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TECHNICAL CORRIGENDUM 1

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Information technology — Open Systems Interconnection — Systems Management: Attributes for representing relationships

AMENDMENT 1: Implementation conformance statement proformas

TECHNICAL CORRIGENDUM 1

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Gestion-systèmes: Attributs pour la représentation des relations

AMENDEMENT 1: Proformes ICS

RECTIFICATIF TECHNIQUE 1

Technical Corrigendum 1 to International Standard ISO/IEC 10164-3:1993/Amd.1:1996 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology,* Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing.*

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – SYSTEMS MANAGEMENT: ATTRIBUTES FOR REPRESENTING RELATIONSHIPS

AMENDMENT 1
Implementation conformance statement proformas

TECHNICAL CORRIGENDUM 1

1) Annex A

In Table A.6 – "PICS Support Summary", *first row referencing* "CCITT Rec. X.730 | ISO/IEC 10164-1, Annex E, SM Application Context" *change the status from* "m" *to* "o" *and add the following note for the corresponding row of this table:*

"NOTE – The supplier of implementation shall indicate the application contexts supported."

2) Subclause A.1.3

Add the following sentence after the line "– Not applicable or out of scope", *immediately before* "NOTES":

"The value of 'm' in the Status column for the receiving of parameters, of tables of type MCS in Annex A indicates that there is a minimum requirement for the implementation to be able to receive the parameter. The Additional information column shall be used to state whether the implementation provides support for more than the minimum requirement."

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Information technology — Open Systems Interconnection — Systems Management: Attributes for representing relationships

AMENDMENT 1: Implementation conformance statement proformas

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Gestion-systèmes: Attributs pour la représentation des relations

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Reference number
ISO/IEC 10164-3:1993/Amd.1:1996(E)

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Foreword

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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 1 to International Standard ISO/IEC 10164-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing*, in collaboration with ITU-T. The identical text is published as ITU-T Rec. X.732/Amd.1.

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Introduction

This amendment includes tables, which document the mandatory and optional management information specific to the Attributes for Representing Relationships Recommendation. This amendment will be used by Profile specifiers, for example, those developing International Standardized Profiles (ISPs), to specify an explicit subset of capability, which will afford interoperability between implementations. The tables also include a column for equipment vendors to state the capability of their products in terms of the Profiles or base specification. The table structures comply with the Guidelines for Implementation Conformance Statement Proformas specified in ITU-T Rec. X.724 | ISO/IEC 10165-6.

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – SYSTEMS MANAGEMENT: ATTRIBUTES FOR REPRESENTING RELATIONSHIPS

AMENDMENT 1
(to Rec. X.732 | ISO/IEC 10164-3)

IMPLEMENTATION CONFORMANCE STATEMENT PROFORMAS

1) *Add the following footnote to the first list item in 2.1:*

"[1] As amended by ITU-T Rec. X.701/Cor.2 | ISO/IEC 10040/Cor.2"

2) *Add the following reference to 2.1:*

"– ITU-T Recommendation X.724 (1993) | ISO/IEC 10165-6:1994, *Information technology – Open Systems Interconnection – Structure of management information: Requirements and guidelines for implementation conformance statement proformas associated with OSI management.*"

3) *Add the following references to 2.2:*

"– CCITT Recommendation X.291 (1992), *OSI conformance testing methodology and framework for protocol Recommendations for CCITT applications – Abstract test suite specification.*

ISO/IEC 9646-2:1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 2: Abstract Test Suite specification.*

– ITU-T Recommendation X.296[2], *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Implementation conformance statements.*

ISO/IEC 9646-7:1995, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 7: Implementation Conformance Statements.*"

And then add the following footnote:

[2] Presently at the stage of draft.

4) *Apply the following changes to 3.4:*

Add the following items to the list

"Management Information Conformance Statement (MICS)"

"Managed Object Conformance Statement (MOCS)"

"MICS proforma"

"MOCS proforma".

Delete item c) and d), re-label the list and re-arrange the list in alphabetic order.

5) *Apply the following change to 3.7:*

Replace "system conformance statement" *with the following:*

"a) PICS proforma;

b) protocol implementation conformance statement;

c) system conformance statement."

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6) *Renumber 3.8 as 3.9 and insert the following new subclause:*

"3.8 Implementation conformance statement proforma definitions

This Recommendation | International Standard makes use of the following terms defined in ITU-T Rec. X.724 | ISO/IEC 10165-6:

a) Managed Relationship Conformance Statement (MRCS);

b) Management Conformance Summary (MCS);

c) MCS proforma;

d) MRCS proforma."

7) *Add the following abbreviations to clause 4:*

"ICS Implementation Conformance Statement

MCS Management Conformance Summary

MICS Management Information Conformance Statement

MIDS Management Information Definition Statement

MOCS Managed Object Conformance Statement

MRCS Managed Relationship Conformance Statement

PICS Protocol Implementation Conformance Statement"

8) *Replace clause 13 with the following:*

"13 Conformance

Implementations claiming to conform to this Recommendation | International Standard shall comply with the conformance requirements as defined in the following subclauses.

13.1 Static conformance

The implementation shall conform to the requirements of this Recommendation | International Standard in the manager role, the agent role, or both roles. A claim of conformance to at least one role shall be made in Table A.1.

If a claim of conformance is made for support in the manager role, the implementation shall support at least the notification or one of the management operations specified in this Recommendation | International Standard. The conformance requirements in the manager role for those management operations and notifications are specified in Table A.3 and further tables referenced by Annex A.

If a claim of conformance is made for support in the agent role, the implementation shall support at least one of the attributes, attribute group, notification identified in Table A.4. The conformance requirements in the agent role are specified in Annex A and further tables referenced by Annex A.

The implementation shall support the transfer syntax derived from the encoding rules specified in CCITT Rec. X.209 | ISO/IEC 8825 named {joint-iso-ccitt asn1(1) basicEncoding(1)} for the abstract data types referenced by the definitions for which support is claimed.

NOTE – Prior to the publication of this amendment, this Recommendation | International Standard identified general and dependent conformance classes. A claim of conformance similar to general conformance class can be made by stating support in the manager role, the agent role, or both roles, for object events functional unit in Table A.2. A claim of conformance similar to dependent conformance class can be made by stating support for at least one of the items in Tables A.3 or A.4.

13.2 Dynamic conformance

Implementations claiming to conform to this Recommendation | International Standard shall support the elements of procedure and definitions of semantics corresponding to the definitions for which support is claimed.

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13.3 Management implementation conformance statement requirements

Any MCS proforma, MICS proforma, and MOCS proforma which conforms to this Recommendation | International Standard shall be technically identical to the proformas specified in Annexes A, B, and C preserving table numbering and the index numbers of items, and differing only in pagination and page headers.

The supplier of an implementation which is claimed to conform to this Recommendation | International Standard shall complete a copy of the Management Conformance Summary (MCS) provided in Annex A as part of the conformance requirements together with any other ICS proformas referenced as applicable from that MCS. An ICS which conforms to this Recommendation | International Standard shall:

- describe an implementation which conforms to this Recommendation | International Standard;
- have been completed in accordance with the instructions for completion given in ITU-T Rec. X.724 | ISO/IEC 10165-6;
- include the information necessary to uniquely identify both the supplier and the implementation.

Claims of conformance to the management information defined in this Recommendation | International Standard in managed object classes defined elsewhere shall include the requirements of the MIDS proforma, as specified in Annex D, in the MOCS for the managed object class."

9) *Apply the following change to 11.1.1.1:*

In the last sentence, replace "11.1.1.1.2" *by* "11.1.1.2"

10) *Apply the following change to 11.1.2.1:*

In the last sentence, replace "11.1.1.2.2" *by* "11.1.2.2"

11) *Add the following annexes:*

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Annex A

MCS proforma[3)]

(This annex forms an integral part of this Recommendation I International Standard)

A.1 Introduction

A.1.1 Purpose and structure

The Management Conformance Summary (MCS) is a statement by a supplier that identifies an implementation and provides information on whether the implementation claims conformance to any of the listed set of documents that specify conformance requirements to OSI management.

The MCS proforma is a document, in the form of a questionnaire that when completed by the supplier of an implementation becomes the MCS.

A.1.2 Instructions for completing the MCS proforma to produce an MCS

The supplier of the implementation shall enter an explicit statement in each of the boxes provided. Specific instruction is provided in the text which precedes each table.

A.1.3 Symbols, abbreviations and terms

For all annexes of this Recommendation I International Standard, the following common notations, defined in CCITT Rec. X.291 I ISO/IEC 9646-2 and ITU-T Rec. X.296 I ISO/IEC 9646-7 are used for the Status column:

- m Mandatory
- o Optional
- c Conditional
- x Prohibited
- – Not applicable or out of scope

NOTES

1 'c', 'm', and 'o' are prefixed by a 'c:' when nested under a conditional or optional item of the same table;

2 'o' may be suffixed by '.N' (where N is a unique number) for selectable options among a set of status values. Support of at least one of the choices (from the items with the same values of N) is required.

