

## Annexes

### Annex A (to Recommendation X.402) Directory Object Classes and Attributes

This annex is an integral part of this Recommendation.

Several Directory object classes, attributes, and attribute syntaxes are specific to Message Handling. These are defined in the present annex using the OBJECT-CLASS, ATTRIBUTE, and ATTRIBUTE-SYNTAX macros of Recommendation X.501, respectively.

Temporary note The details of this annex are subject to modification as a result of the final meeting of the CCITT Special Rapporteur on Directory Systems (Q35/VII) in Gloucester in November 1987.

#### A.1 Object Classes

The object classes specific to Message Handling are those specified below.

##### A.1.1 MHS Distribution List

An .I.ot:MHS Distribution List; object is a DL. The attributes in its entry identify its common name, submit permissions, and O/R addresses and, to the extent that the relevant attributes are present, describe the DL, identify its organization, organizational units, and owner; cite related objects; and identify its deliverable content types, deliverable EITs, members, and preferred delivery methods.

.I.va:mhs-distribution-list; OBJECT-CLASS SUBCLASS OF top MUST CONTAIN {  
commonName, mhs-dl-submit-permissions, mhs-or-addresses} MAY CONTAIN {  
description, organization, organizationalUnitName, owner, seeAlso, mhs-  
deliverable-content-types, mhs-deliverable-eits, mhs-dl-members, mhs-preferred-delivery-  
methods} ::= id-oc-mhs-distribution-list

##### A.1.2 MHS Message Store

An .I.ot:MHS Message Store; object is an AE that realizes an MS. The attributes in its entry, to the extent that they are present, describe the MS, identify its owner, and enumerate the optional attributes, automatic actions, and content types it supports.

.I.va:mhs-message-store; OBJECT-CLASS SUBCLASS OF applicationEntity MAY  
CONTAIN { description, owner, mhs-supported-optional-attributes, mhs-supported-automatic-actions, mhs-  
supported-content-types} ::= id-oc-mhs-message-store

##### A.1.3 MHS Message Transfer Agent

An .I.ot:MHS Message Transfer Agent; object is an AE that implements an MTA. The attributes in its entry, to the extent that they are present, describe the MTA and identify its owner and its deliverable content length.

.I.va:mhs-message-transfer-agent; OBJECT-CLASS SUBCLASS OF applicationEntity MAY  
CONTAIN { description, owner,  
mhs-deliverable-content-length} ::= id-oc-mhs-message-transfer-agent

##### A.1.4 MHS User

An MHS User object is a generic MHS user. (The generic user can have, for example, a business address, a residential address, or both.) The attributes in its entry identify the user's O/R address and, to the extent that the relevant attributes are present, identify the user's deliverable content length, content types, and EITs; its MS; and its preferred delivery methods.

.I.va:mhs-user; OBJECT-CLASS SUBCLASS OF ORGANIZATIONALPERSON MUST CONTAIN { mhs-or-  
addresses} MAY CONTAIN {  
mhs-deliverable-content-length, mhs-  
deliverable-content-types, mhs-deliverable-eits, mhs-message-store, mhs-preferred-delivery-  
methods} ::= id-oc-mhs

##### A.1.5 MHS User Agent

An MHS User Agent; object is an AE that realizes a UA. The attributes in its entry, to the extent that they are present, identify the UA's owner; its deliverable content length, content types, and EITs; and its O/R address.

.I.va:mhs-user-agent; OBJECT-CLASS SUBCLASS OF applicationEntity MAY  
CONTAIN { owner, mhs- deliverable-content-length, mhs-deliverable-content-types, mhs-  
deliverable- eits, mhs-or-addresses} ::= id-oc-mhs-user-agent

A.2 Attributes

The attributes specific to Message Handling are those specified below.

A.2.1 MHS Deliverable Content Length

The .I.ot:MHS Deliverable Content Length; attribute identifies the maximum content length of the messages whose delivery a user will accept.

A value of this attribute is an Integer.

