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SPECIFICATIONS OF SIGNALLING SYSTEM No. 7

**NETWORK ELEMENT MANAGEMENT
INFORMATION MODEL FOR THE MESSAGE
TRANSFER PART (MTP)**

ITU-T Recommendation Q.751.1

(Previously "CCITT Recommendation")

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

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NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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SUMMARY

The management functionality described in this Recommendation pertains to the Network Element Management of the Message Transfer Part (MTP). It contains the Network Element Management Information Model for the MTP, that is the definition of network element managed objects.

Annex B contains an informal description of the management view of the MTP resources, the main body of the Recommendation refines this view into a formal description of the network element management information model.

NETWORK ELEMENT MANAGEMENT INFORMATION MODEL FOR THE MESSAGE TRANSFER PART (MTP)

(Geneva, 1995)

1 Scope

The management functionality described in this Recommendation pertains to the Network Element Management of the Message Transfer Part (MTP). It contains the Network Element Management Information Model for the MTP, that is the definition of network element managed objects.

This Recommendation is part of a Series of Recommendations (Q.750) for management of SS No. 7 Network consisting of several signalling points. A signalling point is a node in the Signalling System No. 7 Network.

This Recommendation only pertains to management of **one** single SS No. 7 network.

2 References

The following Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Recommendation A.15 (1993), *Elaboration and presentation of texts for Recommendations of the ITU Telecommunication Standardization Sector.*
- [2] CCITT Recommendation M.3010 (1992), *Principles for a telecommunications management network.*
- [3] CCITT Recommendation M.3100 (1992), *Generic network information model.*
- [4] ITU-T Recommendation Q.700 (1993), *Introduction to CCITT Signalling System No. 7.*
- [5] ITU-T Recommendation Q.701 (1993), *Functional description of the Message Transfer Part (MTP) of Signalling System No. 7.*
- [6] CCITT Recommendation Q.702 (1988), *Signalling data link.*
- [7] ITU-T Recommendation Q.703 (1993), *Signalling System No. 7 – Signalling link.*
- [8] ITU-T Recommendation Q.704 (1993), *Signalling System No. 7 – Signalling network functions and messages.*
- [9] ITU-T Recommendation Q.705 (1993), *Signalling System No. 7 – Signalling network structure.*
- [10] CCITT Recommendation Q.707 (1988), *Testing and maintenance.*
- [11] ITU-T Recommendation Q.750 (1993), *Overview of Signalling System No. 7 management.*
- [12] ITU-T Recommendation Q.752 (1993), *Monitoring and measurements for Signalling System No. 7 networks.*
- [13] ITU-T Recommendation Q.753 (1993), *Signalling System No. 7 management functions MRVT, SRVT and CVT and definition of OMASE-user.*
- [14] ITU-T Recommendation Q.754 (1993), *Signalling System No. 7 management Application Service Element (ASE) definitions.*

- [15] ITU-T Recommendation Q.764 (1993), *Signalling System No. 7 – ISDN user part signalling procedures.*
- [16] ITU-T Recommendation Q.822 (1994), *Stage 1, stage 2 and stage 3 description for the Q3 interface – Performance management.*
- [17] CCITT Recommendation X.208 (1988), *Specification of Abstract Syntax Notation One (ASN.1).*
- [18] ITU-T Recommendation X.283 (1993), *Elements of management information related to the OSI network layer.*
- [19] ITU-T Recommendation X.680 (1994), *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- [20] CCITT Recommendation X.700 (1992), *Management framework for Open Systems Interconnection (OSI) for CCITT applications.*
- [21] CCITT Recommendation X.701 (1992), *Information technology – Open Systems Interconnection – Systems management overview.*
- [22] CCITT Recommendation X.710 (1991), *Common management information service definition for CCITT applications.*
- [23] CCITT Recommendation X.720 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Management information model.*
- [24] CCITT Recommendation X.721 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information.*
- [25] CCITT Recommendation X.722 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Guidelines for the definition of managed objects.*
- [26] ITU-T Recommendation X.723 (1993), *Information technology – Open Systems Interconnection – Structure of management information: Generic management information.*
- [27] CCITT Recommendation X.731 (1992), *Information technology – Open Systems Interconnection – Systems management: State management function.*
- [28] CCITT Recommendation X.733 (1992), *Information technology – Open Systems Interconnection – Systems management: Alarm reporting function.*

3 Definitions

For the purposes of this Recommendation, the following definitions apply:

This Recommendation makes use of the following terms defined in Recommendation M.3010:

- a) performance management;
- b) configuration management;
- c) fault management;
- d) Telecommunications Management Network (TMN).

This Recommendation makes use of the following terms defined in Recommendation X.700:

- object instance.

This Recommendation makes use of the following terms defined in Recommendation X.701:

- a) managed object class;
- b) management information;
- c) notification.

This Recommendation makes use of the following terms defined in Recommendation X.710:

- attribute.

This Recommendation makes use of the following terms defined in Recommendation X.720:

- a) inheritance;
- b) name binding;
- c) package;
- d) parameter.

This Recommendation makes use of the following terms defined in Recommendation X.722:

- template.

4 Abbreviations

Abbreviations regarding the MTP are listed in Table 1/Q.704. Additionally, the following abbreviations are used throughout this Recommendation:

B-ISUP	Broadband ISUP
CIC	Circuit Identification Code
ERD	Entity Relationship Diagram
GDMO	Guidelines for the Definition of Managed Objects
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
LS	Signalling Linkset
MO	Managed Object
MOC	Managed Object Class
MRVT	MTP Route Verification Test
MSU	Message Signal Unit
MTP	Message Transfer Part
NE	Network Element
OMAP	Operation, Maintenance and Administration Part
OS	Operations System
OSI	Open Systems Interconnection
PCR	Preventive Cyclic Retransmission
SCCP	Signalling Connection Control Part
SEP	Signalling End Point
SIB	Status Indication Busy
SL	Signalling Link
SLC	Signalling Link Code
SLS	Signalling Link Selection
SP	Signalling Point
SS No. 7	Signalling System No. 7
STEP	Signalling Transfer End Point
STM	Synchronous Transfer Mode
STP	Signalling Transfer Point
TC	Transaction Capability
TMN	Telecommunications Management Network
UP	User Part

5 Conventions

Recommendation A.1500 is used for the elaboration and presentation of texts for Recommendations of the ITU-T.

The Guidelines for the Definition of Managed Objects (GDMO), defined in Recommendation X.722, are used. In case of differences between the formal part (clause 7) and the informal parts of this Recommendation the formal part is to be regarded as leading.

Throughout this Recommendation the wording "The managed object class x" refers to a particular managed object class while the wording "An x" refers to an instance of the managed object class "x".

Modelling of redundancy is avoided (e.g. relationships between managed objects are described in one MOC only). However, for some implementations, it may be useful or necessary to add some additional information to some managed object classes, depending on the user's needs. This can be done by subclassing. For all MTP protocol timers that are modelled in this Recommendation, it is implementation dependent what value they take when they are not used.

6 Informal description of managed object classes

This clause gives an informal description – in alphabetical order – of the managed object classes. Diagrams are presented for inheritance, containment and pointer relationships. For each object-class a brief description is given, including the attributes, notifications and actions. Each MOC is (informally) described using tables. In these tables, (I), (M) and (C) are used with the following meaning:

- (I) This element is inherited from a superclass.
- (M) This element is mandatory.
- (C) This element is optional, preconditions on presence may apply.

Measurements for MTP are described in Recommendation Q.752, Tables 1, 2, 3, 4, 5 and 6. The modelling of these measurements for management can be found in Annex E.

A comprehensive analysis of the entities from the MTP protocol that are of relevance to management can be found in Annex B. Annex B consists of entity relationships diagrams and accompanying descriptive text.

Abstracted from Annex B is the collection of managed object classes that forms the management information model. This is described in this clause.

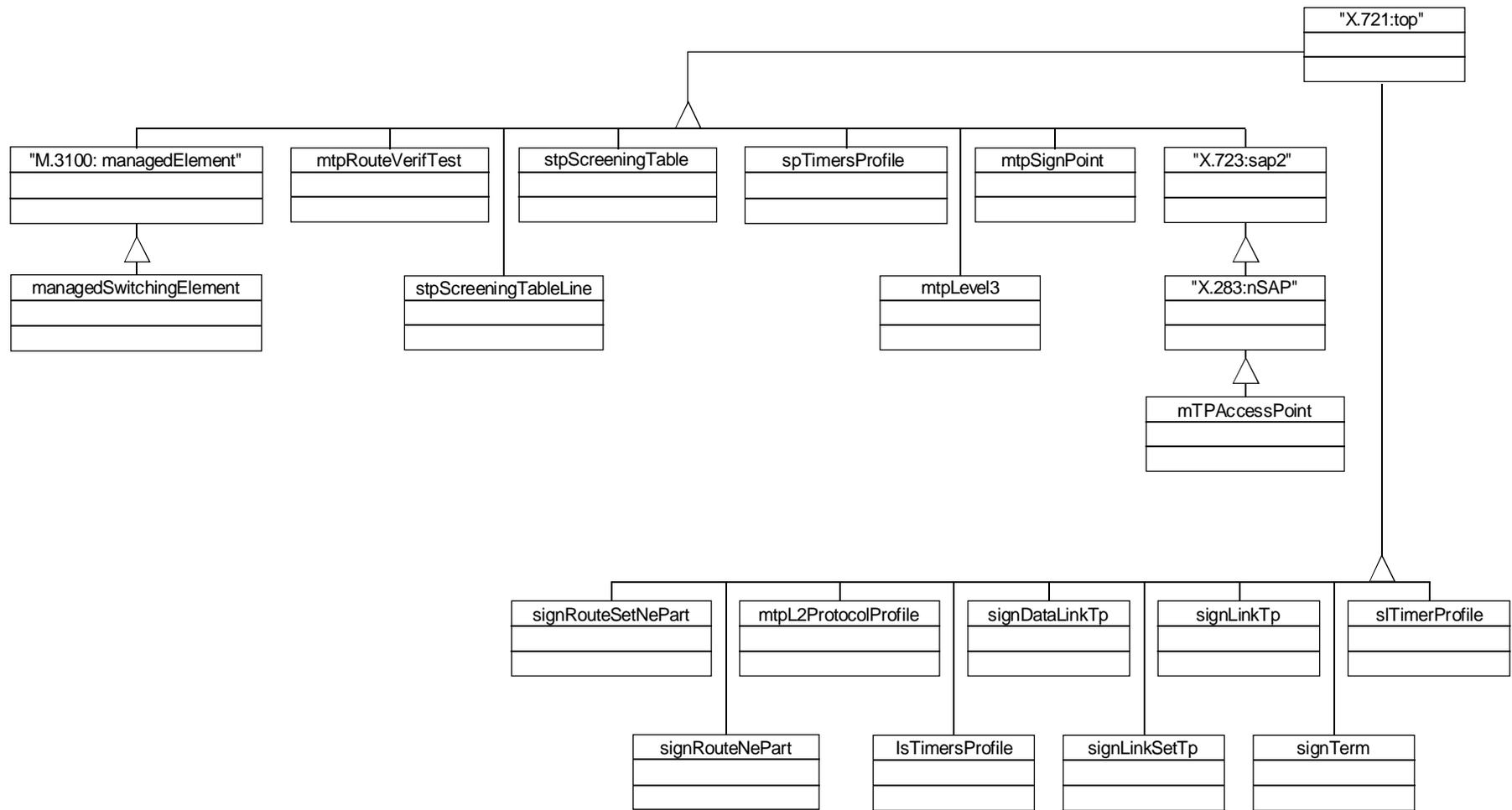
Formal definitions of the managed object classes are given in clause 7.

6.1 Diagrams

A summary on the notation used for the diagrams is given in Annex A. See Figure 1.

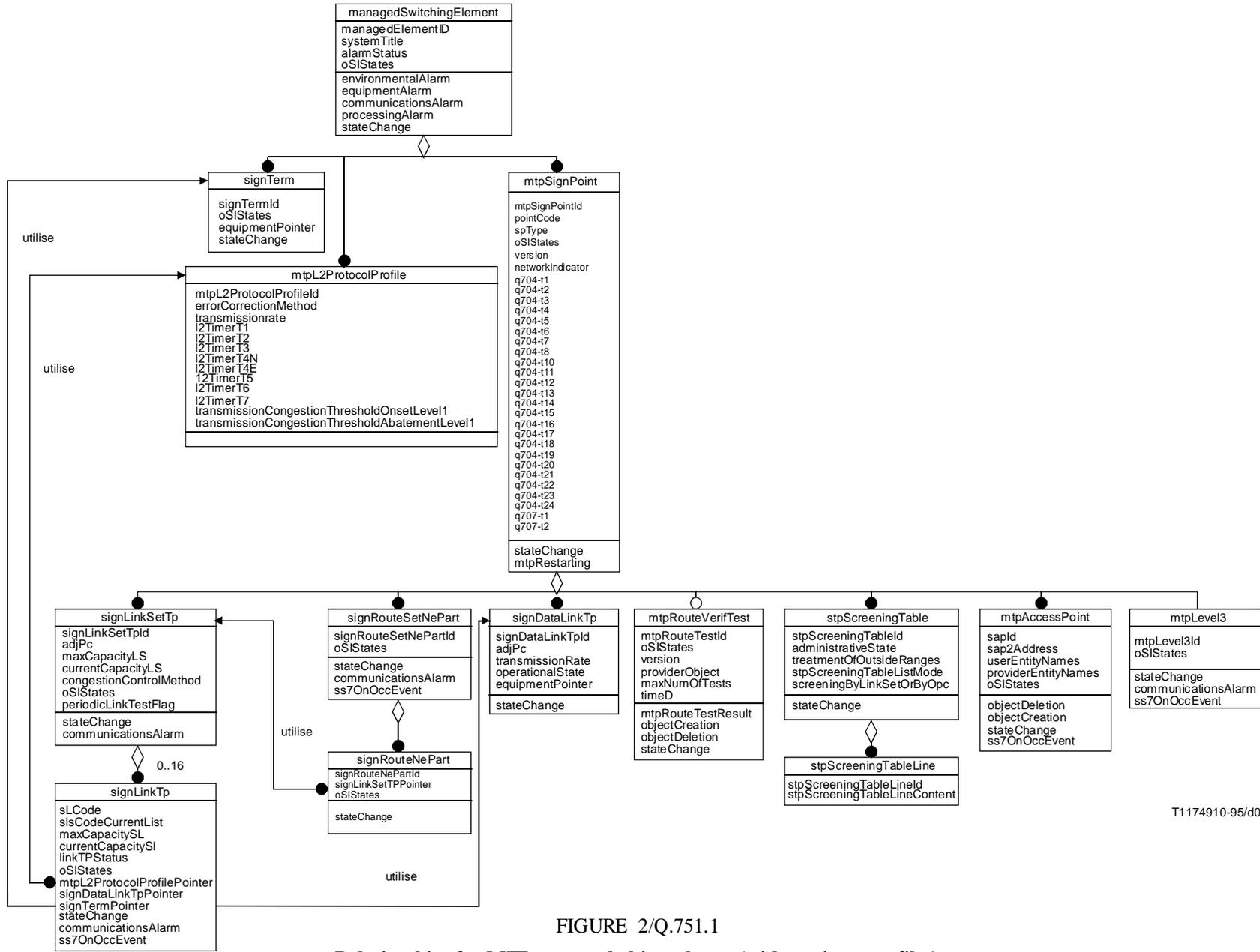
Naming, containment and pointer relationships are visualized in the following two diagrams. Figure 2 shows the case without the use of timer profiles while Figure 3 displays the case with. The diagrams show all managed object classes except for the ones that model the MTP measurements which can be found in Annex E.

An international SS No. 7-gateway exchange contains at least one signalling point for each network which it serves. There is one mtpLevel3 per signalling point, hence an exchange may contain multiple mtpLevel3s.



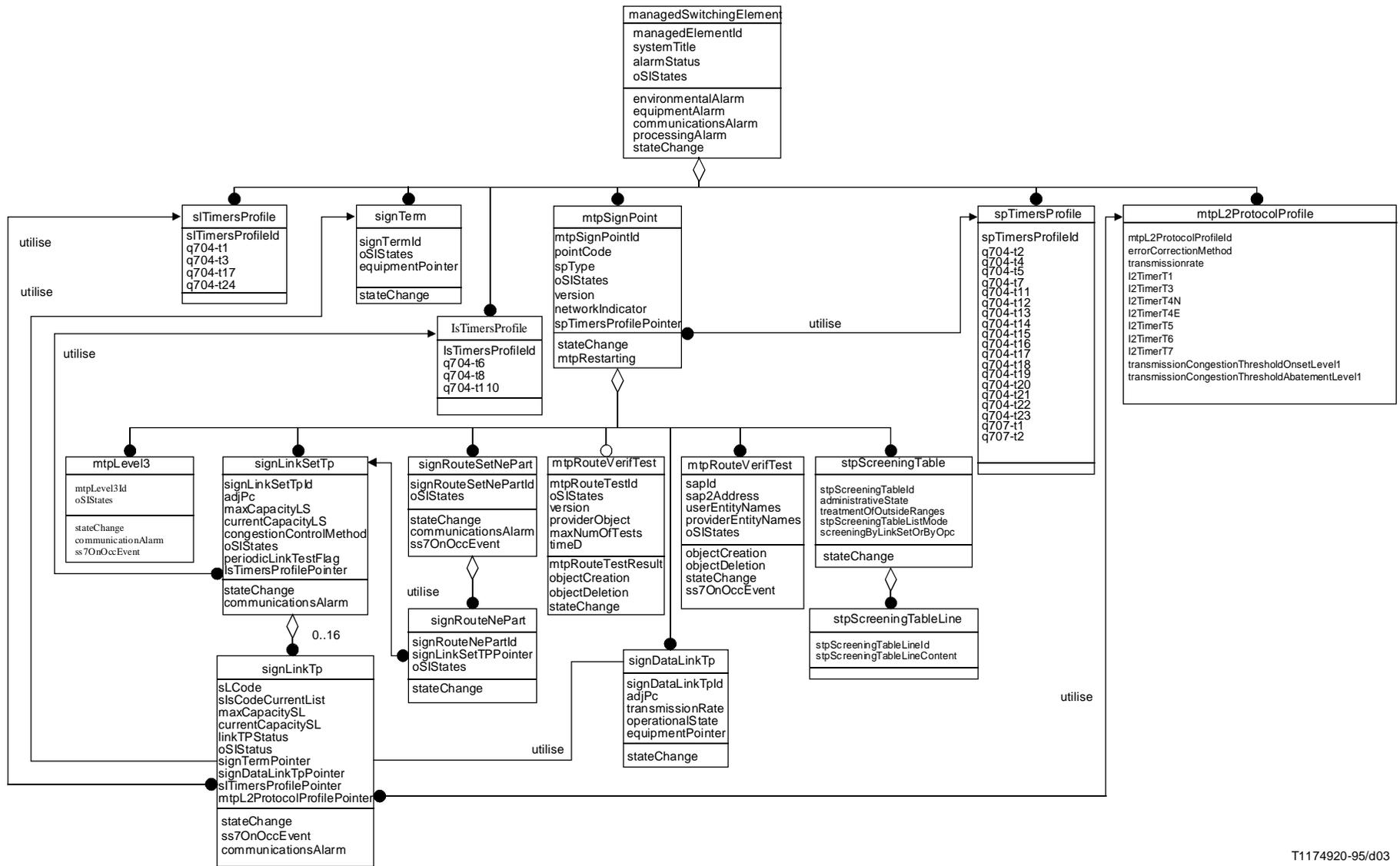
T1174900-94/d01

FIGURE 1/Q.751.1
Inheritance tree for MTP managed objects



T1174910-95/d02

FIGURE 2/Q.751.1
Relationships for MTP managed object classes (without timer profiles)



T1174920-95/d03

FIGURE 3/Q.751.1

Relationships for MTP managed object classes (with timer profiles)

6.2 Managed Object classes

6.2.1 Signalling Linkset Timer Profile

IsTimersProfile		
Attributes	Notifications	Actions
IsTimersProfileId		
q704-t6		
q704-t8		
q704-t10		
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
IsTimersProfileNamePackage (C)		
IsTimersProfileName		

An instance of this managed object class represents the Q.704 timers that are associated to a signalling linkset. Instances of this class are contained in the switching element. There can exist multiple instances of this class within one switching element and multiple signalling links set can share a given instance of this class. The use of this managed object class is optional. Alternatively, the timer attributes can all be part of the mtpSignPoint.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an IsTimersProfile which is still referenced by a signLinkSetTp the delete request will be rejected.

Attributes

- 1) IsTimersProfileId: this attribute identifies an instance of this MOC;
- 2) q704-t6: Q.704 timer "Delay to avoid message mis-sequencing on controlled rerouting";
- 3) q704-t8: Q.704 timer "Transfer prohibited inhibition timer (transient solution)";
- 4) q704-t10: Q.704 timer "Waiting to repeat signalling routeset test message";
- 5) IsTimersProfileName: (optional) attribute for additional name for IsTimersProfiles.

Notifications

- 1) objectCreation: (optional) this notification is emitted if an instance is created;
- 2) objectDeletion: (optional) this notification is emitted if an instance is deleted;
- 3) attributeValueChange: (optional) this notification is emitted if an attribute value changes.

6.2.2 Managed Switching Element

managedSwitchingElement		
Attributes	Notifications	Actions
"ITU-T Rec. M.3100 (1992)": managedElement (I)		
managedElementId	environmentalAlarm	
systemTitle	equipmentAlarm	
vendorName	communicationsAlarm	
alarmStatus	processingAlarm	
administrativeState		
operationalState		
usageState		
"ITU-T Rec. M.3100 (1992)": stateChangeNotificationPackage (I,M)		
	stateChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationPackage (I,C)		
	objectCreation	
	objectDeletion	
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (I,C)		
	attributeValueChange	
managedSwitchingElementNamePackage (C)		
managedSwitchingElement Name		

The ManagedSwitchingElement represents, for management purposes, an exchange, i.e. the aggregate of traffic carrying devices, switching stages, controlling and signalling means at a network node that enables subscriber lines to be interconnected and packets to be forwarded as required by individual users. It is derived from the generic managed object class "managedElement".

Attributes

- 1) managedElementId: this attribute identifies an instance of this MOC;
- 2) systemTitle;
- 3) vendorName;
- 4) alarmStatus;
- 5) OSI-states: administrativeState, operationalState and usageState;
- 6) managedSwitchingElementName: (optional) attribute for additional name for managedSwitchingElements.

Notifications

- 1) environmentalAlarm;
- 2) equipmentAlarm;
- 3) communicationsAlarm;
- 4) processingAlarm;

- 5) stateChange: this notification is emitted if the state attributes change;
- 6) objectCreation: (optional) this notification is emitted if an instance is created;
- 7) objectDeletion: (optional) this notification is emitted if an instance is deleted;
- 8) attributeValueChange: (optional) this notification is emitted if an attribute value changes.

6.2.3 MTP Access Point

mtpAccessPoint		
Attributes	Notifications	Actions
operationalState		
availabilityStatus		
"ITU-T Rec. X.283 (1993)":nSAP (M,I)		
sap2Address	objectDeletion	
	objectCreation	
"ITU-T Rec. X.723 (1992)":sap2 (M,I)		
sapId	stateChange	
userEntityNames		
providerEntityNames		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (I, C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": alarmSeverityAssignmentPointerPackage (C)		
alarmSeverityAssignmentPointer		
mtpAccessPointNamePackage (C)		
mtpAccessPointName		
ss7OnOccEventPackage (C)		
	ss7OnOccEvent	

This managed object class is derived from the generic managed object class nSAP (network Service Access Point). The sap2Address attribute contains the address of the mtpAccessPoint. It contains the Signalling Point Code (SPC), Service Indicator (SI) and MTP Network Identity (NI). The sapId attribute is used in naming instances of the mtpAccessPoint managed object class.

The userEntityNames attribute contains the distinguishable names of the managed objects that represent the user entities that are using the mtpAccessPoint, e.g. the SCCP instance. The providerEntityNames attribute contains the distinguishable names of the managed objects that represent the provider entities that are supporting the mtpAccessPoint, i.e. the instance of the MTP.

A signalling point can have the MTP status:

- allowed, the mtpAccessPoint is accessible;
- congested, this means that the mtpAccessPoint is accessible but the path to it is heavily loaded;
- prohibited, this means that the mtpAccessPoint is not accessible.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same managed object class will be rejected.

6.2.4 MTP Level 2 Protocol Profile

mtpL2ProtocolProfile		
Attributes	Notifications	Actions
mtpL2ProtocolProfileId		
errorCorrectionMethod		
transmissionRate		
l2TimerT1		
l2TimerT2		
l2TimerT3		
l2TimerT4N		
l2TimerT4E		
l2TimerT5		
l2TimerT6		
l2TimerT7		
transmissionCongestionThresholdOnsetLevel1		
transmissionCongestionThresholdAbatementLevel1		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
bufferMechanismPackage (C)		
numberOfThresholdLevels		
congestionHandlingPackage (C)		
congestionCounting		
congestionReportingBaseObject		
loopDelayPackage (C)		
loopDelay		
mtpL2ProtocolProfileNamePackage (C)		
mtpL2ProtocolProfileName		
multipleTransmissionCongestionLevelsPackage (C)		
transmissionCongestionThresholdDiscardLevel1		
transmissionCongestionThresholdOnsetLevel2		
transmissionCongestionThresholdAbatementLevel2		
transmissionCongestionThresholdDiscardLevel2		
transmissionCongestionThresholdOnsetLevel3		
transmissionCongestionThresholdAbatementLevel3		
transmissionCongestionThresholdDiscardLevel3		

mtpL2ProtocolProfile		
Attributes	Notifications	Actions
multipleTransmissionCongestionStatesPackage (C)		
timerTx		
timerTy		
numberOfCongestionStates		
initialLevelIfCongested		
pCRPackage (C)		
maxMSURetransN1		
maxOctRetransN2		
receiveCongestionLevelsPackage (C)		
receiveCongestionThresholdOnset		
receiveCongestionThresholdAbatement		

In this managed object class, information which is the same for many links is held. Each signLinkTp is associated with one mtpL2ProtocolProfile via a pointer. Several signLinkTp managed objects can use the same instance of mtpL2ProtocolProfile. This allows the operator an easy way to assign parameters when creating new links and to modify many characteristic coherent values of a link at the same time by changing the pointer in signLinkTp to another profile.

The manufacturer can provide object instances of this class with pre-set values.

The operator can create specific object instances as required. The only constraint is that the contained values fit with the offered protocol capabilities in the switch and lie within the limits specified in the standards.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an mtpL2ProtocolProfile which is still referenced by a signLinkTp the delete request will be rejected.

Modifying attributes other than the mtpL2ProtocolProfileName is not allowed. Instead a new object instance with the respective attribute values has to be created and referenced by the signLinkTp instance.

Attributes

The managed object class mtpL2ProtocolProfile contains the following attributes:

- 1) mtpL2ProtocolProfileId: identifies the mtpL2ProtocolProfile instance within the managedSwitchingElement instance.
- 2) errorCorrectionMethod: specifies the ECM (PCR or basic) which is used by a signalling link.
- 3) transmissionRate: specifies the transmission rate to which the profile fits. (This attribute also implies, if the transmission is analog or digital, i.e. 64 kbit/s and 56 kbit/s are digital, 4.8 kbit is analog). Refer to 12.3/Q.703 for the relation of the timer ranges to the nominal values of the other attributes.
- 4) l2TimerT1: level 2 timer "Alignment ready".
- 5) l2TimerT2: level 2 timer "Not aligned".
- 6) l2TimerT3: level 2 timer "Aligned".
- 7) l2TimerT4N: level 2 timer "Proving period timer normal".
- 8) l2TimerT4E: level 2 timer "Proving period timer emergency".

- 9) l2TimerT5: level 2 timer "Sending SIB".
- 10) l2TimerT6: level 2 timer "Remote congestion".
- 11) l2TimerT7: level 2 timer "Excessive delay of acknowledgement".
- 12) transmissionCongestionThresholdOnsetLevel1: if the number of MSUs in the transmission/retransmission buffer gets bigger than this value, the respective link is congested in congestionLevel 1. CongestionLevel 1 measures start.
- 13) transmissionCongestionThresholdAbatementLevel1: if the number of MSUs in the transmission/retransmission buffer of a link in the congestionLevel 1 gets smaller than this number, the respective link is not any more congested. CongestionLevel 1 measures end.
- 14) numberOfThresholdLevels: (optional) this attribute equals the number of threshold levels that are used for congestion control.
- 15) congestionCounting: (optional) this attribute indicates whether congestion counting is message based or octet based.
- 16) congestionReportingBaseObject: (optional) this attribute indicates on what object congestion counting is based.
- 17) loopDelay: optional attribute, represents the loop delay, as defined in 6.4.2/Q.703.
- 18) mtpL2ProtocolProfileName: (optional) attribute for additional name for mtpL2ProtocolProfile.
- 19) transmissionCongestionThresholdDiscardLevel1 – optional attribute: if the number of MSUs in the transmission buffer of a link in the congestionLevel 2 gets bigger than this number, MSUs are discarded.
- 20) transmissionCongestionThresholdOnsetLevel2 – optional attribute: if the number of MSUs in the transmission/retransmission buffer gets bigger than this value, the respective link is congested in congestionLevel 2. CongestionLevel 2 measures start.
- 21) transmissionCongestionThresholdAbatementLevel2 – optional attribute: if the number of MSUs in the transmission/retransmission buffer of a link in the congestionLevel 1 gets smaller than this number, the respective link is not any more in congestionLevel 2. CongestionLevel 2 measures end.
- 22) transmissionCongestionThresholdDiscardLevel2 – optional attribute: if the number of MSUs in the transmission buffer of a link in the congestionLevel 2 gets bigger than this number, MSUs are discarded.
- 23) transmissionCongestionThresholdOnsetLevel3 – optional attribute: if the number of MSUs in the transmission/retransmission buffer gets bigger than this value, the respective link is congested in congestionLevel 3. CongestionLevel 3 measures start.
- 24) transmissionCongestionThresholdAbatementLevel3 – optional attribute: if the number of MSUs in the transmission/retransmission buffer of a link in the congestionLevel 1 gets smaller than this number, the respective link is not any more in congestionLevel 3. CongestionLevel 3 measures end.
- 25) transmissionCongestionThresholdDiscardLevel3 – optional attribute: if the number of MSUs in the transmission buffer of a link in the congestionLevel 3 gets bigger than this number, MSUs are discarded.
- 26) timerTx: (optional) attribute timer threshold, see 3.8.2.3/Q.704.
- 27) timerTy: (optional) attribute timer threshold, see 3.8.2.3/Q.704.
- 28) numberOfCongestionStates: (optional) this attribute equals the number of congestion states used in the "multiple link congestion states without congestion priority", see 3.8.2.3/Q.704.
- 29) initialLevelIfCongested: (optional) this attribute represents the initial state of congestion states used in the "multiple link congestion states without congestion priority", see 3.8.2.3/Q.704.

- 30) maxMSURetransN1: (optional) maximum number of MSUs which are available for retransmission when PCR is used (name in Recommendation Q.703: N1).
- 31) maxOctRetransN2: (optional) PCR threshold for the number of octets available for retransmission (name in 6.4/Q.703: N2).
- 32) receiveCongestionThresholdOnset – optional attribute: if the number of MSUs in the reception buffer gets bigger than this value, Level 2 flow control measures begin. MSUs are still accepted.
- 33) receiveCongestionThresholdAbatement – optional attribute: if the number of MSUs in the reception buffer gets smaller than this number, Level 2 flow control measures end.

NOTE – The attributes 12), 13) and 19) to 25) represent the threshold levels for the transmission/retransmission buffer. For the international network, only one threshold level is defined. This level is referred here to as congestionLevel 1. For national networks, up to three threshold levels can be defined. Therefore the thresholds belonging to congestionLevels 2 and 3 are optional, as are all the discard levels since these imply use of congestion methods with priorities. See B.1.2.9.2. The behaviour of a link, if its congestionState or its level of congestion changes are to be described at the managed object class signLinkTp.

For all attributes, apply the operation GET.

Notifications

- 1) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 2) objectCreation: (optional) this notification is emitted if an instance is created.
- 3) objectDeletion: (optional) this notification is emitted if an instance is deleted.

6.2.5 MTP Level 3

mtpLevel3		
Attributes	Notifications	Actions
mtpLevel3Id	stateChange	
administrativeState		
operationalState		
usageState		
proceduralStatus		
"ITU-T Rec. M.3100 (1992)": alarmSeverityAssignmentPointerPackage (C)		
alarmSeverityAssignmentProfilePointer		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
communicationsAlarmPackage (C)		
	communicationsAlarm	
mtpLevel3NamePackage (C)		
mtpLevel3Name		
ss7OnOccEventPackage (C)		
	ss7OnOccEvent	

Level 3 of MTP is the signalling network functionality of the SPs. Its purpose is to transfer SS No. 7 messages between SPs.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

Attributes

- 1) mtpLevel3Id: this attribute is the identification of the instance of this class.
- 2) OSI states administrativeState, operationalState, usageState and proceduralStatus: these attributes represent the OSI-management state (as defined in Recommendation X.731) for the MTP level 3.
- 3) alarmSeverityAssignmentProfilePointer: (optional).
- 4) mtpLevel3Name: (optional) attribute for additional name for mtpLevel3.

Notifications

- 1) stateChange: in case one of the state-attributes changes this notification is emitted. The notification will contain the old and the new value of the related state-attributes.
- 2) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 3) objectCreation: (optional) this notification is emitted if an instance is created.
- 4) objectDeletion: (optional) this notification is emitted if an instance is deleted.
- 5) "Recommendation X.721 | ISO/IEC 10165-2: 1992": communicationsAlarm: (optional), the following probable causes can apply: Probable Cause = 501 (AdjacentPCInaccessible), with the inaccessible adjacent pointcode as a parameter, which represents measurement Q.752/5.1 (PerceivedSeverity = Maj/Min/War) and measurement Q.752/5.4 (PerceivedSeverity = Cleared).
- 6) ss7OnOccEvent: (optional) event notification for which the following probable causes can apply: Probable Cause = 405 (LinkSetFailure), with the inaccessible adjacent pointcode as a parameter, which represents measurement Q.752/4.5 (PerceivedSeverity = Maj/Min/War) and measurement Q.752/4.6 (PerceivedSeverity = Cleared).
 Probable Cause = 413 (LinkSetChange), with the involved linksets as parameter, which represents measurement Q.752/4.13.

6.2.6 MTP Signalling Point

mtpSignPoint		
Attributes	Notifications	Actions
mtpSignPointId	stateChange	
pointCode	mtpRestarting	
spType		
operationalState		
proceduralStatus		
availabilityStatus		
version		
networkIndicator		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage		
	objectCreation	
	objectDeletion	

mtpSignPoint		
Attributes	Notifications	Actions
mtpSignPointNamePackage (C)		
mtpSignPointName		
spTimersPackage (C)		
q704-t1		
q704-t2		
q704-t3		
q704-t4		
q704-t5		
q704-t6		
q704-t7 ^{a)}		
q704-t8		
q704-t10		
q704-t11 ^{a)}		
q704-t12		
q704-t13		
q704-t14		
q704-t15 ^{a)}		
q704-t16 ^{a)}		
q704-t17		
q704-t18		
q704-t19		
q704-t20		
q704-t21		
q704-t22		
q704-t23		
q704-t24 ^{a)}		
q707-t1		
q707-t2		
spTimersProfilePointerPackage (C)		
spTimersProfilePointer		
^{a)} These timers are national options. It is implementation dependent what value they take them they are not used.		

The signalling point is a node in the SS No. 7 network. The MTP permits three types of nodes:

- SEP: the signalling end point, this type of SP contains MTP and ISUP (and or other MTP Users), but cannot act as an intermediate MTP transfer node in the SS No. 7 network. (It can act as an SCCP Relay Node.)
- STP: the MTP signalling transfer point, this type of SP acts as an intermediate node between SEPs to transfer messages through the SS No. 7 network, it only contains MTP¹⁾.

¹⁾ In case of an STP, OMAP, and hence also TC and SSCP may be present. If no other user parts than OMAP are present, the SP is still regarded as just an STP.

- STEP: MTP signalling transfer and end point, the type combines the previous mentioned types, thus acting both as a SEP and as a STP.

The signPoint may be locked, unlocked or restarted for management purposes.

An mtpSignPoint can be created by an operator or automatically. In case the spTimersProfilePackage is used, a create or set request is rejected, if:

- i) the spTimersProfilePointer does not reference a spTimersProfile; or
- ii) the spTimersProfilePointer would reference an instance which does not exist.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

An mtpSignPoint can be deleted if and only if it does not contain any other managed object class instances, except for contained measurements.

NOTE – Management actions carried out at a signalling point are performed on subordinate MOCs.

Attributes

- 1) mtpSignPointId: this attribute is used to identify an instance of this MOC.
- 2) pointCode: this attribute represents the point code which is used within the MTP signalling procedures.
- 3) spType: this attribute represents the SP-type: SEP, STP or STEP. This attribute is readable, and optionally writable.
- 4) OSI states administrativeState, operationalState, proceduralStatus and availabilityStatus: these attributes represent the OSI-management states.
- 5) version: this attribute represents the version (e.g. whether it is *Blue Book*, *Red Book* or some other) of the MTP implementation. The attribute is read-only. This attribute is implementation dependent.
- 6) networkIndicator: this attribute indicates the network indicator of the network the signalling point belongs to.
- 7) mtpSignPointName: (optional) attribute for additional name for mtpSignPoints.
- 8) q704-t1: Q.704 timer "Delay to avoid message mis-sequencing on changeover". This attribute is optional. If used, option B applies.
- 9) q704-t2: Q.704 timer "Waiting for changeover acknowledgement". This attribute is optional. If used, option B applies.
- 10) q704-t3: Q.704 timer "Time controlled diversion-delay to avoid mis-sequencing on change back". This attribute is optional. If used, option B applies.
- 11) q704-t4: Q.704 timer "Waiting for change back acknowledgement (first attempt)". This attribute is optional. If used, option B applies.
- 12) q704-t5: Q.704 timer "Waiting for change back acknowledgement (second attempt)". This attribute is optional. If used, option B applies.
- 13) q704-t6: Q.704 timer "Delay to avoid message mis-sequencing on controlled rerouting". This attribute is optional. If used, option B applies.
- 14) q704-t7: Q.704 timer "Waiting for signalling data link connection acknowledgement". This attribute is optional. If used, option B applies.
- 15) q704-t8: Q.704 timer "Transfer prohibited inhibition timer (transient solution)". This attribute is optional. If used, option B applies.
- 16) q704-t10: Q.704 timer "Waiting to repeat signalling routeset test message". This attribute is optional. If used, option B applies.

- 17) q704-t11: Q.704 timer "Transfer restricted timer. (This is one way of implementing the function described in 13.4/Q.704 and mainly intended to simplify STPs.)" This attribute is optional. If used, option B applies.
- 18) q704-t12: Q.704 timer "Waiting for uninhibit acknowledgement". This attribute is optional. If used, option B applies.
- 19) q704-t13: Q.704 timer "Waiting for force uninhibit". This attribute is optional. If used, option B applies.
- 20) q704-t14: Q.704 timer "Waiting for inhibition acknowledgement". This attribute is optional. If used, option B applies.
- 21) q704-t15: Q.704 timer "Waiting to start signalling routeset congestion test". This attribute is optional. If used, option B applies.
- 22) q704-t16: Q.704 timer "Waiting for routeset congestion status update". This attribute is optional. If used, option B applies.
- 23) q704-t17: Q.704 timer "Delay to avoid oscillation of initial alignment failure and link restart". This attribute is optional. If used, option B applies.
- 24) q704-t18: Q.704 timer "Timer within a signalling point whose MTP restarts, for supervising link and linkset activation as well as the receipt of routing information". This attribute is optional. If used, option B applies.
- 25) q704-t19: Q.704 timer "Supervision timer during MTP restart to avoid possible ping-pong of TFP, TFR²⁾ and TRA messages". This attribute is optional. If used, option B applies.
- 26) q704-t20: Q.704 timer "Overall MTP restart timer at the signalling point whose MTP restarts. Overall MTP restart timer at a signalling point adjacent to one whose MTP restarts". This attribute is optional. If used, option B applies.
- 27) q704-t21: Q.704 timer "Overall MTP restart timer at a signalling point adjacent to one whose MTP restarts". This attribute is optional. If used, option B applies.
- 28) q704-t22: Q.704 timer "Local inhibit test timer". This attribute is optional. If used, option B applies.
- 29) q704-t23: Q.704 timer "Remote inhibit test timer". This attribute is optional. If used, option B applies.
- 30) q704-t24: Q.704 timer "Stabilizing timer after removal of local processor outage, used in LPO latching to RPO (national option)". This attribute is optional. If used, option B applies.
- 31) q707-t1: Q.707 timer T1. This attribute is optional. If used, option B applies.
- 32) q707-t2: Q.707 timer T2. This attribute is optional. If used, option B applies.
- 33) spTimersProfilePointer: (optional) this attribute indicates the timer profile used for this particular MTP signalling point. If used, option A applies to this instance.

This managed object class can be used in two ways: either option A or option B. The options are mutually exclusive. Option A (see also Figure 3) uses a separate profile for the SP timers from Recommendations Q.704 and Q.707, where option B includes all Q.704 and Q.707 timers attributes in the instances of this MOC itself (see Figure 2).

Notifications

- 1) stateChange: if the state attributes change, this notification will be emitted.
- 2) mtpRestarting: if the MTP is restarting this managed object class will emit this notification (once).

²⁾ National option.

- 3) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 4) objectCreation: (optional) this notification is emitted if an instance is created.
- 5) objectDeletion: (optional) this notification is emitted if an instance is deleted.

6.2.7 Signalling Data Link Termination Point

signDataLinkTp		
Attributes	Notifications	Actions
signDataLinkTpId	stateChange	
adjPc		
transmissionRate		
operationalState		
equipmentPointer		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
cICPackage (C)		
cIC		
signDataLinkTpNamePackage (C)		
signDataLinkTpName		
stmChannelPackage (C)		
stmChannel		

For management purposes only the part of the signalling data link that resides within the SP is being considered. It is called the signalling data link Termination Point (TP), which is in fact a Circuit Termination Point (CTP) especially allocated to SS No.7. The following management aspects are relevant to the signalling data link TP. The signDataLinkTp shall be in an OSI-management-state (see Recommendation X.731). The signDataLinkTp managed object class will notify the OS in case a failure can be identified as located in the signalling data link.

