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Q.751.3

(09/97)

SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – Signalling System No. 7 management

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Network element information model for MTP accounting

ITU-T Recommendation Q.751.3

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
General	Q.700
Message transfer part (MTP)	Q.701–Q.709
Signalling connection control part (SCCP)	Q.711–Q.719
Telephone user part (TUP)	Q.720–Q.729
ISDN supplementary services	Q.730–Q.739
Data user part	Q.740–Q.749
Signalling System No. 7 management	**Q.750–Q.759**
ISDN user part	Q.760–Q.769
Transaction capabilities application part	Q.770–Q.779
Test specification	Q.780–Q.799
Q3 interface	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1999
BROADBAND ISDN	Q.2000–Q.2999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION Q.751.3

NETWORK ELEMENT INFORMATION MODEL FOR MTP ACCOUNTING

Summary

Measurements for MTP Accounting have been defined in Recommendation Q.752. The network element information model – based on Recommendations X.742 and Q.751.1 – for these measurements is contained in this Recommendation.

Source

ITU-T Recommendation Q.751.3 was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 12th of September 1997.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the 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.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Recommendation Q.751.3

NETWORK ELEMENT INFORMATION MODEL FOR MTP ACCOUNTING

(Geneva, 1997)

1 Scope

This Recommendation contains the network element information model which is necessary to manage network elements for accounting of MTP traffic according to 7.1/Q.752, 7.2/Q.752 and Table 15/Q.752. The model is based on the model defined in Recommendations Q.751.1 and X.742.

2 Intellectual property rights

No patent information from a patent holder concerning the content of this Recommendation was received by the ITU-T.

3 References

The following ITU-T 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.

- ITU-T Recommendation A.3 (1996), *Elaboration and presentation of texts and development of terminology and other means of expression for Recommendations of the ITU Telecommunication Standardization Sector*.
- ITU-T Recommendation I.751 (1996), *Asynchronous transfer mode management of the network element view*.
- CCITT Recommendation M.3100 (1992), *Generic network information model.*
- ITU-T Recommendation Q.750 (1993), *Overview of Signalling System No. 7 management.*
- ITU-T Recommendation Q.751.1 (1995), *Network element information model for the Message Transfer Part.*
- ITU-T Recommendation Q.752 (1997), *Monitoring and measurements for Signalling System No. 7 networks*.
- CCITT Recommendation X.208 (1988), *Specification of Abstract Syntax Notation One (ASN.1).*
- ITU-T Recommendation X.680 (1994), *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.
- CCITT Recommendation X.711 (1991), *Common management information protocol specification for CCITT applications*.
- CCITT Recommendation X.720 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Management information model*.

– CCITT Recommendation X.721 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information*.

– CCITT Recommendation X.722 (1992), *Information technology – Open Systems Interconnection – Structure of management information: Guidelines for the definition of managed objects*.

– ITU-T Recommendation X.722/Amd.1 (1995), *Set by create and component registration*.

– ITU-T Recommendation X.723 (1993), *Information technology – Open Systems Interconnection – Structure of management information: Generic management information*.

– CCITT Recommendation X.731 (1992), *Information technology – Open Systems Interconnection – Systems management: State management function*.

– CCITT Recommendation X.733 (1992), *Information technology – Open Systems Interconnection – Systems management: Alarm reporting function*.

– ITU-T Recommendation X.742 (1995), *Information technology – Open Systems Interconnection – Systems management: Usage metering function for accounting purposes*.

4 Terms and definitions

For the purpose 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 term 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 term 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;

e) action;

f) actual class;

g) attribute group;

h) behaviour;

i) conditional package;

j) instantiation;

k) superclass.

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

a) managed object class;

b) notification.

5 Abbreviations

Abbreviations regarding the MTP are listed in Table 1/Q.704. Additionally, for the purpose of this Recommendation, the following definitions apply:

ASN.1	Abstract Syntax Notation One
ERD	Entity Relationship Diagram
GDMO	Guidelines for the Definition of Managed Objects
max	Maximum
MO	Managed Object
MOC	Managed Object Class
MSU	Message Signal Unit
MTP	Message Transfer Part
NE	Network Element
OMAP	Operations, Maintenance and Administration Part
TMN	Telecommunications Management Network

6 Conventions

Recommendation A.3 (Elaboration and presentation of texts for Recommendations of the ITU-T) is used.

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 8) and the informal parts of this Recommendation, the formal part is to be regarded as leading.

In case there are inconsistencies between the informal description, the formal definitions or conformance statements proformas, the formal definitions shall prevail.

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, information which is obtainable via referenced instances of other information models are not repeated here). However, for some implementations, it may be useful or necessary to add some additional information to some managed object classes. For all protocol timers that are modelled in this Recommendation, it is implementation dependent what value they take when they are not managed.

7 Informal description of managed object classes

This clause gives informal descriptions of the object model for SS7 accounting.

A table overview is given showing the re-use of Recommendation Q.751.1.

Diagrams are presented for inheritance, containment and pointer relationships.

Table overviews of the content (possible operations, packages, attributes, notifications and actions) of the object class definitions are given. No explanation of the detailed meanings of these items are given here, but can be found in the behaviour descriptions of the formal definitions. The reason for this is to avoid redundancies and reduce the effort for editing and translating considerably. Additionally a short introduction how to read the formal part is given in Appendix I.

A table overview is given showing the context specific errors possible in the management of these object classes.

7.1 Re-use of Recommendation Q.751.1

The following Table 1 gives an overview of all the Q.751.1 object classes which are referenced by object classes of this information model.

Table 1/Q.751.3 – Re-use of Recommendation Q.751.1

Referenced object class	Q.751.1
managedSwitchingElement	Q.751.1
mtpSignPoint	Q.751.1
signRouteSetNePart	Q.751.1
signLinkSetTp	Q.751.1

7.2 Relation notification/LogRecord/File

The modelling of the accounting results as content of notifications does not result in an obligation to transport this (eventually large amount of) data to the TMN operation system via the Q3 interface. Another possibility to transfer the data from the network element is to write the notifications via an event forwarding discriminator into a log, to convert this log into a file and then transfer this file via usual file transfer mechanisms like FTAM, etc.

