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Contents

Foreword

This Interim European Telecommunication Standard (I-ETS) has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

An ETSI standard may be given I-ETS status either because it is regarded as a provisional solution ahead of a more advanced standard, or because it is immature and requires a "trial period". The life of an I-ETS is limited to three years after which it can be converted into an ETS, have it's life extended for a further two years, be replaced by a new version, or be withdrawn.

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Introduction

The objective of traffic management is to enable as many calls as possible to be successfully completed. This objective is met by maximizing the use of all available resources in any situation. It is also to be seen as the function of supervising the performance of a network, and to be able, if necessary, to take action to control the flow of traffic for optimizing the utilisation of the network capacity.

The information model given in this I-ETS provides a common view for the performance data retrieval from the Network Element (NE), and for the administration of controls and instructions from the Operations System (OS) to the NE. The performance data provide information for the activation of traffic management controls, for the validation of former traffic management actions, and as input data for future traffic management actions.

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1 Scope

This Interim European Telecommunication Standard (I-ETS) provides an information model which covers the management aspects of the "traffic management" services functions in an exchange, as defined in the ETR 047. The application of this I-ETS is limited only to circuit-switched networks. Traffic management for Signalling System No.7 (SS7) networks and intelligent networks are outside the scope of this I-ETS.

This I-ETS focuses only on the information model at the Q3 interface between Network Element (NE) and Operations System (OS).

The following restrictions to the scope of this I-ETS apply:

- this I-ETS does not cover traffic measurement aspects;

- the handling and processing of traffic management related information on OS level and the forwarding of these data on OS level are out of the scope of this I-ETS.

- network performance data are needed as input for the traffic management controls. Sometimes the same data can be used for traffic measurement, but this coincidence is ignored in this context. The network performance data are identified and modelled as far as they are relevant and when they cannot be retrieved from other documents;

- functions listed in Task Information Base B (TIB B) for traffic management (ETR 047, subclause 5.5) which are supportable by information models defined in other ETSI and ITU-T documents are not redefined in this I-ETS. Those information models are either referenced or, if necessary, inherited;

- as far as possible and sensible, the functions defined in the Open Systems Interconnection (OSI) system management framework are considered.

2 Normative references

This I-ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this I-ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] I-ETS 300 292 (1995): "Network Aspects (NA); Functional specification of call routing information management on the Operations System/Network Element (OS/NE) interface".

[2] prI-ETS 300 293 (1996): "Telecommunications Management Network (TMN); Generic managed objects".

[3] CCITT Recommendation E.410 (1992): "International network management - General information".

[4] CCITT Recommendation E.411 (1992): "International network management - Operational guidance".

[5] CCITT Recommendation E.412 (1992): "Network management controls".

[6] CCITT Recommendation E.502 (1992): "Traffic measurement requirements for digital telecommunication exchanges".

[7] CCITT Recommendation M.3100 (1992): "Generic network information model".

[8] CCITT Recommendation Q.763 (1992): "Formats and codes of the ISDN user part of Signalling System No.7".

[9] ITU-T Recommendation Q.822 (1994): "Stage 1, stage 2 and stage 3 description for the Q3 interface - Performance management".

[10] CCITT Recommendation X.720 (1992): "Information technology - Open Systems Interconnection - Structure of management information: Management information model".

[11] CCITT Recommendation X.721 (1992): "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".

[12] CCITT Recommendation X.730 (1992): "Information technology - Open Systems Interconnection - Systems Management: Object management function".

[13] CCITT Recommendation X.731 (1992): "Information technology - Open Systems Interconnection - Systems Management: State management function".

[14] CCITT Recommendation X.732 (1992): "Information technology - Open Systems Interconnection - Systems Management: Attributes for representing relationships".

[15] CCITT Recommendation X.733 (1992): "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[16] CCITT Recommendation X.734 (1992): "Information technology - Open Systems Interconnection - Systems Management: Event report management function".

[17] CCITT Recommendation X.735 (1992): "Information technology - Open Systems Interconnection - Systems Management: Log control function".

[18] ITU-T Recommendation X.738 (1993): "Information technology - Open Systems Interconnection - Systems management: Summarization function".

[19] ITU-T Recommendation X.739 (1993): "Information technology - Open Systems Interconnection - Systems Management: Metric objects and attributes".

[20] ITU-T Recommendation X.746 (1995): "Information technology - Open Systems Interconnection - Systems management: Scheduling function".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this I-ETS, the following definitions apply:

answer signal: See CCITT Recommendation E.410 [3].

bid: See CCITT Recommendation E.410 [3].

circuit: See CCITT Recommendation E.410 [3].

NOTE 1: Only the exchange termination point that terminates a circuit is visible on NE management level.

circuit group: See CCITT Recommendation E.410 [3].

NOTE 2: On the NE management level it is represented by the exchange termination point sub-groups addressing the identical adjacent exchange. For traffic management, a circuit group is not visible on NE management level.

circuit sub-group: See CCITT Recommendation E.410 [3].

NOTE 3: On the NE management level the view on a circuit sub-group is represented by "ITU-T Recommendation M.3100 (1996)": circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)": exchange termination point sub-group.

destination: See CCITT Recommendation E.410 [3].

NOTE 4: A destination identified by one or more destination codes, i.e. digit combinations.

destination code: See CCITT Recommendation E.410 [3].

seizure: See CCITT Recommendation E.410 [3].

switching node: An exchange represented by an instance of "CCITT Recommendation M.3100 (1992)": managed element or a subclass of it.

congestion level: An indicator for the present congestion situation in an exchange and an indicator for the degree of traffic management actions to be taken. It is expressed by the following Machine Congestion Levels (MCL):

- MCL0: No exchange congestion.
  The exchange works well, no traffic management action needs to be done with respect to the machine load;

- MCL1: moderate exchange congestion, the exchange keeps working. Some calls may get rejected if no traffic management action is taken.
  This is a warning, the exchange may have activated internal traffic control actions. No additional traffic should be directed to this exchange;

- MCL2: serious congestion level, the exchange is no more able to handle all offered traffic.
  More severe traffic management actions are to be performed to reduce the exchange load;

- MCL3: complete inability of the exchange to process calls.
  With high probability, the exchange is not able to handle any calls. No further calls should be directed to this exchange.

direct routed traffic: A collection of offered calls for which a circuit sub-group would be the first choice.

alternate routed traffic: A collection of offered calls for which a circuit sub-group would be the overflow case.

3.2 Abbreviations

For the purposes of this I-ETS, the following abbreviations apply:

ACC	Automatic Congestion Control
CCS	Common Channel Signalling
DCC	Destination Code Control
HTR	Hard To Reach
MCL	Machine Congestion Levels
M/C/O	Mandatory/Conditional/Optional
NE	Network Element
OS	Operations System
OSI	Open Systems Interconnection
RDN	Relative Distinguished Name
SCR	Selective Circuit Reservation
SS7	Signalling System No.7
TAR	Temporary Alternative Routing
TIB	Task Information Base
TMN	Telecommunications Management Network

4 Functional requirements

The functional requirements are derived from the TIB A and TIB B specified in ETR 047 for the traffic management service (see annex B). They cover the following management service function areas:

- status monitoring functions;
- performance monitoring functions;
- control functions;
- reference data;
- administrative functions.

The status and performance monitoring functions considered in the model are based on measurement items specified in CCITT Recommendation E.502 [6] (which is internally based on CCITT Recommendation E.411 [4]).

The traffic management control functions considered in the model are based on controls specified in CCITT Recommendation E.412 [5].

4.1 Status and performance monitoring functions

A wide range of status and performance monitoring functions is still covered by the information model provided in ITU-T Recommendation Q.822 [9]. An excerpt of this recommendation is given in annex E.

Therefore this I-ETS contains only those parts of the information model which cannot be referenced to ITU-T Recommendation Q.822 [9].

For the presentation of the performance data at the NE-OS interface the use of the simpleScanner object class and its scan report notification as defined in ITU-T Recommendation X.738 [18] were chosen, as due to the potential amount of performance data their retrieval from one simpleScanner object instance per observed object class is assumed to fit more into a five minute interval of time than their retrieval from one historyData object instance per observed object instance.

4.2 Traffic management control functions

The status and performance monitoring functions provide the input data for traffic management decisions which may lead to the initiation of network management control functions.

This I-ETS provides an information model covering network management control functions defined in CCITT Recommendation E.412 [5]. Annex C indicates by which object class the considered network management control functions are covered.

It was recognized that the circuit turndown/busying/blocking traffic control is not to be considered, as this control seems nowadays no longer applicable in a sensible way. More sophisticated controls are available in a Telecommunications Management Network (TMN) environment.

Furthermore it was identified that the circuit directionalization traffic control is covered by the cancel to object class when an instance of cancel to is valid for all traffic types and traffic sources. Therefore this traffic control is not considered as well.

The modelling of the Q3 aspects of the Automatic Congestion Control (ACC) and the automatic destination control are for further study.

NOTE: These controls are being modelled in draft ITU-T Recommendation Q.823 which was elaborated in parallel with this I-ETS.

4.3 Reference data functions

Reference data provides the network traffic manager with information retained by the NE about its resources. This includes information about the topology of the NE and its relationship to the network as well as data on the NEs capacities and capabilities.

CCITT Recommendations E.411 [4] and E.502 [6] recognize the need for reference data as part of the data required for traffic management.

Reference data is usually long term in nature, that is, it does not change rapidly. However, when changed or modified, this should be reported immediately to the OS. An additional requirement imposed by the OS is the need to resynchonize its database at any time with the data base of the NE. This will allow recovery from events like loss of data link, data base corruption, etc.

The relevant reference data object classes are or will be defined as part of other information models, e.g. like I-ETS 300 292 [1]. Annex G identifies the already defined object classes and corresponding attributes that are relevant for traffic management. In detail, the following minimum set was identified:

- circuitEndPointSubgroup resp. xtpsg;
  - traffic direction;
  - signalling capability;
  - bearer capability;
  - total number of circuits in circuitEndPointSubgroup resp. xtpsg;
  - adjacent exchange id;

- xtpsgComb;
  - xtpsgComb identity;
  - set of corresponding xtpsgs;
  - algorithm used for assigning traffic to the corresponding xtpsgs;

- orderedListXTPSGComb;
  - orderedListXTPSGComb identity;
  - set of corresponding XTPSGCombs;
  - algorithm used for assigning traffic to the corresponding XTPSGCombs.

Reference data can either be retrieved directly from the NE or from another OS, depending upon the specific implementation.

4.4 Administrative functions

The administrative functions listed in subclause 5.5 of ETR 047 (TIB B, item 6) are mainly alarm reporting functions, event report management functions, and scheduling functions as defined in CCITT Recommendations X.733 [15], X.734 [16], respectively ITU-T Recommendation X.746 [20] and modelled in CCITT Recommendation X.721 [11]. Some of the administrative functions are covered as well by ETR 088.

The retrieval of routing information is provided by the call routing information model given in I-ETS 300 292 [1].

4.5 Modelling methodology

The modelling techniques described in ETR 078 (Methodology for Specification of TMN Interfaces) and ETR 046 (Modelling Guidelines) have been regarded.

In the modelling work the definitions of the supporting object classes given in the OSI system management framework (X.700 series) and in ETR 088 were adopted.

The managed object classes specified in this I-ETS are defined in line with I-ETS 300 292 [1], prI-ETS 300 293 [2], CCITT Recommendations M.3100 [7] and X.721 [11], and ITU-T Recommendation Q.822 [9].

5 Information model diagrams

5.1 Entity relationship diagrams

Figure 1 gives the entity relationship diagram for the object classes defined in the managed element fragment, and figure 2 gives the entity relationship diagram for the object classes defined in the status and

performance monitoring fragment. For clearness, the inheritances of the current data and history data object classes is not drawn in figure 2. These inheritances are shown in table 1.

In figure 3 the entity relationship diagram for the traffic management control fragment is provided.

The relationships of object classes which are referenced in this I-ETS but defined in other documents are shown in this I-ETS only as far as it is needed for the clarification of their relationships in the traffic management context.

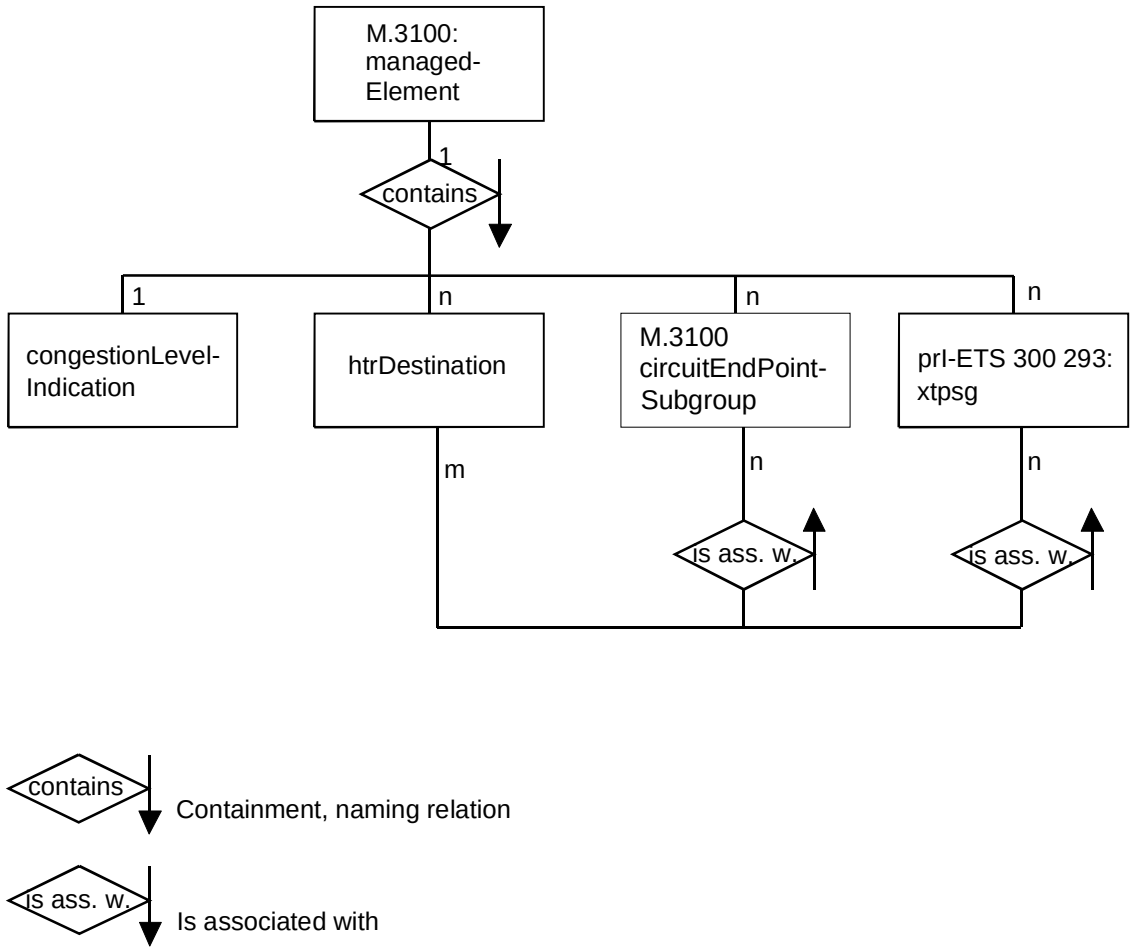


Figure 1: Managed element fragment

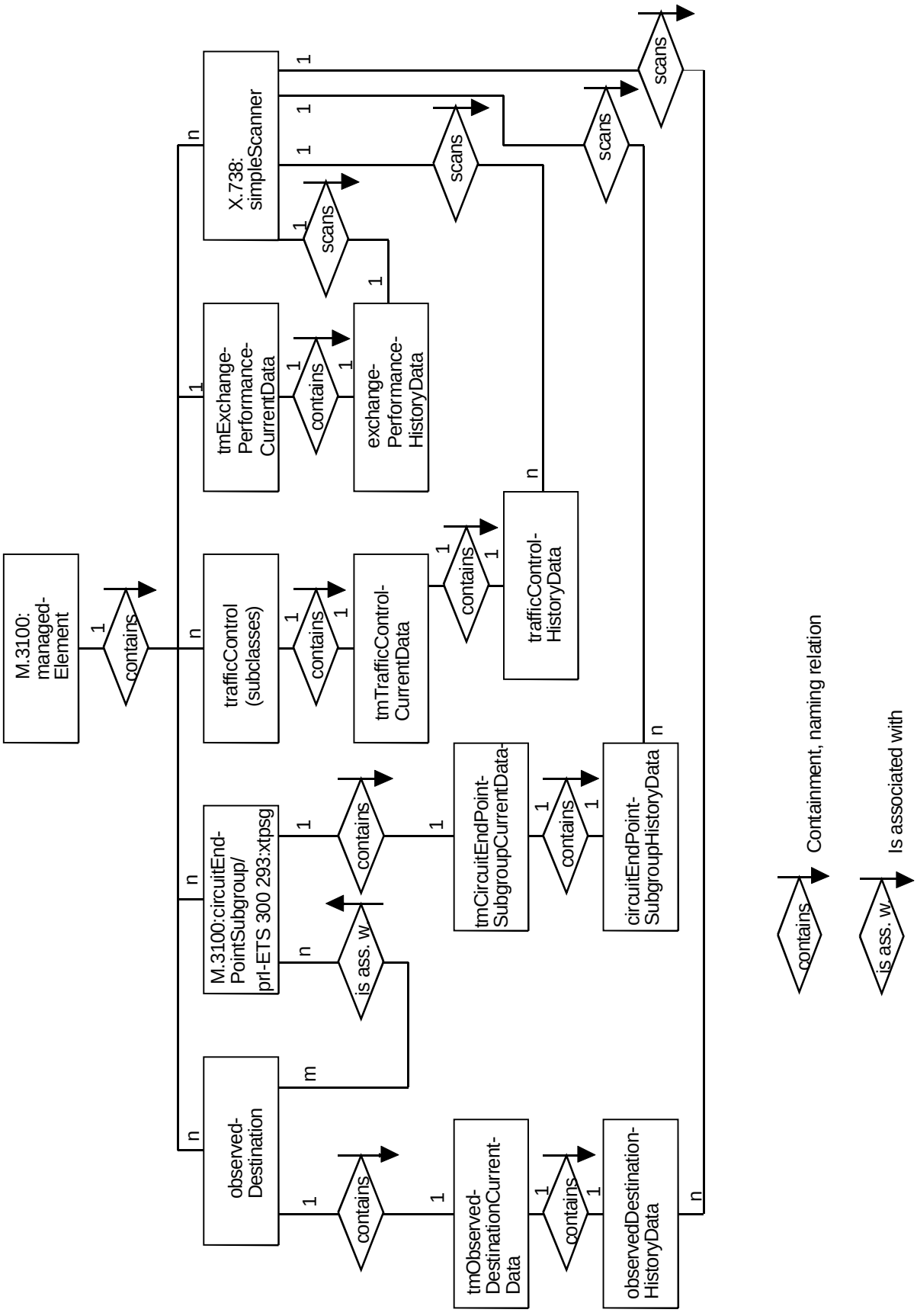


Figure 2: Status and performance monitoring fragment

It is to be considered that the simpleScanner object class can be as well associated with the currentData subclasses, not using the historyData subclasses for the retrieval of performance data.