A create request is rejected if the equipmentPointer would reference equipment that does not exist.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

Attributes

- 1) signDataLinkTpId: this attribute identifies particular instances of this class.
- 2) adjPc: this attribute represents the point code of the adjacent SP, to which the resource represented by this instance is connected. The attribute is read-only.
- 3) transmissionRate: this attribute specifies the transmissionRate and implies the transmissionType (i.e. 56 and 64 kbit/s imply digital, 4.8 kbit/s implies analog transmission).
- 4) operational state: in normal operation this state is "enabled". In case of failure of the signalling data link (in transmission system or part residing within the managed switching element) this state will be "disabled".

- 5) equipmentPointer: this attribute references the physical equipment (port) where the signalling data link is connected to the exchange.
- 6) cIC: (optional), this attribute is used to reference the SS No. 7 trunk used by the datalink. Its value has to be unique within the SPs connected by the trunk.
- 7) signDataLinkTpName: (optional) attribute for additional name for signDataLinkTps.
- 8) stmChannel: (optional) this attribute denotes the STM channel which defines the signalling datalink on the PCM transmission system.

Notifications

- 1) stateChange: when a state changes this notification will be emitted.
- 2) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 3) objectCreation: (optional) this notification is emitted if an instance is created.
- 4) objectDeletion: (optional) this notification is emitted if an instance is deleted.

6.2.8 Signalling Linkset Termination Point

signLinkSetTp		
Attributes	Notifications	Actions
signLinkSetTpId	stateChange	
adjPc		
maxCapacityLS		
currentCapacityLS		
congestionControlMethod		
usageState		
operationalState		
availabilityStatus		
periodicLinkTestFlag		
administrativeStatePackage (C)		
administrativeState		
"ITU-T Rec. M.3100 (1992)": alarmSeverityAssignmentPointerPackage (C)		
alarmSeverityAssignmentProfilePointer		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage		
	objectCreation	
	objectDeletion	
communicationsAlarmPackage (C)		
	communicationsAlarm	
inLsLoadShareAlgorithmPackage (C)		
inLsLoadShareAlgorithm		
lsTimersProfilePointerPackage (C)		
lsTimersProfilePointer		
noBasicLinkAllocationPackage (C)		
numberOfNormallyActiveSignLinkTps		
signLinkSetTpNamePackage (C)		
signLinkSetTpName		

Corresponding to the NE-part of a signalling linkset a managed object class `signLinkSetTp` is defined. An OS can manage a complete signalling linkset (at the network management level) by managing both ends of the corresponding `signLinkSetTps`. Adding and removing links to and from linksets may ultimately be done via the appropriate network management managed objects.

A creation request is only successful if a `signRouteSetNePart` exists within the `mtpSignPoint` for the value of attribute `adjPC`.

In case the `lsTimersProfilePackage` is used, a create or set request is rejected, if:

- i) the `lsTimersProfilePointer` does not reference a `lsTimersProfile`; or
- ii) the `lsTimersProfilePointer` would reference an instance which does not exist.

If the `name` package is supported: a create request with a value for the `name` attribute that is already used by another instance of the same object class will be rejected.

If it is tried to delete a `signLinkSetTp`, which is referenced by at least one `signRouteNePart`, the deletion of the `signLinkSetTp` is rejected.

Attributes

- 1) `signLinkSetTpId`: this attribute identifies a particular instance of this class.
- 2) `adjPc`: this attribute represents the point code of the signalling point to which this linkset is connected. This attribute is read-only.
- 3) `maxCapacityLS`: the maximum capacity is reflected in this attribute. This attribute is read and optionally writable. The maximum capacity of a signalling linkset is the maximum load that should be placed on the linkset, when all links that could be active in the linkset are, and are working in service.
- 4) `currentCapacityLS`: the current capacity for the linkset is reflected in this attribute. It is read-only. The current capacity of signalling linkset is the sum over the current capacities of the signalling links (or over the maximum capacities where the current capacities of the links of the linkset are not defined) which are active, working and in service.
- 5) `congestionControlMethod`: this attribute reflects the congestion control method used within a signalling point. It is set per SP when the first `signLinkSetTp` is created within the `mtpSignPoint`.
- 6) OSI states `operationalState`, `usageState` and `availabilityStatus`: these attributes represent the OSI-management states. The `administrativeState` is optional.
- 7) `periodicLinkTestFlag`: this attribute indicates whether the periodic test procedure of Recommendation Q.707 is applied to the links in this signalling linkset.
- 8) `alarmSeverityAssignmentProfilePointer`: (optional).
- 9) `inLsLoadShareAlgorithm`: (optional) the specific algorithm which is used for assignment of the SLS codes is indicated by this attribute. The value of this attribute is vendor-dependent. This optional attribute is optionally writable.
- 10) `lsTimersProfilePointer`: (optional) this attribute indicates the timer profile used for this particular MTP signalling linkset. It is an optional attribute.
- 11) `numberOfNormallyActiveSignLinkTps`: (optional) this attribute represents the number of normally active signalling links in a linkset, as defined in clause 12/Q.704.
- 12) `signLinkSetTpName`: (optional) attribute for additional name for `signLinkSetTps`.

Notifications

- 1) stateChange: this notification is emitted when a state change has occurred.
- 2) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 3) objectCreation: (optional) this notification is emitted if an instance is created.
- 4) objectDeletion: (optional) this notification is emitted if an instance is deleted.
- 5) communicationsAlarm: for communication alarms emitted from this MOC, the following probable cause can apply: Probable Cause = 403 (LinkSetFailure), which represents measurements Q.752/4.3 (PerceivedSeverity = Maj/Min/War) and Q.752/4.4 (PerceivedSeverity = Cleared).

6.2.9 Signalling Link Termination Point

Attributes	signLinkTp Notifications	Actions
slCode	stateChange	localInhibit
slsCodeCurrentList		localUninhibit
maxCapacitySL		
currentCapacitySL		
linkTpStatus		
administrativeState		
operationalState		
usageState		
proceduralStatus		
mtpL2ProtocolProfilePointer		
signTermPointer		
signDataLinkTpPointer		
"ITU-T Rec. M.3100 (1992)": alarmSeverityAssignmentPointerPackage (C)		
alarmSeverityAssignmentProfilePointer		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
communicationsAlarmPackage (C)		
	communicationsAlarm	
linkCongestionLevelPackage (C)		
linkCongestionLevel		
relatedLinkGroupNumberPackage (C)		
relatedLinkGroupNumber		
signDataLinkTpListPackage (C)		
signDataLinkTpList		
signLinkTestPackage (C)		
		signLinkTest

signLinkTp		
Attributes	Notifications	Actions
signLinkTpNamePackage (C)		
signLinkTpName		
signTermListPackage (C)		
signTermList		
slsCodeNormalListPackage (C)		
slsCodeNormalList		
slTimersProfilePointerPackage (C)		
slTimersProfilePointer		
ss7OnOccEventPackage (C)		
	ss7OnOccEvent	

This managed object class models the part of a signalling link that is residing in the NE.

A create or set request is rejected, if:

- i) a pointer would reference an instance, which does not belong to the appropriate object class; or,
- ii) a pointer would reference an instance which does not exist; or
- iii) a signDataLinkTpPointer would reference a signDataLinkTp which is not in the same mtpSignPoint; or
- iv) a signDataLinkTpPointer would reference a signDataLinkTp which has a different value of adjPc than the superior signLinkSetTp; or
- v) the link would reference a datalink and a mtpL2ProtocolProfile whose transmission rates are not the same; or
- vi) the link would reference a mtpL2ProtocolProfile where the appropriate packages for the congestionControlMethod of the superior signLinkSetTp are not present (see B.1.2.9.2); or
- vii) the spTimersProfilePackage is present in the superior mtpSignPoint AND the link would reference a mtpL2ProtocolProfile whose l2TimerT2 is not bigger than the q704-t17 of the spTimersProfile referenced by the mtpSignPoint; or
- viii) the spTimersPackage is present in the superior mtpSignPoint AND the link would reference a mtpL2ProtocolProfile whose l2TimerT2 is not bigger than the q704-t17 of the mtpSignPoint.

This rejection also takes place if only a single pointer within the signDataLinkList or the signTermList (if present) is wrong.

A delete request is rejected, if the linkTpStatus does not contain the value deactivated.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

Attributes

- 1) slCode: the Signalling Link Code (SLC) is the same value (between 0 and 15) at each end of the link, and is different from that of any other link between the same two adjacent signalling points.
- 2) slsCodeCurrentList: this attribute represents the SLS-Code which is currently used on the signLinkTp. It may be different from the slsCodeNormalList, in case some fault has occurred. This attribute is read-only.

- 3) maxCapacitySL: this attribute describes the maximum capacity for the signLinkTp. The attribute is read-only. The maximum capacity of a signalling link is the maximum load that should be placed on the signalling link.
- 4) currentCapacitySL: this attribute represents the current capacity. It is read-only. The current capacity of a signalling link (implementation dependent, consequently optional attribute) is the maximum load that should be placed on the signalling link given the present configuration of Signalling Data Links (SDLs) to signalling terminals. Could be used where Signalling Terminal (ST) capacities might be different in an implementation and automatic allocation of SDL to ST can be done, and/or where a signalling terminal could control several signalling links.
- 5) linkTpStatus: this is a set-valued attribute. It contains the SS No. 7 functional statuses as described in Recommendation Q.704. Values are local blocked, remote blocked, local inhibited, remote inhibited, failed and deactivated.
- 6) OSI states administrativeState, operationalState, usageState and proceduralStatus: these attributes represent the OSI-management states of this MOC.
- 7) mtpL2ProtocolProfilePointer: this attribute refers to an instance of the mtpL2ProtocolProfile managed object class used for this signalling link termination point.
- 8) signTermPointer: this attribute identifies the signTerm that is allocated to this signLinkTp.
- 9) signDataLinkTpPointer: this attribute identifies the signDataLinkTp that is allocated to this signLinkTp.
- 10) alarmSeverityAssignmentProfilePointer: (optional).
- 11) linkCongestionLevel: (optional) this attribute is used to reflect link congestion, if multiple congestion levels are used. Its value in case of no congestion is "none". Its value can change from system inside.
- 12) relatedLinkGroupNumber: this attribute identifies the link group which the signalling link belongs to. It is an optional attribute.
- 13) signDataLinkTpList: (optional) this attribute lists the signDataLink instances that can be used for dynamical allocation to the signLinkTp.
- 14) signLinkTpName: (optional) attribute for additional name for signLinkTps.
- 15) signTermList: (optional) this attribute lists the signTerm instances that can be used for dynamical allocation to the signLinkTp.
- 16) slsCodeNormalList: this attribute indicates which SLS-Codes are initially administratively assigned to this signLinkTp for the normal operation. This optional attribute is readable and writable.
- 17) slTimersProfilePointer: this attribute indicates the timer profile used for this particular MTP signalling link. It is an optional attribute.

Notifications

- 1) stateChange: if a state attribute changes, then the OS will be informed by this notification.
- 2) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 3) objectCreation: (optional) this notification is emitted if an instance is created.
- 4) objectDeletion: (optional) this notification is emitted if an instance is deleted.

- 5) communicationsAlarm: (optional) for communication alarms emitted from this class, the following probable cause can apply: Probable Cause = 102 (slFailure) which represents measurement Q.752/1.2 – measurement Q.752/1.6 (SpecificProblems = 003 abnormalFIBRorBSNR, 004 excessiveAckDelay, 005 excessiveErrorRate, 006 excessiveCongDuration) and Q.752/1.12 (PerceivedSeverity = Cleared).
- 6) ss7OnOccEvent: (optional) notification for which the following probable causes can apply:
- Probable Cause = 110 (localChangeOver) which represents measurement Q.752/1.10 (PerceivedSeverity = Maj/Min/War) and measurement Q.752/1.11 (PerceivedSeverity = Cleared).
- Probable Cause = 210 (remoteProcOutage) which represents measurements Q.752/2.10 (PerceivedSeverity = Maj/Min/War) and Q.752/2.11 (PerceivedSeverity = Cleared).
- Probable Cause = 216 (start of local inhibition) which represents measurement Q.752/2.16 (PerceivedSeverity = Maj/Min/War) and Q.752/2.17 (PerceivedSeverity = Cleared).
- Probable Cause = 218 (start of remote inhibition) which represents measurement Q.752/2.18 (PerceivedSeverity = Maj/Min/War) and Q.752/2.19 (PerceivedSeverity = Cleared).

Actions

- 1) localInhibit: this action inhibits the signalling link.
- 2) localUninhibit: this action uninhibits the signalling link.
- 3) signLinkTest: this optional action initiates the signalling link test defined in Recommendation Q.707.

6.2.10 Signalling Link Timer Profile

sTimersProfile		
Attributes	Notifications	Actions
sTimersProfileId		
q704-t1		
q704-t3		
q704-t17		
q704-t24 ^{a)}		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
sTimersProfileNamePackage (C)		
sTimersProfileName		
^{a)} This timer is a national option. It is implementation dependent what value it takes when it is not used.		

The sTimersProfile represents the Q.704 timers that are associated to a signalling link. sTimersProfiles are contained in the switching element. There can exist sTimersProfiles within one switching element and multiple signalling links can share a given sTimersProfile. The use of this MOC is optional. Alternatively, the timer attributes can all be part of the mtpSignPoint MOC.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an slTimersProfile which is still referenced by a signLinkTp the delete request will be rejected.

Attributes

- 1) slTimersProfileId.
- 2) q704-t1: Q.704 timer "Delay to avoid message mis-sequencing on changeover". Constraint: the same value applies for all links associated with an instance of the procedure.
- 3) q704-t3: Q.704 timer "Time controlled diversion-delay to avoid mis-sequencing on change back". The value of this attribute is network implementation dependent.
- 4) q704-t17: Q.704 timer "Delay to avoid oscillation of initial alignment failure and link restart".
- 5) q704-t24: Q.704 timer "Stabilizing timer after removal of local processor outage, used in LPO latching to RPO (national option)".
- 6) slTimersProfileName: (optional) attribute for additional name for slTimerProfile.

Notifications

- 1) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 2) objectCreation: (optional) this notification is emitted if an instance is created.
- 3) objectDeletion: (optional) this notification is emitted if an instance is deleted.

6.2.11 Signalling Point Timers Profile

spTimersProfile		
Attributes	Notifications	Actions
spTimersProfileId		
q704-t2		
q704-t4		
q704-t5		
q704-t7 ^{a)}		
q704-t11 ^{a)}		
q704-t12		
q704-t13		
q704-t14		
q704-t15 ^{a)}		
q704-t16 ^{a)}		
q704-t18		
q704-t19		
q704-t20		
q704-t21		
q704-t22		
q704-t23		

spTimersProfile		
Attributes	Notifications	Actions
q707-t1		
q707-t2		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
spTimersProfileNamePackage (C)		
spTimersProfileName		
a) These timers are national options. It is implementation dependent what value they take when they are not used.		

The spTimersProfile represents the Q.704 timers that are associated to a signalling point. spTimersProfiles are contained in the switching element. There can exist multiple spTimersProfiles within one switching element and multiple signalling points can share a given spTimersProfiles. The use of this MOC is optional. Alternatively, the timer attributes can all be part of the mtpSignPoint MOC.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an spTimersProfile which is still referenced by a mtpSignPoint the delete request will be rejected.

Attributes

- 1) spTimersProfileId: this attribute identifies an instance of this MOC.
- 2) q704-t2: Q.704 timer "Waiting for changeover acknowledgement".
- 3) q704-t4: Q.704 timer "Waiting for change back acknowledgement (first attempt)".
- 4) q704-t5: Q.704 timer "Waiting for change back acknowledgement (second attempt)".
- 5) q704-t7: Q.704 timer "Waiting for signalling data link connection acknowledgement".
- 6) q704-t11: Q.704 timer "Transfer restricted timer. (This is one way of implementing the function described in 13.4/Q.704 and mainly intended to simplify STPs)".
- 7) q704-t12: Q.704 timer "Waiting for uninhibit acknowledgement".
- 8) q704-t13: Q.704 timer "Waiting for force uninhibit".
- 9) q704-t14: Q.704 timer "Waiting for inhibition acknowledgement".
- 10) q704-t15: Q.704 timer "Waiting to start signalling routeset congestion test".
- 11) q704-t16: Q.704 timer "Waiting for routeset congestion status update".
- 12) q704-t18: Q.704 timer "Timer within a signalling point whose MTP restarts, for supervising link and linkset activation as well as the receipt of routing information".

- 13) q704-t19: Q.704 timer "Supervision timer during MTP restart to avoid possible ping-pong of TFP, TFR³⁾ and TRA messages".
- 14) q704-t20: Q.704 timer "Overall MTP restart timer at the signalling point whose MTP restarts. Overall MTP restart timer at a signalling point adjacent to one whose MTP restarts".
- 15) q704-t21: Q.704 timer "Overall MTP restart timer at a signalling point adjacent to one whose MTP restarts".
- 16) q704-t22: Q.704 timer "Local inhibit test timer".
- 17) q704-t23: Q.704 timer "Remote inhibit test timer".
- 18) q707-t1: Q.707 timer T1.
- 19) q707-t2: Q.707 timer T2.
- 20) spTimersProfileName: (optional) attribute for additional name for spTimerProfile.

Notifications

- 1) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 2) objectCreation: (optional) this notification is emitted if an instance is created.
- 3) objectDeletion: (optional) this notification is emitted if an instance is deleted.

6.2.12 Signalling Route Network Element Part

signRouteNePart		
Attributes	Notifications	Actions
signRouteNePartId	stateChange	
signLinkSetTpPointer		
administrativeState		
operationalState		
availabilityStatus		
"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)": createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
clsLoadsharingInformationPackage (C)		
inClsLoadsharingAlgorithm		
fixedRouteNePartPriorityPackage (C)		
fixedPriority		
flexibleRouteNePartPriorityPackage (C)		
flexiblePriority	attributeValueChange	
priorityMode		
loadsharingInformationRouteNePartPackage (C)		
loadsharingInformationRouteNePart		
mtpLoadSharingObjectForRouteNePartPointerPackage (C)		
mtpLoadSharingObjectForRouteNePartPointer		

³⁾ National option.

signRouteNePart		
Attributes	Notifications	Actions
signRouteNePartNamePackage (C)		
signRouteNePartName		
slsListPackage (C)		
slsList		
usageStatePackage (C)		
usageState		

The multiple instantiable MOC signRouteNePart is contained in the MOC signRouteSetNePart. In the signRouteNePart instances contained in the same signRouteSetNePart information is in existence via which signLinkSetTp instances – as possible first segment of the route in network view – messages are intended to be routed and actually can be routed to the respective destination signalling point. Each single signRouteNePart instance contains the respective information for a specific signLinkSetTp.

If changes of these information on network element level are to take place, coordination on network level is necessary because of the broad effect of these changes within the network.

A create request is rejected, if the signLinkSetTpPointer would reference an instance, which:

- i) does not belong to the signLinkSetTp object class; or
- ii) does not exist; or
- iii) is not contained in the same mtpSignPoint as the signRouteNePart; or
- iv) is already referenced by a signRouteNePart contained within the same signRouteSetNePart.

A delete request is rejected if its administrativeState does not equal locked.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

Attributes

- 1) signRouteNePartId: this is the naming attribute of signRouteNePart. It identifies a signRouteNePart instance within the signRouteSet. This attribute is defined at creation time and is only readable.
- 2) signLinkSetTpPointer: references the signLinkSetTp which is intended to be used as first segment of the succession of linksets, which form the signalling route on the network level. This attribute is only readable.
- 3) administrativeState: describes whether it is administratively permitted to route messages towards the respective destination point via the referenced signLinkSetTp. Before the administrative state of a signRouteNePart, which is aiming towards a non-adjacent signalling point, can be set to "unlocked", a direct linkset must be used for a route towards the respective adjacent point.

This attribute is readable and writable.

- 4) operationalState: describes whether the respective destination signalling point is accessible – ("enabled") or not ("disabled") via the referenced signLinkSetTp.

For the management system this attribute is only readable. Its value can change from system inside.

The value is "enabled", if the administrativeState = unlocked, the referenced signLinkSetTp is in the operational state "enabled" and no TFP messages concerning the respective destination and the respective signLinkSetTp are valid.

- 5) **availabilityStatus**: this attribute gives additional information about the availability of the **signRouteNePart**. It is furthermore needed to map some of the MTP functional states (prohibited: **availabilityStatus** = {dependency}, restricted: **availabilityStatus** = {degraded}) and is used for the case that the route is locked not by the OS, but, for example, by a local administrator (**administrativeState** = unlocked and **availabilityStatus** = {off line}).
- 6) **inCIsLoadsharingAlgorithm**: (optional) this attribute represents the over- and in-linkset loadsharing algorithm within a combined linkset.

Attributes for priority: these attributes determine, if the **signRouteNePart** is used as current route. The **signRouteNePart** instances with operational state = "enabled" contained in the same **signRouteSetNePart** are chosen in ascending order as current routes (The lower the value, the higher the priority).

There are different behaviours for the handling of "priority gaps" possible:

- i) **priorityGapAllowedBehaviour**;
- ii) **priorityGapNotAllowedBehaviour**.

In the latter case it is not possible to have a priority value, if there is a lower value, which is not used in one of the routes of the routeset. For example, in case of deleting a **signRouteNePart** instance whose priority value is not equal to the priority of at least one of the remaining **signRouteNeParts** contained in the same **signRouteSetNePart**, the priority values of the remaining instances have to be decremented by one (see also example in table below).

What kind of priority gap behaviour is performed by the switch is to be derived from the combination of the values of the attributes **vendorName** and **version** of the **managedSwitchingElement**.

For implementation dependent purposes this attribute can have the same value for different **signRouteNePart** instances contained in the same **signRouteSetNePart**.

This attribute is present in two conditional packages, of which only one but exact one is to be used.

In the conditional package "**fixedRouteNePartPriorityPackage**" this attribute is only readable and is named:

- 7) **fixedPriority**:

NOTE – The expression "fixed" does not pertain to the priority gap behaviour.

In the conditional package "**flexibleRouteNePartPriorityPackage**" the attribute is called:

- 8) **flexiblePriority**: which is read – and – only together with the attribute **priorityMode** – writable. In this case an **attributeValueChange-Notification** for this attribute is mandatory, because the value of this attribute can change due to management actions on another **signRouteNePart** instance.
- 9) **priorityMode**: this attribute is part of the **flexibleRouteNePartPriorityPackage**. It describes the influence of the management action concerning one specific **signRouteNePart** on the priority attributes of other **signRouteNePart** instances contained in the same **signRouteSetNePart** in case of creating a **signRouteNePart** instance or modifying its priority attribute.

This attribute is only writable, and this only together with the writing of attribute **priority**. This attribute is needed for the following reason: The interdependence of the attribute **priority** with the same attribute of other instances contained in the same **signRouteSetNePart** forces specific behaviours for creating a **signRouteNePart** instance and for modifying the priority of a **signRouteNePart** object instance.

If a new `signRouteNePart` instance (route) is to be created with a priority attribute value which exists in one or more of the created routes from the same `signRouteSetNePart`, there are the following three possibilities to put the new route in the priority order:

- i) either the new route shall join the others with the same priority (`priorityMode = EQUAL`); or
- ii) it shall displace – if necessary – the other priorities, i.e. for the priorities of all created routes from the same `signRouteSetNePart` with equal or lower priority the priority value has to be incremented by one (`priorityMode = INSERT`);
- iii) or for `priorityMode = EXCHANGE_SINGLE` the new route gets the specified priority and any route which had this priority before gets the lowest priority value which is not used by a route within the routeset.

When modifying the priority attribute of a route from a "starting" value to a "target" value, which already exists in one of the created routes contained in the same `signRouteSetNePart`, there are four variations possible:

- i) Joining (`priorityMode = EQUAL`) – see above.
- ii) Displacing (`priorityMode = INSERT`) – see above.
- iii) Exchanging with priority mode = "EXCHANGE_SINGLE" – see below.
- iv) Exchanging with priority mode = "EXCHANGE_GROUP" – see below.

"EXCHANGE_GROUP" is necessary to allow exchanging of priorities without exceeding the limit for the number of routes with the same priority attribute value.

Concerning iii) and iv) above:

If by modifying the priority with one of the EXCHANGE priority modes to a "target" value which is present in several routes of a `signRouteSetNePart`, then all the priority values of these routes are exchanged for the last ("starting") priority value of the specified route.

In case of "EXCHANGE_GROUP", the priorities of all routes which have the same "starting" priority attribute value as the specified route are changed to the "target" value.

In case of `priorityMode "EXCHANGE_SINGLE"` only the priority of the specified route is changed to the "target" value.

If by modifying the priority with "EQUAL" a "priority gap" would occur, then for the priorities of all routes with priorities lower than the "gap priority" the priority value must be decremented by one, if the `priorityGapNotAllowedBehaviour` is used.

- 10) `loadsharingInformationRouteNePart`: this optional attribute contains specific information for target specific loadsharing via the current routes working on a route basis. This information can be used by, for example, the referenced `mtpLoadsharingObjectForRoute` to execute the target specific loadsharing.
- 11) `mtpLoadsharingObjectForRouteNePartPointer`: this attribute is optional and is used to reference implementation dependent loadsharing MOC instances needed to model implementation dependent mechanisms for loadsharing over linksets working on a route basis (e.g. such an object can represent a loadsharing collection with specific characteristics to which the route belongs).
- 12) `signRouteNePartName`: (optional) attribute for assigning an additional name to the `signRouteNePart`.
- 13) `slsList`: this optional attribute has to be used if loadsharing over linksets toward a specific destination is done. It indicates which SLSs are assigned to this `signRouteNePart`, in case it is a current route (i.e. the messages with these SLSs are sent over the allocated linkset).

It has to be ensured that all SLSs are covered and no SLS exists more than one time within the `slsList` attributes of the current routes.

The attribute is read-only and can be written from system inside.

- 14) usageState: this optional attribute is used to cover restriction of a route. Its value is set to "busy", if the route is restricted ("transfer restricted" is a national option).

The attribute is only readable.

Notifications

- 1) stateChange: in case one of the state-attributes changes this notification is emitted. The notification will contain the old and the new value of the related state-attributes.
- 2) objectCreation: (optional) this notification is emitted if an instance is created.
- 3) objectDeletion: (optional) this notification is emitted if an instance is deleted.
- 4) attributeValueChange: (optional) this notification is emitted if an attribute value changes.

6.2.13 Signalling Routeset Network Element Part

signRouteSetNePart		
Attributes	Notifications	Actions
signRouteSetNePartId	stateChange	
administrativeState		
operationalState		
"ITU-T Rec. M.3100 (1992)":alarmSeverityAssignmentPointerPackage (C)		
alarmSeverityAssignmentProfilePointer		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
communicationsAlarmPackage (C)		
	communicationsAlarm	
congestedStatePackage (C)		
congestedState	attributeValueChange	
congestionLevelPackage (C)		
congestionLevel		
loadsharingInformationRouteSetNePartPackage (C)		
loadsharingInformationRouteSetNePart		
mtpLoadSharingObjectForRouteSetNePartPointerPackage (C)		
mtpLoadSharingObjectForRouteSetNePartPointer		
remoteExchangeLabelPackage		
remoteExchangeLabel		
signRouteSetNePartNamePackage (C)		
signRouteSetNePartName		
ss7OnOccEventPackage (C)		
	ss7OnOccEvent	

The multiple instantiable MOC `signRouteSetNePart` is contained in the MOC `mtpSignPoint`. It groups together information which is available in the own network element A concerning a specific signalling point of the network element B within the same network. This information comprises among others the identification of the destination (the signalling point of the network element B), its accessibility from the own `mtpSignPoint` of network element A via the SS No. 7 network and if it is allowed to route messages towards this signalling destination.

If changes of these information on network element level are to take place by the management, coordination on network level is necessary because of the broad effect of these changes within the network.

The behaviour in case of inaccessibility or re-accessibility of the respective destination depends, if it is an adjacent point or not. The behaviour comprehends the respective MTP actions (like sending TFP, TFA etc.).

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

A delete request is rejected, if the `administrativeState` of the `signRouteSetNePart` does not equal `locked`. A check would be needed before deletion, if a routeset is still in a routing table of a user part.

Attributes

- 1) `signRouteSetNePartId`: this is the naming attribute of `signRouteSetNePart`. It identifies a `signRouteSetNePart` instance within the `mtpSignPoint` and equals the signalling point code of the respective destination signalling point. This attribute is defined at creation time and is only readable.
- 2) `administrativeState`: describes whether it is administratively permitted to route SS No. 7 MSUs towards the respective destination point. This attribute is readable and writable.
- 3) `operationalState`: this attribute describes whether the respective destination signalling point is accessible – (“enabled”) or not (“disabled”). For the management system this attribute is only readable. Its value can change from system inside.
- 4) `alarmSeverityAssignmentProfilePointer`: (optional).

The following two attributes are optional, but one of them has to be present.

- 5) `congestedState`: this attribute is used to reflect routeset congestion, if no multiple congestion levels are used. Its value is “congested” in case of routeset congestion. For the management system this attribute is only readable. Its value can change from system inside.
- 6) `congestionLevel`: this attribute is used to reflect routeset congestion, if multiple congestion levels are used. Its value in case of no congestion is “none”. For the management system this attribute is only readable. Its value can change from system inside.
- 7) `loadsharingInformationRouteSetNePart`: this optional attribute contains specific information for target specific loadsharing via the current routes working on a routeset basis via the current routes. This information can be used by, for example, the referenced `mtpLoadsharingObjectForRouteSetNePart` to execute the target specific loadsharing. (If this object is for example the representation of a loadsharing algorithm, this information can contain parameters for this algorithm.)
- 8) `mtpLoadsharingObjectForRouteSetNePartPointer`: this attribute is optional and is used to reference implementation dependent loadsharing MOC instances needed to model implementation dependent mechanisms for loadsharing over linksets working on a routeset basis.
- 9) `remoteExchangeLabel`: this optional attribute specifies the remote exchange which contains the `mtpSignPoint` with the point code equal to the `signRouteSetNePartId`. The attribute is read- and writable.

- 10) `signRouteSetNePartName`: this optional attribute additionally identifies a `signRouteSetNePart` instance within the managed object class; its value is unique within the `signRouteSetNePart` MOC. If at creation time the value of this attribute given for the instance to be created already exists in another `signRouteNePart` instance within the managedSwitchingElement, then the creation is rejected and not carried out. The attribute is read- and writable.

Notifications

- 1) `stateChange`: if a state attribute changes, then this notification is emitted.
- 2) `attributeValueChange`: (optional) this notification is emitted if an attribute value changes.
- 3) `objectCreation`: (optional) this notification is emitted if an instance is created.
- 4) `objectDeletion`: (optional) this notification is emitted if an instance is deleted.
- 5) `communicationsAlarm`: for notifications emitted from this class, the following probable causes can apply:
 Probable Cause = 411 (`RouteSetUnavailable`), which represents measurements Q.752/4.11 (`PerceivedSeverity` = Maj/Min/War) and Q.751/4.12 (`PerceivedSeverity` = Cleared).
- 6) `ss7OnOccEvent`: (optional) event notification for which the following probable causes can apply:
 Probable Cause = 002 (`remoteUserPartUnavailable`), with the involved user part as parameter. Possible values for `SpecificProblems` are: 007 "unknown", 008 "unequipped" and 009 "inaccessibleRemoteUser".

6.2.14 Signalling Terminal

Attributes	signTerm Notifications	Actions
<code>signTermId</code>	<code>stateChange</code>	
<code>administrativeState</code>		
<code>operationalState</code>		
<code>usageState</code>		
<code>proceduralStatus</code>		
<code>availabilityStatus</code>		
<code>equipmentPointer</code>		
"ITU-T Rec. M.3100 (1992)": <code>attributeValueChangeNotificationPackage</code> (C)		
	<code>attributeValueChange</code>	
"ITU-T Rec. M.3100 (1992)": <code>createDeleteNotificationsPackage</code> (C)		
	<code>objectCreation</code>	
	<code>objectDeletion</code>	
<code>signTermNamePackage</code> (C)		
<code>signTermName</code>		

The `signTerm` MOC defines the management capabilities for the signalling terminal. The signalling terminal is defined in Recommendation Q.703.

A create request is rejected if the `equipmentPointer` would reference equipment that does not exist.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

Attributes

- 1) signTermId: this attribute identifies an instance of this MOC.
- 2) OSI states administrativeState, operationalState, usageState, proceduralStatus and availabilityStatus: this attribute identifies the OSI-management state.
- 3) equipmentPointer: this attribute references the physical equipment of the signalling terminal.
- 4) signTermName: (optional) attribute for assigning an additional name to the signTerm.

Notifications

- 1) stateChange: if a state change occurs, then this notification will be emitted.
- 2) attributeValueChange: (optional) this notification is emitted if an attribute value changes.
- 3) objectCreation: (optional) this notification is emitted if an instance is created.
- 4) objectDeletion: (optional) this notification is emitted if an instance is deleted.

6.2.15 STP Screening Table

stpScreeningTable		
Attributes	Notifications	Actions
stpScreeningTableId	stateChange	
administrativeState		
treatmentOfOutsideRanges		
stpScreeningTableListMode		
screeningByLinkSetOrByOpc		
getScreenedOpcsOrLinkSetsByDpcActionPackage (C)		
		getScreenedOpcsOrLinkSetsByDpc
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
stpScreeningTableNamePackage (C)		
stpScreeningTableName		

The MOC STP Screening Table is introduced to meet the requirements of 8.2/Q.705 and 8.3/Q.705. Clause 8/Q.705 offers an optional functionality in order to identify and to handle unauthorized SS No.7 messages. For this purpose a lot of information is necessary (e.g. three different types of tables which are usable in several ways). For the Operator/Administration it must be possible to establish and to modify these information. This MOC is the base for this function. Together with its subordinate stpScreeningTableLine instances it contains all the information necessary for an STP to identify and to handle unauthorized SS No. 7 messages. Since the prevention of unauthorized use of an STP is an optional function this managed object is optional as well. If no stpScreeningTableInstance does exist, no STP screening takes place within the superior signPoint. The options to identify unauthorized SS No. 7 messages (8.2/Q.705) are: OPC/DPC, ILS/DPC and OLS/DPC policing. The option is chosen by the attribute screeningByLinkSetOrByOpc.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

Attributes

The managed object class STP Screening Table contains the following attributes :

- 1) stpScreeningTableId: this attribute identifies an instance of this managed object class. It is defined at creation time and only readable.
- 2) administrativeState: this attribute represents the OSI administrative state as defined in Recommendation X.731. It has the initial value "locked".
- 3) treatmentOfOutsideRanges: this attribute determines the treatment of the messages which are outside the designated ranges. This attribute is single-valued and read-write-able.
- 4) stpScreeningTableListMode: this attribute defines how the content of the subordinate stpScreeningTableLine's has to be used. It indicates whether the STP access is allowed (TRUE) or not (FALSE) by the designated combinations. This attribute is single-valued and read-write-able.
- 5) screeningByLinkSetOrByOpc: this attribute defines which of the different options to identify unauthorized SS No. 7 messages (8.2/Q.705) is represented by this list. This attribute is single-valued, defined at creation time and only readable.
- 6) stpScreeningTableName: (optional) attribute for assigning an additional name to the stpScreeningTable.

Notifications

- 1) stateChange: this notification is emitted if a state attribute changes.
- 2) attributeValueChange: this notification is emitted if an attribute value changes.
- 3) objectCreation: this notification is emitted if an instance is created.
- 4) objectDeletion: this notification is emitted if an instance is deleted.

Action

- getScreenedOpcsOrLinkSetsByDpc: this (optional) action gets all OPCs respectively linksets (depending on the value of the screeningByLinkSetOrByOPC attribute) together with their respective message treatments which are screened in combination with a specific DPC within all the stpScreeningTableLineContents of all stpScreeningTableLine instances contained in the stpScreeningTable.

The resulting list in the reply is empty, if no OPC or Linkset within all the stpScreeningTableLineContents of all stpScreeningTableLine instances contained in the stpScreeningTable is screened in combination with the DPC – given in the information syntax of the action –, or if no stpScreeningTableLine instance contained in the stpScreeningTable does exist.

6.2.16 stpScreeningTableLine

stpScreeningTableLine		
Attributes	Notifications	Actions
stpScreeningTableLineId		
stpScreeningTableLineContent		
"ITU-T Rec. M.3100 (1992)": attributeValueChangeNotificationPackage (C)		
	attributeValueChange	
"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage (C)		
	objectCreation	
	objectDeletion	
stpScreeningTableLineNamePackage (C)		
stpScreeningTableLineName		

The multiple instantiable MOC STP Screening TableLine is introduced to meet the requirements of 8.2/Q.705 and 8.3/Q.705. Clause 8/Q.705 offers an optional functionality in order to identify and to handle unauthorized SS No.7 messages. For the Operator/Administration it must be possible to establish and to modify these information. This MOC together with MOC stpScreeningTable contains all the information necessary for an STP to identify and to handle unauthorized SS No. 7 messages. Since the prevention of unauthorized use of an STP is an optional function this managed object is optional as well.

The total number of screened DPC's across all stpScreeningTableLine instances contained by a stpScreeningTable must be less or equal to maxNoOfScreenedDpcs. Respectively unallowed requests are rejected.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

Attributes

The managed object class STP Screening Table Line contains the following attributes :

- 1) stpScreeningTableLineId: this attribute identifies an instance of this managed object class. It is defined at creation time and only readable. Depending on the value of attribute screeningByLinkSetOrByDpc of the superior stpScreeningTable instance it represents the OPC or linkset which is designated to be screened for STP traffic. If one tries to create an instance with an stpScreeningTableLineId which would represent a linkset which is not contained within the same signPoint as the stpScreeningTable, the create request is rejected.
- 2) stpScreeningTableLineContent: this attribute represents the content of one line of the stpScreeningTable. The content consists of elements indicating the designated DPCs which are to be screened in combination with the OPC or linkset given by the stpScreeningTableLineId and an indication how a message fulfilling such a combination is to be treated. This attribute is read-write-able, also adding and removing of one or more elements shall be possible.

The total number of screened DPC's across all stpScreeningTableLine instances contained by a stpScreeningTable must be less or equal to maxNoOfScreenedDpcs. Respectively unallowed requests are rejected.

- 3) stpScreeningTableLineName: (optional) attribute for assigning an additional name to the stpScreeningTableLine.

Notifications

- 1) attributeValueChange: this notification is emitted if an attribute value changes.
- 2) objectCreation: this notification is emitted if an instance is created.
- 3) objectDeletion: this notification is emitted if an instance is deleted.

7 Formal specification

In this clause the identified managed object classes are formally described using GDMO [X.721] and ASN.1 [X.208].

Measurements for MTP are described in Recommendation Q.752, Tables 1, 2, 3, 4, 5 and 6. The modelling of these measurements for management can be found in Annex E of this Recommendation.

7.1 Managed object classes definitions

7.1.1 Signalling Link Set Timers Profile

IsTimersProfile MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY IsTimersProfilePackage PACKAGE

BEHAVIOUR IsTimersProfileBehaviour BEHAVIOUR DEFINED AS

"A signalling link set timer profile is a set of Q.704 timers which are related to the characteristics of signalling links sets.

The managed object class IsTimersProfile is a support managed object class which can be instantiated in order to define a particular profile. At creation time of a signLinkSetTp one of the IsTimersProfiles is referenced.";;

ATTRIBUTES

IsTimersProfileId	GET SET BY CREATE,
q704-t6	GET SET BY CREATE,
q704-t8	GET SET BY CREATE,
q704-t10	GET SET BY CREATE;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

IsTimersProfileNamePackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 1 };

7.1.2 Managed Switching Element

managedSwitchingElement MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. M.3100 (1992)":managedElement;

CHARACTERIZED BY managedSwitchingElementPackage PACKAGE

BEHAVIOUR managedSwitchingElementBehaviour BEHAVIOUR DEFINED AS

"The Managed Switching Element represents, for management purposes, an exchange, i.e. the aggregate of traffic carrying devices, switching stages, controlling and signalling means at a network node that enables subscriber lines to be interconnected and packets to be forwarded as required by individual users.";;

ATTRIBUTES

"ITU-T Rec. M.3100 (1992)": vendorName	GET SET BY CREATE;;;
--	----------------------

CONDITIONAL PACKAGES

managedSwitchingElementNamePackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 2 };

7.1.3 MTP Access Point

mtpAccessPoint MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.283 (1993) | ISO/IEC 10733 : 1992":nSAP;

CHARACTERIZED BY mtpAccessPointPkg PACKAGE

BEHAVIOUR mtpAccessPointBehaviour BEHAVIOUR DEFINED AS

"The sap2Address attribute contains the address of the mtpAccessPoint. It contains the Signalling Point Code (SPC), Service Indicator (SI) and MTP Network Identity (NI). The sapId attribute is used in naming instances of the mtpAccessPoint managed object class.

The userEntityNames attribute contains the distinguished names of the managed objects that represent the user entities that are using the mtpAccessPoint, e.g. the SCCP instance. The providerEntityNames attribute contains the distinguished names of the managed objects that represent the provider entities that are supporting the mtpAccessPoint, i.e., the instance of the MTP.

A mtpAccessPoint can have the MTP status:

- allowed, this means that the mtpAccessPoint is accessible and is functioning normally
- congested, this means that the mtpAccessPoint is accessible but the path to it is heavily loaded
- prohibited, this means that the mtpAccessPoint not accessible.

If the ss7OnOccEventPackage is present, event notification with the following probable causes can apply: Probable Cause = 001 (localUserPartUnavailable)";;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":alarmSeverityAssignmentPointerPackage PRESENT IF "an instance supports it and ss7OnOccEventPackage is present",
mtpAccessPointNamePackage PRESENT IF "an instance supports it",
ss7OnOccEventPackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 3 };

7.1.4 MTP Level 2 Protocol Profile

mtpL2ProtocolProfile MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY mtpL2ProtocolProfilePkg PACKAGE

BEHAVIOUR mtpL2ProtocolProfileBehaviour BEHAVIOUR DEFINED AS

"An MTP level 2 protocol profile is a set of Q.703 parameters which defines the layer 2 characteristics of Signalling Links.