7.3 Diagrams

7.3.1 Inheritance diagram

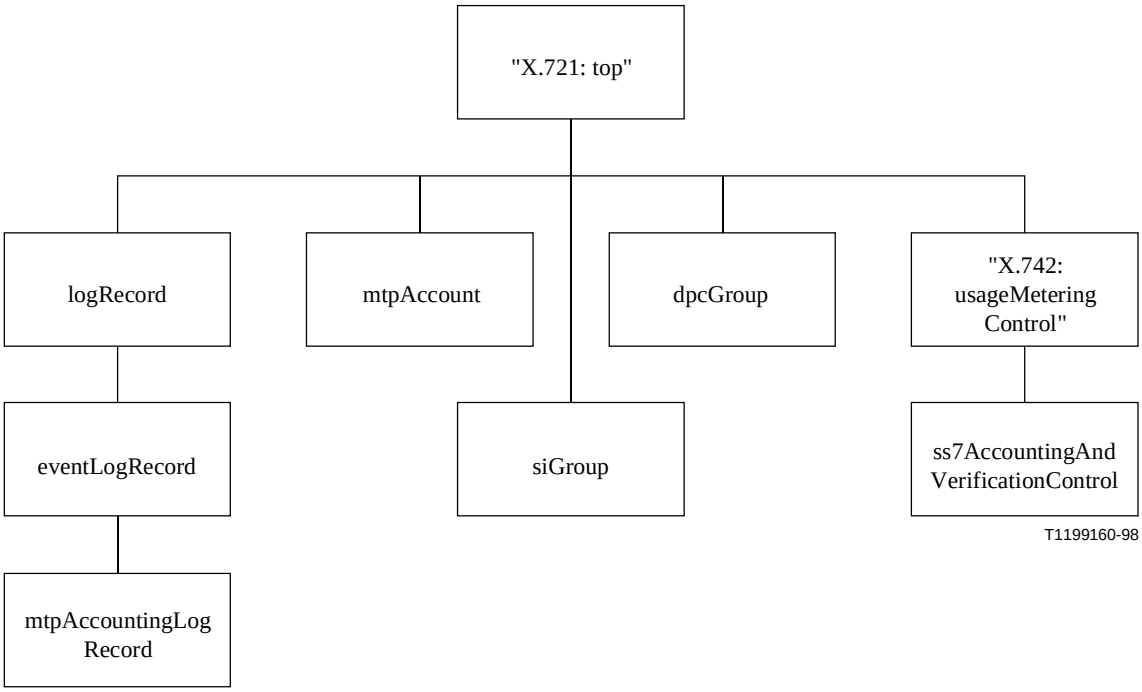

Figure 1/Q.751.3 – Inheritance diagram

7.3.2 Entity Relationship Diagram

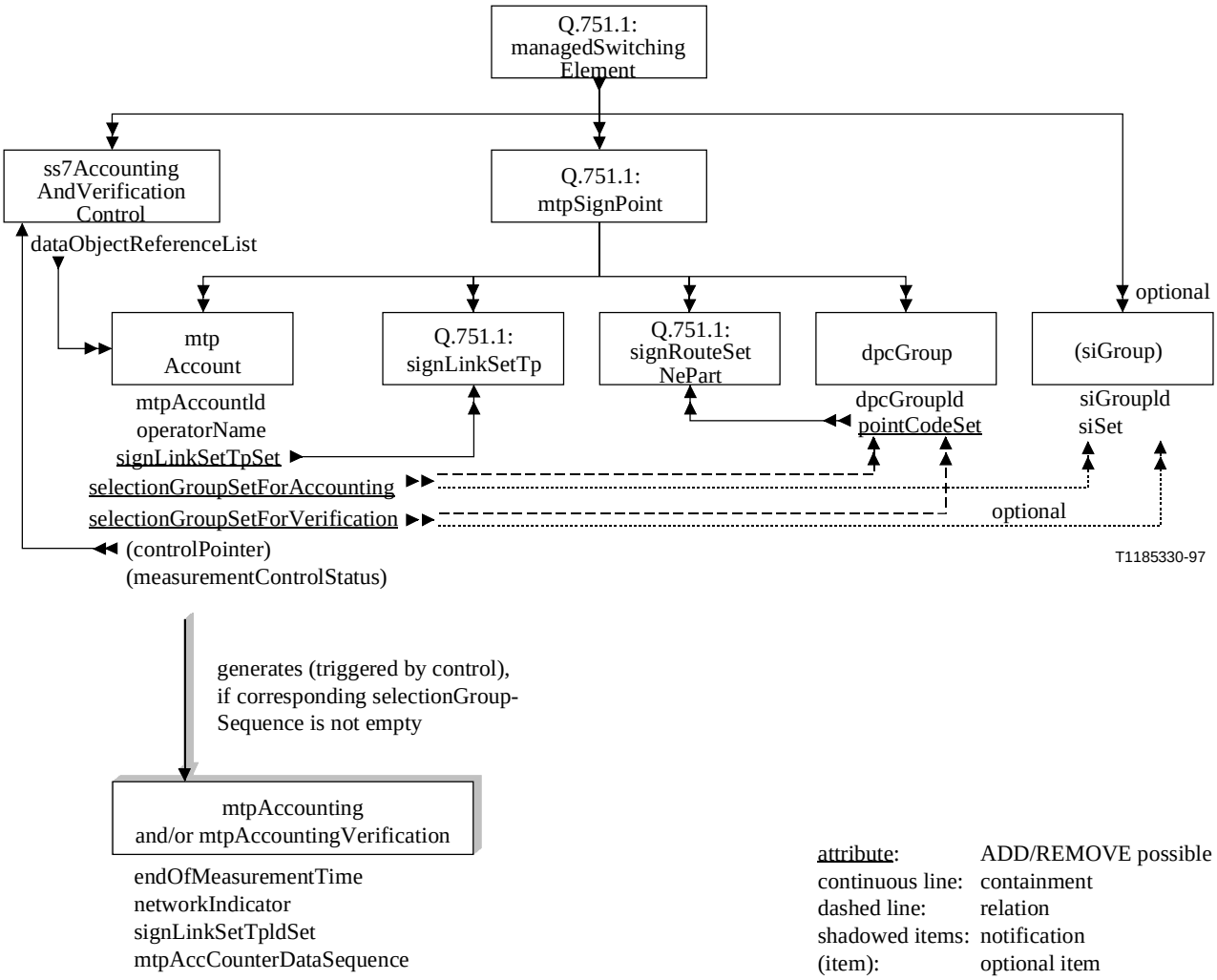

Figure 2/Q.751.3 – ERD: Diagram for MTP accounting and verification

Explanations for the arrows in Figure 2

Containment

Double arrows at the subordinate object class signify that several instances of it can be contained in one instance of the superior object class. Relation:

– A single arrow at the "targeted" object means that the "pointing" object references exactly one instance of the "target" object.

– Double arrows at the "targeted" object mean that the "pointing" object can reference several instances of the "target" object. A single arrow at the "pointing" object means that the "targeted" object is referenced by exactly one instance of the "pointing object".

– Double arrows at the "pointing" object mean that the "targeted" object can be referenced by several instances of the "pointing object".

7.3.3 Tables and textual description

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.

(Cn) Conditional, n specifies the number of the condition; explanation of it below the tables.

(O) Optional (condition "if the instance supports it" or similar).

This signification is only done at the package level.

The possible operations on objects and attributes are specified by:

(Cr) CREATE

(Del) DELETE

(G) GET

(SBC) SET BY CREATE

(R) REPLACE

(A-Rm) ADD-REMOVE

(d) DEFAULT VALUE is defined for the attribute

(dr) DEFAULT VALUE DERIVATION RULE is defined for the attributes

7.3.3.1 Managed Object Classes common for SS7 accounting

7.3.3.1.1 ss7AccountingAndVerificationControl

Table 2/Q.751.3 – ss7AccountingAndVerificationControl

ss7AccountingAndVerificationControl (Cr, Del)		
Attributes	**Notifications**	**Actions**
"ITU-T Rec. X.742 (1995)":meteringControlObject PACKAGE (M,I)		
controlObjectId (G, SBC)		
"ITU-T Rec. X.721 | ISO/IEC 10165-2":operationalState (G)		
"ITU-T Rec. X.742 (1995)":meteringControlCapabilities PACKAGE (M,I)		
reportingTriggers (G, SBC, R; A-Rm)		
accountableObjectsReferenceList (G)		
dataObjectsReferenceList (G)		
	"ITU-T Rec. X.721 (1992)":attributeValueChange	
	"ITU-T Rec. X.721 (1992)":objectCreation	
	"ITU-T Rec. X.721 (1992)":objectDeletion	
	"ITU-T Rec. X.721 (1992)":StateChange	