For all annexes of this Recommendation I International Standard, the following common notations, defined in CCITT Rec. X.291 I ISO/IEC 9646-2 and ITU-T Rec. X.296 I ISO/IEC 9646-7 are used for the Support column:

- Y Implemented
- N Not implemented
- – No answer required
- Ig The item is ignored (i.e. processed syntactically but not semantically)

A.1.4 Table format

Some of the tables in this Recommendation I International Standard have been split because the information is too wide to fit on the page. Where this occurs, the index number of the first block of columns are the index numbers of the corresponding rows of the remaining blocks of columns. A complete table reconstructed from the constituent parts should have the following layout:

Index	First block of columns	Second block of columns	Etc.

3) Users of this Recommendation I International Standard may freely reproduce the MCS proforma in this annex so that it can be used for its intended purpose, and may further publish the completed MCS. Instructions for completing the MCS proforma are specified in ITU-T Rec.X.724 I ISO/IEC 10165-6.

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In this Recommendation | International Standard the constituent parts of the table appear consecutively, starting with the first block of columns.

When a table with sub-rows is too wide to fit on a page, the continuation tables(s) have been constructed with index numbers identical to the index numbers in the corresponding rows of the first table, and with sub-index numbers corresponding to the sub-rows within each indexed row. For example, if Table X.1 has 2 rows and the continuation of Table X.1 has 2 sub-rows for each row, the tables are presented as follows:

Table X.1 – Title

					Support		
Index	A	B	C	D	E	F	G
1	a	b	–				
2	a	b	–				

Table X.1 *(concluded)* – Title

Index	Sub-index	H	I	J	K	L
1	1.1	h	i	j		
	1.2	h	i	j		
2	2.1	h	i	j		
	2.2	h	i	j		

A complete table reconstructed from the constituent parts should have the following layout:

					Support							
Index	A	B	C	D	E	F	G	Sub-index	H	I	J	K	L
1	a	b	–					1.1	h	i	j		
								1.2	h	i	j		
2	a	b	–					2.1	h	i	j		
								2.2	h	i	j		

References made to cells within tables shall be interpreted as references within reconstructed tabled. In the example, above, the reference X.1/1d corresponds to the blank cell in the column G for row with Index 1, and X.1/1.2b corresponds to the blank cell in column L for row with Sub-index 1.2

A.2 Identification of the implementation

A.2.1 Date of statement

The supplier of the implementation shall enter the date of this statement in the box below. Use the format DD-MM-YYYY.

Date of statement

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A.2.2 Identification of the implementation

The supplier of the implementation shall enter information necessary to uniquely identify the implementation and the system(s) in which it may reside, in the box below.

A.2.3 Contact

The supplier of the implementation shall provide information on whom to contact if there are any queries concerning the content of the MCS, in the box below.

A.3 Identification of the Recommendation | International Standard in which the management information is defined

The supplier of the implementation shall enter the title, reference number and date of the publication of the Recommendation | International Standard which specifies the management information to which conformance is claimed, in the box below.

Recommendation | International Standard to which conformance is claimed

A.3.1 Technical corrigenda implemented

The supplier of the implementation shall enter the reference numbers of implemented technical corrigenda which modify the identified Recommendation | International Standard, in the box below.

A.3.2 Amendments implemented

The supplier of the implementation shall state the titles and reference numbers of implemented amendments to the identified Recommendation | International Standard, in the box below.

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A.4 Management conformance summary

The supplier of implementation shall state the capabilities and features supported and provide summary of conformance claims to Recommendations I International Standards using the tables in this annex.

The supplier of the implementation shall specify the roles that are supported, in Table A.1.

Table A.1 – Roles

Index	Roles supported	Status	Support	Additional information
1	Manager role support	o.1		
2	Agent role support	o.1		

The supplier of the implementation shall specify support for systems management functional units in Table A.2.

Table A.2 – Systems management functional unit

		Manager		Agent		
Index	Capability	Status	Support	Status	Support	Additional information
1	relationship change reporting functional unit	c1		c2		
c1: if A.1/1a then o else –. c2: if A.1/2a then o else –.						

The supplier of the implementation shall specify support for management information in the manager role, in Table A.3.

Table A.3 – Manager role minimum conformance requirement

Index	Item	Status	Support	Additional information
1	Operations on generic relationship attributes and attribute group	c3		
2	Relationship change notification	c4		
3	Operations on managed objects	c3		
c3: if A.2/1a then o else (if A.1/1a then o.2 else –). c4: if A.2/1a then m else (if A.1/1a then o.2 else –).				

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The supplier of the implementation shall specify support for management information in the agent role, in Table A.4.

Table A.4 – Agent role minimum conformance requirement

Index	Item	Status	Support	Table reference	Additional information
1	providerObject attribute	c5			
2	userObject attribute	c5			
3	peer attribute	c5			
4	primary attribute	c5			
5	secondary attribute	c5			
6	backUpObject attribute	c5			
7	backedUpObject attribute	c5			
8	member attribute	c5			
9	owner attribute	c5			
10	relationships attribute group	c5			
11	Relationship change notification	c6			
12	relationship change record managed object class	c7		–	

c5: if A.2/1b then o else (if A.1/2a then o.3 else –).

c6: if A.1/1b then m else (if A.1/2a then o.3 else –).

c7: if A.4/11a and A.5/1a then m else –.

NOTE – The Table reference column in this table is the notification, attributes, or managed object class table reference of the MOCS supplied by the supplier of the managed object which claims to import the notification or attribute from this Recommendation | International Standard.

Table A.5 – Logging of event records

Index		Status	Support	Additional information
1	Does the implementation support logging of event records in agent role?	c8		

c8: if A.1/2a then o else –.

NOTE – Conformance to this Recommendation | International Standard does not require conformance to CCITT Rec. X.735 | ISO/IEC10164-6.

The supplier of the implementation shall provide information on claims of conformance to any of the Recommendation | International Standards summarized in Tables A.6 to A.9. For each Recommendation | International Standard that the supplier of the implementation claims conformance to, the corresponding conformance statement(s) shall be completed, or referenced by, the MCS. The supplier of the implementation shall complete the Support, Table numbers and Additional information columns.

In Tables A.6 to A.9 the Status column is used to indicate whether the supplier of the implementation is required to complete the referenced tables or referenced items. Conformance requirements are as specified in the referenced tables or referenced items and are not changed by the value of the MCS Status column. Similarly, the Support column is used by the supplier of the implementation to indicate completion of the referenced tables or referenced items.

NOTE – Conformance to the MAPDUs defined in this Recommendation | International Standard can be claimed by completing the corresponding tables in the MICS and MOCS annexes of the referenced Recommendations | International Standards.

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Table A.6 – PICS support summary

Index	Identification of the document that includes the PICS proforma	Table numbers of PICS proforma	Description	Constraints and values	Status	Support	Table numbers of PICS	Additional information
1	CCITT Rec. X.730 | ISO/IEC 10164-1	Annex E all tables	SM application context	OBJECT IDENTIFIER	m			

Table A.7 – MOCS support summary

Index	Identification of the document that includes the MOCS proforma	Table numbers of MOCS proforma	Description	Constraints and values	Status	Support	Table numbers of MOCS	Additional information
1	CCITT Rec. X.732 | ISO/IEC 10164-3	Annex C all tables	relationship change record	–	c9			
c9: if A.4/12a then m else –.								

Table A.8 – MRCS support summary

Index	Identification of the document that includes the MRCS proforma	Table numbers of MRCS proforma	Description	Constraints and values	Status	Support	Table numbers of MRCS	Additional information
1	CCITT Rec. X.735 | ISO/IEC 10164-6	Item D.1/1	logRecord-log name binding	–	c10			
c10: if A.5/1a then o else –.								

Table A.9 – MICS support summary

Index	Identification of the document that includes the MICS proforma	Table numbers of MICS proforma	Description	Constraints and values	Status	Support	Table numbers of MICS	Additional information
1	CCITT Rec. X.732 | ISO/IEC 10164-3	Tables B.1 and B.2	operations on generic relationship attributes and attribute group	–	c11			
2	CCITT Rec. X.732 | ISO/IEC 10164-3	Table B.3	notifications	–	c12			
3	CCITT Rec. X.732 | ISO/IEC 10164-3	Tables B.4 and B.5	management operations	–	c13			
c11: if A.3/1a then m else –. c12: if A.3/2a then m else –. c13: if A.3/3a then m else –.								

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Annex B

MICS proforma[4)]

(This annex forms an integral part of this Recommendation | International Standard)

B.1 Introduction

The purpose of this MICS proforma is to provide a mechanism for a supplier of an implementation which claims conformance, in the manager role, to management information specified in this Recommendation | International Standard, to provide conformance information in a standard form.