The managed object class mtpL2ProtocolProfile is a support managed object class which can be instantiated in order to define a particular profile. At creation time of a signLinkTp one of the mtpL2ProtocolProfiles is referenced.";;

ATTRIBUTES

mtpL2ProtocolProfileId	GET SET BY CREATE,
errorCorrectionMethod	GET SET BY CREATE,
transmissionRate	GET SET BY CREATE,
l2TimerT1	GET SET BY CREATE,
l2TimerT2	GET SET BY CREATE,
l2TimerT3	GET SET BY CREATE,
l2TimerT4N	GET SET BY CREATE,
l2TimerT4E	GET SET BY CREATE,
l2TimerT5	GET SET BY CREATE,
l2TimerT6	GET SET BY CREATE,
l2TimerT7	GET SET BY CREATE,
transmissionCongestionThresholdOnsetLevel1	GET SET BY CREATE,
transmissionCongestionThresholdAbatementLevel1	GET SET BY CREATE;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

bufferMechanismPackage PRESENT IF "an instance supports it",

congestionHandlingPackage PRESENT IF "an instance supports it",

loopDelayPackage PRESENT IF "an instance supports it",

mtpL2ProtocolProfileNamePackage PRESENT IF "an instance supports it",

multipleTransmissionCongestionLevelsPackage PRESENT IF "an instance supports it",

multipleTransmissionCongestionStatesPackage PRESENT IF "an instance supports it",

pCRPackage PRESENT IF "an instance supports it",

receiveCongestionLevelsPackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 4 };

7.1.5 MTP Level 3

mtpLevel3 MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY mtpLevel3Package PACKAGE

BEHAVIOUR mtpLevel3Behaviour BEHAVIOUR DEFINED AS

"This managed object class models MTP Level 3 functionality.

If the 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992':communicationsAlarm notification is used, the following probable causes can apply:

Probable Cause = 501 (AdjacentPCInaccessible), with the inaccessible adjacent pointcode as a parameter, which represents measurement Q.752/5.1 (PerceivedSeverity=Maj/Min/War) and measurement Q.752/5.4 (PerceivedSeverity=Cleared).

If the `ss7OnOccEventPackage` is included, event notifications with the following probable causes can apply:

Probable Cause = 405 (`LinkSetFailure`), with the inaccessible adjacent pointcode as a parameter, which represents measurement Q.752/4.5 (`PerceivedSeverity=Maj/Min/War`) and measurement Q.752/4.6 (`PerceivedSeverity=Cleared`).

Probable Cause = 413 (`LinkSetChange`), with the involved link sets as parameter, which represents measurement Q.752/4.13.

";;

ATTRIBUTES

`mtpLevel3Id` GET SET BY CREATE,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":`administrativeState` GET-REPLACE,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":`operationalState` GET,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":`usageState` GET,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":`proceduralStatus` GET;

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":`stateChange`;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":`alarmSeverityAssignmentPointerPackage` PRESENT IF "an instance supports it and the (`communicationsAlarmPackage` or `ss7OnOccEventPackage`) is present",

"ITU-T Rec. M.3100 (1992)":`attributeValueChangeNotificationPackage` PRESENT IF "the `attributeValueChangeNotification` defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":`createDeleteNotificationsPackage` PRESENT IF "the `objectCreation` and `objectDeletion` notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

`communicationsAlarmPackage` PRESENT IF "an instance supports it",

`mtpLevel3NamePackage` PRESENT IF "an instance supports it",

`ss7OnOccEventPackage` PRESENT IF "an instance supports it";

REGISTERED AS { `mtpObjectClass 5` };

7.1.6 MTP Signalling Point

`mtpSignPoint` MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":`top`;

CHARACTERIZED BY `mtpSignPointPackage` PACKAGE

BEHAVIOUR `mtpSignPointBehaviour` BEHAVIOUR DEFINED AS

"A signalling point is a node in the signalling network. It is part of a managed switching element (exchange). The MTP permits three types of node:

- SEP: the signalling end point, this type of SP contains MTP and ISUP (and or other MTP Users), but cannot act as an intermediate MTP transfer node in the SS No.7 network. (It can act as an SCCP Relay Node.)
- STP: the MTP signalling transfer point, this type of SP acts as an intermediate node between SEPs to transfer messages through the SS No.7-network, it only contains MTP. (In case of an STP, OMAP, and hence also TC and SCCP may be present.)
- STEP: MTP signalling transfer and end point, the type combines the previous mentioned types, thus acting both as a SEP and as a STP.

A `mtpSignPoint` can have the MTP status:

- allowed, this means that the `mtpSignPoint` is accessible and is functioning normally (operational state = enabled, availability status = \emptyset)
- congested, this means that the `mtpSignPoint` is accessible but is heavily loaded (operational state = enabled, availability status = { degraded })
- prohibited, this means that the `mtpSignPoint` not accessible (operational state = disabled).

During MTP restart, the `proceduralStatus` is {initializing} until the restart is finished.";;

ATTRIBUTES

mtpSignPointId GET SET BY CREATE,
pointCode GET SET BY CREATE,
spType GET SET BY CREATE,
-- In some implementations the spType attribute might additionally be writable.
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":operationalState GET,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":proceduralStatus GET,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":availabilityStatus GET,
"ITU-T Rec. M.3100 (1992)":version GET SET BY CREATE,
networkIndicator GET SET BY CREATE;

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange,
mtpRestarting;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",
"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",
mtpSignPointNamePackage PRESENT IF "an instance supports it",
spTimersPackage PRESENT IF "the instance does not support the spTimersProfilePointerPackage",
spTimersProfilePointerPackage PRESENT IF "the instance does not support the spTimersPackage";

REGISTERED AS { mtpObjectClass 6 };

7.1.7 Signalling Data Link Termination Point

signDataLinkTp MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY signDataLinkTpPackage PACKAGE

BEHAVIOUR signDataLinkTpBehaviour BEHAVIOUR DEFINED AS

"This managed object represents the termination of the signalling data link within the SP as defined in Q.702.

The operational state is 'enabled' in normal operation. In case of failure of the part of the signalling data link that is within control of the managed switching element, this state will be 'disabled'.";

-- Note that for a complete view of the status of a signalling data link a network view is required.

ATTRIBUTES

signDataLinkTpId GET SET BY CREATE,
adjPc GET SET BY CREATE,
transmissionRate GET SET BY CREATE,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":operationalState GET,
equipmentPointer GET SET BY CREATE;

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",
"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",
clCPackage PRESENT IF "an instance supports it",
signDataLinkTpNamePackage PRESENT IF "an instance supports it",
stmChannelPackage PRESENT IF "an instance supports it or the signalling point supports the automatic allocation of signalling datalinks";

REGISTERED AS { mtpObjectClass 7 };

7.1.8 Signalling Link Set Termination Point

-- An example of the OSI state mapping for this class can be found in Annex C.

signLinkSetTp MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY signLinkSetTpPackage PACKAGE

BEHAVIOUR signLinkSetTpBehaviour BEHAVIOUR DEFINED AS

"This managed object class represents the SS No. 7 signalling link set termination point. Link sets are defined in Recommendation Q.704.

The states are directly related to the set of link termination point's states, except for the optional administrativeState.

General principles on state information:

- The states of the managed object linkset are only readable, except for the optional administrativeState.
- Activation and deactivation of a linkset may be done via operations on the links (e.g. by using scoping functions) or the optional administrativeState can be used for this.

Based on these principles the states of a linkset are defined as follows:

- operational state (read-only for the OS). The operational state is enabled whenever one link of the linkset is enabled, i.e. neither FAILED nor DEACTIVATED nor LOCAL BLOCKED nor REMOTE BLOCKED.
- usage state (read-only for the OS). The usage state reflects the usage of the belonging links. It is ACTIVE if at least one of the belonging links is ACTIVE and no link is BUSY. It contains BUSY if one of the belonging links is BUSY. It is IDLE if all links are UNAVAILABLE.
- availability status (read-only for the OS). The availability status indicates unavailability or reduced availability of the belonging links. It contains DEPENDENCY if all the belonging links are unavailable for user traffic. It contains DEGRADED if at least one belonging link is not available for user traffic.

For the different reasons of unavailability (failed, deactivated, local blocked, remote blocked, local inhibited and remote inhibited) see 3.2.1/Q.704.

If the 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992':communicationsAlarm notification is used, the following probable causes can apply:

Probable Cause=403 (LinkSetFailure), which represents measurements Q.752/4.3

(PerceivedSeverity=Maj/Min/War) and Q.752/4.4 (PerceivedSeverity=Cleared).

State change notifications are emitted for all state and status changes. ";;

ATTRIBUTES

signLinkSetTpId	GET SET BY CREATE,
adjPc	GET SET BY CREATE,
maxCapacityLS	GET SET BY CREATE,
<i>-- In some implementations, the maxCapacityLS attribute might be additionally writable.</i>	
currentCapacityLS	GET,
congestionControlMethod	GET SET BY CREATE,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":usage State	GET,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":operationalState	GET,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":availabilityStatus	GET,
periodicLinkTestFlag	DEFAULT VALUE MTPDefinedTypesModule.
periodicTestFlagDefault	GET-REPLACE;

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange;;;

CONDITIONAL PACKAGES

administrativeStatePackage PRESENT IF "an instance supports it",
"ITU-T Rec. M.3100 (1992)":alarmSeverityAssignmentPointerPackage PRESENT IF "an instance supports it and the communicationsAlarmPackage is present",
"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",
"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",
communicationsAlarmPackage PRESENT IF "an instance supports it",
inLsLoadShareAlgorithmPackage PRESENT IF "an instance supports it",
IsTimersProfilePointerPackage PRESENT IF "the instance of superior class mtpSignPoint does not support the conditional spTimersPackage",
noBasicLinkAllocationPackage PRESENT IF "Basic link allocation is not done",
signLinkSetTpNamePackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 8 };

7.1.9 Signalling Link Termination Point

-- An example of mapping of the MTP functional states to the incorporated OSI management states
-- can be found in Annex C.

signLinkTp MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY signLinkTpPackage PACKAGE

BEHAVIOUR signLinkTpBehaviour BEHAVIOUR DEFINED AS

"This managed object represents the termination of the signalling link within the signalling point as defined in Recommendation Q.703. The signLinkTp object class represents that part of a signalling link which is located in one NE.

The following state and status attributes are supported:

administrative state:

- locked: it is administratively not permitted to transport traffic on the link termination point.
- unlocked: it is administratively permitted to transport user part traffic or test traffic on the link termination point.

operational state:

- enabled: the link termination point is operationally able to transport user part traffic or test traffic.
- disabled: the link termination point is operationally unable to transport user part traffic or test traffic.

The operational state is disabled whenever the link termination point status contains Failed, Deactivated, Local Blocked, Remote Blocked, or the procedural status is Initializing.

usage state:

- idle: the link termination point carries no user part traffic (test traffic may be present).
- 'active': the link termination point is not congested. Currently the link termination point carries user part traffic.
- busy: the link termination point is congested due to user part traffic.

The usage state is idle whenever the link termination point status is not empty i.e. the usage state immediately reflects the availability of the signLinkTp for user traffic. For national MTP options applying several congestion levels an additional attribute indicating these levels may be added.

procedural status:

- The procedural status initializing is valid during initial alignment procedure.
- The procedural status not initialized applies when the link termination point is not aligned and the initial alignment procedure has not been started.

Link termination point status. This is a set-valued attribute. The following statuses can exist alone or in combinations with each other. The exact definition for each of the following SS7-functional states is to be gained from Q.704

- local blocked
- remote blocked
- local inhibited
- remote inhibited
- failed
- deactivated.

If the 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992':communicationsAlarm notification is used, the following probable causes can apply:

Probable Cause = 102 (slFailure) which represents measurement Q.752/1.2 – measurement Q.752/1.6 (SpecificProblems=003 abnormalFIBRorBSNR, 004 excessiveAckDelay, 005 excessiveErrorRate, 006 excessiveCongDuration) and Q.752/1.12.(PerceivedSeverity=cleared)

If the ss7OnOccEventPackage is present, the event notifications with the following probable causes can apply:

Probable Cause = 110 (localChangeOver) which represents measurement Q.752/1.10 (PerceivedSeverity=Maj/Min/War) and measurement Q.752/1.11 (PerceivedSeverity=Cleared).

Probable Cause = 210 (remoteProcOutage) which represents measurements Q.752/2.10 (PerceivedSeverity=Maj/Min/War) and Q.752/2.11 (PerceivedSeverity=Cleared).

Probable Cause = 216 (start of local inhibition) which represents measurement Q.752/2.16 (PerceivedSeverity=Maj/Min/War) and Q.752/2.17 (PerceivedSeverity=Cleared).

Probable Cause = 218 (start of remote inhibition) which represents measurement Q.752/2.18 (PerceivedSeverity=Maj/Min/War) and Q.752/2.19 (PerceivedSeverity=Cleared).

A create or set request is rejected, if

- i) a pointer would reference an instance, which does not belong to the appropriate object class
- OR ii) a pointer would reference an instance which is not existing
- OR iii) a signDataLinkTpPointer would reference a signDataLinkTp which is not in the same mtpSignPoint
- OR iv) a signDataLinkTpPointer would reference a signDataLinkTp which has a different value of adjPc than the superior signLinkSetTp
- OR v) the link would reference a datalink and a mtpL2ProtocolProfile whose transmissionRates is not the same
- OR vi) the link would reference a mtpL2ProtocolProfile where the appropriate packages for the congestionControlMethod of the superior signLinkSetTp are not present (see B.1.2.9.2)
- OR vii) the spTimersProfilePackage is present in the superior mtpSignPoint AND the link would reference a mtpL2ProtocolProfile whose l2TimerT2 is not bigger than the q704-t17 of the spTimersProfile referenced by the mtpSignPoint
- OR viii) the spTimersPackage is present in the superior mtpSignPoint AND the link would reference a mtpL2ProtocolProfile whose l2TimerT2 is not bigger than the q704-t17 of the mtpSignPoint.

The rejection also takes place if only a single pointer within the signDataLinkList or the signTermList (if present) is wrong.

A delete request is rejected, if the linkTpStatus does not contain the value deactivated,"";

ATTRIBUTES

slCode	GET SET BY CREATE,
slsCodeCurrentList	GET,
maxCapacitySL	GET,
currentCapacitySL	GET,
linkTpStatus	GET,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":administrativeState	GET-REPLACE,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":operationalState	GET,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":usageState	GET,

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":proceduralStatus
mtpL2ProtocolProfilePointer
signTermPointer
signDataLinkTpPointer

GET,
GET-REPLACE,
GET SET BY CREATE,
GET-REPLACE;

ACTIONS

localInhibit
localUninhibit

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":alarmSeverityAssignmentPointerPackage PRESENT IF "an instance supports it and the (communicationsAlarmPackage or ss7OnOccEventPackage) is present",
"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",
"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",
communicationsAlarmPackage PRESENT IF "an instance supports it",
linkCongestionLevelPackage PRESENT IF "the exchange support the operation, management and administration of multiple transmission congestion levels (national option)",
relatedLinkGroupNumberPackage PRESENT IF "an instance supports it",
signDataLinkTpListPackage PRESENT IF "an instance supports it",
signLinkTestPackage PRESENT IF "the on-demand signalling link test as described in Q.707 is supported",
signLinkTpNamePackage PRESENT IF "an instance supports it",
signTermListPackage PRESENT IF "an instance supports it or an instance supports the signDataLinkTpListPackage",
slsCodeNormalListPackage PRESENT IF "an instance supports it",
slTimersProfilePointerPackage PRESENT IF "the instance of superior class mtpSignPoint does not support the conditional spTimersPackage",
ss7OnOccEventPackage PRESENT IF "an instance supports it";

REGISTERED AS [mtpObjectClass 9];

7.1.10 Signalling Link Timers Profile

slTimersProfile MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY

slTimersProfilePackage PACKAGE

BEHAVIOUR slTimersProfileBehaviour BEHAVIOUR DEFINED AS

"A signalling link timer profile is a set of Q.704 timers which are related to the characteristics of Signalling Links.

The managed object class slTimersProfile is a support managed object class which can be instantiated in order to define a particular profile. At creation time of a signLinkTp one of the slTimersProfiles may be referenced..";;

ATTRIBUTES

slTimersProfileId GET SET BY CREATE,
q704-t1 GET SET BY CREATE,
q704-t3 GET SET BY CREATE,
q704-t17 GET SET BY CREATE,
q704-t24 GET SET BY CREATE;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",
"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",
slTimersProfileNamePackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 10 };

7.1.11 Signalling Point Timers Profile

spTimersProfile MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY

spTimersProfilePackage PACKAGE

BEHAVIOUR spTimersProfileBehaviour **BEHAVIOUR DEFINED AS**

"A signalling link set timer profile is set of Q.704 and Q.707 timers which are related to the characteristics of signalling points.

The managed object class spTimersProfile is a support managed object class which can be instantiated in order to define a particular profile. At creation time of a signPoint one of the spTimersProfiles is referenced.";;

ATTRIBUTES

spTimersProfileId	GET SET BY CREATE,
q704-t2	GET SET BY CREATE,
q704-t4	GET SET BY CREATE,
q704-t5	GET SET BY CREATE,
q704-t7	GET SET BY CREATE,
q704-t11	GET SET BY CREATE,
q704-t12	GET SET BY CREATE,
q704-t13	GET SET BY CREATE,
q704-t14	GET SET BY CREATE,
q704-t15	GET SET BY CREATE,
q704-t16	GET SET BY CREATE,
q704-t18	GET SET BY CREATE,
q704-t19	GET SET BY CREATE,
q704-t20	GET SET BY CREATE,
q704-t21	GET SET BY CREATE,
q704-t22	GET SET BY CREATE,
q704-t23	GET SET BY CREATE,
q707-t1	GET SET BY CREATE,
q707-t2	GET SET BY CREATE;;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage **PRESENT IF** "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage **PRESENT IF** "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

spTimersProfileNamePackage **PRESENT IF** "an instance supports it";

REGISTERED AS { mtpObjectClass 11 };

7.1.12 Signalling Route Network Element Part

NOTE – The optional package ClsLoadsharingInformationPackage shows an example of how the loadsharing mechanism may be implemented. However, this option might complicate the operation of SS No. 7 networks. Therefore, other implementation dependent solutions might be used in which the load sharing within the individual link sets of a combined link set is made independent of the destination.

signRouteNePart MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY signRouteNePartPackage PACKAGE

BEHAVIOUR signRouteNePartBehaviour **BEHAVIOUR DEFINED AS**

"A signalling route (A,C,B)_i is defined as an ordered sequence of the near end signalling point A (i.e. the network element), an adjacent SP C and the destination SP B. The adjacent SP C may be identical with the destination B, or it may or may not be directly interconnected to the destination SP.

The adjacent SP C must be directly connected to the near end SP by at least one linkset which is intended to convey MSUs sent from A to B (hence the use of the term 'adjacent').

Two signalling routes (A,C,B)_i and (A,C',B)_j are distinct if the adjacent SP is different.

The signRouteNePart Managed Object class defines the management capabilities of the resources which define a specific route segment (Link Set to be traversed) and its priority within the routeset as seen from the own SP.

A particular signRouteNePart is related to one or more Signalling Routes on the network level.

The priority in which the network Signalling Routes are used, is defined by means of assigning priorities to all involved route segments. If from a particular SP two or more route segments are used with the same priority, loadsharing between Signalling Routes may occur. A Combined Link Set is a set of Link Sets used with the same priority by message routing.

The signLinkSetTp used for routing is allocated at creation time and cannot be changed during the existence of a particular signRouteNePart.

The administrativeState attribute describes whether it is administratively permitted to route messages towards the respective destination point via the referenced signLinkSetTp.

The operationalState attribute is 'enabled' if both the referenced signLinkSetTp is in the operational state 'enabled' and no TFP message concerning the respective destinations has been received from the adjPC of the respective signLinkSetTp.

The optional usageState attribute is used to cover restriction of a route. Its value is set to 'busy', if the route is restricted ('transfer restricted' is a national option).

The availabilityStatus attribute gives additional information about the availability of the signRouteNePart instance. It is furthermore needed to map some of the MTP functional states (prohibited: availabilityStatus = {dependency}, restricted: availabilityStatus={degraded}) and is used for the case that the route is locked not by the OS, but e.g. by a local administrator (administrativeState=unlocked and availabilityStatus={off line}).";;

ATTRIBUTES

signRouteNePartId	GET SET BY CREATE,
signLinkSetTPPointer	GET SET BY CREATE,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":administrativeState	GET-REPLACE,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":operationalState	GET,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":availabilityStatus	GET;

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

clsLoadsharingInformationPackage PRESENT IF "an instance supports it",

fixedRouteNePartPriorityPackage PRESENT IF "the instance does not use the flexibleRouteNePartPriorityPackage",

flexibleRouteNePartPriorityPackage PRESENT IF "the instance does not use the fixedRouteNePartPriorityPackage",

loadsharingInformationRouteNePartPackage PRESENT IF "the instance supports it",

mtpLoadsharingObjectForRouteNePartPointerPackage PRESENT IF "the instance supports it",

signRouteNePartNamePackage PRESENT IF "an instance supports it",

slsListPackage PRESENT IF "the instance supports it",

usageStatePackage PRESENT IF "the instance supports 'transfer restricted'";;

REGISTERED AS { mtpObjectClass 12 }

7.1.13 Signalling Route Set Network Element Part

signRouteSetNePart MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY signRouteSetNePartPackage PACKAGE

BEHAVIOUR signRouteSetNePartBehaviour BEHAVIOUR DEFINED AS

"A Signalling Route Set is a complete set of routes that can be used to carry traffic toward a specific destination signalling point.

The signRouteSetNePart Managed Object class defines the management capabilities of the resources which represent a specific destination SP and its accessibility as seen from the own SP. This SP may be the originating SP of the MTP messages or an STP.

A particular signRouteSetNePart may be related to one or more Signalling Route Sets on network level.

The administrativeState attribute describes whether it is administratively permitted to route SS No. 7 MSUs towards the respective destination point. Before the administrative state of a signRouteSetNePart can be set to 'unlocked', there must be at least one signRouteNePart contained within the signRouteSetNePart.

The operationalState attribute describes whether the respective destination signalling point is accessible - ('enabled') or not ('disabled'). If the operational states of all signRouteNePart instances contained in the signRouteSetNePart are 'disabled', then the operational state of the signRouteSetNePart is 'disabled', in any other case it is 'enabled'.

The usageState attribute is used to reflect route set congestion. The value is 'busy' in case of route set congestion.

If the 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2: 1992':communicationsAlarm notification is present, it indicates at least the following probable causes:

Probable Cause = 411(RouteSetUnavailable), which represents measurements Q.752/4.11 (PerceivedSeverity=Maj/Min/War) and Q.751/4.12 (PerceivedSeverity=Cleared).

If the ss7OnOccEventPackage is present, event notifications with the following probable cause can apply:

Probable Cause = 002 (remoteUserPartUnavailable), with the involved user part as parameter. Possible values for SpecificProblems are: 007 'unknown', 008 'unequipped' and 009 'inaccessibleRemoteUser'.

An activation or deactivation of a signRouteSetNePart must lead to the activation respectively deactivation of all contained signRouteNeParts.";;

ATTRIBUTES

signRouteSetNePartId	GET SET BY CREATE,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":administrativeState	GET-REPLACE,
"ITU-T Rec. X.721 (1992) ISO/IEC 10165-2 : 1992":operationalState	GET,

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":alarmSeverityAssignmentPointerPackage PRESENT IF "an instance supports it and the (communicationsAlarmPackage or ss7OnOccEventPackage) is present",

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

communicationsAlarmPackage PRESENT IF "an instance supports it",
congestedStatePackage PRESENT IF "the instance does not use the congestionLevelPackage",
congestionLevelPackage PRESENT IF "the instance does not use the congestedStatePackage",
loadsharingInformationRouteSetNePartPackage PRESENT IF "the instance supports it",
mtpLoadsharingObjectForRouteSetNePartPointerPackage PRESENT IF "the instance supports it",
remoteExchangeLabelPackage PRESENT IF "the instance supports it",
signRouteSetNePartNamePackage PRESENT IF "the instance supports it",
ss7OnOccEventPackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 13 };

7.1.14 Signalling Terminal

signTerm MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY signTermPackage PACKAGE

BEHAVIOUR signTermBehaviour BEHAVIOUR DEFINED AS

"The signTerm MOC defines the management capabilities for the signalling terminal. The signalling terminal is defined in ITU-T Rec. Q.703.";

ATTRIBUTES

signTermId GET SET BY CREATE,

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":operationalState GET,

-- the application of the following state is f.f.s.

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":usageState GET,

-- the application of the following state is f.f.s.

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":proceduralStatus GET,

-- the application of the following state is f.f.s.

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":availabilityStatus GET,

equipmentPointer GET SET BY CREATE;

NOTIFICATIONS

"ITU-T Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange;;;

CONDITIONAL PACKAGES

ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

signTermNamePackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 14 };

7.1.15 STP Screening Table

stpScreeningTable MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY stpScreeningTablePkg PACKAGE

BEHAVIOUR stpScreeningTableBehaviour BEHAVIOUR DEFINED AS

"The stpScreeningTable object class is the base for STP screening. Together with its subordinate stpScreeningTableLine's it contains all the information which are necessary for an STP to identify and to handle unauthorized SS No. 7 messages as defined in 8.2/Q.705 and 8.3/Q.705.

";;

ATTRIBUTES

stpScreeningTableId GET SET BY CREATE,

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":administrativeState

INITIAL VALUE MTPDefinedTypesModule.

administrativeStateLocked GET-REPLACE,

treatmentOfOutsideRanges GET-REPLACE,
 stpScreeningTableListMode GET-REPLACE,
 screeningByLinkSetOrByDPCopc GET SET BY CREATE;

NOTIFICATIONS

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

getScreenedOpcsOrLinkSetsByDpcActionPackage PRESENT IF "an instance supports it",

stpScreeningTableNamePackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 15 };

7.1.16 STP Screening Table Line

stpScreeningTableLine MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top,

CHARACTERIZED BY stpScreeningTableLinePkg PACKAGE

BEHAVIOUR stpScreeningTableLineBehaviour BEHAVIOUR DEFINED AS

"The stpScreeningTableLine together with its superior stpScreeningTable contains all the information which are necessary for an STP to identify and to handle unauthorized SS No. 7 messages as defined in 8.2/Q.705 and 8.3/Q.705.

The total number of screened DPC's across all stpScreeningTableLine instances contained by a stpScreeningTable must be less or equal to maxNoOfScreenedDpcs.";;

ATTRIBUTES

stpScreeningTableLineId GET SET BY CREATE.

stpScreeningTableLineContent GET-REPLACE ADD-REMOVE;;;

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class";

REGISTERED AS { mtpObjectClass 16 };

7.2 Package definitions

administrativeStatePackage PACKAGE

BEHAVIOUR administrativeStatePackageBehaviour BEHAVIOUR DEFINED AS

"This package can be used for activated and deactivated link sets. Possible values of the administrativeState attribute are: locked and unlocked.

If transition takes place from locked to unlocked, this will result in activation of all links in the set that are unlocked.

If transition takes place from unlocked to locked, this will result in deactivation of all links in the set. This has no effect on the administrative states of the links themselves";;

ATTRIBUTES

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":administrativeState

GET-REPLACE;

REGISTERED AS { mtpPackage 1 };

bufferMechanismPackage PACKAGE

ATTRIBUTES

numberOfThresholdLevels GET SET BY CREATE;

REGISTERED AS { mtpPackage 2 };

clCPackage PACKAGE

ATTRIBUTES

clC GET SET BY CREATE;

REGISTERED AS { mtpPackage 3 };

loadsharingInformationRouteNePartPackage PACKAGE
ATTRIBUTES
loadsharingInformationRouteNePart GET-REPLACE;
REGISTERED AS { mtpPackage 14 };

loadsharingInformationRouteSetNePartPackage PACKAGE
ATTRIBUTES
loadsharingInformationRouteSetNePart GET-REPLACE;
REGISTERED AS { mtpPackage 15 };

loopDelayPackage PACKAGE
ATTRIBUTES
loopDelay GET SET BY CREATE;
REGISTERED AS { mtpPackage 16 };

lsTimersProfileNamePackage PACKAGE
ATTRIBUTES
lsTimersProfileName GET-REPLACE;
REGISTERED AS { mtpPackage 17 };

lsTimersProfilePointerPackage PACKAGE
ATTRIBUTES
lsTimersProfilePointer GET-REPLACE;
REGISTERED AS { mtpPackage 18 };

managedSwitchingElementNamePackage PACKAGE
ATTRIBUTES
managedSwitchingElementName GET-REPLACE;
REGISTERED AS { mtpPackage 19 };

mtpAccessPointNamePackage PACKAGE
ATTRIBUTES
mtpAccessPointName GET-REPLACE;
REGISTERED AS { mtpPackage 20 };

mtpL2ProtocolProfileNamePackage PACKAGE
ATTRIBUTES
mtpL2ProtocolProfileName GET-REPLACE;
REGISTERED AS { mtpPackage 21 };

mtpLevel3NamePackage PACKAGE
ATTRIBUTES
mtpLevel3Name GET-REPLACE;
REGISTERED AS { mtpPackage 22 };

mtpLoadsharingObjectForRouteNePartPointerPackage PACKAGE
ATTRIBUTES
mtpLoadsharingObjectForRouteNePartPointer GET-REPLACE;
REGISTERED AS { mtpPackage 23 };

mtpLoadsharingObjectForRouteSetNePartPointerPackage PACKAGE
ATTRIBUTES
mtpLoadsharingObjectForRouteSetNePartPointer GET-REPLACE;
REGISTERED AS { mtpPackage 24 };

mtpSignPointNamePackage PACKAGE
ATTRIBUTES
mtpSignPointName GET-REPLACE;
REGISTERED AS { mtpPackage 25 };

multipleTransmissionCongestionLevelsPackage PACKAGE
BEHAVIOUR multipleTransmissionCongestionLevelsPackageBehaviour BEHAVIOUR DEFINED AS
"This package contains the second and third levels of transmission congestion. The values of the thresholds
belonging to congestion level 2 have to be bigger than the respective ones of congestion level 1. The values of the
thresholds belonging to congestion level 3 have to be bigger than the respective ones of congestion level 2.";;

ATTRIBUTES

transmissionCongestionThresholdDiscardLevel1	GET SET BY CREATE,
transmissionCongestionThresholdOnsetLevel2	GET SET BY CREATE,
transmissionCongestionThresholdAbatementLevel2	GET SET BY CREATE,
transmissionCongestionThresholdDiscardLevel2	GET SET BY CREATE,
transmissionCongestionThresholdOnsetLevel3	GET SET BY CREATE,
transmissionCongestionThresholdAbatementLevel3	GET SET BY CREATE,
transmissionCongestionThresholdDiscardLevel3	GET SET BY CREATE,

REGISTERED AS { mtpPackage 26};

multipleTransmissionCongestionStatesPackage PACKAGE

BEHAVIOUR multipleTransmissionCongestionStatesPackageBehaviour BEHAVIOUR DEFINED AS
 "This package contains the attributes related to the management of 'multiple link congestion states without congestion priority' method. This method is described in 3.8.2.3/Q.704. See also B.1.2.9.2. The range of initialLevelOfCongestion is [1,numberOfCongestionStates].";;

ATTRIBUTES

timerTx	GET SET BY CREATE,
timerTy	GET SET BY CREATE,
numberOfCongestionStates	GET SET BY CREATE,
initialLevelOfCongestion	GET SET BY CREATE;

REGISTERED AS { mtpPackage 27 };

noBasicLinkAllocationPackage PACKAGE

ATTRIBUTES

numberOfNormallyActiveSignLinksTps	GET-REPLACE;
------------------------------------	--------------

REGISTERED AS { mtpPackage 28 };

pCRPackage PACKAGE

BEHAVIOUR pCRPackageBehaviour BEHAVIOUR DEFINED AS
 "This package contains signLinkTp attributes for the PCR method";;

ATTRIBUTES

maxMSUsRetransN1	GET SET BY CREATE,
maxOctRetransN2	GET SET BY CREATE;

REGISTERED AS { mtpPackage 29 };

receiveCongestionLevelsPackage PACKAGE

BEHAVIOUR receiveCongestionLevelsPackageBehaviour BEHAVIOUR DEFINED AS
 "This package contains the levels of receive congestions";;

ATTRIBUTES

receiveCongestionThresholdOnset	GET SET BY CREATE,
receiveCongestionThresholdAbatement	GET SET BY CREATE;

REGISTERED AS { mtpPackage 30 };

relatedLinkGroupNumberPackage PACKAGE

ATTRIBUTES

relatedLinkGroupNumber	GET-REPLACE;
------------------------	--------------

REGISTERED AS { mtpPackage 31 };

remoteExchangeLabelPackage PACKAGE

BEHAVIOUR remoteExchangeLabelPackageBehaviour BEHAVIOUR DEFINED AS
 "This package supplies the possibility to have textual information about the remote exchange that contains the destination signalling point.";;

ATTRIBUTES

remoteExchangeLabel	GET-REPLACE;
---------------------	--------------

REGISTERED AS { mtpPackage 32 };

signDataLinkTpListPackage PACKAGE

ATTRIBUTES

signDataLinkTpList	GET;
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REGISTERED AS { mtpPackage 33 };

signDataLinkTpNamePackage PACKAGE

ATTRIBUTES

signDataLinkTpName	GET-REPLACE;
--------------------	--------------

REGISTERED AS { mtpPackage 34 };

signLinkSetTpNamePackage PACKAGE

ATTRIBUTES

signLinkSetTpName	GET-REPLACE;
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REGISTERED AS { mtpPackage 35 };

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signLinkTestPackage PACKAGE
  ACTIONS
    signLinkTest;
REGISTERED AS { mtpPackage 36 };

signLinkTpNamePackage PACKAGE
  ATTRIBUTES
    signLinkTpName GET-REPLACE;
REGISTERED AS { mtpPackage 37 };

signRouteNePartNamePackage PACKAGE
  ATTRIBUTES
    signRouteNePartName GET-REPLACE;
REGISTERED AS { mtpPackage 38 };

signRouteSetNePartNamePackage PACKAGE
  ATTRIBUTES
    signRouteSetNePartName GET-REPLACE;
REGISTERED AS { mtpPackage 39 };

signTermListPackage PACKAGE
  ATTRIBUTES
    signTermList GET;
REGISTERED AS { mtpPackage 40 };

signTermNamePackage PACKAGE
  ATTRIBUTES
    signTermName GET-REPLACE;
REGISTERED AS { mtpPackage 41 };

slsCodeNormalListPackage PACKAGE
  ATTRIBUTES
    slsCodeNormalList GET SET BY CREATE;
    -- in some implementations this attribute might additionally be writable
REGISTERED AS { mtpPackage 42 };

slsListPackage PACKAGE
  ATTRIBUTES
    slsList GET SET BY CREATE;
REGISTERED AS { mtpPackage 43 };

slTimersProfileNamePackage PACKAGE
  ATTRIBUTES
    slTimersProfileName GET-REPLACE;
REGISTERED AS { mtpPackage 44 };

slTimersProfilePointerPackage PACKAGE
  ATTRIBUTES
    slTimersProfilePointer GET-REPLACE;
REGISTERED AS { mtpPackage 45 };

spTimersPackage PACKAGE
  BEHAVIOUR spTimersPackageBehaviour BEHAVIOUR DEFINED AS
    "This package contains the values of the Q.704 and Q.707 timers.";;
  ATTRIBUTES
    q704-t1 GET SET BY CREATE,
    q704-t2 GET SET BY CREATE,
    q704-t3 GET SET BY CREATE,
    q704-t4 GET SET BY CREATE,
    q704-t5 GET SET BY CREATE,
    q704-t6 GET SET BY CREATE,
    q704-t7 GET SET BY CREATE,
    q704-t8 GET SET BY CREATE,
    q704-t10 GET SET BY CREATE,
    q704-t11 GET SET BY CREATE,
    q704-t12 GET SET BY CREATE,

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q704-t13 GET SET BY CREATE,
 q704-t14 GET SET BY CREATE,
 q704-t15 GET SET BY CREATE,
 q704-t16 GET SET BY CREATE,
 q704-t17 GET SET BY CREATE,
 q704-t18 GET SET BY CREATE,
 q704-t19 GET SET BY CREATE,
 q704-t20 GET SET BY CREATE,
 q704-t21 GET SET BY CREATE,
 q704-t22 GET SET BY CREATE,
 q704-t23 GET SET BY CREATE,
 q704-t24 GET SET BY CREATE,
 q707-t1 GET SET BY CREATE,
 q707-t2 GET SET BY CREATE;
 REGISTERED AS { mtpPackage 46 };

spTimersProfileNamePackage PACKAGE
 ATTRIBUTES
 spTimersProfileName GET-REPLACE;
 REGISTERED AS { mtpPackage 47 };

spTimersProfilePointerPackage PACKAGE
 ATTRIBUTES
 spTimersProfilePointer GET-REPLACE;
 REGISTERED AS { mtpPackage 48 };

ss7OnOccEventPackage PACKAGE
 NOTIFICATIONS
 ss7OnOccEvent
 changeInLsToAdjSp
 inaccessibleSp
 remoteUserPartUnavailable;
 REGISTERED AS { mtpPackage 49 };

stmChannelPackage PACKAGE
 ATTRIBUTES
 stmChannel GET;
 REGISTERED AS { mtpPackage 50 };

stpScreeningTableNamePackage PACKAGE
 ATTRIBUTES
 stpScreeningTableName GET-REPLACE;
 REGISTERED AS { mtpPackage 51 };

usageStatePackage PACKAGE
 BEHAVIOUR usageStatePackageBehaviour BEHAVIOUR DEFINED AS
 "This package supplies a possibility to cover 'transfer restricted' for a route.";;
 ATTRIBUTES
 ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":usageState GET;
 REGISTERED AS { mtpPackage 52 };

7.3 Parameter definitions

changeInLsToAdjSp PARAMETER
 CONTEXT EVENT-INFO;
 WITH SYNTAX MTPDefinedTypesModule.ChangeInLsToAdjSpInfo;
 REGISTERED AS { mtpParameter 1 };

inaccessibleSp PARAMETER
 CONTEXT EVENT-INFO;
 WITH SYNTAX MTPDefinedTypesModule.InaccessibleSpInfo;
 REGISTERED AS { mtpParameter 2 };

remoteUserPartUnavailable PARAMETER
 CONTEXT EVENT-INFO;
 WITH SYNTAX MTPDefinedTypesModule.UserPart;
 REGISTERED AS { mtpParameter 3 };

7.4 Attribute definitions

adjPc ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PointCode;
MATCHES FOR EQUALITY;
BEHAVIOUR adjPcBehaviour BEHAVIOUR DEFINED AS
"This attribute represents the pointcode of an adjacent SP.";;

REGISTERED AS { mtpAttribute 1 };

cIC ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Cic;
MATCHES FOR EQUALITY;
BEHAVIOUR cicBehaviour BEHAVIOUR DEFINED AS
"This attribute is used to reference the SS No. 7 trunk used by the datalink. Its value has to be unique within the SP's connected by the trunk.";;

REGISTERED AS { mtpAttribute 2 };

congestedState ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CongestedState
MATCHES FOR EQUALITY;
BEHAVIOUR congestedStateBehaviour BEHAVIOUR DEFINED AS
"This attribute is used to reflect route set congestion, if no multiple congestion levels are used. Its value is 'congested' in case of route set congestion. Its value can change from system inside.";;

REGISTERED AS { mtpAttribute 3 };

congestionControlMethod ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CongestionControlMethod;
BEHAVIOUR congestionControlMethodBehaviour BEHAVIOUR DEFINED AS
"This attribute reflects the congestion control method used within a signalling point.";;

REGISTERED AS { mtpAttribute 4 };

congestionCounting ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CongestionCounting;
BEHAVIOUR congestionCountingBehaviour BEHAVIOUR DEFINED AS
"This attribute indicates whether congestion counting is message based or octet based.";;

REGISTERED AS { mtpAttribute 5 };

congestionLevel ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CongestionLevel;
MATCHES FOR EQUALITY;
BEHAVIOUR congestionLevelBehaviour BEHAVIOUR DEFINED AS

"This attribute is used to reflect route set congestion, if multiple congestion levels are used. Its value in case of no congestion is 'none'. Its value can change from system inside.";;

REGISTERED AS { mtpAttribute 6 };

congestionReportingBaseObject ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CongestionReportingBaseObject;
BEHAVIOUR congestionReportingBaseObjectBehaviour BEHAVIOUR DEFINED AS
"This attribute indicates on what object congestion counting is based.";;

REGISTERED AS { mtpAttribute 7 };

currentCapacityLS ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CapacityLS;
BEHAVIOUR currentCapacityLSBehaviour BEHAVIOUR DEFINED AS
"This attribute represents the current capacity of a signalling link set.";;

REGISTERED AS { mtpAttribute 8 };

currentCapacitySL ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CapacityLink;
BEHAVIOUR currentCapacitySLBehaviour BEHAVIOUR DEFINED AS
"This attribute represents the current capacity of a signalling link.";;

REGISTERED AS { mtpAttribute 9 };

dpc ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PointCode;
MATCHES FOR EQUALITY;
BEHAVIOUR dpcBehaviour BEHAVIOUR DEFINED AS
"This attribute represents a destination pointcode.";;

REGISTERED AS { mtpAttribute 10 };

equipmentPointer ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR equipmentPointerBehaviour BEHAVIOUR DEFINED AS
"This attribute is used to reference physical equipment.";;

REGISTERED AS { mtpAttribute 11 };

errorCorrectionMethod ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.ErrorCorrectionMethod;
MATCHES FOR EQUALITY;
BEHAVIOUR errorCorrectionMethodBehaviour BEHAVIOUR DEFINED AS
"This attribute is used to specify the type of error-correction the signalling link is using.";;

REGISTERED AS { mtpAttribute 12 };

fixedPriority ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.FixedPriority;
BEHAVIOUR fixedPriorityBehaviour BEHAVIOUR DEFINED AS
"This attribute determines, if the signRouteNePart is used as current route. The signRouteNePart instances with operational state = 'enabled' contained in the same signRouteSetNePart are chosen in ascending order as current routes (The lower the value, the higher the priority).