Table 2/Q.751.3 – ss7AccountingAndVerificationControl *(concluded)*

ss7AccountingAndVerificationControl (Cr, Del)		
Attributes	**Notifications**	**Actions**
"ITU-T Rec. X.742 (1995)":meteringStart PACKAGE (C1,I)		
		startMetering
"ITU-T Rec. X.742 (1995)":meteringControl PACKAGE (C2,I)		
		suspendMetering
		resumeMetering
"ITU-T Rec. X.742 (1995)":startNotification PACKAGE (C3,I)		
	meteringStarted	
"ITU-T Rec. X.742 (1995)":controlNotification PACKAGE (C4,I)		
	meteringSuspended	
	meteringResumed	
"ITU-T Rec. X.721 (1992)":topPackage (M,I)		
objectClass (G)		
nameBinding (G)		
"ITU-T Rec. X.721 (1992)":packagesPackage (C5,I)		
packages (G)		
"ITU-T Rec. X.721 (1992)":allomorphicPackage (C6,I)		
allomorphs (G)		

C1 Present if corresponding data objects are explicitly created in a suspended condition.

C2 Present if suspend and resume operations are required and the corresponding data objects support the meteringDataCondition package.

C3 Present if there is a static requirement to advise manager(s) other than the one generating the action of the outcome of the action and the meteringStart package is supported.

C4 Present if there is a static requirement to advise manager(s) other than the one generating the action of the outcome of the action and the meteringControl package is supported.

C5 Present if any registered package has been instantiated.

C6 Present if allomorphism is supported.

For detailed meanings of the object class and its attributes, notifications and actions, see their behaviour description in Recommendation X.742.

7.3.3.2 Managed Objects for MTP accounting

7.3.3.2.1 dpcGroup

Table 3/Q.751.3 – dpcGroup

dpcGroup (Cr, Del)		
Attributes	**Notifications**	**Actions**
dpcGroupPackage (M)		
dpcGroupId (G, SBC)		
pointCodeSet (G, SBC, A-Rm)		
"ITU-T Rec. M.3100 (1995)":objectManagementNotificationsPackage (M)		
	"ITU-T Rec. X.721 (1992)":attributeValueChange	
	"ITU-T Rec. X.721 (1992)":objectCreation	
	"ITU-T Rec. X.721 (1992)":objectDeletion	
"ITU-T Rec. X.721 (1992)":topPackage (M,I)		
objectClass (G)		
nameBinding (G)		
"ITU-T Rec. X.721 (1992)":packagesPackage (C1,I)		
packages (G)		
"ITU-T Rec. X.721 (1992)":allomorphicPackage (C2,I)		
allomorphs (G)		
C1 Present if any registered package has been instantiated. C2 Present if allomorphism is supported.		

For the explanations of the object class and the attributes defined in this Recommendation, see their behaviour descriptions in the formal definition clause.

7.3.3.2.2 mtpAccount

Table 4/Q.751.3 – mtpAccount

mtpAccount (Cr, Del)		
Attributes	**Notifications**	**Actions**
mtpAccountPackage (M)		
mtpAccountId (G, SBC)		
signLinkSetTpSet (G, SBC, A-Rm)		
operatorName (G, SBC)		
selectionGroupSetForAccounting (G, R, A-Rm)		
selectionGroupSetForVerification (G, R, A-Rm)		
	mtpAccounting	
	mtpAccountingVerification	
controlPointerPackage (O[a])		
controlPointer (G, SBC)		
measurementControlStatusPackage (O)		
measurementControlStatus (G, SBC)		
"ITU-T Rec. X.721 (1992)":topPackage (M,I)		
objectClass (G)		
nameBinding (G)		
"ITU-T Rec. X.721 (1992)":packagesPackage (C1,I)		
packages (G)		
"ITU-T Rec. X.721 (1992)":allomorphicPackage (C2,I)		
allomorphs (G)		

C1 Present if any registered package has been instantiated.

C2 Present if allomorphism is supported.

a) To avoid redundancies, it should not be used if the startMetering and/or controlMetering packages is/are supported by the corresponding ss7AcccountingAndVerificationControl instance.

For the explanations of the object class and the attributes defined in this Recommendation, see their behaviour descriptions in the formal definition clause.

7.3.3.2.3 mtpAccountingLogRecord

This non-instantiable object class is defined to formally supply the possibility to write the mtpAccounting and/or mtpAccountingVerification notifications into a log.

7.3.3.2.4 siGroup

Table 5/Q.751.3 – siGroup

siGroup (Cr, Del) – optional[a])		
Attributes	**Notifications**	**Actions**
siGroupPackage (M)		
siGroupId (G, SBC)		
siSet (G, SBC)		
"ITU-T Rec. X.721 (1992)":topPackage (M,I)		
objectClass (G)		
nameBinding (G)		
"ITU-T Rec. X.721 (1992)":packagesPackage (C1,I)		
packages (G)		
"ITU-T Rec. X.721 (1992)":allomorphicPackage (C2,I)		
allomorphs (G)		

C1 Present if any registered package has been instantiated.

C2 Present if allomorphism is supported.

a) This object class is optional, because it models the optional registration item service indicator (or set of). If this registration item is not used, then no instance of this class is needed.

For the explanations of the object class and the attributes defined in this Recommendation, see their behaviour descriptions in the formal definition clause.

7.3.3.3 Context specific errors

Table 6/Q.751.3 – Context specific errors

Operation	Error	Description
object class mtpAccount		
REPLACE signLinkSetTpSet + CREATE	linksetNotExistingInSameMtpSignPoint Error	At least one of the signLinkSetTp instances to be referenced is not existing in the same mtpSignPoint as the mtpAccount.
	linksetAlreadyInOtherMtpAccountError	At least one of the signLinkSetTp instances to be referenced is already referenced by another mtpAccount instance.
REPLACE selectionGroupSequence ForAccounting + REPLACE selectionGroupSequence ForVerification + CREATE	dpcGroupNotExistingInSameMtpSign PointError	At least one of the dpcGroup instances to be referenced is not existing in the same mtpSignPoint as the mtpAccount.
	selectionGroupOverlapError	The selectionGroups within the selectionGroupSequence would not allow an unambiguous identification of the counter to be incremented.
	referencedSiGroupNotExistingError	At least one of the siGroup instances to be referenced is not existing.
	referencedDpcGroupNotExistingError	At least one of the dpcGroup instances to be referenced is not existing.
object class dpcGroup		
REPLACE ADD-REMOVE pointCodeSet + CREATE	pointCodeNotExistingInSameMtp SignPointError	At least one of the point codes is not used by any signRouteSetNePart instance contained in the same mtpSignPoint as the mtpAccount.
	pointCodeUsedByMtpSignPointError	At least one of the point codes is used as point code by the mtpSignPoint containing the mtpAccount.
DELETE	objectStillReferencedError	This object instance is still referenced by one or more instances of other objects and therefore must not be deleted.
object class siGroup		
DELETE	objectStillReferencedError	See above.