B.2 Instructions for completing the MICS proforma to produce a MICS

The MICS proforma contained in this annex is comprised of information in tabular form, in accordance with ITU-T Rec. X.724 | ISO/IEC 10165-6. In addition to the general guidance given in ITU-T Rec. X.724 | ISO/IEC 10165-6, the Additional information column shall be used to identify the object classes for which the management operations are supported. The supplier of the implementation shall state which items are supported in tables below and if necessary, provide additional information.

B.3 Symbols, abbreviations and terms

The following abbreviations are used throughout the MICS proforma:

dmi-att	joint-iso-ccitt ms(9) smi(3) part2(2) attribute(7)
dmi-not	joint-iso-ccitt ms(9) smi(3) part2(2) notification(10)

The notations used for the Status and Support columns are specified in A.1.3.

B.4 Statement of conformance to the management information

B.4.1 Generic relationship attributes and attribute group

The specifier of a managed object class that claims to support the relationship attributes specified by CCITT Rec. X.732 | ISO/IEC 10164-3 shall import a copy of Table B.1 and complete.

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Table B.1 – Generic relationship attributes

				Set by create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	providerObject	{dmi-att 46}	–	o.4		o.4		o.4	
2	userObject	{dmi-att 48}	–	o.4		o.4		o.4	
3	peer	{dmi-att 44}	–	–		o.4		–	
4	primary	{dmi-att 45}	–	o.4		o.4		o.4	
5	secondary	{dmi-att 47}	–	o.4		o.4		o.4	
6	backUpObject	{dmi-att 40}	–	–		o.4		–	
7	backedUpObject	{dmi-att 41}	–	–		o.4		–	
8	member	{dmi-att 42}	–	o.4		o.4		o.4	
9	owner	{dmi-att 43}	–	o.4		o.4		o.4	

Table B.1 *(concluded)* – Generic relationship attributes

	Add		Remove		Set to default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	o.4		o.4		–		
2	o.4		o.4		–		
3	–		–		–		
4	o.4		o.4		–		
5	o.4		o.4		–		
6	–		–		–		
7	–		–		–		
8	o.4		o.4		–		
9	o.4		o.4		–		

The specifier of a managed object class that claims to support the relationship attribute group specified by CCITT Rec. X.732 | ISO/IEC 10164-3 shall import a copy of Table B.2 and complete it according to the instructions specified in ITU-T Rec. X.724 | ISO/IEC 10165-6.

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Table B.2 – Relationship attribute group

Index	Attribute group template label	Value of object identifier for attribute group	Constraints and values	Get		Set to default		Additional information
				Status	Support	Status	Support	
1	relationships	{dmi-att 2}	–	o.4		–		

B.4.2 Notifications

The specifier of a manager role implementation that claims to support the notifications specified in this Recommendation | International Standard shall import a copy of Table B.3 and complete it.

Table B.3 – Notification support

Index	Notification type template label	Value of object identifier for notification type	Constraints and values	Status	Support		Additional information
					Confirmed	Non-confirmed	
1	relationshipChange	{dmi-not 14}	–	c1			
c1: if A.3/2a then m else –.							

Table B.3 *(concluded)* – Notification support

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
1	1.1	sourceIndicator	{dmi-att 26}	0 to 3	m		
	1.2	attribute identifier list	{dmi-att 8}	–	m		
	1.3	relationshipChangeDefinition	{dmi-att 20}	–	m		
	1.3.1	attributeId	–	–	m		
	1.3.2	oldAttributeValue	–	–	m		
	1.3.3	newAttributeValue	–	–	m		
	1.4	notificationIdentifier	{dmi-att 16}	INTEGER	m		
	1.5	correlatedNotifications	{dmi-att 12}	–	m		
	1.4.1	correlatedNotification	–	–	m		
	1.4.2	sourceObjectInst	–	–	m		
	1.4.2.1	distinguishedName	–	–	m		
	1.4.2.2	nonSpecificForm	–	–	m		
	1.4.2.3	localDistinguishedName	–	–	m		
	1.6	additionalText	{dmi-att 7}	–	m		
	1.7	additionalInformation	{dmi-att 6}	–	m		

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B.4.2 Attributes

The specifier of a manager role implementation that claims to support management operations on the *attributes specified* in this Recommendation | International Standard shall import a copy of Table B.4 and complete it.

Table B.4 – Attribute support

				Set by create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	objectClass	{dmi-att 65}	–	–		o.5		–	
2	nameBinding	{dmi-att 63}	–	–		o.5		–	
3	packages	{dmi-att 66}	–	–		o.5		–	
4	allomorphs	{dmi-att 50}	–	–		o.5		–	
5	log recordId	{dmi-att 3}	–	–		o.5		–	
6	loggingTime	{dmi-att 59}	–	–		o.5		–	
7	managedObjectClass	{dmi-att 60}	–	–		o.5		–	
8	managedObjectInstance	{dmi-att 61}	–	–		o.5		–	
9	eventType	{dmi-att 14}	–	–		o.5		–	
10	eventTime	{dmi-att 13}	–	–		o.5		–	
11	notificationIdentifier	{dmi-att 16}	–	–		o.5		–	
12	correlatedNotifications	{dmi-att 12}	–	–		o.5		–	
13	additionalText	{dmi-att 7}	–	–		o.5		–	
14	additionalInformation	{dmi-att 6}	–	–		o.5		–	
15	relationshipChangeDefinition	{dmi-att 20}	–	–		o.5		–	
16	sourceIndicator	{dmi-att 26}	–	–		o.5		–	
17	attributeIdentifierList	{dmi-att 8}	–	–		o.5		–	

Table B.4 *(continued)* – Relationship change record attribute support

	Add		Remove		Set to default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	–		–		–		
2	–		–		–		
3	–		–		–		
4	–		–		–		
5	–		–		–		
6	–		–		–		
7	–		–		–		

(continued)

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Table B.4 *(concluded)* – Relationship change record attribute support

	Add		Remove		Set to default		
Index	Status	Support	Status	Support	Status	Support	Additional information
8	–		–		–		
9	–		–		–		
10	–		–		–		
11	–		–		–		
12	–		–		–		
13	–		–		–		
14	–		–		–		
15	–		–		–		
16	–		–		–		
17	–		–		–		

B.4.3 Create and delete management operations

The specifier of a manager role implementation that claims to support the create or delete management operations on managed objects specified in this Recommendation | International Standard shall import a copy of Table B.5 and complete it. The Additional information column shall be used to indicate any restrictions in the claim to support the create or delete management operations.

Table B.5 – Create and delete support

Index	Operation	Constraints and values	Status	Support	Additional information
1	Create support	–	x		
1.1	Create with reference object	–	–		
2	Delete support	relationshipChangeRecord managed object	o.5		

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Annex C

MOCS proforma[5)]

(This annex forms an integral part of this Recommendation | International Standard)

C.1 Introduction

The purpose of this MOCS proforma is to provide a mechanism for a supplier of an implementation which claims to conform to a managed object class, to provide conformance information in a standard form.

C.2 Instructions for completing the MOCS proforma to produce a MOCS

The MOCS proforma contained in this annex is comprised of information in tabular form, in accordance with ITU-T Rec. X.724 | ISO/IEC 10165-6. The supplier of the implementation shall state which items are supported in tables below and if necessary provide additional information.

C.3 Symbols, abbreviations and terms

The following abbreviations are used throughout the proformas:

dmi-att	joint-iso-ccitt ms(9) smi(3) part2(2) attribute(7)
dmi-moc	joint-iso-ccitt ms(9) smi(3) part2(2) managedObjectClass(3)
dmi-not	joint-iso-ccitt ms(9) smi(3) part2(2) notification(10)
dmi-pkg	joint-iso-ccitt ms(9) smi(3) part2(2) package(4)

The notations used in the Status and Support columns are specified in A.1.3.

The following requirement is commonly used throughout this MOCS proforma:

c1 If C.3/3a or C.3/6a or C.3/7a or C.3/8a or C.3/9a or C.3/10a or C.3/12a or C.3/13a then m else –.

c2 If C.1/1b then – else m.

C.4 Relationship change record managed object class

C.4.1 Statement of conformance to the managed object class

See Table C.1.

Table C.1 – Managed object class support

Index	Managed object class template label	Value of object identifier for class	Support of all mandatory features? (Y/N)	Is the actual class the same as the managed object class to which conformance is claimed? (Y/N)
1	RelationshipChangeRecord	{dmi-moc 10}		

5) Users of this Recommendation | International Standard may freely reproduce the MOCS proforma in this annex so that it can be used for its intended purpose, and may further publish the completed MOCS. Instructions for completing the MOCS proforma are specified in ITU-T Rec. X.724 | ISO/IEC 10165-6.

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If the answer to the actual class question in the managed object class support table is "N", the supplier of the implementation shall supply the actual class support details, in Table C.2.

Table C.2 – Actual class support

Index	Actual managed object class template label	Value of object identifier for managed object class	Additional information
1			

C.3.2 State change record packages

See Table C.3.