There are different behaviours for the handling of 'priority gaps' possible:

i) priorityGapAllowedBEHAVIOUR ii) priorityGapNotAllowedBehaviour:

In the latter case it is not possible, to have a priority value, if there is a lower value, which is not used in one of the routes of the route set. E.g. in case of deleting a signRouteNePart instance whose priority value is not equal to the priority of at least one of the remaining signRouteNeParts contained in the same signRouteSetNePart, the priority values of the remaining instances have to be decremented by one (see also example in table below).

What kind of priority gap behaviour is performed by the switch is to be derived from the combination of the values of the attributes vendorName and version of the managedSwitchingElement.";;

REGISTERED AS { mtpAttribute 13 };

flexiblePriority ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.FlexiblePriority;
BEHAVIOUR flexiblePriorityBehaviour BEHAVIOUR DEFINED AS
"This attribute determines, if the signRouteNePart is used as current route. The signRouteNePart instances with operational state = 'enabled' contained in the same signRouteSetNePart are chosen in ascending order as current routes (The lower the value, the higher the priority).

There are different behaviours for the handling of 'priority gaps' possible:

i) priorityGapAllowedBEHAVIOUR ii) priorityGapNotAllowedBehaviour:

In the latter case it is not possible, to have a priority value. If there is a lower value, which is not used in one of the routes of the route set. E.g. in case of deleting a signRouteNePart instance whose priority value is not equal to the priority of at least one of the remaining signRouteNeParts contained in the same signRouteSetNePart, the priority values of the remaining instances have to be decremented by one (see also example in table below).

What kind of priority gap behaviour is performed by the switch is to be derived from the combination of the values of the attributes vendorName and version of the managedSwitchingElement.

This attribute is writable only together with the attribute priorityMode.";;

REGISTERED AS { mtpAttribute 14 };

inClsLoadsharingAlgorithm ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.InClsLoadsharingAlgorithm;
BEHAVIOUR inClsLoadsharingAlgorithmBehaviour BEHAVIOUR
DEFINED AS

"This attribute represents the over- and in-link set loadsharing algorithm within a combined link set.";;

REGISTERED AS { mtpAttribute 15 };

initialLevelOfCongestion ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.InitialLevelOfCongestion;
BEHAVIOUR initialLevelOfCongestionBehaviour BEHAVIOUR DEFINED AS

"This attribute represents the initial level of congestion.";;

REGISTERED AS { mtpAttribute 16 };

inLsLoadShareAlgorithm ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.InLsLoadShareAlgorithm;
BEHAVIOUR inLsLoadShareAlgorithmBehaviour BEHAVIOUR DEFINED AS
"The inLsLoadShareAlgorithm specifies a registered, vendor-specific within-linkset loadsharing algorithm.";;
REGISTERED AS { mtpAttribute 17 };

l2TimerT1 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT1;
BEHAVIOUR l2TimerT1Behaviour BEHAVIOUR
DEFINED AS
"Q.703: Level 2 timer 'Alignment ready'. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 18 };

l2TimerT2 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT2;
BEHAVIOUR l2TimerT2Behaviour BEHAVIOUR
DEFINED AS
"Q.703: Level 2 timer 'Not aligned'. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 19 };

l2TimerT3 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT3;
BEHAVIOUR l2TimerT3Behaviour BEHAVIOUR
DEFINED AS
"Q.703: Level 2 timer 'Aligned'. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 20 };

l2TimerT4E ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT4E;
BEHAVIOUR l2TimerT4eBehaviour BEHAVIOUR
DEFINED AS
"Q.703: Level 2 timer 'Proving period timer emergency'. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 21 };

l2TimerT4N ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT4N;
BEHAVIOUR l2TimerT4nBehaviour BEHAVIOUR
DEFINED AS
"Q.703: Level 2 timer 'Proving period timer normal'. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 22 };

l2TimerT5 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT5;
BEHAVIOUR l2TimerT5Behaviour BEHAVIOUR
DEFINED AS
"Q.703: Level 2 timer 'Sending SIB'. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 23 };

l2TimerT6 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT6;
BEHAVIOUR l2TimerT6Behaviour BEHAVIOUR
DEFINED AS
"Q.703: Level 2 timer 'Remote congestion'. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 24 };

l2TimerT7 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.L2TimerT7;
BEHAVIOUR l2TimerT7Behaviour BEHAVIOUR
DEFINED AS
"Q.703: Delay to avoid message mis-sequence on changeover. The unit for the INTEGER range is milliseconds.";;
REGISTERED AS { mtpAttribute 25 };

linkCongestionLevel ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CongestionLevel;
MATCHES FOR EQUALITY;
BEHAVIOUR linkCongestionLevelBehaviour BEHAVIOUR DEFINED AS
"This attribute is used to reflect link congestion, if multiple congestion levels are used. Its value in case of no congestion is 'none'. Its value can change from system inside.";;
REGISTERED AS { mtpAttribute 26 };

linkTPStatus ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.LinkTPStatus;
MATCHES FOR EQUALITY;
BEHAVIOUR linkTpStatusBehaviour BEHAVIOUR DEFINED AS
"The linkTpStatus contains the SS No. 7 functional statuses as described in Recommendation Q.704. Possible states indicated are local blocked, remote blocked, local inhibited, remote inhibited, failed and deactivated.";;
REGISTERED AS { mtpAttribute 27 };

loadsharingInformationRouteNePart ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.LoadsharingInformationRouteNePart;
BEHAVIOUR loadsharingInformationRouteNePartBehaviour BEHAVIOUR DEFINED AS
"This attribute contains specific information for target specific loadsharing via the current routes working on a route basis. This information can be used by e.g. the referenced mtpLoadsharingObjectFor-Route to execute the target specific loadsharing.";;
REGISTERED AS { mtpAttribute 28 };

loadsharingInformationRouteSetNePart ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.LoadsharingInformationRouteSetNePart;
BEHAVIOUR loadsharingInformationRouteSetNePartBehaviour BEHAVIOUR DEFINED AS
"This attribute contains specific information for target specific loadsharing via the current routes working on a routeset basis via the current routes. This information can be used by e.g. the referenced mtpLoadsharingObjectFor-RouteSet to execute the target specific loadsharing.";;
REGISTERED AS { mtpAttribute 29 };

loopDelay ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.LoopDelay;
MATCHES FOR EQUALITY;
BEHAVIOUR loopDelayBehaviour BEHAVIOUR DEFINED AS
"This attribute models loop delay.";;
REGISTERED AS { mtpAttribute 30 };

lsTimersProfileId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR lsTimersProfileIdBehaviour BEHAVIOUR DEFINED AS
"This attribute is used for naming instances.";;
REGISTERED AS { mtpAttribute 31 };

lsTimersProfileName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR lsTimersProfileNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the lsTimersProfile managed object class.";;
REGISTERED AS { mtpAttribute 32 };

lsTimersProfilePointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR lsTimersProfilePointerBehaviour BEHAVIOUR DEFINED AS
"This attribute to the instance of the class lsTimersProfile, containing the Q.704 timers for the signalling link set.";;
REGISTERED AS { mtpAttribute 33 };

managedSwitchingElementName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR managedSwitchingElementNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the managedSwitchingElement managed object class.";;
REGISTERED AS { mtpAttribute 34 };

maxCapacityLS ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CapacityLS;
REGISTERED AS { mtpAttribute 35 };

maxCapacitySL ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.CapacityLink;
REGISTERED AS { mtpAttribute 36 };

maxMSUsRetransN1 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.MaxMSUsRetransN1;
BEHAVIOUR maxMSUsRetransN1Behaviour BEHAVIOUR
DEFINED AS
"This attribute specifies the maximum number of MSUs which are available for retransmission (name in Q.703:N1).";
REGISTERED AS { mtpAttribute 37 };

maxOctRetransN2 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.MaxOctRetransN2;
BEHAVIOUR maxOctRetransN2Behaviour BEHAVIOUR DEFINED AS
"This attribute specifies the maximum number of octets, which are available for retransmission (Q.703: N2).";
REGISTERED AS { mtpAttribute 38 };

mtpAccessPointName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpAccessPointNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the mtpAccessPoint managed object class.";
REGISTERED AS { mtpAttribute 39 };

mtpL2ProtocolProfileId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpL2ProtocolProfileIdBehaviour BEHAVIOUR
DEFINED AS
"Identifies a mtpL2ProtocolProfile instance within the managedSwitching-element; this is an attribute type whose distinguished value can be used as an RDN when naming an instance of the mtpL2ProtocolProfile object class.";
REGISTERED AS { mtpAttribute 40 };

mtpL2ProtocolProfileName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpL2ProtocolProfileNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the mtpL2ProtocolProfile managed object class.";
REGISTERED AS { mtpAttribute 41 };

mtpL2ProtocolProfilePointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpL2ProtocolProfilePointerBehaviour BEHAVIOUR
DEFINED AS
"Identifies an mtpL2ProtocolProfile instance.";
REGISTERED AS { mtpAttribute 42 };

mtpLevel3Id ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpLevel3IdBehaviour BEHAVIOUR DEFINED AS
"This attribute is used for naming instances.";
REGISTERED AS { mtpAttribute 43 };

mtpLevel3Name ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpLevel3NameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the mtpLevel3 managed object class.";
REGISTERED AS { mtpAttribute 44 };

mtpLoadsharingObjectForRouteNePartPointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpLoadsharingObjectForRouteNePartPointerBehaviour BEHAVIOUR DEFINED AS
"This attribute is used to reference implementation dependent loadsharing object class instances needed to model
implementation dependent mechanisms for loadsharing over linksets working on a route basis.";;
REGISTERED AS { mtpAttribute 45 };

mtpLoadsharingObjectForRouteSetNePartPointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpLoadsharingObjectForRouteSetNePartPointerBehaviour BEHAVIOUR DEFINED AS
"This attribute is used to reference implementation dependent loadsharing object class instances needed to model
implementation dependent mechanisms for loadsharing over linksets working on a routeset basis.";;
REGISTERED AS { mtpAttribute 46 };

mtpSignPointId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpSignPointIdBehaviour BEHAVIOUR DEFINED AS
"This attribute is used for naming instances.";;
REGISTERED AS { mtpAttribute 47 };

mtpSignPointName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpSignPointNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the mtpSignPoint managed object class.";;
REGISTERED AS { mtpAttribute 48 };

networkIndicator ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NetworkIndicator;
MATCHES FOR EQUALITY;
BEHAVIOUR networkIndicatorBehaviour BEHAVIOUR DEFINED AS
"This attribute models the network indicator of the network the signalling point belongs to.";;
REGISTERED AS { mtpAttribute 49 };

numberOfCongestionStates ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NumCongStates;
MATCHES FOR EQUALITY;
BEHAVIOUR numberOfCongestionStatesBehaviour BEHAVIOUR DEFINED AS
"This attribute specifies the number of congestion states used in the 'multiple link congestion states without
congestion priority' mechanism as described in 3.8.2.3/Q.704.";;
REGISTERED AS { mtpAttribute 50 };

numberOfNormallyActiveSignLinksTps ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NumberOfNormallyActiveSignLinksTps;
MATCHES FOR EQUALITY;
BEHAVIOUR numberOfNormallyActiveSignLinksTpsBehaviour BEHAVIOUR DEFINED AS
"This attribute represents the number of normally active signalling links in a link set, as defined in
clause 12/Q.704.";;
REGISTERED AS { mtpAttribute 51 };

numberOfThresholdLevels ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NumberOfThresholdLevels;
BEHAVIOUR numberOfThresholdsLevelsBehaviour BEHAVIOUR DEFINED AS
"This attribute equals the number of threshold levels that are used for congestion control.";;
REGISTERED AS { mtpAttribute 52 };

opc ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PointCode;
MATCHES FOR EQUALITY;
BEHAVIOUR opcBehaviour BEHAVIOUR DEFINED AS
"This attribute represents the pointcode of an SP from which a certain message has been originated.";;
REGISTERED AS { mtpAttribute 53 };

periodicLinkTestFlag ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PeriodicLinkTestFlag;

BEHAVIOUR periodicLinkTestFlagBehaviour BEHAVIOUR DEFINED AS

"This attribute indicates whether the periodical signalling link test procedure of Recommendation Q.707 is applied to a link set.";;

REGISTERED AS { mtpAttribute 54 };

pointCode ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PointCode;

MATCHES FOR EQUALITY;

BEHAVIOUR pointCodeBehaviour BEHAVIOUR DEFINED AS

"This attribute represents the pointcode of a certain SP.";;

REGISTERED AS { mtpAttribute 55 };

priorityMode ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PriorityMode;

BEHAVIOUR priorityModeBehaviour BEHAVIOUR DEFINED AS

"This attribute is necessary in case of creating a signRouteNePart instance or modifying its priority attribute. It describes the influence of the management action on the priority attributes of other signRouteNePart instances contained in the same signRouteSetNePart.

This attribute is only writable, and this only together with the writing of attribute flexiblePriority.

The meanings of the attribute values are:

EQUAL: If by modifying the priority with priorityMode 'EQUAL' a 'priority gap' would come into existence, then for the priorities of all created signRouteNePart instances from the same signRouteSetNePart with priorities lower than the 'gap priority' the priority value has to be decremented by one.

INSERT: Priority values of all created signRouteNePart instances from the same signRouteSetNePart with equal or lower priorities are incremented by one.

EXCHANGE_SINGLE: The priority values of all created signRouteNePart instances from the same signRouteSetNePart which have the specified 'target' priority value, are exchanged for the last ('starting') priority value of the specified signRouteNePart instance.

EXCHANGE_GROUP: The priority values of all created signRouteNePart instances from the same signRouteSetNePart which have the specified 'target' priority value, are exchanged for the last ('starting') priority value of the specified signRouteNePart instance. Additionally the priority values of all created signRouteNePart instances from the same signRouteSetNePart, which have the same value as the 'starting' priority value of the specified signRouteNePart instance, are changed to the 'target' value.";;

REGISTERED AS { mtpAttribute 56 };

q704-t1 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t1Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T1 'Delay to avoid message mis-sequencing on changeover from this link' defined in Recommendation Q.704. The value range is from 500 to 1200 ms. For routes with long propagation delays a minimum value of 800 ms is used. The same value applies for all links associated with an instance of the procedure.";;

REGISTERED AS { mtpAttribute 57 };

q704-t2 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t2Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T2 'Waiting for changeover acknowledgement' defined in Recommendation Q.704. The value range is from 700 to 2000 ms. For routes with long propagation delays a minimum value of 1400 ms is used.";;

REGISTERED AS { mtpAttribute 58 };

q704-t3 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t3Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T3 'Time controlled diversion-delay to avoid mis-sequencing on changeback from this link' defined in Recommendation Q.704. The value range is from 500 to 1200 ms. For routes with long propagation delays a minimum value of 800 ms is used. The value of this attribute is network implementation dependent.";;

REGISTERED AS { mtpAttribute 59 };

q704-t4 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t4Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T4 'Waiting for changeback acknowledgement (first attempt)' defined in Recommendation Q.704. The value range is from 500 to 1200 ms. For routes with long propagation delays a minimum value of 800 ms is used.";;

REGISTERED AS { mtpAttribute 60 };

q704-t5 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t5Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T5 'Waiting for changeback acknowledgement (second attempt)' defined in Recommendation Q.704. The value range is from 500 to 1200 ms. For routes with long propagation delays a minimum value of 800 ms is used.";;

REGISTERED AS { mtpAttribute 61 };

q704-t6 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t6Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T6 'Delay to avoid message mis-sequencing on controlled rerouting' defined in Recommendation Q.704. The value range is from 500 to 1200 ms. For routes with long propagation delays a minimum value of 800 ms is used.";;

REGISTERED AS { mtpAttribute 62 };

q704-t7 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t7Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T7 'Waiting for signalling data link connection acknowledgement' defined in Recommendation Q.704. The value range is from 1 to 2 seconds.";;

REGISTERED AS { mtpAttribute 63 };

q704-t8 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t8Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T8 'Transfer prohibited inhibition timer (transient solution)' defined in Recommendation Q.704. The value range is from 800 to 1200 ms.";;

REGISTERED AS { mtpAttribute 64 };

q704-t10 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t10Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T10 'Waiting to repeat signalling route set test message' defined in Recommendation Q.704. The value range is from 30 to 60 seconds. The maximum value may be extended at the discretion of the management function in certain situations, e.g. many signalling points being unavailable or signalling points of known long term unavailability.";;

REGISTERED AS { mtpAttribute 65 };

q704-t11 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t11Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T11 'Transfer restricted timer' defined in Recommendation Q.704. The value range is from 30 to 90 seconds. This is one way of implementing the function described in 13.4/Q.704 and mainly intended to simplify STPs.";;

REGISTERED AS { mtpAttribute 66 };

q704-t12 ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;

BEHAVIOUR q704-t12Behaviour BEHAVIOUR DEFINED AS

"This attribute defines the initial timer value of timer T12 'Waiting for uninhibit acknowledgement' defined in Recommendation Q.704. The value range is from 800 to 1500 ms.";;

REGISTERED AS { mtpAttribute 67 };

q704-t13 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t13Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T13 'Waiting for force uninhibit' defined in Recommendation Q.704. The value range is from 800 to 1500 ms.";;
REGISTERED AS { mtpAttribute 68 };

q704-t14 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t14Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T14 'Waiting for inhibition acknowledgement' defined in Recommendation Q.704. The value range is from 2 to 3 seconds.";;
REGISTERED AS { mtpAttribute 69 };

q704-t15 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t15Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T15 'Waiting to start signalling route set congestion test' defined in Recommendation Q.704. The value range is from 2 to 3 seconds.";;
REGISTERED AS { mtpAttribute 70 };

q704-t16 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t16Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T16 'Waiting for route set congestion status update' defined in Recommendation Q.704. The value range is from 1.4 to 2 seconds.";;
REGISTERED AS { mtpAttribute 71 };

q704-t17 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t17Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T17 'Delay to avoid oscillation of initial alignment failure and link restart' defined in Recommendation Q.704. The value range is from 800 to 1500 ms. The value should be less than the corresponding timer 2 in 12.2.1.2/Q.703.";;
REGISTERED AS { mtpAttribute 72 };

q704-t18 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t18Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T18 defined in Recommendation Q.704. T18 is the Timer within a signalling point whose MTP restarts, for supervising link and linkset activation as well as the receipt of routing information. The value is implementation and network dependent. Criteria to choose T18 are given in 9.2/Q.704.";;
REGISTERED AS { mtpAttribute 73 };

q704-t19 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t19Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T19 'Supervision timer during MTP restart to avoid possible ping-pong of TFP, TFR and TRA messages.' defined in Recommendation Q.704. The value range is from 67 to 69 seconds.";;
REGISTERED AS { mtpAttribute 74 };

q704-t20 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t20Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T20 'Overall MTP restart timer at the signalling point whose MTP restarts.' defined in Recommendation Q.704. The value range is from 59 to 61 seconds.";;
REGISTERED AS { mtpAttribute 75 };

q704-t21 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t21Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T21 'Overall MTP restart timer at a signalling point adjacent to one whose MTP restarts.' defined in Recommendation Q.704. The value range is from 63 to 65 seconds.";;
REGISTERED AS { mtpAttribute 76 };

q704-t22 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t22Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T22 'Local inhibit test timer' defined in Recommendation Q.704. The value range is from 3 to 6 minutes (provisional value).";;
REGISTERED AS { mtpAttribute 77 };

q704-t23 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t23Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T23 'Remote inhibit test timer' defined in Recommendation Q.704. The value range is from 3 to 6 minutes (provisional value).";;
REGISTERED AS { mtpAttribute 78 };

q704-t24 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q704-t24Behaviour BEHAVIOUR DEFINED AS
"This attribute defines the initial timer value of timer T24 'Stabilising timer after removal of local processor outage, used in LPO latching to RPO (national option)' defined in Recommendation Q.704. The value is 500 ms (provisional value).";;
REGISTERED AS { mtpAttribute 79 };

q707-t1 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q707-t1Behaviour BEHAVIOUR DEFINED AS
"This attribute defines a timer value of timer T1 which is defined in Recommendation Q.707.";;
REGISTERED AS { mtpAttribute 80 };

q707-t2 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR q707-t2Behaviour BEHAVIOUR DEFINED AS
"This attribute defines a timer value of timer T2 which is defined in Recommendation Q.707.";;
REGISTERED AS { mtpAttribute 81 };

receiveCongestionThresholdAbatement ATTRIBUTE
WITH ATTRIBUTE SYNTAX
MTPDefinedTypesModule.ReceiveCongestionThresholdAbatement;
BEHAVIOUR receiveCongestionThresholdAbatementBehaviour BEHAVIOUR DEFINED AS
"If the number of MSUs in the reception buffer gets smaller than this number, Level 2 flow control measures end. The value has to be smaller than the respective congestion onset threshold.";;
REGISTERED AS { mtpAttribute 82 };

receiveCongestionThresholdOnset ATTRIBUTE
WITH ATTRIBUTE SYNTAX
MTPDefinedTypesModule.ReceiveCongestionThresholdOnset;
BEHAVIOUR receiveCongestionThresholdOnsetBehaviour BEHAVIOUR DEFINED AS
"If the number of MSUs in the reception buffer gets bigger than this value, Level 2 flow control measures begin. MSUs are still accepted.";;
REGISTERED AS { mtpAttribute 83 };

relatedLinkGroupNumber ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.RelatedLinkGroupNumber;
BEHAVIOUR relatedLinkGroupNumberBehaviour BEHAVIOUR DEFINED AS
"This attribute identifies the link group which the signalling link belongs to.";;
REGISTERED AS { mtpAttribute 84 };

remoteExchangeLabel ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.RemoteExchangeLabel;
MATCHES FOR EQUALITY;
BEHAVIOUR remoteExchangeLabelBehaviour BEHAVIOUR DEFINED AS
 "This attribute specifies the remote exchange which contains the mtpSignPoint with the point code equal to the
 signRouteSetNePartId.";;
REGISTERED AS { mtpAttribute 85 };

screeningByLinkSetOrByOpc ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.ScreeningByLinkSetOrByOpc;
BEHAVIOUR screeningByLinkSetOrByOpcBehaviour BEHAVIOUR DEFINED AS
 "This attribute defines which of the different options of 8.2/Q.705 are used for identifying unauthorized SS No. 7
 messages.";;
REGISTERED AS { mtpAttribute 86 };

signDataLinkTpId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR signDataLinkTpIdBehaviour BEHAVIOUR DEFINED AS
 "This attribute is used for naming instances.";;
REGISTERED AS { mtpAttribute 87 };

signDataLinkTpList ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PointerList;
MATCHES FOR EQUALITY;
BEHAVIOUR signDataLinkTpListBehaviour BEHAVIOUR DEFINED AS
 "This attribute lists the signDataLink instances that can be used for dynamical allocation to the signLinkTp.";;
REGISTERED AS { mtpAttribute 88 };

signDataLinkTpName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR signDataLinkTpNameBehaviour BEHAVIOUR DEFINED AS
 "This attribute is an additional name for instances of the signDataLinkTp managed object class.";;
REGISTERED AS { mtpAttribute 89 };

signDataLinkTpPointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer
MATCHES FOR EQUALITY;
BEHAVIOUR signDataLinkTpPointerBehaviour BEHAVIOUR DEFINED AS
 "This attribute references a particular signDataLinkTp instance. The following restriction applies to this attribute:
 modification is only allowed if the administrative state of the instance that contains this attribute is 'locked'.";;
REGISTERED AS { mtpAttribute 90 };

signLinkSetTpId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR signLinkSetTpIdBehaviour BEHAVIOUR DEFINED AS
 "This attribute is used for naming instances.";;
REGISTERED AS { mtpAttribute 91 };

signLinkSetTpName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR signLinkSetTpNameBehaviour BEHAVIOUR DEFINED AS
 "This attribute is an additional name for instances of the signLinkSetTp managed object class.";;
REGISTERED AS { mtpAttribute 92 };

signLinkSetTpPointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR signLinkSetTpPointerBehaviour BEHAVIOUR DEFINED AS
 "References the signLinkSetTp which is intended to be used as first segment of the succession of linksets, which
 form the signalling route on the network level.
 If during creation of a signRouteNePart instance the value of this attribute is referencing a signLinkSetTp instance,
 which is not created or is already referenced by a signRouteNePart of the same signRouteSetNePart, then the
 creation of the signRouteNePart is rejected and not carried out.
 It is not allowed to reference a signLinksetTp, which is not contained in the same mtpSignPoint as the
 signRouteSetNePart where the signRouteNePart is contained in.";;
REGISTERED AS { mtpAttribute 93 };

signLinkTpName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR signLinkTpNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the signLinkTp managed object class.";;
REGISTERED AS { mtpAttribute 94 };

signLinkTpPointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR signLinkTpPointerBehaviour BEHAVIOUR DEFINED AS
"This attribute identifies the signalling link termination point that uses this particular signalling data link.";;
REGISTERED AS { mtpAttribute 95 };

signRouteNePartId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR signRouteNePartIdBehaviour BEHAVIOUR DEFINED AS
"This is the naming attribute of signRouteNePart. It identifies a signRouteNePart instance within the signRouteSetNePart.";;
REGISTERED AS { mtpAttribute 96 };

signRouteNePartName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR signRouteNePartNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the signRouteNePart managed object class.";;
REGISTERED AS { mtpAttribute 97 };

signRouteSetNePartId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR signRouteSetNePartIdBehaviour BEHAVIOUR DEFINED AS
"This is the naming attribute of signRouteSetNePart. It identifies a signRouteSetNePart instance within the mtpSignPoint and equals the signalling point code of the respective destination signalling point.";;
REGISTERED AS { mtpAttribute 98 };

signRouteSetNePartName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR signRouteSetNePartNameBehaviour BEHAVIOUR DEFINED AS
"Identifies a signRouteSetNePart instance within the managed object class; its value is unique within the signRouteSetNePart object class. In this attribute implementation or administration dependent information - like used for naming schemes - can be stored. If at creation time the value of this attribute given for the instance to be created already exists in another signRouteNePart instance, then the creation is rejected and not carried out.";;
REGISTERED AS { mtpAttribute 99 };

signTermId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR signTermIdBehaviour BEHAVIOUR DEFINED AS
"This attribute is used for naming instances.";;
REGISTERED AS { mtpAttribute 100 };

signTermList ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.PointerList;
BEHAVIOUR signTermListBehaviour BEHAVIOUR DEFINED AS
"This attribute lists the signTerm instances that can be used for dynamical allocation to the signLinkTp.";;
REGISTERED AS { mtpAttribute 101 };

signTermName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR signTermNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the signTerm managed object class.";;
REGISTERED AS { mtpAttribute 102 };

signTermPointer ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
 MATCHES FOR EQUALITY;
 BEHAVIOUR signTermPointerBehaviour BEHAVIOUR DEFINED AS
 "This attribute identifies a particular signTerm instance.";;
 REGISTERED AS { mtpAttribute 103 };

slCode ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.SlCode;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slCodeBehaviour BEHAVIOUR DEFINED AS
 "If one SLC has been assigned, it should be checked that this SLC will not be assigned again.";;
 REGISTERED AS { mtpAttribute 104 };

slsCodeCurrentList ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.SLSCodeCurrentList;
 MATCHES FOR SET-INTERSECTION;
 BEHAVIOUR slsCodeCurrentListBehaviour BEHAVIOUR DEFINED AS
 "This attribute indicates, which SLSs are currently assigned to this signLinkTp. It has to be ensured, that all SLSs are covered and no SLS exists more than one time within the slsCodeCurrentList attributes of the signLinkTp instances contained within one signLinkSetTp. The content of this attribute can be different from that of the attribute slsCodeNormalList. This attribute can be changed from system inside.";;
 REGISTERED AS { mtpAttribute 105 };

slsCodeNormalList ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.SlsCodeNormalList;
 MATCHES FOR SET-INTERSECTION;
 BEHAVIOUR slsCodeNormalListBehaviour BEHAVIOUR DEFINED AS
 "This attribute indicates, which SLSs are administratively assigned to this signLinkTp for the case of normal operation.";;
 REGISTERED AS { mtpAttribute 106 };

slsList ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.SlsCodeList;
 BEHAVIOUR slsListBehaviour BEHAVIOUR DEFINED AS
 "This attribute has to be used if loadsharing over link sets toward a specific destination is done. It indicates which SLSs are assigned to this signRouteNePart, in case it is a current route (i.e. the messages with these SLSs are sent over the allocated link set).
 It has to be ensured that all SLSs are covered and no SLS exists more than one time within the slsList attributes of the current routes.
 The attribute can be written from system inside.";;
 REGISTERED AS { mtpAttribute 107 };

slTimersProfileId ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slTimersProfileIdBehaviour BEHAVIOUR DEFINED AS
 "This attribute is used for naming instances.";;
 REGISTERED AS { mtpAttribute 108 };

slTimersProfileName ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slTimersProfileNameBehaviour BEHAVIOUR DEFINED AS
 "This attribute is an additional name for instances of the slTimersProfile managed object class.";;
 REGISTERED AS { mtpAttribute 109 };

slTimersProfilePointer ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slTimersProfilePointerBehaviour BEHAVIOUR DEFINED AS
 "This attribute points to the instance of the class slTimersProfile, containing the Q.704 timers for the signalling link.";;
 REGISTERED AS { mtpAttribute 110 };

spTimersProfileId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR spTimersProfileIdBehaviour BEHAVIOUR DEFINED AS
"This attribute is used for naming instances.";;
REGISTERED AS { mtpAttribute 111 };

spTimersProfileName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR spTimersProfileNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the spTimersProfile managed object class.";;
REGISTERED AS { mtpAttribute 112 };

spTimersProfilePointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Pointer;
MATCHES FOR EQUALITY;
BEHAVIOUR spTimersProfilePointerBehaviour BEHAVIOUR DEFINED AS
"This attribute points to the instance of the class spTimersProfile, containing the Q.704 and Q.707 timers for the signalling point.";;
REGISTERED AS { mtpAttribute 113 };

spType ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.SpType;
MATCHES FOR EQUALITY;
BEHAVIOUR spTypeBehaviour BEHAVIOUR DEFINED AS
"This attribute represents the SP-type: SEP, STEP or STP.";;
REGISTERED AS { mtpAttribute 114 };

stmChannel ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.StmChannel;
MATCHES FOR EQUALITY;
BEHAVIOUR stmChannelBehaviour BEHAVIOUR DEFINED AS
"This attribute denotes the STM channel which defines the signalling datalink on the PCM transmission system.";;
REGISTERED AS { mtpAttribute 115 };

stpScreeningTableListMode ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.StpScreeningTableListMode;
BEHAVIOUR stpScreeningTableListModeBehaviour BEHAVIOUR DEFINED AS
"The stpScreeningTableListMode attribute indicates whether the STP access is allowed or not by the designated combinations contained in the subordinate stpScreeningTableLine's (see 8.2/Q.705).
TRUE: STP access allowed
FALSE: STP access inhibited.";;
REGISTERED AS { mtpAttribute 116 };

stpScreeningTableId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR stpScreeningTableIdBehaviour BEHAVIOUR DEFINED AS
"The STP Screening Table Id is an attribute used for naming purposes.";;
REGISTERED AS { mtpAttribute 117 };

stpScreeningTableLineContent ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.StpScreeningTableLineContent;
BEHAVIOUR stpScreeningTableLineContentBehaviour BEHAVIOUR DEFINED AS
"The stpScreeningTableLineContent attribute represents the content of one line of the STP ScreeningTable. The content consists of elements indicating the designated DPCs which are to be screened in combination with the OPC or linkset given by the stpScreeningTableLineId and an indication how a message fulfilling such a combination is to be treated.";;
REGISTERED AS { mtpAttribute 118 };

stpScreeningTableLineId ATTRIBUTE
MATCHES FOR EQUALITY;
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.StpScreeningTableLineId;
BEHAVIOUR stpScreeningTableLineIdBehaviour BEHAVIOUR DEFINED AS
"The stpScreeningTableLineId is an attribute used for naming purposes. Depending on the value of attribute screeningByLinkSetOrByDpc of the superior stpScreeningTable instance it represents the OPC or linkset which is designated to be screened for STP traffic.";;
REGISTERED AS { mtpAttribute 119 };

stpScreeningTableLineName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR stpScreeningTableLineNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the stpScreeningTableLine managed object class.";;
REGISTERED AS { mtpAttribute 120 };

stpScreeningTableName ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR stpScreeningTableNameBehaviour BEHAVIOUR DEFINED AS
"This attribute is an additional name for instances of the stpScreeningTable managed object class.";;
REGISTERED AS { mtpAttribute 121 };

timerTx ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
MATCHES FOR EQUALITY;
BEHAVIOUR timerTxBehaviour BEHAVIOUR DEFINED AS
"This attribute identifies the Tx timer value for the 'multiple link congestion states without congestion priority'
mechanism as described in 3.8.2.3/Q.704.";;
REGISTERED AS { mtpAttribute 122 };

timerTy ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimerValue;
BEHAVIOUR timerTyBehaviour BEHAVIOUR DEFINED AS
"This attribute identifies the Ty timer value for the 'multiple link congestion states without congestion priority'
mechanism as described in 3.8.2.3/Q.704.";;
REGISTERED AS { mtpAttribute 123 };

transmissionCongestionThresholdAbatementLevel1 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdAbatementLevel1;
BEHAVIOUR transmissionCongestionThresholdAbatementLevel1Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transmission / retransmission buffer gets smaller than this number, Level 2 flow
control measures end. The value has to be smaller than the respective congestion onset threshold.";;
REGISTERED AS { mtpAttribute 124 };

transmissionCongestionThresholdAbatementLevel2 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdAbatementLevel2;
BEHAVIOUR transmissionCongestionThresholdAbatementLevel2Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transm./retransm. buffer of a link in the congestionLevel 2 gets smaller than this
number, the resp. link is not any more in congestionLevel 2. CongestionLevel 2 measures end. The value has to
be smaller than the respective congestion onset threshold.";;
REGISTERED AS { mtpAttribute 125 };

transmissionCongestionThresholdAbatementLevel3 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdAbatementLevel3;
BEHAVIOUR transmissionCongestionThresholdAbatementLevel3Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transm./retransm. buffer of a link in the congestionLevel 3 gets smaller than this
number, the resp. link is not any more in congestionLevel 3. CongestionLevel 3 measures end. The value has to
be smaller than the respective congestion onset threshold.";;
REGISTERED AS { mtpAttribute 126 };

transmissionCongestionThresholdDiscardLevel1 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdDiscardLevel1;
BEHAVIOUR transmissionCongestionThresholdDiscardLevel1Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transmission / retransmission buffer of a link in the congestion level 1 gets bigger than this number, MSUs are discarded (this threshold equals the respective buffer size). The value has to be bigger than the respective congestion onset threshold.";;
REGISTERED AS { mtpAttribute 127 };

transmissionCongestionThresholdDiscardLevel2 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdDiscardLevel2;
BEHAVIOUR transmissionCongestionThresholdDiscardLevel2Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transm./retransm. buffer of a link in the congestion level 2 gets bigger than this number, MSUs are discarded (this threshold equals the respective buffer size). The value has to be bigger than the respective congestion onset threshold.";;
REGISTERED AS { mtpAttribute 128 };

transmissionCongestionThresholdDiscardLevel3 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdDiscardLevel3;
BEHAVIOUR transmissionCongestionThresholdDiscardLevel3Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transmission / retransmission buffer of a link in the congestion level 3 gets bigger than this number, MSUs are discarded (this threshold equals the respective buffer size). The value has to be bigger than the respective congestion onset threshold.";;
REGISTERED AS { mtpAttribute 129 };

transmissionCongestionThresholdOnsetLevel1 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdOnsetLevel1;
BEHAVIOUR transmissionCongestionThresholdOnsetLevel1Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transmission / retransmission buffer gets bigger than this value, the respective link is congested in congestionLevel 1. CongestionLevel 1 measures start.";;
REGISTERED AS { mtpAttribute 130 };

transmissionCongestionThresholdOnsetLevel2 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdOnsetLevel2;
BEHAVIOUR transmissionCongestionThresholdOnsetLevel2Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transmission / retransmission buffer gets bigger than this value, the respective link is congested in congestionLevel 2. CongestionLevel 2 measures start.";;
REGISTERED AS { mtpAttribute 131 };

transmissionCongestionThresholdOnsetLevel3 ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.
TransmissionCongestionThresholdOnsetLevel3;
BEHAVIOUR transmissionCongestionThresholdOnsetLevel3Behaviour BEHAVIOUR
DEFINED AS
"If the number of MSUs in the transmission / retransmission buffer gets bigger than this value, the respective link is congested in congestionLevel 3. CongestionLevel 3 measures start.";;
REGISTERED AS { mtpAttribute 132 };

transmissionRate ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TransmissionRate;
MATCHES FOR EQUALITY;
BEHAVIOUR transmissionRateBehaviour BEHAVIOUR DEFINED AS
"This attribute represents the transmissionRate and implies the transmissionType (i.e. 56 and 64 kbits imply digital, 4.8 kbits implies analog transmission).";;
REGISTERED AS { mtpAttribute 133 };

treatmentOfOutsideRanges ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TreatmentOf;
BEHAVIOUR treatmentOfOutsideRangesBehaviour BEHAVIOUR DEFINED AS
 "The treatmentOfOutsideRanges attribute specifies the treatment of the messages outside the designated ranges given the stpScreeningTable managed object (see 8.3/Q.705, part two).
 normal : allow all STP messages outside the designated ranges
 discard : discard all STP messages outside the designated ranges.";;
REGISTERED AS { mtpAttribute 134 };

7.5 Action definitions

getScreenedOpcsOrLinkSetsByDpc ACTION
BEHAVIOUR getScreenedOpcsOrLinkSetsByDpcBehaviour BEHAVIOUR DEFINED AS
 "This action gets all OPCs or linksets (depending on the value of the screeningByLinkSetOrByOPC attribute) together with their respective messageTreatments which are screened in combination with a specific DPC within all the stpScreeningTableLineContents of all stpScreeningTableLine's contained in the stpScreeningTable.
 The resulting list in the reply is empty, if no OPC or Linkset within all the stpScreeningTableLine (Contents of all stpScreeningTableLine's contained in the stpScreeningTable is screened in combination with the DPC - given in the information syntax), or if no stpScreeningTableLine contained in the stpScreeningTable does exist.";;
MODE CONFIRMED;
WITH INFORMATION SYNTAX MTPDefinedTypesModule.SpecificDpc
WITH REPLY SYNTAX MTPDefinedTypesModule.ScreenedOpcsOrLinkSetsList;
REGISTERED AS { mtpAction 1 };

localInhibit ACTION
BEHAVIOUR localInhibitBehaviour BEHAVIOUR DEFINED AS
 "This action inhibits the signalling link termination point. If the inhibition procedure completes successfully the linkTpStatus contains localInhibit. This action is not performed if the linkTpStatus contains localInhibit.";;
MODE CONFIRMED;
WITH REPLY SYNTAX MTPDefinedTypesModule.ResultOfAction;
REGISTERED AS { mtpAction 2 };

localUninhibit ACTION
BEHAVIOUR localUninhibitBehaviour BEHAVIOUR DEFINED AS
 "This action uninhibits the signalling link termination point. If the uninhibition procedure completes successfully the localInhibit is removed from linkTpStatus. This action is not performed if the linkTpStatus does not contain localInhibit.";;
MODE CONFIRMED;
WITH REPLY SYNTAX MTPDefinedTypesModule.ResultOfAction;
REGISTERED AS { mtpAction 3 };

replaceSignTerm ACTION
BEHAVIOUR replaceSignTermBehaviour BEHAVIOUR DEFINED AS
 "This action replaces the signalling terminal in a signalling link termination point. This action is not performed if:
 i) the signTermPointer does not reference a signTerm
 or ii) the new signTerm does not exist
 or iii) the signTerm is already referenced by the link
 or iv) the linkTpStatus does not contain the values 'deactivated' or 'failed'.
 If the action has been successful, the signTermPointer has the value of the signTermId given in the information syntax; otherwise the pointer value remains unchanged.";;
MODE CONFIRMED;
WITH INFORMATION SYNTAX MTPDefinedTypesModule.Pointer;
WITH REPLY SYNTAX MTPDefinedTypesModule.ResultOfAction;
REGISTERED AS { mtpAction 4 };

signLinkTest ACTION
BEHAVIOUR signLinkTestBehaviour BEHAVIOUR DEFINED AS
 "This test is performed to analyse the signalling link.";;
WITH REPLY SYNTAX MTPDefinedTypesModule.ResultOfAction;
REGISTERED AS { mtpAction 5 };

7.6 Notification definitions

mtpRestarting NOTIFICATION

WITH INFORMATION SYNTAX MTPDefinedTypesModule.MtpRestarting;

REGISTERED AS { mtpNotification 1 };

ss7OnOccEvent NOTIFICATION

BEHAVIOUR ss7OnOccEventBhv BEHAVIOUR DEFINED AS

"This notification is used to report the Q.752 on-occurrence measurement results and other MTP events, which are not reported as a communication alarm.";;

WITH INFORMATION SYNTAX MTPDefinedTypesModule.SS7OnOccEventInfo;

REGISTERED AS { mtpNotification 2 };

7.7 Naming binding definitions

Naming is specified by *structure rules* and *name bindings*. The structure rules define the distinguished names that the managed objects shall have and the ways in which the objects are related to one another in the Management Information Tree (MIT).

Each structure rule defines a sequence of name bindings. The name binding selects the attribute to be used in the relative distinguished name of an object. The structure rule herewith selects all the attributes to be used in the distinguished name of an object.

For the labels that are used for the name binding templates, the convention "superiorClass-subordinateClass" is followed.

managedSwitchingElement-mtpSignPoint NAME BINDING

SUBORDINATE OBJECT CLASS mtpSignPoint;

NAMED BY

SUPERIOR OBJECT CLASS managedSwitchingElement;

WITH ATTRIBUTE mtpSignPointId;

BEHAVIOUR managedSwitchingElement-mtpSignPointBehaviour BEHAVIOUR DEFINED AS

"An mtpSignPoint can be created by an operator or automatically.