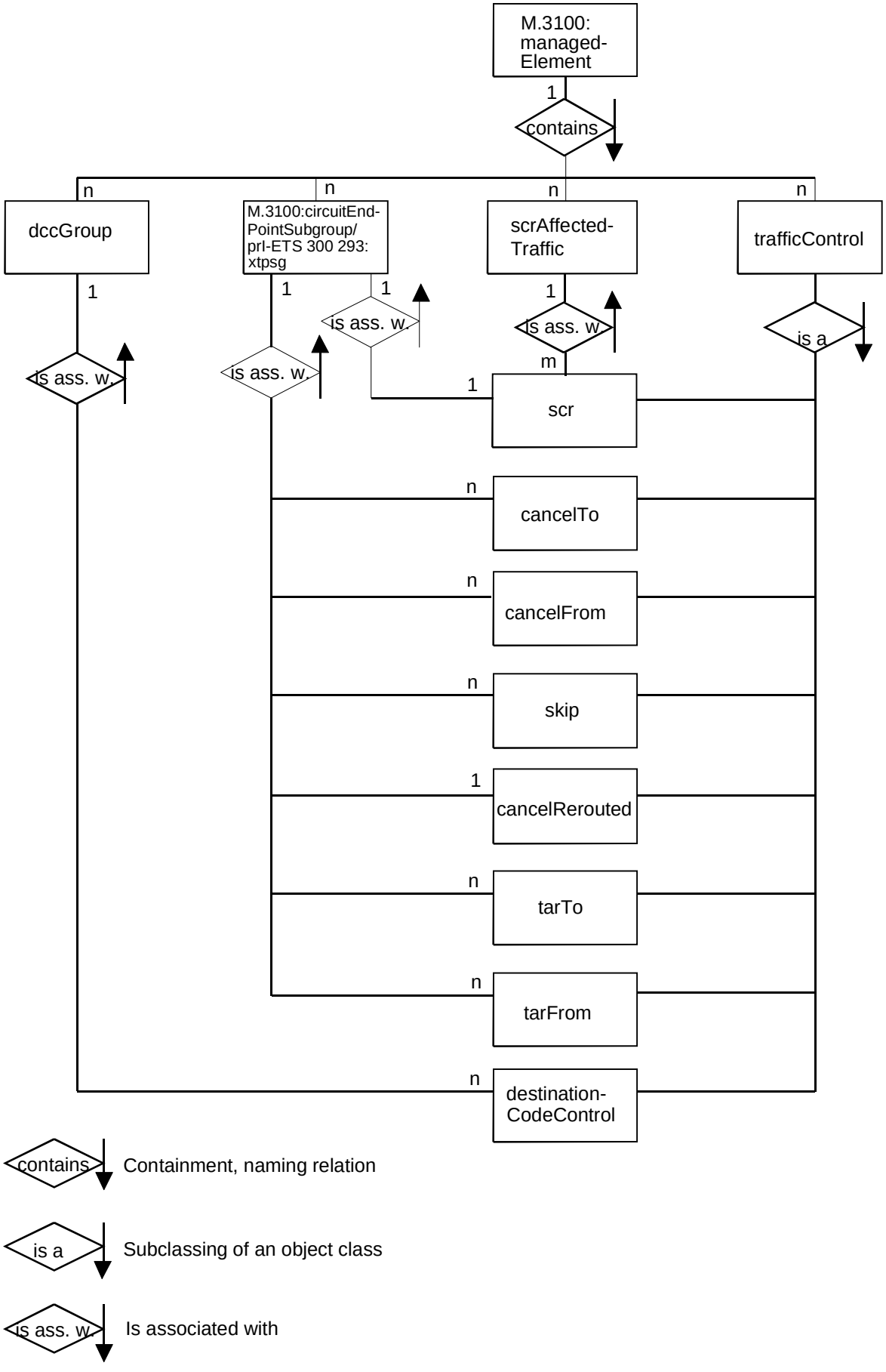
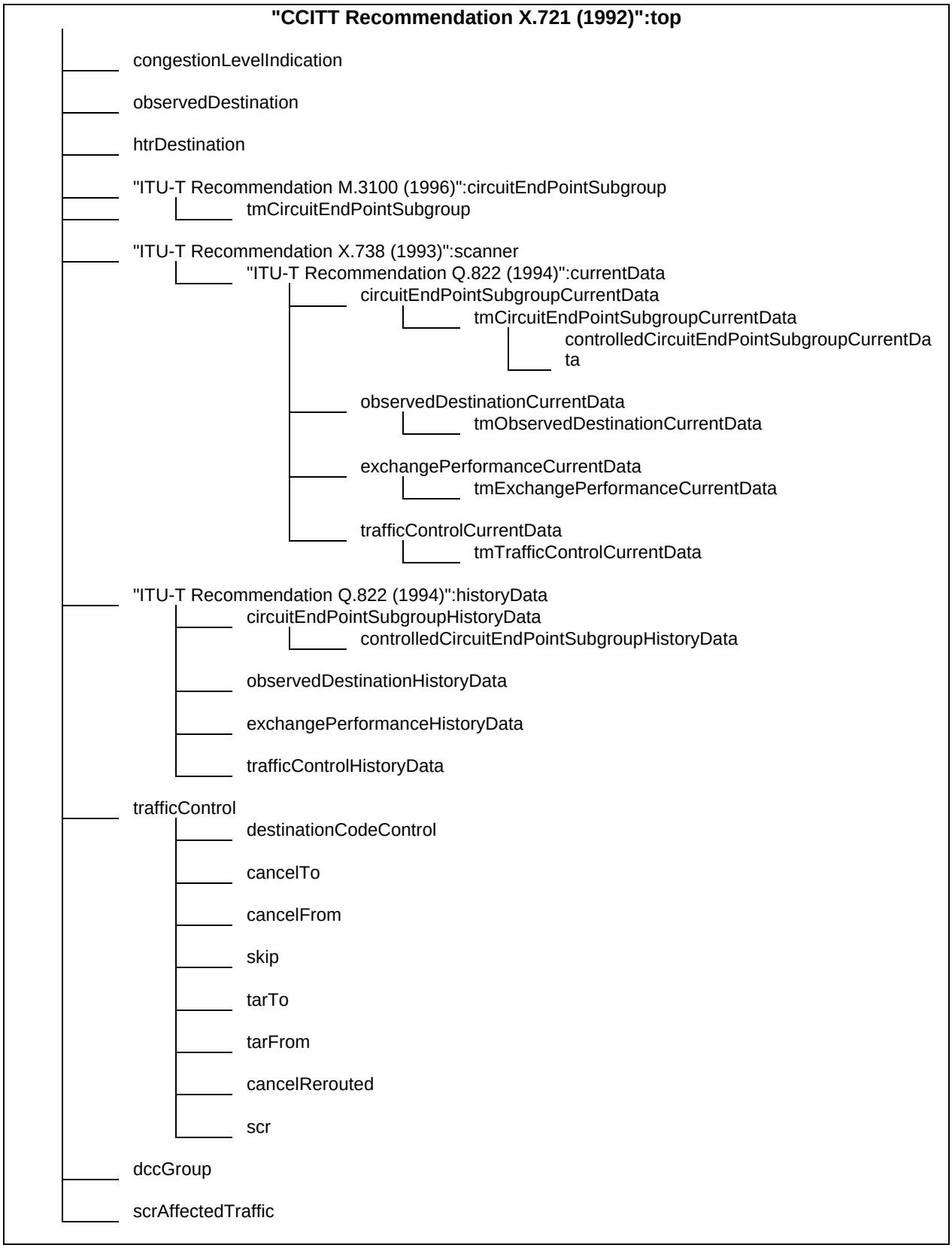


Figure 3: Traffic management control fragment

5.2 Inheritance hierarchy

Table 1



This table shows the inheritances of the object classes defined in this I-ETS. The inheritances of object classes referenced from other documents but not subclassed in this I-ETS are defined in the referenced documents.

5.3 Naming hierarchy

Table 2

"CCITT Recommendation M.3100 (1992)":managedElement

- congestionLevelIndication
- htrDestination
- observedDestination
  - observedDestinationHistoryData
  - observedDestinationCurrentData
    - observedDestinationHistoryData
- exchangePerformanceHistoryData
- exchangePerformanceCurrentData
  - exchangePerformanceHistoryData
- "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup
  - circuitEndPointSubgroupHistoryData
  - circuitEndPointSubgroupCurrentData
    - circuitEndPointSubgroupHistoryData
- "prI-ETS 300 293 (1996)":xtpsg
  - circuitEndPointSubgroupHistoryData
  - circuitEndPointSubgroupCurrentData
    - circuitEndPointSubgroupHistoryData
- trafficControl
  - trafficControlHistoryData
  - trafficControlCurrentData
    - trafficControlHistoryData
- dccGroup
- scrAffectedTraffic
- simpleScanner

This table shows the name bindings (containment relationships) of the object classes defined in this I-ETS. The name bindings of object classes referenced from other documents are defined in the referenced documents. They are only indicated in this table where necessary.

6 Information model description

This clause provides a high-level informal description of the Traffic Management information model.

Subclause 6.1 contains a brief description for each object class used in the model covering:

- the purpose of the object class;
- the attributes defined and inherited for the object class; and
- the relationship of the object class to other object classes.

Attributes which are common to several object classes are described in subclause 6.2.

Subclause 6.3 describes actions which are influencing several object classes in the information model.

Subclause 6.4 describes the common aspects of the notifications used in the information model.

6.1 Object class descriptions

This subclause is divided into subclauses in which the object classes of the information model are described, where they are not described in other documents. In these cases, references are given.

In the tables listing the attributes of the object classes, the attributes inherited from super classes (e.g. "CCITT Recommendation X.721 (1992)":top or other object classes) are not mentioned explicitly, although they are present in these object classes as defined in CCITT Recommendation X.721 [11] and the other corresponding deliverables.

6.1.1 Managed element fragment

6.1.1.1 Managed element (managedElement)

The managed element object class is defined in CCITT Recommendation M.3100 [7].

6.1.1.2 Congestion level indication (congestionLevelIndication)

An instance of the congestion level indication object class provides an indication of the current congestion level of the managed element object instance in which it is contained.

Although it is desirable, the managed element might not be able to provide an MCL3 indication during catastrophic failures.

This object class is identical to "ITU-T Recommendation Q.823 (1996)": congestionLevelIndication.

Table 3

Name		M/C/O	Value Set
congestionLevelIndicationId		M	RDN
congestionLevel		M	single
congestionLevelIndicationId	gives the Relative Distinguished Name (RDN).		
congestionLevel	is an indicator for the present congestion situation in an exchange and an indicator for the degree of traffic management actions to be taken. It is expressed by the following machine congestion levels (MCL): MCL0: No exchange congestion. The exchange works well, no traffic management action needs to be done with respect to the machine load; MCL1: Moderate exchange congestion, the exchange keeps working. Some calls may get rejected if no traffic management action is taken. This is a warning, the exchange may have activated internal traffic control actions. No additional traffic should be directed to this exchange; MCL2: Serious congestion level, the exchange is no more able to handle all offered traffic. More severe traffic management actions are to be performed to reduce the exchange load; MCL3: Complete inability of the exchange to process calls. With high probability, the exchange is not able to handle any calls. No further calls should be directed to this exchange.		

6.1.1.3 Observed destination (observedDestination)

A destination is a country, an area, an exchange or other location, or special service, in which the called subscriber is located and that may be specified within the country. A destination is identified by the destination code. It is defined in annex A of CCITT Recommendation E.410 [3].

An observed destination is only instantiated for performance monitoring purposes. Its performance is monitored by a contained tmObservedDestinationCurrentData object instance.

Table 4

Name	M/C/O	Value Set
observedDestinationId	M	RDN
destinationType	C	single
destinationCode	M	single
tmSurveillance	M	single
circuitEndPointSubgroups	C	set
creatorIdentity	O	single

observedDestinationId	gives the RDN.
destinationType	indicates either the nature of address of the destination code referred by an instance of this object class in a seven bit string according to CCITT Recommendation Q.763 [8], or the type of the destination as an enumerated value. If it has NULL value, it is not to be considered.
destinationCode	is a country code, or area code, or exchange identifying code, or individual line number etc. which this observedDestination object instance represents.
tmSurveillance	identifies whether the object instance is being monitored for traffic management purposes. If this attribute is set to TRUE, the object instance contains an instance of the corresponding subclass of current data.
circuitEndPointSubgroups	points to the circuit sub-groups ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) on which this destination shall be observed.
creatorIdentity	gives the creator identity (resource or management operation).

6.1.1.4 Hard to reach destination (htrDestination)

A destination is a country, an area, an exchange or other location, or special service, in which the called subscriber is located and that may be specified within the country. A destination is identified by the destination code. It is defined in annex a of CCITT Recommendation E.410 [3].

An instance of the htrDestination object class represents a destination identified as Hard To Reach (HTR).

All instances of the htrDestination object class are forming the HTR list.

The decision whether a destination is hard or easy to reach is made based on the answer to bid ratio or answer to seizure ratio either by the OS or by the resource management of the exchange. In the latter case, the administrativeState attribute provides the opportunity to inhibit the HTR status.

The HTR status of a destination can be correlated with circuit sub-groups by using the circuitEndPointSubgroups attribute. If this attribute is empty set, the destination is assigned HTR via all possible circuit sub-groups.

In this I-ETS the mechanisms for the recognition of the HTR status of a destination by the resource management of the exchange are not modelled, as in a TMN environment due to performance monitoring, all relevant information are present in the OS.

A destination for which no htrDestination is instantiated or which is inhibited (administrativeState = locked) is to be considered as non HTR.

Table 5

Name	M/C/O	Value Set
htrDestinationId	M	RDN
destinationType	C	single
destinationCode	M	single
circuitEndPointSubgroups	C	set
"CCITT Recommendation X.721: 1992":administrativeState	M	single
creatorIdentity	M	single

htrDestinationId	gives the RDN.
destinationType	indicates either the nature of address of the destination code referred by an instance of this object class in a seven bit string according to CCITT Recommendation Q.763 [8], or the type of the destination as an enumerated value. If it has NULL value, it is not to be considered.
destinationCode	is a country code, or area code, or exchange identifying code, or individual line number etc. which this htrDestination object instance represents.
circuitEndPointSubgroups	points to the circuit sub-groups ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) for which this destination is HTR.
administrativeState	is defined in CCITT Recommendation X.721 [11]. It indicates whether the HTR status of this destination is to be regarded by the call handling process (unlocked), or not (locked). Default value is unlocked. Shutting down is excluded.
creatorIdentity	gives the creator identity (resource or management operation).

6.1.1.5 Exchange termination point sub-group (xtpsg)

The exchange termination point sub-group object class is defined in prI-ETS 300 293 [2]. In the traffic management context, its subclasses:

- incoming exchange termination point sub-group (xtpsgIn);
- outgoing exchange termination point sub-group (xtpsgOut); and
- bi-directional exchange termination point sub-group (xtpsgBid),

as defined in prI-ETS 300 293 [2] are to be considered.

The circuit end point sub-group object class defined in ITU-T Recommendation M.3100 (1996). represents as well circuit sub-groups.

6.1.1.6 Traffic management circuit end point sub-group (tmCircuitEndPointSubgroup)

The tmCircuitEndPointSubgroup is a subclass of ITU-T Recommendation M.3100: circuitEndPointSubgroup. It is used for performance monitoring and controls for traffic management purposes

Table 6

Name		M/C/O	Value Set
tmSurveillance		M	single
tmSurveillance	identifies whether the object instance is being monitored for traffic management purposes. If this attribute is set to TRUE, the object instance contains an instance of the corresponding subclass of current data.		

6.1.2 Status and performance monitoring fragment

6.1.2.1 Current data (currentData)

The current data object class is defined in ITU-T Recommendation Q.822 [9]. It is subclassed for the different monitored entities.

It is to be considered that in this I-ETS only a minimum set of performance data is modelled. Individual implementations may require additional performance data. Their retrieval can be modelled by subclassing the currentData subclasses given hereafter accordingly.

6.1.2.2 CircuitEndPointSubgroup current data (circuitEndPointSubgroupCurrentData)

The circuitEndPointSubgroup current data object class is a subclass of the currentData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring circuit sub-group related performance data as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1994":currentData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

The assignment of the performance attributes to the individual xtpsg subclasses (xtpsgIn, xtpsgOut, and xtpsgBid) or an equivalent circuitEndPointSubgroup is given in annex A.

In order to synchronize the granularityPeriod of an instance of a currentData subclass with the scanning time to the next integral time period, the value of the periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an integral multiple of the granularity period relative to an hour. E.g. if the granularity period of 5 minutes is specified for an instance, the periodSynchronizationTime might have the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ...

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that shall be instantiated.

This object class is identical to "ITU-T Recommendation Q.823 (1996)": circuitEndPointSubgroupCurrentData.

Table 7

Name	M/C/O	Value Set
outgoingSeizures	M	single
incomingSeizures	M	single
outgoingBids	M	single
answeredOutgoingSeizures	M	single
answeredIncomingSeizures	O	single
overflow	M	single
incomingTrafficUsage	M	single
outgoingTrafficUsage	M	single
numberOfAvailableCircuits	M	single

outgoingSeizures	gives the number of outgoing seizures (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity b, and annex A).
incomingSeizures	gives the number of incoming seizures (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity b, and annex A).
outgoingBids	gives the number of outgoing bids (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity a, and annex A).
answeredOutgoingSeizures	gives the number of outgoing seizures where an answer signal was received (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity c, and annex A).
answeredIncomingSeizures	gives the number of incoming seizures where an answer signal was transmitted back to the preceding exchange (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity c, and annex A).
overflow	gives the number of bids overflowing from this circuit sub-group (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity d). This count shall not include calls affected by cancel rerouted overflow, tar from, and cancel from.
incomingTrafficUsage	gives the incoming carried traffic in Erlang seconds (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity e, and annex A).
outgoingTrafficUsage	gives the outgoing carried traffic in Erlang seconds (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity e, and annex A).
numberOfAvailableCircuits	gives the number of circuits available for traffic, i.e. with administrativeState = unlocked, operationalState = enabled (complement to the requirement in see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity f). Whether this value is provided as snapshot or as mean value is left to the implementation, as due to the normally low frequency of changes of the administrativeState as well as of the operationalState both methods are equivalent.

6.1.2.3 Observed destination current data (observedDestinationCurrentData)

The observed destination current data object class is a subclass of the currentData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring destination related performance data as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1994": currentData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

In order to synchronize the granularityPeriod of an instance of a currentData subclass with the scanning time to the next integral time period, the value of the periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an integral multiple of the granularity period relative to an hour. E.g. if the granularity period of 5 minutes is specified for an instance, the periodSynchronizationTime might have the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ...

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that.

Table 8

Name	M/C/O	Value Set
bids	M	single
outgoingSeizures	M	single
answeredOutgoingSeizures	M	single
callsAffectedByDcc	O	single
noCircuitsAvailable	M	single

bids	gives the number of outgoing bids (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity a, and annex A).
outgoingSeizures	gives the number of outgoing seizures (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity b, and annex A).
answeredOutgoingSeizures	gives the number of outgoing seizures where an answer signal was received (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity c, and annex A).
callsAffectedByDcc	gives the number of calls affected by destination related traffic controls (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity e).
noCircuitsAvailable	gives the number of outgoing bids resulting in an unsuccessful call due to the fact that no free circuit leading to this destination was available (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity d, and annex A).

6.1.2.4 Exchange performance current data (exchangePerformanceCurrentData)

The exchange performance current data object class is a subclass of the currentData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring exchange related performance data as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1993":currentData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

In order to synchronize the granularityPeriod of an instance of a currentData subclass with the scanning time to the next integral time period, the value of the periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an integral multiple of the granularity period relative to an hour. E.g. if the granularity period of 5 minutes is specified for an instance, the periodSynchronizationTime might have the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ...

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that.

Table 9

Name	M/C/O	Value Set
incomingSeizures	M	single
outgoingSeizures	M	single
transitSeizures	M	single
terminatingSeizures	M	single
originatingSeizures	M	single
internalSeizures	M	single
numberOfCallsBlockedByLoadShedding	M	single

incomingSeizures	gives the number of incoming seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow B, subclause 4.2, measurement type 20, entity a, measurement type 4, entity a, and annex A).
outgoingSeizures	gives the number of outgoing seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow R, subclause 4.2, measurement type 20, entity a and {measurement type 3, entity a + measurement type 6, entity a}, and annex A).
transitSeizures	gives the number of transit seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow L, subclause 4.2, measurement type 20, entity a, measurement type 6, entity a, and annex A).
terminatingSeizures	gives the number of terminating seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow Q, subclause 4.2, measurement type 20, entity a and {measurement type 2, entity a + measurement type 5, entity a}, and annex A).
originatingSeizures	gives the number of originating seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow A, subclause 4.2, measurement type 20, entity a, measurement type 1, entity a, and annex A).
internalSeizures	gives the number of internal seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow F, subclause 4.2, measurement type 20, entity a, measurement type 2, entity a, and annex A).
numberOfCallsBlockedByLoadShedding	gives the number of calls not possible to be handled due to the application of an exchange internal overload protection mechanism (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 20, entity g).

6.1.2.5 Traffic control current data (trafficControlCurrentData)

The traffic control current data object class is a subclass of the currentData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring the effectiveness of a traffic control as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1993":currentData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

In order to synchronize the granularityPeriod of an instance of a currentData subclass with the scanning time to the next integral time period, the value of the periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an integral multiple of the granularity period relative to an hour. E.g. if the granularity period of 5 minutes is specified for an instance, the periodSynchronizationTime might have the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ...

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that.

Table 10

Name		M/C/O	Value Set
callsAffectedByTrafficControl		M	single
callsAffectedByTrafficControl	gives the number of calls affected by the observed trafficControl object instance.		

6.1.2.6 Traffic management circuitEndPointSubgroup current data (tmCircuitEndPointSubgroupCurrentData)

The traffic management circuitEndPointSubgroup current data object class is a subclass of the circuitEndPointSubgroupCurrentData object class.

It is used for monitoring circuit sub-group related performance data as defined in CCITT Recommendation E.502 [6] in the traffic management context.

A tmCircuitEndPointSubgroupCurrentData object instance shall contain only one instance of circuitEndPointSubgroupHistoryData.

All tmCircuitEndPointSubgroupCurrentData object instances within the same managed element shall have the same granularity period.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":tmCircuitEndPointSubgroupCurrentData.

Table 11

Name		M/C/O	Value Set
"ITU-T Recommendation Q.822:1994":historyRetention		M	single
historyRetention	is defined in ITU-T Recommendation Q.822 [9]. In the context of this object class, its permitted value is "1".		

6.1.2.7 Controlled circuitEndPointSubgroup current data (controlledCircuitEndPointSubgroupCurrentData)

The controlled circuitEndPointSubgroup current data object class is a subclass of the tmCircuitEndPointSubgroupCurrentData object class.

This object class can be used if the effectiveness of traffic controls is required on a per circuitEndPointSubgroup resp. xtpsg instance basis.

All controlledCircuitEndPointSubgroupCurrentData object instances within the same managed element shall have the same granularity period.

It is to be considered that the additional performance information provided by this object class can as well be retrieved in the OS by calculating the traffic control related performance data accordingly.

Table 12

Name	M/C/O	Value Set
callsAffectedByCancelFrom	C	single
callsAffectedByCancelRerouted	C	single
callsAffectedByCancelTo	C	single
callsAffectedByScr	C	single
callsAffectedBySkip	C	single
callsAffectedByTarFrom	C	single
callsAffectedByTarTo	C	single
callsAffectedByCancelFrom callsAffectedByCancelRerouted callsAffectedByCancelTo callsAffectedByScr callsAffectedBySkip callsAffectedByTarFrom callsAffectedByTarTo	gives the number of calls affected by circuitEndPointSubgroup resp. xtpsg related traffic controls, by type of control (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity i).	

6.1.2.8 Traffic management observed destination current data (tmObservedDestinationCurrentData)

The traffic management observed destination current data object class is a subclass of the observedDestinationCurrentData object class.

It is used for monitoring destination related performance data as defined in CCITT Recommendation E.502 [6] in the traffic management context.

A tmObservedDestinationCurrentData object instance shall contain only one instance of observedDestinationHistoryData.

All tmObservedDestinationCurrentData object instances within the same managed element shall have the same granularity period.

This object class is identical to "ITU-T Recommendation Q.823 (1996) ":tmObservedDestinationCurrentData.

Table 13

Name	M/C/O	Value Set
"ITU-T Recommendation Q.822:1994":historyRetention	M	single
historyRetention	is defined in ITU-T Recommendation Q.822 [9]. In the context of this object class, its permitted value is "1".	

6.1.2.9 Traffic management exchange performance current data (tmExchangePerformanceCurrentData)

The traffic management exchange performance current data object class is a subclass of the exchangePerformanceCurrentData object class.

It is used for monitoring exchange related performance data as defined in CCITT Recommendation E.502 [6] in the traffic management context.

A tmExchangePerformanceCurrentData object instance shall contain only one instance of exchangePerformanceHistoryData.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":tmExchangeCurrentData.

Table 14

Name		M/C/O	Value Set
"ITU-T Recommendation Q.822:1994":historyRetention		M	single
historyRetention	is defined in ITU-T Recommendation Q.822 [9]. In the context of this object class, its permitted value is "1".		

6.1.2.10 Traffic Management traffic control current data (tmTrafficControlCurrentData)

The traffic management traffic control current data object class is a subclass of the trafficControlCurrentData object class.

It is used for monitoring the effectiveness of a traffic control as defined in CCITT Recommendation E.502 [6] in the traffic management context.

A tmTrafficControlCurrentData object instance shall contain only one instance of trafficControlHistoryData.

All tmTrafficControlCurrentData object instances within the same managed element shall have the same granularity period.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":tmTrafficControlCurrentData.

Table 15

Name		M/C/O	Value Set
"ITU-T Recommendation Q.822:1994":historyRetention		M	single
historyRetention	is defined in ITU-T Recommendation Q.822 [9]. In the context of this object class, its permitted value is "1".		

6.1.2.11 History data (historyData)

The history data object class is defined in ITU-T Recommendation Q.822 [9]. It is subclassed for the different monitored entities.

It is to be considered that in this I-ETS only a minimum set of performance data is modelled. Individual implementations may require additional performance data. Their retrieval can be modelled by subclassing the historyData subclasses given hereafter accordingly.

