



INTERNATIONAL STANDARD ISO/IEC 9596-1:1998
TECHNICAL CORRIGENDUM 2

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**Information technology — Open Systems Interconnection —
Common management information protocol —**

**Part 1:
Specification**

TECHNICAL CORRIGENDUM 2

*Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Protocole commun
d'information de gestion —*

Partie 1: Spécification

RECTIFICATIF TECHNIQUE 2

Technical Corrigendum 2 to ISO/IEC 9596-1:1998 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

**INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION –
COMMON MANAGEMENT INFORMATION PROTOCOL: SPECIFICATION**

TECHNICAL CORRIGENDUM 2

Revision to include ASN.1: 1997

1) Subclause 2.1

Insert the following references into this subclause:

- ITU-T Recommendation X.680 (1997) | ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- ITU-T Recommendation X.681 (1997) | ISO/IEC 8824-2:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*
- ITU-T Recommendation X.682 (1997) | ISO/IEC 8824-3:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*
- ITU-T Recommendation X.690 (1997) | ISO/IEC 8825-1:1998, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).*
- ITU-T Recommendation X.691 (1997) | ISO/IEC 8825-2:1998, *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER).*
- ITU-T Recommendation X.880 (1994) | ISO/IEC 13712-1:1995, *Information technology – Remote Operations: Concepts, model and notation.*
- ITU-T Recommendation X.881 (1994) | ISO/IEC 13712-2:1995, *Information technology – Remote Operations: OSI realizations – Remote Operations Service Element (ROSE) service definition.*
- ITU-T Recommendation X.882 (1994) | ISO/IEC 13712-3:1995, *Information technology – Remote Operations: OSI realizations – Remote Operations Service Element (ROSE) protocol specification.*

2) Subclause 2.2

Replace subclause 2.2 with the following:

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.700 (1992), *Management framework for Open Systems Interconnection (OSI) for CCITT applications.*
ISO/IEC 7498-4:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4: Management framework.*

3) Subclause 3.3

Replace subclause 3.3 with the following:

3.3 Remote Operations definitions

This Recommendation | International Standard makes use of the following term defined in ITU-T Rec. X.880 | ISO/IEC 13172-1:

- a) linked-operation.

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.881 | ISO/IEC 13172-2:

- a) association-initiator;
- b) association-responder;
- c) Remote Operation Service Element;
- d) invoker;
- e) performer.

4) Subclause 5.2

Replace the first paragraph with the following:

This Recommendation | International Standard uses the RO-INVOKE, RO-RESULT, RO-ERROR and RO-REJECT-U services of the Remote Operations Service Element (ROSE) defined in ITU-T Rec. X.880 | ISO/IEC 13712-1. ROSE assumes the use of the presentation service defined in ITU-T Rec. X.216 | ISO/IEC 8822. The confirmed operations of CMIP are asynchronous or synchronous as required by the application. The choice of asynchronous or synchronous is a local matter implemented by the application. The unconfirmed operations of CMIP are asynchronous, outcome not reported. Both the association-initiating and the association-responding application entities can invoke operations.

5) Subclause 5.2.2

Replace CCITT Rec. X.229 and ISO/IEC 9072-2 with ITU-T Rec. X.882 | ISO/IEC 13712-3.

6) Subclause 6.2.1

Replace CCITT Rec. X.229 and ISO/IEC 9072-2 with ITU-T Rec. X.882 | ISO/IEC 13712-3.

Replace InvokeID with invokeId in Table 2.

Replace Linked-ID with linkedId in Table 2.

7) Subclause 6.4.3

Replace linked-ID with linkedId (occurs 4 times).

8) Subclause 6.4.4

Replace linked-ID with linkedId (occurs twice).

9) Subclause 6.5.3

Replace linked-ID with linkedId (occurs 4 times).

10) Subclause 6.5.4

Replace linked-ID with linkedId (occurs twice).

11) Subclause 6.6.3

Replace linked-ID with linkedId (occurs 4 times).

12) Subclause 6.6.4

Replace linked-ID with linkedId (*occurs twice*).

13) Subclause 6.8.3

Replace linked-ID with linkedId (*occurs 4 times*).

14) Subclause 6.8.4

Replace linked-ID with linkedId (*occurs twice*).

15) Subclause 7.1

Replace the first paragraph with the following:

The abstract syntax is defined using the notation specified in ITU-T Rec. X.680 | ISO/IEC 8824-1.

16) Subclause 7.2

Replace Linked-ID with linkedId in Table 4.

Remove the last line of Table 4.