Table C.3 – Relationship change record packages

Index	Package name	Value of object identifier	Constraints and values	Status	Support	Additional information
1	topPackage	–	–	m		
2	packagesPackage	{dmi-pkg 16}	–	c1		
3	allomorphicPackage	{dmi-pkg 17}	–	c2		
4	logRecordPackage	–	–	m		
5	eventLogRecordPackage	–	–	m		
6	eventTimePackage	{dmi-pkg 11}	–	o		
7	notificationIdentifierPackage	{dmi-pkg 24}	–	o		
8	correlatedNotificationPackage	{dmi-pkg 23}	–	o		
9	additionalTextPackage	{dmi-pkg 19}	–	o		
10	additionalInformationPackage	{dmi-pkg 18}	–	o		
11	RelationshipChangeRecordPackage	–	–	m		
12	sourceIndicatorPackage	{dmi-pkg 28}	–	o		
13	attributeIdentifierListPackage	{dmi-pkg 20}	–	o		

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C.3.3 Attributes

See Table C.4.

Table C.4 – Relationship change record attribute support

				Set by create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	objectClass	{dmi-att 65}		x		m		x	
2	nameBinding	{dmi-att 63}		x		m		x	
3	packages	{dmi-att 66}		x		c1		x	
4	allomorphs	{dmi-att 50}		x		c2		x	
5	log recordId	{dmi-att 3}		x		m		x	
6	loggingTime	{dmi-att 59}		x		m		x	
7	managedObjectClass	{dmi-att 60}		x		m		x	
8	managedObjectInstance	{dmi-att 61}		x		m		x	
9	eventType	{dmi-att 14}		x		m		x	
10	eventTime	{dmi-att 13}		x		c3		x	
11	notificationIdentifier	{dmi-att 16}		x		c4		x	
12	correlatedNotifications	{dmi-att 12}		x		c5		x	
13	additionalText	{dmi-att 7}		x		c6		x	
14	additionalInformation	{dmi-att 6}		x		c7		x	
15	relationshipChange Definition	{dmi-att 20}		x		m		x	
16	sourceIndicator	{dmi-att 26}		x		c8		x	
17	attributeIdentifierList	{dmi-att 8}		x		c9		x	

c2: if C.3/6a then m else –.
c3: if C.3/7a then m else –.
c4: if C.3/8a then m else –.
c5: if C.3/9a then m else –.
c6: if C.3/10a then m else –.
c7: if C.3/12a then m else –.
c8: if C.3/13a then m else –.

(continued)

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Table C.4 *(concluded)* – Relationship change record attribute support

	Add		Remove		Set to default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	–		–		–		
2	–		–		–		
3	x		x		–		
4	x		x		–		
5	–		–		–		
6	–		–		–		
7	–		–		–		
8	–		–		–		
9	–		–		–		
10	–		–		–		
11	–		–		–		
12	x		x		–		
13	–		–		–		
14	x		x		–		
15	x		x		–		
16	–		–		–		
17	x		x		–		

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Annex D

MIDS proforma[6)]

(This annex forms an integral part of this Recommendation | International Standard)

D.1 Symbols, abbreviations and terms

The following abbreviations are used throughout the proformas:

dmi-att joint-iso-ccitt ms(9) smi(3) part2(2) attribute(7)

dmi-not joint-iso-ccitt ms(9) smi(3) part2(2) notification(10)

The notations used in the Status and Support columns are specified in A.1.3.

D.2 Notification

The specifier of a managed object class that claims to support the notification specified by CCITT Rec. X.732 | ISO/IEC 10164-3 shall import a copy of Table D.1 and complete it according to the instructions specified in ITU-T Rec. X.724 | ISO/IEC 10165-6.

Table D.1 – Notification support

					Support		
Index	Notification type template label	Value of object identifier for notification type	Constraints and values	Status	Confirmed	Non-confirmed	Additional information
1	relationshipChange	{dmi-not 12}	–				

(continued)

6) Users of this Recommendation | International Standard may freely reproduce the MIDS proforma in this annex so that it can be used for its intended purpose, and may further publish the completed MIDS. Instructions for completing the MIDS proforma are specified in ITU-T Rec. X.724 | ISO/IEC 10165-6.

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Table D.1 *(concluded)* – Notification support

Index	Sub-index	Notification field name label	Value of object identifier of attribute type associated with field	Constraints and values	Status	Support	Additional information
1	1.1	sourceIndicator	{dmi-att 26}	0 to 3	o		
	1.2	attribute identifier list	{dmi-att 8}	–	o		
	1.3	relationshipChangeDefinition	{dmi-att 20}	–	m		
	1.3.1	attributeId	–	–	m		
	1.3.2	oldAttributeValue	–	–	o		
	1.3.3	newAttributeValue	–	–	m		
	1.4	notificationIdentifier	{dmi-att 16}	INTEGER	c3		
	1.5	correlatedNotifications	{dmi-att 12}	–	o		
	1.4.1	correlatedNotification	–	–	c:m		
	1.4.2	sourceObjectInst	–	–	c:o		
	1.4.2.1	distinguishedName	–	–	c:o.5		
	1.4.2.2	nonSpecificForm	–	–	c:o.5		
	1.4.2.3	localDistinguishedName	–	–	c:o.5		
	1.6	additionalText	{dmi-att 7}	–	o		
	1.7	additionalInformation	{dmi-att 6}	–	o		

c1: if D.1/1.4a then m else o.

c2: if D.1/2.4a then m else o.

c3: if D.1/3.5a then m else o.

D.3 Generic relationship attributes

The specifier of a managed object class that claims to support the relationship attributes specified by CCITT Rec. X.732 | ISO/IEC 10164-3 shall import a copy of Table D.2 and complete it according to the instructions specified in ITU-T Rec. X.724 | ISO/IEC 10165-6.

Table D.2 – Generic relationship attributes

				Set by create		Get		Replace	
Index	Attribute template label	Value of object identifier for attribute	Constraints and values	Status	Support	Status	Support	Status	Support
1	providerObject	{dmi-att 46}	–	o		o		o	
2	userObject	{dmi-att 48}	–	o		o		o	
3	peer	{dmi-att 44}	–	–		o		x	
4	primary	{dmi-att 45}	–	o		o		o	
5	secondary	{dmi-att 47}	–	o		o		o	
6	backUpObject	{dmi-att 40}	–	x		o		x	
7	backedUpObject	{dmi-att 41}	–	x		o		x	
8	member	{dmi-att 42}	–	o		o		o	
9	owner	{dmi-att 43}	–	o		o		o	

(continued)

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Table D.2 *(concluded)* – Generic relationship attributes

	Add		Remove		Set to default		
Index	Status	Support	Status	Support	Status	Support	Additional information
1	o		o		–		
2	o		o		–		
3	–		–		–		
4	o		o		–		
5	o		o		–		
6	–		–		–		
7			–		–		
8	o		o		–		
9	o		o		–		

D.4 Relationship attribute group

The specifier of a managed object class that claims to support the relationship attribute group specified by CCITT Rec. X.732 | ISO/IEC 10164-3 shall import a copy of Table D.3 and complete it according to the instructions specified in ITU-T Rec. X.724 | ISO/IEC 10165-6.

Table D.3 – Relationship attribute group

				Get		Set to default		
Index	Attribute group template label	Value of object identifier for attribute group	Constraints and values	Status	Support	Status	Support	Additional information
1	relationships	{dmi-att 2}	–	o		–		

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INTERNATIONAL STANDARD

ISO/IEC 10164-3

First edition
1993-06-15

Information technology — Open Systems Interconnection — Systems Management: Attributes for representing relationships

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Gestion-systèmes: Attributs pour la représentation des relations

Reference number
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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 10164-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in collaboration with the CCITT. The identical text is published as CCITT Recommendation X.732.

ISO/IEC 10164 consists of the following parts, under the general title *Information technology – Open Systems Interconnection – Systems Management*:

- *Part 1 : Object Management Function*
- *Part 2 : State Management Function*
- *Part 3 : Attributes for representing relationships*
- *Part 4 : Alarm reporting function*
- *Part 5 : Event report management function*
- *Part 6: Log control function*
- *Part 7: Security alarm reporting function*
- *Part 8: Security audit trail function*
- *Part 9: Objects and attributes for access control*
- *Part 10: Accounting meter function*
- *Part 11: Workload monitoring function*
- *Part 12: Test management function*
- *Part 13: Summarization function*
- *Part 14: Confidence and diagnostic test categories*

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Introduction

ISO/IEC 10164 is a multipart Standard developed according to ISO 7498 and ISO/IEC 7498-4. ISO/IEC 10164 is related to the following International Standards:

ISO/IEC 9595:1990, *Information technology – Open Systems Interconnection – Common management information service definition*;

ISO/IEC 9596:1990, *Information technology – Open Systems Interconnection – Common management information protocol*;

ISO/IEC 10040:1992, *Information technology – Open Systems Interconnection – Systems management overview*;

ISO/IEC 10165:1992, *Information technology – Open Systems Interconnection – Structure of management information.*

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INTERNATIONAL STANDARD

CCITT RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN SYSTEMS INTERCONNECTION – SYSTEMS MANAGEMENT: ATTRIBUTES FOR REPRESENTING RELATIONSHIPS

1 Scope

This Recommendation | International Standard defines a systems management function which may be used by an application process in a centralized or decentralized management environment to interact for the purpose of systems-management as defined by CCITT Rec. X.700 | ISO/IEC 7498-4. This Recommendation | International Standard defines the attributes for representing relationships and consists of services and generic definitions. It is positioned in the application layer of CCITT Rec. X.200 | ISO/IEC 7498 and is defined according to the model provided by ISO/IEC 9545. The role of systems management functions are described by CCITT Rec. X.701 | ISO/IEC 10040.