In case the spTimersProfilePackage is used, a create or set request is rejected, if

i) the spTimersProfilePointer does not reference an spTimersProfile

OR ii) the spTimersProfilePointer would reference an instance which does not exist

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

An mtpSignPoint can be deleted if and only if it does not contain any other managed object class instances, except for contained measurements.";;

CREATE;

DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { mtpNameBinding 1 };

mtpSignPoint-signRouteSetNePart NAME BINDING

SUBORDINATE OBJECT CLASS signRouteSetNePart;

NAMED BY

SUPERIOR OBJECT CLASS mtpSignPoint;

WITH ATTRIBUTE signRouteSetNePartId;

BEHAVIOUR mtpSignPoint-signRouteSetNePartBehaviour BEHAVIOUR DEFINED AS

"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

A delete request is rejected, if the administrativeState of the signRouteSetNePart does not equal locked.";;

CREATE;

DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { mtpNameBinding 2 };

signRouteSetNePart-signRouteNePart NAME BINDING

SUBORDINATE OBJECT CLASS signRouteNePart;
NAMED BY
SUPERIOR OBJECT CLASS signRouteSetNePart;
WITH ATTRIBUTE signRouteNePartId;
BEHAVIOUR signRouteSetNePart-signRouteNePartBehaviour **BEHAVIOUR DEFINED AS**
"A create request is rejected, if the signLinkSetTpPointer would reference an instance, which
i) does not belong to the signLinkSetTp object class
OR ii) does not exist
OR iii) is not contained in the same mtpSignPoint as the signRouteNePart
OR iv) is already referenced by a signRouteNePart contained within the same signRouteSetNePart

A delete request is rejected if its administrativeState does not equal locked.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 3 };

signLinkSetTp-signLinkTp NAME BINDING

SUBORDINATE OBJECT CLASS signLinkTp **AND SUBCLASSES;**
NAMED BY
SUPERIOR OBJECT CLASS signLinkSetTp;
WITH ATTRIBUTE slCode;
BEHAVIOUR signLinkSetTp-signLinkTpBehaviour **BEHAVIOUR DEFINED AS**
"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 4 };

mtpSignPoint-mtpAccessPoint NAME BINDING

SUBORDINATE OBJECT CLASS mtpAccessPoint;
NAMED BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.723 (1993) | ISO/IEC 10165-5 : 1993":sapId;
BEHAVIOUR mtpSignPoint-mtpAccessPointBehaviour **BEHAVIOUR DEFINED AS**
"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 5 };

mtpSignPoint-mtpLevel3 NAME BINDING

SUBORDINATE OBJECT CLASS mtpLevel3;
NAMED BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE mtpLevel3Id;
BEHAVIOUR mtpSignPoint-mtpLevel3Behaviour **BEHAVIOUR DEFINED AS**
"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.";;

CREATE;

DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { mtpNameBinding 6 };

mtpSignPoint-signDataLinkTp NAME BINDING

SUBORDINATE OBJECT CLASS signDataLinkTp;
NAMED BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE signDataLinkTpId;
BEHAVIOUR mtpSignPoint-signDataLinkTpBehaviour **BEHAVIOUR DEFINED AS**

"A create request is rejected if the equipmentPointer would reference equipment that does not exist.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.";;

CREATE;

DELETE;

WITH ATTRIBUTE signDataLinkId;

REGISTERED AS { mtpNameBinding 7 };

mtpSignPoint-signLinkSetTp NAME BINDING

SUBORDINATE OBJECT CLASS signLinkSetTp;

NAMED BY

SUPERIOR OBJECT CLASS mtpSignPoint;

WITH ATTRIBUTE signLinkId;

BEHAVIOUR mtpSignPoint-signLinkSetTpBehaviour BEHAVIOUR DEFINED AS

"A creation request is only successful if a signRouteSetNePart exists within the mtpSignPoint for the value of attribute adjPC

In case the lsTimersProfilePackage is used, create or set request is rejected, if

i) the lsTimersProfilePointer does not reference an lsTimersProfile

OR ii) the lsTimersProfilePointer would reference an instance which does not exist

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If it is tried to delete a signLinkSetTp, which is referenced by at least one signRouteNePart, the deletion of the signLinkSetTp is rejected and not carried out.";;

CREATE;

DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS { mtpNameBinding 8 };

managedSwitchingElement-signTerm NAME BINDING

SUBORDINATE OBJECT CLASS signTerm;

NAMED BY

SUPERIOR OBJECT CLASS managedSwitchingElement;

WITH ATTRIBUTE signTermId;

BEHAVIOUR managedSwitchingElement-signTermBehaviour BEHAVIOUR DEFINED AS

"A create request is rejected if the equipmentPointer would reference equipment that does not exist.

If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 9 };

mtpSignPoint-stpScreeningTable NAME BINDING

SUBORDINATE OBJECT CLASS stpScreeningTable;

NAMED BY

SUPERIOR OBJECT CLASS mtpSignPoint;

WITH ATTRIBUTE stpScreeningTableId;

BEHAVIOUR mtpSignPoint-stpScreeningTableBehaviour BEHAVIOUR DEFINED AS

"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

It is only allowed to delete an instance of this object class if its administrative state equals 'locked'.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 10 };

managedSwitchingElement-lsTimersProfile NAME BINDING

SUBORDINATE OBJECT CLASS lsTimersProfile;

NAMED BY

SUPERIOR OBJECT CLASS managedSwitchingElement;

WITH ATTRIBUTE lsTimersProfileId;

BEHAVIOUR managedSwitchingElement-lsTimersProfileBehaviour BEHAVIOUR DEFINED AS

"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an lsTimersProfile which is still referenced by a signLinkSetTp the delete request will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 11 };

managedSwitchingElement-mtpL2ProtocolProfile NAME BINDING

SUBORDINATE OBJECT CLASS mtpL2ProtocolProfile;

NAMED BY

SUPERIOR OBJECT CLASS managedSwitchingElement;

WITH ATTRIBUTE mtpL2ProtocolProfileId;

BEHAVIOUR managedSwitchingElement-mtpL2ProtocolProfileBehaviour BEHAVIOUR DEFINED AS

"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an mtpL2ProtocolProfile which is still referenced by a signLinkTP the delete request will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 12 };

managedSwitchingElement-slTimersProfile NAME BINDING

SUBORDINATE OBJECT CLASS slTimersProfile;

NAMED BY

SUPERIOR OBJECT CLASS managedSwitchingElement;

WITH ATTRIBUTE slTimersProfile Id;

BEHAVIOUR managedSwitchingElement-slTimersProfileBehaviour BEHAVIOUR DEFINED AS

"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an slTimersProfile which is still referenced by a signLinkTp the delete request will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 13 };

managedSwitchingElement-spTimersProfile NAME BINDING

SUBORDINATE OBJECT CLASS spTimersProfile;

NAMED BY

SUPERIOR OBJECT CLASS managedSwitchingElement;

WITH ATTRIBUTE spTimersProfileId;

BEHAVIOUR managedSwitchingElement-spTimersProfileBehaviour BEHAVIOUR DEFINED AS

"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected.

If an attempt is made to delete an spTimersProfile which is still referenced by an mtpSignPoint the delete request will be rejected.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 14 };

stpScreeningTable-stpScreeningTableLine NAME BINDING

SUBORDINATE OBJECT CLASS stpScreeningTableLine;

NAMED BY

SUPERIOR OBJECT CLASS stpScreeningTable;

WITH ATTRIBUTE stpScreeningTableLineId;

BEHAVIOUR stpScreeningTable-stpScreeningTableLineBehaviour BEHAVIOUR DEFINED AS

"If the name package is supported: a create request with a value for the name attribute that is already used by another instance of the same object class will be rejected. The total number of screened DPC's across all stpScreeningTableLine instances contained by an stpScreeningTable must be less or equal to maxNoOfScreenedDpcs. A respectively unallowed create request is rejected. If one tries to create an instance with an stpScreeningTableLineId which would represent a linkset which is not contained within the same signPoint as the stpScreeningTable, the create request is rejected. Instances of this object class can be deleted automatically if the superior stpScreeningTable is deleted.";;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 15 };

7.8 Abstract syntax productions

-- The syntax of this ASN.1 is based on Recommendation X.208. However, from Recommendation X.680,
-- the "ellipsis notation" is used.

MTPDefinedTypesModule

{itu-t recommendation q(17) omap(751) mtp(1) informationModel(0) asn1Modules(2)}

mtpDefinedTypesModule(0)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

IMPORTS

AdministrativeState, SimpleNameType, ProbableCause, SpecificProblems, PerceivedSeverity,
NotificationIdentifier, CorrelatedNotifications, AdditionalText, AdditionalInformation FROM Attribute-
ASN1Module

{joint-iso-itu-t ms(9) smi(3) part2(2) asn1Module(2) 1}

NameType, Pointer, ObjectList, PointerOrNull FROM ASN1DefinedTypesModule

{itu-t recommendation m gnm(3100) informationModel(0) asn1Modules(2) asn1DefinedTypesModule(0)}

ObjectInstance FROM CMIP-1

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

mtpInformationModel OBJECT IDENTIFIER ::= {itu-t recommendation q(17) omap(751) mtp(1) informationModel(0)}

mtpObjectClass OBJECT IDENTIFIER ::= {mtpInformationModel managedObjectClass(3)}

mtpPackage OBJECT IDENTIFIER ::= {mtpInformationModel package(4)}

mtpParameter OBJECT IDENTIFIER ::= {mtpInformationModel parameter(5)}

mtpAttribute OBJECT IDENTIFIER ::= {mtpInformationModel attribute(7)}

mtpNameBinding OBJECT IDENTIFIER ::= {mtpInformationModel nameBinding(6)}

mtpAction OBJECT IDENTIFIER ::= {mtpInformationModel action(9)}

mtpNotification OBJECT IDENTIFIER ::= {mtpInformationModel notification(10)}

mtpSpecificExtensions OBJECT IDENTIFIER ::= { mtpInformationModel specificExtensions(0) }

AdditionalName ::= IA5String -- the size of this string is implementation dependent

administrativeStateLocked AdministrativeState ::= locked

AlternativeSLCodeList ::= SEQUENCE SIZE (0..15) OF SLCode

CapacityLink ::= INTEGER (0..maxOctetsPerSecondLink)

CapacityLS ::= INTEGER (0..maxOctetsPerSecondLS)

ChangeInLsToAdjSpInfo ::= SEQUENCE {

oldSignLinkSetTp NameType,

newSignLinkSetTp NameType }

Cic ::= INTEGER (0..4095)

CongestedState ::= ENUMERATED {

notCongested (0),

congested (1)}

CongestionControlMethod ::= ENUMERATED {

unknown (0),

ccmQ704International (1),

ccmQ704NationalWithPrio (2),

ccmQ704NationalNoPrioBufferMechanism (3),

ccmQ704NationalNoPrioTimerMechanism (4)}

CongestionCounting ::= ENUMERATED {

octet (0),

message (1)}

CongestionLevel ::= ENUMERATED {

none (0),

congestionLevel1 (1),

congestionLevel2 (2),

congestionLevel3 (3)}

```

CongestionReportingBaseObject ::= ENUMERATED {
    routeSet (0),
    linkSetOfCongestedRouteSet (1),
    linkOfCongestedRouteSet (2),
    congestedLinkOfCongestedRoute (3)}

DpcComponent ::= CHOICE {
    dpc [0] PointCode,
    dpcRange [1] SEQUENCE {
        firstDPC PointCode,
        lastDPC PointCode }}

ErrorCorrectionMethod ::= ENUMERATED
    {basicRetr (0),
    prevCyclRetr (1) }

EventsCongestionLevel ::= SEQUENCE {
    events INTEGER,
    congllevel CongestionLevel }

EventsUP ::= SEQUENCE {
    events INTEGER,
    userpart UserPart}

FixedPriority ::= Priority

FlexiblePriority ::= Priority

InaccessibleSpInfo ::= SEQUENCE {
    networkIndicator NetworkIndicator,
    pointCode PointCode }

InClsLoadsharingAlgorithm ::= SET OF SlsLinkPriorityList

InfoRequest ::= BITSTRING {
    pointCode (0),
    pointCodeList (1),
    routePriorityList (2),
    ...}

InitialLevelOfCongestion ::= INTEGER (1..3) -- This equals the value s from B.1.2.9.2

InLsLoadShareAlgorithm ::= OBJECT IDENTIFIER

L2TimerT1 ::= INTEGER (13000..600000)
-- time, in milliseconds

L2TimerT2 ::= INTEGER (5000..150000)
-- time, in milliseconds

L2TimerT3 ::= INTEGER (1000..14000)
-- time, in milliseconds

L2TimerT4E ::= INTEGER (400..8000)
-- time, in milliseconds

L2TimerT4N ::= INTEGER (7500..120000)
-- time, in milliseconds

L2TimerT5 ::= INTEGER (80..120)
-- time, in milliseconds

L2TimerT6 ::= INTEGER (3000..12000)
-- time, in milliseconds

L2TimerT7 ::= INTEGER (500..6000)
-- time, in milliseconds

LinkSetPriorityListSntx ::= SEQUENCE OF NameType

```

```

LinkTPStatus ::= BIT STRING {
    localBlocked (0),
    remoteBlocked (1),
    localInhibited (2),
    remoteInhibited (3),
    failed (4),
    deactivated (5)}

LoadsharingInformationRouteNePart ::= IA5String
-- the size of this string is implementation dependent

LoadsharingInformationRouteSetNePart ::= IA5String
-- the size of this string is implementation dependent

LocalUpUnavailable ::= UserPart

LoopDelay ::= INTEGER
-- time, in milliseconds

ManagementExtension ::= SEQUENCE {
    identifier OBJECT IDENTIFIER,
    significance [1] BOOLEAN DEFAULT FALSE,
    information [2] ANY DEFINED BY identifier }

maxLinksInLs INTEGER ::= 16

MaxMSUsRetransN1 ::= INTEGER (0..127)
-- lower range is implementation dependent

MaxMSUsRetransN2 ::= INTEGER

maxNoOfScreenedDpcs INTEGER ::= 128
-- This value is suggested by clause 8/Q.705. It is likely that this value is too low for international networks

maxNoOfScreenedOpcs INTEGER ::= 128
-- This value is suggested by clause 8/Q.705. It is likely that this value is too low for international networks

MaxNumOfTests ::= INTEGER

maxOctetsPerSecondLink INTEGER ::= 8000

maxOctetsPerSecondLS INTEGER ::= 128000

MaxOctRetransN2 ::= INTEGER

maxSpc INTEGER ::= 16383

MRVTActionResult ::= CHOICE {
    resultOfMRTVT [0] ResultOfMRVT,
    reasonForRejection [1] ReasonForRejection}

MRVTFailureString ::= BIT STRING {
    detectedLoop (0),
    excessiveLengthRoute (1),
    unknownDestination (2),
    routeInaccessible (3),
    processingFailure (4),
    unknownInitiatingSP (5),
    timerExpired (6),
    spNotAnSTP (7),
    indirectRoute (8),
    maxNrMRVTestsAlready (9), -- Info from adjacent SP
    ... }

MtpRestarting ::= PointCode

```

```

MtpRouteVerifTestResultSntx ::= SEQUENCE {
    testedDestination          PointCode, -- 2.2.2.3 b)/Q.753
    routeTestResult           ResultOfMRVT, -- 2.2.2.3 c)/Q.753
    failureType [1]           MRVTFailureString OPTIONAL, -- 2.1.1.3.1/Q.754
    routeTrace [2]           RouteTrace OPTIONAL, -- 2.2.2.3 d)/Q.753
    copyData [6] OCTET STRING OPTIONAL -- 2.2.2.3 e)/Q.753
}

NetworkIndicator ::= ENUMERATED{
    internationalNetwork1 (0),
    internationalNetwork2 (1),
    nationalNetwork 1 (2),
    nationalNetwork 2 (3)}

NumCongStates ::= INTEGER (0..3)

NumberOfNormallyActiveSignLinksTps ::= INTEGER (0..16)

NumberOfThresholdLevels ::= INTEGER (2 | 3)

PeriodicLinkTestFlag ::= ENUMERATED {
    on (0),
    off (1)}

periodicTestFlagDefault PeriodicLinkTestFlag ::= off

PointCode ::= INTEGER (0..maxSpc)

PointCodeList ::= SEQUENCE OF PointCode

PointerList ::= SEQUENCE OF Pointer

Priority ::= INTEGER
-- maximum value is implementation dependent

PriorityInfo ::= INTEGER {
    unknown (0),
    firstChoice (1),
    secondChoice (2),
    thirdChoice (3),
    ...} (0..255)

PriorityMode ::= ENUMERATED {
    insert (0),
    equal (1),
    exchangeSingle(2),
    exchangeGroup (3),

priorityModeDefault PriorityMode ::= insert

localUserPartUnavailable ProbableCause ::= globalValue: {mtpSpecificExtensions 001}
q752Item1p02 ProbableCause ::= globalValue: {mtpSpecificExtensions 102}
q752Item1p10 ProbableCause ::= globalValue: {mtpSpecificExtensions 110}
q752Item2p10 ProbableCause ::= globalValue: {mtpSpecificExtensions 210}
q752Item2p16 ProbableCause ::= globalValue: {mtpSpecificExtensions 216}
q752Item2p18 ProbableCause ::= globalValue: {mtpSpecificExtensions 218}
q752Item3p06 ProbableCause ::= globalValue: {mtpSpecificExtensions 306}
q752Item3p11 ProbableCause ::= globalValue: {mtpSpecificExtensions 311}
q752Item4p03 ProbableCause ::= globalValue: {mtpSpecificExtensions 403}
q752Item4p05 ProbableCause ::= globalValue: {mtpSpecificExtensions 405}
q752Item4p11 ProbableCause ::= globalValue: {mtpSpecificExtensions 411}
q752Item4p13 ProbableCause ::= globalValue: {mtpSpecificExtensions 413}

```

q752Item5p01 ProbableCause ::= globalValue: {mtpSpecificExtensions 501}
q752Item5p05 ProbableCause ::= globalValue: {mtpSpecificExtensions 505}
q752Item5p06 ProbableCause ::= globalValue: {mtpSpecificExtensions 506}
q752Item5p07 ProbableCause ::= globalValue: {mtpSpecificExtensions 507}
q752Item5p08 ProbableCause ::= globalValue: {mtpSpecificExtensions 508}
remoteUserPartUnavailable ProbableCause:: = globalValue: {mtpSpecificExtensions 002}
abnormalFIBRorBSNR SpecificProblems ::= {{mtpSpecificExtensions 003}}
excessiveAckDelay SpecificProblems ::= {{mtpSpecificExtensions 004}}
excessiveCongDuration SpecificProblems ::= {{mtpSpecificExtensions 006}}
excessiveErrorRate SpecificProblems ::= {{mtpSpecificExtensions 005}}
remoteUPInaccessible SpecificProblems ::= {{mtpSpecificExtensions 009}}
remoteUPUnequipped SpecificProblems ::= {{mtpSpecificExtensions 008}}
remoteUPUnknown SpecificProblems ::= {{mtpSpecificExtensions 007}}
ReasonForRejection ::= ENUMERATED {
 routeTestInstanceLocked (10),
 routeTestInstanceDisabled (11),
 routeTestInstanceBusy (12),
 routeTestAlreadyInProgress (13)}
ReceiveCongestionThresholdAbatement ::= INTEGER
ReceiveCongestionThresholdOnset ::= INTEGER
RelatedLinkGroupNumber ::= INTEGER (0..15)
RemoteExchangeLabel ::= IA5String
-- the size of this string is implementation dependent
RemoteUpUnavailable ::= SEQUENCE {
 pointCode [0] PointCode,
 userPart [1] UserPart }
ResultMtpRouteTest ::= SEQUENCE {
 testedDestination PointCode,
 routeTestActionResult MRVTActionResult,
 announcementOfMRVR [0] BOOLEAN OPTIONAL,
 failureType [1] MRVTFailureString OPTIONAL,
 routeTrace [2] RouteTrace OPTIONAL,
 pointCodeInfo [3] PointCode OPTIONAL,
 pointCodeListInfo [4] PointCodeList OPTIONAL,
 routePriorityListInfo [5] RoutePriorityListInfo OPTIONAL,
 copyData [6] OCTET STRING OPTIONAL,
 ...}
ResultOfAction ::= ENUMERATED {
 success (0),
 unsuccessful (1),
 notPerformed (2),
 linkAlreadyInhibited (3),
 linkNotInhibited (4),
 wrongClassReferenced (5),
 signTermNonExisting (6),
 signTermAlreadyReferenced (7),
 wrongSignLinkTpStatus (8),
 ...}
ResultOfMRVT ::= ENUMERATED {
 success (0),
 partialSuccess (1), -- 2.1.1.3.2/Q.754, Partial Success
 failure (2), -- 2.1.1.3.1/Q.754, Failure
 }

ReturnUnknownParams ::= BIT STRING {
tag15 (0),
tag16 (1),
...}

RoutePriorityListInfo ::= SEQUENCE OF PriorityInfo

RouteSetUnavailable ::= OBJECT IDENTIFIER

RouteTrace ::= CHOICE {
success [0] IMPLICIT PointCodeList,
detectedLoop [1] IMPLICIT PointCodeList,
excessiveLengthRoute [2] IMPLICIT PointCodeList,
unknownDestination [3] IMPLICIT NULL,
routeInaccessible [4] IMPLICIT PointCodeList,
processingFailure [5] IMPLICIT NULL,
unknownInitiatingSP [6] IMPLICIT PointCode,
timerExpired [7] IMPLICIT PointCodeList,
spNotAnSTP [8] IMPLICIT PointCodeList,
indirectRoute [9] IMPLICIT PointCode}

ScreenedOpcsOrLinkSetsList ::= SET SIZE (0..maxNoOfScreenedOpcs) OF
SEQUENCE {
screenedOpcOrLinkset StpScreeningTableLineId,
messageTreatment TreatmentOf }

ScreeningByLinkSetOrByOpc ::= ENUMERATED {
byOpc (0),
byIncomingLinkset (1),
byOutgoingLinkset (2)}

Seconds ::= INTEGER

SIOType ::= SEQUENCE {
service ENUMERATED {
signallingNetworkManagement (0),
signallingNetworkTesting (1),
sccp (3),
tup (4),
isup (5),
dup (6),
mt (8),
b-isup (9),
siup (10),
...},
subService ENUMERATED {
internationalNetwork (0),
nationalNetwork (2),
...}
}

SignRouteSetNePartName ::= IA5String
-- the size of this string is implementation dependent

SIcode ::= INTEGER (0..15)

Sls ::= INTEGER (0..15)

SLSCodeCurrentList ::= SlsCodeList

SlsCodeList ::= SET SIZE (0..16) OF Sls
-- Each Sls value can occur at most once in a given SET

SlsCodeNormalList ::= SlsCodeList

SlsLinkPriorityList ::= SEQUENCE {
slsCode [0] Sls,
normalSlcCode [1] SIcode,
alternativeSIcodeList [2] AlternativeSIcodeList
}

StmChannel ::= INTEGER (1..31)

SpecificDpc ::= PointCode

SpType ::= ENUMERATED

{sep (0),
step (1),
stp (2)}

SS7OnOccEventInfo ::= SEQUENCE{

probableCause		ProbableCause,
specificProblems	[1]	SpecificProblems OPTIONAL,
perceivedSeverity		PerceivedSeverity,
notificationIdentifier	[5]	NotificationIdentifier OPTIONAL,
correlatedNotifications	[6]	CorrelatedNotifications OPTIONAL,
additionalText		AdditionalText OPTIONAL,
additionalInformation	[10]	AdditionalInformation OPTIONAL }

StartMtpRouteTest ::= SEQUENCE {

testDestination		PointCode,
traceRequested		BOOLEAN,
threshold		ThresholdN,
infoRequest	[0]	InfoRequest OPTIONAL,
returnUnknownParams	[1]	ReturnUnknownParams OPTIONAL,
directRouteCheck	[2]	BOOLEAN OPTIONAL}

StpScreeningElement ::= SEQUENCE{

designatedDPC		DpcComponent,
messageTreatment		TreatmentOf }

StpScreeningTableLineContent ::= SET SIZE (1..maxNoOfScreenedDpcs) OF StpScreeningElement

StpScreeningTableLinkId ::= CHOICE {

designatedlinkset	[0]	Objectinstance,
designateddopc	[1]	PointCode}

StpScreeningTableListMode ::= BOOLEAN

SuermNSU ::= INTEGER (0..256)

-- lower range is implementation dependent

SuermThresh ::= INTEGER (32 | 64) -- (minSuermThresh or maxSuermThres)

TestResult ::= BIT STRING

detectedLoop	(0),
excessiveLengthRoute	(1),
unknownDestination	(2),
routeInaccessible	(3),
processingFailure	(4),
unknownInitiatingSP	(5),
timerExpired	(6),
spNotAnSTP	(7),
indirectRoute	(8),
maxNrMRVTestsAlready	(9),
...	

ThresholdN ::= INTEGER

TimeD ::= INTEGER

TimerValue ::= INTEGER (0..60000)

TransmissionCongestionThresholdAbatementLevel1 ::= INTEGER

TransmissionCongestionThresholdAbatementLevel2 ::= INTEGER

TransmissionCongestionThresholdAbatementLevel3 ::= INTEGER

TransmissionCongestionThresholdDiscardLevel1 ::= INTEGER

TransmissionCongestionThresholdDiscardLevel2 ::= INTEGER

```

TransmissionCongestionThresholdDiscardLevel3 ::= INTEGER
TransmissionCongestionThresholdOnsetLevel1 ::= INTEGER
TransmissionCongestionThresholdOnsetLevel2 ::= INTEGER
TransmissionCongestionThresholdOnsetLevel3 ::= INTEGER
TransmissionRate ::= ENUMERATED {
    kbits4point8 (0),
    kbits56 (1),
    kbits64 (2)}
TreatmentOf ::= ENUMERATED {
    normal (0),
    discard (1) }
UserPart ::= ENUMERATED
    { isup (5),
    sccp (3),
    tup (4),
    dup (6),
    mt (8),
    b-isup (9),
    siup (10),
    ...}
END -- end of MTPDefinedTypesModule

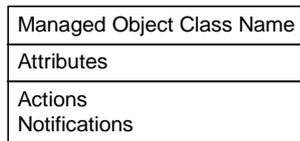
```

Annex A

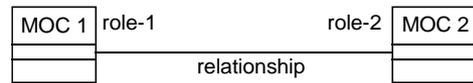
Overview of OMT notation

(This annex forms an integral part of this Recommendation)

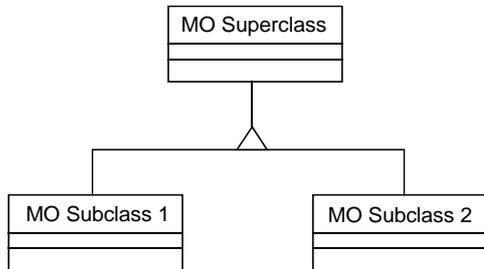
Managed Object Class:



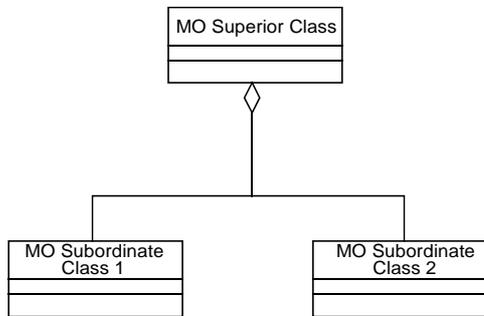
Relationship between object classes:



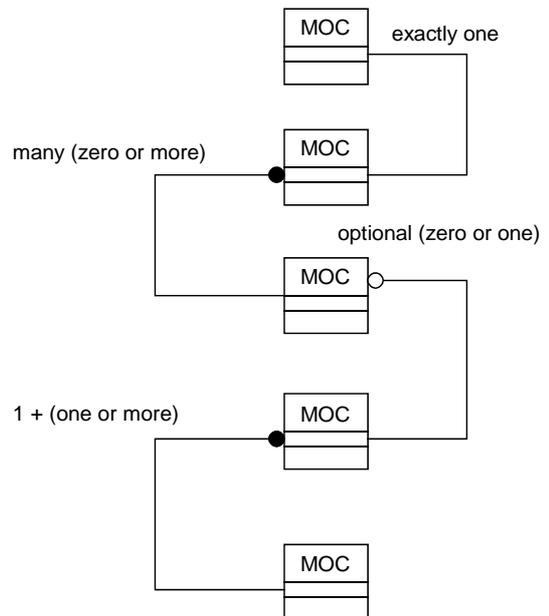
Inheritance between managed object classes:



Name binding between managed object classes:



Cardinality of roles in relationship:



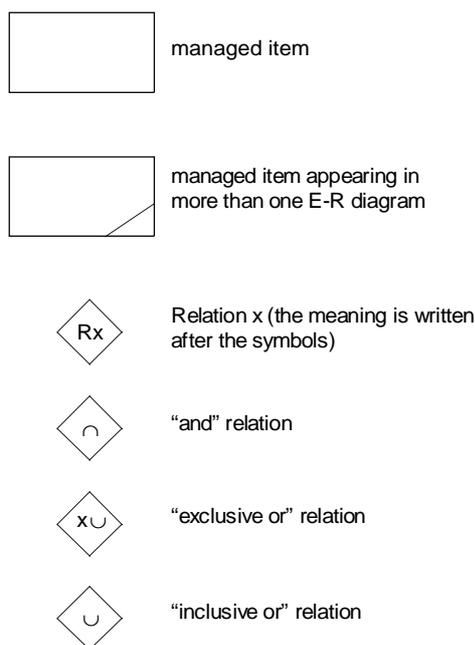
T1174930-95/d04

Annex B

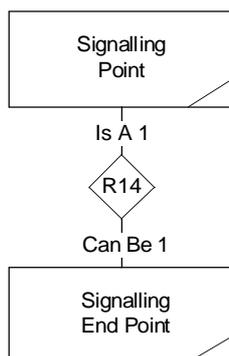
Informal entity-relationship diagrams

(This annex forms an integral part of this Recommendation)

This subclause contains an informal description of the management view of the SS No. 7 resources, which was refined into the formal description of managed objects in the main body of this Recommendation. The entity-relationship diagrams can be read as follows:



To read the diagram, consider the following part of it:



T1 168390-94/d05

To read this relation, start with, say, the item "Signalling Point" [which also exists in entity-relation (E-R) diagrams other than this], and read through the relation R14 to "Can Be 1" Signalling End Point. Conversely, a Signalling End Point is just one Signalling Point (the "Is A 1" relation).

For two-way "exclusive or" ($x\cup$) relations, entry one way is on a line marked without an attached \cup , and exit is on just one line with an attached \cup .

Entry the other way is on just one of the lines with an attached \cup , and exit is on the line without an attached \cup .

For one way $x \cup$ relations, follow the arrows and apply the appropriate rule.

For two-way "inclusive or" (\cup) relations, entry one way is on the line without an attached \cup , and exit is on one or more lines with an attached \cup . Entry the other way is on one or more lines with attached \cup s, and exit on the line without an attached \cup .

For one way \cup relations, follow the arrows and apply the appropriate rule.

For two-way "and" (\cap) relations, entry one way is from all of the lines with $\&$ s attached, and exit is on the line without an $\&$.

Entry the other way is on the line without an $\&$, and exit is on all the lines with attached $\&$ s.

For one-way \cap relations, follow the arrows and apply the appropriate rule.

The definition of relations

The general properties of the relations between SS No. 7 managed items are described below.

Mathematical definition

If X and Y are sets, a relation R from X to Y is a subset $R \subseteq X \times Y$ with $(x,y) \in R \ni x \in X, y \in Y$ if x and y are R -related.

The *Domain* of R is defined by: $Domain(R) = \{ x \in X \mid (x,y) \in R \text{ for some } y \in Y \}$ and the *Range* of R is defined by: $Range(R) = \{ y \in Y \mid (x,y) \in R \text{ for some } x \in X \}$.

Relations of the E-R diagrams

The relations on E-R diagrams adopt the ideas from the definition of mathematical relations given above, but usually they are **not** mathematical relations themselves. In particular, a two-way relation, read in one direction, is usually **not** the inverse of that read in the other direction (even though the name might be the same!). In addition, ordering is sometimes imposed, and additional constraints might exist, on sets from the E-R diagram.

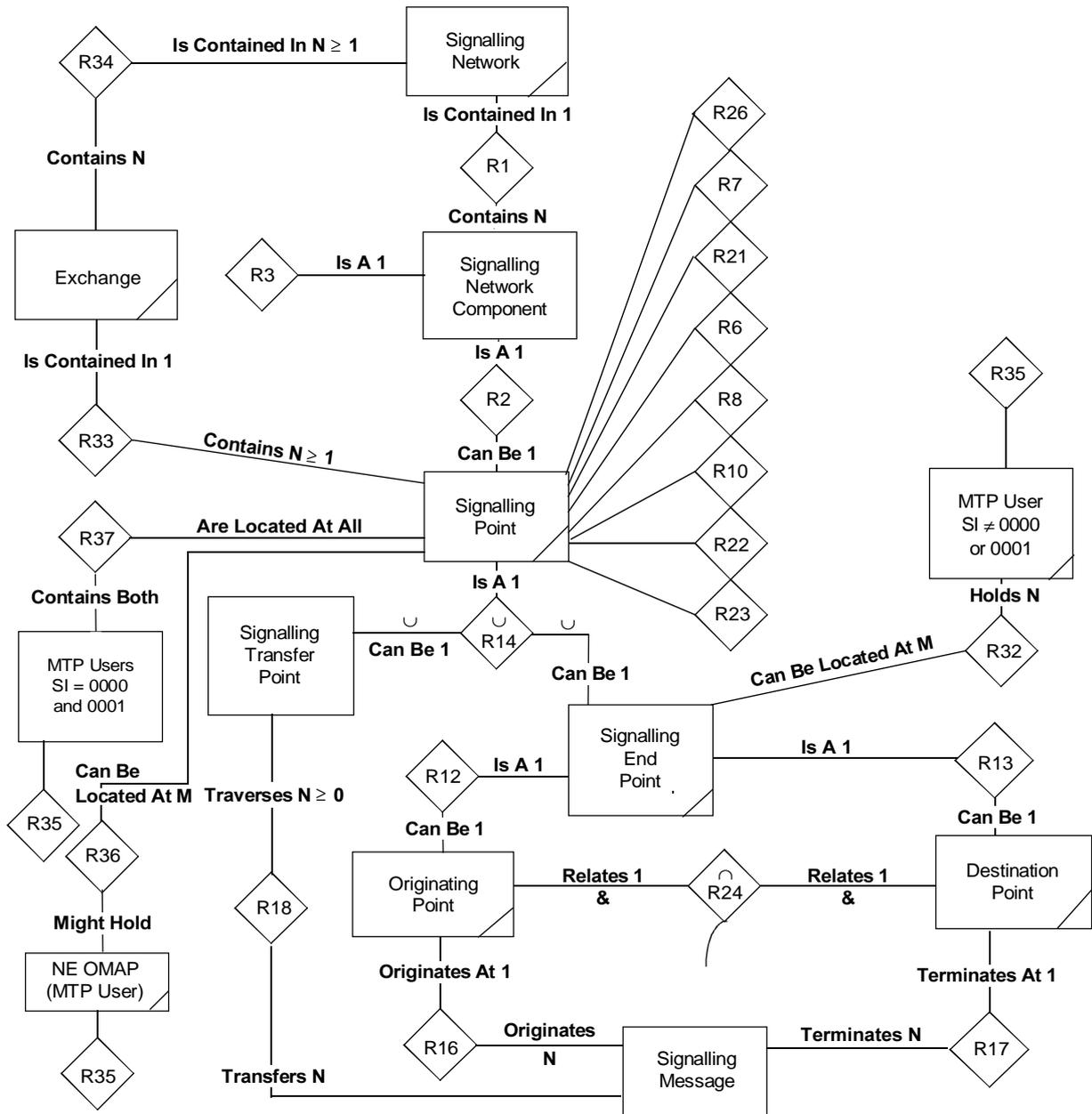
Key to logical symbols used in this annex

{ }	the contents denote a set.
\in	element : $x \in Y$ means x is an element of set Y .
or \ni	means "such that". So $\{ x \in X \mid (x,y) \in R \text{ for some } y \in Y \}$ means the set of elements x of X such that (x,y) is an element of set R for some element y of set Y .
\subset	logical inclusion. So $A \subset B$ means that set A is included in set B .
\subseteq	improper logical inclusion symbol. $C \subseteq D$ means C equals D or is included in D .
\cap	logical and.
\cup	logical or.
\emptyset	the empty symbol. So $A \equiv \emptyset$ means that A is an empty set.

B.1 Entity-relationship diagram for MTP

All relations which are described within the protocol of MTP are illustrated in the entity-relationship diagram below. This diagram is used to derive the management aspects for MTP. It is used as a "shopping list" for the managed object definitions.

It should be noted that Figures B.1 through B.3 show an abstraction of this ERD to the MTP managed objects for naming and containment. There, a different notation is used, which is more appropriate than this one for managed object definitions. The ERD notation used here is suited to problem domain descriptions.



T1168400-94/d06

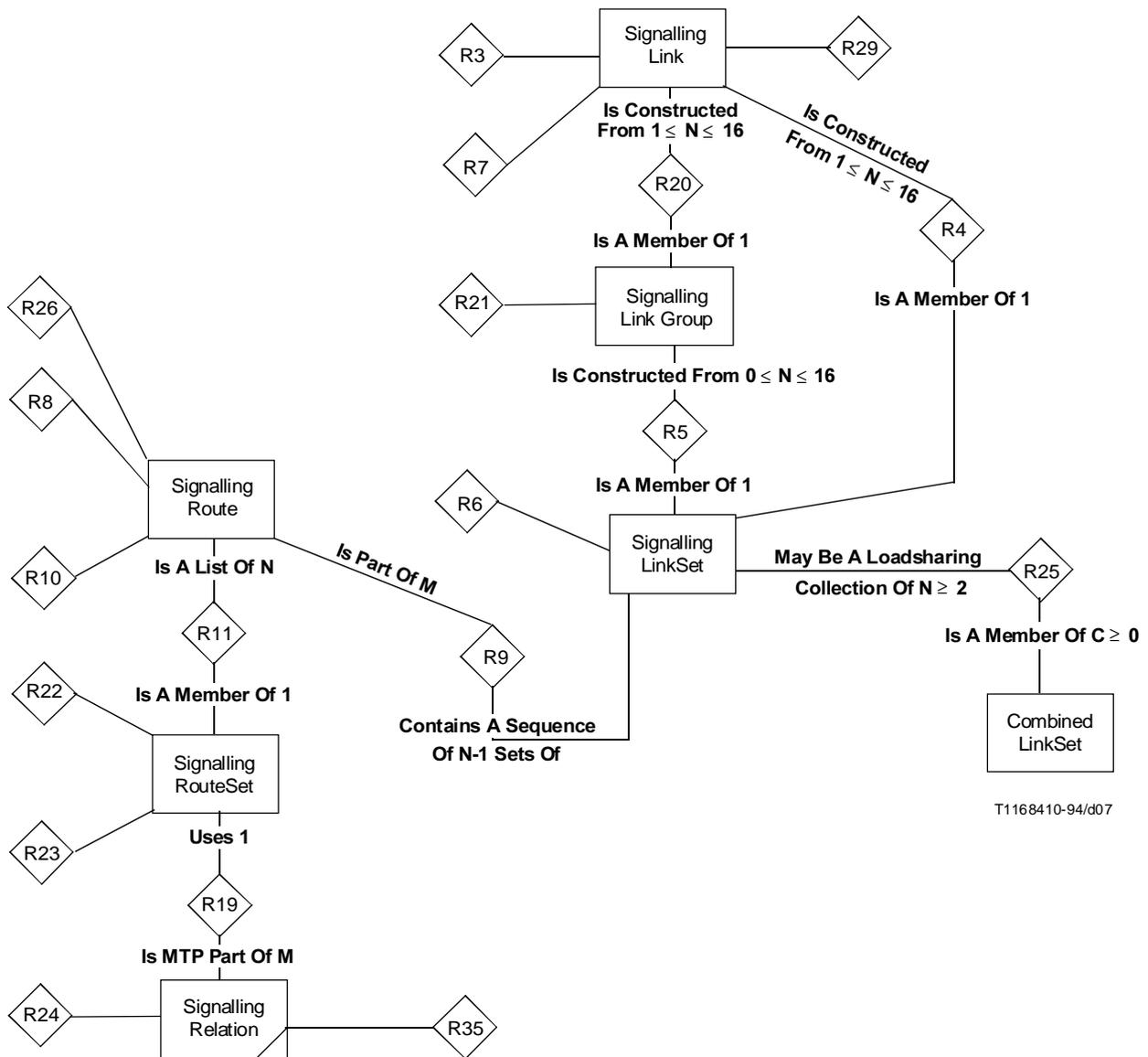
FIGURE B.1/Q.751.1
 SS No. 7 MTP managed items entity-relation diagram
 (off-page relations – see following page)

Off-Page Relations

Identity	From item	Function	To item
R3	Signalling Network Component	Can Be 1	Signalling Link
R7	Signalling Point	Is The Endpoint Of N	Signalling Link
R21	Signalling Point	Is The Endpoint Of N ≥ 0	Signalling Link Group
R6	Signalling Point	Is The Endpoint Of N	Signalling LinkSet
R8	Signalling Point	Is Traversed By N	Signalling Route
R10	Signalling Point	Is The Endpoint Of N	Signalling Route
R22	Signalling Point	Is Traversed By N	Signalling RouteSet
R23	Signalling Point	Is The Endpoint Of N	Signalling RouteSet
R24	Originating & Destination Points	May Be Associated By N	Signalling Relation
R26	Signalling Point	Is An End Or Intermediate Point Of N	Signalling Route
R35	MTP User	Utilises N	Signalling Relation
<p>NOTES</p> <p>1 Relation R24 is an "and" relation.</p> <p>2 R15 is not used.</p> <p>3 R14 is an "inclusive or" relation.</p>			

FIGURE B.1/Q.751.1 (*end*)

SS No. 7 MTP managed items entity-relation diagram



T1168410-94/d07

FIGURE B.2/Q.751.1
 SS No. 7 MTP managed items entity-relation diagram part 2
 (off-page relations – see following page)

Off-Page Relations

Identity	From item	Function	To item
R3	Signalling Link	Is A 1	Signalling Network Component
R7	Signalling Link	Directly Connects 2	Signalling Point
R21	Signalling Link Group	Directly Connects 2	Signalling Point
R6	Signalling LinkSet	Directly Connects 2	Signalling Point
R8	Signalling Route	Traverses N	Signalling Point
R10	Signalling Route	Indirectly Connects 2	Signalling Point
R22	Signalling RouteSet	Has M Sets Of N Traversed	Signalling Point
R23	Signalling RouteSet	Indirectly Connects 2	Signalling Point
R24	Signalling Relation	Relates 1 (twice)	Originating & Destination Points
R26	Signalling Route	Contains An Ordered Sequence Of N	Signalling Point
R29	Signalling Link	Connects 2 & Uses 1	Signalling Terminal & Signalling Data Link
R35	Signalling Relation	Is Utilized By 1	MTP User

NOTE – Relations R24 and R29 are "and" relations.