6.1.2.12 CircuitEndPointSubgroup history data (circuitEndPointSubgroupHistoryData)

The circuitEndPointSubgroup history data object class is a subclass of the historyData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring circuit sub-group related performance data as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1994": historyData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

Table 16

Name	M/C/O	Value Set
outgoingSeizures	M	single
incomingSeizures	M	single
outgoingBids	M	single
answeredOutgoingSeizures	M	single
answeredIncomingSeizures	C	single
overflow	M	single
incomingTrafficUsage	M	single
outgoingTrafficUsage	M	single
numberOfAvailableCircuits	M	single

outgoingSeizures	gives the number of outgoing seizures (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity b, and annex A).
incomingSeizures	gives the number of incoming seizures (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity b, and annex A).
outgoingBids	gives the number of outgoing bids (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity a, and annex A).
answeredOutgoingSeizures	gives the number of outgoing seizures where an answer signal was received (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity c, and annex A).
answeredIncomingSeizures	gives the number of incoming seizures where an answer signal was transmitted back to the preceding exchange (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity c, and annex A).
overflow	gives the number of bids overflowing from this circuit sub-group (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity d). This count shall not include calls affected by cancel rerouted overflow, tar from, and cancel from.
incomingTrafficUsage	gives the incoming carried traffic in Erlang seconds (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity e, and annex A).
outgoingTrafficUsage	gives the outgoing carried traffic in Erlang seconds (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity e, and annex A).
numberOfAvailableCircuits	gives the number of circuits available for traffic, i.e. with administrativeState = unlocked, operationalState = enabled (complement to the requirement in see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity f). Whether this value is provided as snapshot or as mean value is left to the implementation, as due to the normally low frequency of changes of the administrativeState as well as of the operationalState both methods are equivalent.

6.1.2.13 Controlled circuitEndPointSubgroup history data (controlledCircuitEndPointSubgroupHistoryData)

The controlled circuitEndPointSubgroup history data object class is a subclass of the circuitEndPointSubgroupHistoryData object class.

This object class can be used if the effectiveness of traffic controls is required on a per circuitEndPointSubgroup resp. xtpsg instance basis.

It is to be considered that the additional performance information provided by this object class can as well be retrieved in the OS by calculating the traffic control related performance data accordingly.

Table 17

Name	M/C/O	Value Set
callsAffectedByCancelFrom	C	single
callsAffectedByCancelRerouted	C	single
callsAffectedByCancelTo	C	single
callsAffectedByScr	C	single
callsAffectedBySkip	C	single
callsAffectedByTarFrom	C	single
callsAffectedByTarTo	C	single

callsAffectedByCancelFrom callsAffectedByCancelRerouted callsAffectedByCancelTo callsAffectedByScr callsAffectedBySkip callsAffectedByTarFrom callsAffectedByTarTo	gives the number of calls affected by circuitEndPointSubgroup resp. xtpsg related traffic controls, by type of control (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 21, entity i).

6.1.2.14 Observed destination history data (observedDestinationHistoryData)

The observed destination history data object class is a subclass of the historyData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring destination related performance data as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1994": historyData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

Table 18

Name	M/C/O	Value Set
bids	M	single
outgoingSeizures	M	single
answeredOutgoingSeizures	M	single
callsAffectedByDcc	C	single
noCircuitsAvailable	M	single

bids	gives the number of outgoing bids (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity a, and annex A).
outgoingSeizures	gives the number of outgoing seizures (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity b, and annex A).
answeredOutgoingSeizures	gives the number of outgoing seizures where an answer signal was received (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity c, and annex A).
callsAffectedByDcc	gives the number of calls affected by destination related traffic controls (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity e).
noCircuitsAvailable	gives the number of outgoing bids resulting in an unsuccessful call due to the fact that no free circuit leading to this destination was available (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 22, entity d, and annex A).

6.1.2.15 Exchange performance history data (exchangePerformanceHistoryData)

The exchange performance history data object class is a subclass of the historyData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring exchange related performance data as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1994":historyData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

Table 19

Name	M/C/O	Value Set
incomingSeizures	M	single
outgoingSeizures	M	single
transitSeizures	M	single
terminatingSeizures	M	single
originatingSeizures	M	single
internalSeizures	M	single
numberOfCallsBlockedByLoadShedding	M	single

incomingSeizures	gives the number of incoming seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow B, subclause 4.2, measurement type 20, entity a, measurement type 4, entity a, and annex A).
outgoingSeizures	gives the number of outgoing seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow R, subclause 4.2, measurement type 20, entity a and {measurement type 3, entity a + measurement type 6, entity a}, and annex A).
transitSeizures	gives the number of transit seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow L, subclause 4.2, measurement type 20, entity a, measurement type 6, entity a, and annex A).
terminatingSeizures	gives the number of terminating seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow Q, subclause 4.2, measurement type 20, entity a and {measurement type 2, entity a + measurement type 5, entity a}, and annex A).
originatingSeizures	gives the number of originating seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow A, subclause 4.2, measurement type 20, entity a, measurement type 1, entity a, and annex A).
internalSeizures	gives the number of internal seizures (see CCITT Recommendation E.502 [6], Figure 4, traffic flow F, subclause 4.2, measurement type 20, entity a, measurement type 2, entity a, and annex A).
numberOfCallsBlockedByLoadShedding	gives the number of calls not possible to be handled due to the application of an exchange internal overload protection mechanism (see CCITT Recommendation E.502 [6], subclause 4.2, measurement type 20, entity g).

6.1.2.16 Traffic control history data (trafficControlHistoryData)

The traffic control history data object class is a subclass of the historyData object class defined in ITU-T Recommendation Q.822 [9].

It is used for monitoring the effectiveness of a traffic control as defined in CCITT Recommendation E.502 [6].

The attributes inherited from "ITU-T Recommendation Q.822: 1994": historyData are not mentioned explicitly in the table, although they are present in this object class as defined in ITU-T Recommendation Q.822 [9].

Table 20

Name		M/C/O	Value Set
callsAffectedByTrafficControl		M	single
callsAffectedByTrafficControl	gives the number of calls affected by the observed trafficControl object instance.		

6.1.2.17 Simple scanner (simpleScanner)

The simpleScanner object class is defined in ITU-T Recommendation X.738 [18].

The simpleScanner object instance used for the collection of performance data, and their provision in the related historyData object instances shall be synchronized by the resource management.

6.1.3 Traffic management control fragment

6.1.3.1 Traffic control (trafficControl)

Traffic management controls are used to assure efficient utilization of network capacity and maintain satisfactory performance in the face of fluctuating traffic demands and emergency conditions. Controls may be exercised by specific input from an OS or automatically in response to an internal or external stimulus.

Both for automatic and manual controls, network traffic performance data is crucial to allow determination of when controls are to be applied or removed. Similarly, in order to evaluate the effect control has on the traffic carrying capacity and performance of the network, data needs to be obtained that provides this information. Thus, for each entity that may be controlled, e.g. destination, circuit sub-group ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg), etc., traffic performance data needs to be defined and for each active control a metering capability needs to exist that will measure the effect of the control. The capabilities are modelled by performance monitoring managed object classes (see subclause 6.1.2).

Manual and automatic traffic controls are modelled in this I-ETS. In the model, activation and deactivation of manual controls is modelled by creation and deletion of the control managed object instance. Manual control managed object instances cannot be set to a deactivated state, however, it is possible to set parameters of these control object instance to values that will not impact the normal traffic volume or routing characteristics, e.g. the percentage of calls to be blocked could be set to 0.

The Traffic Control object class is the superclass for all object classes representing traffic controls as defined in CCITT Recommendation E.412 [5]. This superclass shall not be instantiated.

The following descending hierarchy of traffic controls modelled in the subclasses shall be considered in the call handling process:

1) destination code control;
2) TAR to (replace, insert before);
3) cancel to;
4) skip;
5) selective circuit reservation;
6) cancel rerouted overflow;
7) TAR from (insert after);
8) cancel from.

Table 21

Name		M/C/O	Value Set
trafficControlId		M	RDN
tmSurveillance		M	single
creatorIdentity		O	single
trafficControlId	gives the RDN.		
tmSurveillance	identifies whether the object instance is being monitored for traffic management purposes. If this attribute is set to TRUE, the object instance contains an instance of the corresponding subclass of current data.		
creatorIdentity	gives the creator identity (resource or management operation).		

6.1.3.2 Destination code control function

The destination code traffic control covers both code blocking and call gapping.

Code blocking bars routing for a specific destination on a percentage basis. Code blocking can be done on a country code, on an area code, an exchange identifying code or an individual line number. The last of these is the most selective control available. It is defined in CCITT Recommendation E.412 [5], subclause 2.3.1 and subclause 3.1.1.1.

Call gapping sets an upper limit on the output rate that calls are allowed to be routed to the destination. With this control, the number of call attempts that are routed will never exceed a specific output rate, regardless of the arrival rate of the call attempts. It is defined in CCITT Recommendation E.412 [5], subclause 2.3.2 and subclause 3.1.1.2.

Destination code control is activated by input from an OS.

When this control is active in the code blocking mode, the specified percentage of calls is blocked (cancelled).

When this control is active in the call gapping mode, the rate at which call attempts will be controlled by one of three methods.

In the continuous timer method, a continuously running timer with an adjustable duration is used. Once the allowable number of call attempts has been handled within a timer cycle, no further attempts are allowed until the timer expires. This method uses two variables: the time and the number of call attempts, e.g. 5 calls in 60 seconds.

In the asynchronous timer method a timer with specified duration is set when call attempt is allowed, and no further call attempts are allowed until the timer expires. This method requires the specification of a single variable, time.

In the leaky bucket method, a dynamic counter (leaky bucket) is used. If the counter exceeds the defined maximum size, the call attempt is cancelled. If the counter is less or equal than the maximum size, the call attempt is allowed and the counter is incremented. The counter is decremented at defined intervals making it possible for new calls to be accepted. The method requires two variables, the bucket size (maximum allowed counter value) and the throughput (decrement per time unit).

Call attempts that exceed the maximum allowed rate are blocked (cancelled). No triggering calls shall pass through in that case, contrary to the functionality defined for specified finite times.

Besides the classification of the destination code control in code blocking and call gapping, it is useful for modelling purposes to classify this control also in controls described by single or multiple call characteristics.

A destination code control is described by a single call characteristic, if the control is applied to calls characterized by one attribute value combination of the attributes destinationType, destinationCode, and originationAspect of the object class destinationCodeControl.

EXAMPLE 1: A destination code control function controls all calls with dialled codes beginning with 123 with a gap time of 1 second (asynchronous timer method).

A call with dialled digits 123ab... activates the control and all calls with dialled digits 123xy... are cancelled within the next second.

A destination code control is described by a multiple call characteristic, if the control is applied to calls characterized by two or more attribute value combinations of the attributes destinationType, destinationCode, and originationAspect of the object class destinationCodeControl.

EXAMPLE 2: A destination code control function controls all calls with dialled codes beginning with 123 or 1245 with a gap time of 1 second (asynchronous timer method). The call characteristic of this control consists of two value combinations of the attribute destinationCode, the originationAspect is not relevant.

There are two possibilities to trigger the control. In the first possibility, a call with dialled digits 123ab... activates the control and all calls with dialled digits 123uv... or 1245xy... are cancelled within the next second. In the second possibility, a call with dialled digits 1245ab... activates the control and all calls with dialled digits 123uv...or 1245xy... are cancelled within the next second.

The destination code control function can be administered with one or two object classes. Destination code control functions described by a single call characteristic can be represented by one (destinationCodeControl) or two (destinationCodeControl, dccGroup) object instances. Destination code control functions described by a multiple call characteristic can only be represented by two (destinationCodeControl, dccGroup) object instances.

6.1.3.3 Destination code control (destinationCodeControl)

This object class is used both for destination code control functions described by single or multiple call characteristics.

If one of the strength packages (containing either the attribute percentage, or continousTimer, or asynchronousTimer, or leakyBucket) is instantiated, this object instance alone defines the destination code control function. The traffic control is restricted to the single call characteristic application in this case for this instance.

If the pointerToDccGroup package (attribute assocOwnerDccGroup) is instantiated, then this object instance defines only the criteria for the call whether the destination code control function has to be applied to it. The strength of the control is described in this case by an associated instance of the dccGroup object class. Instances of this object class are associated with instances of the dccGroup object class by a (n:1) relationship. The instance of the dccGroup object class and all instances of the destinationCodeControl object class which reference the dccGroup instance represent one destination code control function. The instantiation of the pointerToDccGroup package allows the representation of destination code control functions for single as well as for multiple call characteristic application. In this case it is also possible to extend/reduce a destination code control from single/multiple to multiple/single call characteristic application.

The following rules are valid independently whether one or two object classes are used to represent a destination code control function:

- it is not possible to create two or more destinationCodeControl object instance with an identical value combination of the key attributes destinationType, destinationCode, and originationAspect;

- within one NE, all instances of this object class shall be instantiated either with a full destinationCode or destinationCode with destinationType, but not both. If the destinationType is specified in an instance of this object class, it shall be evaluated at the same level as destinationCode, followed by the components origin and callingPartyCategory of the originationAspect. The more specific value has the priority.

One and only one of the strength attributes (percentage or continousTimer or asynchronousTimer or leakyBucket shall be present when this object class is instantiated.

If the assocOwnerDccGroup attribute is specified, the associated dccGroup object instance shall exist. Instances of this object class belong to the same group if and only if they have the same value of the assocOwnerDccGroup attribute.

It is a subclass of the trafficControl object class.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":destinationCodeControl.

Table 22

Name	M/C/O	Value Set
destinationType	C	single
destinationCode	M	single
originationAspect	M	single
treatment	M	single
percentage	C	single
continousTimer	C	single
asynchronousTimer	C	single

destinationType	indicates either the nature of address of the destination code referred by an instance of this object class in a seven bit string according to CCITT Recommendation Q.763 [8], or the type of the destination as an enumerated value. If it has NULL value, it is not to be considered.
destinationCode	is a country code, or area code, or exchange identifying code, or individual line number etc. which this destination object instance represents.
originationAspect	identifies the origin and the calling parties' category according CCITT Recommendation Q.763 [8] for which this control is valid. If this attribute has empty sequence value, the traffic control is valid for all origination aspects.
treatment	indicates how the traffic flow impacted by the traffic management control is treated (e.g. announcement, congestion tone, ...).
percentage	identifies the percentage of calls that will be cancelled as a result of control activation. When this control is active, the specified percentage of calls is blocked. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of the percentage of calls to be cancelled within one NE. The package of this attribute has to be instantiated, if the continousTimerPackage and the asynchronousTimerPackage and the leakyBucketPackage and the assocOwnerDccGroupPackage are not present. The package of this attribute only allows the control of calls described by a single call characteristic.
continousTimer	identifies continuous timer which includes the number of calls and a time. Once the number of call attempts has been handled within a time cycle, no further are allowed until the timer expires (e.g. 5 calls in 60 seconds). It is recommended only to use one the values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for restricting the call rate of the traffic within one NE. Besides the blockAllCalls component the component scale1 or scale2 needs to be supported. For every attribute value using the sec0 value of scale1 or the integer value 0 of scale2 (see ASN.1 type Timer) for the perTimeUnit component, the control will not impact the normal traffic volume. The package of this attribute has to be instantiated, if the percentagePackage and the asynchronousTimerPackage and the leakyBucketPackage and the assocOwnerDccGroupPackage are not present. The package of this attribute only allows the control of calls described by a single call characteristic.
asynchronousTimer	identifies the asynchronous timer specifying a time. the timer is set when the call attempt is allowed and no further call attempts are allowed until the timer expires. It is recommended only to use one the values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for restricting the call rate of the traffic within one NE. Besides the blockAllCalls component the component scale1 or scale2 needs to be supported. The package of this attribute has to be instantiated, if the continousTimerPackage and the percentagePackage and the leakyBucketPackage and the assocOwnerDccGroupPackage are not present. The package of this attribute only allows the control of calls described by a single call characteristic.

(continued)

Table 22 (concluded)

Name		M/C/O	Value Set
leakyBucket		C	single
assocOwnerDccGroup		C	single
leakyBucket	identifies the leaky bucket which includes the bucket size (maximum allowed counter value) and the decrement per time unit. If the counter exceeds the defined maximum size, the call attempt is cancelled. If the counter is less or equal than the maximum size, the call attempt is allowed and the counter is incremented. the counter is decremented at defined intervals making it possible for new calls to be accepted. It is recommended only to use one the values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for restricting the call rate of the traffic within one NE. Besides the blockAllCalls component the component scale1 or scale2 needs to be supported. For every attribute value using the sec0 value of scale1 or the integer value 0 of scale2 (see ASN.1 type Timer) for the perTimeUnit component, the control will not impact the normal traffic volume. The package of this attribute has to be instantiated, if the continousTimerPackage and the asynchronousTimerPackage and the percentagePackage and the assocOwnerDccGroupPackage are not present. The package of this attribute only allows the control of calls described by a single call characteristic.			
assocOwnerDccGroup	identifies the associated dccGroup object instance. The referenced dccGroup instance describes the strength of the control like the attribute percentage, continousTimer, asynchronousTimer or leakyBucket respectively. The instantiation of the package of this attribute however allows both the control of calls described by single and multiple call characteristics.		

6.1.3.4 Destination code control group (dccGroup)

This object class defines the strength of the destination code control when it is desired to apply the same strength to a group of destinations. Instances of this object class are associated with instances of the destinationCodeControl object class by an (1:n) relationship. This object class by itself does not provide the destination code control function; the association with the destinationCodeControl object class together represents the destination code control function.

This object class is an option in case of destination code control described by single call characteristics. It is mandatory for destination code control described by multiple call characteristic.

One and only one of the strength attributes (percentage or continousTimer or asynchronousTimer or leakyBucket) shall be present when this object class is instantiated.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":dccGroup.

Table 23

Name	M/C/O	Value Set
dccGroupId	M	RDN
percentage	C	single
continousTimer	C	single
asynchronousTimer	C	single
leakyBucket	C	single

dccGroupId	gives the RDN.
percentage	identifies the percentage of calls that will be cancelled as a result of control activation. When this control is active, the specified percentage of calls is blocked. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of the percentage of calls to be cancelled within one NE.
continousTimer	identifies continuous timer which includes the number of calls and a time. Once the number of call attempts has been handled within a time cycle, no further are allowed until the timer expires (e.g. 5 calls in 60 seconds). It is recommended only to use one the values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for restricting the call rate of the traffic within one NE. Besides the blockAllCalls component the component scale1 or scale2 needs to be supported. For every attribute value using the sec0 value of scale1 or the integer value 0 of scale2 (see ASN.1 type Timer) for the perTimeUnit component, the control will not impact the normal traffic volume.
asynchronousTimer	identifies the asynchronous timer specifying a time. the timer is set when the call attempt is allowed and no further call attempts are allowed until the timer expires. It is recommended only to use one the values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for restricting the call rate of the traffic within one NE. Besides the blockAllCalls component the component scale1 or scale2 needs to be supported.
leakyBucket	identifies the leaky bucket which includes the bucket size (maximum allowed counter value) and the decrement per time unit. If the counter is less or equal than the defined maximum size, the call attempt is cancelled. If the counter is less than the maximum size, the call attempt is allowed and the counter is incremented. the counter is decremented at defined intervals making it possible for new calls to be accepted. It is recommended only to use one the values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for restricting the call rate of the traffic within one NE. Besides the blockAllCalls component the component scale1 or scale2 needs to be supported. For every attribute value using the sec0 value of scale1 or the integer value 0 of scale2 (see ASN.1 type Timer) for the perTimeUnit component, the control will not impact the normal traffic volume.

6.1.3.5 Cancel to (cancelTo)

This traffic control object class covers both cancellation of direct routing and cancellation of alternative routing to.

The cancellation of direct routing control blocks the amount of direct routed traffic accessing an outgoing/bothway circuit sub-group. It is defined in CCITT Recommendation E.412 [5], subclause 3.1.2.

The cancellation of alternative routing to control is activated on an outgoing/bothway circuit sub-group and prohibits overflow traffic from accessing the controlled circuit sub-group. It is defined in CCITT rec. E.412 [5], subclause 3.2.1.

The cancellation of direct routing and the "cancellation of alternative routing to" control allow fine tuning the amount of traffic to be cancelled by specifying a call volume variable that allows specification of the percentage of calls to be cancelled. The distinction between these two controls is made by the assignment of the appropriate routing aspect to the routingAspect attribute.

The cancel to control applies to circuit sub-groups (modelled as "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg).

The circuitEndPointSubgroup attribute is the key with the highest priority, followed by each component in the originationAspect, destinationAspect, and routingAspect in that order, regarding the order of the components in the type definition. The more specific value has the priority.

It is a subclass of the trafficControl object class.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":cancelTo.

Table 24

Name		M/C/O	Value Set
circuitEndPointSubgroup		M	single
percentage		M	single
originationAspect		M	single
destinationAspect		M	single
routingAspect		M	single
treatment		M	single
circuitEndPointSubgroup	points to a circuit sub-group ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) for which this control object instance applies.		
percentage	indicates the percentage of calls to be cancelled. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of the percentage of calls to be cancelled within one NE.		
originationAspect	identifies the origin and the calling parties' category according CCITT Recommendation Q.763 [8] for which this control is valid. If this attribute has empty sequence value, the traffic control is valid for all origination aspects.		
destinationAspect	identifies the HTR aspect for which this control is valid. If it has allDestinationAspects value, it is valid for all aspects.		
routingAspect	identifies the routing aspect for which this control is valid. If it has null value, it is valid for all aspects.		
treatment	indicates how the traffic flow impacted by the traffic management control is treated (e.g. announcement, congestion tone, etc.).		

6.1.3.6 Cancellation of routing from (cancelFrom)

This control is activated on an outgoing/bothway circuit sub-group and prohibits traffic from overflowing to the next-in-chain circuit sub-groups. The control will suspend all next-in-chain circuit sub-groups for direct or alternate overflow traffic. It is defined in CCITT Recommendation E.412 [5], subclause 3.2.1.

The "cancellation of routing from" control allows fine tuning the amount of overflow traffic to be cancelled by specifying a call volume variable that allows specification of the percentage of calls to be cancelled.

The control applies to circuit sub-groups (modelled as "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg).

The circuitEndPointSubgroup attribute is the key with the highest priority, followed by each component in the originationAspect, destinationAspect, and routingAspect in that order, regarding the order of the components in the type definition. The more specific value has the priority.

It is a subclass of the trafficControl object class.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":cancelFrom.