This Recommendation | International Standard

- establishes user requirements for attributes for representing relationships;
- establishes a model that relates the service and generic definitions provided by this function to user requirements;
- defines the services provided by the function;
- defines generic attribute types, notification types and parameters documented in accordance with CCITT Rec. X.722 | ISO/IEC 10165-4;
- specifies the protocol that is necessary in order to provide the services;
- defines the relationship between the service and management operations and notifications;
- specifies compliance requirements placed on other standards that makes use of these generic definitions;
- defines relationships with other systems management functions;
- specifies conformance requirements.

This Recommendation | International Standard does not

- define the nature of any implementation intended to provide this function;
- specify the manner in which management is accomplished by the user of this function;
- define the nature of any interactions that result in the use of this function;
- specify the services necessary for the establishment, normal and abnormal release of a management association;
- preclude the definition of further notification types;
- define managed objects.

2 Normative references

The following CCITT Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent editions of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The CCITT Secretariat maintains a list of the currently valid CCITT Recommendations.

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2.1 Identical Recommendations | International Standards

- CCITT Recommendation X.701 (1992) | ISO/IEC 10040:1992, *Information technology – Open Systems Interconnection – Systems management overview.*
- CCITT Recommendation X.720 (1992) | ISO/IEC 10165-1:1993, *Information technology – Open Systems Interconnection – Structure of management information: Management information model.*
- CCITT Recommendation X.721 (1992) | ISO/IEC 10165-2:1992, *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information.*
- CCITT Recommendation X.722 (1992) | ISO/IEC 10165-4:1992, *Information technology – Open Systems Interconnection – Structure of management information: Guidelines for the definition of managed objects.*
- CCITT Recommendation X.733 (1992) | ISO/IEC 10164-4:1992, *Information technology – Open Systems Interconnection – Systems Management: Alarm reporting function.*
- CCITT Recommendation X.734 (1992) | ISO/IEC 10164-5:1993, *Information technology – Open Systems Interconnection – Systems Management: Event report management function.*
- CCITT Recommendation X.735 (1992) | ISO/IEC 10164-6:1993, *Information technology – Open Systems Interconnection – Systems Management: Log control function.*

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.200 (1988), *Reference Model of Open Systems Interconnection for CCITT Applications.*

  ISO 7498:1984, *Information processing systems – Open Systems Interconnection – Basic Reference Model.*
- CCITT Recommendation X.209 (1988), *Specification of basic encoding rules for Abstract Syntax Notation One (ASN.1).*

  ISO/IEC 8825:1990, *Information technology – Open Systems Interconnection – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).*
- CCITT Recommendation X.210 (1988), *Open Systems Interconnection – Layer Service Definition Conventions.*

  ISO/TR 8509:1987, *Information processing systems – Open Systems Interconnection – Service conventions.*
- CCITT Recommendation X.290 (1992), *OSI conformance testing methodology and framework for protocol Recommendations for CCITT applications – General concepts.*

  ISO/IEC 9646-1:1991, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework - Part 1: General concepts.*
- CCITT Recommendation X.700 (1992), *Management Framework Definition 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.*
- CCITT Recommendation X.710 (1991), *Common Management Information Service Definition for CCITT Applications.*

  ISO/IEC 9595:1991, *Information technology – Open Systems Interconnection – Common management information service definition.*

2.3 Additional references

- ISO/IEC 9545:1989, *Information technology – Open Systems Interconnection – Application layer structure.*

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3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

3.1 Basic reference model definitions

This Recommendation | International Standard makes use of the following terms defined in CCITT Rec. X.200 | ISO 7498:

a) open system;
b) systems management.

3.2 Management framework definitions

This Recommendation | International Standard makes use of the following term defined in CCITT Rec. X.700 | ISO/IEC 7498-4:

managed object.

3.3 CMIS definitions

This Recommendation | International Standard makes use of the following term defined in CCITT Rec. X.710 | ISO/IEC 9595:

attribute.

3.4 Systems management overview definitions

This Recommendation | International Standard makes use of the following terms defined in CCITT Rec. X.701 | ISO/IEC 10040:

a) agent;
b) agent role;
c) dependent conformance;
d) general conformance;
e) generic definitions;
f) managed object class;
g) manager;
h) manager role;
i) notification;
j) systems management functional unit;
k) systems management function;
l) systems management application protocol;
m) (systems management) operation.

3.5 Management information model definitions

This Recommendation | International Standard makes use of the following term defined in CCITT Rec. X.720 | ISO/IEC 10165-1:

managed object boundary.

3.6 Service conventions definitions

This Recommendation | International Standard makes use of the following terms defined in CCITT Rec. X.210 | ISO/TR 8509:

a) confirm (primitive);
b) confirmed-service;
c) indication (primitive);
d) non-confirmed-service;
e) request (primitive);
f) response (primitive).

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3.7 OSI conformance testing definitions

This Recommendation | International Standard makes use of the following term defined in CCITT Rec. X.290 | ISO/IEC 9646-1:

system conformance statement.

3.8 Additional definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

3.8.1 service relationships: An asymmetric relationship denoting that the first of a pair of managed objects is a provider object (providing services) to the second, and that the second is a user object (using services) of the first.

3.8.2 peer relationships: A peer relationship is a symmetric relationship describing the rules under which pairs of similar managed objects communicate.

3.8.3 fallback relationships: A fallback relationship is an asymmetric relationship denoting that the second of a pair of managed objects (the secondary object) is capable of serving as a fallback or "next preferred choice" to the first managed object (the primary object).

3.8.4 back-up relationships: A back-up relationship is an asymmetric relationship denoting that the second of a pair of managed objects (the back-up object) is currently active and performing a back-up function in place of the first (the backed-up object).

3.8.5 group relationships: A group relationship is a relationship between two managed objects where one, the member object, belongs to a group represented by the other, the owner object.

4 Abbreviations

ASN.1	Abstract Syntax Notation One
CMIS	Common Management Information service
Conf	Confirmation
Ind	Indication
MAPDU	Management application protocol data unit
OSI	Open systems interconnection
Req	Request
Rsp	Response
SMAPM	Systems management application protocol machine
SMI	Structure of management information

5 Conventions

This Recommendation | International Standard defines services for the Relationship Change Reporting following the descriptive conventions defined in CCITT Rec. X.210 | ISO/TR 8509. In clause 9, the definition of each service includes a table that lists the service parameters. For a given service primitive, the presence of each parameter is described by one of the following values:

M the parameter is mandatory;
(=) the value of the parameter is equal to the value of the parameter in the column to the left;
U the use of the parameter is a Service-user option;
– the parameter is not present in the interaction described by the primitive concerned;
C the parameter is conditional;
P the parameter is subject to the constraints imposed by CCITT Rec. X.710 | ISO/IEC 9595.

NOTE – The parameters that are marked "P" in service tables of this Recommendation | International Standard are mapped directly onto the corresponding parameters of the CMIS service primitive, without changing the semantics or syntax of the parameters. The remaining parameters are used to construct an MAPDU.

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6 Requirements

The management user needs the ability to examine the relationships among various parts of the system or systems, to see how the operation of one part of the system depends upon or is depended upon by other parts. Knowing the existence of one part, the user needs to locate other parts that are related to it. The user also needs the ability to change such relationships and to be notified of such changes when they occur due to other causes.

This Recommendation | International Standard defines the general attributes, operations and notifications that can be part of any managed object definition.

7 Model

The definitions used in this Recommendation | International Standard are to assist the description of the model for attributes for representing relationships.

7.1 General

A relationship is defined by a set of rules that describe how the operation of one part of an open system affects the operation of other parts of the open system. A relationship is said to exist among managed objects when the operation of one managed object affects the operation of the other managed objects. For a relationship to be significant within the context of OSI management, sufficient management information must be available to allow the user of Management Information Services to identify the managed objects involved and the rules governing their interaction.

7.1.1 Direct and indirect relationships

A direct relationship exists between two managed objects when some portion of the management information associated with one managed object expressly identifies the other managed object with which it has a relationship.

An indirect relationship exists when such a relationship can be deduced from the concatenation of two or more direct relationships. Figure 1 illustrates the direct and indirect relationships.