17) Subclause 7.4

Replace with the following:

7.4 CMIP data units

The protocol is described in terms of Common Management Information Protocol Data Units exchanged between the peer CMISEs. The PDUs are specified using ASN.1 and the ROSE information objects defined in ITU-T Rec. X.880 | ISO/IEC 13712-1.

-- Common Management Information Protocol (CMIP)

CMIP-1 {joint-iso-itu-t ms(9) cmip(1) modules(0) protocol(3)}

DEFINITIONS ::= BEGIN

-- This ASN.1 specification has been checked for conformance with the ASN.1 standard by the OSS ASN.1 Tools

IMPORTS

ERROR, OPERATION

FROM Remote-Operations-Information-Objects

{joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)}

ROS {}, InvokeId, noInvokeId

FROM Remote-Operations-Generic-ROS-PDUs

{joint-iso-itu-t remote-operations(4) generic-ROS-PDUs(6) version1(0)};

```
CMIP-Operations OPERATION ::= {
  m-Action
  m-Action-Confirmed
  m-CancelGet
  m-Create
  m-Delete
  m-EventReport
  m-EventReport-Confirmed
  m-Get
  m-Linked-Reply
  m-Set
  m-Set-Confirmed
}
```

```

CMIP-Confirmed-Operations OPERATION ::= {
    m-Action-Confirmed      |
    m-CancelGet             |
    m-Create                |
    m-Delete                |
    m-EventReport-Confirmed |
    m-Get                   |
    m-Set-Confirmed         }

```

-- CMISE error definitions

```

accessDenied ERROR ::= {

```

```

    PRIORITY    {0}
    CODE        local : 2 }

```

```

classInstanceConflict ERROR ::= {

```

```

    PARAMETER   BaseManagedObjectId
    PRIORITY    {1}
    CODE        local : 19 }

```

```

complexityLimitation ERROR ::= {

```

```

    PARAMETER   ComplexityLimitation OPTIONAL TRUE
    PRIORITY    {1}
    CODE        local : 20 }

```

```

duplicateManagedObjectInstance ERROR ::= {

```

```

    PARAMETER   ObjectInstance
    PRIORITY    {1}
    CODE        local : 11 }

```

```

getListError ERROR ::= {

```

```

    PARAMETER   GetListError
    PRIORITY    {1}
    CODE        local : 7 }

```

```

invalidArgumentValue ERROR ::= {

```

```

    PARAMETER   InvalidArgumentValue
    PRIORITY    {1}
    CODE        local : 15 }

```

```

invalidAttributeValue ERROR ::= {

```

```

    PARAMETER   Attribute
    PRIORITY    {1}
    CODE        local : 6 }

```

```

invalidFilter ERROR ::= {

```

```

    PARAMETER   CMISFilter
    PRIORITY    {1}
    CODE        local : 4 }

```

```

invalidObjectInstance ERROR ::= {

```

```

    PARAMETER   ObjectInstance
    PRIORITY    {1}
    CODE        local : 17 }

```

```

invalidScope ERROR ::= {

```

```

    PARAMETER   Scope
    PRIORITY    {1}
    CODE        local : 16 }

```

```

missingAttributeValue ERROR ::= {

```

```

    PARAMETER   SET OF AttributeId
    PRIORITY    {1}
    CODE        local : 18 }

```

```

mistypedOperation ERROR ::= {

```

```

    PRIORITY    {1}
    CODE        local : 21 }

```

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noSuchAction ERROR ::= {
PARAMETER NoSuchAction
PRIORITY {1}
CODE local : 9 }

noSuchArgument ERROR ::= {
PARAMETER NoSuchArgument
PRIORITY {1}
CODE local : 14 }

noSuchAttribute ERROR ::= {
PARAMETER AttributeId
PRIORITY {1}
CODE local : 5 }

noSuchEventType ERROR ::= {
PARAMETER NoSuchEventType
PRIORITY {1}
CODE local : 13 }

noSuchInvokeId ERROR ::= {
PARAMETER InvokeIDType
PRIORITY {1}
CODE local : 22 }

noSuchObjectClass ERROR ::= {
PARAMETER ObjectClass
PRIORITY {1}
CODE local : 0 }

noSuchObjectInstance ERROR ::= {
PARAMETER ObjectInstance
PRIORITY {1}
CODE local : 1 }

noSuchReferenceObject ERROR ::= {
PARAMETER ObjectInstance
PRIORITY {1}
CODE local : 12 }

operationCancelled ERROR ::= {
PRIORITY {1}
CODE local : 23 }

processingFailure ERROR ::= {
PARAMETER ProcessingFailure OPTIONAL TRUE
PRIORITY {1}
CODE local : 10 }