Table 25

Name		M/C/O	Value Set
circuitEndPointSubgroup		M	single
percentage		M	single
originationAspect		M	single
destinationAspect		M	single
routingAspect		M	single
treatment		M	single
circuitEndPointSubgroup	points to a circuit sub-group ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) for which this control object instance applies.		
percentage	indicates the percentage of calls to be cancelled. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of the percentage of calls to be cancelled within one NE.		
originationAspect	identifies the origin and the calling parties' category according CCITT Recommendation Q.763 [8] for which this control is valid. If this attribute has empty sequence value, the traffic control is valid for all origination aspects.		
destinationAspect	identifies the HTR aspect for which this control is valid. If it has allDestinationAspects value, it is valid for all aspects.		
routingAspect	identifies the routing aspect for which this control is valid. If it has null value, it is valid for all aspects.		
treatment	indicates how the traffic flow impacted by the traffic management control is treated (e.g. announcement, congestion tone, etc.).		

6.1.3.7 Skip control (skip)

This control is activated on an outgoing/bothway circuit sub-group and is used to force traffic to the next in-chain circuit sub-group in the routing table. The skip control can effect both direct and alternate routed traffic. It is defined in CCITT Recommendation E.412 [5], subclause 3.2.2.

The skip control allows fine tuning the amount of traffic to be forced to skip the controlled circuit sub-group ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) by specifying a call volume variable that allows specification of the percentage of calls to be forced to skip bidding for the controlled circuitEndPointSubgroup resp. xtpsg.

The control applies to circuit sub-groups (modelled as circuitEndPointSubgroup resp. xtpsg).

The circuitEndPointSubgroup attribute is the key with the highest priority, followed by each component in the originationAspect, destinationAspect, and routingAspect in that order, regarding the order of the components in the type definition. The more specific value has the priority.

It is a subclass of the Traffic Control object class.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":skip.

Table 26

Name		M/C/O	Value Set
circuitEndPointSubgroup		M	single
percentage		M	single
originationAspect		M	single
destinationAspect		M	single
routingAspect		M	single
circuitEndPointSubgroup	points to a circuit sub-group ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) for which this control object instance applies.		
percentage	indicates the percentage of calls to be skipped. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of the percentage of calls to be skipped within one NE.		
originationAspect	identifies the origin and the calling parties' category according CCITT Recommendation Q.763 [8] for which this control is valid. If this attribute has empty sequence value, the traffic control is valid for all origination aspects.		
destinationAspect	identifies the HTR aspect for which this control is valid. If it has allDestinationAspects value, it is valid for all aspects.		
routingAspect	identifies the routing aspect for which this control is valid. If it has null value, it is valid for all aspects.		

6.1.3.8 Temporary alternative routing to a circuit sub-group (tarTo)

Temporary alternative routing to a circuit sub-group is an expansive control which temporarily increases the number of routing possibilities to controlled destinations. One or several circuit sub-groups, which are not normally available in the normal routing plan are made available in chain before the reference circuit sub-group to reduce traffic overflowing respectively directly offered to the reference circuit sub-group. The temporary alternative routed circuit sub-groups shall terminate on an exchange that has the capability of reaching the destination. The objects to which the temporary alternative routing is applied can be either destinations and/or circuit sub-groups. It is defined in CCITT Recommendation E.412 [5], subclause 3.2.3.

The temporary alternative routing control is activated by input from an OS. When this control is active, in all routing tables where the circuitEndPointSubgroup is present it is replaced by the circuitEndPointSubgroups resp. xtpsgs indicated in the newCircuitEndPointSubgroups attribute respectively they are made available in chain before it, and the TAR indication is provided for the Signalling System No.7 (SS7).

The effect of this control can be limited to destinations which are HTR by setting the destinationAspect attribute accordingly or to the destination which is indicated in the destinationCode attribute. If this attribute is empty string, the control is valid for all destinations regarding the limitations given by the destinationAspect attribute.

Within one NE, all instances of this object class shall be instantiated either with a full destinationCode or destinationCode with destinationType, but not both. If the destinationType is specified in an instance of this object class, it shall be evaluated at the same level as destinationCode.

The circuitEndPointSubgroup attribute is the key with the highest priority, followed by the destinationType attribute and the destinationCode attribute, and each component in the originationAspect, destinationAspect, and routingAspect in that order, regarding the order of the components in the type definition. The more specific value has the priority.

It is a subclass of the trafficControl object class.

Table 27

Name	M/C/O	Value Set
circuitEndPointSubgroup	M	single
newCircuitEndPointSubgroups	M	single
percentage	M	single
originationAspect	M	single
destinationAspect	M	single
routingAspect	M	single
returnAction	M	single
destinationType	M	single
destinationCode	M	single

circuitEndPointSubgroup	points to an "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg object instance before which the circuitEndPointSubgroups resp. xtpsgs listed in the newCircuitEndPointSubgroups attribute are introduced into the routing tables, or which is replaced temporary in the routing tables by the circuitEndPointSubgroups resp. xtpsgs listed in the newCircuitEndPointSubgroups attribute.
newCircuitEndPointSubgroups	lists the "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroups resp. "prI-ETS 300 293 (1996)":xtpsgs to be introduced into the routing tables in the sequence indicated in the attribute value. At least one element in the sequence shall be present.
percentage	indicates the percentage of calls underlying traffic control. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of the percentage of calls to be temporarily alternate routed within one NE.
originationAspect	identifies the origin and the calling parties' category according CCITT Recommendation Q.763 [8] for which this control is valid. If this attribute has empty sequence value, the traffic control is valid for all origination aspects.
destinationAspect	identifies the HTR aspect for which this control is valid. If it has allDestinationAspects value, it is valid for all aspects.
routingAspect	identifies the routing aspect for which this control is valid. If it has null value, it is valid for all aspects.
returnAction	gives the disposition how the traffic overflowing from newCircuitEndPointSubgroups shall be treated. Three possibilities exist: Setting returnAction to return inserts the newCircuitEndPointSubgroups before the controlled circuitEndPointSubgroup. Setting returnAction to skip replaces the controlled circuitEndPointSubgroup with the newCircuitEndPointSubgroups. Setting returnAction to cancelTreatment replaces the controlled circuitEndPointSubgroup and the remaining circuit sub-groups in the routing plan with the newCircuitEndPointSubgroups.
destinationType	indicates either the nature of address of the destination code referred by an instance of this object class in a seven bit string according to CCITT Recommendation Q.763 [8], or the type of the destination as an enumerated value. If it has NULL value, it is not to be considered.
destinationCode	is a country code, or area code, or exchange identifying code, or individual line number etc. which this destination object instance represents.

6.1.3.9 Temporary alternative routing from a circuit sub-group (tarFrom)

Temporary alternative routing from a circuit sub-group is an expansive control which temporarily increases the number of routing possibilities to controlled destinations. One or several circuit sub-groups, which are not normally available in the normal routing plan are made available as overflow possibility from the reference circuit sub-group. The temporary alternative routed circuit sub-groups shall terminate on an exchange that has the capability of reaching the destination. The objects to which the temporary alternative routing is applied can be either destinations and/or circuit sub-groups. It is defined in CCITT Recommendation E.412 [5], subclause 3.2.3.

The temporary alternative routing control is activated by input from an OS. When this control is active, in all routing tables where the circuitEndPointSubgroup is present it is followed by the circuitEndPointSubgroups resp. xtpsgs indicated in the newCircuitEndPointSubgroups attribute, and the TAR indication is provided for the SS7.

The effect of this control can be limited to destinations which are HTR by setting the destinationAspect attribute accordingly or to the destination which is indicated in the destinationCode attribute. If this attribute is empty string, the control is valid for all destinations regarding the limitations given by the destinationAspect attribute.

Within one NE, all instances of this object class shall be instantiated either with a full destinationCode or destinationCode with destinationType, but not both. If the destinationType is specified in an instance of this object class, it shall be evaluated at the same level as destinationCode.

The circuitEndPointSubgroup attribute is the key with the highest priority, followed by the destinationType attribute and the destinationCode attribute, and each component in the originationAspect, destinationAspect, and routingAspect in that order, regarding the order of the components in the type definition. The more specific value has the priority.

It is a subclass of the trafficControl object class.

Table 28

Name	M/C/O	Value Set
circuitEndPointSubgroup	M	single
newCircuitEndPointSubgroups	M	single
percentage	M	single
originationAspect	M	single
destinationAspect	M	single
routingAspect	M	single
returnAction	M	single
destinationType	M	single
destinationCode	M	single

circuitEndPointSubgroup	points to an "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg object instance after which the circuitEndPointSubgroups resp. xtpsgs listed in the newCircuitEndPointSubgroups attribute are introduced into the routing tables.
newCircuitEndPointSubgroups	lists the "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroups resp. "prI-ETS 300 293 (1996)":xtpsgs to be introduced into the routing tables in the sequence indicated in the attribute value. At least one element in the sequence shall be present.
percentage	indicates the percentage of calls underlying traffic control. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of the percentage of calls to be temporarily alternate routed within one NE.
originationAspect	identifies the origin and the calling parties' category according CCITT Recommendation Q.763 [8] for which this control is valid. If this attribute has empty sequence value, the traffic control is valid for all origination aspects.
destinationAspect	identifies the HTR aspect for which this control is valid. If it has allDestinationAspects value, it is valid for all aspects.
routingAspect	identifies the routing aspect for which this control is valid. If it has null value, it is valid for all aspects.
returnAction	gives the disposition how the traffic overflowing from newCircuitEndPointSubgroups shall be treated, i.e. continuing in the routing table or cancellation. In the cancellation case the treatment (e.g. announcement, congestion tone, ...) is indicated.
destinationType	indicates either the nature of address of the destination code referred by an instance of this object class in a seven bit string according to CCITT Recommendation Q.763 [8], or the type of the destination as an enumerated value. If it has NULL value, it is not to be considered.
destinationCode	is a country code, or area code, or exchange identifying code, or individual line number etc. which this destination object instance represents.

6.1.3.10 Cancel rerouted overflow (cancelRerouted)

This control prevents additional rerouting or alternate routing of a rerouted call. Rerouted calls are not allowed to overflow the circuit sub-group to which the cancel rerouted overflow control is applied, while normal overflow traffic is not affected. It is defined in CCITT Recommendation E.412 [5], subclause 3.2.4.

The control applies to circuit sub-groups (modelled as "ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg). The control may be activated manually by an OS.

It is a subclass of the trafficControl object class.

This object class is identical to "ITU-T Recommendation Q.823 (1996)":cancelRerouted.

Table 29

Name		M/C/O	Value Set
circuitEndPointSubgroup		M	single
treatment		M	single
circuitEndPointSubgroup	points to a circuit sub-group ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) for which this control object instance applies.		
treatment	indicates how the traffic flow impacted by the traffic management control is treated (e.g. announcement, congestion tone, etc.).		

6.1.3.11 Selective Circuit Reservation Control (scr)

The selective circuit reservation control enables an exchange to automatically give preference to specific traffic attributes over others (e.g. direct routed calls over alternate routed calls) at the moment when circuit congestion is present or imminent. It can be provided with one or two thresholds, with later providing greater selectivity. The activation threshold defines how many circuits or how much circuit capacity shall be kept idle for those traffic attributes given preferred access to the circuit subgroup. When the number of idle circuits or the idle capacity in the given circuit subgroup is less or equal to the reservation threshold, the NE shall check the specified control response (level(n)ResponseCategory) to determine if calls are to be controlled. The skip response (dispositionOfCalls = skip) allows a call to alternate-route to the next circuit subgroup in the routing pattern (if any), while the cancel response (dispositionOfCalls = cancel) blocks the call. The control is defined in CCITT Recommendation E.412 [5], subclause 4.2.

The selective circuit reservation control has the following operating variables:

- reservation thresholds;

- control response;

- control action option.

The reservation thresholds and the related control response are determined by the activationThresholds attribute and by the associated scrAffectedTraffic object instance. The control action option for processing of calls denied access to the circuit sub-groups is given in the dispositionOfCalls attribute.

When the number of circuits or the idle capacity in the circuit sub-group is less than or equal to the reservation threshold, the exchange shall check the indicated scrAffectedTraffic object instance to determine if calls shall be controlled. If the dispositionOfCalls attribute is set to treatment and the call has no preferred access, the call shall be blocked and treated as indicated in the treatment attribute. If the dispositionOfCalls attribute is set to NULL and the call has no preferred access, the call shall be alternate routed to the next circuit sub-group in the routing pattern (if any). In this case, the value of the treatment attribute is not to be considered.

The defined levels in the activationThresholds attribute and the reference given in the assocScrAffectedTraffic attribute to a single or multi threshold instance shall correspond. The scrAffectedTraffic object instance to be associated shall be present before the scr object class can be instantiated.

A value change of the autoActivated attribute shall not be reported by the attributeValueChange notification.

The selective circuit reservation control is a subclass of the trafficControl object class.

Table 30

Name	M/C/O	Value Set
circuitEndPointSubgroup	M	single
dispositionOfCalls	M	single
treatment	M	single
activationThresholds	M	single
assocScrAffectedTraffic	M	single
autoActivated	M	single
"CCITT Recommendation X.721: 1992":administrativeState	M	single

circuitEndPointSubgroup	points to the circuit sub-group ("ITU-T Recommendation M.3100 (1996)":circuitEndPointSubgroup resp. "prI-ETS 300 293 (1996)":xtpsg) for which this control object instance applies.
dispositionOfCalls	indicates whether calls without preferred access will be cancelled or will skip to the next available circuit sub-group.
treatment	indicates how the traffic flow impacted by the traffic management control is treated (e.g. announcement, congestion tone, ...) in the case of cancellation.
activationThresholds	contains in a sequence the number of circuits or the circuit capacity that shall be reserved for preferred traffic by controlling the calls without preferred access indicated in the associated scrAffectedTraffic object instance for reservation threshold 1 and 2.
assocScrAffectedTraffic	points to the associated scrAffectedTraffic object instance for reservation threshold 1 and 2.
autoActivated	indicates whether a trigger for this control is outstanding. When this attribute has TRUE value and the administrativeState is "unlocked", the control is active. The control is deactivated for all other combinations of the values of autoActivated and administrativeState.
administrativeState	is defined in CCITT Recommendation X.721 [11]. It identifies whether the control has been locked by the network manager. If the value is "locked", the control cannot be activated. If the value is "unlocked", the control can be activated.

6.1.3.12 Selective circuit reservation affected traffic (scrAffectedTraffic)

The selective circuit reservation affected traffic object class represents the control response category for the selective circuit reservation.

It determines per individual destination aspect and routing aspect correlated to origination aspects the quantity of traffic to be controlled.

If a level 2 activation threshold is specified, both components level1 and level2 shall be specified using the same unit (number or percentage).

In the level1ResponseCategories and level2ResponseCategories attributes (if present) the key with the highest priority is in the following order the components origin, callingPartyCategory, and additionalAspects of the originationAspect value followed by the additionalTrafficCriteria value, the destinationAspect value and as the least the routingAspect value. The more specific value has the priority.

Table 31

Name		M/C/O	Value Set
scrAffectedTrafficId		M	RDN
level1ResponseCategories		M	set
level2ResponseCategories		C	set
scrAffectedTrafficId	gives the RDN.		
level1ResponseCategories,			
level2ResponseCategories	defines for reservation threshold 1 respectively for reservation threshold 2 in a set per individual destination aspect and routing aspect correlated to origination aspects the quantity of traffic to be controlled. At least one of the optional value assignments of the attribute shall be present. The additionalTrafficCriteria value could e.g. point to a preferred destination. It is recommended only to use the values of one CHOICE alternative of the ASN.1 type Percentage within one NE. The specified percentage of calls with a correlated characteristic shall be affected by the control.		

6.2 Definition of attributes

This subclause provides the description of all generic attributes used within this information model. The following generic attributes have been identified:

- RDN;

- performance attributes.

The attributes specific to this information model are already explained within the object class descriptions.

6.2.1 RDN

The semantics of the RDN attribute type are specified in CCITT Recommendation X.720 [10]. This attribute type is used to identify an instance of a managed object uniquely within the scope of its immediate superior in the Management Information Tree. This is modelled as a single-valued attribute type:

Value type: Identifier, graphic string or integer.

Inherent properties: The value shall be unique within the scope of superior managed object instance.

Permitted operations: Get only.

Implicit relations: The object instance is contained in the superior managed object instance.

Specification properties: This attribute type may be used for naming all object classes defined in this I-ETS.

6.2.2 Performance attributes

The identified performance attributes listed hereafter are derived from the "CCITT Recommendation X.721: 1992":counter attribute:

- answeredIncomingSeizures
- answeredOutgoingSeizures
- bids
- callsAffectedByCancelFrom
- callsAffectedByCancelRerouted
- callsAffectedByCancelTo
- callsAffectedByDcc
- callsAffectedByScr
- callsAffectedBySkip
- callsAffectedByTarFrom
- callsAffectedByTarTo
- callsAffectedByTrafficControl
- incomingSeizures
- internalSeizures
- noCircuitsAvailable
- numberOfCallsBlockedByLoadShedding
- originatingSeizures
- outgoingBids
- outgoingSeizures
- overflow
- terminatingSeizures
- transitSeizures

The identified performance attribute listed hereafter is derived from the "CCITT Recommendation X.721: 1992":gauge attribute:

- numberOfAvailableCircuits.

The semantics of these attributes are described in the context of the object class description in subclause 6.1.

6.3 Actions description

No specific actions were identified.

6.4 Notifications description

The following generic notifications will be utilized:

- object creation notification according to CCITT Recommendations X.721 [11] and X.730 [12];
- object deletion notification according to CCITT Recommendations X.721 [11] and X.730 [12];
- attribute value change notification according to CCITT Recommendations X.721 [11] and X.730 [12];
- state change according notification to CCITT Recommendations X.721 [11] and X.731 [13];
- scan report notification according to ITU-T Recommendations X.738 [18].

No specific notifications were identified.

7 Formal object class definitions

7.1 Definition of object classes

7.1.1 Managed element fragment

7.1.1.1 Managed element (managedElement)

The managed element object class is defined in CCITT Recommendation M.3100 [7].

7.1.1.2 Congestion level indication (congestionLevelIndication)

```
congestionLevelIndication MANAGED OBJECT CLASS
    DERIVED FROM "CCITT Recommendation X.721: 1992":top;
    CHARACTERIZED BY
    "CCITT Recommendation M.3100: 1992":attributeValueChangeNotificationPackage,
    congestionLevelIndicationPackage PACKAGE
    BEHAVIOUR
    congestionLevelIndicationBehaviour BEHAVIOUR
    DEFINED AS "An instance of the congestion level indication object class provides an
    indication of the current congestion level of the managedElement object instance in which it
    is contained.
    Although it is desirable, the managedElement might not be able to provide an MCL3 indication
    during catastrophic failures."
    ;;
    ATTRIBUTES
    congestionLevelIndicationId GET,
    congestionLevel GET
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 1};
```

7.1.1.3 Observed destination (observedDestination)

```
observedDestination MANAGED OBJECT CLASS
    DERIVED FROM "CCITT Recommendation X.721: 1992":top;
    CHARACTERIZED BY
    "CCITT Recommendation M.3100: 1992":objectManagementNotificationsPackage,
    observedDestinationPackage PACKAGE
    BEHAVIOUR
    observedDestinationBehaviour BEHAVIOUR
    DEFINED AS "A destination is a country, an area, an exchange or other location, or special
    service, in which the called subscriber is located and that may be specified within the
    country. A destination is identified by the destination code. It is defined in CCITT
    Recommendation E.410, annex A.
    An observed destination is only instantiated for performance monitoring purposes. Its
    performance is monitored by a contained tmObservedDestinationCurrentData object instance."
    ;;
    ATTRIBUTES
    observedDestinationId GET,
    destinationCode GET,
    tmSurveillance
    INITIAL VALUE I-ETS300637.initialTmSurveillance
    GET
    ;;;
    CONDITIONAL PACKAGES
    destinationTypePackage PRESENT IF "the destination type is needed to identify unabigiously
    the destination",
    circuitEndPointSubgroupsPackage PRESENT IF "a destination's performance is monitored in
    correlation with certain circuitEndPointSubgroups resp. xtpsgs",
    creatorPackage PRESENT IF "an instance supports it";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 2};
```

7.1.1.4 Hard to reach destination (htrDestination)

```
htrDestination MANAGED OBJECT CLASS
    DERIVED FROM "CCITT Recommendation X.721: 1992":top;
    CHARACTERIZED BY
    "CCITT Recommendation M.3100: 1992":objectManagementNotificationsPackage,
    creatorPackage,
    "CCITT Recommendation M.3100: 1992":stateChangeNotificationPackage,
    htrDestinationPackage PACKAGE
    BEHAVIOUR
    htrDestinationBehaviour BEHAVIOUR
    DEFINED AS "A destination is a country, an area, an exchange or other location, or special
    service, in which the called subscriber is located and that may be specified within the
    country. A destination is identified by the destination code. It is defined in CCITT
    Recommendation E.410, annex A.
    An instance of the htrDestination object class represents a destination identified as hard to
    reach.
    All instances of the htrDestination object class are forming the HTR list.
    The decision whether a destination is hard or easy to reach is made based on the answer bid
    ratio or answer seizure ratio either by the OS or by the resource management of the exchange.
    In the latter case, the  administrativeState attribute provides the opportunity to inhibit
    the hard to reach status.
    The HTR status of a destination can be correlated with circuit sub-groups by using the
circuitEndPointSubgroups
    attribute. If this attribute is empty set, the destination is assigned HTR via all possible
    circuit sub-groups.
    An htrDestination which is inhibited (administrativeState = locked) is to be considered as
    non hard to reach."
    ;;
    ATTRIBUTES
    htrDestinationId GET,
    destinationCode GET,
    "CCITT Recommendation X.721: 1992":administrativeState
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultAdministrativeState
    PERMITTED VALUES I-ETS300637.PermittedStates
    GET-REPLACE
    ;;;
    CONDITIONAL PACKAGES
    destinationTypePackage PRESENT IF "the destination type is needed to identify unabigiously
    the destination",
    circuitEndPointSubgroupsPackage PRESENT IF "the htrDestination is correlated with certain
circuitEndPointSubgroups resp. xtpsgs";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 3};
```

7.1.1.5 Exchange termination point sub-group (xtpsg)

The exchange termination point sub-group object class is defined in prI-ETS 300 293 [2]. In the traffic management context, its subclasses

- incoming exchange termination point sub-group (xtpsgIn),
- outgoing exchange termination point sub-group (xtpsgOut), and
- bi-directional exchange termination point sub-group (xtpsgBid)

as defined in prI-ETS 300 293 [2] are to be considered.

The circuit end point sub-group object class defined in ITU-T Recommendation M.3100. represents circuit sub-groups as well.