8 Formal definitions

8.1 Formal definitions common for SS7 accounting

8.1.1 Managed Object Class definitions

```
ss7AccountingAndVerificationControl MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Rec. X.742 (1996)":usageMeteringControlObject;
CHARACTERIZED BY
        ss7AccountingAndVerificationControlPackage;
REGISTERED AS {ss7AccountingAndVerificationControl-OOi};
```

8.1.2 Package definitions

```
controlPointerPackage PACKAGE
BEHAVIOUR controlPointerPackageBehaviour BEHAVIOUR DEFINED AS
        "This package provides an attribute to assign the account instance at creation time to an
        ss7AcccountingAndVerificationControl instance.";;
ATTRIBUTES
  controlPointer GET SET-BY-CREATE;
REGISTERED AS { controlPointerPackage-POi};

measurementControlStatusPackage PACKAGE
BEHAVIOUR measurementControlStatusBehaviour BEHAVIOUR DEFINED AS
        "This package allows to read the status of the accounting/verification measurements.";;
ATTRIBUTES
  measurementControlStatus PERMITTED VALUES
     AccountingDefinedTypesModule.MeasurementControlStatus GET SET-BY-CREATE;
REGISTERED AS { measurementControlStatusPackage-POi};

ss7AccountingAndVerificationControlPackage PACKAGE
BEHAVIOUR ss7AccountingAndVerificationControlPackageBehaviour BEHAVIOUR DEFINED AS
        "The ss7AccountingAndVerificationControl managed object is derived from
        X.742:usageMeteringControlObject. The reportingTriggers attribute contains the timePeriod after which
        the periodic SS7 Accounting notifications are generated (periodic is the only allowed reporting trigger
        event). For ss7 Accounting the time period recommended in ITU-T Rec. Q.752 is 30 minutes. The
        accountableObjectsReferenceList is an empty set. The dataObjectsReferenceList is updated automatically
        on creation of an mtpAccount or sccpAccount instance respectively.";;
REGISTERED AS {ss7AccountingAndVerificationControlPackage-POi};
```

8.1.3 Attribute definitions

```
controlPointer ATTRIBUTE
WITH ATTRIBUTE SYNTAX AccountingDefinedTypesModule.PointerOrNull;
MATCHES FOR EQUALITY;
BEHAVIOUR controlPointerBehaviour BEHAVIOUR DEFINED AS
        "The controlPointer attribute points to an ss7AccountingAndVerificationControl instance. It is used to
        assign an instance at creation time to an ss7AccountingAndVerificationControl. The referencing instance
        shall automatically be added to the dataObjectList of the referenced ss7AccountingAndVerificationControl
        instance. The value of this attribute shall be set to NULL if an action suspendMetering for the instance was
        performed successfully.";;
REGISTERED AS {controlPointer-AOi};

endOfMeasurementTime ATTRIBUTE
WITH ATTRIBUTE SYNTAX AccountingDefinedTypesModule.EndOfMeasurementTime;
BEHAVIOUR endOfMeasurementTimeBehaviour BEHAVIOUR DEFINED AS
        "The endOfMeasurementTime attribute specifies time at the end of the accounting or verification
        measurement.";;
REGISTERED AS {endOfMeasurementTime-AOi};
```

measurementControlStatus ATTRIBUTE
WITH ATTRIBUTE SYNTAX AccountingDefinedTypesModule.ControlStatus;
MATCHES FOR EQUALITY;
BEHAVIOUR measurementControlStatusBehaviour BEHAVIOUR DEFINED AS
"The measurementControlStatus attribute indicates, whether the accounting/verification measurement is suspended (value: {suspended(3)} or not (value: { }, i.e. empty set). The other possible values of X.721 ASN.1 type ControlStatus are not used.";;
REGISTERED AS {measurementControlStatus-AOi};

operatorName ATTRIBUTE
WITH ATTRIBUTE SYNTAX AccountingDefinedTypesModule.AdditionalName;
MATCHES FOR EQUALITY;
BEHAVIOUR operatorNameBehaviour BEHAVIOUR DEFINED AS
"The operatorName attribute indicates the operator for which accounting and/or verification is done in the account.";;
REGISTERED AS {operatorName-AOi};

selectionGroupSetForAccounting ATTRIBUTE
WITH ATTRIBUTE SYNTAX AccountingDefinedTypesModule.SelectionGroupSet;
MATCHES FOR EQUALITY;
BEHAVIOUR selectionGroupSetForAccountingBehaviour BEHAVIOUR DEFINED AS
"The selectionGroupSetForAccounting attribute refers to set of groups of object instances that are representing the items against which incoming SS7 traffic should be registered.";;
REGISTERED AS {selectionGroupSetForAccounting-AOi};

selectionGroupSetForVerification ATTRIBUTE
WITH ATTRIBUTE SYNTAX AccountingDefinedTypesModule.SelectionGroupSet;
MATCHES FOR EQUALITY;
BEHAVIOUR selectionGroupSetForVerificationBehaviour BEHAVIOUR DEFINED AS
"The selectionGroupSetForVerification attribute refers to set of groups of object instances that are representing the items against which outgoing SS7 traffic should be registered.";;
REGISTERED AS {selectionGroupSetForAccounting-AOi};

8.1.4 Name Binding definitions

ss7AccountingAndVerificationControl-managedElement NAME BINDING
-- this name binding is optional
SUBORDINATE OBJECT CLASS ss7AccountingAndVerificationControl AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Rec. M.3100 (1992)":managedElement AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Rec. X.742 (1996)":controljectId;
BEHAVIOUR ss7AccountingAndVerificationControl-managedElementBehaviour BEHAVIOUR DEFINED AS
"This name binding is used when the ss7AccountAndVerificationControl MO is created by management operations.";;
CREATE;
DELETE;
REGISTERED AS {ss7AccountingAndVerificationControl-managedElement-NBOI};

"ITU-T Rec. Q.751.1 (1995)":ss7AccountingAndVerificationControl-managedSwitchingElement NAME BINDING
-- this name binding is optional
SUBORDINATE OBJECT CLASS ss7AccountingAndVerificationControl AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Rec. Q.751.1 (1995)":managedSwitchingElement AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Rec. X.742 (1996)":controlObjectId;
BEHAVIOUR ss7AccountingAndVerificationControl-managedSwitchingElement-Behaviour BEHAVIOUR DEFINED AS
"This name binding is used when the ss7AccountAndVerificationControl MO is created by management operations.";;
CREATE;
DELETE;
REGISTERED AS {ss7AccountingAndVerificationControl-managedSwitchingElement-NBOI};

8.1.5 Notification definitions

Currently none defined.

8.1.6 Parameter definitions

Currently none defined.