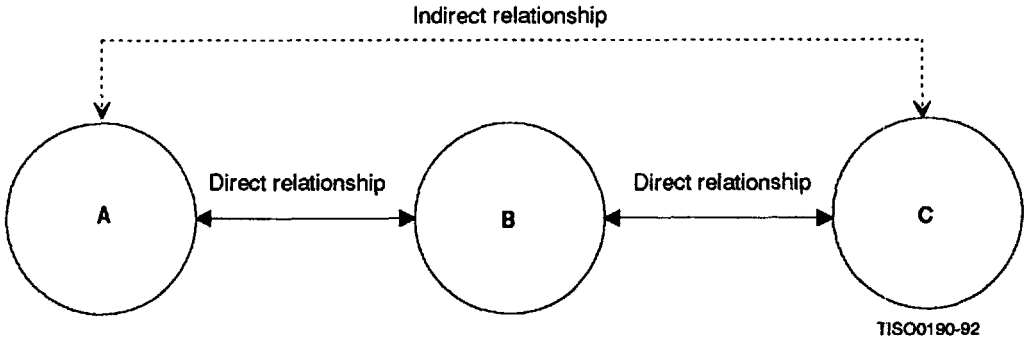


Figure 1 – Direct and indirect relationships

In this diagram, the circles represent managed objects, and the solid lines represent direct relationships (AB and BC), expressed as explicit management information. The dotted line represents an indirect relationship (AC) that can be inferred from the existence of the direct relationships.

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7.1.2 Relationship role

In a relationship between two managed objects, the relationship role is a description of the part played by one managed object (i.e. the rules describing its behaviour) with respect to the other managed object.

7.1.3 Role attribute

A role attribute is a single valued or a set-valued attribute of a managed object whose values are the names of other managed objects that exist in a particular relationship role with respect to the managed object possessing the attribute. Role attributes are used to represent such relationships. The managed object class definer may impose a limit on the number of values in a set-valued role attribute.

Figure 2 illustrates a service relationship, comprising two managed objects, one in a service provider role and the other in a service user role.

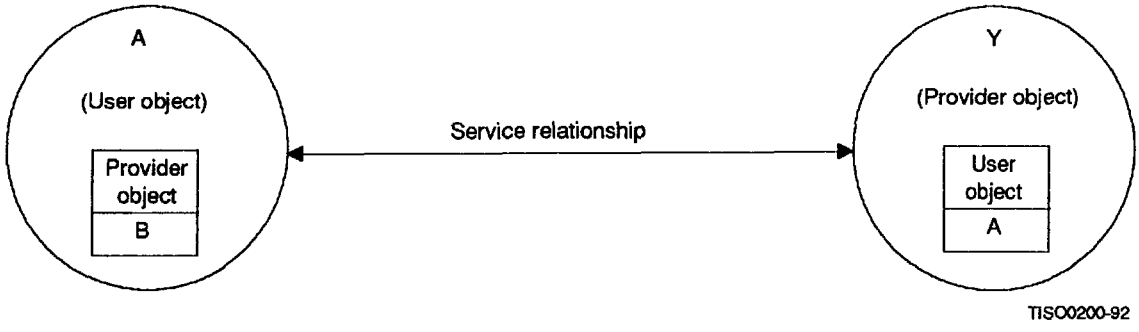


Figure 2 – Relationship roles

7.1.4 Symmetric and asymmetric relationships

A symmetric relationship exists between two managed objects when the set of generic rules governing their interactions with each other and the roles of the two managed objects are identical.

An asymmetric relationship exists between two managed objects when the set of generic rules governing their interactions with each other and the roles of the two managed objects differ.

7.1.5 Relationship type

Relationships among managed objects can be of many types. The relationship type is defined by the set of relationship roles applicable to the managed objects that constitute the relationship.

7.2 Categories of relationships

This Recommendation | International Standard defines reciprocal and one way relationships.

7.2.1 Reciprocal relationships

7.2.1.1 Definition of reciprocal relationship

A reciprocal relationship between two managed objects is represented by including, as one of the values of a role attribute of each of the managed objects, the name of the other managed object to which it is related. Figure 3 illustrates a reciprocal relationship.

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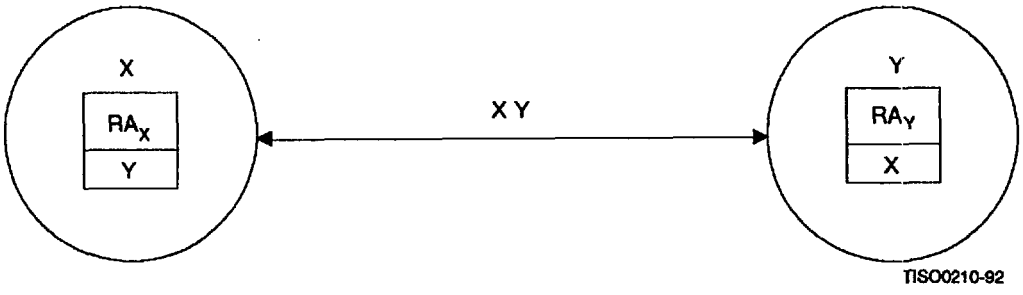


Figure 3 – Reciprocal relationship

In this diagram, the two managed objects X and Y have a direct relationship XY that is expressed both by the existence of the name of the object Y as a value of X's role attribute RA_X, and also by the existence of the name of the object X as a value of Y's role attribute RA_Y.

A reciprocal relationship is identified by the names of the two related managed objects and the name of either of the two role attributes that reflect the existence of the relationship. Thus in Figure 3, the relationship XY can be addressed in management information by addressing either the value Y in the role attribute RA_X, or the value X in the role attribute RA_Y.

A managed object may have multiple instances of similar reciprocal relationships. These relationships are expressed using a set valued role attribute.

7.2.1.2 Management of reciprocal relationships

Reciprocal relationships result from the creation of a managed object with specific role attribute(s). They may be changed through the create, delete, replace (add and remove in the case of set-valued attributes) operations. When a managed object is deleted, all reciprocal relationships pertaining to that managed object are deleted. The result of carrying out these operations on any one managed object causes a change to the relationships between managed objects. Depending on the behaviour of the managed object, these may result in further operations on related managed objects which assist in maintaining the consistency of the relationships.

Information about reciprocal relationships may be obtained through management operations or as a result of notifications. The relationships of a managed object can be read by applying get operations to the role attribute(s) of the managed object. Dependent upon the behaviour of managed objects, they may generate a notification whenever a relationship is created, deleted or changed.

7.2.2 One-way relationships

7.2.2.1 Definition of one-way relationships

A one-way relationship between two managed objects is represented by including, as one of the values of a role attribute of only one of the managed object, the name of the other managed object to which it is related.

7.2.2.2 Management of one-way relationships

One-way relationships are managed in the same manner as reciprocal relationships, by means of operations at the managed object boundary addressed to the role attribute.

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7.2.3 Managed objects that also represent relationships

When two direct relationships are concatenated to form an indirect relationship, the managed object that is common to both the direct relationships (e.g., the managed object B in Figure 1) can be regarded as representing the (indirect) relationship between the other two managed objects (A and C in Figure 1).

Managed object B represents a relationship when it contains the information identifying the type of the relationship and other role attributes of the indirect relationships. By extension, such relationship objects may represent relationships between three or more managed objects which cannot be represented unambiguously through containment or reciprocal relationships alone.

7.3 Types of relationships

The relationship type describes the nature of the relationship between two or more managed objects. The type of the relationship is implied by the name of the role attribute. The following types of reciprocal relationships are defined by this Recommendation | International Standard.

7.3.1 Service relationships

A **service relationship** is an asymmetric relationship denoting that the first of a pair of managed objects is a **provider object** (providing services) to the second and that the second is a **user object** (using services) of the first.

The fact that a service relationship exists between managed objects does not necessarily imply that the service is available.

Provider object and user object are two roles in a service relationship. A one-way service relationship exists if a managed object designates a second managed object to be in the user object role, or if the second managed object designates the first managed object to be in the provider object role. A reciprocal service relationship exists if both managed objects designate each other to be in the complementary roles.

The order of preference in which the user objects are selected for the provision of service by the provider object is expressed as a priority value attached to each user object.

The order of preference in which the provider objects are selected to provide service to the user object is expressed as a priority value attached to each provider object.

7.3.2 Peer relationships

A **peer relationship** is a symmetric relationship under which pairs of similar managed objects communicate. The related managed objects are termed **peers**. The attribute is constrained to be read-only for management operations though the value of the attribute may be changed by the normal or abnormal operation of the layer.

A one-way relationship exists if one managed object designates another managed object to be in the peer role. A reciprocal peer relationship exists if both managed objects designate each other to be in the peer role.

7.3.3 Fallback relationships

A **fallback relationship** is an asymmetric relationship denoting that the second of a pair of managed objects (the **secondary object**) has been designated as a fallback or "next preferred choice" to the first managed object (the **primary object**). The existence of a fall back relationship implies that the secondary resource is capable of providing Back-up service to the primary resource if the latter is unable to fulfil its function. It does not necessarily imply that the secondary resource is currently active and performing its Back-up function in place of the primary resource.