.I.va:mhs-deliverable-content-length; ATTRIBUTE WITH ATTRIBUTE-SYNTAX integerSyntax  
SINGLE VALUE ::= id-at-mhs-deliverable-content-length

A.2.2 MHS Deliverable Content Types

The .I.ot:MHS Deliverable Content Types; attribute identifies the content types of the messages whose delivery a user will accept.

A value of this attribute is an Object Identifier.

.I.va:mhs-deliverable-content-types; ATTRIBUTE WITH ATTRIBUTE-SYNTAX  
objectIdentifierSyntax MULTI VALUE ::= id-at-mhs-deliverable-content-types

A.2.3 MHS Deliverable EITs

The .I.ot:MHS Deliverable EITs; attribute identifies the EITs of the messages whose delivery a user will accept.

A value of this attribute is an Object Identifier.

.I.va:mhs-deliverable-eits; ATTRIBUTE WITH ATTRIBUTE-SYNTAX  
objectIdentifierSyntax MULTI VALUE ::= id-at-mhs-deliverable-eits

A.2.4 MHS DL Members

The .I.ot:MHS DL Members; attribute identifies a DL's members.

A value of this attribute is an O/R name.

.I.va:mhs-dl-members; ATTRIBUTE WITH ATTRIBUTE-SYNTAX mhs-or-name-  
syntax MULTI VALUE ::= id-at-mhs-dl-members

A.2.5 MHS DL Submit Permissions

The .I.ot:MHS DL Submit Permissions; attribute identifies the users and DLs that may submit messages to a DL.

A value of this attribute is a DL submit permission.

.I.va:mhs-dl-submit-permissions; ATTRIBUTE WITH ATTRIBUTE-SYNTAX mhs-dl-submit-  
permission-syntax MULTI VALUE ::= id-at-mhs-dl-submit-permissions

A.2.6 MHS Message Store

The .I.ot:MHS Message Store; attribute identifies a user's MS by name.

The value of this attribute is a Directory distinguished name.

.I.va:mhs-message-store; ATTRIBUTE WITH ATTRIBUTE-SYNTAX  
distinguishedNameSyntax SINGLE VALUE ::= id-at-mhs-message-store

A.2.7 MHS O/R Addresses

The .I.ot:MHS O/R Addresses; attribute specifies a user's or DL's O/R addresses.

A value of this attribute is an O/R address.

.I.va:mhs-or-addresses; ATTRIBUTE WITH ATTRIBUTE-SYNTAX mhs-or-  
address-syntax MULTI VALUE ::= id-at-mhs-or-addresses

A.2.8 MHS Preferred Delivery Methods

The .I.ot:MHS Preferred Delivery Methods; attribute identifies, in order of decreasing preference, the methods of delivery a user prefers.

A value of this attribute is a preferred delivery method.

.I.va:mhs-preferred-delivery-methods; ATTRIBUTE WITH ATTRIBUTE-SYNTAX  
RequestedDeliveryMethod MATCHES FOR EQUALITY SINGLE VALUE ::= id- at-mhs-preferred-  
delivery-methods

A.2.9 MHS Supported Automatic Actions

The .I.ot:MHS Supported Automatic Actions; attribute identifies the automatic actions that an MS fully supports.

A value of this attribute is an Object Identifier.

.I.va:mhs-supported-automatic-actions; ATTRIBUTE  
objectIdentifierSyntax MULTI VALUE

WITH ATTRIBUTE-SYNTAX

::= id-at-mhs-supported-automatic-actions

#### A.2.10 MHS Supported Content Types

The .I.ot:MHS Supported Content Types; attribute identifies the content types of the messages whose syntax and semantics a MS fully supports.

A value of this attribute is an Object Identifier.

.I.va:mhs-supported-content-types; ATTRIBUTE  
objectIdentifierSyntax MULTI VALUE

WITH ATTRIBUTE-SYNTAX

::= id-at-mhs-supported-content-types

#### A.2.11 MHS Supported Optional Attributes

The .I.ot:MHS Supported Optional Attributes; attribute identifies the optional attributes that an MS fully supports.

A value of this attribute is an Object Identifier.

.I.va:mhs-supported-optional-attributes; ATTRIBUTE  
objectIdentifierSyntax MULTI VALUE

WITH ATTRIBUTE-SYNTAX

::= id-at-mhs-supported-optional-attributes

### A.3 Attribute Syntaxes

The attribute syntaxes specific to Message Handling are those specified below.