8.1.7 ASN.1 definitions

```
AccountingDefinedTypesModule
{itu-t(0) recommendation(0) q(17)  omap(751) accounting(3) informationModel(0) asn1Modules(2)
accountingDefinedTypesModule(0)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

IMPORTS

ObjectInstance, ControlStatus
        FROM Attribute-ASN1Module {joint-iso-itu-t ms(9) smi(3) part2(2) asn1Module(2) 1}

PointerOrNull
FROM ASN1DefinedTypesModule { itu-t recommendation m gnm(3100) informationModel(0) asn1Modules(2)
asn1DefinedTypesModule(0) }

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

EXPORTS ALL

-- ASN.1 type definitions

DataProblem ::= ENUMERATED {
                noProblem               (0),
                intervalNotComplete     (1),
                configurationChanged    (2),
                notReliable             (3)             }

EndOfMeasurementTime  ::= GeneralizedTime

MeasurementControlStatus ControlStatus::= SET OF INTEGER {suspended(3)}

maxNumberReferencesInSelectionGroupSet INTEGER::= h -- this number is only for compilability

SelectionGroup ::= SEQUENCE {
                selectionItem           [0] ObjectInstance,
                optionalSelectionItem   [1] ObjectInstance OPTIONAL      }

SelectionGroupSet ::= SET SIZE (0..maxNumberReferencesInSelectionGroupSet) OF SelectionGroup

-- ASN.1 OBJECT IDENTIFIER definitions

ss7AccountingInformationModel OBJECT IDENTIFIER ::= {itu-t recommendation(0) q(17)  omap(751)
accounting(3)}

accountingAction OBJECT IDENTIFIER ::= {ss7AccountingInformationModel action(9)}

accountingAttribute OBJECT IDENTIFIER ::= {ss7AccountingInformationModel attribute(7)}

accountingAttributeGroup OBJECT IDENTIFIER ::= {ss7AccountingInformationModel attributeGroup(8)}
```

accountingNameBinding OBJECT IDENTIFIER ::= {ss7AccountingInformationModel nameBinding(6)}

accountingNotification OBJECT IDENTIFIER ::= {ss7AccountingInformationModel notification(10)}

accountingObjectClass OBJECT IDENTIFIER ::= {ss7AccountingInformationModel managedObjectClass(3)}

accountingPackage OBJECT IDENTIFIER ::= {ss7AccountingInformationModel package(4)}

accountingParameter OBJECT IDENTIFIER ::= {ss7AccountingInformationModel parameter(5)}

accountingOrVerification-AOi OBJECT IDENTIFIER ::= {accountingAttribute accountingOrVerification(0)}

endOfMeasurementTime-AOi OBJECT IDENTIFIER ::= {accountingAttribute endOfMeasurementTime(7)}

controlPointer-AOi OBJECT IDENTIFIER ::= {accountingAttribute controlPointer(1)}

controlPointerPackage-POi OBJECT IDENTIFIER ::= ::= {accountingPackage controlPointerPackage(1)}

measurementControlStatus-AOi OBJECT IDENTIFIER ::= {accountingAttribute measurementControlStatus(6)}

measurementControlStatusPackage-POi OBJECT IDENTIFIER ::= ::= {accountingPackage measurementControlStatusPackage(2)}

operatorName-AOi OBJECT IDENTIFIER ::= {accountingAttribute operatorName(3)}

selectionGroupSetForAccounting-AOi OBJECT IDENTIFIER ::= {accountingAttribute selectionGroupSetForAccounting(4)}

selectionGroupSetForVerification-AOi OBJECT IDENTIFIER ::= {accountingAttribute selectionGroupSetForVerification(5)}

ss7AccountingAndVerificationControlPackage-POi OBJECT IDENTIFIER ::= ::= {accountingPackage ss7AccountingAndVerificationControlPackage(3)}

ss7AccountingAndVerificationControl-OOi OBJECT IDENTIFIER ::= {accountingObjectClass ss7AccountingAndVerificationControl(0)}

ss7AccountingAndVerificationControl-managedElement-NBOI OBJECT IDENTIFIER ::= {accountingNameBinding ss7AccountingAndVerificationControl-managedElement(0)}

ss7AccountingAndVerificationControl-managedSwitchingElement-NBOI OBJECT IDENTIFIER ::= {accountingNameBinding ss7AccountingAndVerificationControl-managedSwitchingElement(1)}

ss7AccountingAndVerificationControlPackage-POi OBJECT IDENTIFIER ::= {accountingPackage ss7AccountingAndVerificationControlPackage(0)}

ss7AccountingLogRecord-OOi OBJECT IDENTIFIER ::= {accountingObjectClass ss7AccountingLogRecord(1)}

ss7AccountingLogRecordPackage-POi OBJECT IDENTIFIER ::= {accountingPackage ss7AccountingLogRecordPackage(1)}

ss7Accounting-NOI OBJECT IDENTIFIER ::= {accountingNotification ss7Accounting(0)}

-- ASN.1 OBJECT IDENTIFIER definitions for specific errors

objectStillReferencedError-OID OBJECT IDENTIFIER ::= {accountingParameter objectStillReferencedError(1)}

END

8.2 Formal definitions for MTP Accounting

8.2.1 Managed Object Class definitions

dpcGroup MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;
CHARACTERIZED BY
dpcGroupPackage,
"ITU-T Rec. M.3100 (1995)":objectManagementNotificationsPackage ;
REGISTERED AS {dpcGroup-OOi};

mtpAccount MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;
CHARACTERIZED BY
"ITU-T Rec. M.3100 (1995)":objectManagementNotificationsPackage,
mtpAccountPackage ;
CONDITIONAL PACKAGES
controlPointerPackage PRESENT IF "the instance supports it (To avoid redundancies it should not be used if the startMetering and/or controlMetering package/s is/are supported by the corresponding ss7AcccountingAndVerificationControl instance)",
measurementControlStatusPackage PRESENT IF "the instance supports it ";
REGISTERED AS {mtpAccount-OOi};

mtpAccountingLogRecord MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Rec. X.735 (1991)":eventLogRecord;
CHARACTERIZED BY
mtpAccountingLogRecordPackage;
REGISTERED AS {mtpAccountingLogRecord-OOi};

siGroup MANAGED OBJECT CLASS
DERIVED FROM "ITU-T Rec. X.721 (1992) | ISO/IEC 10165-2 : 1992":top;
CHARACTERIZED BY
siGroupPackage,
"ITU-T Rec. M.3100 (1995)":objectManagementNotificationsPackage ;
REGISTERED AS {siGroup-OOi};

8.2.2 Package definitions

dpcGroupPackage PACKAGE
BEHAVIOUR dpcGroupBehaviour BEHAVIOUR DEFINED AS
"The dpcGroup lists at least one or more point codes of signRouteSetNeParts within the same mtpSignPoint as the dpcGroup for which shall be accounted collectively. An instance of this class represents the destination information item involved in accounting or verification.";;
ATTRIBUTES
dpcGroupId GET SET-BY-CREATE,
pointCodeSet GET SET-BY-CREATE ADD-REMOVE;
REGISTERED AS {dpcGroupPackage-POi};

mtpAccountPackage PACKAGE
BEHAVIOUR mtpAccountPackageBehaviour BEHAVIOUR DEFINED AS
"The mtpAccount managed object allows by means of the signLinkSetTpSet attribute to define a set (at least one) of signLinkSetTps which are leading to an adjacent operator and therefore their MSU traffic can be accounted/verified collectively. One signLinkSetTp must not be assigned to more than one mtpAccountPackage instance within one mtpSignPoint. All signLinkSetTpSets of mtpAccounts with the same operatorName value must be disjunct.
The selectionItem in each of the entries of selectionGroupSet refers each to one instance of dpcGroup, the optionalSelectionItem can be used to refer one instance of siGroup. Each selectionGroup entry shall be unique in this attribute.