setListError ERROR ::= {
PARAMETER SetListError
PRIORITY {1}
CODE local : 8 }

syncNotSupported ERROR ::= {
PARAMETER CMISSync
PRIORITY {1}
CODE local : 3 }

-- CMISE operations

-- Action operation (M-ACTION)

m-Action OPERATION ::= {
ARGUMENT ActionArgument
RETURN RESULT FALSE
ALWAYS RESPONDS FALSE
CODE local : 6 }

m-Action-Confirmed OPERATION ::= {
ARGUMENT ActionArgument


```

m-Linked-Reply OPERATION ::= {
  ARGUMENT      LinkedReplyArgument
  CODE          local : 2 }

```

-- Set operations (M-SET)

```

m-Set OPERATION ::= {
  ARGUMENT      SetArgument
  RETURN RESULT FALSE
  ALWAYS RESPONDS FALSE
  CODE          local : 4 }

```

```

m-Set-Confirmed OPERATION ::= {
  ARGUMENT      SetArgument
  RESULT        SetResult OPTIONAL TRUE -- this result is conditional;
                                           -- for conditions see 8.3.2.2.9 of ITU-T Rec. X.710
  ERRORS        {accessDenied | classInstanceConflict | complexityLimitation | invalidFilter |
                 invalidScope |
                 noSuchObjectClass | noSuchObjectInstance | processingFailure | setListError |
                 syncNotSupported}
  LINKED        {m-Linked-Reply}
  CODE          local : 5 }

```

-- INFORMATION OBJECT definitions

-- While it is possible to use the Information object class definitions defined below to specify

-- Action types, Attribute types, Event Report types, and their associated ASN.1 type definitions,

-- the alternative approach using GDMO templates, as defined in ITU-T Rec. X.722 | ISO/IEC 10165-4,

-- continues to be available for use with this Recommendation | International Standard.

```

CMIP-ACTION ::= CLASS {
  &id      ActionTypeId UNIQUE,
  &Value   }
  WITH SYNTAX {TYPE &Value
              ID &id }

```

```

CMIP-ATTRIBUTE ::= CLASS {
  &id      AttributeId UNIQUE,
  &Value   }
  WITH SYNTAX {TYPE &Value
              ID &id }

```

```

CMIP-AVA ::= CLASS {
  &id      OBJECT IDENTIFIER UNIQUE,
  &Value   }

```

```

CMIP-EVENT ::= CLASS {
  &id      EventTypeId UNIQUE,
  &Value   }
  WITH SYNTAX {TYPE &Value
              ID &id }

```

```

CMIP-SPECIFICERROR ::= CLASS {
  &id      OBJECT IDENTIFIER UNIQUE,
  &Value   }
  WITH SYNTAX {TYPE &Value
              ID &id }

```

-- Supporting type definitions

```

AccessControl ::= EXTERNAL

```

```

ActionArgument ::= SEQUENCE {
  COMPONENTS OF BaseManagedObjectId,
  accessControl [5] AccessControl OPTIONAL,
  synchronization [6] IMPLICIT CMISSync DEFAULT bestEffort,
  scope [7] Scope DEFAULT namedNumbers : baseObject,

```

```

filter          CMISFilter DEFAULT and : {},
actionInfo     [12] IMPLICIT ActionInfo,
...
}

```

```

ActionError ::= SEQUENCE {
  managedObjectClass  ObjectClass OPTIONAL,
  managedObjectInstance ObjectInstance OPTIONAL,
  currentTime         [5] IMPLICIT GeneralizedTime OPTIONAL,
  actionErrorInfo     [6] ActionErrorInfo,
  ...
}

```

```

ActionErrorInfo ::= SEQUENCE {
  errorStatus  ENUMERATED {accessDenied      (2),
                           noSuchAction      (9),
                           noSuchArgument    (14),
                           invalidArgumentValue (15),
                           ... },
  errorInfo    CHOICE {
    actionType  CMIP-ACTION.&id ({ActionSet}),
    actionArgument [0] NoSuchArgument,
    argumentValue [1] InvalidArgumentValue
  },
  ... }

```

```

ActionInfo ::= SEQUENCE {
  actionType  CMIP-ACTION.&id ({ActionSet}),
  actionInfoArg [4] CMIP-ACTION.&Value ({ActionSet} {@.actionType}) OPTIONAL
}

```

```

ActionReply ::= SEQUENCE {
  actionType  CMIP-ACTION.&id ({ActionSet}),
  actionReplyInfo [4] CMIP-ACTION.&Value ({ActionSet} {@.actionType})
}