FIGURE B.2/Q.751.1 (end)

SS No. 7 MTP managed items entity-relation diagram part 2

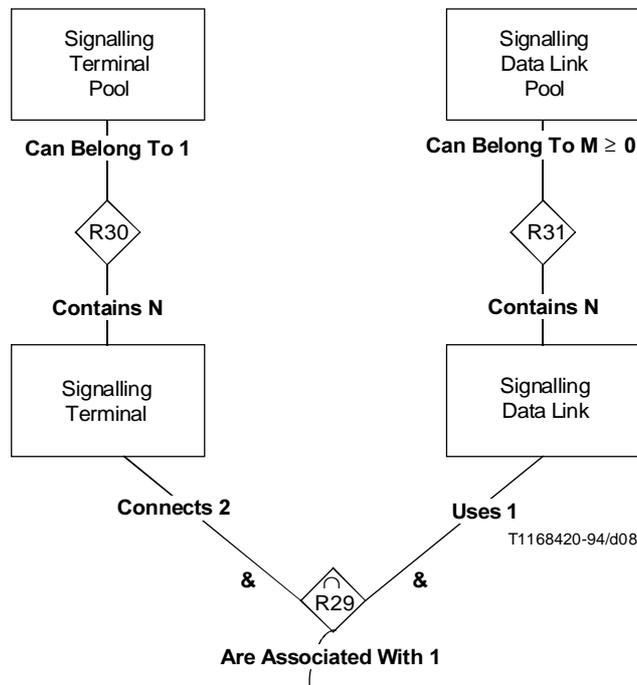


FIGURE B.3/Q.751.1

Informal MTP ERD part 3
(off-page relations – see following page)

Off-Page Relations

Identity	From item	Function	To item
R29	2 Signalling Terminal & 1 Signalling Data Link	Are Associated With 1	Signalling Link

FIGURE B.3/Q.751.1 (*end*)

Informal MTP ERD part 3

Relation R29 associates two signalling terminals and one signalling data link with one signalling link. One signalling terminal must be in the SP (SP A) at one end of the signalling link, the other at the other end of the signalling link (SP B).

The rules for selecting the two signalling terminals and one signalling data link are summarised in the following table:

	Fixed ST at SP A	Auto allocation of ST at SP A	Fixed ST at SP B	Auto allocation of ST at SP B
Auto allocation of SdL	No	Yes	No	Yes
Fixed allocation of SdL	Yes Yes No No	No No Yes Yes	Yes No Yes No	No Yes No Yes

B.1.2 MTP management hierarchies and managed item line diagrams

B.1.2.1 Management hierarchies

The most significant hierarchy is the tree from Signalling Relation to Signalling terminal and Signalling Data Link via Signalling Link. If an element of the tree is subjected to management action, consideration is required of the effects upon the preceding and following elements (which might affect their preceding and following elements respectively). This aspect is considered in detail for each tree element.

The line diagrams give an informal view of the network management view of the managed items.

The network management view is considered throughout, with the network element (SP) view given also in some cases. Usually the network element view is just one half of the network management view. This former view should accommodate all known implementations, with those properties that are not common to all implementations defined as "optional" in some way.

In what follows, relations and attributes are shown which might (depending upon network or vendor implementation) be manageable to a greater or lesser extent. For example, some attributes might be human-machine up dateable in some implementations, read-only in some, and not accessible to the management interface in others.

A minimum set of items with their relations, attributes and behaviours needs to be defined, and then supersets of those items should be defined to cover the known managed items and their properties in existing MTP networks.

In the following, it is assumed that the maintenance, operations and administration personnel would take action at the appropriate hierarchical level for the item being managed. Thus, for example, if a linkset were to be moved "out of service" the command would be issued to the linkset. This command would be permitted, unless a routeset would thereby become unavailable (if it were desired to remove the routeset from service, a command would have been issued to the routeset). The action of removing the linkset from service might be realised by automatically issuing a command to remove each of its constituent links from service, in this case the check on the last available link would allow it to be removed.

B.1.2.2 Line diagram conventions

The relation names are the same as on the informal MTP managed items E-R diagram (where the relations exist), the conventions adopted are:

- a) the item name is on the left hand side of the drawing, with the Recommendation defining the item listed underneath. The identity of the item is listed under the item name;
- b) the associated relations are listed on the right hand side, a solid leftwards pointing arrow indicates a relation with the referred-to item above this item in the MTP routing rules or management tree;
- c) a solid rightwards pointing arrow indicates a relation with the referred-to item below this item in the MTP routing rules or management tree;
- d) no arrow on a solid line indicates an attribute with no relation currently defined (although it is possible that some of the measurement-type attributes might have objects defined at some stage);
- e) optional relations are represented by dashed arrows;
- f) optional attributes are represented by dashed lines;
- g) dotted lines indicate mathematical or logical relations;
- h) a dotted line with inward pointing arrow indicates an input parameter to a mathematical or logical relation;
- i) an outward pointing dotted arrow indicates an output parameter (or result) of a logical or mathematical relation;
- j) relations are defined in **bold type** and numbered according to the MTP managed items E-R diagram.

B.1.2.3 Signalling End point (SEP)

See Figure B.4.

B.1.2.3.1 Behaviour

A Signalling end point (SEP) is the node at which the MTP Users, and end users, can access the SS No. 7 network. It acts simultaneously as an originating point and a destination point for the signalling interactions of a number of users of the SS No. 7 network [and these users have Service Indicators (SIs) different from 0000 and 0001, although the SEP also contains MTP Signalling Network Management and Testing and Maintenance, because it is a signalling point].

Each user possesses a number of sources and sinks of message traffic (e.g. ISUP generates a number of ISUP calls per trunk group per second, each call requires the exchange of several messages).

A signalling end point may be created and destroyed. Before it is destroyed, all reference to it in the network's MTP routing tables (and in the respective MTP Users' data) must have been removed.

B.1.2.3.2 Notifications

These are the ones defined for a signalling point, viz.:

- signalling point unavailable; and
- signalling point available.

When a signalling end point becomes available (i.e. its first link becomes available at MTP level 2), after a time of unavailability of at least the Q.704 T1 value, it is deemed to be restarting as an SEP.

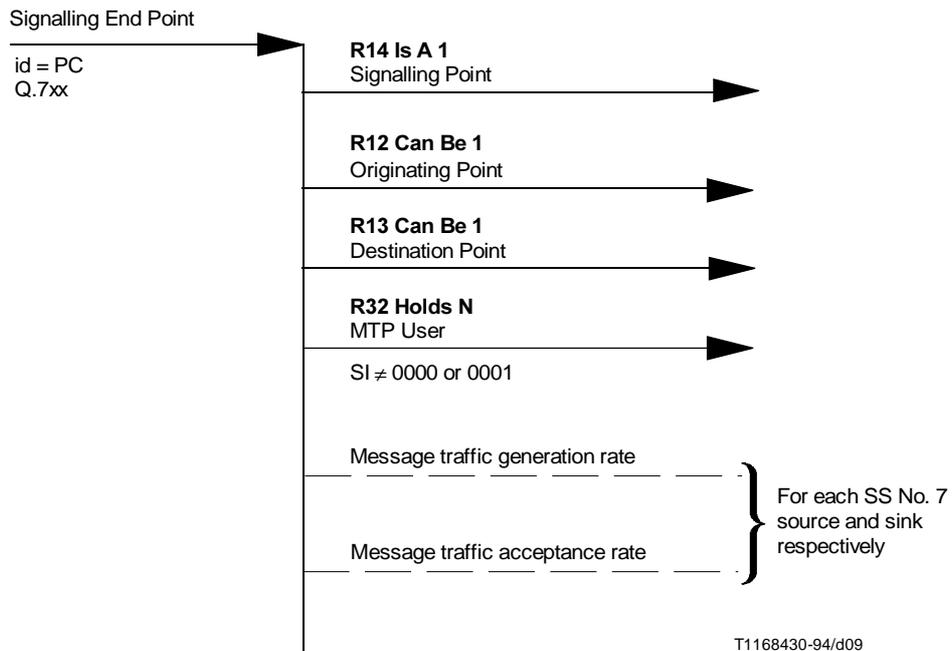


FIGURE B.4/Q.751.1
Signalling End Point line diagram

B.1.2.4 Signalling Transfer Point (STP)

See Figure B.5.

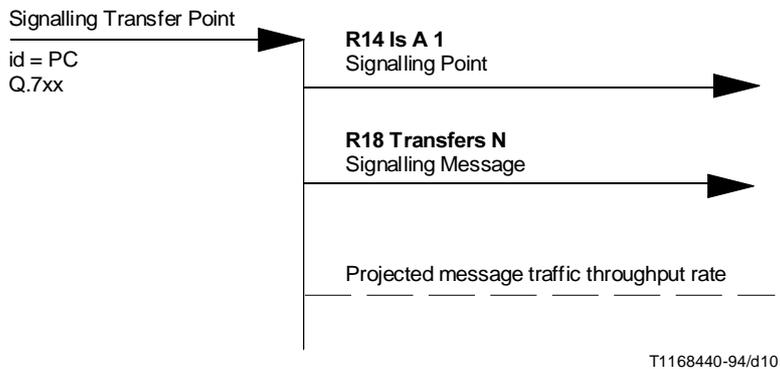


FIGURE B.5/Q.751.1
Signalling transfer point line diagram

B.1.2.4.1 Behaviour

A signalling Transfer Point (STP) acts as a transit switch for SS No. 7 messages.

There are two main reasons for using it:

- i) to provide alternative routes for messages, and hence increase the robustness of the SS No. 7 network; and
- ii) to reduce the number of signalling links over that required for a full mesh network, and hence reduce network complexity.

An STP, by virtue of being a signalling point, possesses at least two MTP users, viz. MTP Signalling Network Management, and Testing and Maintenance (SI = 0000 and 0001 respectively). See 4-13/Q.704 and Recommendation Q.707. It may also contain network element management OMAP (along with a vestigial SCCP and TC to support OMAP).

An STP may be created and destroyed. Before it is destroyed, all reference to it in the network's MTP routing tables must have been removed (i.e. all routesets using the STP must have been deleted).

B.1.2.4.2 Notifications

These are the ones defined for a signalling point, viz.:

- signalling point unavailable;
- signalling point available.

When an STP becomes available (i.e. its first link becomes available at MTP level 2), after a period of at least the Q.704 timer T1 during which it was unavailable, it is deemed to be restarting as an STP.

B.1.2.5 Signalling Transfer and End Point (STEP)

This managed item combines the functions of an SEP and an STP. As such, it has the attributes of both. See Figure B.6.

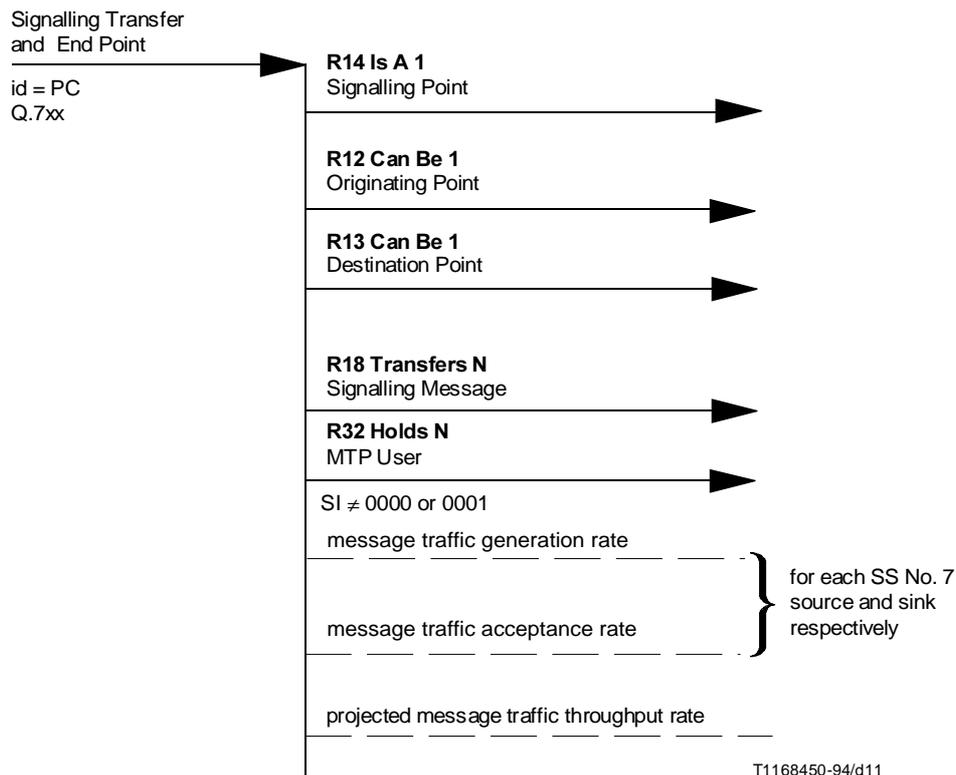


FIGURE B.6/Q.751.1
STEP line diagram

B.1.2.5.1 Behaviour

This is as an SEP plus STP, except that on MTP restart the STEP behaves as an STP.

B.1.2.6 Signalling Relation

This item is defined as a supporting item for MTP User (Parts) and will not be a managed object in its own right. See Figure B.7.

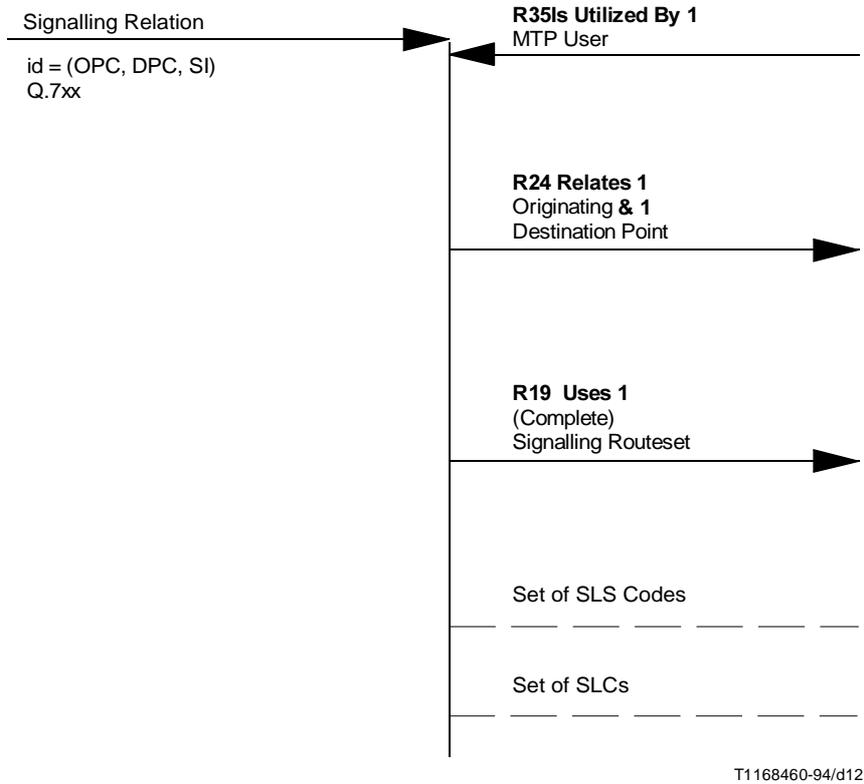


FIGURE B.7/Q.751.1
Signalling relation line diagram

B.1.2.6.1 Behaviour

A signalling relation needs to exist when some service requires communication between origin and destination Signalling Points (SPs) in the SS No. 7 network. Usually a signalling relation is established in each direction. The service will be associated with an MTP User (e.g. SCCP or ISUP, or even the MTP itself), and the signalling relation is identified by the MTP User and the origin, destination pair.

The signalling relation has as an attribute the set of SLS codes that it supports for the MTP User. The MTP User may add or delete SLS code values from this set. Such a change might require the routes comprising the routeset supporting the signalling relation to vary the SLS codes they support.

Signalling relations used by the MTP signalling network management, and MTP testing and maintenance, have as an attribute the set of Signalling Link Codes (SLCs) for the links they use, support and test.

A signalling relation may be added (created), and destroyed (deleted).

The signalling relation is created when the services using it are established by the network administration, and persists and is used for all communication by the MTP User between origin and destination, until the service is discontinued by the administration.

The origin and destination SPs, and the MTP User at both the origin and destination, must exist before the signalling relation can be created.

All signalling relations between origin and destination must be removed before either origin or destination can be destroyed.

A signalling relation becomes unavailable if the MTP User at the destination becomes inaccessible to the origin (note that the signalling relation is one way, but there will usually be another defined for the other direction).

If the MTP User at the origin attempts to communicate with its peer at the destination in the signalling relation, and the remote User is inaccessible, the remote MTP may send a "User Part Unavailable" message to the MTP at the origin SP. Such a UPU message contains a reason, if the sending MTP is post-1992 Recommendation, which indicates that the MTP User is either unequipped (and so the signalling relation is not valid), inaccessible, or its condition is unknown. ("condition unknown" is also that given by pre-1992 but post-1988 Recommendation MTPs).

Before the signalling relation can be used, the routeset upon which it relies must be created and brought into service.

B.1.2.6.2 Notifications

User part Unavailable:

- inaccessible remote User; or
- unequipped remote User; or
- unknown.

B.1.2.7 Routeset

See Figure B.8.

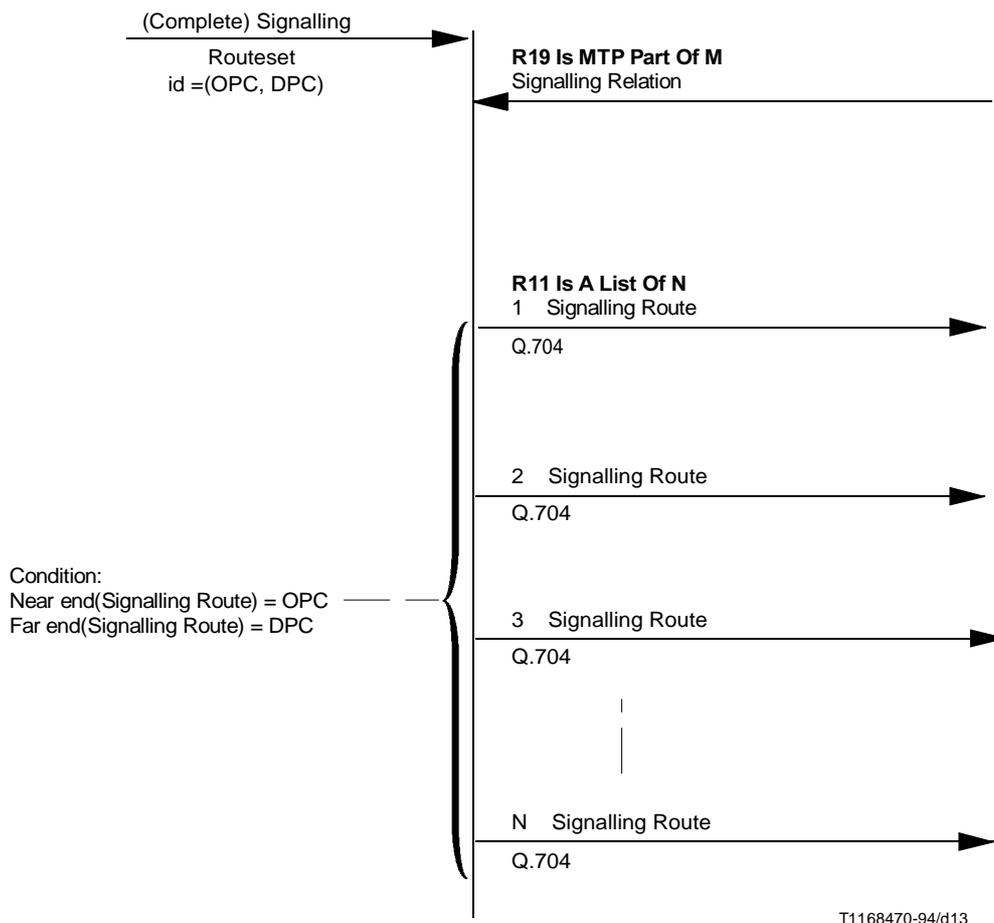


FIGURE B.8/Q.751.1
Signalling routeset line diagram

B.1.2.7.1 Behaviour

Recommendation Q.704 allows for different MTP Users, or the MTP itself, to use different routings between an origin SP and a destination SP. The collection of all signalling routes for all MTP Users forms the signalling routeset.

It is helpful to qualify the notion of "routeset" to ease the description of route properties. Accordingly, the concepts of complete signalling routeset, normal signalling routeset and current signalling routeset are defined.

- 1) The network element view, at the instant of creation or modification of the routing data, of the **complete signalling routeset** $O(A,B)$ is defined as the set of all distinct signalling routes intended to convey MSUs sent from or through the near end SP A to the destination SP B.

A member of this set is called a signalling route.

In the above the network element view of a route is used.

The network management view uses the same wording in the definition, but it uses the network management view of a route, with A just the origin SP.

- 2) The network element view, at the instant of creation or modification of the routing data, of the **normal signalling routeset** $N(A,B)$ is defined as the set of all distinct signalling routes that would convey MSUs sent from or through the near end SP A to destination SP B, in the absence of any failure in the complete routeset $O(A,B)$.

The network management view uses the same wording, but with A just the origin SP.

A member of the set is called a normal signalling route.

- 3) The network element view of the **current signalling routeset** $C(A,B)$ is defined as the set of all distinct routes that convey MSUs sent from or through the near end SP A to the destination SP B, at the moment of observation.

The network management view uses the same wording, but with A just the origin SP.

A member of the set is called a current signalling route.

Note that different observations might show different current signalling routesets.

B.1.2.7.1.1 Relationship between definitions

If we write:

O: complete routeset $O(A,B)$.

N: normal routeset $N(A,B)$.

C: current routeset $C(A,B)$.

Then we have:

$$C \subseteq O, N \subseteq O$$

B.1.2.7.1.2 Operations

A signalling routeset can be created (added), destroyed (deleted), and have signalling relations added to it or deleted from it.

The routeset is created when the first signalling relation between the origin signalling point and the destination is created, and it is destroyed when the last signalling relation between the origin and destination is destroyed.

Each of the signalling points on every route of the routeset must have a signalling relation between it and the destination defined and operational before any signalling relation from origin to destination can become operational.

A signalling routeset can be congested or uncongested. A network option allows up to three levels of congestion. The "congested" marking occurs when a message for the destination served by the routeset is first routed using a signalling link marked as congested. See 3.8.4./Q.704.

B.1.2.7.2 Choice of route from the routeset

The Q.704 network element view of route choice is as follows:

Clause 4/Q.704 states that one or more alternative linksets or combined linksets are allocated for each destination which may be reached from a signalling point.

A combined linkset is a load sharing collection of two or more linksets.

The possible linksets (or combined linksets) are arranged in a certain priority order⁴⁾. To route a message to a destination, the highest priority available linkset (or combined linkset) is chosen.

If a combined linkset is to be used, the linkset from the combined linkset is selected according to an (SP or network) implementation dependent loadsharing algorithm. Such algorithms usually take as an input the SLS code of the message to be transported – at any time each linkset of the combined linkset supports a disjoint set of SLS codes for the destination, the whole combined linkset supporting all values in (0..15). See, for example, Recommendation Q.705.

B.1.2.8 Signalling Route

The line diagram for this is as follows (see Figure B.9):

B.1.2.8.1 Behaviour

A signalling route is used to convey MTP User messages from origin SP to destination SP (and the MTP itself is an MTP User).

For OMAP purposes the network element view and network management view of a route are defined as follows:

Network element view

A signalling route $(A,C,B)_i$ is defined as an ordered sequence of the near end signalling point A (i.e. the network element), an adjacent SP C and the destination SP B. The adjacent SP C may be identical with the destination B, or it may or may not be directly interconnected to the destination SP.

The adjacent SP C must be directly connected to the near end SP by at least one linkset which is intended to convey MSUs sent from A to B (hence the use of the term "adjacent").

Two signalling routes $(A,C,B)_i$ and $(A,C',B)_j$ are distinct if the adjacent SP is different.

Network management view:

A signalling route $(A,B)_i$ is defined as an ordered sequence of the origin SP A, zero or several intermediate SPs (i.e. STPs), and the destination SP B. Each intermediate STP is directly interconnected to its neighbour SPs in the ordered sequence by at least one linkset which is intended to convey MSUs sent from A to B.

The second SP in the sequence is the same as that in the network element view of the route $(A,B)_i$. If this second SP "C" is not the destination, then there is a signalling route (C,B) which is intended to convey messages sent from A to B.

⁴⁾ In OMAP this is defined to be the **linkset priority for the destination** (or respectively the combined linkset priority).

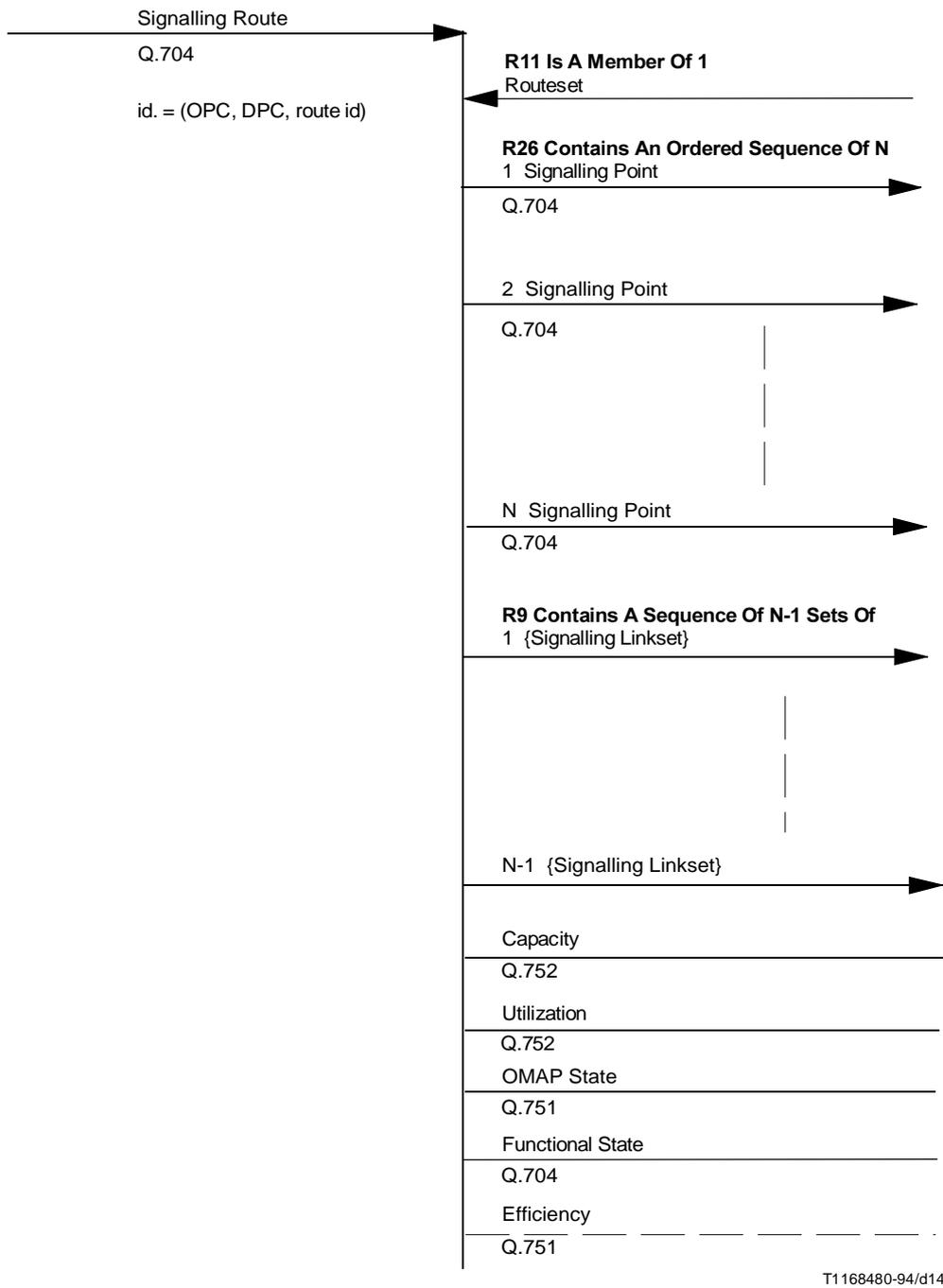


FIGURE B.9/Q.751.1
Signalling route line diagram

Two signalling routes are distinct if one or more SPs are different in the corresponding two ordered sequences.

There is a network implementation dependent value N for the maximum number of signalling points in any route (see also clause 2/Q.753).

Signalling routes can be created and destroyed, activated and deactivated.

A signalling route is created after the signalling routeset to which the route will belong is created, or if the routeset requires expansion for reliability or capacity reasons.

No signalling point may appear more than once in any valid signalling route.

A route becomes deactivated if any of its constituent signalling route components (SPs or connecting linksets) is deactivated, and is active only when all of its signalling route components are active.

A route may only be deactivated if it is not the last remaining activated route in the routeset, or it is permitted to deactivate the routeset.

A route is defined as active when the required network resources are present, when all necessary routing data is present in the signalling points of the network, and the route is ready to carry message traffic.

B.1.2.8.2 Attributes

1) *Capacity*

Several capacities could be defined, such as maximum, or current. The current capacity is the message carrying capability of the signalling route component of the route which has the lowest available capacity to devote to this route. The capacity of a route needs to be defined to identify the maximum message traffic that the route is allowed to support.

2) *Utilization*

This is the message traffic actually being carried on this route.

3) *OMAP state*

This is only defined if "Route" is defined as a network management managed object, and is then mapped from the functional state on to the OSI states appropriate to it.

4) *Functional state*

This includes the activated or deactivated status, and is formed by the logical "and" of the functional states of all of the signalling route components in the sequence. The state includes an indication of route congestion (+ congestion level if appropriate), obtained from the maximum value of all of its components, with the component's value obtained considering all of the routes using it.

The Q.704 statuses also apply, namely available, unavailable or restricted.

5) *Efficiency*

This has no definition in Recommendation Q.704, for Recommendation Q.751 we state that a route is more efficient than another to the same destination if it has fewer signalling transfer points in it, or the projected message delay is significantly lower.

B.1.2.8.2.1 Notifications

These are:

- signalling route unavailable;
- signalling route available;
- signalling route restricted (national option).

B.1.2.8.3 Supporting definition of "signalling path"

The definition of a signalling path is provided here, in order to describe the (non-ITU specified) load sharing applicable within and between linksets (in the network element view), and between routes (in the network management view). The concept is also useful in determining, in the MTP Route Verification Test, if a reported loop is a true or pseudo-loop.

Network element view

A signalling path $(A,B)_i$ is defined as an ordered sequence of the near end signalling point A (i.e. the network element), the link connecting A to an adjacent SP C which is designated to carry from A to B messages with the SLS code associated with $(A,B)_i$, and the destination SP B. The adjacent SP C may be identical with the destination B, or it may or may not be directly interconnected to the destination SP.

Associated with the signalling path is a priority and the SLS code.

Two signalling paths $(A,B)_i$ and $(A,B)_j$ are distinct if they have different links, or the SLS code associated with one is different from that associated with the other. If two signalling paths $(A,B)_i$ and $(A,B)_j$ have different links but the same priority, then they must have different SLS codes.

Two signalling paths $(A,B)_i$ and $(A,B)_j$ cannot have the same link, the same associated SLS code and different priorities.

Network management view

A signalling path $(A,B)_i$ is defined as an ordered sequence of the origin SP A, a sequence of one or more combinations of signalling link and its far end signalling point, and the destination SP B. Each link is designated to convey MSUs [with the SLS code associated with $(A,B)_i$ in the network element view] sent from A to B.

The signalling point at the near end of the first link of the sequence is the origin A. The far end of the first link in the sequence is the adjacent SP C in the network element view of the path $(A,B)_i$. If this SP "C" is not the destination, then there is a signalling path (C,B) with the SLS associated with $(A,B)_i$.

Associated with a signalling path is an SLS code and a compound priority. The compound priority is a sequence of elements arranged in the same order as the signalling links of the signalling path. Each element of the compound priority is the priority associated with the network element view of the signalling path from the corresponding signalling link's near end to the destination.

Two signalling paths $(A,B)_i$ and $(A,B)_j$ are distinct if they have different links, or the SLS code associated with one is different from that associated with the other. If two signalling paths $(A,B)_i$ and $(A,B)_j$ have different links but the same compound priority, then they are associated with different SLS codes.

Two signalling paths $(A,B)_i$ and $(A,B)_j$ cannot have the same links, the same associated SLS code and different compound priorities.

A valid signalling path is defined as a path which contains any particular link at most once in the ordered sequence, with the sequence having no more than a (network implementation dependent) defined number M of links. In addition, each intermediate signalling point in the sequence must have the MTP transfer function.

We define the "line" of a signalling path as its contained sequence of signalling points.

B.1.2.8.4 Supporting definition of "signalling path group"

A signalling path group (in the network management view) is the complete collection of signalling paths with the same sequence of signalling points and the same associated compound priority.

Associated with the signalling path group is a disjoint set of SLS codes, one for each signalling path of the group.

B.1.2.8.5 Constraints upon signalling paths

The set of signalling paths with a particular associated priority from a near end A to a destination B is not complete unless it has a complete set of SLS codes associated with it (i.e. all values from decimal 0 to decimal 15).

B.1.2.8.6 Relation between message routing, signalling paths and signalling route

If a message is to be transported between its origin and destination, there must be a signalling path for it. The message will be carried on the highest priority available path for the SLS code of the message.

The current load of a route is the sum of the loads of its constituent current signalling paths.

B.1.2.8.7 Relation between signalling path priority and linkset or combined linkset priority

Let $P_L(r,l)$ be the (network element view of the) priority of linkset l in the routeset r as defined in 4.2.1/Q.704 paragraph 3. We define $P_L(r,s) = \infty$ if linkset s is not used in the routeset r . This implies that the "highest" linkset priority has the lowest numerical value. Let $n(l)$ be the number of links in linkset l .

Then the network element view of the path priority of a path of routeset r , using a link of linkset l is:

$$\sum_{\substack{k \\ \exists P_L(r;k) < P_L(r;l)}} n(k) + \Delta$$

where Δ is calculated as follows:

- i) if linkset l does not form part of a combined linkset for routeset r , at priority $P_L(r,l)$, Δ is the relative priority of the link within linkset l for the traffic stream served by the path (as in 4.2.1/Q.704 paragraph 4 first sentence). (This uses the assumption that a linkset is available if any link within it is available); or
- ii) if linkset l does form part of a combined linkset for routeset r , at priority $P_L(r,l)$, Δ is the relative priority of the link within the combined linkset for the traffic stream served by the path. It might be that all other links of the **combined linkset** are alternatives for this link, at linkset priority $P_L(r,l)$, or (as in 4.2.1/Q.704, paragraph 4 first sentence) all other links of the **linkset** l . This latter case means that, if the links in the other linksets of the combined linkset are to be used as alternatives for "our" link, then it will have to be at (a) different **linkset** priority (or priorities).

See B.1.2.10.2 for examples of this relation.

B.1.2.9 Signalling Linkset

See Figure B.10.

B.1.2.9.1 Behaviour

A Signalling Linkset is a collection of Signalling Links used for connecting adjacent Signalling Points.

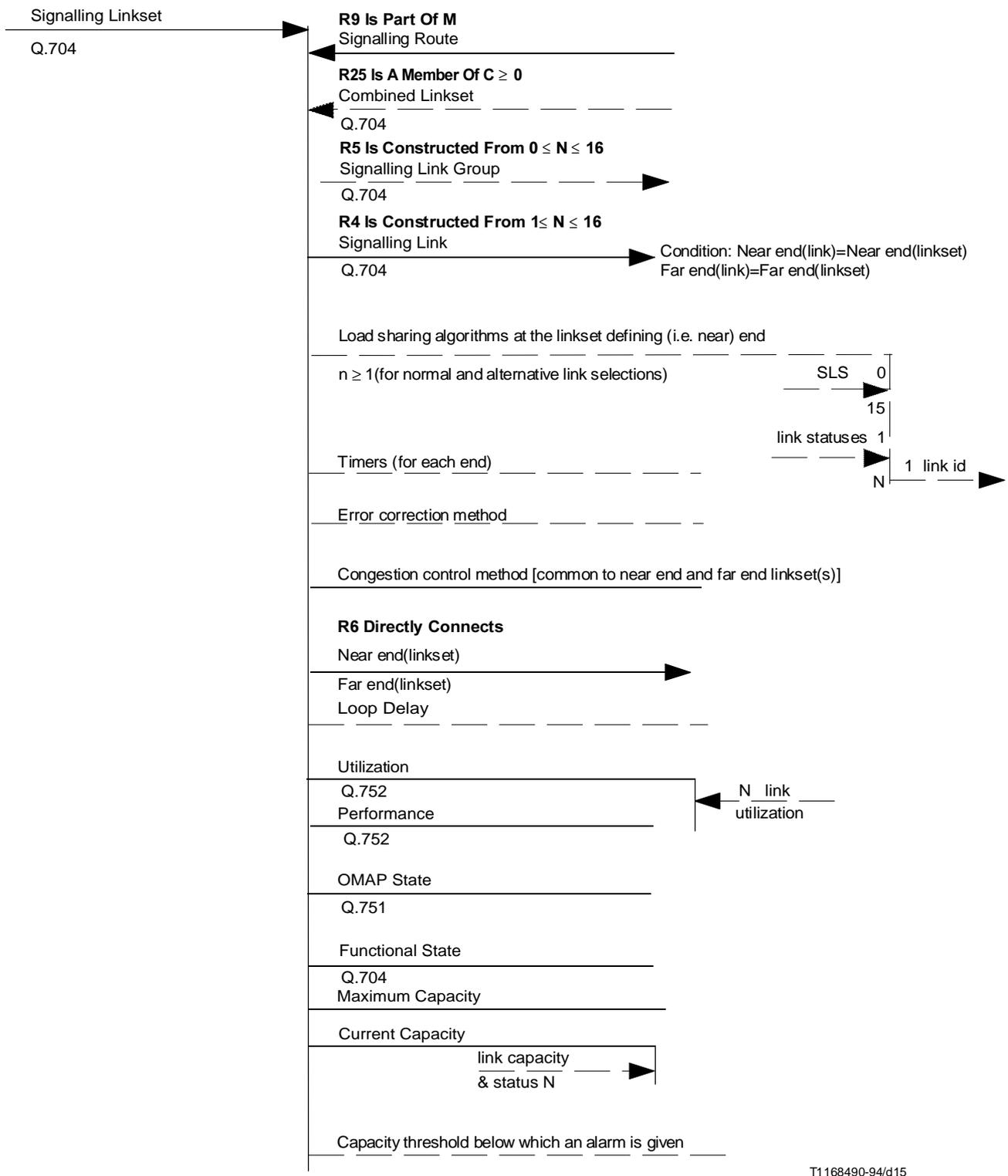
A Signalling Linkset may be part of many Routes. It can be part of a number of Combined Linksets, it may contain a number of Signalling Link Groups (a link group is a set of links with the same characteristics, e.g. transmission speed).

A Signalling Linkset is constructed from between 1 and 16 Signalling Links, all of which have the same two end points (Signalling Points) as the Signalling Linkset.

Note that a linkset is a unidirectional concept, but because signalling links are bi-directional, and must have the same identity (signalling link code, SLC) at each end, the complete set of signalling links in the signalling linksets defined at signalling point "A", whose far end is signalling point "B", is the same as the set of signalling links in the signalling linksets defined at "B" whose far end is "A". See B.1.2.10.2 for examples.

A network or vendor defined manageable message load sharing algorithm might be defined for each SP of the linkset.

A Signalling Linkset may be created, destroyed, activated (with normal and emergency restart), and deactivated.



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FIGURE B.10/Q.751.1
Signalling Linkset line diagram

Constraints:

- a) At least one route must exist (i.e. be identified) to require to use the linkset before it can be created;
- b) all links in the linkset must have been removed before the linkset can be destroyed;
- c) a linkset cannot be destroyed until it has been deactivated, and until the concerned routes have been identified as being destroyable;
- d) a linkset must exist before it can be activated;
- e) a linkset may only be deactivated if its deactivation is permitted for all routes utilizing this linkset as a signalling route component (if the linkset is deactivated, each route or partial route using the linkset would become deactivated. This could lead to some routeset becoming unavailable, and for this to occur the command must have been issued upon the routeset).

B.1.2.9.2 Attributes

1) *Load sharing algorithm*

This is shown as an optionally manageable attribute. The load sharing algorithm within the linkset is defined in Recommendation Q.704 to rely upon the SLS codes of offered messages, but not their destination, and at one time a particular available link will carry all messages with a particular SLS code.

2) *Timers*

Timers might be updateable within the Q.703, Q.704 and Q.707 limits.

- i) **Level 2:** if any of these are human-machine up dateable, there should be a check that the limits are those of ITU-T (formerly CCITT) Recommendation 12.3/Q.703. In addition, if the network limits the error correction method to be the same for all links of the linkset, and if a satellite is in the transmission path of the linkset, the "excessive delay of acknowledgement" timer T7 should be constrained to be not less than 0.8 seconds.
- ii) **Level 3:** if any of the timers are human-machine updateable⁵⁾, then their values should be restricted to those given in ITU-T (formerly CCITT) Recommendation 16.8/Q.704. Certain timers might apply on a linkset, rather than a link, basis, e.g. T1-T6, T10, T12-T14, T17, T21, T23.

3) *Error correction method*

It is desirable that this is the same for all links in the linkset. It might be possible to define the method by human-machine interface, or to read the mechanism.

4) *Congestion control method*

This might be a network-wide scheme, rather than a per-linkset scheme or a per SP scheme. It is unlikely to be a per routeset scheme.

Congestion of a routeset is first detected when a message with DPC that of the routeset is to be placed into the transmission or retransmission buffer of the link, and a congestion threshold is thereby exceeded, or a congestion threshold of the link has already been passed but this message is the first to the DPC at this congestion level.