For each selectionGroup it is counted separately. Each counter information contains the number of MSUs, the number of octets and an eventual data problem. The counters are not readable but only available in the notification data.
If all counters for verification or accounting should still be zero at the end of the measurement, the corresponding notification should be generated regardless of that in order to provide a measure against notification loss.
Two different notifications, one for accounting, one for accounting verification containing the measurement results might be generated by this one object. If a selectionGroupSet is empty, then this means, that accounting resp. verification is not performed for the adjacent operator. In this case there is no notification for accounting resp. verification.";;

ATTRIBUTES
mtpAccountId GET SET-BY-CREATE,
signLinkSetTpSet GET SET-BY-CREATE ADD-REMOVE,
operatorName GET SET-BY-CREATE,
controlPointer GET SET-BY-CREATE,
selectionGroupSetForAccounting GET REPLACE ADD-REMOVE;
selectionGroupSetForVerification GET REPLACE ADD-REMOVE;

NOTIFICATIONS
mtpAccounting,
mtpAccountingVerification;

REGISTERED AS {mtpAccountPackage-POi};

mtpAccountingLogRecordPackagePACKAGE
BEHAVIOUR mtpAccountingLogRecordPackageBehaviour BEHAVIOUR DEFINED AS
"The mtpAccountingLogRecord managed object is used to represent logged information that resulted from the mtpAccounting or mtpAccountingVerification notifications.";;

ATTRIBUTES
endOfMeasurementTime GET,
networkIndicator GET,
signLinkSetTpIdSet GET,
mtpAccCounterDataSequence GET;

REGISTERED AS {mtpAccountingLogRecordPackage-POi};

siGroupPackage PACKAGE
BEHAVIOUR siGroupBehaviour BEHAVIOUR DEFINED AS
"The siGroup instances contain a set (at least one) of service indicators with the same account class. The account class is identified by the siGroupId. An instance of this class represents the service indicator information item involved in accounting or accounting verification.";;

ATTRIBUTES
siGroupId GET,
siSet GET SET-BY-CREATE;

REGISTERED AS {siGroupPackage-POi};

8.2.3 Attribute definitions

dpcGroupId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.SimpleNameType;
MATCHES FOR EQUALITY;
BEHAVIOUR dpcGroupIdBehaviour BEHAVIOUR DEFINED AS
"The dpcGroupId is the naming attribute of the dpcGroup managed object. ";;
REGISTERED AS {dpcGroupId-AOi};

mtpAccCounterDataSequence ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.MtpAccCounterDataSequence;
BEHAVIOUR mtpAccCounterDataSequenceBehaviour BEHAVIOUR DEFINED AS
"This attribute defines the counter values of MTP accounting or accounting verification and optionally the list of point codes or set of service indicators to which the counter values refer.";;
REGISTERED AS {mtpAccCounterDataSequence-AOi};

mtpAccountId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.SimpleNameType;
MATCHES FOR EQUALITY;
BEHAVIOUR mtpAccountIdBehaviour BEHAVIOUR DEFINED AS
"The mtpAccountId is the naming attribute of the mtpAccountGroup managed object.";;
REGISTERED AS {mtpAccountId-AOi};

pointCodeSet ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.PointCodeSet;
MATCHES FOR EQUALITY,SET-COMPARISON,SET-INTERSECTION;
BEHAVIOUR pointCodeSetBehaviour BEHAVIOUR DEFINED AS
"The pointCodeSet lists signalling point codes of signalling points for which shall be accounted collectively.
A set request is rejected if
for at least one of the point codes in the attribute no signRouteSetNePart with the same pointCode is existing within the superior mtpSignPoint.";;
REGISTERED AS {pointCodeSet-AOi};

signLinkSetTpIdSet ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.SignLinkSetTpIdSet;
BEHAVIOUR signLinkSetTpIdSetBehaviour BEHAVIOUR DEFINED AS
"This attribute defines a list of the identifiers of the linksets which are combined in one mtpAccount and are contained in the superior mtpSignPoint of the mtpAccount. The CHOICE in the SimpleName type used for the identifiers shall be restricted to INTEGER.";;
REGISTERED AS {signLinkSetTpIdSet-AOi};

signLinkSetTpSet ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.SignLinkSetTpSet;
MATCHES FOR EQUALITY,SET-COMPARISON,SET-INTERSECTION;
BEHAVIOUR signLinkSetTpSetBehaviour BEHAVIOUR DEFINED AS
"The signLinkSetTpSet refers to a set (at least one) of signLinkSetTps, for which MTP accounting or verification shall be done collectively. E.g. for signLinkSetTps, which lead to the same adjacent operator.
A set request is rejected if
at least one of the pointers would reference an instance of another object class than signLinkSetTp or a signLinkSetTp instance which is not existing or contained in another mtpSignPoint instance than the mtpAccount.";;
REGISTERED AS {signLinkSetTpSet-AOi};

siGroupId ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.SimpleNameType;
MATCHES FOR EQUALITY;
BEHAVIOUR siGroupIdBehaviour BEHAVIOUR DEFINED AS
"The siGroupId is the naming attribute of the siGroup managed object.";;
REGISTERED AS {siGroupId-AOi};

siSet ATTRIBUTE
WITH ATTRIBUTE SYNTAX MtpAccountingDefinedTypesModule.SiSet;
MATCHES FOR EQUALITY,SET-COMPARISON,SET-INTERSECTION;
BEHAVIOUR siSetBehaviour BEHAVIOUR DEFINED AS
"The siSet lists service indicators for which shall be accounted collectively.";;
REGISTERED AS {siSet-AOi};

8.2.4 Name Binding definitions

dpcGroup-mtpSignPoint NAME BINDING
SUBORDINATE OBJECT CLASS dpcGroup AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Rec. Q.751.1 (1995)":mtpSignPoint AND SUBCLASSES;
WITH ATTRIBUTE dpcGroupId;

BEHAVIOUR dpcGroup-mtpSignPointBehaviour BEHAVIOUR DEFINED AS
"This name binding is used when the dpcGroup instance is created by management operations.
A create request is rejected if
for at least one of the point codes in the attribute pointCodeSet no signRouteSetNePart with the same pointCode is existing within the superior mtpSignPoint.
A delete request is rejected if
the instance is still referenced by an instance of object class mtpAccount via attribute selectionGroupSet.";;
CREATE;
DELETE;
REGISTERED AS {dpcGroup-mtpSignPoint-NBOI};

mtpAccount-mtpSignPoint NAME BINDING
SUBORDINATE OBJECT CLASS mtpAccount AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Rec. Q.751.1 (1995)":mtpSignPoint AND SUBCLASSES;
WITH ATTRIBUTE mtpAccountId;
BEHAVIOUR mtpAccount-mtpSignPointBehaviour BEHAVIOUR DEFINED AS
"This name binding is used when the mtpAccount instance is created by management operations.
A create request is rejected if
at least one of the pointers in attribute signLinkSetTpSet would reference an instance of another object class than signLinkSetTp or a signLinkSetTp instance which is not existing or contained in another mtpSignPoint instance than the mtpAccount or a signLinkSetTp instance which is already referenced by another mtpAccount
OR
at least one of the instances which would be referenced by the attribute selectionGroupSetForAccounting or -ForVerification is not existing or is of another object class than dpcGroup or siGroup
OR
at least one of the dpcGroup instances which would be referenced by the attribute selectionGroupSetForAccounting or -ForVerification is contained in another mtpSignPoint.";;
CREATE;
DELETE;
REGISTERED AS {mtpAccount-mtpSignPoint-NBOI};

siGroup-managedElement NAME BINDING
-- this name binding is optional
SUBORDINATE OBJECT CLASS siGroup AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Rec. M.3100 (1992)":managedElement AND SUBCLASSES;
WITH ATTRIBUTE siGroupId;
BEHAVIOUR siGroupBehaviour-managedElement BEHAVIOUR DEFINED AS
"This name binding is used when the siGroup instance is created by management operations.
A delete request is rejected if
the instance is still referenced by an instance of object class mtpAccount via attribute selectionGroupSet.";;
CREATE;
DELETE;
REGISTERED AS {siGroup-managedElement-NBOI};

siGroup-managedSwitchingElement NAME BINDING
-- this name binding is optional
SUBORDINATE OBJECT CLASS siGroup AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Rec. Q.751.1 (1995)":managedSwitchingElement AND SUBCLASSES;
WITH ATTRIBUTE siGroupId;
BEHAVIOUR siGroupBehaviour-managedSwitchingElement BEHAVIOUR DEFINED AS
"This name binding is used when the siGroup instance is created by management operations.
A delete request is rejected if
the instance is still referenced by an instance of object class mtpAccount via attribute selectionGroupSet.";;
CREATE;
DELETE;
REGISTERED AS {siGroup-managedSwitchingElement-NBOI};