```

```

ActionResult ::= SEQUENCE {
  managedObjectClass  ObjectClass OPTIONAL,
  managedObjectInstance ObjectInstance OPTIONAL,
  currentTime         [5] IMPLICIT GeneralizedTime OPTIONAL,
  actionReply         [6] IMPLICIT ActionReply OPTIONAL,
  ...
}

```

```

ActionSet CMIP-ACTION ::= {...}

```

```

ActionTypeId ::= CHOICE {
  globalForm [2] IMPLICIT OBJECT IDENTIFIER,
  localForm  [3] IMPLICIT INTEGER
}

```

-- This Recommendation | International Standard does not allocate any values for localForm.
 -- Where this alternative is used, the permissible values for the integers and their meanings shall be defined
 -- as part of the application context in which they are used

```

Attribute ::= SEQUENCE {
  id          CMIP-ATTRIBUTE.&id      ({AttributeSet}),
  value       CMIP-ATTRIBUTE.&Value   ({AttributeSet} {@.id})
}

```

```

AttributeError ::= SEQUENCE {
  errorStatus  ENUMERATED {
    accessDenied      (2),
    noSuchAttribute  (5),
    invalidAttributeValue (6),
    invalidOperation (24),
    invalidOperator   (25),
    ... },

```

modifyOperator [2] IMPLICIT ModifyOperator OPTIONAL, -- present for invalidOperator
 -- and invalidOperation

attributeId CMIP-ATTRIBUTE.&id ({AttributeSet}),
attributeValue CMIP-ATTRIBUTE.&Value ({AttributeSet} {@.attributeId}) OPTIONAL
 -- value is absent for setToDefault

}

AttributeId ::= CHOICE {
globalForm [0] IMPLICIT OBJECT IDENTIFIER,
localForm [1] IMPLICIT INTEGER
 }

-- This Recommendation | International Standard does not allocate any values for localForm.

-- Where this alternative is used, the permissible values for the integers and their meanings shall be defined

-- as part of the application context in which they are used

AttributeIdError ::= SEQUENCE {
errorStatus ENUMERATED {accessDenied (2),
 noSuchAttribute (5),
 ... },
attributeId AttributeId,
 ...
 }

AttributeSet CMIP-ATTRIBUTE ::= {...}

AttributeValueAssertion ::= SEQUENCE {
id CMIP-AVA.&id ({AvaSet}),
value CMIP-AVA.&Value ({AvaSet} {@.id})
 }

AvaSet CMIP-AVA ::= {...}

BaseManagedObjectId ::= SEQUENCE {
baseManagedObjectClass ObjectClass,
baseManagedObjectInstance ObjectInstance
 }

CMISFilter ::= CHOICE {
item [8] FilterItem,
and [9] IMPLICIT SET OF CMISFilter,
or [10] IMPLICIT SET OF CMISFilter,
not [11] CMISFilter
 }

CMISSync ::= ENUMERATED {
 bestEffort (0),
 atomic (1) }

ComplexityLimitation ::= SET {
scope [0] Scope OPTIONAL,
filter[1] CMISFilter OPTIONAL,
sync [2] CMISSync OPTIONAL,
 ...
 }

CreateArgument ::= SEQUENCE {
managedObjectClass ObjectClass,
managedOrSuperiorObjectInstance CHOICE {
 managedObjectInstance ObjectInstance,
 superiorObjectInstance [8] ObjectInstance } OPTIONAL,
 ...
 }

accessControl [5] AccessControl OPTIONAL,
referenceObjectInstance [6] ObjectInstance OPTIONAL,
attributeList [7] IMPLICIT SET OF Attribute OPTIONAL,
 ...
 }

FilterItem ::= CHOICE {

equality	[0] IMPLICIT Attribute,	
substrings	[1] IMPLICIT SEQUENCE OF CHOICE {	
initialString	[0] IMPLICIT Attribute,	
anyString	[1] IMPLICIT Attribute,	
finalString	[2] IMPLICIT Attribute },	
greaterOrEqual	[2] IMPLICIT Attribute,	<i>-- asserted value ≥ attribute value</i>
lessOrEqual	[3] IMPLICIT Attribute,	<i>-- asserted value ≤ attribute value</i>
present	[4] AttributeId,	
subsetOf	[5] IMPLICIT Attribute,	<i>-- asserted value is a subset of attribute value</i>
supersetOf	[6] IMPLICIT Attribute,	<i>-- asserted value is a superset of attribute value</i>
nonNullSetIntersection	[7] IMPLICIT Attribute	

}

GetArgument ::= SEQUENCE {

COMPONENTS OF	BaseManagedObjectId,	
accessControl	[5] AccessControl OPTIONAL,	
synchronization	[6] IMPLICIT CMISync DEFAULT bestEffort,	
scope	[7] Scope DEFAULT namedNumbers : baseObject,	
filter	CMISFilter DEFAULT and : {},	
attributeIdList	[12] IMPLICIT SET OF AttributeId OPTIONAL,	
...		