#### A.3.1 MHS DL Submit Permission

The .I.ot:MHS DL Submit Permission; attribute syntax characterizes an attribute each of whose values is a submit permission.

.I.va:mhs-dl-submit-permission-syntax; ATTRIBUTE-SYNTAX  
MATCHES FOR EQUALITY

SYNTAX DLSubmitPermission

::= id-as-mhs-dl-submit-permission

.I.ty:DLSubmitPermission; ::= CHOICE {  
[1] ORName, pattern-match [2] ORNamePattern,

individual [0] ORName, member-of-dl  
member-of-group [3] Name}

A presented DL submit permission value shall be of type Individual.

A DL submit permission, depending upon its type, grants submit access to the following zero or more users and DLs:

- a) Individual: The user or (unexpanded) DL any of whose O/R names is equal to the specified O/R name.
- b) Member-of-dl: Each member of the DL, any of whose O/R names is equal to the specified O/R name, or of each nested DL, recursively.
- c) Pattern-match: Each user or (unexpanded) DL any of whose O/R names matches the specified O/R name pattern.

.I.ty:ORNamePattern; ::= ORName

- d) Member-of-group: Each member of the group-of-names whose name is specified, or of each nested group-of-names, recursively.

A presented value is equal to a target value of this type if the two are identical, attribute by attribute. Additionally, equality may be declared under other conditions which are a local matter.

#### A.3.2 MHS O/R Address

The .I.ot:MHS O/R Address; attribute syntax characterizes an attribute each of whose values is an O/R address.

.I.va:mhs-or-address-syntax; ATTRIBUTE-SYNTAX  
EQUALITY ::= id-as-mhs-or-address

SYNTAX ORAddress MATCHES FOR

A presented O/R address value is equal to a target O/R address value under the conditions specified in clause 18.4.

#### A.3.3 MHS O/R Name

The .I.ot:MHS O/R Name; attribute syntax characterizes an attribute each of whose values is an O/R name.

.I.va:mhs-or-name-syntax; ATTRIBUTE-SYNTAX  
EQUALITY ::= id-as-mhs-or-name

SYNTAX ORName MATCHES FOR

A presented O/R name value is equal to a target O/R name value if the two are identical, attribute by attribute. Additionally, equality may be declared under other conditions which are a local matter.

## Annex B (to Recommendation X.402) Reference Definition of Object Identifiers

This annex is an integral part of this Recommendation.

This annex defines for reference purposes various Object Identifiers cited in the ASN.1 module of annex C. It uses ASN.1.

All Object Identifiers this Recommendation assigns are assigned in this annex. The annex is definitive for all but those