7.1.1.6 Traffic management circuit end point sub-group (tmCircuitEndPointSubgroup)

```
tmCircuitEndPointSubgroup MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation M.3100:1996":circuitEndPointSubgroup
    CHARACTERIZED BY
    tmCircuitEndPointSubgroupPackage PACKAGE
    BEHAVIOUR
    tmCircuitEndPointSubgroupBehaviour BEHAVIOUR
    DEFINED AS "The tmCircuitEndPointSubgroup is a subclass of ITU-T Recommendation M.3100:
    circuitEndPointSubgroup. It is used for performance monitoring and controls for traffic
    management purposes."
    ;;
    ATTRIBUTES
    tmSurveillance GET
    INITIAL VALUE I-ETS300637.initialTmSurveillance
    ;;;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 4};
```

7.1.2 Status and performance monitoring fragment

7.1.2.1 Current data (currentData)

The current data object class is defined in CCITT Recommendation Q.822 [9]. It is subclassed for the different monitored entities.

It is to be considered that in this I-ETS only a minimum set of performance data is modelled. Individual implementations may require additional performance data. Their retrieval can be modelled by subclassing the currentData subclasses given hereafter accordingly.

7.1.2.2 CircuitEndPointSubgroup current data (circuitEndPointSubgroupCurrentData)

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that.

```
circuitEndPointSubgroupCurrentData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994":currentData;
    CHARACTERIZED BY
    circuitEndPointSubgroupCurrentDataPackage PACKAGE
    BEHAVIOUR
    circuitEndPointSubgroupCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "The circuitEndPointSubgroup current data object class is used for monitoring
circuit sub-group
    related performance data as defined in CCITT Recommendation E.502.
    The assignment of the performance attributes to the individual circuitEndPointSubgroup resp.
    xtpsg subclasses (xtpsgIn, xtpsgOut, and xtpsgBid) is given in annex A.
    In order to synchronize the granularityPeriod of an instance of a currentData subclass with
    the scanning time to the next integral time period, the value of the
    periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an
    integral multiple of the granularity period relative to an hour. E.g. if the granularity
    period of 5 minutes is specified for an instance, the periodSynchronizationTime might have
    the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ..."
    ;;
    ATTRIBUTES
    outgoingSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    incomingSeizures
```

```
    INITIAL VALUE I-ETS300637.initialCount,
    outgoingBids
    INITIAL VALUE I-ETS300637.initialCount,
    answeredOutgoingSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    overflow
    INITIAL VALUE I-ETS300637.initialCount,
    incomingTrafficUsage
    INITIAL VALUE I-ETS300637.initialInteger,
    outgoingTrafficUsage
    INITIAL VALUE I-ETS300637.initialInteger,
    numberOfAvailableCircuits
    INITIAL VALUE I-ETS300637.initialGauge
    ;;;
    CONDITIONAL PACKAGES
    answeredIncomingSeizuresPackage PRESENT IF "this performance measurement is supported by the
    exchange";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 5};
```

7.1.2.3 Observed destination current data (observedDestinationCurrentData)

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that.

```
observedDestinationCurrentData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994":currentData;
    CHARACTERIZED BY
    observedDestinationCurrentDataPackage PACKAGE
    BEHAVIOUR
    observedDestinationCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "The observed destination current data object class is used for monitoring
    destination related performance data as defined in CCITT Recommendation E.502.
    In order to synchronize the granularityPeriod of an instance of a currentData subclass with
    the scanning time to the next integral time period, the value of the
    periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an
    integral multiple of the granularity period relative to an hour. E.g. if the granularity
    period of 5 minutes is specified for an instance, the periodSynchronizationTime might have
    the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ..."
    ;;
    ATTRIBUTES
    bids
    INITIAL VALUE I-ETS300637.initialCount,
    outgoingSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    answeredOutgoingSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    noCircuitsAvailable
    INITIAL VALUE I-ETS300637.initialCount
    ;;;
    CONDITIONAL PACKAGES
    callsAffectedByDccPackage PRESENT IF "the exchange supports this measurement";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 6};
```

7.1.2.4 Exchange performance current data (exchangePerformanceCurrentData)

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that.

```
exchangePerformanceCurrentData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994": currentData;
    CHARACTERIZED BY
    exchangePerformanceCurrentDataPackage PACKAGE
    BEHAVIOUR
    exchangePerformanceCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "The exchange performance current data object class is used for monitoring
    exchange related performance data as defined in CCITT Recommendation E.502.
    In order to synchronize the granularityPeriod of an instance of a currentData subclass with
    the scanning time to the next integral time period, the value of the
    periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an
    integral multiple of the granularity period relative to an hour. E.g. if the granularity
    period of 5 minutes is specified for an instance, the periodSynchronizationTime might have
    the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ..."
    ;;
    ATTRIBUTES
    incomingSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    outgoingSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    transitSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    terminatingSeizures
```

```
    INITIAL VALUE I-ETS300637.initialCount,
    originatingSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    internalSeizures
    INITIAL VALUE I-ETS300637.initialCount,
    numberOfCallsBlockedByLoadShedding
    INITIAL VALUE I-ETS300637.initialCount
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 7};
```

7.1.2.5 Traffic control current data (trafficControlCurrentData)

For traffic management purposes, this object class shall not be instantiated, but its subclass defined in this I-ETS or a subclass derived from that.

```
trafficControlCurrentData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994": currentData;
    CHARACTERIZED BY
    trafficControlCurrentDataPackage PACKAGE
    BEHAVIOUR
    trafficControlCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "The traffic control current data object class is used for monitoring the
    effectiveness of a traffic control as defined in CCITT Recommendation E.502.
    In order to synchronize the granularityPeriod of an instance of a currentData subclass with
    the scanning time to the next integral time period, the value of the
    periodSynchronizationTime (attribute of the periodSynchronizationPackage) has to be set to an
    integral multiple of the granularity period relative to an hour. E.g. if the granularity
    period of 5 minutes is specified for an instance, the periodSynchronizationTime might have
    the values 1.05 p.m., 1.10 p.m., 0.30 a.m., ..."
    ;;
    ATTRIBUTES
    callsAffectedByTrafficControl
    INITIAL VALUE I-ETS300637.initialCount
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 8};
```

7.1.2.6 Traffic management circuitEndPointSubgroup current data (tmCircuitEndPointSubgroupCurrentData)

```
tmCircuitEndPointSubgroupCurrentData MANAGED OBJECT CLASS
    DERIVED FROM circuitEndPointSubgroupCurrentData ;
    CHARACTERIZED BY
    tmCircuitEndPointSubgroupCurrentDataPackage PACKAGE
    BEHAVIOUR
    tmCircuitEndPointSubgroupCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "A tmCircuitEndPointSubgroupCurrentData object instance shall contain only one
    instance of
    circuitEndPointSubgroupHistoryData.
    All tmCircuitEndPointSubgroupCurrentData object instances within the same managed element
    shall have the same
    granularity period."
    ;;
    ATTRIBUTES
    "ITU-T Recommendation Q.822:1994":historyRetention
    PERMITTED VALUES I-ETS300637.PermittedHistoryRetention
    GET
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 9};
```

7.1.2.7 Controlled circuitEndPointSubgroup current data (controlledCircuitEndPointSubgroupCurrentData)

This object class can be used if the effectiveness of traffic controls is required on a per circuitEndPointSubgroup resp. xtpsg instance basis.

It is to be considered that the additional performance information provided by this object class can as well be retrieved in the OS by calculating the traffic control related performance data accordingly.

```
controlledCircuitEndPointSubgroupCurrentData MANAGED OBJECT CLASS
    DERIVED FROM tmCircuitEndPointSubgroupCurrentData;
    CHARACTERIZED BY
    controlledCircuitEndPointSubgroupCurrentDataPackage PACKAGE
    BEHAVIOUR
    controlledCircuitEndPointSubgroupCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "All controlledCircuitEndPointSubgroupCurrentData object instances within the same
managed element shall have
    the same granularity period."
    ;;;;
    CONDITIONAL PACKAGES
    callsAffectedByCancelFromPackage PRESENT IF "cancel from is supported by the exchange and the
    monitored instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup",
    callsAffectedByCancelReroutedPackage PRESENT IF "cancel rerouted is supported by the exchange
    and the monitored instance is an xtpsgOut or an xtpsgBid or an equivalent
    circuitEndPointSubgroup",
    callsAffectedByCancelToPackage PRESENT IF "cancel to is supported by the exchange and the
    monitored instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup",
    callsAffectedByScrPackage PRESENT IF "SCR is supported by the exchange and the monitored
    instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup",
    callsAffectedBySkipPackage PRESENT IF "skip is supported by the exchange and the monitored
    instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup",
    callsAffectedByTarFromPackage PRESENT IF "TAR from is supported by the exchange and the
    monitored instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup",
    callsAffectedByTarToPackage PRESENT IF "TAR to is supported by the exchange and the monitored
    instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 10};
```

7.1.2.8 Traffic management observed destination current data (tmObservedDestinationCurrentData)

```
tmObservedDestinationCurrentData MANAGED OBJECT CLASS
    DERIVED FROM observedDestinationCurrentData;
    CHARACTERIZED BY
    tmObservedDestinationCurrentDataPackage PACKAGE
    BEHAVIOUR
    tmObservedDestinationCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "A tmObservedDestinationCurrentData object instance shall contain only one
    instance of observedDestinationHistoryData.
    All tmObservedDestinationCurrentData object instances within the same managed element shall
    have the same granularity period."
    ;;
    ATTRIBUTES
    "ITU-T Recommendation Q.822:1994":historyRetention
    PERMITTED VALUES I-ETS300637.PermittedHistoryRetention
    GET
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 11};
```

7.1.2.9 Traffic management exchange performance current data (tmExchangePerformanceCurrentData)

```
tmExchangePerformanceCurrentData MANAGED OBJECT CLASS
    DERIVED FROM exchangePerformanceCurrentData;
    CHARACTERIZED BY
    tmExchangePerformanceCurrentDataPackage PACKAGE
    BEHAVIOUR
    tmExchangePerformanceCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "A tmExchangePerformanceCurrentData object instance shall contain only one
    instance of exchangePerformanceHistoryData."
    ;;
    ATTRIBUTES
    "ITU-T Recommendation Q.822:1994":historyRetention
    PERMITTED VALUES I-ETS300637.PermittedHistoryRetention
    GET
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 12};
```

7.1.2.10 Traffic Management traffic control current data (tmTrafficControlCurrentData)

```
tmTrafficControlCurrentData MANAGED OBJECT CLASS
    DERIVED FROM trafficControlCurrentData;
    CHARACTERIZED BY
    tmTrafficControlCurrentDataPackage PACKAGE
    BEHAVIOUR
    tmTrafficControlCurrentDataBehaviour BEHAVIOUR
    DEFINED AS "A tmTrafficControlCurrentData object instance shall contain only one instance of
    observedDestinationHistoryData.
    All tmTrafficControlCurrentData object instances within the same managed element shall have
    the same granularity period."
    ;;
    ATTRIBUTES
    "ITU-T Recommendation Q.822:1994":historyRetention
    PERMITTED VALUES I-ETS300637.PermittedHistoryRetention
    GET
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 13};
```

7.1.2.11 History data (historyData)

The history data object class is defined in CCITT Recommendation Q.822 [9]. It is subclassed for the different monitored entities.

It is to be considered that in this I-ETS only a minimum set of performance data is modelled. Individual implementations may require additional performance data. Their retrieval can be modelled by subclassing the historyData subclasses given hereafter accordingly.

7.1.2.12 CircuitEndPointSubgroup history data (circuitEndPointSubgroupHistoryData)

```
circuitEndPointSubgroupHistoryData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994":historyData;
    CHARACTERIZED BY
    circuitEndPointSubgroupHistoryDataPackage PACKAGE
    BEHAVIOUR
    circuitEndPointSubgroupHistoryDataBehaviour BEHAVIOUR
    DEFINED AS "The circuitEndPointSubgroup history data object class is used for monitoring
circuit sub-group
    related performance data as defined in CCITT Recommendation E.502."
    ;;
    ATTRIBUTES
    outgoingSeizures,
    incomingSeizures,
    outgoingBids,
    answeredOutgoingSeizures,
    overflow,
    incomingTrafficUsage,
    outgoingTrafficUsage,
    numberOfAvailableCircuits
    ;;;
    CONDITIONAL PACKAGES
    answeredIncomingSeizuresHistoryPackage PRESENT IF "this performance measurement is supported
    by the exchange";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 14};
```

7.1.2.13 Controlled circuitEndPointSubgroup history data (controlledCircuitEndPointSubgroupHistoryData)

This object class can be used if the effectiveness of traffic controls is required on a per circuitEndPointSubgroup resp. xtpsg instance basis.

It is to be considered that the additional performance information provided by this object class can as well be retrieved in the OS by calculating the traffic control related performance data accordingly.

```
controlledCircuitEndPointSubgroupHistoryData MANAGED OBJECT CLASS
    DERIVED FROM circuitEndPointSubgroupHistoryData;
    CHARACTERIZED BY
    CONDITIONAL PACKAGES
    callsAffectedByCancelFromHistoryPackage PRESENT IF "cancel from is supported by the exchange
    and the monitored instance is an xtpsgOut or an xtpsgBid or an equivalent
    circuitEndPointSubgroup",
    callsAffectedByCancelReroutedHistoryPackage PRESENT IF "cancel rerouted is supported by the
    exchange and the monitored instance is an xtpsgOut or an xtpsgBid or an equivalent
    circuitEndPointSubgroup",
    callsAffectedByCancelToHistoryPackage PRESENT IF "cancel to is supported by the exchange and
    the monitored instance is an xtpsgOut or an xtpsgBid or an equivalent
    circuitEndPointSubgroup",
    callsAffectedByScrHistoryPackage PRESENT IF "SCR is supported by the exchange and the
    monitored instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup",
    callsAffectedBySkipHistoryPackage PRESENT IF "skip is supported by the exchange and the
    monitored instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup",
    callsAffectedByTarFromHistoryPackage PRESENT IF "TAR from is supported by the exchange and
    the monitored instance is an xtpsgOut or an xtpsgBid or an equivalent
    circuitEndPointSubgroup",
    callsAffectedByTarToHistoryPackage PRESENT IF "TAR to is supported by the exchange and the
    monitored instance is an xtpsgOut or an xtpsgBid or an equivalent circuitEndPointSubgroup";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 15};
```

7.1.2.14 Observed destination history data (observedDestinationHistoryData)

```
observedDestinationHistoryData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994":historyData;
    CHARACTERIZED BY
    observedDestinationHistoryDataPackage PACKAGE
    BEHAVIOUR
    observedDestinationHistoryDataBehaviour BEHAVIOUR
    DEFINED AS "The observed destination history data object class is used for monitoring
    destination related performance data as defined in CCITT Recommendation E.502."
    ;;
    ATTRIBUTES
    bids,
    outgoingSeizures,
    answeredOutgoingSeizures,
    noCircuitsAvailable
    ;;;
    CONDITIONAL PACKAGES
    callsAffectedByDccHistoryPackage PRESENT IF "the exchange supports this measurement";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 16};
```

7.1.2.15 Exchange performance history data (exchangePerformanceHistoryData)

```
exchangePerformanceHistoryData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994":historyData;
    CHARACTERIZED BY
    exchangePerformanceHistoryDataPackage PACKAGE
    BEHAVIOUR
    exchangePerformanceHistoryDataBehaviour BEHAVIOUR
    DEFINED AS "The exchange performance history data object class is used for monitoring
    exchange related performance data as defined in CCITT Recommendation E.502."
    ;;
    ATTRIBUTES
    incomingSeizures,
    outgoingSeizures,
    transitSeizures,
    terminatingSeizures,
    originatingSeizures,
    internalSeizures,
    numberOfCallsBlockedByLoadShedding
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 17};
```

7.1.2.16 Traffic control history data (trafficControlHistoryData)

```
trafficControlHistoryData MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Recommendation Q.822: 1994":historyData;
    CHARACTERIZED BY
    trafficControlHistoryDataPackage PACKAGE
    BEHAVIOUR
    trafficControlHistoryDataBehaviour BEHAVIOUR
    DEFINED AS "The traffic control history data object class is used for monitoring the
    effectiveness of a traffic control as defined in CCITT Recommendation E.502."
    ;;
    ATTRIBUTES
    callsAffectedByTrafficControl
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 18};
```

7.1.2.17 Simple scanner (simpleScanner)

The simpleScanner object class is defined in ITU-T Recommendation X.738 [18].

The simpleScanner object instance used for the collection of performance data, and their provision in the related historyData object instances shall be synchronized by the resource management.

7.1.3 Traffic management control fragment

7.1.3.1 Traffic control (trafficControl)

The Traffic Control object class is the superclass for all object classes representing traffic controls as defined in CCITT Recommendation E.412 [5]. This superclass is not instantiated.

```
trafficControl MANAGED OBJECT CLASS
    DERIVED FROM "CCITT Recommendation X.721: 1992":top;
    CHARACTERIZED BY
    "CCITT Recommendation M.3100: 1992":objectManagementNotificationsPackage,
    trafficControlPackage PACKAGE
    BEHAVIOUR
    trafficControlBehaviour BEHAVIOUR
    DEFINED AS "Traffic management controls are used to assure efficient utilization of network
    capacity and maintain satisfactory performance in the face of fluctuating traffic demands and
    emergency conditions. Controls may be exercised by specific input from an operations system
    or automatically in response to an internal or external stimulus.
    Manual and automatic traffic controls are modelled in this ETS. In the model, activation and
    deactivation of manual controls is modelled by creation and deletion of the control managed
    object instance. Manual control managed object instances cannot be set to a deactivated
    state, however, it is possible to set parameters of these control object instance to values
    that will not impact the normal traffic volume or routing characteristics, e.g. the
    percentage of calls to be blocked could be set to 0.
    The following descending hierarchy of traffic controls shall be considered in the call
    handling process:
    1.  Destination code control
    2.  TAR to (replace, insert before)
    3.  Cancel to
    4.  Skip
    5.  Selective circuit reservation
    6.  Cancel rerouted overflow
    7.  TAR from (insert after)
    8.  Cancel from"
    ;;
    ATTRIBUTES
    trafficControlId GET,
    tmSurveillance
    INITIAL VALUE I-ETS300637.initialTmSurveillance
    GET
    ;;;
    CONDITIONAL PACKAGES
    creatorPackage PRESENT IF "an instance supports it";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 19};
```

7.1.3.2 Destination code control (destinationCodeControl)

```
destinationCodeControl MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    destinationCodeControlPackage PACKAGE
    BEHAVIOUR
    destinationCodeControlBehaviour BEHAVIOUR
    DEFINED AS "This object class is used both for destination code control functions described
    by single or multiple call characteristics.
    If one of the strength packages (containing either the attribute percentage, or
    continousTimer, or asynchronousTimer, or leakyBucket) is instantiated, this object instance
    alone defines the destination code control function. The traffic control is restricted to the
    single call characteristic application in this case for this instance.
    If the pointerToDccGroup package (attribute assocOwnerDccGroup) is instantiated, then this
    object instance defines only the criteria for the call whether the destination code control
    function has to be applied to it. The strength of the control is described in this case by an
    associated instance of the dccGroup object class. Instances of this object class are
    associated with instances of the dccGroup object class by a (n:1) relationship. The instance
    of the dccGroup object class and all instances of the destinationCodeControl object class
    which reference the dccGroup instance represent one destination code control function. The
    instantiation of the pointerToDccGroup package allows the representation of destination code
    control functions for single as well as for multiple call characteristic application. In this
    case it is also possible to extend/reduce a destination code control from single/multiple to
    multiple/single call characteristic application.
    The following rules are valid independently whether one or two object classes are used to
    represent a destination code control function:
    -   It is not possible to create two or more destinationCodeControl object instance with an
    identical value combination of the key attributes destinationType, destinationCode, and
    originationAspect.
```

```
    -   Within one NE, all instances of this object class shall be instantiated either with a
    full destinationCode or destinationCode with destinationType, but not both. If the
    destinationType is specified in an instance of this object class, it shall be evaluated at
    the same level as destinationCode, followed by the components origin and callingPartyCategory
    of the originationAspect.
    One and only one of the strength attributes (percentage or continousTimer or
    asynchronousTimer or leakyBucket or assocOwnerDccGroup shall be present when this object
    class is instantiated.
    If the assocOwnerDccGroup attribute is specified, the associated dccGroup object instance
    shall exist. Instances of this object class belong to the same group if and only if they have
    the same value of the assocOwnerDccGroup attribute."
    ;;
    ATTRIBUTES
    destinationCode GET,
    originationAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultAllOrigins
    GET-REPLACE,
    treatment GET-REPLACE
    ;;;
    CONDITIONAL PACKAGES
    destinationTypePackage PRESENT IF "the destination type is needed to identify unabigiously
    the destination",
    percentagePackage PRESENT IF "the continousTimerPackage and the asynchronousTimerPackage and
    the leakyBucketPackage and the assocOwnerDccGroupPackage are not present and the NE supports
    it",
    continousTimerPackage PRESENT IF "the percentagePackage and the asynchronousTimerPackage and
    the leakyBucketPackage and the assocOwnerDccGroupPackage are not present and the NE supports
    it",
    asynchronousTimerPackage PRESENT IF "the continousTimerPackage and the percentagePackage and
    the leakyBucketPackage and the assocOwnerDccGroupPackage are not present and the NE supports
    it",
    leakyBucketPackage PRESENT IF "the continousTimerPackage and the asynchronousTimerPackage and
    the percentagePackage and the assocOwnerDccGroupPackage are not present and the NE supports
    it",
    assocOwnerDccGroupPackage PRESENT IF "the continousTimerPackage and the
    asynchronousTimerPackage and the leakyBucketPackage and the percentagePackage are not present
    and the NE supports it";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 20};
```

7.1.3.3 Destination code control group (dccGroup)

```
dccGroup MANAGED OBJECT CLASS
    DERIVED FROM "CCITT Recommendation X.721: 1992":top;
    CHARACTERIZED BY
    "CCITT Recommendation M.3100: 1992":objectManagementNotificationsPackage,
    dccGroupPackage PACKAGE
    BEHAVIOUR
    dccGroupBehaviour BEHAVIOUR
    DEFINED AS "This object class defines the strength of the destination code control when it is
    desired to apply the same strength to a group of destinations. Instances of this object class
    are associated with instances of the destinationCodeControl object class by an (1:n)
    relationship. This object class by itself does not provide the destination code control
    function; the association with the destinationCodeControl object class together represents
    the destination code control function.
    This object class is an option in case of destination code control described by single call
    characteristics. It is mandatory for destination code control described by multiple call
    characteristic.
    One and only one of the strength attributes (percentage or continousTimer or
    asynchronousTimer
    or leakyBucket shall be present when this object class is instantiated."
    ;;
    ATTRIBUTES
    dccGroupId GET
    ;;;
    CONDITIONAL PACKAGES
    percentagePackage PRESENT IF "the continousTimerPackage and the asynchronousTimerPackage and
    the leakyBucketPackage are not present and the NE supports it",
    continousTimerPackage PRESENT IF "the percentagePackage and the asynchronousTimerPackage and
    the leakyBucketPackage are not present and the NE supports it",
    asynchronousTimerPackage PRESENT IF "the continousTimerPackage and the percentagePackage and
    the leakyBucketPackage are not present and the NE supports it",
    leakyBucketPackage PRESENT IF "the continousTimerPackage and the asynchronousTimerPackage and
    the percentagePackage are not present and the NE supports it";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 21};
```