}

GetInfoStatus ::= CHOICE {

attributeIdError	[0] IMPLICIT AttributeIdError,	
attribute	[1] IMPLICIT Attribute	

}

GetListError ::= SEQUENCE {

managedObjectClass	ObjectClass OPTIONAL,	
managedObjectInstance	ObjectInstance OPTIONAL,	
currentTime	[5] IMPLICIT GeneralizedTime OPTIONAL,	
getInfoList	[6] IMPLICIT SET OF GetInfoStatus,	
...		

}

GetResult ::= SEQUENCE {

managedObjectClass	ObjectClass OPTIONAL,	
managedObjectInstance	ObjectInstance OPTIONAL,	
currentTime	[5] IMPLICIT GeneralizedTime OPTIONAL,	
attributeList	[6] IMPLICIT SET OF Attribute OPTIONAL,	
...		

}

InvalidArgumentValue ::= CHOICE {

actionValue	[0] IMPLICIT ActionInfo,	
eventValue	[1] IMPLICIT SEQUENCE {	
eventType	CMIP-EVENT.&id ({EventSet}),	
eventInfo	[8] CMIP-EVENT.&Value ({EventSet} {@.eventType}) OPTIONAL}	

}

InvokeIdType ::= InvokeId (ALL EXCEPT absent : NULL)

LinkedReplyArgument ::= CHOICE {

getResult	[0] IMPLICIT GetResult,	
getListError	[1] IMPLICIT GetListError,	
setResult	[2] IMPLICIT SetResult,	
setListError	[3] IMPLICIT SetListError,	
actionResult	[4] IMPLICIT ActionResult,	
processingFailure	[5] IMPLICIT ProcessingFailure,	
deleteResult	[6] IMPLICIT DeleteResult,	
actionError	[7] IMPLICIT ActionError,	
deleteError	[8] IMPLICIT DeleteError	

}

ModifyOperator ::= INTEGER {
 replace (0),
 addValues (1),
 removeValues (2),
 setDefault (3) }

NoSuchAction ::= SEQUENCE {
 managedObjectClass ObjectClass,
 actionType CMIP-ACTION.&id ({ActionSet}),
 ...
 }

NoSuchArgument ::= CHOICE {
 actionId [0] IMPLICIT SEQUENCE {
 managedObjectClass ObjectClass OPTIONAL,
 actionType CMIP-ACTION.&id ({ActionSet}) },
 eventId [1] IMPLICIT SEQUENCE {
 managedObjectClass ObjectClass OPTIONAL,
 eventType CMIP-EVENT.&id ({EventSet}) }
 }

NoSuchEventType ::= SEQUENCE {
 managedObjectClass ObjectClass,
 eventType CMIP-EVENT.&id ({EventSet}),
 ...
 }

ObjectClass ::= CHOICE {
 globalForm [0] IMPLICIT OBJECT IDENTIFIER,
 localForm [1] IMPLICIT INTEGER
 }

-- This Recommendation | International Standard does not allocate any values for localForm.
 -- Where this alternative is used, the permissible values for the integers and their meanings shall be defined
 -- as part of the application context in which they are used

ObjectInstance ::= CHOICE {
 distinguishedName [2] IMPLICIT DistinguishedName,
 nonSpecificForm [3] IMPLICIT OCTET STRING,
 localDistinguishedName [4] IMPLICIT RDNSequence
 }

-- localDistinguishedName is that portion of the distinguished name that is necessary to unambiguously identify the
 -- managed object within the context of communication between the open systems

ProcessingFailure ::= SEQUENCE {
 managedObjectClass ObjectClass,
 managedObjectInstance ObjectInstance OPTIONAL,
 specificErrorInfo [5] SpecificErrorInfo,
 ...
 }

RDNSequence ::= SEQUENCE OF RelativeDistinguishedName

RelativeDistinguishedName ::= SET OF AttributeValueAssertion

Scope ::= CHOICE { **namedNumbers** INTEGER { **baseObject** (0),
 firstLevelOnly (1),
 wholeSubtree (2) },
 individualLevels [1] IMPLICIT INTEGER, -- POSITIVE integer indicates the level to be selected
 baseToNthLevel [2] IMPLICIT INTEGER } -- POSITIVE integer N indicates that the range of levels
 -- (0-N) is to be selected