One of two main types of congestion control mechanism can be applied to a routeset:

- 1) with message priorities; or
- 2) without message priorities.

⁵⁾ Note that MTP level 3 timers are implicitly MTP-wide, and not just per linkset. But it might be convenient to hold their values per linkset.

Type 1 uses multiple levels of congestion, and message discard within the MTP, if an offered message for a particular routeset has a priority lower than the current discard level. For every such message received, the origin (local or remote) is told that routeset congestion exists, and its level (which is the congestion level of the link). The MTP at a remote SP receiving such an indication remembers it, and starts a signalling routeset congestion test, employing timers T15 and T16. (See 11.2.4/Q.704, 13.7/Q.704 and 13.9/Q.704).

Type 2 has two subtypes:

- i) single congestion level; or
- ii) multiple congestion levels.

For both of these subtypes, the origin (local or remote) of a message is told when that message is the first to indicate (a particular level of) congestion. If multiple levels of congestion are used, the particular congestion level is also indicated (this is initially set to a value s for the link when congestion starts). Indications are returned for the initial and every 8th message or Nth octet (N provisionally is 279 to 300) subsequently received, to this message's origin. The counting can be for the congested routeset, or per linkset of the congested routeset, or per link of the congested routeset, or per congested link of the congested routeset. Messages are not discarded by the MTP for this congestion control type, and the signalling routeset congestion test is not used.

For multiple congestion levels, 3.8/Q.704 suggests using a timer mechanism with timers T_x and T_y in an SP containing the congested link, to determine the signalling link congestion status. Here, there is just one congestion onset and one congestion abatement threshold. When the congestion onset threshold is passed, the link's congestion status is set to s . If the buffer occupancy continues to be above the congestion onset threshold during T_x , then the signalling link's congestion status is increased by 1. For each additional T_x when the buffer occupancy persists above the onset threshold, the congestion status is increased by 1. If the buffer occupancy falls below the congestion abatement threshold, and persists for a time T_y below the threshold, then the congestion status of the link is decreased by 1. For each additional T_y with the buffer occupancy persisting below the abatement threshold, the congestion status is decreased by 1 (until 0 is reached, with the link uncongested). A similar effect can be achieved to the timer mechanism by using multiple congestion onset and abatement thresholds (as in SPs with type 1 congestion control, but with appropriate values for thresholds).

For both subtypes, the congestion status of the routeset is set to that of the congested link, within the SP containing it.

The congestion control type should be indicated. This might be a read-only value (at best), and is set per SP.

For type 1, timer values might be read-writable, just read-only, or not even readable, per SP. Congestion onset and abatement thresholds, and discard thresholds, might be similarly manageable (but it is possible that these are manageable per SP, per link or per linkset).

For type 2, the subtype should be indicated, this might also be read-only per SP. Also the message counting or octet counting (with value of N) method should be indicated per SP (this might be a read-only indication, but if octet counting is used, N might be read-only, read-write, or neither, per SP).

The method of reporting (per congested routeset, per linkset of the congested routeset, per link of the congested routeset, or per congested link of the congested routeset) might be read-only per SP.

For subtype i), the congestion onset and abatement threshold might be read-only, or read-write, or neither, per SP, or per linkset, or per link.

For subtype ii), if there is one congestion onset and one abatement threshold, this might be read-only, read-write, or neither, again per SP, per linkset, or per link. The timer values T_x and T_y are likely to be manageable (if at all) only per SP. The value of s , if manageable, might be per SP, per link, or per linkset.

For subtype ii) with multiple congestion thresholds, these might be manageable (if at all) per SP, per linkset, or per link.

It is unlikely that the multiple levels of congestion with message priorities method would co-exist in the same network as the multiple levels of congestion without priorities method, but the "international" method (i.e. one level only of congestion, no message priorities) might co-exist with the multiple levels of congestion without priorities method, and then it would be desirable to select the scheme per linkset.

5) Loop delay is an optional read-only attribute.

6) *Utilization*

This is the message traffic carried by the linkset (as measured during the last accumulation period). It is the sum of the traffics carried by its constituent links.

7) *Performance*

This is the set of linkset measurements from, for example, Table 4/Q.752.

8) *OMAP state*

This is to be mapped from the Q.704 functional state into appropriate OSI states.

9) *Functional state*

This is the state selected from those shown in Figure 36/Q.704.

10) *Maximum capacity*

This can be expressed as the number of MSUs (and octets) transportable each way per second on the linkset, when all assigned activate-able links are working at their maximum capacity.

11) *Current capacity*

This is the calculated maximum message traffic (MSUs and octets) that can be carried with the currently available links.

B.1.2.10 Combined linkset

See Figure B.11.

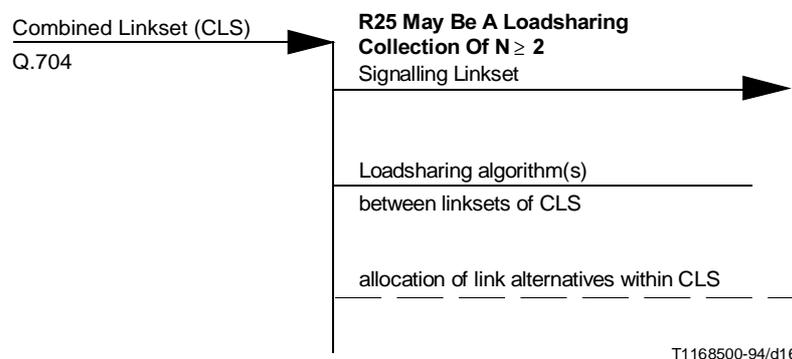


FIGURE B.11/Q.751.1
Combined linkset line diagram

B.1.2.10.1 Behaviour

A combined linkset is a collection of two or more signalling linksets, whose near ends are the same signalling point.

Associated with the combined linkset's network element view are one or more destinations, whose message traffic from or through the near end SP is load shared across the constituent signalling linksets, according to an (SP or network implementation dependent) algorithm per destination.

Thus a combined linkset is the network element view, at the near end SP, of the corresponding network management set of equal priority routing choices to the destination(s) served by the combined linkset.

A linkset may form part of several combined linksets.

A combined linkset may be created and destroyed (i.e. have linksets allocated to it or de-allocated from it).

B.1.2.10.2 Examples of linkset, parallel and combined linksets

See Figure B.12.

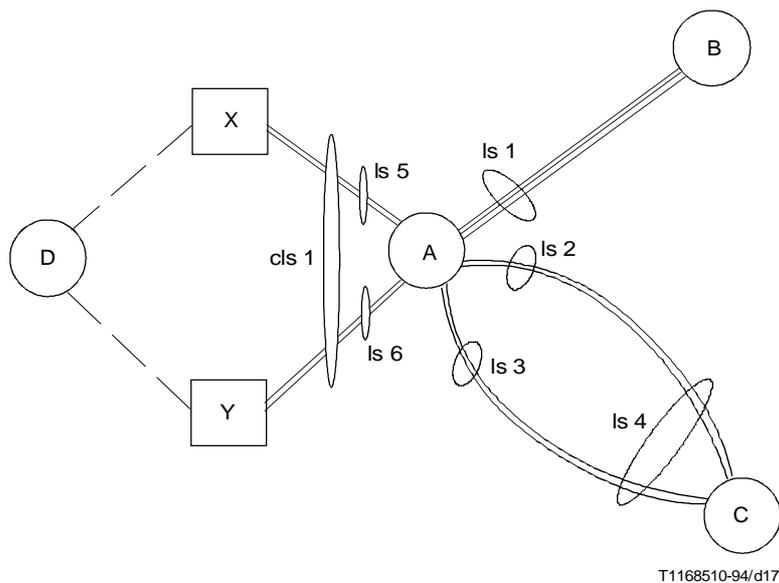


FIGURE B.12/Q.751.1
Linkset examples

Here the linkset Is 1 defined from SP A to SP B contains three links, and is also defined as just one linkset from B to A.

A has two parallel linksets, Is 2 and Is 3, from A to C. C defines these as just one linkset Is 4 to A.

A has a combined linkset cls 1, consisting of the two two-link linksets Is 5 and Is 6, to reach D. By definition, at least one of the constituent linksets of a combined linkset must access the destination through an STP (two are shown here, X and Y).

Path priority and linkset priority example

Let the normal load sharing rule for destination D on combined linkset cls 1 for messages at A be:

- messages with SLS codes in the range [0..7] are routed over linkset ls 5;
- messages with SLS codes in the range [8..15] are routed over linkset ls 6.

Let cls 1 have a (combined) linkset priority of p in the routeset (A, D). Identify the links of ls 5 as 5-1 and 5-2, and those of ls 6 as 6-1 and 6-2.

Suppose the normal SLS code allocations at A for messages to D are 0,2,4,6 on link 5-1; 1,3,5,7 on link 5-2; 8,10,12,14 on link 6-1 and 9,11,13,15 on link 6-2.

Then, according to 4.2.1/Q.704, link 5-2 is an alternative to 5-1. Hence, at (combined) linkset priority p , the path priority relative to linkset ls 5 for link 5-1 to serve the SLS code 2 is 1, and for link 5-2 to serve it is 2.

The absolute path priorities are $\Gamma + 1$ and $\Gamma + 2$ respectively, where Γ is the sum of the number of all links in linksets used by A to D whose linkset priorities are $p - 1$ or better.

According to Recommendation Q.704, ls 6 might be an alternative linkset to ls 5, but the linkset priority would be $p + 1$ at least. Then, if link 6-1 were to be used as an alternative to link 5-1, after link 5-2, the absolute path priority for SLS code 2 on link 6-1 is $(\Gamma + 2) + 1$.

However, if all the other links in the **combined** linkset are alternatives for a given link, at the same (combined) linkset priority p , then given a cyclic redistribution of SLS codes from link 5-1 on failure to all other links in the combined linkset, the first alternative link for SLS code 2 would be link 6-1, and so the absolute path priority for SLS 2 on link 6-1 is $\Gamma + 2$.

B.1.2.11 Signalling link

See Figure B.13.

B.1.2.11.1 Behaviour

A signalling link is a constituent of the linkset directly connecting a signalling point with an adjacent SP. It is the combination of the signalling data link and signalling terminals.

The status of signalling links is defined in ITU-T (formerly CCITT) Recommendation 3.2/Q.704, and the link management procedures are defined in clause 12/Q.704.

A signalling link can be a member of only one signalling linkset, and its ends must be in the same signalling points as the linkset's.

A signalling link may be created and destroyed, activated and deactivated, inhibited or uninhibited. It might be tested by, for example, the signalling link test defined in Recommendation Q.707 (when inhibited, and possibly when not, the test could be run manually).

Constraints:

- a) a link can only be created if the linkset to which it will belong exists;
- b) a link must be deactivated before it can be destroyed;
- c) a link cannot be deactivated if by doing so its linkset would be deactivated, or it is permitted to deactivate the linkset;
- d) the constraints upon inhibiting the link are defined in clause 10/Q.704. If any destination were to become inaccessible upon inhibiting the link, the MTP refuses the inhibition request from OMAP. Note that a link may be automatically uninhibited if a destination has become inaccessible and the use of the inhibited link would remedy this.

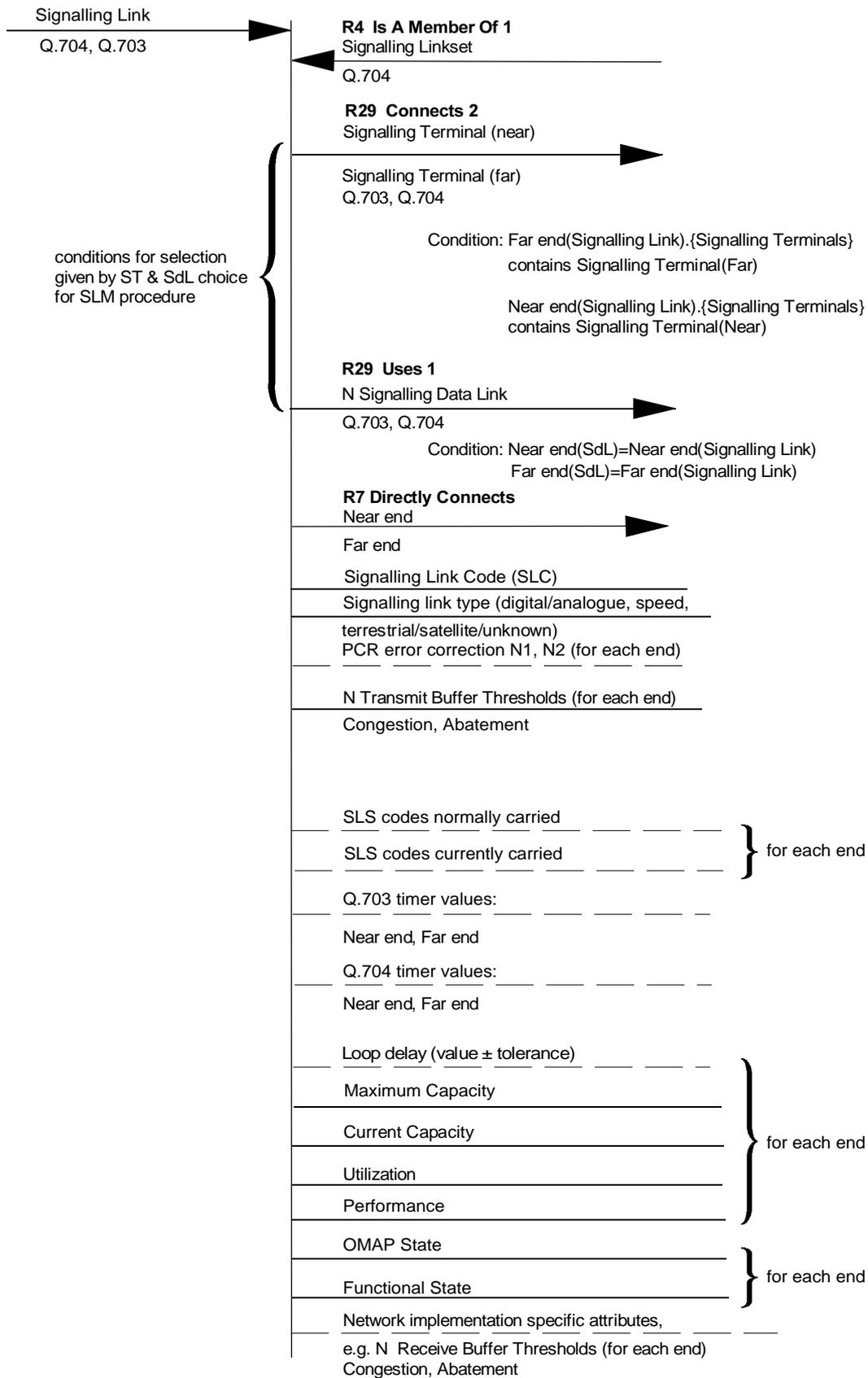


FIGURE B.13/Q.751.1
Signalling link line diagram

B.1.2.11.2 Attributes

- 1) The Signalling Link Code (SLC) is the same value (between 0 and 15) at each end of the link, and is different from that of any other link between the same two adjacent signalling points.
- 2) The signalling link may be digital 64 kbit/s (the standard digital rate), or analogue with a minimum equivalent bit rate for telephony applications of 4.8 kbit/s (see Recommendation Q.702). It also has a type, which is terrestrial, satellite or unknown.
- 3) The error correction method (basic or preventive cyclic retransmission) is an attribute of the link. It might be allocable to the link by human-machine interaction, possibly on a linkset basis. It might be read-only, or not readable. If the method is PCR, the values of N1 and N2 must be allocated at each end, possibly by human-machine interaction.
- 4) Transmission (and possibly retransmission) buffer thresholds exist for the determination of onset of congestion. Multiple thresholds might be defined, to allow different levels of response. A timer, or thresholds, might be used to determine the abatement of congestion. If the method of multiple congestion levels with message priorities is used, then message discard thresholds are also defined. All these thresholds might be human-machine up dateable. Any quantitative limits (and checks that the abatement threshold is sufficiently lower than the corresponding onset threshold to avoid oscillation) would need to be enforced.
- 5) SLS codes might be readable, or adjustable by human-machine interaction (but this needs coordination at linkset level).
- 6) MTP level 2 and level 3 timers might be adjustable, within the limits given by Recommendations Q.703 and Q.704, by human-machine interaction. If periodic signalling link tests (see Recommendation Q.707) are performed, the period might also be adjustable.
- 7) The loop delay's value and tolerance might be readable.
- 8) Capacities of the signalling link might be affected by, for example, automatic allocation of signalling terminals or signalling data links. If different types of terminal are possible at one end of the link, the current and maximum capacities might be different. It might be beneficial to read these.
- 9) Utilization might be obtained from, for example, Table 3/Q.752 measurements.
- 10) Performance figures might be obtained from measurements in Tables 1, 2 and 3 of Recommendation Q.752.
- 11) OMAP state: this would be mapped from the functional state, if it is desired to model the SS No. 7 signalling link states in OSI management terms.
- 12) Functional state: this is defined by Recommendations Q.704 and Q.703.
- 13) Network implementation specific attributes might exist (e.g. Receive buffer congestion onset and abatement thresholds might need to be defined for some implementations; **some** mechanism is necessary. The method's parameters might be adjustable by human-machine interaction).

B.1.2.11.3 Relationship between network element and network management views

The network element (i.e. SP) view can be constructed from the network management view by considering one end of the signalling link.

B.1.2.12 Signalling data link

A signalling data link is the MTP level 2 connection serving a signalling link.

If automatic allocation of signalling data links (and by implication automatic allocation of signalling terminals) is employed between the two connected signalling points, then any pre-designated communication path may be used for the signalling data link, and signalling within the MTP occurs when the signalling data link is to be allocated. Otherwise, the signalling data link is allocated semi-permanently to the signalling link.

B.1.2.13 Signalling terminal

A signalling terminal is the termination of a signalling link at an SP. Each end of the signalling link employs a signalling terminal. The signalling terminal can be (semi-) permanently allocated to the signalling link as in the Basic Link Management scheme (see 12.2/Q.704), or it can be connected via a switchblock and allocated automatically (see 12.3/Q.704).

Automatic allocation of signalling terminals may be done even though the signalling data link can be (semi-) permanently allocated to the signalling link.

B.1.2.14 MTP routing table

This is a supporting item, which contains details of all the network's routesets. The network management view enables the individual network element views (i.e. the SPs' MTP routing tables) to be coordinated. It may be thought of as a list of routesets organized as a matrix of rows and columns, the element in row i column j is the routeset from SP i to destination SP j .

It has an administrative state, to enable changes to be made consistently in the network.

B.1.2.14.1 Use of MTP routing table

A signalling point wishing to route a load-shared message to a destination D chooses from the routeset to D the highest priority available linkset or combined linkset.

If the highest priority available entity is a linkset, the link over which to send the message is determined from the linkset's load sharing algorithm and the message's SLS code.

If the entity is a combined linkset, the selection of the link used may be viewed as consisting of two stages (although in practice these stages may be concatenated into one): first the linkset of the combined linkset is chosen, using the inter-linkset load sharing algorithm current in the combined linkset for D, and the whole or part of the SLS code of the message; next the link is chosen from the linkset, using the linkset's load sharing algorithm and the SLS code of the message.

Annex C

Examples

(This annex forms an integral part of this Recommendation)

NOTE – The tables in C.1, C.2, C.3 do not show ALL possible combinations – which is the reason why they are titled "examples" – of MTP states or of OSI/TMN states of the respective managed objects. However, the given cases are not just examples, but show the correct MTP-OSI/TMN-state mapping of the respective managed objects.

C.1 Example state mapping of signLinkSetTp

MTP versus OSI/TMN state of signLinkSetTp

MTP functional states			OSI/TMN state for linkset		
Link 1	Link 2	Link 3	Operational	Usage	Availability
Available	Available	Available	Enabled	Active or busy	–
Available	Available	Unavailable	Enabled	Active or busy	Degraded
Unavailable	Unavailable	Unavailable because inhibition	Enabled	Idle	Degraded
Unavailable	Unavailable	Unavailable	Disabled	Idle	Dependency

C.2 Example state mapping of signLinkTp

The following three tables give examples for the state mapping:

- a) for available signLinkTps;
- b) for not available signLinkTps due to one unavailability reason;
- c) for not available signLinkTps with a combination of several unavailability reasons.

State mapping for available signalling Link termination points

MTP versus OSI/TMN state of signLinkTp

Functional state	Admin. state	Operat. state	Usage state	Proc. status	Link termination point status
Unblocked uninhibited (restored) activated not congested	Unlocked	Enabled	Active	–	–
Unblocked uninhibited (restored) activated congested	Unlocked	Enabled	Busy	–	–

“–” Denotes the empty status.

State mapping for not available signalling Link termination points

MTP versus OSI/TMN state of signLinkTp

Functional state	Admin. state	Operat. state	Usage state	Proc. status	Link termination point status
Unblocked uninhibited (restored) activated	Unlocked	Enabled	Idle	–	– ^{a)}
Loc.blocked uninhibited (restored) activated	Unlocked	Disabled	Idle	–	Loc-blk
Rem. blocked uninhibited (restored) activated	Unlocked	Disabled	Idle	–	Rem-blk
Unblocked Loc.inhib. (restored)	Unlocked	Enabled	Idle	–	Loc-inh
Unblocked rem.inhib. (restored) activated	Unlocked	Enabled	Idle	–	Rem-inh
Unblocked uninhibited failed	Unlocked	Disabled	Idle	Initializing or not initial.	Failed
Unblocked uninhibited (restored) deactivated by OS	Locked	Disabled	Idle	Not initial.	Deact
Unblocked uninhibited deactivated by MTP L3	Unlocked	Disabled	Idle	Not initial. or initializing	Deact
^{a)} This is the status after initial alignment, during signalling link test.					

Combined state mapping for not available signalling Link termination points

Examples: Combinations of two, three and four failure reasons.

MTP versus OSI/TMN state of signLinkTp

Functional state	Admin. state	Operat. state	Usage state	Proc. status	Link termination point status
Loc.blocked uninhibited failed	Unlocked	Disabled	Idle	Not initial. or initializing	Loc-blk. failed
Loc.blocked rem.inhib. deactivated by OS	Locked	Disabled	Idle	Not initial.	Loc-blk, rem-inh, deact
Loc.blocked loc. inhib. rem.inhib. deactivated by OS	Locked	Disabled	Idle	Not initial.	Loc-blk, Loc-inh, rem-inh, deact

C.3 Example state mapping for signRouteSetNePart

The following table shows the possible state combinations and their relation to the MTP functional state of the signRouteSetNePart.

State mapping for signRouteSetNePart

Functional state	Admin. state	Operat. state	Congested state ^{a)}	Description
Available	Unlocked	Enabled	Not congested	The route set is accessible
Congested	Unlocked	Enabled	Congested ^{a)}	The route set is accessible, but congested
Unavailable	Unlocked	Disabled	Not congested	The destination SP is inaccessible, but administratively intended to be used
Unavailable	Locked	Enabled	Not congested	The route set is accessible, but is administratively locked
Unavailable	Locked	Enabled	Congested ^{a)}	The route set is accessible, but is congested and administratively locked
Unavailable	Locked	Disabled	Not congested	The destination SP is inaccessible and administratively prohibited to be used

^{a)} If the attribute congestionLevel is used, the respective congestion level applies.

C.4 Examples for the signRouteNePart MOC

The following table represents an example to help understand the way the priorities of the routes behave depending on the value of the priorityMode in case of modifying the priority of one route:

"target" priority for route5 => priority = 2		resulting priority in case of priorityMode =			
signRouteNePart	"starting priority"	EQUAL	INSERT	EXCHANGE SINGLE	EXCHANGE GROUP
route1	1	1	1	1	1
route2	2	2	3	4	4
route3	2	2	3	4	4
route4	3	3	4	3	3
route5	4	2	2	2	2
route6	4	4	5	4	2

The following table represents an example to help understand the way the priorities of the routes behave depending on the possibility or impossibility of a "priority gap":

		resulting priority in case of			
		"priority gap" allowed and		"priority gap" not allowed and	
signRouteNePart	"starting priority"	deleting route4	modifying route4's priority to 2 with priorityMode = EQUAL	deleting route4	modifying route4's priority to 2 with priorityMode = EQUAL
route1	1	1	1	1	1
route2	2	2	2	2	2
route3	2	2	2	2	2
route4	3	–	2	–	2
route5	4	4	4	3	3
route6	4	4	4	3	3

The following table shows the possible state combinations and their relation to the MTP functional state of the signRouteNePart:

Functional state	Administrative state	Operational state	Usage state	Availability status	Description
Available	Unlocked	Enable	Active	{ }	Available and in use
Available	Unlocked	Enable	Idle	{ }	Available but not used (Note 1)
Restricted (Note 2)	Unlocked	Enable	Busy	{ Degraded }	A TFR message has been received and the Route is in use
Restricted (Note 2)	Unlocked	Enable	Idle	{ Degraded }	A TFR message has been received and the Route is not in use
Prohibited (Note 3)	Unlocked	Disable	Idle	{ Dependency }	A TFP message has been received
Unavailable (Note 3)	Unlocked	Disable	Idle	{ Dependency }	The Link Set is unavailable
Unavailable	Locked	Disable	Idle	{ Off Line }	The Route is locked by the manager
Unavailable	Unlocked	Disable	Idle	{ Off Line }	The Route is unlocked by the OS but locked by a local administrator

NOTES

- 1 Because a route with higher priority is available (see also 6.2.12).
- 2 National option.
- 3 These two states can be distinguished by reading additionally the corresponding Link (Set) State.

Annex D

Networkmanagement of an SS No. 7 network

(This annex forms an integral part of this Recommendation)

The relationship between the objects on the NM-level and the objects on the NE-level ought to be described.

See Clause 3/Q.750 for a comparison of networkelementmanagement with networkmanagement.

D.1 Plain text description of object classes

This subclause gives a plain text description of the various managed object-classes which are distinguished on the networkmanagement level. For each object-class the SS No. 7 function and the management aspects are clarified. See Figure D.1.

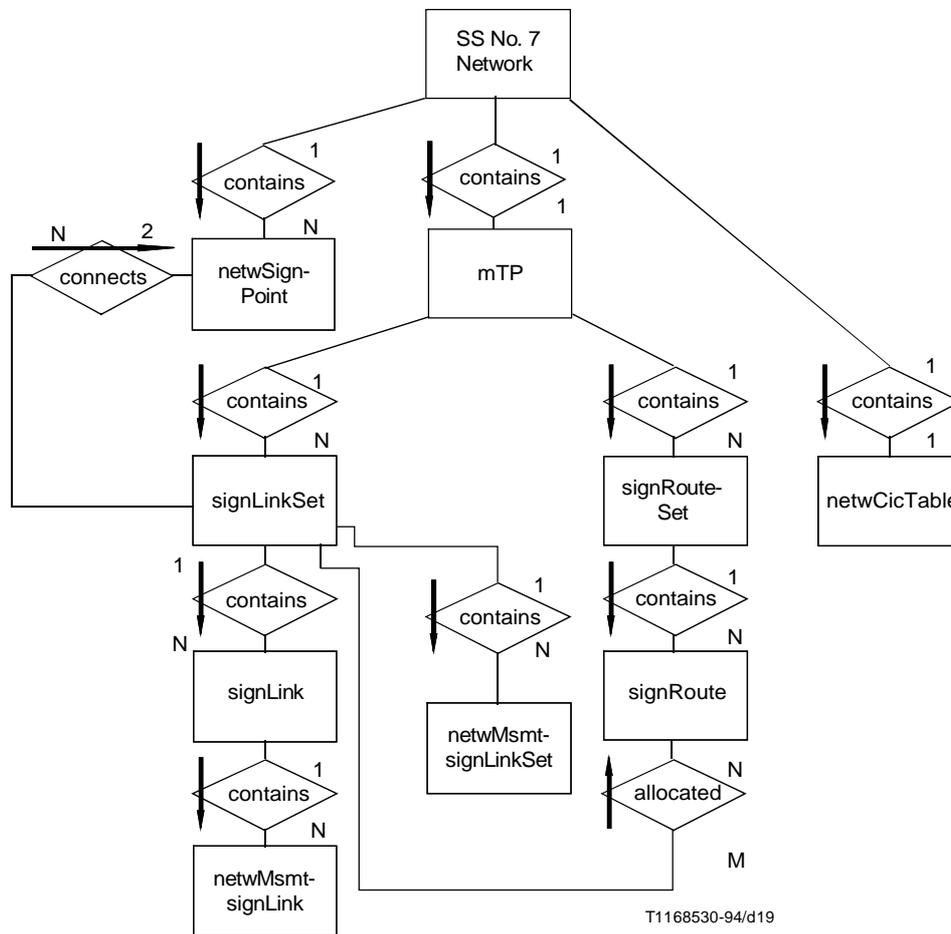


FIGURE D.1/Q.751.1

Entity-relationship diagram for networkmanagement

NOTE – A signDataLink managed object class might be required on the networkmanagement layer, this is for further study. Other possible managed object classes are: MRVT, CVT, SRVT, etc.

D.1.1 CIC-table at networkmanagement level

SS No. 7 function

For the identification of telecommunications circuits, ISUP uses the Circuit Identification Code (CIC). It is essential to keep track of the issued CICs in order to certify that the two SEPs at either end of a telecommunications circuit, use the same CIC for this circuit.

Management aspects

At the networkmanagement level it must be possible to assign or to modify the CIC-value of a certain telecommunication circuit. An assignment or a modification will cause implicitly a modification of the two corresponding cicTable-objects at networkelementmanagement level. (A direct modification of a cicTable-object at networkelementmanagement level should not be allowed.)

Object Class	Attributes	Notifications	Actions
netwCicTable	netwCicTableId		
	cicCircuitComb		

The attribute cicCircuitComb contains a (OPC-DPC-unique) CIC-identifier for all the telecommunication circuits (of every possible signalling relation in the network).

D.1.2 Signalling link

SS No. 7 function

The signalling link on networkmanagement level is modelled by a signLink managed object class. Management-operations on a signLink object will in general have counterpart management-operations on the two corresponding signLinkTp objects.

Management aspects

At networkmanagement level it should be possible to reconfigure a signalling link, i.e. allocate different signalling terminals or a different signalling datalink to it. It should be possible to request or to modify the state of a signalling link.

Also it must be possible to modify certain attributes (e.g. congestion thresholds) or collect measurement notifications from the signalling link.

Object class	Attributes	Notifications	Actions
signLink	signLinkTpId	stateChange	signLinkTest
– (Type - 0) – (Type - 1) – (Type - 3)	state	occQ752-SL	reconfigureLink
	q703-tx		modifyTimer
	q704-tx		
	maxCapacitySL		
	currentCapacitySL		
	congThreshTrxLeft		
	congThreshTrxRight		
	congThreshRecLeft		
	congThreshRecRight		
	linkTestPatternLeft		
linkTestPatternRight			

For the above-mentioned attributes with a left and right-indication, both ends of the signalling link may have different values.

D.1.3 Signalling LinkSet

SS No. 7 function

The object class signLinkSet reflects the characteristics of the signalling link set on networkmanagement level. It is represented by two signLinkSetTps on networkelement level. In defining actions on the signLinkSet, these actions will in general result in actions onto the corresponding signLinkSetTps.

Management aspects

For networkmanagement it must be possible to change the state of the signLinkset (as far as the administrative state, the repair-status and the control-status is concerned). Also it must be possible to modify certain attributes or collect measurement notifications from the signalling linkset.

Object class	Attributes	Notifications	Actions
signLinkSet	signLinkSetId	stateChange	
	state	occQ752-SLS	
	leftSignPoint		
	rightSignPoint		
	errCorrMethod		
	loadShareAlgorithmLeft		
	loadShareAlgorithmRight		
	congControlMethod		
	maxCapacityLSLeft		
	maxCapacityLSRight		
	currentCapacityLSLeft		
	currentCapacityLSRight		
	setOfSignRoutes		

Whether the set of signalling linkgroups from which a signLinkSet is constructed should be made visible is for further study.

D.1.4 Signalling point

SS No. 7 function

The object class netwSignPoint reflects the characteristics of the signalling point as viewed by a network manager.

Management aspects

At networkmanagement level it must be possible to start an MRVT and CVT for a specific destination and it must be possible to restart a netwSignPoint. Also it must be possible to modify or request the state of the netwSignPoint. The netwSignPoint object has a read-only attribute called hierarchyLayer. This attribute denotes an identification of the layer in the signalling network hierarchy to which this netwSignPoint belongs. It can be important for testing whether the implemented routing satisfies certain rules.

Object class	Attributes	Notifications	Actions
netwSignPoint	netwSignPointId	mrvtTestResult	startMrvt
	state	stateChange	restartSp
	spType	cvtResult	startCvt
	pointCode		
	location		
	hierarchyLayer		
location: This represents a geographical location.			

D.1.5 Signalling Route

NOTE – The managed objects signRoute and signRouteSet are present in the NM-layer because we suppose that in this way an Administration is able to modify in a coordinated manner all individual Routing Tables within the signalling Points.

Note that a particular signRoute may be part of many other signRoute(s), and a particular signRouteSet may be part of many other signRouteSet(s), and any change to the former would cause corresponding changes to the latter. Such changes might best be co-ordinated automatically by an OS.

SS No. 7 function

A signalling route is an ordered sequence of signalling points, directly interconnected by linksets.

Management aspects

For networkmanagement it must be possible to change the state of the signRoute (as far as the administrative state, the repair-status and the control-status is concerned).

Such a modification will result in an (automatic) modification of mtpRouteTable objects on networkelement-management level. If this signRoute forms a part of another signRoute, then any modification will have a corresponding effect upon the other signRoute.

NOTE – Whether a signalling relation managed object class adds additional information is for further study.

It may be required to add subclasses for various route-types. These are routes with special characteristics.

Object class	Attributes	Notifications	Actions
signRoute	signRouteId	stateChange	
	signPointSequence		
	signLinkSetSequence		
	state		

The signPointSequence attribute is defined as a sequence of signPointId's. The signLinkSetSequence is defined as a sequence of signLinkSetIds.

D.1.6 Signalling RouteSet

SS No. 7 function

A signalling route set is the set of the signalling routes between two Signalling Points (SPs). For each signalling relation in the network a signalling route set (signRouteSet object) is defined.

Management aspects

On the networkmanagement level it must be possible to define or to modify an existing signRouteSet. Such an activity on the networkmanagement level will result in automatic and implicit definition or modification of mtpRouteTable objects on the networkelementmanagement level. Also it must be possible to change the state of the signRouteSet (as far as the administrative state, the repair-status and the control-status is concerned).

Object class	Attributes	Notifications	Actions
signRouteSet	signRouteSetId	stateChange	
	opc		
	dpc		
	state		

D.1.7 SS No. 7 network

D.1.8 Measurements

SS No. 7 function

Management aspects

In Recommendation Q.752 a large number of measurements is defined, for instance duration measurements (i.e. duration measurements) which have to be activated on demand. For instance, for a signLink object a measurement objectclass on networkmanagement level (netwMsmt) could be defined. When such a measurement is activated on the networkmanagement level, implicitly and automatically two measurements could be started on the networkelementmanagement level which pertain to the two corresponding signLinkTp-objects.

NOTE – For every measurement defined in Recommendation Q.752 it should be studied how they have to be modelled on networkmanagement level.

D.2 Semi-formal specification of the managed object classes

NOTE – To be supplied.

Annex E

Formal descriptions of MTP measurements

(This annex forms an integral part of this Recommendation)

This annex contains GDMO templates for modelling measurements for the MTP. These measurements are described in Tables 1 to 6/Q.752. Subclause E.1 contains tables that indicate the relationship with the modelling done in this annex to the descriptions in Recommendation Q.752. Subclause E.2 presents the GDMO modelling. The ASN.1 descriptions for attributes defined in this annex are included in the main body of this Recommendation.

E.1 Relationship with Recommendation Q.752

Q.752 meas.	Represented by	With name	With syntax	In Managed Object Class
1.1	Attribute	sInServiceDuration	Seconds	oblSignallingLinkDurationData, granularityPeriod = 30min (obl/perm measurement)
1.2	Notification	X.721:communicationsAlarm	probableCause = 102	signLinkTp (obl/perm measurement)
1.3	Notification	X.721:communicationsAlarm	probableCause = 102 specificProblems = 003	signLinkTp
1.4	Notification	X.721:communicationsAlarm	probableCause = 102 specificProblems = 004	signLinkTp
1.5	Notification	X.721:communicationsAlarm	probableCause = 102 specificProblems = 005	signLinkTp
1.6	Notification	X.721:communicationsAlarm	probableCause = 102 specificProblems = 006	signLinkTp
1.7	Attribute	sAlignment	X.721:counter	allSignallingLinkUtilizationData, granularityPeriod = 5,30min
1.8	Attribute	signUnitsReceived	X.721:counter	oblSignallingLinkUtilizationData, granularityPeriod = 5,30min
1.9	Attribute	negAckReceived	X.721:counter	allSignallingLinkUtilizationData, granularityPeriod = 5,30min

Q.752 meas.	Represented by	With name	With syntax	In Managed Object Class
1.10	Attribute Notification	localChangeOvers ss7OnOccEvent	X.721:counter probableCause = 110 PerceivedSeverity = Maj/Min/War	allSignallingLinkUtilizationData, granularityPeriod = 30min signLinkTp
1.11	Notification	ss7OnOccEvent	probableCause = 110 PerceivedSeverity = Cleared	signLinkTp
1.12	Notification	X.721:communicationsAlarm	probableCause = 102 PerceivedSeverity = Cleared	signLinkTp
2.1	Attribute	sIUnavailabilityDuration	Seconds	oblSignallingLinkDurationData, granularityPeriod = 30min (obl/perm measurement)
2.5	Attribute	sILocalInhibition	Seconds	all30MinSignallingLinkDurationData, granularityPeriod = 30min
2.6	Attribute	sIRemoteInhibition	Seconds	all30MinSignallingLinkDurationData, granularityPeriod = 30min
2.7	Attribute	sIFailed	Seconds	all30MinSignallingLinkDurationData, granularityPeriod = 30min
2.9	Attribute	sIRemoteProcOutage	Seconds	all30MinSignallingLinkDurationData, granularityPeriod = 30min

Q.752 meas.	Represented by	With name	With syntax	In Managed Object Class
2.10	Notification	ss7OnOccEvent	probableCause = 210 PerceivedSeverity = Maj/Min/War	signLinkTp
2.11	Notification	ss7OnOccEvent	probableCause = 210 PerceivedSeverity = Cleared	signLinkTp
2.13	Attribute	localMgntInhibit	Seconds	all5And30MinSignallingLinkDurationData, granularityPeriod = 5,30min
2.14	Attribute	localMgntUninhibit	Seconds	all5And30MinSignallingLinkDurationData, granularityPeriod = 5,30min
2.15	Attribute	localBusy	X.721:counter	all5And30MinSignallingLinkDurationData, granularityPeriod = 5,30min
2.16	Notification	ss7OnOccEvent	probableCause = 216 PerceivedSeverity = Maj/Min/War	signLinkTp
2.17	Notification	ss7OnOccEvent	probableCause = 216 PerceivedSeverity = Cleared	signLinkTp
2.18	Notification	ss7OnOccEvent	probableCause = 218 PerceivedSeverity = Maj/Min/War	signLinkTp
2.19	Notification	ss7OnOccEvent	probableCause = 218 PerceivedSeverity = Cleared	signLinkTp

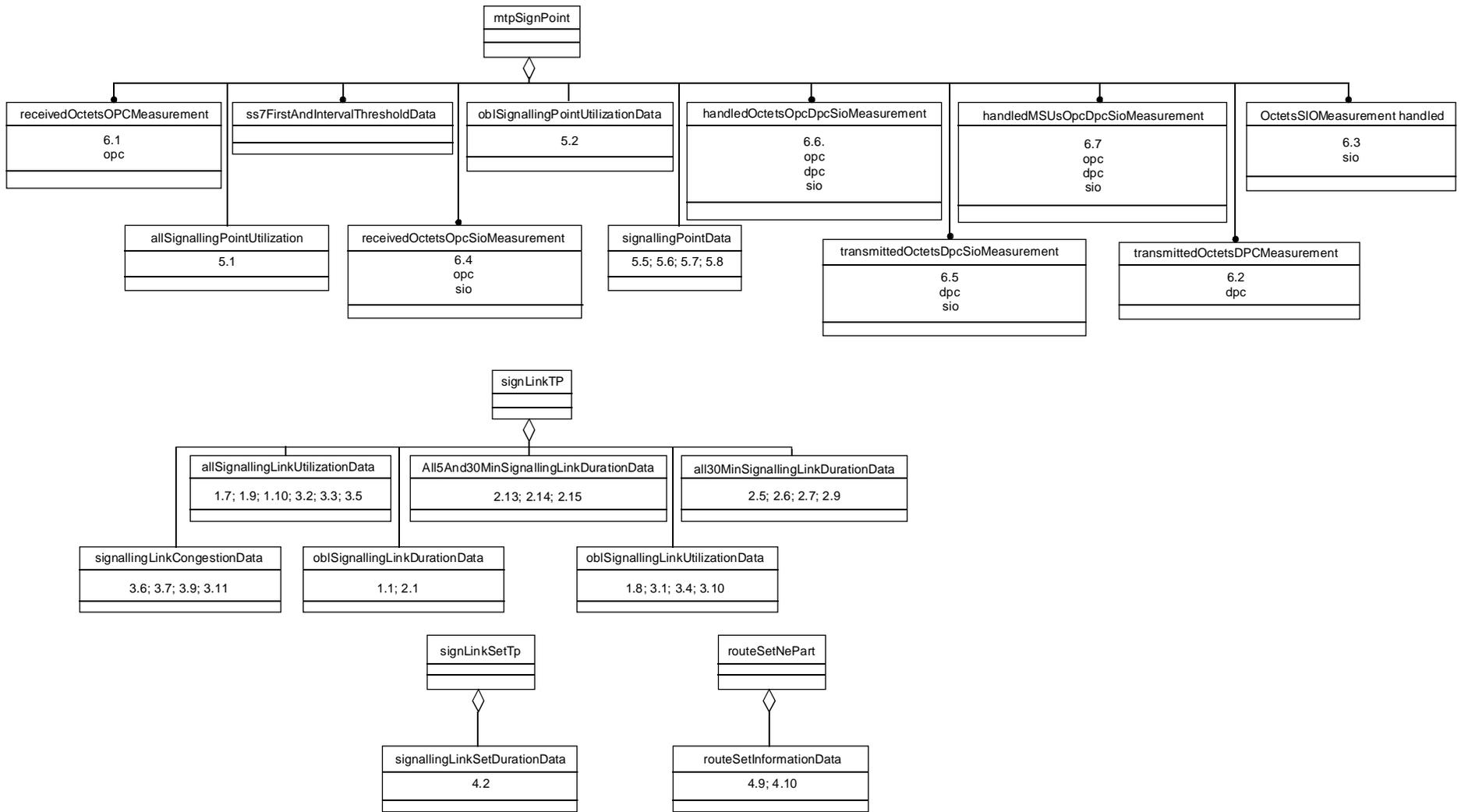
Q.752 meas.	Represented by	With name	With syntax	In Managed Object Class
3.1	Attribute	transmittedOctetsSIFSIO	X.721:counter	oblSignallingLinkUtilizationData granularityPeriod = 5,30min (obl/perm measurement)
3.2	Attribute	retransmittedOctets	X.721:counter	allSignallingLinkUtilizationData, granularityPeriod = 5,30min
3.3	Attribute	transmittedMSUs	X.721:counter	allSignallingLinkUtilizationData, granularityPeriod = 5,30min
3.4	Attribute	receivedOctetsSIFSIO	X.721:counter	oblSignallingLinkUtilizationData, granularityPeriod = 5,30min (obl/act measurement)
3.5	Attribute	receivedMSUs	X.721:counter	allSignallingLinkUtilizationData, granularityPeriod = 5,30min
3.6	Attribute Notification First and interval attribute	slCongestedStarts X.721:qualityOfServiceAlarm firstAndIntervalThresholdValue	X.721:counter probableCause = 306 PerceivedSeverity = Maj/Min/War Events with value 1	signallingLinkCongestionData, granularityPeriod = 5,30min signLinkTp firstAndIntervalThreshold
3.7	Attribute	slCongestedDuration	Seconds	signallingLinkCongestionData, granularityPeriod = 30min