7.1.3.4 Cancel to (cancelTo)

```
cancelTo MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    cancelToPackage PACKAGE
    BEHAVIOUR
    cancelToBehaviour BEHAVIOUR
    DEFINED AS "This traffic control object class covers both cancellation of direct routing and
    cancellation of alternative routing to.
    The cancellation of direct routing control blocks the amount of direct routed traffic
    accessing an outgoing/bothway circuit sub-group. It is defined in CCITT Recommendation E.412,
    subclause 3.1.2.
    The cancellation of alternative routing to control is activated on an outgoing/bothway
    circuit sub group and prohibits overflow traffic from accessing the controlled circuit sub-
    group. It is defined in CCITT rec. E.412, subclause 3.2.1.
    The cancellation of direct routing and the cancellation of alternative routing to control
    allow fine tuning the amount of traffic to be cancelled by specifying a call volume variable
    that allows specification of the percentage of calls to be cancelled. The distinction between
    these two controls is made by the assignment of the appropriate routing aspect to the
    routingAspect attribute.
    The cancel to control applies to circuit sub-groups (modelled as 'ITU-T Recommendation M.3100
    (1996)':circuitEndPointSubgroup resp. 'prI-ETS 300 293 (1996)':xtpsg).
    The circuitEndPointSubgroup attribute is the key with the highest priority, followed by in
    the following order the components origin, callingPartyCategory, and additionalAspects of the
    originationAspect attribute, the destinationAspect attribute and as the least the
    routingAspect attribute. The more specific value has the priority."
    ;;
    ATTRIBUTES
    circuitEndPointSubgroup GET,
    percentage GET-REPLACE,
    originationAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultAllOrigins
    GET-REPLACE,
    destinationAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultDestinationAspects
    GET-REPLACE,
    routingAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultRoutingAspects
    GET-REPLACE,
    treatment GET-REPLACE
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 22};
```

7.1.3.5 Cancellation of routing from (cancelFrom)

```
cancelFrom MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    cancelFromPackage PACKAGE
    BEHAVIOUR
    cancelFromBehaviour BEHAVIOUR
    DEFINED AS "This control is activated on an outgoing/bothway circuit sub-group and prohibits
    traffic from overflowing to the next-in-chain circuit sub-groups. The control will suspend
    all next-in-chain circuit sub-groups for direct or alternate overflow traffic. It is defined
    in CCITT Recommendation E.412, subclause 3.2.1.
    The cancellation of routing from control allows fine tuning the amount of overflow traffic
    to be cancelled by specifying a call volume variable that allows specification of the
    percentage of calls to be cancelled.
    The control applies to circuit sub-groups (modelled as 'ITU-T Recommendation M.3100
    (1996)':circuitEndPointSubgroup resp. 'prI-ETS 300 293 (1996)':xtpsg).
    The circuitEndPointSubgroup attribute is the key with the highest priority, followed by in
    the following order the components origin, callingPartyCategory, and additionalAspects of the
    originationAspect attribute, the destinationAspect attribute and as the least the
    routingAspect attribute. The more specific value has the priority."
    ;;
    ATTRIBUTES
    circuitEndPointSubgroup GET,
    percentage GET-REPLACE,
    originationAspect
    REPLACE-WITH-DEFAULT
```

```
    DEFAULT VALUE I-ETS300637.defaultAllOrigins
    GET-REPLACE,
    destinationAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultDestinationAspects
    GET-REPLACE,
    routingAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultRoutingAspects
    GET-REPLACE,
    treatment GET-REPLACE
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 23};
```

7.1.3.6 Skip control (skip)

```
skip MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    skipPackage PACKAGE
    BEHAVIOUR
    skipBehaviour BEHAVIOUR
    DEFINED AS "This control is activated on an outgoing/bothway circuit sub-group and is used to
    force traffic to the next in-chain circuit sub-group in the routing table. The skip control
    can effect both direct and alternate routed traffic. It is defined in CCITT Recommendation
    E.412, subclause 3.2.2.
    The skip control allows fine tuning the amount of traffic to be forced to skip the controlled
    circuit sub-group ('ITU-T Recommendation M.3100 (1996)':circuitEndPointSubgroup resp. 'prI-
    ETS 300 293 (1996)':xtpsg) by specifying a call volume variable that
    allows specification of the percentage of calls to be forced to skip bidding for the
    controlled circuitEndPointSubgroup resp. xtpsg.
    The control applies to circuit sub-groups (modelled as circuitEndPointSubgroup resp. xtpsg).
    The circuitEndPointSubgroup attribute is the key with the highest priority, followed by in
    the following order the components origin, callingPartyCategory, and additionalAspects of the
    originationAspect attribute, the destinationAspect attribute and as the least the
    routingAspect attribute. The more specific value has the priority."
    ;;
    ATTRIBUTES
    circuitEndPointSubgroup GET,
    percentage GET-REPLACE,
    originationAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultAllOrigins
    GET-REPLACE,
    destinationAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultDestinationAspects
    GET-REPLACE,
    routingAspect
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultRoutingAspects
    GET-REPLACE
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 24};
```

7.1.3.7 Temporary alternative routing to a circuit sub-group (tarTo)

```
tarTo MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    tarAttributesPackage,
    tarToPackage PACKAGE
    BEHAVIOUR
    tarToBehaviour BEHAVIOUR
    DEFINED AS "Temporary alternative routing to a circuit sub-group is an expansive control
    which temporarily increases the number of routing possibilities to controlled destinations.
    One or several circuit sub-groups, which are not normally available in the normal routing
    plan are made available in chain before the reference circuit sub-group to reduce traffic
    overflowing resp. directly offered to the reference circuit sub-group. The temporary
    alternative routed circuit sub-groups shall terminate on an exchange that has the capability
    of reaching the destination. The objects to which the temporary alternative routing is
    applied can be either destinations and/or circuit sub-groups. It is defined in CCITT
```

```
    Recommendation E.412, subclause 3.2.3.
    The temporary alternative routing control is activated by input from an OS. When this
    control is active, in all routing tables where the circuitEndPointSubgroup resp. xtpsg is
    present it is replaced by the circuitEndPointSubgroups indicated in the
    newCircuitEndPointSubgroups attribute resp. they are made available in chain before it, and
    the TAR indication is provided for the signalling system #7.
    The effect of this control can be limited to destinations which are hard to reach by setting
    the destinationAspect attribute accordingly or to the destination which is indicated in the
    destinationCode attribute. If this attribute is empty string, the control is valid for all
    destinations regarding the limitations given by the destinationAspect attribute.
    Within one NE, all instances of this object class shall be instantiated either with a full
    destinationCode or destinationCode with destinationType, but not both. If the destinationType
    is specified in an instance of this object class, it shall be evaluated at the same level as
    destinationCode.
    The circuitEndPointSubgroup attribute is the key with the highest priority, followed by the
    destinationType
    attribute and the destinationCode attribute, and in the following order the components
    origin, callingPartyCategory, and additionalAspects of the originationAspect attribute, the
    destinationAspect attribute and as the least the routingAspect attribute. The more specific
    value has the priority."
    ;;
    ATTRIBUTES
    returnAction GET
    ;;;
    CONDITIONAL PACKAGES
    destinationTypePackage PRESENT IF "the destination type is needed to identify unabigiously
    the destination";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 25};
```

7.1.3.8 Temporary alternative routing from a circuit sub-group (tarFrom)

```
tarFrom MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    tarAttributesPackage,
    tarFromPackage PACKAGE
    BEHAVIOUR
    tarFromBehaviour BEHAVIOUR
    DEFINED AS "Temporary alternative routing from a circuit sub-group is an expansive control
    which temporarily increases the number of routing possibilities to controlled destinations.
    One or several circuit sub-groups, which are not normally available in the normal routing
    plan are made available as overflow possibility from the reference circuit sub-group. The
    temporary alternative routed circuit sub-groups shall terminate on an exchange that has the
    capability of reaching the destination. The objects to which the temporary alternative
    routing is applied can be either destinations and/or circuit sub-groups. It is defined in
    CCITT Recommendation E.412, subclause 3.2.3.
    The temporary alternative routing control is activated by input from an OS. When this
    control is active, in all routing tables where the circuitEndPointSubgroup resp. xtpsg is
    present it is followed by the circuitEndPointSubgroups indicated in the
    newCircuitEndPointSubgroups attribute, and the TAR indication is provided for the signalling
    system #7.
    The effect of this control can be limited to destinations which are hard to reach by setting
    the destinationAspect attribute accordingly or to the destination which is indicated in the
    destinationCode attribute. If this attribute is empty string, the control is valid for all
    destinations regarding the limitations given by the destinationAspect attribute.
    Within one NE, all instances of this object class shall be instantiated either with a full
    destinationCode or destinationCode with destinationType, but not both. If the destinationType
    is specified in an instance of this object class, it shall be evaluated at the same level as
    destinationCode.
    The circuitEndPointSubgroup attribute is the key with the highest priority, followed by the
destinationType
    attribute and the destinationCode attribute, and in the following order the components
    origin, callingPartyCategory, and additionalAspects of the originationAspect attribute, the
    destinationAspect attribute and as the least the routingAspect attribute. The more specific
    value has the priority."
    ;;
    ATTRIBUTES
    returnAction
    PERMITTED VALUES
    I-ETS300637.PermittedTarFromReturnAction
    GET
    ;;;
    CONDITIONAL PACKAGES
    destinationTypePackage PRESENT IF "the destination type is needed to identify unabigiously
    the destination";
REGISTERED AS {I-ETS300637.otmManagedObjectClass 26};
```

7.1.3.9 Cancel rerouted overflow (cancelRerouted)

```
cancelRerouted MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    cancelReroutedPackage PACKAGE
    BEHAVIOUR
    cancelReroutedBehaviour BEHAVIOUR
    DEFINED AS "This control prevents additional rerouting or alternate routing of a rerouted
    call. Rerouted calls are not allowed to overflow the circuit sub-group to which the cancel
    rerouted overflow control is applied, while normal overflow traffic is not affected. It is
    defined in CCITT Recommendation E.412, subclause 3.2.4.
    The control applies to circuit sub-groups (modelled as 'ITU-T Recommendation M.3100
    (1996)':circuitEndPointSubgroup resp. 'prI-ETS 300 293 (1996)':xtpsg). The control may be
    activated manually by an OS."
    ;;
    ATTRIBUTES
    circuitEndPointSubgroup GET,
    treatment GET-REPLACE
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 27};
```

7.1.3.10 Selective Circuit Reservation Control (scr)

```
scr MANAGED OBJECT CLASS
    DERIVED FROM trafficControl;
    CHARACTERIZED BY
    "CCITT Recommendation M.3100: 1992":stateChangeNotificationPackage,
    scrPackage PACKAGE
    BEHAVIOUR
    scrBehaviour BEHAVIOUR
    DEFINED AS "The selective circuit reservation control enables an exchange to automatically
    give preference to specific traffic attributes over others (e.g. direct routed calls over
    alternate routed calls) at the moment when circuit congestion is present or imminent. It can
    be provided with one or two thresholds, with later providing greater selectivity. The
    activation threshold defines how many circuits or how much circuit capacity shall be kept
    idle for those traffic attributes given preferred access to the circuit subgroup. When the
    number of idle circuits or the idle capacity in the given circuit subgroup is less or equal
    to the reservation threshold, the NE shall check the specified control response
    (level(n)ResponseCategory) to determine if calls are to be controlled. The skip response
    (dispositionOfCalls = skip) allows a call to alternate-route to the next circuit subgroup in
    the routing pattern (if any), while the cancel response (dispositionOfCalls = cancel) blocks
    the call. The control is defined in CCITT Recommendation E.412, 4.2.
    The selective circuit reservation control has the following operating variables:
-   reservation thresholds
-   control response
-   control action option
    The reservation thresholds and the related control response are determined by the
    activationThresholds attribute and by the associated scrAffectedTraffic object instance. The
    control action option for processing of calls denied access to the circuit sub-groups is
    given in the dispositionOfCalls attribute.
    When the number of circuits or the idle capacity in the circuit sub-group is less than or
    equal to the reservation threshold, the exchange shall check the indicated scrAffectedTraffic
    object instance to determine if calls shall be controlled. If the dispositionOfCalls
    attribute is set to TRUE and the call is to be controlled, the call shall be blocked and
    treated as indicated in the treatment attribute. If the dispositionOfCalls attribute is set
    to treatment and the call has no preferred access, the call shall be blocked and treated as
    indicated in the treatment attribute. If the dispositionOfCalls attribute is set to NULL and
    the call has no preferred access, the call shall be alternate routed to the next circuit sub-
    group in the routing pattern (if any). In this case, the value of the treatment attribute is
    not to be considered.
    The defined levels in the activationThresholds attribute and the reference given in the
    assocScrAffectedTrafic attribute to a single or multi threshold instance shall correspond.
    The scrAffectedTraffic object instance to be associated shall be present before the scr
    object class can be instantiated.
    A value change of the autoActivated attribute shall not be reported by the
    attributeValueChange notification."
    ;;
    ATTRIBUTES
    circuitEndPointSubgroup GET,
    dispositionOfCalls GET-REPLACE,
    treatment GET-REPLACE,
    activationThresholds GET-REPLACE,
    assocScrAffectedTraffic GET-REPLACE,
    autoActivated
```

```
    INITIAL VALUE DERIVATION RULE
        autoActivatedInitBehaviour BEHAVIOUR
        DEFINED AS  "If the number of circuits or the idle circuit capacity of the referenced
        circuitEndPointSubgroup resp. xtpsg is less or equal than the reservation threshold
        described by the level1 component of the attribute activationThresholds, then the value
        of this attribute is TRUE. Otherwise the value of this attribute is FALSE. The attribute
        value is verified by the NE if provided in the create request.";
    GET,
    "CCITT Recommendation X.721: 1992":administrativeState
    REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultAdministrativeState
    PERMITTED VALUES I-ETS300637.PermittedStates
    GET-REPLACE
    ;;
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 28};
```

7.1.3.11 Selective circuit reservation affected traffic (scrAffectedTraffic)

```
scrAffectedTraffic MANAGED OBJECT CLASS
    DERIVED FROM "CCITT Recommendation X.721: 1992":top;
    CHARACTERIZED BY
    "CCITT Recommendation M.3100: 1992":objectManagementNotificationsPackage,
    scrAffectedTrafficPackage PACKAGE
    BEHAVIOUR
    scrAffectedTrafficBehaviour BEHAVIOUR
    DEFINED AS "The selective circuit reservation affected traffic object class represents the
    control response category for the selective circuit reservation.
    It determines per individual destination aspect and routing aspect correlated to origination
    aspects the quantity of traffic to be controlled.
    If a level 2 activation threshold is specified, both components level1 and level2 shall be
    specified using the same unit (number or percentage).
    In the level1ResponseCategories and level2ResponseCategories attributes (if present) the key
    with the highest priority is in the following order the components origin,
    callingPartyCategory, and additionalAspects of the originationAspect value followed by the
    additionalTrafficCriteria value, the destinationAspect value and as the least the
    routingAspect value. The more specific value has the priority."
    ;;
    ATTRIBUTES
    scrAffectedTrafficId GET,
    level1ResponseCategories GET-REPLACE ADD-REMOVE
    ;;;
    CONDITIONAL PACKAGES
    level2ResponseCategoriesPackage PRESENT IF "an instance supports multi threshold selective
    circuit reservation"
    ;
REGISTERED AS {I-ETS300637.otmManagedObjectClass 29};
```

7.2 Name bindings

The historyData-currentData name binding is defined in ITU-T Recommendation Q.822 [9]. It is used for the currentData and historyData subclasses defined in this I-ETS.

```
congestionLevelIndication-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS congestionLevelIndication AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE congestionLevelIndicationId;
REGISTERED AS {I-ETS300637.otmNameBinding 1};

observedDestination-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS observedDestination AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE observedDestinationId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 2};

htrDestination-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS htrDestination AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE htrDestinationId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE;
REGISTERED AS {I-ETS300637.otmNameBinding 3};

autoHtrDestination-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS htrDestination AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE htrDestinationId;
    BEHAVIOUR
    autoHtrDestinationBehaviour BEHAVIOUR
    DEFINED AS "This name binding is used when an instance of htrDestination or its subclasses is
    created by the agent after determining by a local means that a destination is hard-to-reach."
    ;;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE;
REGISTERED AS {I-ETS300637.otmNameBinding 4};

circuitEndPointSubgroupCurrentData-xtpsg NAME BINDING
    SUBORDINATE OBJECT CLASS circuitEndPointSubgroupCurrentData AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "prI-ETS 300 293 (1996)":xtpsg AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739:1993":scannerId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 5};

circuitEndPointSubgroupCurrentData-circuitEndPointSubgroup NAME BINDING
    SUBORDINATE OBJECT CLASS circuitEndPointSubgroupCurrentData AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "ITU-T Recommendation M.3100: 1996":circuitEndPointSubgroup AND
        SUBCLASSES;
    WITH ATTRIBUTE scannerId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 6};

It is to be regarded that there will be no co-existence of xtpsg and circuitEndPoitSubgroup in an
NE.

observedDestinationCurrentData-observedDestination NAME BINDING
    SUBORDINATE OBJECT CLASS observedDestinationCurrentData AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS observedDestination AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739:1993":scannerId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 7};

exchangePerformanceCurrentData-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS exchangePerformanceCurrentData AND SUBCLASSES;
    NAMED BY
```

```
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739:1993":scannerId;
    CREATE WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 8};

trafficControlCurrentData-trafficControl NAME BINDING
    SUBORDINATE OBJECT CLASS trafficControlCurrentData AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS trafficControl AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739:1993":scannerId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 9};

dccGroup-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS dccGroup AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE dccGroupId;
    BEHAVIOUR
    dccGroup-managedElementBehaviour BEHAVIOUR
    DEFINED AS "Delete operations shall fail if one or more instances of destinationCodeControl
    point to this object instance."
    ;;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE;
REGISTERED AS {I-ETS300637.otmNameBinding 10};

simpleScanner-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS "ITU-T Recommendation X.739:1993":simpleScanner AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE "ITU-T Recommendation X.739:1993":scannerId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 11};

trafficControl-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS trafficControl AND SUBCLASSES;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE trafficControlId;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE DELETES-CONTAINED-OBJECTS;
REGISTERED AS {I-ETS300637.otmNameBinding 12};

scrAffectedTraffic-managedElement NAME BINDING
    SUBORDINATE OBJECT CLASS scrAffectedTraffic;
    NAMED BY
    SUPERIOR OBJECT CLASS "CCITT Recommendation M.3100: 1992":managedElement AND SUBCLASSES;
    WITH ATTRIBUTE scrAffectedTrafficId;
    BEHAVIOUR
    scrAffectedTraffic-managedElementBehaviour BEHAVIOUR
    DEFINED AS "Delete operations shall fail if one or more instances of scr point to this object
    instance."
    ;;
    CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
    DELETE;
REGISTERED AS {I-ETS300637.otmNameBinding 13};
```

7.3 Definition of packages

```
answeredIncomingSeizuresHistoryPackage PACKAGE
ATTRIBUTES
    answeredIncomingSeizures;
REGISTERED AS {I-ETS300637.otmPackage 1};

answeredIncomingSeizuresPackage PACKAGE
ATTRIBUTES
    answeredIncomingSeizures
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.otmPackage 2};

assocOwnerDccGroupPackage PACKAGE
    ATTRIBUTES
    assocOwnerDccGroup GET-REPLACE
    ;
REGISTERED AS {I-ETS300637.otmPackage 3};

asynchronousTimerPackage PACKAGE
    ATTRIBUTES
    asynchronousTimer GET-REPLACE
    ;
REGISTERED AS {I-ETS300637.otmPackage 4};

callsAffectedByDccHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedByDcc;
REGISTERED AS {I-ETS300637.otmPackage 5};

callsAffectedByDccPackage PACKAGE
ATTRIBUTES
    callsAffectedByDcc
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.omPackage 6};

continousTimerPackage PACKAGE
    ATTRIBUTES
    continousTimer GET-REPLACE
    ;
REGISTERED AS {I-ETS300637.otmPackage 7};

leakyBucketPackage PACKAGE
    ATTRIBUTES
    leakyBucket GET-REPLACE
    ;
REGISTERED AS {I-ETS300637.otmPackage 8};

level2ResponseCategoriesPackage PACKAGE
ATTRIBUTES
    level2ResponseCategories GET-REPLACE ADD-REMOVE;
REGISTERED AS {I-ETS300637.otmPackage 9};

callsAffectedByCancelFromHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedByCancelFrom;
REGISTERED AS {I-ETS300637.otmPackage 10};

callsAffectedByCancelFromPackage PACKAGE
ATTRIBUTES
    callsAffectedByCancelFrom
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.otmPackage 11};

callsAffectedByCancelReroutedHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedByCancelRerouted;
REGISTERED AS {I-ETS300637.otmPackage 12};

callsAffectedByCancelReroutedPackage PACKAGE
ATTRIBUTES
    callsAffectedByCancelRerouted
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.otmPackage 13};

callsAffectedByCancelToHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedByCancelTo;
REGISTERED AS {I-ETS300637.otmPackage 14};

callsAffectedByCancelToPackage PACKAGE
ATTRIBUTES
    callsAffectedByCancelTo
    INITIAL VALUE I-ETS300637.initialCount;
```

```
REGISTERED AS {I-ETS300637.otmPackage 15};

callsAffectedByScrHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedByScr;
REGISTERED AS {I-ETS300637.otmPackage 16};

callsAffectedByScrPackage PACKAGE
ATTRIBUTES
    callsAffectedByScr
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.otmPackage 17};

callsAffectedBySkipHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedBySkip;
REGISTERED AS {I-ETS300637.otmPackage 18};

callsAffectedBySkipPackage PACKAGE
ATTRIBUTES
    callsAffectedBySkip
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.otmPackage 19};

callsAffectedByTarFromHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedByTarFrom;
REGISTERED AS {I-ETS300637.otmPackage 20};

callsAffectedByTarFromPackage PACKAGE
ATTRIBUTES
    callsAffectedByTarFrom
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.otmPackage 21};

callsAffectedByTarToHistoryPackage PACKAGE
ATTRIBUTES
    callsAffectedByTarTo;
REGISTERED AS {I-ETS300637.otmPackage 22};

callsAffectedByTarToPackage PACKAGE
ATTRIBUTES
    callsAffectedByTarTo
    INITIAL VALUE I-ETS300637.initialCount;
REGISTERED AS {I-ETS300637.otmPackage 23};

creatorPackage PACKAGE
ATTRIBUTES
    creatorIdentity GET;
REGISTERED AS {I-ETS300637.otmPackage 24};

destinationTypePackage PACKAGE
    ATTRIBUTES
    destinationType GET
    ;
REGISTERED AS {I-ETS300637.otmPackage 25};

percentagePackage PACKAGE
    ATTRIBUTES
    percentage GET-REPLACE
    ;
REGISTERED AS {I-ETS300637.otmPackage 26};

tarAttributesPackage PACKAGE
    ATTRIBUTES
    circuitEndPointSubgroup GET,
    newCircuitEndPointSubgroups GET-REPLACE,
    percentage GET-REPLACE,
    destinationAspect REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultDestinationAspects GET-REPLACE,
    routingAspect REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultRoutingAspects GET-REPLACE,
    originationAspect REPLACE-WITH-DEFAULT
    DEFAULT VALUE I-ETS300637.defaultAllOrigins GET-REPLACE,
    destinationCode
    DEFAULT VALUE I-ETS300637.defaultAllDestinationCodes GET;
REGISTERED AS {I-ETS300637.otmPackage 27};

circuitEndPointSubgroupsPackage PACKAGE
ATTRIBUTES
    circuitEndPointSubgroups GET-REPLACE ADD-REMOVE;
REGISTERED AS {I-ETS300637.otmPackage 28};
```