for ASN.1 modules and MHS itself. The definitive assignments for the former occur in the modules themselves; other references to them appear in IMPORT clauses. The latter is fixed.

```
-----
.I.mo:MHSObjectIdentifiers; {joint-iso-ccitt                                mhs-motis(6) arch(5) modules(0) object-
identifiers(0)} DEFINITIONS IMPLICIT TAGS ::= BEGIN
-- Prologue
-- Exports everything.
IMPORTS -- nothing -- ;
.I.ty:ID; ::= OBJECT IDENTIFIER
-- MHS Aspects
.I.va:id-mhsac; ID ::= {joint-iso-ccitt mhs-motis(6) mhsac(0)} -- MHS Application Contexts      -- See
Recommendation X.419. .I.va:id-ipms; ID ::= {joint-iso-ccitt mhs-motis(6) ipms (1)}      -- Interpersonal Messaging
-- See Recommendation X.420. .I.va:id-asdc; ID ::= {joint-iso-ccitt mhs-motis(6) asdc (2)}      -- Abstract
Service Definition Conventions      -- See Recommendation X.407. .I.va:id-mts; ID ::= {joint-iso-ccitt mhs-motis(6)
mts (3)}      -- Message Transfer System      -- See Recommendation X.411. .I.va:id-ms;
ID ::= {joint-iso-ccitt mhs-motis(6) ms (4)}      -- Message Store      -- See
Recommendation X.413. .I.va:id-arch; ID ::= {joint-iso-ccitt mhs-motis(6) arch (5)} -- Overall Architecture      -- See
this Recommendation. .I.va:id-group; ID ::= {joint-iso-ccitt mhs-motis(6) group(6)}      -- Reserved.
-- Categories
.I.va:id-mod; ID ::= {id-arch 0} -- modules; not definitive .I.va:id-oc; ID ::= {id-arch 1} -- object classes .I.va:id-at;
ID ::= {id-arch 2} -- attribute types .I.va:id-as; ID ::= {id-arch 3} -- attribute syntaxes
-- Modules
.I.va:id-object-identifiers; ID ::= {id-mod 0} -- not definitive .I.va:id-directory-objects-and-attributes; ID ::=
{id-mod 1} -- not definitive
-- Object classes
.I.va:id-oc-mhs-distribution-list; ID ::= {id-oc 0} .I.va:id-oc-mhs-message-store; ID ::= {id-oc 1} .I.va:id-oc-
mhs-message-transfer-agent; ID ::= {id-oc 2} .I.va:id-oc-mhs-organizational-user; ID ::= {id-oc 3} .I.va:id-oc-mhs-
residential-user; ID ::= {id-oc 4} .I.va:id-oc-mhs-user-agent; ID ::= {id-oc 5}
-- Attributes
.I.va:id-at-mhs-deliverable-content-length; ID ::= {id-at 0} .I.va:id-at-mhs-deliverable-content-types; ID ::= {id-at
1} .I.va:id-at-mhs-deliverable-eits; ID ::= {id-at 2} .I.va:id-at-mhs-dl-members; ID ::= {id-at
3} .I.va:id-at-mhs-dl-submit-permissions; ID ::= {id-at 4} .I.va:id-at-mhs-message-store; ID ::= {id-at 5}
.I.va:id-at-mhs-or-addresses; ID ::= {id-at 6} .I.va:id-at-mhs-preferred-delivery-methods; ID ::= {id-at
7} .I.va:id-at-mhs-supported-automatic-actions; ID ::= {id-at 8} .I.va:id-at-mhs-supported-content-types; ID ::=
{id-at 9} .I.va:id-at-mhs-supported-optional-attributes; ID ::= {id-at 10}
-- Attribute syntaxes
.I.va:id-as-mhs-dl-submit-permission; ID ::= {id-as 0} .I.va:id-as-mhs-or-address; ID ::= {id-as 1} .I.va:id-as-mhs-
or-name; ID ::= {id-as 2}
END -- of MHSObjectIdentifiers
```

## Annex C (to Recommendation X.402) Reference Definition of Directory Object Classes and Attributes

This annex is an integral part of this Recommendation.

This annex, a supplement to annex A, defines for reference purposes the object classes, attributes, and attribute syntaxes specific to Message Handling. It uses the OBJECT-CLASS, ATTRIBUTE, and ATTRIBUTE-SYNTAX macros of Recommendation X.501.

```
-----
.I.mo:MHSDirectoryObjectsAndAttributes; {joint-iso-ccitt                                mhs-motis(6) arch(5) modules(0) directory(1)}
DEFINITIONS IMPLICIT TAGS ::= BEGIN
-- Prologue
-- Exports everything.
IMPORTS -- MHS Object Identifiers                                id-as-mhs-dl-submit-permission, id-as-mhs-or-
```

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address, id-as-mhs-or-name, id-at-mhs-deliverable-content-length, id-at-mhs-deliverable-content-types, id-at-
mhs-deliverable-eits, id-at-mhs-dl-members, id-at-mhs-dl-submit-permissions, id-at-mhs-
message-store, id-at-mhs-or-addresses, id-at-mhs-preferred-delivery-methods, id-at-mhs-supported-automatic-actions,
id-at-mhs-supported-content-types, id-at-mhs-supported-optional-attributes,
id-oc-mhs-distribution-list, id-oc-mhs-message-store, id-oc-mhs-message-transfer-agent, id-oc-
mhs-organizational-user, id-oc-mhs-residential-user, id-oc-mhs-user-agent,