Primary and secondary are two roles in a fallback relationship. A one-way fallback relationship exists if a managed object designates a second managed object to be in the secondary role, or if the second managed object designates the first managed object to be in the primary role. A reciprocal fallback relationship exists if both managed objects designate each other to be in the complementary roles.

The order of preference in which the secondary objects are selected to provide Back-up service to the primary object is expressed as a priority value attached to each secondary object.

The order of preference in which the primary objects are selected for the provision of Back-up service by the secondary object is expressed as a priority value attached to each primary object.

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7.3.4 Back-up relationships

A **back-up relationship** is an asymmetric relationship denoting that the second of a pair of managed objects (the **back-up object**) is currently active and performing a back-up function in place of the first managed object (the **backed-up object**).

Back-up object and backed-up object are two roles in a back-up relationship. A one-way back-up relationship exists if a managed object designates a second managed object to be in the back-up role, or if the second managed object designates the first managed object to be in the backed-up role. A reciprocal back-up relationship exists if both managed objects designate each other to be in the complementary roles.

A back-up relationship is created as a result of a pre-existing fallback relationship between two managed objects. The back-up relationship comes into existence when the backed-up resource is not fulfilling its function, and the back-up resource is activated to provide the same service. The back-up relationship ceases to exist when the backed-up resource resumes fulfilling its function, and the back-up resource ceases to provide that service. Creation and deletion of the back-up relationship has no effect on the existence of the fallback relationship between the two managed objects.

A backed-up object may be in the **disabled** or **enabled** operational state. The administrative state of the back-up object must be **unlocked** to allow the back-up relationship to exist. When a managed object is being backed-up for any reason (i.e., a back-up relationship exists), the back-up object is in use as long as it is not **disabled**. The operational and administrative states are defined in CCITT Rec. X.731 | ISO/IEC 10164-2.

7.3.5 Group relationships

A **group relationship** is a relationship between two managed objects where one, the **member object**, belongs to a group represented by the other, the **owner object**. Group relationships are used to express the grouping of the same or different classes of member objects for some identified functional or administrative purpose, and can be changed during the lifetime of the member objects. Membership in groups can overlap, i.e., a given member object can have multiple owners.

Owner and **member** are the two roles in a group relationship. A one-way group relationship exists if a managed object designates a second managed object to be in the member role, or if the second managed object designates the first managed object to be in the owner role. A reciprocal group relationship exists if both managed objects designate each other to be in the complementary roles.

7.4 Relationship roles

The following types of relationship roles have been defined by this Recommendation | International Standard.

For service relationships:

- provider object;
- user object.

For peer relationships:

- peer.

For fallback relationships:

- primary;
- secondary.

For back-up relationships:

- back-up object;
- backed-up object.

For group relationships:

- owner;
- member.

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8 Generic definitions

This clause specifies a set of generic attributes and notification and their applicable parameters and semantics.

8.1 Generic attributes

This Recommendation | International Standard defines the following specific management attributes and attribute group, the abstract syntax of which are specified in CCITT Rec. X.721 | ISO/IEC 10165-2:

a) providerObject;
b) userObject;
c) peer;
d) primary;
e) secondary;
f) backUpObject;
g) backedUpObject;
h) member;
i) owner;
j) relationships.

These standardized attribute definitions can be used to derive new attribute definitions to identify more specific roles for the related managed object classes.

8.1.1 Provider object

A managed object definition shall use the provider object attribute to identify one or more managed objects acting in a service provider role with respect to that managed object, and the order of priority in which they do so. If the same priority is applied to more than one managed object, then the order of priority among these managed objects is a local matter. The provider object attribute is set-valued and read-write.

8.1.2 User object

A managed object definition shall use the user object attribute to identify one or more managed objects acting in a service user role with respect to that managed object, and the order of priority in which they do so. If the same priority is applied to more than one managed object, then the order of priority among these managed objects is a local matter. The user object attribute is set-valued and read-write.

8.1.3 Peer

A managed object definition shall use the peer attribute to identify one other managed object that acts in the peer role with respect to it. The peer attribute is single-valued and read-only. The attribute value may either be null or a managed object name.

8.1.4 Primary

A managed object shall use the primary attribute to identify one or more managed objects acting in a primary role with respect to that managed object, and the order of priority in which they do so. If the same priority is applied to more than one managed object, then the order of priority among these managed objects is a local matter. The primary attribute is set-valued and read-write.

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8.1.5 Secondary

A managed object shall use the secondary attribute to identify one or more managed objects acting in a secondary role with respect to that managed object, and the order of priority in which they do so. If the same priority is applied to more than one managed object, then the order of priority among these managed objects is a local matter. The secondary attribute is set-valued and read-write.

8.1.6 Back-up object

A managed object shall use the back-up object attribute to identify a managed object acting in a back-up role with respect to it. The back-up object attribute is single-valued and read-only. The attribute value may either be null if the managed object that has the attribute is currently active and not in need of back-up service, or a managed object name. The back-up object attribute forms the back-up object parameter defined in CCITT Rec. X.733 | ISO/IEC 10164-4.

8.1.7 Backed-up object

A managed object shall use the backed-up object attribute to identify a second managed object acting in a backed-up role with respect to it. The backed-up object attribute is single-valued and read-only. The attribute value may either be null if the managed object that has the attribute is not currently active as a back-up on behalf of any other object, or a managed object name.

8.1.8 Member

A managed object shall use the member attribute to identify one or more managed objects acting in the member role with respect to that managed object. The member attribute is set-valued and read-write.

8.1.9 Owner

A managed object shall use the owner attribute to identify one or more managed objects acting in the owner role with respect to that managed object. The owner attribute is set-valued and read-write.

8.1.10 Relationships attribute group

The relationships attribute group is defined as an empty attribute group. It provides a means of referring to the collection of all relationship attributes of a managed object. The intent of the relationships attribute group is to contain the generic and specific relationship attributes of a managed object when included in the managed object class definition. When the relationships attribute group is read, the set of attribute identifiers and values which are members of the relationships attribute group will be returned.

8.1.11 Rules applicable to relationship attributes

When a managed object is required to represent any of the relationships described above as management information it shall include the appropriate attribute type(s) as part of the object class definition. If an instance of that object class does not currently have a relationship established, then the relevant attributes shall be assigned a null value.

When there is a set of multiple objects related in a certain role to a given object, the objects in the set can be assigned a priority value showing the order of preference. Such a priority feature is provided for objects in the following roles.

- (service) provider object: The priority shows which service provider objects are preferred;
- (service) user object: The priority shows which service user objects are preferred;
- primary: The priority shows which primary objects are given preference for back-up service if more than one primary object is disabled;
- secondary: The priority shows which back-up objects are preferred.

In the relationship attributes for each of these *four* roles, each value is a bound pair of values comprising the related object name and the priority value assigned to that related object. A lower numerical priority value indicates that the related object has a higher preference.

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8.2 Generic notifications

The generic notification, parameters and semantics defined by this Recommendation | International Standard provide the detail for the following general parameters of the M-EVENT-REPORT service as defined by CCITT Rec. X.710 | ISO/IEC 9595:

- Event type;
- Event information;
- Event reply.

All notifications are potential entries in a systems management log and this Recommendation | International Standard defines one managed object class for this purpose. CCITT Rec. X.721 | ISO/IEC 10165-2 defines a generic event log record object class from which all entries are derived, the additional information being specified by the event information and event reply parameters.

8.2.1 Event type

This parameter defines the type of the event. The following event type is defined in this Recommendation | International Standard.

- relationship change: This notification type is used to report the change in the value of one or more relationship attributes of a managed object, that result through either the internal operation of the resource or via management operation. It is also used to report changes in object class specific relationship attributes.

8.2.2 Event information

The following parameters constitute the notification specific event information.

8.2.2.1 Source indicator

This parameter, when present, indicates the source of the operation that led to the generation of this notification type. It can have one of the following values.

- resource operation: The notification was generated in response to a relationship attribute value change effected through the internal operation of the resource;
- management operation: The notification was generated in response to a relationship attribute value change effected through an SMI management operation applied across the managed object boundary external to the managed object;
- unknown: It is not possible to determine the source of the operation.

8.2.2.2 Attribute identifier list

This parameter, when present, identifies the set of relationship attributes whose value changes are being reported.

8.2.2.3 Relationship change definition

This parameter set consists of a set of sequences of the three parameters: Attribute identifier, Old attribute value and new attribute value described below. Each individual sequence describes a single relationship attribute value change. At least one new relationship attribute value shall be present in this list.

8.2.2.3.1 Attribute identifier

This parameter identifies the relationship attribute whose value change is being reported.

8.2.2.3.2 Old attribute value

This parameter, when present, identifies the old value of the relationship attribute.

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8.2.2.3.3 New attribute value

This parameter identifies the current value of the relationship attribute.