8.2.5 Notification definitions

mtpAccounting NOTIFICATION
BEHAVIOUR mtpAccountingBehaviour BEHAVIOUR DEFINED AS
"This notification is generated on occurrence of the event specified in the reporting triggers attribute of the ss7AccountingAndVerificationControl object controlling the mtpAccount, except if the attribute selectionGroupSetForAccounting of the instance has size zero. The notification shall also be sent, if all counters have the value zero.
If accounting is done for all accounts in the same way, then it is possible to include the pointCodeSet only in one notification (e.g. the first) of the interval and omit it in all others. In this case the sequence of the given counters must be identical, i.e. refer to the same DPCs, for all notifications of the interval.";;
WITH INFORMATION SYNTAX AccountingDefinedTypesModule.MtpAccountingNotificationData
AND ATTRIBUTE IDS
endOfMeasurementTime endOfMeasurementTime,
networkIndicator networkIndicator,
signLinkSetTpIdSet signLinkSetTpIdSet,
mtpAccCounterDataSequence mtpAccCounterDataSequence;
REGISTERED AS {mtpAccounting-NOI}

mtpAccountingVerification NOTIFICATION
BEHAVIOUR mtpAccountingVerificationBehaviour BEHAVIOUR DEFINED AS
"This notification is generated on occurrence of the event specified in the reporting triggers attribute of the ss7AccountingAndVerificationControl object controlling the mtpAccount, except if the attribute selectionGroupSetForVerification of the instance has size zero. The notification shall also be sent, if all counters have the value zero.
If verification is done for all accounts in the same way, then it is possible to include the pointCodeSet only in one notification (e.g. the first) of the interval and omit it in all others. In this case the sequence of the given counters must be identical, i.e. refer to the same DPCs, for all notifications of the interval.";;
WITH INFORMATION SYNTAX AccountingDefinedTypesModule.MtpAccountingNotificationData
AND ATTRIBUTE IDS
endOfMeasurementTime endOfMeasurementTime,
networkIndicator networkIndicator,
signLinkSetTpIdSet signLinkSetTpIdSet,
mtpAccCounterDataSequence mtpAccCounterDataSequence;
REGISTERED AS {mtpAccountingVerification-NOI}

8.2.6 Parameter definitions

Currently none defined.

8.2.7 ASN.1 definitions

MtpAccountingDefinedTypesModule
{itu-t(0) recommendation(0) q(17) omap(751) accounting(3) informationModel(0) asn1Modules(2) mtpAccountingDefinedTypesModule(1)}

DEFINITIONS IMPLICIT TAGS ::= BEGIN

IMPORTS

ObjectInstance, SimpleNameType, NameType
FROM Attribute-ASN1Module {joint-iso-itu-t ms(9) smi(3) part2(2) asn1Module(2) 1}

Counter, DataProblem, accountingInformationModel, accountingAction, accountingAttribute, accountingAttributeGroup, accountingNameBinding, accountingNotification, accountingObjectClass, accountingPackage, accountingParameter
FROM AccountingDefinedTypesModule {itu-t(0) recommendation(0) q(17) omap(751) accounting(3) informationModel(0) asn1Modules(2) accountingDefinedTypesModule(0)}

```
PointCode, SIOType, NetworkIndicator
FROM MTPDefinedTypesModule {itu-t(0) recommendation(0) q(17) omap(751) mtp(1) informationModel(0)
asn1Modules(2) mtpDefinedTypesModule(0)}

Ss7SpecificErrorInformation
FROM {itu(0) recommendation(0) q(17) omap2(2751) part1(1) informationModel(0) asn1Modules(2)
      q2751DefinedTypesModule(0)}

EXPORTS EVERYTHING

-- ASN.1 type definitions

maxNumberPointCodesInPointCodeSet INTEGER::= n -- this number is only for compilability

maxNumberReferencesInMtpSelectionGroupSet INTEGER::= p -- this number is only for compilability

maxNumberReferencesInSignLinkSetTpSet INTEGER::= m -- this number is only for compilability

MtpAccCounterData ::= SEQUENCE
      {     msus              [0] INTEGER,
            octetts           [1] INTEGER,
            dataProblem       [2] DataProblem,
            pointCodeSet      [3] PointCodeSet      OPTIONAL,
            optionalSiSet     [5] SiSet             OPTIONAL    }

MtpAccCounterDataSequence ::= SEQUENCE SIZE(1..maxNumberReferencesInMtpSelectionGroupSet} OF
MtpAccCounterData
-- maximum size = p

MtpAccountingNotificationData ::= SEQUENCE{
      endOfMeasurementTime      GeneralizedTime,
      networkIndicator          NetworkIndicator,
      signLinkSetTpIdSet        SignLinkSetTpIdSet,
      mtpAccCounterDataSequence MtpAccCounterDataSequence}

PointCodeSet ::= SET SIZE (1..maxNumberPointCodesInPointCodeSet) OF PointCode

SignLinkSetTpIdSet ::= SET SIZE(1..maxNumberReferencesInSignLinkSetTpSet) OF
                                                NameType

-- maximum size = m
-- Only the integer type of the CHOICE within NameType shall be used.

SignLinkSetTpSet ::= SET SIZE (1..maxNumberReferencesInSignLinkSetTpSet) OF ObjectInstance

SiSet ::= SET SIZE (1..16) OF SIOType

-- the following values of Ss7SpecificErrorInformation defined in Rec. Q.2751.1 are used additionally:
      dpcGroupNotExistingInSameMtpSignPointError Ss7SpecificErrorInformation ::= 3000
                        -- At least one of the dpcGroup instances to be referenced is not
                        -- existing in the same mtpSignPoint as the mtpAccount.
      linksetAlreadyInOtherMtpAccountError Ss7SpecificErrorInformation ::= 3001,
                        -- At least one of the signLinkSetTp instances to be referenced is
                        -- already referenced by another mtpAccount instance.
      linksetNotExistingInSameMtpSignPointError Ss7SpecificErrorInformation ::= 3002
                        -- At least one of the signLinkSetTp instances to be referenced is
                        -- not existing in the same mtpSignPoint as the mtpAccount.
      pointCodeNotExistingInSameMtpSignPointError Ss7SpecificErrorInformation ::= 3003
                        -- At least one of the point codes is not used by any signRouteSetNePart
                        -- instance contained in the same mtpSignPoint as the mtpAccount.
```

pointCodeUsedByMtpSignPointError Ss7SpecificErrorInformation ::= 3004
-- At least one of the point codes is used as point code by the mtpSignPoint
-- containing the mtpAccount.
referencedDpcGroupNotExistingError Ss7SpecificErrorInformation ::= 3005
-- At least one of the dpcGroup instances to be referenced is not existing.
referencedSiGroupNotExistingError Ss7SpecificErrorInformation ::= 3006
-- At least one of the siGroup instances to be referenced is not existing.
selectionGroupOverlapError Ss7SpecificErrorInformation ::= 3007
-- The selectionGroups within the selectionGroupSequence would
-- not allow an unambiguous identification of the counter to be incremented.