---- FROM MHSObjectIdentifiers {joint-iso-ccitt mhs-motis(6) arch(5) modules(0) object-
identifiers(0)} -- MTS Abstract Service ORAddress, ORName,
PreferredDeliveryMethod ---- FROM MTSAbstractService {joint-iso-ccitt mhs-motis(6) mts(3)
modules(0) mTS-abstract-service(3)} -- Information Framework
ATTRIBUTE, ATTRIBUTE-SYNTAX, Name, OBJECT-CLASS ---- FROM InformationFramework
{joint-iso-ccitt ds(5) modules(1) informationFramework(1)} -- Selected Object Classes
applicationEntity, organizationalPerson, residentialPerson, top ---- FROM SelectedObjectClasses {joint-
iso-ccitt ds(5) modules(1) selectedObjectClasses(6)} -- Selected Attribute Types commonName,
description, distinguishedNameSyntax, integerSyntax, objectIdentifierSyntax,
organization, organizationalUnitName, owner, seeAlso ---- FROM SelectedAttributeTypes {joint-iso-
ccitt ds(5) modules(1) selectedAttributeTypes(5)}
-- OBJECT CLASSES
-- MHS Distribution List
.I.va:mhs-distribution-list; OBJECT-CLASS SUBCLASS OF top MUST CONTAIN {
commonName, mhs-dl-submit-permissions, mhs-or-addresses} MAY CONTAIN {
description, organization, organizationalUnitName, owner, seeAlso, mhs-
deliverable-content-types, mhs-deliverable-eits,
mhs-dl-members, mhs-preferred-delivery-methods} ::= id-
oc-mhs-distribution-list
-- MHS Message Store
.I.va:mhs-message-store; OBJECT-CLASS SUBCLASS OF applicationEntity MAY
CONTAIN { description, owner, mhs-supported-optional-attributes, mhs-supported-automatic-actions, mhs-
supported-content-types} ::= id-oc-mhs-message-store
-- MHS Message Transfer Agent
.I.va:mhs-message-transfer-agent; OBJECT-CLASS SUBCLASS OF applicationEntity MAY
CONTAIN { description, owner, mhs-deliverable-content-length} ::= id-oc-mhs-message-transfer-agent
-- MHS Organizational User
.I.va:mhs-organizational-user; OBJECT-CLASS SUBCLASS OF organizationalPerson MUST
CONTAIN { mhs-or-address} MAY CONTAIN {
deliverable-content-types, mhs-deliverable-eits, mhs-message-store, mhs-preferred-delivery-
methods} ::= id-oc-mhs-organizational-user
-- MHS Residential User
.I.va:mhs-residential-user; OBJECT-CLASS SUBCLASS OF residentialPerson MUST
CONTAIN { mhs-or-address} MAY CONTAIN {
deliverable-content-types, mhs-deliverable-eits, mhs-message-store, mhs-preferred-delivery-
methods} ::= id-oc-mhs-residential-user
-- MHS User Agent
.I.va:mhs-user-agent; OBJECT-CLASS SUBCLASS OF applicationEntity MAY
CONTAIN { owner, mhs-deliverable-content-length,
deliverable-eits,
mhs-or-address} ::= id-oc-mhs-user-agent
-- ATTRIBUTES

```