7.4 Definition of attributes

7.4.1 General traffic management attributes

```
activationThresholds ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.ActivationThresholds;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    activationThresholdsBehaviour BEHAVIOUR
    DEFINED AS "It contains in a sequence the number of circuits or the circuit capacity that
    shall be reserved for preferred traffic by controlling the calls without preferred access
    indicated in the associated scrAffectedTraffic object instance for reservation threshold 1
    and 2."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 1};

assocOwnerDccGroup ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.AssocOwnerDccGroup;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    assocOwnerDccGroupBehaviour BEHAVIOUR
    DEFINED AS "This attribute points to the associated dccGroup object instance."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 2};

assocScrAffectedTraffic ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.AssocScrAffectedTraffic;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    assocScrAffectedTrafficBehaviour BEHAVIOUR
    DEFINED AS "This attribute points to the associated scrAffectedTraffic object instance for
    reservation threshold 1 and 2."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 3};

asynchronousTimer ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.Timer;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    asynchronousTimerBehaviour BEHAVIOUR
    DEFINED AS "It identifies the asynchronous timer specifying a time. the timer is set when
    the call attempt is allowed and no further call attempts are allowed until the timer expires.
    It is recommended only to use one the values of one CHOICE alternative scale1 or scale2 of
    the ASN.1 type Timer for restricting the call rate of the traffic within one network element.
    Besides the blockAllCalls component the component scale1 or scale2 needs to be supported."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 4};

autoActivated ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.TrueFalse;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    autoActivatedBehaviour BEHAVIOUR
    DEFINED AS "This attribute indicates whether a trigger for this control is outstanding. When
    this attribute has TRUE value and the administrativeState is unlocked, the control is active.
    The control is deactivated for all other combinations of the values of autoActivated and
    administrativeState. The value of this attribute is maintained by the NE as defined in the
    autoActivatedInitBehaviour."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 5};

congestionLevel ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.CongestionLevel;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    congestionLevelBehaviour BEHAVIOUR
    DEFINED AS "It is an indicator for the present congestion situation in an exchange and an
    indicator for the degree of traffic management actions to be taken. It is expressed by the
    following machine congestion levels (MCL):
    -   MCL0: No exchange congestion
    The exchange works well, no traffic management action needs to be done with respect to the
    machine load.
    -   MCL1: Moderate exchange congestion, the exchange keeps working. Some calls may get
    rejected if no traffic management action is taken
    This is a warning, the exchange may have activated internal traffic control actions. No
    additional traffic should be directed to this exchange.
    -   MCL2: Serious congestion level, the exchange is no more able to handle all offered
    traffic
```

```
    More severe traffic management actions are to be performed to reduce the exchange load.
    -   MCL3: Complete inability of the exchange to process calls
    With high probability, the exchange is not able to handle any calls. No further calls should
    be directed to this exchange."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 6};

continousTimer ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.ContinousTimer;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    continousTimerBehaviour BEHAVIOUR
    DEFINED AS "It identifies continous timer which includes the number of calls and a time. Once
    the number of call attempts has been handled within a time cycle, no further are allowed
    until the timer expires (e.g. 5 calls in 60 seconds). It is recommended only to use one the
    values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for restricting the
    call rate of the traffic within one network element. Besides the blockAllCalls component the
    component scale1 or scale2 needs to be supported."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 7};

creatorIdentity ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.CreatorIdentity;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    creatorIdentityBehaviour BEHAVIOUR
    DEFINED AS "It gives the creator identity (resource or management operation)."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 8};

destinationAspect ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.DestinationAspect;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    destinationAspectBehaviour BEHAVIOUR
    DEFINED AS "It identifies the destination aspect for which this control is valid. If it has
    allDestinationAspects value, it is valid for all aspects."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 9};

destinationCode ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.DestinationCode;
    MATCHES FOR EQUALITY, SUBSTRINGS, ORDERING;
    BEHAVIOUR
    destinationCodeBehaviour BEHAVIOUR
    DEFINED AS "It identifies the country code, or/and area code, or/and exchange code, or/and
    other location number to which the object instance applies."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 10};

destinationType ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.DestinationType;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    destinationTypeBehaviour BEHAVIOUR
    DEFINED AS "It indicates either the nature of address of the destination code referred by an
    instance of this object class in a seven bit string according to CCITT Recommendation Q.763
    or the type of the destination as an enumerated value. If it has NULL value, it is not to be
    considered."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 11};


dispositionOfCalls ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.DispositionOfCall;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    dispositionOfCallsBehaviour BEHAVIOUR
    DEFINED AS "It indicates whether controlled calls will be cancelled (if the value is
    treatment) or will skip (if the value is NULL) to the next available circuit sub-group."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 12};

leakyBucket ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.LeakyBucket;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    leakyBucketBehaviour BEHAVIOUR
    DEFINED AS "It identifies the leaky bucket which includes the bucket size (maximum allowed
    counter value) and the decrement per time unit. If the counter exceeds the defined maximum
    size, the call attempt is is canceled. If the counter is less oe equal than the maximum size,
```

```
    the call attempt is allowed and the counter is incremented. the counter is decremented at
    defined intervals making it possible for new calls to be accepted. It is recommended only to
    use one the values of one CHOICE alternative scale1 or scale2 of the ASN.1 type Timer for
    restricting the call rate of the traffic within one network element. Besides the
    blockAllCalls component the component scale1 or scale2 needs to be supported. The NE will
    provide the bucket size if this element is not provided by the OS."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 13};

level1ResponseCategories ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.ResponseCategories;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    responseCategoriesBehaviour BEHAVIOUR
    DEFINED AS "It defines in a set per individual destination aspect and routing aspect
    correlated to origination aspects the quantity of traffic to be controlled. At least one of
    the optional values shall be present. The additionalTrafficCriteria value could e.g. point to
    a preferred destination. It is recommended only to use the values of one CHOICE alternative
    of the ASN.1 type Percentage within one NE. The specified percentage of calls with a
    correlated characteristic shall be affected by the control."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 14};

level2ResponseCategories ATTRIBUTE
    DERIVED FROM level1ResponseCategories;
REGISTERED AS {I-ETS300637.otmAttribute 15};

newCircuitEndPointSubgroups ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.CircuitEndPointSubgroupList;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    newCircuitEndPointSubgroupsBehaviour BEHAVIOUR
    DEFINED AS "It lists the 'ITU-T Recommendation M.3100 (1996)':circuitEndPointSubgroups resp.
    'prI-ETS 300 293 (1996)':xtpsgs to be introduced into the routing
    tables in the sequence indicated in the attribute value."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 16};

originationAspect ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.OriginationAspect;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    originationAspectBehaviour BEHAVIOUR
    DEFINED AS "It identifies the origin and the calling parties' category according CCITT
    Recommendation Q.763 for which this control is valid. If this attribute has empty sequence
    value, the traffic control is valid for all origination aspects.
    The definition of the defined origin values for the origin component of this attribute is
    according to CCITT Rec. E.502 subclause 4.1.1.
    customerOriginated:
    Traffic A+D of figure 4/E.502
    transit:
    Traffic L of figure 4/E.502
    inboundTerminating:
    Traffic I+J+K of figure 4/E.502"
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 17};

percentage ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.Percentage;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    percentageBehaviour BEHAVIOUR
    DEFINED AS "It identifies the percentage of calls affected by the control as a result of
    control activation. Depending on the used control, the specified percentage of calls is
    blocked, skips, or will be temporarily alternate routed. It is recommended only to use
    the values of one CHOICE alternative of the ASN.1 type Percentage for the specification of
    the percentage of calls affected by the control within one network element."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 18};

returnAction ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.ReturnAction;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    returnActionBehaviour BEHAVIOUR
    DEFINED AS "It gives the disposition how the traffic overflowing from
    newCircuitEndPointSubgroups shall be treated. Three possibilities exist:
    Setting returnAction to return inserts the newCircuitEndPointSubgroups before the controlled
    circuitEndPointSubgroup.
    Setting returnAction to skip replaces the controlled circuitEndPointSubgroup with the
    newCircuitEndPointSubgroups.
    Setting returnAction to cancelTreatment replaces the controlled circuitEndPointSubgroup and
    the remaining
    circuit sub-groups in the routing plan with the newCircuitEndPointSubgroups."
    ;;
```

```
REGISTERED AS {I-ETS300637.otmAttribute 19};

routingAspect ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.RoutingAspect;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    routingAspectBehaviour BEHAVIOUR
    DEFINED AS "It identifies the routing aspect for which this control is valid. If it has null
    value, it is valid for all aspects."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 20};

tmSurveillance ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.trueFalse;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    tmSurveillanceBehaviour BEHAVIOUR
    DEFINED AS "It identifies whether the object instance is being monitored for traffic
    management purposes. If this attribute is set to TRUE, the object instance contains an
    instance of the corresponding subclass of current data."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 21};

treatment ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.Treatment;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    pointerAndNameBehaviour,
    treatmentBehaviour BEHAVIOUR
    DEFINED AS "It indicates how the traffic flow impacted by the traffic management control is
    treated (e.g. announcement, congestion tone, ...) in the case of cancellation."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 22};

circuitEndPointSubgroup ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.InstanceOrNamePointer;
    MATCHES FOR EQUALITY, SUBSTRINGS, ORDERING;
    BEHAVIOUR
    pointerAndNameBehaviour,
    circuitEndPointSubgroupBehaviour BEHAVIOUR
    DEFINED AS "It points to a circuit sub-group ('ITU-T Recommendation M.3100
    (1996)':circuitEndPointSubgroup resp. 'prI-ETS 300 293 (1996)': xtpsg) for which this
    object instance applies. The substrings and ordering matching rules apply only if the value
    of this attribute is specified as nameType."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 23};

circuitEndPointSubgroups ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.CircuitEndPointSubgroups;
    BEHAVIOUR
    circuitEndPointSubgroupsBehaviour BEHAVIOUR
    DEFINED AS "It points to the circuit sub-groups ('ITU-T Recommendation M.3100
    (1996)':circuitEndPointSubgroup resp. 'prI-ETS 300 293 (1996)':xtpsg) for which
    this object instance applies."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 24};
```

7.4.2 Naming attributes

```
trafficManagementObjectRdn ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.NameType;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    trafficManagementObjectRdnBehaviour BEHAVIOUR
    DEFINED AS "It gives the relative distinguished name. The semantics of the relative
    distinguished name attribute type are specified in CCITT Recommendation X.720 (1992)."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 25};

congestionLevelIndicationId ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.NameType;
    MATCHES FOR EQUALITY;
    BEHAVIOUR
    congestionLevelIndicationIdBehaviour BEHAVIOUR
    DEFINED AS "It gives the RDN."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 26};

dccGroupId ATTRIBUTE
    DERIVED FROM trafficManagementObjectRdn;
REGISTERED AS {I-ETS300637.otmAttribute 27};

htrDestinationId ATTRIBUTE
    DERIVED FROM trafficManagementObjectRdn;
REGISTERED AS {I-ETS300637.otmAttribute 28};

observedDestinationId ATTRIBUTE
    DERIVED FROM trafficManagementObjectRdn;
REGISTERED AS {I-ETS300637.otmAttribute 29};

scrAffectedTrafficId ATTRIBUTE
    DERIVED FROM trafficManagementObjectRdn;
REGISTERED AS {I-ETS300637.otmAttribute 30};

trafficControlId ATTRIBUTE
    DERIVED FROM trafficManagementObjectRdn;
REGISTERED AS {I-ETS300637.otmAttribute 31};
```

7.4.3 Performance monitoring attributes

```
answeredIncomingSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
answeredIncomingSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of incoming seizures where an answer signal was transmitted
    back to the preceding exchange."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 32};

answeredOutgoingSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
answeredOutgoingSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of outgoing seizures where an answer signal was received."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 33};

bids ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
bidsBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of outgoing bids."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 34};

callsAffectedByCancelFrom ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByCancelFromBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by cancel from."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 35};
```

```
callsAffectedByCancelRerouted ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByCancelReroutedBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by cancel rerouted."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 36};

callsAffectedByCancelTo ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByCancelToBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by cancel to."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 37};

callsAffectedByDcc ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByDccBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls to a destination affected by DCC."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 38};

callsAffectedByScr ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByScrBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by SCR."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 39};

callsAffectedBySkip ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedBySkipBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by skip."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 40};

callsAffectedByTarFrom ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByTarFromBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by TAR from."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 41};

callsAffectedByTarTo ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByTarToBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by TAR to."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 42};

callsAffectedByTrafficControl ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
callsAffectedByTrafficControlBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls affected by the observed trafficControl object
    instance."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 43};

incomingSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
incomingSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of incoming seizures."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 44};

incomingTrafficUsage ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.Integer;
    BEHAVIOUR
    incomingTrafficUsageBehaviour BEHAVIOUR
    DEFINED AS "It gives the incoming carried traffic in erlang seconds."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 45};
```

```
internalSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
internalSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of internal seizures."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 46};

noCircuitsAvailable ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
    noCircuitsAvailableBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of outgoing bids resulting in an unsuccessful call due to the
    fact that no free circuit leading to this destination was available."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 47};

numberOfAvailableCircuits ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":gauge;
    BEHAVIOUR
    numberOfAvailableCircuitsBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of circuits available for traffic, i.e. with
    administrativeState = unlocked, operationalState = enabled. Whether this value is provided as
    snapshot or as mean value is left to the implementation, as due to the normally low frequency
    of changes of the administrativeState as well as of the operationalState both methods are
    equivalent."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 48};

numberOfCallsBlockedByLoadShedding ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
numberOfCallsBlockedByLoadSheddingBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of calls not possible to be handled due to the application of
    an exchange internal overload protection mechanism."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 49};

originatingSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
originatingSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of originating seizures."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 50};

outgoingBids ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
outgoingBidsBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of outgoing bids."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 51};

outgoingSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
outgoingSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of outgoing seizures."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 52};

outgoingTrafficUsage ATTRIBUTE
    WITH ATTRIBUTE SYNTAX I-ETS300637.Integer;
    BEHAVIOUR
    outgoingTrafficUsageBehaviour BEHAVIOUR
    DEFINED AS "It gives the outgoing carried traffic in erlang seconds."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 53};

overflow ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
    overflowBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of bids overflowing from this circuit sub-group. This count
    shall not include calls affected by cancel rerouted overflow, tar from, and cancel from."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 54};
```

```
terminatingSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
terminatingSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of terminating seizures."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 55};

transitSeizures ATTRIBUTE
    DERIVED FROM "CCITT Recommendation X.721: 1992":counter;
    BEHAVIOUR
    transitSeizuresBehaviour BEHAVIOUR
    DEFINED AS "It gives the number of transit seizures."
    ;;
REGISTERED AS {I-ETS300637.otmAttribute 56};
```

7.5 Definition of behaviours

```
pointerAndNameBehaviour BEHAVIOUR
    DEFINED AS "If the string choice for the syntax is used, matching on the substrings is
    permitted. If the number choice for the syntax is used then matching on ordering is
    permitted.";
```

7.6 Definition of actions

No specific actions were identified.

7.7 Definition of notifications

No specific notifications were identified.

7.8 ASN.1 defined types module

```
I-ETS300637 {ccitt(0) identified-organization(4) etsi(0) ets(637) informationModel(0)
asn1Module(2) asn1DefinedTypesModule (0)}

DEFINITIONS IMPLICIT TAGS ::=
BEGIN
-- EXPORTS everything
IMPORTS
Attribute,ObjectInstance FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) version1(1) protocol(3)}

AdministrativeState,Count,ObservedValue FROM Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3)
part2(2) asn1Module(2) 1}

HistoryRetention FROM Q822-PM-ASN1Module {ccitt(0) recommendation(0) q(17) q822(822)
asn1Module(2) q822ASN1Module(0)}

NameType FROM ASN1DefinedTypesModule {ccitt recommendation m gnm(3100) informationModel(0)
asn1Modules(2) asn1DefinedTypesModule(0)};

informationModel OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0) ets(637)
informationModel(0)}
otmManagedObjectClass OBJECT IDENTIFIER ::= {informationModel managedObjectClass(3)}
otmPackage OBJECT IDENTIFIER ::= {informationModel package(4)}
otmNameBinding OBJECT IDENTIFIER ::= {informationModel nameBinding(6)}
otmAttribute OBJECT IDENTIFIER ::= {informationModel attribute(7)}

-- default value definitions

defaultAllDestinationCodes  DestinationCode ::= ""

defaultAllOrigins  OriginationAspect ::= {}

defaultDestinationAspects  DestinationAspect ::= definedDestinationAspect : allDestinationAspects

defaultRoutingAspects  RoutingAspect ::= null

defaultAllCircuitEndPointSubgroups  CircuitEndPointSubgroups ::= {}
```

```
defaultAdministrativeState  AdministrativeState ::= unlocked

-- initial value definitions

initialCount  Count ::= 0

initialGauge  ObservedValue ::= integer : 0

initialInteger  INTEGER ::= 0

initialTmSurveillance  TrueFalse ::= FALSE

-- permitted type definitions

PermittedHistoryRetention ::= HistoryRetention(1)

PermittedStates ::= AdministrativeState(locked|unlocked)

PermittedTarFromReturnAction ::= ReturnAction (WITH COMPONENTS {return, cancelTreatment})

-- supporting productions

ActivationThresholds ::= SEQUENCE {
    level1                          [0] ThresholdLevel,
    level2                          [1] ThresholdLevel OPTIONAL}

AdditionalTrafficCriteria ::= OBJECT IDENTIFIER
-- points to additional traffic criteria defined by an OBJECT IDENTIFIER

AssocOwnerDccGroup ::= ObjectInstance -- points to the associated dccGroup instance

AssocScrAffectedTraffic ::= ObjectInstance

Category ::= BIT STRING (SIZE(8))
-- value according to CCITT Recommendation Q.763

CircuitEndPointSubgroupList ::= SEQUENCE OF InstanceOrNamePointer

CircuitEndPointSubgroups ::= SET OF InstanceOrNamePointer

CongestionLevel ::= ENUMERATED {
    mcl0                                (0),
    mcl1                                (1),
    mcl2                                (2),
    mcl3                                (3)}

ContinousTimer ::= SEQUENCE {
    calls                           [0] INTEGER(0..MAX),
    perTimeUnit                     [1] Timer}

CreatorIdentity ::= CHOICE {
    sourceCls                       [0] SourceClass,
    sourceName                      [1] GraphicString}

DefinedDestinationAspect ::= ENUMERATED {
    allDestinationAspects               (0),
    htr                                 (1),
    nonHtr                              (3)}
-- null stands for all destination aspects

DefinedOrigin ::= ENUMERATED {
    originated                          (0),
    transit                             (1),
    inboundTerminating                  (2)}

DestinationAspect ::= CHOICE {
    definedDestinationAspect        [0] DefinedDestinationAspect,
    destinationExtension            [1] OBJECT IDENTIFIER}
-- destinationExtension points to a destination aspect defined by an OBJECT IDENTIFIER

DestinationCode ::= GraphicString (FROM
("0"|"1"|"2"|"3"|"4"|"5"|"6"|"7"|"8"|"9"|"A"|"B"|"C"|"D"|"E"|"F"|"#"|"*"))

DestinationType ::= CHOICE {
    natureOfAddress                 [0] NatureOfAddress,
    destType                        [1] DestType,
    all                             [2] NULL}
```

```
DestType ::= ENUMERATED {
    international                       (0),
    national                            (1),
    local                               (2),
    other                               (3)}

DispositionOfCall ::= CHOICE {
    skip                            [0] NULL,
    treatment                       [1] Treatment}

InstanceOrNamePointer ::= CHOICE {
    objectInstance                  [0] ObjectInstance,
    symbolic                        [1] NameType}

Integer ::= INTEGER(0..MAX)

LeakyBucket ::= SEQUENCE {
    bucketSize                      [0] INTEGER(0..MAX) OPTIONAL,
                                        -- the NE will define the bucket size if not provided
    calls                           [1] INTEGER(0..MAX),
    perTimeUnit                     [2] Timer(WITH COMPONENTS {scale1, scale2})}

NatureOfAddress ::= BIT STRING (SIZE(7))
-- value according to CCITT Recommendation Q.763

Origin ::= CHOICE {
    definedOrigin                   [0] DefinedOrigin,
    namedOrigin                     [1] InstanceOrNamePointer, -- it points to or names an origin
    originExtension                 [2] OBJECT IDENTIFIER}
-- originExtension points to an origin defined by an OBJECT IDENTIFIER

OriginationAspect ::= SEQUENCE {
    callingPartyCategory            [0] Category OPTIONAL,
    origin                          [1] Origin OPTIONAL}

Percentage ::= CHOICE {
    granularity12p5                 [0] ENUMERATED { -- 12.5% step width
        perc0                           (0)     -- 0 % -- ,
        perc12p5                        (1)     -- 12.5 % -- ,
        perc25                          (2)     -- 25 % -- ,
        perc37p5                        (3)     -- 37.5 % -- ,
        perc50                          (4)     -- 50 % -- ,
        perc62p5                        (5)     -- 62.5 % -- ,
        perc75                          (6)     -- 75 % -- ,
        perc87p5                        (7)     -- 87.5 % -- ,
        perc100                         (8)     -- 100 % -- },
    granularity10                   [1] ENUMERATED { -- 10% step width
        perc0                           (0)     -- 0 % -- ,
        perc10                          (1)     -- 10 % -- ,
        perc20                          (2)     -- 20 % -- ,
        perc30                          (3)     -- 30 % -- ,
        perc40                          (4)     -- 40 % -- ,
        perc50                          (5)     -- 50 % -- ,
        perc60                          (6)     -- 60 % -- ,
        perc70                          (7)     -- 70 % -- ,
        perc80                          (8)     -- 80 % --,
        perc90                          (9)     -- 90 % --,
        perc100                         (10)    -- 100 % -- }}

ResponseCategories ::= SET OF SEQUENCE {
    originationAspect               [0] OriginationAspect OPTIONAL,
    additionalTrafficCriteria       [1] AdditionalTrafficCriteria OPTIONAL,
    destinationAspect               [2] DestinationAspect OPTIONAL,
    routingAspect                   [3] RoutingAspect OPTIONAL,
    percentageOfCalls               [4] Percentage}

ReturnAction ::= CHOICE {
    return                          [0] NULL,
    skip                            [1] NULL,
    cancelTreatment                 [2] Treatment}

RoutingAspect ::= ENUMERATED {
    directRoutedTraffic                 (0),
    alternateRoutedTraffic              (1),
    null                                (2)}
-- null stands for all routing aspects
```

```
SourceClass ::= ENUMERATED {
    tmnos                               (0),
    otherNe                             (1),
    thisNe                              (2),
    unknown                             (3)}

ThresholdLevel ::= CHOICE {
    percent                         [0] INTEGER (0..100),
    noOfCircuits                    [1] INTEGER(0..MAX)}

Timer ::= CHOICE {
blockAllCalls                       [0] NULL,
scale1                              [1] ENUMERATED {
        sec0                            (0) -- 0 sec -- ,
        sec0p1                          (1) -- 0.1 sec -- ,
        sec0p25                         (2) -- 0.25 sec -- ,
        sec0p5                          (3) -- 0.5 sec -- ,
        sec1                            (4) -- 1 sec -- ,
        sec2                            (5) -- 2 sec -- ,
        sec5                            (6) -- 5 sec -- ,
        sec10                           (7) -- 10 sec -- ,
        sec15                           (8) -- 15 sec -- ,
        sec30                           (9) -- 30 sec -- ,
        sec60                           (10)    -- 60 sec -- ,
        sec120                          (11)    -- 120 sec -- ,
        sec300                          (12)    -- 300 sec -- ,
        sec600                          (13)    -- 600 sec -- },
scale2                              [2] INTEGER(0..600000) -- millisecond scale --}

Treatment::= CHOICE {
    other                           [0] OBJECT IDENTIFIER,
    announcementNumber              [1] INTEGER(0..MAX),
    congestionTone                  [2] NULL,
    pointer                         [3] InstanceOrNamePointer}
-- other points to a treatment defined by an OBJECT IDENTIFIER

TrueFalse ::= BOOLEAN

END -- of I-ETS300637
```

Annex A (normative): Assignment of the performance attributes to the individual xtspg subclasses

The circuitEndPointSubgroup resp. xtpsg related performance attributes are associated with the direction of the traffic flow. As the subclasses of the xtpsg consider the direction (incoming, outgoing, and bi-directional), some of the performance attributes will provide zero value at the end of the granularity period. Table A.1 gives a correlation between performance attributes and the xtpsg subclasses. Combinations marked with "x" may provide performance values greater than zero, whilst combinations marked with "-" will always provide zero value.