-- ASN.1 OBJECT IDENTIFIER definitions

dpcGroupId-AOi OBJECT IDENTIFIER ::= {accountingAttribute dpcGroupId(6)}

dpcGroup-mtpSignPoint-NBOI OBJECT IDENTIFIER ::= {accountingNameBinding dpcGroup-mtpSignPoint(2)}

dpcGroupPackage-POi OBJECT IDENTIFIER ::= {accountingPackage dpcGroupPackage (3)}

dpcGroup-OOi OBJECT IDENTIFIER ::= {accountingObjectClass dpcGroup(2)}

mtpAccCounterDataSequence-AOi OBJECT IDENTIFIER ::= {accountingAttribute mtpAccCounterDataSequence(13) }

mtpAccount-mtpSignPoint-NBOI OBJECT IDENTIFIER ::= {accountingNameBinding mtpAccount-mtpSignPoint(3)}

mtpAccountId-AOi OBJECT IDENTIFIER ::= {accountingAttribute mtpAccountId(7)}

mtpAccounting-NOI OBJECT IDENTIFIER ::= {accountingNotification mtpAccounting(1) }

mtpAccountingLogRecord-OOi OBJECT IDENTIFIER ::= {accountingObjectClass mtpAccountingLogRecord(5) }

mtpAccountingLogRecordPackage-POi OBJECT IDENTIFIER ::= {accountingPackage mtpAccountingLogRecordPackage(6) }

mtpAccountingVerification-NOI OBJECT IDENTIFIER ::= {accountingNotification mtpAccountingVerification(2) }

mtpAccountPackage-POi OBJECT IDENTIFIER ::= {accountingPackage mtpAccountPackage(4)}

mtpAccount-OOi OBJECT IDENTIFIER ::= {accountingObjectClass mtpAccount(3)}

pointCodeSet-AOi OBJECT IDENTIFIER ::= {accountingAttribute pointCodeSet(8)}

signLinkSetTpIdSet-AOi OBJECT IDENTIFIER ::= {accountingAttribute signLinkSetTpIdSet(12) }

signLinkSetTpSet-AOi OBJECT IDENTIFIER ::= {accountingAttribute signLinkSetTpSet(9)}

siGroupId-AOi OBJECT IDENTIFIER ::= {accountingAttribute siGroupId(10)}

siGroupPackage-POi OBJECT IDENTIFIER ::= {accountingPackage siGroupPackage(5)}

siGroup-OOi OBJECT IDENTIFIER ::= {accountingObjectClass siGroup(4)}

siGroup-managedElement-NBOI OBJECT IDENTIFIER ::= {accountingNameBinding siGroup-managedElement(4)}

siGroup-managedSwitchingElement-NBOI OBJECT IDENTIFIER ::= {accountingNameBinding siGroup-managedSwitchingElement(5)}

siSet-AOi OBJECT IDENTIFIER ::= {accountingAttribute siSet(11)}

END

APPENDIX I

Introduction on how to read the formal definitions

Where to look for what an object class represents

Look in the Package definitions for labels starting with the name of the object class. In the BEHAVIOUR description you find the meaning of the object class.

What kind of operations can be performed on instances of an object class?

Look in the Name Binding definitions for labels starting with the name of the object class. Key words are CREATE and DELETE.

What kind of restrictions apply for these operations on the object class?

Look in the BEHAVIOUR of the corresponding name binding. Key words are CREATE and DELETE.

Keep in mind that a suitable instance of the SUPERIOR OBJECT CLASS must have been created, before you can create an instance of the SUBORDINATE OBJECT CLASS.

In which superior object class is an subordinate object class contained?

Look in the Name Bindings definitions for the name binding labels starting with the name of the subordinate object class. The name after the "-" in the label is the name of the possible superior object class.

What is mandatory, what is optional in an object class?

Look in the Object Class definitions of the object class. The content of the package listed after the key words CHARACTERIZED BY is mandatory. The contents of the packages listed after the key words CONDITIONAL PACKAGES are optional, if the condition defined after the key words PRESENT IF reads "if the instance supports it" or similarly.

Look also for the key words DERIVED FROM. All mandatory parts of the object class listed there are also mandatory for this object class, all its optional parts are again optional.

How to find all attributes of an object class

Look in the Object Class definitions for the corresponding object class.

There all packages of the object class can be found. Then go to the Package definitions of these packages. In these definitions, the attributes of the package are listed.

Go back to the object class definition and look from which object class it was DERIVED. Find this object class – eventually in another standard – and proceed as just described. All attributes of the inheriting object classes are also present in the object class you are looking at.

Where to look for what an attribute represents

Look in the attribute definitions for the attribute.

In the behaviour description, the meaning of the attribute is explained.

Additional information might be contained in the behaviour description of mandatory package of the object class.

For attributes which are not defined in the Attribute definitions, i.e. are inherited from another Recommendation (e.g. state and status attributes), look at the behaviour definition of the objectClassPackage in the Formal definitions of Packages clause.

What kind of operations can be performed on attributes?

Look in the corresponding package definitions where the attribute was listed. Key words are GET, SET-BY-CREATE, ADD-REMOVE and REPLACE.

What kind of restrictions apply for these operations on an attribute?

Look in attribute behaviour.

Additional information might be contained in the behaviour description of package or of the object class.

What data types are used for the attributes?

Look in the attribute definitions for the attribute. Behind the key words WITH ATTRIBUTE SYNTAX you can find the label of the ASN.1 Mode. This mode is defined in or imported by the ASN.1 Module.

Can an attribute be used in a CMISE filter?

Look in the Attribute definitions. It is possible if and only if you find the key words MATCHES FOR there.

How to find all notifications of an object class

This works analogously as for attributes.

Under what circumstances are these notifications generated?

Look in the Notification definitions for the behaviour description of the notifications.

Additional information might be contained in the behaviour description of the package or of the object class.

Which additional information is contained in a notification?

Look in the Notification definitions for the key words WITH INFORMATION SYNTAX. The ASN.1 type listed there gives the possible values of the additional information.

It these key words are not present, no additional information is reported.

How to find all actions of an object class

This works analogously as for attributes and notifications.

What kind of restrictions apply for these actions?

Look in Action definitions for the action behaviour.

Additional information might be contained in the behaviour description of the package or of the object class.

Which variables can be given in an action?

Look in the Notification definitions for the key words WITH INFORMATION SYNTAX. The ASN.1 type listed there gives the possible values for the variable/s which can give additional information how an action shall be performed.

Which additional information is contained in an action reply?

Look in the Notification definitions for the key words WITH REPLY SYNTAX. The ASN.1 type listed there gives the possible values of the reply.

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Series V	Data communication over the telephone network
Series X	Data networks and open system communication
Series Z	Programming languages