```

-- MHS Deliverable Content Length
.I.va:mhs-deliverable-content-length; ATTRIBUTE                               WITH ATTRIBUTE-SYNTAX integerSyntax
    SINGLE VALUE                      ::= id-at-mhs-deliverable-content-length
-- MHS Deliverable Content Types
.I.va:mhs-deliverable-content-types; ATTRIBUTE                               WITH ATTRIBUTE-SYNTAX
objectIdentifierSyntax                MULTI VALUE                      ::= id-at-mhs-deliverable-content-types
-- MHS Deliverable EITs
.I.va:mhs-deliverable-eits; ATTRIBUTE                                       WITH ATTRIBUTE-SYNTAX
objectIdentifierSyntax                MULTI VALUE                      ::= id-at-mhs-deliverable-eits
-- MHS DL Members
.I.va:mhs-dl-members; ATTRIBUTE                                              WITH ATTRIBUTE-SYNTAX mhs-or-name-
syntax    MULTI VALUE                      ::= id-at-mhs-dl-members
-- MHS DL Submit Permissions
.I.va:mhs-dl-submit-permissions; ATTRIBUTE                                  WITH ATTRIBUTE-SYNTAX mhs-dl-submit-
permission-syntax    MULTI VALUE ::= id-at-mhs-dl-submit-permissions
-- MHS O/R Addresses
.I.va:mhs-or-addresses; ATTRIBUTE                                            WITH ATTRIBUTE-SYNTAX mhs-or-
address-syntax    MULTI VALUE ::= id-at-mhs-or-addresses
-- MHS Message Store
.I.va:mhs-message-store; ATTRIBUTE                                          WITH ATTRIBUTE-SYNTAX
distinguishedNameSyntax    SINGLE VALUE                      ::= id-at-mhs-message-store
-- MHS Preferred Delivery Methods
.I.va:mhs-preferred-delivery-methods; ATTRIBUTE                            WITH ATTRIBUTE-SYNTAX
PreferredDeliveryMethod    MATCHES FOR EQUALITY             MULTI VALUE ::= id-at-mhs-preferred-
delivery-methods
-- MHS Supported Automatic Actions
.I.va:mhs-supported-automatic-actions; ATTRIBUTE                            WITH ATTRIBUTE-SYNTAX
objectIdentifierSyntax    MULTI VALUE                      ::= id-at-mhs-supported-automatic-actions
-- MHS Supported Content Types
.I.va:mhs-supported-content-types; ATTRIBUTE                                WITH ATTRIBUTE-SYNTAX
objectIdentifierSyntax    MULTI VALUE                      ::= id-at-mhs-supported-content-types
-- MHS Supported Optional Attributes
.I.va:mhs-supported-optional-attributes; ATTRIBUTE                          WITH ATTRIBUTE-SYNTAX
objectIdentifierSyntax    MULTI VALUE                      ::= id-at-mhs-supported-optional-attributes
-- ATTRIBUTE SYNTAXES
-- MHS DL Submit Permission
.I.va:mhs-dl-submit-permission-syntax; ATTRIBUTE-SYNTAX                    SYNTAX DLSubmitPermission
    MATCHES FOR EQUALITY                      ::= id-as-mhs-dl-submit-permission
.I.ty:DLSubmitPermission; ::= CHOICE {
[1] ORName,    pattern-match [2] ORNamePattern,
.I.ty:ORNamePattern; ::= ORName
-- MHS O/R Address
.I.va:mhs-or-address-syntax; ATTRIBUTE-SYNTAX                              SYNTAX ORAddress MATCHES FOR
EQUALITY      ::= id-as-mhs-or-address
-- MHS O/R Name
.I.va:mhs-or-name-syntax; ATTRIBUTE-SYNTAX                                  SYNTAX ORName MATCHES FOR
EQUALITY      ::= id-as-mhs-or-name
END -- of MHSDirectory

```

Annex D (to Recommendation X.402) Security Threats  
This annex is not a part of this Recommendation

An overview of MHS security threats is provided in clause 15.1 of Recommendation X.400. This considers threats as they appear in an MHS: access threats, inter-message threats, intra-message threats, and message store threats. These threats can appear in various forms as follows:

- a) Masquerade
- b) Message sequencing
- c) Modification of information
- d) Denial of service
- e) Leakage of information
- f) Repudiation
- g) Other MHS threats

In addition, they may occur by accident or by malicious intent and may be active or passive. Attacks on the MHS will address potential weaknesses and may comprise of a number of threats. This annex deals with individual threats and although consideration is given to a number of broad classes of threat, it is not a complete list.

Table 13/X.402 indicates how these threats can be met using the MHS security services. The list of threats given here is indicative rather than definitive.

Table 13/X.402 Use of MHS Security Services

THREAT		SERVICES	
MASQUERADE		Impersonation and misuse	
Authentication of the MTS	Probe Origin Authentication	Message Origin	Secure Access
Management	Falsely acknowledge receipt	Proof of Delivery	Falsely claim to originate
Origin Authentication	a message	Impersonation of an MTA to	Proof of
submission	an MTS-user	Report Origin Authentication	Secure Access