-- with individualLevels and baseToNthLevel, a value of 0 has the same semantics as baseObject
 -- with individualLevels, a value of 1 has the same semantics as firstLevelOnly

```

SetArgument ::= SEQUENCE {
  COMPONENTS OF
  accessControl      [5] AccessControl OPTIONAL,
  synchronization    [6] IMPLICIT CMISync DEFAULT bestEffort,
  scope              [7] Scope DEFAULT namedNumbers : baseObject,
  filter             CMISFilter DEFAULT and : {},
  modificationList  [12] IMPLICIT SET OF SEQUENCE {
    modifyOperator   [2] IMPLICIT ModifyOperator DEFAULT replace,
    attributeId      CMIP-ATTRIBUTE.&id ({AttributeSet}),
    attributeValue   CMIP-ATTRIBUTE.&Value ({AttributeSet} {@.attributeId}) OPTIONAL },
    -- value is absent for setToDefault
  ... }

```

```

SetInfoStatus ::= CHOICE {
  attributeError [0] IMPLICIT AttributeError,
  attribute      [1] IMPLICIT Attribute
}

```

```

SetListError ::= SEQUENCE {
  managedObjectClass ObjectClass OPTIONAL,
  managedObjectInstance ObjectInstance OPTIONAL,
  currentTime        [5] IMPLICIT GeneralizedTime OPTIONAL,
  setInfoList        [6] IMPLICIT SET OF SetInfoStatus,
  ...
}

```

```

SetResult ::= SEQUENCE {
  managedObjectClass ObjectClass OPTIONAL,
  managedObjectInstance ObjectInstance OPTIONAL,
  currentTime        [5] IMPLICIT GeneralizedTime OPTIONAL,
  attributeList       [6] IMPLICIT SET OF Attribute OPTIONAL,
  ...
}

```

```

SpecificErrorInfo ::= SEQUENCE {
  errorId      CMIP-SPECIFICERROR.&id ({SpecificErrorSet}),
  errorInfo    CMIP-SPECIFICERROR.&Value ({SpecificErrorSet} {@.errorId})
}

```

SpecificErrorSet CMIP-SPECIFICERROR ::= {...}

-- the following type specifies the constraints to be applied when using ROSE to support CMIP

```
ROSEapdus ::= ROS{{InvokeIDType}, {CMIP-Operations}, {CMIP-Confirmed-Operations}}
```

END -- End of CMIP syntax definitions

18) Subclause 7.5

Replace Remote-Operations-APDUs.ROSEapdus with Remote-Operations-Generic-ROS-PDUs.ROS.

Replace CCITT Rec. X.229 and ISO/IEC 9072-2 with ITU-T Rec. X.880 | ISO/IEC 13712-1.

Replace CCITT Rec. X.209 and ISO/IEC 8825 with ITU-T Rec. X.690 | ISO/IEC 8825-1.

19) Subclause 8.1

Replace CCITT Rec. X.209 and ISO/IEC 8825 with ITU-T Rec. X.690 | ISO/IEC 8825-1.

Replace CCITT Rec. X.229 and ISO/IEC 9072-2 with ITU-T Rec. X.880 | ISO/IEC 13712-1.

Replace item f) with the following:

- f) support the ability of both the association-initiating and the association-responding application entities to invoke operations;

20) Annex B

Replace with the following:

Annex B**Expanded ASN.1 syntax**

(This annex does not form an integral part of this Recommendation | International Standard)

This annex describes how the OPERATION and ERROR information objects of ITU-T Rec. X.880 | ISO/IEC 13712-1 are expanded into ASN.1 data types and subtypes.

If any inconsistencies exist between these definitions and the definitions in clause 7, then the definitions in clause 7 take precedence.

-- *Common Management Information Protocol (CMIP)*

CMIP-1 {joint-iso-itu-t ms(9) cmip(1) modules(0) protocol(3)}

DEFINITIONS ::= BEGIN

-- *This ASN.1 specification has been checked for conformance with the ASN.1 standard by the OSS ASN.1 Tools*

IMPORTS

ERROR, OPERATION

FROM Remote-Operations-Information-Objects

{joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)}

ROS{, InvokeId, noInvokeId

FROM Remote-Operations-Generic-ROS-PDUs

{joint-iso-itu-t remote-operations(4) generic-ROS-PDUs(6) version1(0)};

CMIP-Operations OPERATION ::= {
m-Action |
m-Action-Confirmed |
m-CancelGet |
m-Create |
m-Delete |
m-EventReport |
m-EventReport-Confirmed |
m-Get |
m-Linked-Reply |
m-Set |
m-Set-Confirmed |
}