Q.752 meas.	Represented by	With name	With syntax	In Managed Object Class
3.9	Attribute Notification First and interval attribute	slCongestionStops X.721:qualityOfServiceAlarm firstAndIntervalThresholdValue	X.721:counter probableCause = 306 PerceivedSeverity = Cleared Events with value 1	signallingLinkCongestionData signLinkTp firstAndIntervalThreshold
3.10	Attribute	discardedMSUs	X.721:counter	oblSignallingLinkUtilizationData, granularityPeriod = 5,30min (obl/perm measurement)
3.11	Attribute Notification First and interval attribute	congestionEventsMSULoss X.721:qualityOfServiceAlarm firstAndIntervalThresholdValue	X.721:counter probableCause = 311 Events with value 1	signallingLinkCongestionData, granularityPeriod = 5,30min signLinkTp firstAndIntervalThreshold
4.2	Attribute	slsUnavailable	Seconds	SLSDurationData, granularityPeriod = 30min
4.3	Notification	X.721:communicationsAlarm	probableCause = LinkSetFailure403 PerceivedSeverity = Maj/Min/War	signLinkSetTp
4.4	Notification	X.721:communicationsAlarm	probableCause = 403 PerceivedSeverity = Cleared	signLinkSetTp

Q.752 meas.	represented by	With name	With syntax	In Managed Object Class
4.5	Notification	ss7OnOccEvent	probableCause = 405 PerceivedSeverity = Maj/Min/War AddInfo = InaccessibleSp	mtpLevel3
4.6	Notification	ss7OnOccEvent	probableCause = 405 PerceivedSeverity = Cleared AddInfo = InaccessibleSp	mtpLevel3
4.9	Attribute	routeSetUnavailable	X.721:counter	routeSetInformationData, granularityPeriod = 30min
4.10	Attribute	routeSetUnavailableDuration	Seconds	routeSetInformationData, granularityPeriod = 30min
4.11	Notification	X.721:communicationsAlarm	probableCause = 411	routeSetNePart
4.12	Notification	X.721:communicationsAlarm	probableCause = 411 PerceivedSeverity = Cleared	routeSetNePart
4.13	Notification	ss7OnOccEvent	probableCause = 413 PerceivedSeverity = Warning AddInfo = ChangeInLsToAdjSp	mtpLevel3
5.1	Attribute	adjacentInaccessibleEvents	X.721:counter	signallingPointData, granularityPeriod = 5,30min

Q.752 meas.	Represented by	With name	With syntax	In Managed Object Class
5.1 (Cont.)	Notification	X.721:communicationsAlarm	probableCause = 501 PerceivedSeverity = Maj/Min/War AddInfo = InaccessibleSpi	mtpLevel3
5.2	Attribute	adjacentInaccessibleDuration	Seconds	oblSignallingPointUtilizationData, granularityPeriod = 5,30min (obl/perm measurement)
5.4	Notification	X.721:communicationsAlarm	probableCause = 501 PerceivedSeverity = Cleared AddInfo = InaccessibleSpi	mtpLevel3
5.5	Attribute Notification First and interval attribute	discardedMSUs X.721:qualityOfServiceAlarm firstAndIntervalThresholdValue	X.721:counter probableCause = 505 Events with value 1	signallingPointData, granularityPeriod = 30min (obl/perm measurement) signallingPointData firstAndIntervalThreshold
5.6	Attribute Notification First and interval attribute	transmittedUPUnavailable X.721:qualityOfServiceAlarm firstAndIntervalThresholdValue	EventsUP probableCause = 506 Events with value 1	signallingPointData signallingPointData firstAndIntervalThreshold
5.7	Attribute Notification First and interval attribute	receivedUPUnavailable X.721:qualityOfServiceAlarm firstAndIntervalThresholdValue	EventsUP probableCause = 507 Events with value 1	signallingPointData signallingPointData firstAndIntervalThreshold

Q.752 meas.	Represented by	With name	With syntax	In Managed Object Class
5.8	Attribute Notification First and interval attribute	receivedTFC X.721:qualityOfServiceAlarm firstAndIntervalThresholdValue	EventsCongestionLevel probableCause = 508 Events with value 1	signallingPointData signallingPointData firstAndIntervalThreshold
6.1	Attribute	receivedOctetsOPC	X.721:counter	receivedOctetsOPC, granularityPeriod = 5,30min
6.2	Attribute	transmittedOctetsDPC	X.721:counter	transmittedOctetsDPC, granularityPeriod = 5,30min
6.3	Attribute	handledOctetsSIO	X.721:counter	handledOctetsSIO, granularityPeriod = 5,30min
6.4	Attribute	receivedOctetsOpcSio	X.721:counter	receivedOctetsOpcSio, granularityPeriod = 5,30min
6.5	Attribute	transmittedOctetsDpcSio	X.721:counter	transmittedOctetsDpcSio, granularityPeriod = 5,30min
6.6	Attribute	handledOctetsOpcDpcSio	X.721:counter	handledOctetsOpcDpcSio, granularityPeriod = 5,30min
6.7	Attribute	handledMSUsOpcDpcSio	X.721:counter	handledMSUsOpcDpcSio, granularityPeriod = 5,30min



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FIGURE E.2/Q.751.1
 Naming schema for managed objects representing MTP measurements

E.3 Managed Object Class definitions

The following managed object class definitions given in alphabetical order.

E.3.1 All 30 Minutes Signalling Link Duration Data

```

all30MinSignallingLinkDurationData          MANAGED          OBJECT          CLASS
DERIVED                                     FROM              oblSignallingLinkDurationData;
CHARACTERIZED          BY          all30MinSignallingLinkDurationDataPackage          PACKAGE
BEHAVIOUR all30MinSignallingLinkDurationDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains all signalling link duration data with
    granularityPeriod 30 minutes. The attributes are read-only.";;

ATTRIBUTES

    slLocalInhibition          GET          SET          BY          CREATE,          --          Measurement          Q.752/2.5
    slRemoteInhibition          GET          SET          BY          CREATE,          --          Measurement          Q.752/2.6
    slFailed          GET          SET          BY          CREATE,          --          Measurement          Q.752/2.7
    slRemoteProcOutage          GET          SET          BY          CREATE;;;          --          Measurement          Q.752/2.9
REGISTERED AS { mtpObjectClass 17 };

```

E.3.2 All 5 And 30 Minutes Signalling Link Duration Data

```

all5And30MinSignallingLinkDurationData          MANAGED          OBJECT          CLASS
DERIVED                                     FROM              ss7CurrentData;
CHARACTERIZED          BY          all5And30MinSignallingLinkDurationDataPackage          PACKAGE
BEHAVIOUR all5And30MinSignallingLinkDurationDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains all obligated signalling link duration data. The
    preferred granularityPeriod is 5 and 30 minutes. The attributes are read-only.";;

ATTRIBUTES

    localMgmtInhibit          GET          SET          BY          CREATE,          --          Measurement          Q.752/2.13
    localMgmtUninhibit          GET          SET          BY          CREATE,          --          Measurement          Q.752/2.14
    localBusy          GET          SET          BY          CREATE;;;          --          Measurement          Q.752/2.15
REGISTERED AS { mtpObjectClass 18 };

```

E.3.3 All Signalling Link Utilization Data

```

allSignallingLinkUtilizationData          MANAGED          OBJECT          CLASS
DERIVED                                     FROM              oblSignallingLinkUtilizationData;
CHARACTERIZED          BY          allSignallingLinkUtilizationDataPackage          PACKAGE
BEHAVIOUR allSignallingLinkUtilizationDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains all signalling link utilization data. The preferred
    granularityPeriods are 5 and 30 minutes. The attributes are read-only.";;

ATTRIBUTES
    slAlignment          GET SET BY CREATE, -- Measurement Q.752/1.7
    negAckReceived          GET SET BY CREATE, -- Measurement Q.752/1.9
    retransmittedOctets          GET SET BY CREATE, -- Measurement Q.752/3.2
    transmittedMSUs          GET SET BY CREATE, -- Measurement Q.752/3.3
    receivedMSUs          GET SET BY CREATE;;; -- Measurement Q.751/3.5
CONDITIONAL PACKAGES
    localChangeOversPackage
    PRESENT          IF          "the          granularity          period          is          30          minutes";
REGISTERED AS { mtpObjectClass 19 };

```

E.3.4 All Signalling Point Utilization Data

```

allSignallingPointUtilizationData          MANAGED          OBJECT          CLASS
DERIVED                                     FROM              oblSignallingPointUtilizationData;
CHARACTERIZED          BY          allSignallingPointUtilizationDataPackage          PACKAGE

```

BEHAVIOUR allSignallingPointUtilizationDataBehaviour BEHAVIOUR DEFINED AS

"This managed object class contains all signalling point utilization data. The preferred granularityPeriods are 5 or 30 minutes. The attributes are read-only.";

ATTRIBUTES

adjacentInaccessibleEvents GET SET BY CREATE;;; -- *Measurement Q.752/5.1*

REGISTERED AS { mtpObjectClass 20 };

E.3.5 Handled MSUs per OPC/DPC/SIO

handledMSUsOpcDpcSioMeasurement **MANAGED** **OBJECT** **CLASS**
DERIVED **FROM** *ss7CurrentData;*
CHARACTERIZED **BY** handledMSUsOpcDpcSioMeasurementPackage **PACKAGE**
BEHAVIOUR handledMSUsOpcDpcSioMeasurementBehaviour BEHAVIOUR DEFINED AS

"This managed object class starts a measurement for a specific OPC/DPC/SIO combination. The preferred granularityPeriods are 5 and 30 minutes. Activation of these measurements should be limited to a small number of OPC/DPC combinations at a given time. The measurement attribute is read-only.";

ATTRIBUTES

opc GET SET BY CREATE,
dpc GET SET BY CREATE,
sio GET SET BY CREATE,

handledMSUsOpcDpcSio GET SET BY CREATE;;; -- *Measurement Q.752/6.7*

REGISTERED AS { mtpObjectClass 21 };

E.3.6 Handled Octets per OPC/DPC/SIO

handledOctetsOpcDpcSioMeasurement **MANAGED** **OBJECT** **CLASS**
DERIVED **FROM** *ss7CurrentData;*
CHARACTERIZED **BY** handledOctetsOpcDpcSioMeasurementPackage **PACKAGE**
BEHAVIOUR handledOctetsOpcDpcSioMeasurementBehaviour BEHAVIOUR DEFINED AS

"This managed object class starts a measurement for a specific OPC/DPC/SIO combination. The preferred granularityPeriods are 5 and 30 minutes. Activation of these measurements should be limited to a small number of OPC/DPC combinations at a given time. The attribute is read-only.";

ATTRIBUTES

opc GET SET BY CREATE,
dpc GET SET BY CREATE,
sio GET SET BY CREATE,

handledOctetsOpcDpcSio GET SET BY CREATE;;; -- *Measurement Q.752/6.6*

REGISTERED AS { mtpObjectClass 22 };

E.3.7 Handled Octets per SIO

handledOctetsSIOMeasurement **MANAGED** **OBJECT** **CLASS**
DERIVED **FROM** *ss7CurrentData;*
CHARACTERIZED **BY** handledOctetsSIOMeasurementPackage **PACKAGE**
BEHAVIOUR handledOctetsSIOMeasurementBehaviour BEHAVIOUR DEFINED AS

"This managed object class starts a measurement for a specific SIO. The preferred granularityPeriods are 5 and 30 minutes. The attribute is read-only.";

ATTRIBUTES

sio GET SET BY CREATE,
handledOctetsSIO GET SET BY CREATE;;; -- *Measurement Q.752/6.3*

REGISTERED AS { mtpObjectClass 23 };

E.3.8 Obligated Signalling Link Duration Data

oblSignallingLinkDurationData **MANAGED** **OBJECT** **CLASS**
DERIVED **FROM** *ss7CurrentData;*
CHARACTERIZED **BY** oblSignallingLinkDurationDataPackage **PACKAGE**
BEHAVIOUR oblSignallingLinkDurationDataBehaviour BEHAVIOUR DEFINED AS

"This managed object class contains the obligated signalling link duration data. The preferred granularityPeriod is 30 minutes. The attributes are read-only.";

ATTRIBUTES

slUnavailabilityDuration GET SET BY CREATE, -- *Measurement Q.752/2.1*
slInServiceDuration GET SET BY CREATE;;; -- *Measurement Q.752/1.1*

REGISTERED AS { mtpObjectClass 24 };

E.3.9 Obligated Signalling Link Utilization Data

```

oblSignallingLinkUtilizationData          MANAGED          OBJECT          CLASS
DERIVED                                  FROM              ss7CurrentData;
CHARACTERIZED BY oblSignallingLinkUtilizationDataPackage PACKAGE
BEHAVIOUR oblSignallingLinkUtilizationDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains all obligated signalling link utilization data. The
    granularityPeriod is 30 minutes. The attributes are read-only.";;

ATTRIBUTES
    signUnitsReceived      GET  SET  BY  CREATE,  --  Measurement  Q.752/1.8
    transmittedOctetsSIFSIO GET  SET  BY  CREATE,  --  Measurement  Q.752/3.1
    receivedOctetsSIFSIO   GET  SET  BY  CREATE,  --  Measurement  Q.751/3.4
    discardedMSUs          GET  SET  BY  CREATE;;; --  Measurement  Q.751/3.10
REGISTERED AS { mtpObjectClass 25 };

```

E.3.10 Obligated Signalling Point Utilization Data

```

oblSignallingPointUtilizationData          MANAGED          OBJECT          CLASS
DERIVED                                  FROM              ss7CurrentData;
CHARACTERIZED BY oblSignallingPointUtilizationDataPackage PACKAGE
BEHAVIOUR oblSignallingPointUtilizationDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains all obligated signalling point utilization data. The
    preferred granularityPeriods are 5 minutes. The attributes are read-only.";;

ATTRIBUTES
    adjacentInaccessibleDuration  GET SET BY CREATE;;; -- Measurement Q.752/5.2
REGISTERED AS { mtpObjectClass 26 };

```

E.3.11 Received Octets per OPC

```

receivedOctetsOPCMeasurement              MANAGED          OBJECT          CLASS
DERIVED                                  FROM              ss7CurrentData;
CHARACTERIZED BY receivedOctetsOPCMeasurementPackage PACKAGE
BEHAVIOUR receivedOctetsOPCMeasurementBehaviour BEHAVIOUR DEFINED AS

    "This managed object class starts a measurement for a specific OPC. The preferred
    granularityPeriods are 5 and 30 minutes. Activation of these measurements should be
    limited to a small number of signalling point codes at a given time. The attribute is
    read-only.";;

ATTRIBUTES
    opc GET                                SET  BY  CREATE,
    receivedOctetsOPC  GET  SET  BY  CREATE;;; -- Measurement  Q.752/6.1
REGISTERED AS { mtpObjectClass 27 };

```

E.3.12 Received Octets per OPC/SIO

```

receivedOctetsOpcSioMeasurement          MANAGED          OBJECT          CLASS
DERIVED                                  FROM              ss7CurrentData;
CHARACTERIZED BY receivedOctetsOpcSioMeasurementPackage PACKAGE
BEHAVIOUR receivedOctetsOpcSioMeasurementBehaviour BEHAVIOUR DEFINED AS

    "This managed object class starts a measurement for a specific OPC/SIO combination. The
    preferred granularityPeriods are 5 and 30 minutes. Activation of these measurements should
    be limited to a small number of signalling point codes at a given time. The attribute is
    read-only.";;

ATTRIBUTES
    opc GET                                SET  BY  CREATE,
    sio GET                                SET  BY  CREATE,
    receivedOctetsOpcSio  GET  SET  BY  CREATE;;; -- Measurement  Q.752/6.4
REGISTERED AS { mtpObjectClass 28 };

```

E.3.13 Route Set Information Data

```

routeSetInformationData          MANAGED          OBJECT          CLASS
DERIVED                        FROM          ss7CurrentData;
CHARACTERIZED                  BY          routeSetInformationDataPackage PACKAGE
BEHAVIOUR routeSetInformationDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains all permanent signalling point duration data. The
    granularityPeriod is 30 minutes. The attributes are read-only.";;

    ATTRIBUTES
        routeSetUnavailable      GET   SET   BY   CREATE,    -- Measurement Q.752/4.9
        routeSetUnavailableDuration GET SET BY CREATE;;; -- Measurement Q.752/4.10
REGISTERED AS { mtpObjectClass 29 };

```

E.3.14 Signalling Link Congestion Data

```

signallingLinkCongestionData    MANAGED          OBJECT          CLASS
DERIVED                        FROM          ss7FirstAndIntervalCurrentData;
CHARACTERIZED                  BY          signallingLinkCongestionDataPackage PACKAGE
BEHAVIOUR signallingLinkCongestionDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains the optional signalling link congestion data. The preferred
    granularityPeriods are 5 and 30 minutes. The attributes slCongestedStarts, slCongestionStops and
    congestionEventsMSULoss can be referenced from an instance of ss7FirstAndIntervalThresholdData
    when they are used for a first and interval measurement. The attributes are read-only.";;

    ATTRIBUTES
        slCongestedStarts        GET   SET   BY   CREATE,    -- Measurement Q.752/3.6
        slCongestionStops        GET   SET   BY   CREATE,    -- Measurement Q.752/3.9
        congestionEventsMSULoss   GET SET BY CREATE;;; -- Measurement Q.752/3.11

    CONDITIONAL
        slCongestedDurationPackage PRESENT IF "the granularity period is 30 minutes";
REGISTERED AS { mtpObjectClass 30 };

```

E.3.15 Signalling Link Set Duration Data

```

signallingLinkSetDurationData   MANAGED          OBJECT          CLASS
DERIVED                        FROM          ss7CurrentData;
CHARACTERIZED                  BY          signallingLinkSetDurationDataPackage PACKAGE
BEHAVIOUR signallingLinkSetDurationDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains all signalling link set duration data. The
    granularityPeriod is 30 minutes. The attributes are read-only.";;

    ATTRIBUTES
        slsUnavailable          GET   SET   BY   CREATE;;; -- Measurement Q.752/4.2
REGISTERED AS { mtpObjectClass 31 };

```

E.3.16 Signalling Point Data

```

signallingPointData            MANAGED          OBJECT          CLASS
DERIVED                        FROM          ss7FirstAndIntervalCurrentData;
CHARACTERIZED                  BY          signallingPointDataPackage PACKAGE
BEHAVIOUR signallingPointDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class contains information about signalling point. The preferred
    granularityPeriods are 5 or 30 minutes. All attributes are read-only and are referenced by an
    instance of ss7FirstAndIntervalThresholdData managed object class so does discardedMSUs
    attribute when it is used as a first and interval measurement.";;

    ATTRIBUTES
        discardedMSUs           GET   SET   BY   CREATE,    -- Measurement Q.752/5.5
        transmittedUPUnavailable GET SET BY CREATE,    -- Measurement Q.752/5.6
        receivedUPUnavailable    GET SET BY CREATE,    -- Measurement Q.752/5.7
        receivedTFC              GET SET BY CREATE;;; -- Measurement Q.752/5.8
REGISTERED AS { mtpObjectClass 32 };

```

E.3.17 SS No. 7 Current Data

```

ss7CurrentData                MANAGED                OBJECT                CLASS
DERIVED                        FROM                "ITU-T                Rec.                Q.822                (1994)":currentData;
CHARACTERIZED                  BY                ss7CurrentDataPackage                PACKAGE
BEHAVIOUR ss7CurrentDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class is used for subtyping of Q.752 duration measurements.
    Subtypes will have to contain one or more attributes that can be scanned.";;;

REGISTERED AS { mtpObjectClass 33 };

```

E.3.18 SS No. 7 First and Interval Current Data

```

ss7FirstAndIntervalCurrentData    MANAGED                OBJECT                CLASS
DERIVED                        FROM                ss7CurrentData;
CHARACTERIZED                    BY                ss7FirstAndIntervalCurrentDataPackage                PACKAGE
BEHAVIOUR ss7FirstAndIntervalCurrentDataBehaviour BEHAVIOUR DEFINED AS

    "This managed object class is used for subtyping of Q.752 first and interval measurements.
    Subtypes will have to contain one or more attributes that can be scanned. The start of a
    measurement can possibly generate an X.721:qualityOfServiceAlarm with an indication of the
    probable cause in an instance of another class.";;;

REGISTERED AS { mtpObjectClass 34 };

```

E.3.19 SS No. 7 First and Interval Threshold Data

```

ss7FirstAndIntervalThresholdData    MANAGED                OBJECT                CLASS
DERIVED                        FROM                "ITU-T                Rec.                Q.822                (1994)":                thresholdData;
CHARACTERIZED                    BY                ss7FirstAndIntervalThresholdDataPackage,                PACKAGE
    "ITU-T Rec. Q.822 (1994)": counterThresholdListPackage,
BEHAVIOUR ss7FirstAndIntervalThresholdDataBehaviour BEHAVIOUR DEFINED AS

    "The conditional package counterThresholdListPackage is mandatory for this subclass. The
    threshold values of the attributes in the counterThresholdAttributeList will be 1, indicating that
    the first event should be notified to the managed using a qualityOfServiceAlarm notification.
    The attributes being referenced will be part of instances of ss7FirstAndIntervalCurrentData or
    one of its subclasses.";;;

REGISTERED AS { mtpObjectClass 35 };

```

E.3.20 Transmitted Octets per DPC

```

transmittedOctetsDPCMeasurement    MANAGED                OBJECT                CLASS
DERIVED                        FROM                ss7CurrentData;
CHARACTERIZED                    BY                transmittedOctetsDPCMeasurementPackage                PACKAGE
BEHAVIOUR transmittedOctetsDPCMeasurementBehaviour BEHAVIOUR DEFINED AS

    "This managed object class starts a measurement for a specific DPC. The preferred
    granularityPeriods are 5 and 30 minutes. Activation of these measurements should be
    limited to a small number of signalling point codes at a given time. The attribute is read-only.";;

    ATTRIBUTES
    dpc GET                SET                BY                CREATE,
    transmittedOctetsDPC GET SET BY CREATE;;; -- Measurement Q.752/6.2

REGISTERED AS { mtpObjectClass 36 };

```

E.3.21 Transmitted Octets per DPC/SIO

```

transmittedOctetsDpcSioMeasurement    MANAGED                OBJECT                CLASS
DERIVED                        FROM                ss7CurrentData;
CHARACTERIZED                    BY                transmittedOctetsDpcSioMeasurementPackage                PACKAGE
BEHAVIOUR transmittedOctetsDpcSioMeasurementBehaviour BEHAVIOUR DEFINED AS

    "This managed object class starts a measurement for a specific DPC/SIO combination. The
    preferred granularityPeriods are 5 and 30 minutes. Activation of these measurements should
    be limited to a small number of signalling point codes at a given time. The attribute is
    read-only.";;

```

ATTRIBUTES
 dpc GET SET BY CREATE,
 sio GET SET BY CREATE,
 transmittedOctetsDpcSio GET SET BY CREATE;;; -- *Measurement* Q.752/6.5
REGISTERED AS { mtpObjectClass 37 };

E.4 Package definitions

localChangeOversPackage PACKAGE
ATTRIBUTES
 localChangeOvers GET SET BY CREATE; -- *Measurement* Q.752/1.10
REGISTERED AS { mtpPackage 53 };

slCongestedDurationPackage PACKAGE
ATTRIBUTES
 slCongestedDuration GET SET BY CREATE; -- *Measurement* Q.752/3.7
REGISTERED AS { mtpPackage 54 };

E.5 Attribute Definitions

adjacentInaccessibleDuration ATTRIBUTE
WITH ATTRIBUTE **SYNTAX** MTPDefinedTypesModule.Seconds;
MATCHES FOR **EQUALITY**;
BEHAVIOUR adjacentInaccessibleDurationBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.752/5.2.";;
REGISTERED AS { mtpAttribute 135 };

adjacentInaccessibleEvents ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR adjacentInaccessibleEventsBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.752/5.1.";;
REGISTERED AS { mtpAttribute 136 };

congestionEventsMSULoss ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR congestionEventsMSULossBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.752/3.11.";;
REGISTERED AS { mtpAttribute 137 };

discardedMSUs ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR discardedMSUsBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.751/3.10.";;
REGISTERED AS { mtpAttribute 138 };

handledOctetsOpcDpcSio ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR handledOctetsOpcDpcSioBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.752/6.6.";;
REGISTERED AS { mtpAttribute 139 };

handledOctetsSIO ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR handledOctetsSIOBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.752/6.3.";;
REGISTERED AS { mtpAttribute 140 };

handledMSUsOpcDpcSio ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR handledMSUsOpcDpcSioBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.752/6.7.";;
REGISTERED AS { mtpAttribute 141 };

localBusy ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR localBusyBehaviour **BEHAVIOUR DEFINED AS**
 "This attribute represents measurement Q.752/2.15. See also 9.3/Q.704.";;
REGISTERED AS { mtpAttribute 142 };

localChangeOvers ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR localChangeOversBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/1.10. See also 5/Q.704.";;
 REGISTERED AS { mtpAttribute 143 };

localMgmtInhibit ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR localMgmtInhibitBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/2.13. See also 10.2/Q.704.";;
 REGISTERED AS { mtpAttribute 144 };

localMgmtUninhibit ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR localMgmtUninhibitBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/2.14. See also 10.3/Q.704.";;
 REGISTERED AS { mtpAttribute 145 };

negAckReceived ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR negAckReceivedBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/1.9.";;
 REGISTERED AS { mtpAttribute 146 };

receivedMSUs ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR receivedMSUsBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.751/3.5.";;
 REGISTERED AS { mtpAttribute 147 };

receivedOctetsOPC ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR receivedOctetsOPCBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/6.1.";;
 REGISTERED AS { mtpAttribute 148 };

receivedOctetsOpcSio ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR receivedOctetsOpcSioBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/6.4.";;
 REGISTERED AS { mtpAttribute 149 };

receivedOctetsSIFSIO ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR receivedOctetsSIFSIOBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.751/3.4.";;
 REGISTERED AS { mtpAttribute 150 };

receivedTFC ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.EventsCongestionLevel;
 BEHAVIOUR receivedTFCBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/5.8.";;
 REGISTERED AS { mtpAttribute 151 };

receivedUPUnavailable ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.EventsUP;
 BEHAVIOUR receivedUPUnavailableBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/5.7. See also Recommendation Q.704/11.7.2.";;
 REGISTERED AS { mtpAttribute 152 };

retransmittedOctets ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR retransmittedOctetsBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/3.2. See also 5/Q.704.";;
 REGISTERED AS { mtpAttribute 153 };

routeSetUnavailable ATTRIBUTE
 DERIVED FROM "ITU Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR routeSetUnavailableBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/4.9. See also Recommendation Q.704/11.2.2.";;
 REGISTERED AS { mtpAttribute 154 };

routeSetUnavailableDuration ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR routeSetUnavailableDurationBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/4.10. See also Recommendation Q.704/11.2.1.";;
 REGISTERED AS { mtpAttribute 155 };

signUnitsReceived ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR signUnitsReceivedBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/1.8. See also 4/Q.704.";;
 REGISTERED AS { mtpAttribute 156 };

sio ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.SIOType;
 MATCHES FOR EQUALITY;
 REGISTERED AS { mtpAttribute 157 };

slAlignment ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR slAlignmentBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/1.7.";;
 REGISTERED AS { mtpAttribute 158 };

slCongestedDuration ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slCongestedDurationBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/3.7.";;
 REGISTERED AS { mtpAttribute 159 };

slCongestedStarts ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR slCongestedStartsBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/3.6. See also 3.8/Q.704.";;
 REGISTERED AS { mtpAttribute 160 };

slCongestionStops ATTRIBUTE
 DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
 BEHAVIOUR slCongestionStopsBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/3.9. See also 3.8/Q.704.";;
 REGISTERED AS { mtpAttribute 161 };

slFailed ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slFailedBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/2.7. See also 3.2.2/Q.704.";;
 REGISTERED AS { mtpAttribute 162 };

slInServiceDuration ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slInServiceDurationBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/1.1.";;
 REGISTERED AS { mtpAttribute 163 };

slLocalInhibition ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slLocalInhibitionBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/2.5. See also 3.2.8/Q.704.";;
 REGISTERED AS { mtpAttribute 164 };

slRemoteInhibition ATTRIBUTE
 WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
 MATCHES FOR EQUALITY;
 BEHAVIOUR slRemoteInhibitionBehaviour BEHAVIOUR DEFINED AS
 "This attribute represents measurement Q.752/2.6. See also 3.2.2/Q.704.";;
 REGISTERED AS { mtpAttribute 165 };

slRemoteProcOutage ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
MATCHES FOR EQUALITY;
BEHAVIOUR **slRemoteProcOutageBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/2.9. See also 3.2.6/Q.704.";
REGISTERED AS { mtpAttribute 166 };

slUnavailable ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
BEHAVIOUR **slUnavailableBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/4.2.";
REGISTERED AS { mtpAttribute 167 };

slUnavailable ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
MATCHES FOR EQUALITY;
BEHAVIOUR **slUnavailableBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/4.2.";
REGISTERED AS { mtpAttribute 168 };

slUnavailabilityDuration ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.Seconds;
MATCHES FOR EQUALITY;
BEHAVIOUR **slUnavailabilityDurationBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/2.1.";
REGISTERED AS { mtpAttribute 169 };

transmittedMSUs ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR **transmittedMSUsBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/3.3.";
REGISTERED AS { mtpAttribute 170 };

transmittedOctetsSIFSIO ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR **transmittedOctetsSIFSIOBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/3.1. See also 2.3.8/Q.704.";
REGISTERED AS { mtpAttribute 171 };

transmittedOctetsDPC ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR **transmittedOctetsDPCBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/6.2.";
REGISTERED AS { mtpAttribute 172 };

transmittedOctetsDpcSio ATTRIBUTE
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":counter;
BEHAVIOUR **transmittedOctetsDpcSioBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/6.5.";
REGISTERED AS { mtpAttribute 173 };

transmittedUPUnavailable ATTRIBUTE
WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.EventsUP;
BEHAVIOUR **transmittedUPUnavailableBehaviour** **BEHAVIOUR DEFINED AS**
"This attribute represents measurement Q.752/5.6. See also Recommendation Q.704/11.7.2.";
REGISTERED AS { mtpAttribute 174 };

E.6 Name Binding Definitions

mtpSignPoint-handledMSUsOpcDpcSioMeasurement NAME BINDING
SUBORDINATE OBJECT CLASS **handledMSUsOpcDpcSioMeasurement;**
NAMED BY
SUPERIOR OBJECT CLASS **mtpSignPoint;**
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 16 };

```

mtpSignPoint-handledOctetsOpcDpcSioMeasurement          NAME          BINDING
SUBORDINATE OBJECT CLASS handledOctetsOpcDpcSioMeasurement;
NAMED                                                    BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 17 };

mtpSignPoint-handledOctetsSIOMeasurement                NAME          BINDING
SUBORDINATE OBJECT CLASS handledOctetsSIOMeasurement;
NAMED                                                    BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 18 };

mtpSignPoint-oblSignallingPointUtilisationData          NAME          BINDING
SUBORDINATE OBJECT CLASS oblSignallingPointUtilisationData AND SUBCLASSES;
NAMED                                                    BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 19 };

mtpSignPoint-receivedOctetsOPCMeasurement               NAME          BINDING
SUBORDINATE OBJECT CLASS receivedOctetsOPCMeasurement;
NAMED                                                    BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 20 };

mtpSignPoint-receivedOctetsOpcSioMeasurement            NAME          BINDING
SUBORDINATE OBJECT CLASS receivedOctetsOpcSioMeasurement;
NAMED                                                    BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 21 };

routeSetNePart-routeSetInformationData                  NAME          BINDING
SUBORDINATE OBJECT CLASS routeSetInformationData;
NAMED                                                    BY
SUPERIOR OBJECT CLASS routeSetNePart;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 22 };

mtpSignPoint-signallingPointData                         NAME          BINDING
SUBORDINATE OBJECT CLASS signallingPointData;
NAMED                                                    BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 23 };

```

```

mtpSignPoint-transmittedOctetsDPCMeasurement          NAME          BINDING
SUBORDINATE OBJECT CLASS transmittedOctetsDPCMeasurement;
NAMED                                                  BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 24 };

mtpSignPoint-transmittedOctetsDpcSioMeasurement      NAME          BINDING
SUBORDINATE OBJECT CLASS transmittedOctetsDpcSioMeasurement;
NAMED                                                  BY
SUPERIOR OBJECT CLASS mtpSignPoint;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 25 };

signLinkSetTP-signallingLinkSetDurationData         NAME          BINDING
SUBORDINATE OBJECT CLASS signallingLinkSetDurationData;
NAMED                                                  BY
SUPERIOR OBJECT CLASS signLinkSetTp;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 26 };

signLinkTp-all5And30MinSignallingLinkDurationData   NAME          BINDING
SUBORDINATE OBJECT CLASS all5And30MinSignallingLinkDurationData;
NAMED                                                  BY
SUPERIOR OBJECT CLASS signLinkTp;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 27 };

signLinkTp-oblSignallingLinkDurationData            NAME          BINDING
SUBORDINATE OBJECT CLASS oblSignallingLinkDurationData AND SUBCLASSES;
NAMED                                                  BY
SUPERIOR OBJECT CLASS signLinkTp;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 28 };

signLinkTp-oblSignallingLinkUtilisationData         NAME          BINDING
SUBORDINATE OBJECT CLASS oblSignallingLinkUtilisationData AND SUBCLASSES;
NAMED                                                  BY
SUPERIOR OBJECT CLASS signLinkTp;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 29 };

signLinkTp-signallingLinkCongestionData            NAME          BINDING
SUBORDINATE OBJECT CLASS signallingLinkCongestionData;
NAMED                                                  BY
SUPERIOR OBJECT CLASS signLinkTp;
WITH ATTRIBUTE "ITU-T Rec. X.739 (1993) | ISO/IEC 10164-11 : 1993": scannerId;
CREATE;
DELETE ;
REGISTERED AS { mtpNameBinding 30 };

```

E.7 ASN.1 productions

The ASN.1 productions for this annex can be found in 7.8.

Annex F

MTP route verification test

(This annex forms an integral part of this Recommendation)

F.1 Informal description

mtpRouteVerifTest		
Attributes	Notifications	Actions
mtpRouteTestId	mtpRouteTestResult	startMtpRouteTest
administrativeState	stateChange	
operationalState	objectCreation	
usageState	objectDeletion	
availabilityState		
providerObject		
version		
maxNumOfTests		
timeD		

This managed object class models the MTP Route Verification Test (Recommendation Q.753). By means of instances of this class, an OS can start a route verification test in an SP and it can collect the test result.

Attributes

- 1) mtpRouteTestId: this attribute represents the instance of this object class.
- 2) administrativeState: this attribute represents the OSI administrative state as defined in Recommendation X.731. This attribute is read- and writable.
- 3) operationalState: this attribute represents the OSI operational state as defined in Recommendation X.731. This attribute is only readable.
- 4) usageState: this attribute represents the OSI usage state as defined in Recommendation X.731. This attribute is only readable.
- 5) availabilityState: this attribute represents the OSI availability state as defined in Recommendation X.731. This attribute is only readable.
- 6) providerObject: this attribute identifies the managed objects acting in a service provider role for the MRVT object (e.g. OMASE, TCAP, SCCP). The semantics of this attribute type are specified in Recommendation X.732. This attribute is read- and writable.
- 7) version: this attribute represents the version of the MRVT implementation. The attribute type is defined in Recommendation M.3100. This attribute is only readable.
- 8) maxNumOfTests: this attribute represents the maximum number of simultaneous route tests at one SP. This attribute is only readable.
- 9) timeD: this attribute represents the maximum performance time D for an STP to process MRVT and MRVA messages. The value of D should be calculated off-line (e.g. by an OS) in accordance with 2.4.2/Q.753. This attribute is only readable.

ATTRIBUTES

```

mtpRouteTestId          GET          SET          BY          CREATE,
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":administrativeState
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":operationalState
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":usageState
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":availabilityStatus
"ITU-T Rec. M.3100 (1992)":version
"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 :
1992":providerObject
maxNumOfTests          GET          SET          BY          CREATE,
timeD                  GET          SET          BY          CREATE;

```

ACTIONS

startMtpRouteTest;

NOTIFICATIONS

mtpRouteTestResult,

```

"ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":stateChange;;

```

CONDITIONAL PACKAGES

"ITU-T Rec. M.3100 (1992)":createDeleteNotificationsPackage PRESENT IF "the objectCreation and objectDeletion notifications defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' are supported by an instance of this class",

"ITU-T Rec. M.3100 (1992)":attributeValueChangeNotificationPackage PRESENT IF "the attributeValueChangeNotification defined in 'ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992' is supported by an instance of this class",

mtpRouteVerifTestNamePackage PRESENT IF "an instance supports it";

REGISTERED AS { mtpObjectClass 38 };

F.2.2 Package definitions

mtpRouteVerifTestNamePackage PACKAGE

ATTRIBUTES

mtpRouteVerifTestName GET-REPLACE;

REGISTERED AS { mtpPackage 55 };

F.2.3 Attribute definitions

maxNumOfTests ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.MaxNumOfTests;

BEHAVIOUR maxNumOfTestsBehaviour BEHAVIOUR DEFINED AS

"This attribute represents the maximum number of simultaneous route tests at one SP.";;

REGISTERED AS { mtpAttribute 175 };

mtpRouteTestId ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.NameType;
MATCHES FOR EQUALITY, SUBSTRINGS;

REGISTERED AS { mtpAttribute 176 };

mtpRouteVerifTestName ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;

BEHAVIOUR mtpRouteVerifTestNameBehaviour BEHAVIOUR DEFINED AS

"This attribute is an additional name for instances of the mtpRouteVerifTest managed object class.";;

REGISTERED AS { mtpAttribute 177 };

timeD ATTRIBUTE

WITH ATTRIBUTE SYNTAX MTPDefinedTypesModule.TimeD;
BEHAVIOUR timeDBehaviour BEHAVIOUR DEFINED AS

"This attribute represents the maximum performance time D for an STP to process MRVT and MRVA messages.";;

REGISTERED AS { mtpAttribute 178 };

F.2.4 Action definitions

startMtpRouteTest ACTION

BEHAVIOUR

startMtpRouteTestBehaviour BEHAVIOUR DEFINED AS

"This action is used by the Management Process to initiate an MRVT procedure. The MRVT procedure sends an MRVT message for each signalling route which is contained in the MTP routing tables to reach the test destination. The destination (DPC) of each of these messages is the adjacent signalling point within the particular route under test. For each MRVT message a corresponding MRVA message is expected.

When the MRVT procedure is initiated, a timer T1 is started. The value of timer T1 depends on the value of the attribute 'timed' and the value of 'threshold' given in the action parameters (2.4/Q.753).

When all MRVA messages expected have been received or when T1 expires, the test is complete

and the result will be returned to the Management Process in the action reply.

The Action will be rejected, if

– the administrative state is locked.

– the operational state is disabled.

– the usage state is busy.

– an MRVT for the test destination given in the action parameters is already in progress.

The reason for the rejection will be returned to the Management Process in the action reply.";

MODE

CONFIRMED;

WITH INFORMATION SYNTAX MTPDefinedTypesModule.StartMtpRouteTest;

WITH REPLY SYNTAX MTPDefinedTypesModule.ResultMtpRouteTest;

REGISTERED AS { mtpAction 6 };

F.2.5 Notification definitions

mtpRouteTestResult NOTIFICATION

BEHAVIOUR mtpRouteTestResultBehaviour BEHAVIOUR DEFINED AS

"The reception of an MRVR message regardless of whether or not the receiving SP was the initiator causes this notification type. The notification includes the information contained in the received MRVR message.";

WITH INFORMATION SYNTAX MTPDefinedTypesModule.MtpRouteVerifTestResultSntx;

REGISTERED AS { mtpNotification 3 };

F.2.6 Naming binding definitions

mtpSignPoint-mtpRouteVerifTest NAME BINDING

SUBORDINATE OBJECT CLASS mtpRouteVerifTest;

NAMED

BY

SUPERIOR OBJECT CLASS mtpSignPoint;

WITH ATTRIBUTE

mtpRouteTestId;

CREATE;

DELETE;

REGISTERED AS { mtpNameBinding 31 };

F.2.7 Abstract syntax productions

The ASN.1 productions for this annex can be found in 7.8.