8.2.2.4 Other information

The following parameters are also utilised. These parameters are defined by CCITT Rec. X.733 | ISO/IEC 10164-4:

- Additional information;
- Additional text;
- Correlated notifications;
- Notification identifier.

8.2.3 Event reply

This Recommendation | International Standard does not specify information to be used in the event reply parameter.

8.3 Managed objects

A relationship change record is a managed object class derived from the event log record object class defined in CCITT Rec. X.735 | ISO/IEC 10164-6. The relationship change record object class represents information stored in logs resulting from relationship change notification.

8.4 Compliance

Managed object class definitions support the function defined in this Recommendation | International Standard by incorporating the specification of the notification and/or relationship attribute types defined in this Recommendation | International Standard through reference to the notification and/or attribute templates defined in CCITT Rec. X.721 | ISO/IEC 10165-2. The reference mechanism is defined in CCITT Rec. X.722 | ISO/IEC 10165-4.

The definition of the managed object class shall, for the imported notification, specify in the behaviour clause which of the optional and conditional parameters are to be utilized and any further restrictions on their use and their values. It is permissible to state that the use of a parameter remains optional.

The managed object class definitions may import one or more of the relationship attribute types defined in this Recommendation | International Standard. For each imported relationship attribute, the managed object class shall state any further restrictions on the use and the values of the attribute.

9 Service definition

9.1 Introduction

This Recommendation | International Standard defines one service which is identified below together with the appropriate parameters.

9.1.1 Relationship change reporting service

This service allows an MIS-User in the agent role to report the changes in the values of managed object relationship attributes. It is defined both as a confirmed and as a non-confirmed service.

The relationship change reporting service uses the parameters defined in clause 8 in addition to the general M-EVENT-REPORT service parameters defined in CCITT Rec. X.710 | ISO/IEC 9595. Table 1 lists the parameters for the relationship change reporting service.

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Table 1 – Relationship change reporting parameters

Parameter name	Req/Ind	Rsp/Conf
Invoke identifier	P	P
Mode	P	–
Managed object class	P	P
Managed object instance	P	P
Event type	M	C(=)
Event time	P	–
Event information		
Source indicator	U	–
Attribute identifier list	U	–
Relationship change definition		
Attribute identifier	M	–
Old attribute value	U	–
New attribute value	M	–
Notification identifier	U	–
Correlated notifications	U	–
Additional text	U	–
Additional information	U	–
Current time	–	P
Event reply	–	–
Errors	–	P

The Event time, Correlated notifications and Notification identifier parameters may be assigned by the object emitting the notification or by the managed system.

9.2 Management of relationship attributes

This Recommendation | International Standard uses the pass-through services of the CCITT Rec. X.730 | ISO/IEC 10164-1 for managing the relationship attributes of managed objects.

10 Functional units

The relationship change reporting service constitutes a single systems management functional unit.

11 Protocol

11.1 Elements of procedure

11.1.1 Agent role

11.1.1.1 Invocation

The relationship change reporting procedures are initiated by the relationship change reporting request primitive. On receipt of a relationship change reporting request primitive, the SMAPM shall construct an MAPDU and issue a CMIS M-EVENT-REPORT request service primitive with parameters derived from the relationship change reporting request primitive. In the non-confirmed mode, the procedure in 11.1.1.1.2 does not apply.

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11.1.1.2 Receipt of response

On receipt of a CMIS M-EVENT-REPORT confirm primitive containing an MAPDU responding to a relationship change reporting notification, the SMAPM shall issue a relationship change reporting confirmation primitive to the reporting service user with parameters derived from the CMIS M-EVENT-REPORT confirm service primitive, thus completing the relationship change reporting procedure.

NOTE – The SMAPM ignores all errors in the received MAPDU. The relationship change reporting service user may ignore such errors, or abort the association as a consequence of such errors.

11.1.2 Manager role

11.1.2.1 Receipt of request

On receipt of a CMIS M-EVENT-REPORT indication service primitive containing an MAPDU requesting the relationship Change Reporting service, the SMAPM shall, if the MAPDU is well formed, issue a relationship change reporting indication primitive to the reporting service user with the parameters derived from the CMIS M-EVENT-REPORT response service primitive. Otherwise, the SMAPM shall in the confirmed mode construct an appropriate MAPDU containing notification of the error, and shall issue a CMIS M-EVENT-REPORT response service primitive with an error parameter present. In the non-confirmed mode, the procedure in 11.1.1.2.2 does not apply.

11.1.2.2 Response

In the confirmed mode, the SMAPM shall accept a relationship change reporting response primitive and shall construct an MAPDU confirming the notification and issue a CMIS M-EVENT-REPORT response primitive with parameters derived from the relationship change reporting response primitive.

11.2 Abstract syntax

11.2.1 Managed objects

This Recommendation | International Standard references the following management support object whose ASN.1 value notation is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:

relationshipChangeRecord

11.2.2 Attributes

This Recommendation | International Standard references the following management attributes, the abstract syntax of which is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:

a) backedUpObject;
b) backUpObject;
c) member;
d) owner
e) peer;
f) primary;
g) providerObject;
h) secondary;
i) userObject.

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11.2.3 Parameter to attribute mapping

Table 2 identifies the relationship between the parameters defined in 8.2 and the attributes type specifications in CCITT Rec. X.721 | ISO/IEC 10165-2.

Table 2 – Parameter to attribute mapping

Parameter	Attribute Name
Source Indicator	sourceIndicator
Attribute Identifier List	attributeIdentifierList
Relationship Change Definition	relationshipChangeDefinition

11.2.4 Attribute group

This Recommendation | International Standard references the following management attribute group, the abstract syntax of which is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:

relationships

11.2.5 Actions

There are no specific actions defined by this Recommendation | International Standard.

11.2.6 Notifications

Table 3 identifies the relationship between the notification defined in 8.1 and the notification type specification in CCITT Rec. X.721 | ISO/IEC 10165-2.

Table 3 – Notifications

Event type	Notification type
Relationship change	relationshipChange

11.3 Negotiation of functional units

This Recommendation | International Standard assigns the following object identifier value:

{joint-iso-ccitt ms(9) function(2) part3(3) functionalUnitPackage(1)}

as a value of ASN.1 type FunctionalUnitPackageId defined in CCITT Rec. X.701 | ISO/IEC 10040 to use for negotiating the availability of the following functional unit:

0 relationship change reporting

where the number identifies the bit position assigned to the functional unit as defined in clause 10.

Within the Systems management application context, the mechanism for negotiating functional units is described by CCITT Rec. X.701 | ISO/IEC 10040.

NOTE – The requirement to negotiate functional units is specified by the application context.

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12 Relationships with other functions

Control of the relationship change reporting service defined in this Recommendation | International Standard is provided by mechanisms specified in CCITT Rec. X.734 | ISO/IEC 10164-5. The relationship change reporting service may exist independently of the control mechanisms of CCITT Rec. X.734 | ISO/IEC 10164-5.

When performing an operation on a relationship attributes, this Recommendation | International Standard utilises the PT-GET and PT-SET services provided by the CCITT Rec. X.730 | ISO/IEC 10164-1.

13 Conformance

There are two conformance classes: general conformance class and dependent conformance class. A system claiming to implement the elements of procedure for the relationship change reporting service defined in this Recommendation | International Standard shall comply with the requirements for either the general or the dependent conformance class as defined in the following sub-clauses. The supplier of the implementation shall state the class to which conformance is claimed.

13.1 General conformance class requirements

A system claiming general conformance to this Recommendation | International Standard shall support this systems management function for all managed object classes that import the management information defined by this Recommendation | International Standard.

13.1.1 Static conformance

The system shall

a) support the role of manager, agent or both with respect to the relationship change reporting functional unit;

b) support the transfer syntax derived from the encoding rules specified in CCITT Rec. X.209 | ISO/IEC 8825 named {joint-iso-ccitt asn1(1) basic encoding(1)}, for the purpose of generating and interpreting the MAPDUs, defined by the abstract data types referenced in 11.2.2, 11.2.4 and 11.2.6 of this Recommendation | International Standard.

13.1.2 Dynamic conformance

The system shall, in the role(s) for which conformance is claimed

a) support the elements of procedure defined in CCITT Rec. X.730 | ISO/IEC 10164-1 for PT-GET and the PT-SET services; and,

b) support the elements of procedure defined in this Recommendation | International Standard for the relationship change reporting service.

13.2 Dependent conformance class requirements

13.2.1 Static conformance

The system shall

a) supply a System Conformance Statement which identifies the standardized use of this systems management function;

b) support the transfer syntax derived from the encoding rules specified in CCITT Rec. X.209 | ISO/IEC 8825 and named {joint-iso-ccitt asn1(1) basic encoding(1)}, for the purpose of generating and interpreting the MAPDUs, defined by the abstract data types referenced in 11.2.2, 11.2.4 and 11.2.6, as required by a standard use of this systems management function.

13.2.2 Dynamic conformance

The system shall support the element of procedure defined in, or referenced by, this Recommendation | International Standard, as required by a standardized use of this systems management function.

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