CMIP-Confirmed-Operations OPERATION ::= {
m-Action-Confirmed |
m-CancelGet |
m-Create |
m-Delete |
m-EventReport-Confirmed |
m-Get |
m-Set-Confirmed |
}

-- *INFORMATION OBJECT definitions*

-- *While it is possible to use the Information object class definitions defined below to specify*

-- *Action types, Attribute types, Event Report types, and their associated ASN.1 type definitions,*

-- *the alternative approach using GDMO templates, as defined in ITU-T Rec. X.722 | ISO/IEC 10165-4,*

-- *continues to be available for use with this Recommendation | International Standard.*

CMIP-ACTION ::= CLASS {
&id **ActionTypeId** **UNIQUE,**
&Value **}**
WITH SYNTAX {TYPE **&Value**
 ID **&id }**

```

CMIP-ATTRIBUTE ::= CLASS {
    &id      AttributeId UNIQUE,
    &Value
    WITH SYNTAX {TYPE &Value
                 ID    &id }
}

```

```

CMIP-AVA ::= CLASS {
    &id      OBJECT IDENTIFIER UNIQUE,
    &Value
}

```

```

CMIP-EVENT ::= CLASS {
    &id      EventTypeId UNIQUE,
    &Value
    WITH SYNTAX {TYPE &Value
                 ID    &id }
}

```

```

CMIP-SPECIFICERROR ::= CLASS {
    &id      OBJECT IDENTIFIER UNIQUE,
    &Value
    WITH SYNTAX {TYPE &Value
                 ID    &id }
}

```

-- the following type specifies the constraints to be applied when using ROSE to support CMIP

```

ROSEapdus ::= ROS{{InvokeIDType}, {CMIP-Operations}, {CMIP-Confirmed-Operations}}

```

-- CMISE operations

-- The following part of the ASN.1 specification provides a definition of ROIVapdu and RORSapdu subtypes used by CMIP.

-- The subtypes of the ROIVapdu define the allowed values of the operation-value and argument defined by that

-- operation-value for all CMIP notifications and operations. The subtypes of the RORSapdu define the allowed

-- values of the operation-value and result defined by that operation-value for all CMIP notifications and operations.

```

m-Action OPERATION.&operationCode ::= local : 6

```

```

ROIV-m-Action ::= ROSEapdus (WITH COMPONENTS {
    invoke (WITH COMPONENTS {
        invokeId      (InvokeIDtype),
        linkedId      ABSENT,
        opcode         (m-Action),
        argument       (ActionArgument) } )
    })

```

```

m-Action-Confirmed OPERATION.&operationCode ::= local : 7

```

```

ROIV-m-Action-Confirmed ::= ROSEapdus (WITH COMPONENTS {
    invoke (WITH COMPONENTS {
        invokeId      (InvokeIDtype),
        linkedId      ABSENT,
        opcode         (m-Action-Confirmed),
        argument       (ActionArgument) } )
    })

```

```

RORS-m-Action-Confirmed ::= ROSEapdus (WITH COMPONENTS {
    returnResult (WITH COMPONENTS {
        invokeId      (InvokeIDtype),
        result        (WITH COMPONENTS {
            opcode     (m-Action-Confirmed),
            result     (ActionResult) } ) OPTIONAL } )
    -- required only if there is a single reply to the ROIV-m-Action-Confirmed ROSEapdu
    -- and data is to be returned in the ROSEapdu
    })

```

```

m-Cancel-Get OPERATION.&operationCode ::= local : 10

```

```

ROIV-m-Cancel-Get ::= ROSEapdus (WITH COMPONENTS {
    invoke (WITH COMPONENTS {
        invokeId      (InvokeIDtype),
        linkedId      ABSENT,
        opcode         (m-Cancel-Get),
        argument       (InvokeIDType) } )
    })

```

RORS-m-Cancel-Get ::= ROSEapdu (WITH COMPONENTS {
 returnResult (WITH COMPONENTS {
 invokeId (InvokeIDtype) })
 -- There is no result sequence for RORS-m-Cancel-Get
 })

m-Create OPERATION.&operationCode ::= local : 8

ROIV-m-Create ::= ROSEapdu (WITH COMPONENTS {
 invoke (WITH COMPONENTS {
 invokeId (InvokeIDtype),
 linkedId ABSENT,
 opcode (m-Create),
 argument (CreateArgument) })
 })