Management	Impersonation of an MTA to	Report Origin Authentication	another MTA
Access Management	MESSAGE SEQUENCING		Replay of messages
Message Sequence Integrity	Re-ordering of messages	Message Sequence Integrity	Pre-play of messages
	Delay of messages	MODIFICATION OF INFORMATION	
Modification of messages		Connection Integrity	Content
Integrity	Destruction of messages	Message Sequence Integrity	Corruption of routing and
other management information		DENIAL OF SERVICE	
Denial of communications	MTA flooding	MTS flooding	
REPUDIATION		Denial of origin	Non-
Non-repudiation of Origin	Denial of submission	Non-repudiation of Submission	Denial of delivery
Non-repudiation of Delivery	LEAKAGE OF INFORMATION		Loss of
confidentiality	Connection Confidentiality	Content Confidentiality	Loss of anonymity
Message Flow Confidentiality	Misappropriation of messages	Secure Access Management	Traffic analysis
Message Flow Confidentiality	OTHER THREATS		Originator not
cleared for	Secure Access Management	Message Security Label	Message Security Labelling
MTA/MTS-user not cleared for	Secure Access Management	Security Context	
Misrouting	Secure Access Management	Message Security Labelling	Differing
labelling policies			

#### D.1 Masquerade

Masquerade occurs when an entity successfully pretends to be a different entity and can take place in a number of ways. An unauthorized MTS-user may impersonate another to gain unauthorized access to MTS facilities or to act to the detriment of the valid user, e.g., to discard his messages. An MTS-user may impersonate another user and so falsely acknowledge receipt of a message by the "valid" recipient. A message may be put into the MTS by a user falsely claiming the identity of another user. An MTS-user, MS, or MTA may masquerade as another MTS-user, MS, or MTA. Masquerade threats include the following:

- a) Impersonation and misuse of the MTS
- b) Falsely acknowledge receipt
- c) Falsely claim to originate a message
- d) Impersonation of an MTA to an MTS-user

#### e) Impersonation of an MTA to another MTA

A masquerade usually consists of other forms of attack and in a secure system may involve authentication sequences from valid users, e.g., in replay or modification of messages.

#### D.2 Message Sequencing

Message sequencing threats occur when part or all of a message is repeated, time-shifted, or reordered. This can be used to exploit the authentication information in a valid message and resequence or time-shift valid messages. Although it is impossible to prevent replay with the MHS security services, it can be detected and the effects of the threat eliminated.

Message sequencing threats include the following:

- a) Replay of messages
- b) Reordering of messages
- c) Pre-play of messages
- d) Delay of messages

#### D.3 Modification of Information

Information for an intended recipient, routing information, and other management data may be lost or modified without detection. This could occur to any aspect of the message, e.g., its labelling, content, attributes, recipient, or originator.

Corruption of routing or other management information, stored in MTAs or used by them, may cause the MTS to lose messages or otherwise operate incorrectly.

Modification of information threats include the following:

- a) Modification of messages
- b) Destruction of messages
- c) Corruption of routing and other management information.

#### D.4 Denial of Service

Denial of service occurs when an entity fails to perform its function or prevents other entities from performing their functions. This may be a denial of access, a denial of communications (leading to other problems like overload), a deliberate suppression of messages to a particular recipient, or a fabrication of extra traffic. The MTS can be denied if an MTA has been caused to fail or operate incorrectly. In addition, an MTS-user may cause the MTS to deny a service to other users by flooding the service with messages which might overload the switching capability of an MTA or fill up all available message storage space.

Denial of service threats include the following:

- a) Denial of communications
- b) MTA failure
- c) MTS flooding

#### D.5 Repudiation

Repudiation can occur when an MTS-user or the MTS may later deny submitting, receiving, or originating a message.

Repudiation threats include the following:

- a) Denial of origin
- b) Denial of submission
- c) Denial of delivery