RORS-m-Create ::= ROSEapdu (WITH COMPONENTS {
 returnResult (WITH COMPONENTS {
 invokeId (InvokeIDtype),
 result (WITH COMPONENTS {
 opcode (m-Create),
 result (CreateResult) }) })
 })

m-Delete OPERATION.&operationCode ::= local : 9

ROIV-m-Delete ::= ROSEapdu (WITH COMPONENTS {
 invoke (WITH COMPONENTS {
 invokeId (InvokeIDtype),
 linkedId ABSENT,
 opcode (m-Delete),
 argument (DeleteArgument) })
 })

RORS-m-Delete ::= ROSEapdu (WITH COMPONENTS {
 returnResult (WITH COMPONENTS {
 invokeId (InvokeIDtype),
 result (WITH COMPONENTS {
 opcode (m-Delete),
 result (DeleteResult) }) OPTIONAL })
 -- required only if there is a single reply to the ROIV-m-DeleteROSEapdu
 -- and data is to be returned in the ROSEapdu
 })

m-EventReport OPERATION.&operationCode ::= local : 0

ROIV-m-EventReport ::= ROSEapdu (WITH COMPONENTS {
 invoke (WITH COMPONENTS {
 invokeId (InvokeIDtype),
 linkedId ABSENT,
 opcode (m-EventReport),
 argument (EventReportArgument) })
 })

m-EventReport-Confirmed OPERATION.&operationCode ::= local : 1

ROIV-m-EventReport-Confirmed ::= ROSEapdu (WITH COMPONENTS {
 invoke (WITH COMPONENTS {
 invokeId (InvokeIDtype),
 linkedId ABSENT,
 opcode (m-EventReport-Confirmed),
 argument (EventReportArgument) })
 })

RORS-m-EventReport-Confirmed ::= ROSEapdu (WITH COMPONENTS {
 returnResult (WITH COMPONENTS {
 invokeId (InvokeIDtype),
 result (WITH COMPONENTS {

```

opcode      (m-EventReport-Confirmed),
result      (EventReportResult) } ) OPTIONAL } )
-- required only if data is to be returned in the ROSEapdu
})

```

m-Get OPERATION.&operationCode ::= local : 3

```

ROIV-m-Get ::= ROSEapdus (WITH COMPONENTS {
  invoke (WITH COMPONENTS {
    invokeId      (InvokeIDtype),
    linkedId      ABSENT,
    opcode        (m-Get),
    argument      (GetArgument) } )
  })

```

```

RORS-m-Get ::= ROSEapdus (WITH COMPONENTS {
  returnResult (WITH COMPONENTS {
    invokeId      (InvokeIDtype),
    result        (WITH COMPONENTS {
      opcode      (m-Get),
      result      (GetResult) } ) OPTIONAL } )
  -- required only if there is a single reply to the ROIV-m-Get ROSEapdus
  })

```

m-Linked-Reply OPERATION.&operationCode ::= local : 2

```

ROIV-m-Linked-Reply ::= ROSEapdus (WITH COMPONENTS {
  invoke (WITH COMPONENTS {
    invokeId      (InvokeIDtype),
    linkedId      PRESENT,
    opcode        (m-Linked-Reply),
    argument      (LinkedReplyArgument) } )
  })

```

-- This part of the ASN.1 specification provides a definition of ROIV-m-Linked-Reply subtypes used by CMIP.
-- The subtypes of the ROIV-m-Linked-Reply ROSEapdus define the allowed values of the argument defined by
-- the opcode for the specific CMIP linked reply operations.

```

ROIV-m-Linked-Reply-Action ::= ROIV-m-Linked-Reply (WITH COMPONENTS {
  invoke (WITH COMPONENTS {
    invokeId      (InvokeIDtype),
    linkedId      PRESENT,
    opcode        (m-Linked-Reply),
    argument      (LinkedReplyArgument (WITH COMPONENTS {
      invoke (WITH COMPONENTS {
        getResult      ABSENT,
        getListError   ABSENT,
        setResult      ABSENT,
        setListError   ABSENT,
        actionResult   PRESENT,
        processingFailure PRESENT,
        deleteResult   ABSENT,
        actionError    PRESENT,
        deleteError    ABSENT } )
      } )
    } )
  } )

```

```

ROIV-m-Linked-Reply-Delete ::= ROIV-m-Linked-Reply (WITH COMPONENTS {
  invoke (WITH COMPONENTS {
    invokeId      (InvokeIDtype),
    linkedId      PRESENT,
    opcode        (m-Linked-Reply),
    argument      (LinkedReplyArgument (WITH COMPONENTS {
      invoke (WITH COMPONENTS {
        getResult      ABSENT,
        getListError   ABSENT,
        setResult      ABSENT,
        setListError   ABSENT,

```