#### D.6 Leakage of Information

Information may be acquired by an unauthorized party by monitoring transmissions, by unauthorized access to information stored in any MHS entity, or by masquerade. In some cases, the presence of an MTS-user on the system may be sensitive and its anonymity may have to be preserved. An MTS-user other than the intended recipient may obtain a message. This might result from impersonation and misuse of the MTS or through causing an MTA to operate incorrectly. Further details on the information flowing in an MTS may be obtained from observing the traffic.

Leakage of information threats include the following:

- a) Loss of confidentiality
- b) Loss of anonymity
- c) Misappropriation of messages
- d) Traffic analysis

#### D.7 Other Threats

In a multi- or single-level secure system, a number of threats may exist that relate to security labelling, e.g., routing



through a node that cannot be trusted with information of particular value, or where systems use different labelling policies. Threats may exist to the enforcement of a security policy based on logical separation using security labels. An MTS-user may originate a message and assign it a label for which it is not cleared. An MTS-user or MTA may set up or accept an association with a security context for which it does not have clearance.

Other threats include the following:

- a) Originator not cleared for message label (inappropriate submit)
- b) MTA/MTS-user not cleared for context
- c) Misrouting
- d) Differing labelling policies

## Annex E (to Recommendation X.402) Provision of Security Services in Recommendation X.411

This annex is an integral part of this Recommendation.

Table 14/X.402 indicates which service elements from Recommendation X.411 may be used to support the security services described in clause 10.2.

Table .T.:14/X.402 MHS Security Service Provision

+-----+-----+   SERVICE   MTS			
ARGUMENTS/SERVICES   +- ORIGIN AUTHENTICATION SECURITY SERVICES -----+			
Message Origin Authentication	Message Origin Authentication Check	Message Token	
Probe Origin Authentication	Probe Origin Authentication Check	Report Origin Authentication	Report Origin Authentication Check
Proof of Submission	Proof of Submission Request	Proof of Submission	
Proof of Delivery	Proof of Delivery Request	Proof of Delivery	
+- SECURE ACCESS MANAGEMENT SECURITY SERVICES -----+		Peer	
Entity Authentication	Initiator Credentials	Responder Credentials	Security Context
Security Context	+- DATA CONFIDENTIALITY SECURITY SERVICES		
-----+   Connection Confidentiality		Not supported	
Content Confidentiality Algorithm	Identifier	Content Confidentiality	
Token	Message Flow Confidentiality	Content Type	+- DATA INTEGRITY SECURITY SERVICES -----+
Connection Integrity	Not supported	Content Integrity	
Content Integrity Check	Message Token	Message	
Origin Authentication Check	Message Sequence Integrity	Message Sequence Number	
Message Token	+- NON-REPUDIATION SECURITY SERVICES -----+		
Repudiation of Origin	Content Integrity Check	Message Token	
Message Origin Authentication Check	Non-Repudiation of Submission	Proof of Submission Request	
Proof of Submission	Non-Repudiation of Delivery	Proof of Delivery Request	
Proof of Delivery	+-----+-----+   Message Security		
Labelling	Message Security Label	Message Token	
Message Origin Authentication Check   +- SECURITY MANAGEMENT SECURITY SERVICES			
Change Credentials	Change Credentials	Register	Register
+-----+-----+-----+			

## Annex F (to Recommendation X.402) Differences Between CCITT Recommendation and ISO Standard

This annex is not a part of this Recommendation.

This annex lists all but the purely stylistic differences between this Recommendation and the corresponding ISO International Standard.

There are no differences between the two specifications.

CCITT Draft Recommendation X.402 MHS: Overall Architecture (Version 5, November 1987, Gloucester)

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## Annex G (to Recommendation X.402) Index

This annex is not a part of this Recommendation.

This annex indexes this Recommendation. It gives the number(s) of the page(s) on which each item in each of several categories is defined. Its coverage of each category is exhaustive.

This annex indexes items (if any) in the following categories:

- a) Abbreviations (ab)
- b) Terms (gt)
- c) Information items (ot)
- d) ASN.1 modules (mo)
- e) ASN.1 macros (ma)
- f) ASN.1 types (ty)
- g) ASN.1 values (va)
- h) Bilateral agreements (ba)
- i) Items for further study (fs)
- j) Items to be supplied (fs)

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None

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