Table A.1

Performance attribute	xtpsgIn	xtpsgOut	xtpsgBid
outgoingBids	-	x	x
incomingSeizures	x	-	x
outgoingSeizures	-	x	x
answeredOutgoingSeizures	-	x	x
answeredIncomingSeizures	x	-	x
overflow	-	x	x
incomingTrafficUsage	x	-	x
outgoingTrafficUsage	-	x	x
numberOfAvailableCircuits	x	x	x

Annex B (informative): TMN management service "Traffic Management"

The network management functions covered by this I-ETS are listed in table B.1. This list does not show explicitly all management service functions as contained in subclause 5.5 of ETR 047 (traffic management), as it is an extract from this I-ETS.

Network management functions which are for the time being out of scope or covered by other documents are indicated as such.

ITU-T Recommendation Q.822 [9] is referenced for the generic aspects of performance monitoring, and this I-ETS for the traffic management related performance monitoring.

The functions of reporting information on demand indicated in this list include, by implication, the function of requesting the information. However, the request function is not shown for reason of clarity.

Table B.1

	Q3 information flows OS NE	
Network management functions		**covered by**
1 Status monitoring functions		
Report the service availability of NEs	⇐	M.3100
Report of status of controls on demand	⇐	this I-ETS
Report circuit group busy/idle status	⇐	this I-ETS
Report congestion status of exchanges	⇐	this I-ETS
Report the receipt of ACC signals	⇐	out of scope
Report HTR status of destinations on demand	⇐	this I-ETS
Manually add/remove HTR status of destinations	⇒	this I-ETS
Report congestion status of Common Channel Signalling (CCS) network	⇐	out of scope
Report receipt of CCS network management signals	⇐	out of scope
2 Performance monitoring functions		
Report circuit group data/parameters on a scheduled basis	⇐	this I-ETS, Q.822
Report circuit group data/parameters on demand	⇐	this I-ETS, Q.822
Report exchange load measurements on a scheduled basis	⇐	this I-ETS, Q.822
Report exchange load measurements on demand	⇐	this I-ETS, Q.822
Report exchange congestion measurement on a scheduled basis	⇐	this I-ETS, Q.822
Report exchange congestion measurement on a demand	⇐	this I-ETS, Q.822
Report CCS load measurements on a scheduled basis	⇐	out of scope
Report CCS load measurements on demand	⇐	out of scope
Report CCS congestion measurements on a scheduled basis	⇐	out of scope
Report CCS congestion measurements on demand	⇐	out of scope
Report data on performance of controls on a scheduled basis	⇐	this I-ETS, Q.822
Report data on performance of controls on demand	⇐	this I-ETS, Q.822
3 Control functions		
Apply/modify/remove a manual control	⇒	this I-ETS
Establish/modify/remove an automatic control	⇒	this I-ETS
Activate/deactivate an automatic control	⇒	this I-ETS
Apply/modify/remove a special recorded announcement	⇒	out of scope
4 Administrative functions		
Establish/change/remove a measurement schedule	⇒	ETR 088, this I-ETS, X.746
Establish/update a network management data base	⇒	out of scope
Establish/change/remove thresholds for status reporting and HTR determination	⇒	X.700 series
Establish/change/remove schedules for status and data reporting	⇐	X.700 series
Report routing table information on demand	⇐	I-ETS 300 292 [1]
5 Supervision of digital transmission network		out of scope
CCITT Recommendation M.3100 [7]. ITU-T Recommendation Q.822 [9]. ITU-T Recommendation X.746 [20].		

Annex C (informative): Correlation between E.412 traffic controls and object classes

Table C.1 gives the correlation between the traffic controls as defined in CCITT Recommendation E.412 [5] and the object classes defined in this I-ETS.

The distinction between code blocking and call gapping is made by setting the callVolumeControl attribute accordingly. The distinction between cancel direct routing and cancel alternative routing to is made by setting the routingAspect attribute accordingly.

Table C.1

E.412 [5] traffic control	Covered by object class	Remark
Code blocking	dccGroup, destinationCodeControl	Call volume control
Call gapping	dccGroup, destinationCodeControl	Call volume control
Cancel direct routing	cancelTo	routingAspect dependent
Cancel alternative routing to	cancelTo	routingAspect dependent
Cancel alternative routing from	cancelFrom	
Circuit directionalization	out of scope	see CCITT Recommendation E.502 [6], subclause 4.2
Circuit turn down/busying/blocking	out of scope	see CCITT Recommendation E.502 [6], subclause 4.2
Skip	skip	
Temporary alternative routing	tarTo, tarFrom	
Cancel rerouted overflow	cancelRerouted	
ACC	out of scope	see CCITT Recommendation E.502 [6], subclause 4.2
Selective circuit reservation	scr, scrAffectedTraffic	
Automatic destination control	out of scope	see CCITT Recommendation E.502 [6], subclause 4.2

Annex D (informative): Differentiation of direct and alternate routed traffic for cancel to and cancel from controls

In order to effectively use the network resources during stress period, the network manager makes use of "cancel to" and "cancel from" controls on circuit sub-groups. When applying these controls, the network manager should have the ability to differentiate and selectively control either direct routed traffic or the alternate routed traffic on both types of controls. Figure D.1 explains the various types of traffic, and how a network manger can selectively apply the different controls for each traffic type.

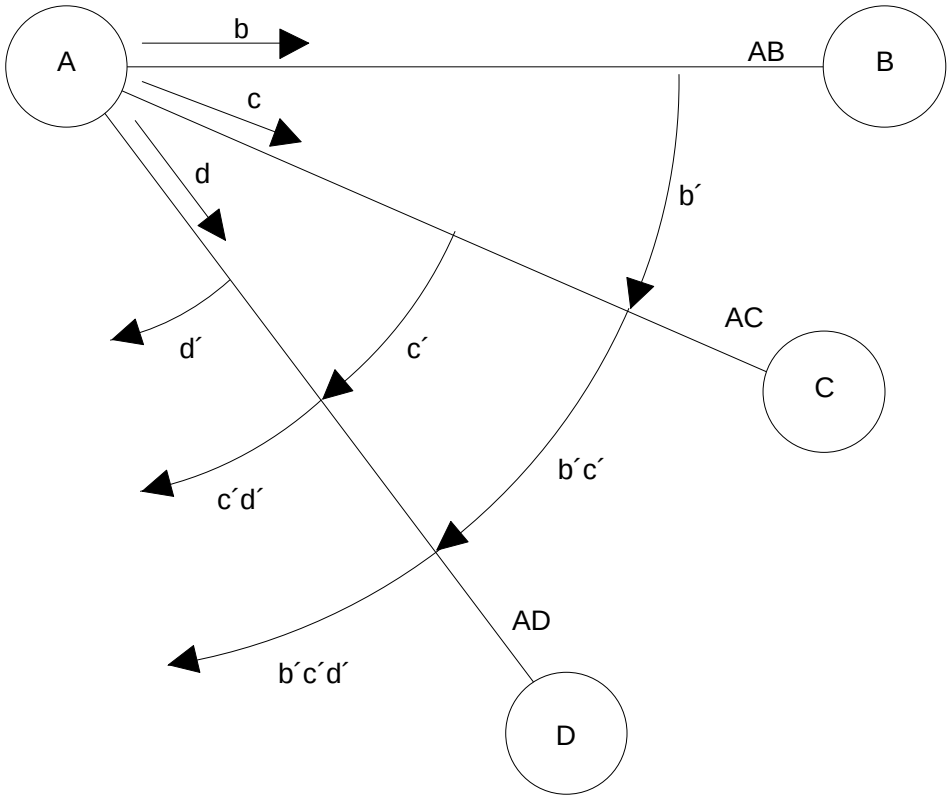


Figure D.1: Examples for direct and alternate routed traffic

In figure D.1, the following traffic types are depicted:

- b-traffic is direct offered traffic to circuit sub-group AB;
- c-traffic is direct offered traffic to circuit sub-group AC;
- d-traffic is direct offered traffic to circuit sub-group AD;
- b'-traffic is an overflow of b-traffic from circuit sub-group AB which is now alternate routed to circuit sub-group AC;
- c'-traffic is an overflow of c-traffic from circuit sub-group AC which is now alternate routed to circuit sub-group AD;
- d'-traffic is an overflow of d-traffic from circuit sub-group AD which is now alternate routed to the subsequent circuit sub-group;
- b'c'-traffic is an overflow of b'-traffic from circuit sub-group AC which is alternate routed again to circuit sub-group AD;
- c'd'-traffic is an overflow of c'-traffic from circuit sub-group AD which is alternate routed again to the subsequent circuit sub-group;
- b'c'd'-traffic is an overflow of b'c'-traffic from circuit sub-group AD having still overflowed from circuit sub-group AC which is alternate routed again to the subsequent circuit sub-group.

NOTE: b'-traffic and c'-traffic is traffic which has overflowed only once (that is direct routed traffic which has overflowed); where as b'c'-traffic, c'd'-traffic, and b'c'd'-traffic is traffic which has overflowed more than once (that is, alternate routed traffic which has overflowed).

The network manger should have the flexibility of controlling each type of the traffic listed above using the "cancel to" and "cancel from" control; especially traffic which has overflowed only once and traffic which has overflowed more than once. Table D.1 illustrates how this can be accomplished:

Table D.1

Traffic to be controlled	Type of control
b traffic	Cancel to direct on circuit sub-group AB
c traffic	Cancel to direct on circuit sub-group AC
d traffic	Cancel to direct on circuit sub-group AD
b' traffic	Cancel from direct on circuit sub-group AB, or cancel to alternate on circuit sub-group AC.
c' traffic	Cancel from direct on circuit sub-group AC
d' traffic	Cancel from direct on circuit sub-group AD
b'c' traffic	Cancel from alternate on circuit sub-group AC
c'd' traffic	Cancel from alternate on circuit sub-group AD
b'c'd' traffic	Cancel from alternate on circuit sub-group AD

Annex E (informative): Use of ITU-T Recommendation Q.822 for traffic measurements

E.1 Introduction

This annex provides a tutorial of the application of the ITU-T Recommendation Q.822 [9] performance management information model to the collection of traffic measurements. The tutorial provides mechanisms to accomplish both autonomous reporting and polled retrieval of measurements.

E.2 Overview of the performance management information model

The performance management model enables summary reporting of performance parameters using the simpleScanner.

The object model for performance management is shown in figure 1 of ITU-T Recommendation Q.822 [9].

The data found in the currentData object class instances (or its subclasses) consists of measurements which are in the process of accumulating and changing during the interval. At the end of the interval, currentData object instances are initialized. Hence, the collected data shall either be immediately reported or stored for persistence of completed intervals. The model supports the retention of the last completed interval as historyData object instances (or its subclasses).

At the end of each performance interval a scanReport may be issued by the currentData object directly. However, this would result in a separate notification for each currentData instance being monitored.

It is more efficient to aggregate the measurements from all the currentData instances accumulated during the same period. The recommended mode is to use the simpleScanner to synchronize the historyData instances. The simpleScanner managed object scans the common attributes to be observed in each of the selected objects according to a specified schedule and produces an aggregated report.

The notifications generated by the scanner may be processed by an event forwarding discriminator (EFD) for reporting to the managing system and/or can be logged in the scanReportRecord managed object class for further polling by the managing system.

The generation of PM summarized reports is depicted in figure B.5 of ITU-T Recommendation Q.822 [9]. The illustration shows that the simpleScanner can be used to scan attributes of the historyData objects and emit a scanReport to the EFD. The EFD in turn forwards an m-EVENT Report of the summarized data providing the established value assertions are met (e.g. eventType = scanReport).

E.3 Initial configuration

This clause discusses the process in which the collection mechanism is configured.

The following object classes are instantiated:

1) subclasses of currentData; e.g. tmCircuitEndPointSubgroupCurrentData

2) subclasses of historyData; e.g. circuitEndPointSubgroupHistoryData

3) simpleScanner.

E.3.1 Current data

The collection interval is specified in the attribute granularityPeriod which is inherited from the scanner. currentData is a subclass of scanner. Typical examples of the value are five minutes or sixty seconds.

The historyRetentionPkg conditional package is required so that the appropriate number of intervals of historyData can be established. For traffic management purposes, this value is restricted to 1 in order to minimize the use of memory resources.

E.3.2 History data

The retention period (duration) is specified in the attribute historyRetention. When a new instance of historyData is created, the oldest existing instance may be deleted.

The historyDataSuspectIntervalPkg conditional package is required since it is useful to know whether measurements are suspect.

E.3.3 Simple scanner

The following attributes inherited from the scanner or the homogeneousScanner need to be set to achieve the desired behaviour.

1) scannerId (inherited from "ITU-T Recommendation X.739 (1993)":scanner).

   The scannerId contains a value that is used to identify an instance of this managed object class (used for naming);

2) administrativeState (inherited from "ITU-T Recommendation X.739 (1993)":scanner).

   The administrativeState (defined in CCITT Recommendation X.731 [13]) is used to suspend or resume the scanning function. If the administrative state has the value UNLOCKED, the scanner is administratively permitted to perform scans. Initially the state should be set to UNLOCKED rather than LOCKED so that scanning may be permitted;

3) granularityPeriod (inherited from "ITU-T Recommendation X.739 (1993)":scanner).

   The granularityPeriod attribute indicates the length of time between successive scans. This should be set to e.g. 5 minutes, to achieve an autonomous scan and report at the end of every period;

4) scope (inherited from "ITU-T Recommendation X.738 (1993)":homogeneousScanner).

   The scoped selection package is specified. The scanner uses the managed object class identified in the base managed object attribute and checks all the managed objects within the levels indicated by the scope attribute. The baseManagedObject that should be the starting node for selecting managed object is the managedElement (the NE such as the circuit switch). The value of the scope attribute for example will be set to individual level 2. This implies all objects contained in the second level of the naming hierarchy relative to the managedElement are candidates for selection. This selection is further restricted by the scanningFilter as explained below;

5) scanningFilter (inherited from "ITU-T Recommendation X.738 (1993)":homogeneousScanner).

   The scanner checks instances of the managed objects within the levels indicated by applying the criteria in the scanningFilter attribute.

   The filter may be configured to select between the following types of data:
   a) circuit sub-group
   b) destination
   c) exchange

   For example, the filter may be configured to select history data objects for the monitored entities circuit sub-group, destination and exchange (objectClass = circuitEndPointSubgroupHistoryData OR objectClass = observedDestinationHistoryData OR objectClass = exchangePerformanceHistoryData);

6) numericAttributeIdArray (from "ITU-T Recommendation X.738 (1993)":simpleScanner).

   The numericAttributeIdArray shall be set. It is the ordered list of identifiers of attributes whose values are to be scanned. The values will be contained in the numericValueArray;

7) supressObjectInstance (from "ITU-T Recommendation X.738 (1993)":simpleScanner).
   The supressObjectInstance attribute is set to TRUE to so that object instance identification is not included in the response. This will reduce the number of bytes in the message.

E.4 Autonomous reporting

The autonomous reporting mechanism is illustrated in figure E.1.

The scanner may be invoked each granularity period autonomously. Autonomous reports are generated periodically by appropriately setting the simple scanner granularityPeriod attribute, e.g. 5 minutes. The appropriate history data for each monitored object will be scanned. The appropriate attribute values will be inserted in the numericValueArray of the scanReport NOTIFICATION.

The numericValueArray may have a sequence of integers or reals. The exact order of attribute identifiers is known from the numericAttributeIdArray.

The notification is sent to the EFD.

The scanReport NOTIFICATION is evaluated by the EFD. The discriminator construct should be provisioned for the appropriate notifications to be forwarded. The summarized reports will be forwarded to the manager as m-EVENT reports.

E.5 Polled reporting

The polled reporting mechanism is illustrated in figure E.2.

A polling mechanism may be achieved by setting the simpleScanner granularityPeriod to zero. This will disable autonomous scanning. The manager (operation system) may initiate a polled scan by invoking the activateScanReport action (ACTION) to the simple scanner. This will cause the scanner to execute a single time (collect the data and respond with results). The action will be executed using as parameters for scope and scanningFilter the values of the attributes as in the autonomous reporting case.

The summarized report will be sent to the manager as an m-ACTION response.

A polled reporting mechanism also may be achieved by logging of scanReport NOTIFICATION in a scanReportRecord object instance. The manager (OS) may initiate the polling of the performance data by invoking the M-GET operation on the appropriate scanReportRecord object instance.

E.6 Changes to the report

The manager may suspend the autonomous generation of the simpleScanner reports by setting the administrativeState to locked. This will abruptly discontinue use of scanning. A more graceful approach is accomplished by setting the administrativeState to shutdown. This will shutdown after completing the current interval and issuing the report.

The manager may change the scope, filter and numericAttributeIdArray to effect the contents of the report. Other parameters may also be changed to change the behaviour of the reporting mechanism e.g. granularityPeriod.

E.7 Conclusions

The standard mechanisms of the ITU-T Recommendation Q.822 [9] performance management specification can be used in conjunction with the ITU-T Recommendation X.738 [18] simpleScanner to summarize and report traffic measurements. Polled and autonomous reporting can be supported using the two mechanisms described.

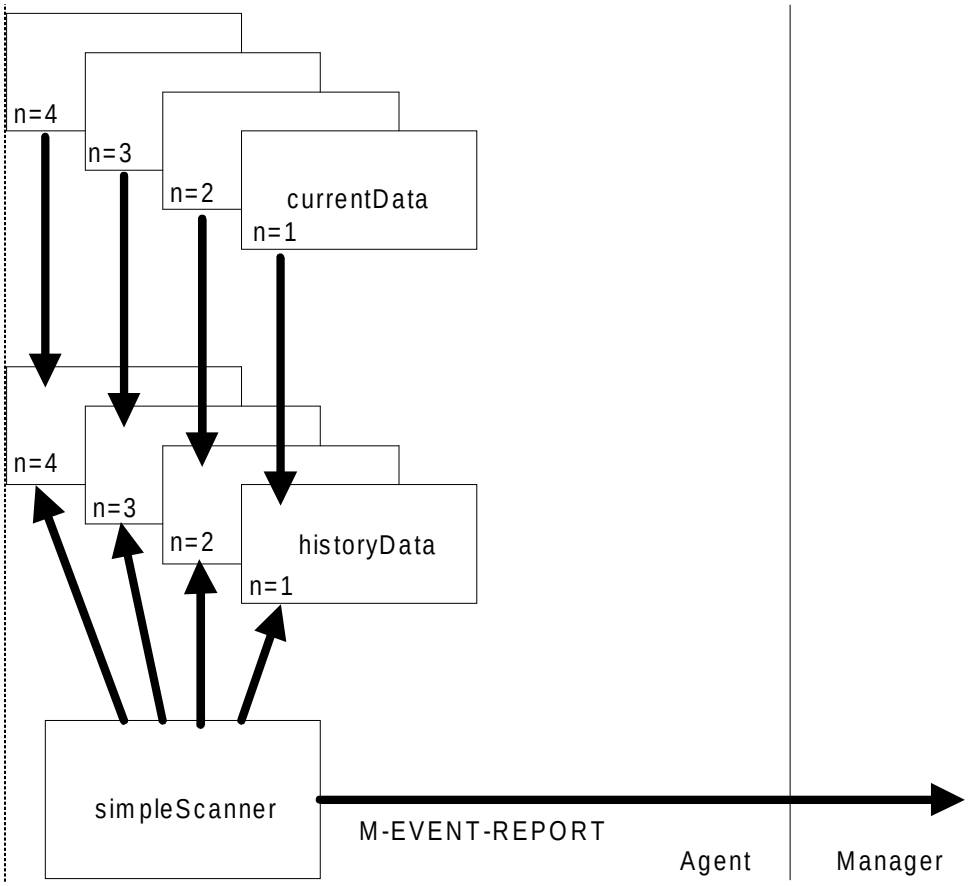


Figure E.1: Autonomous reporting of measurements

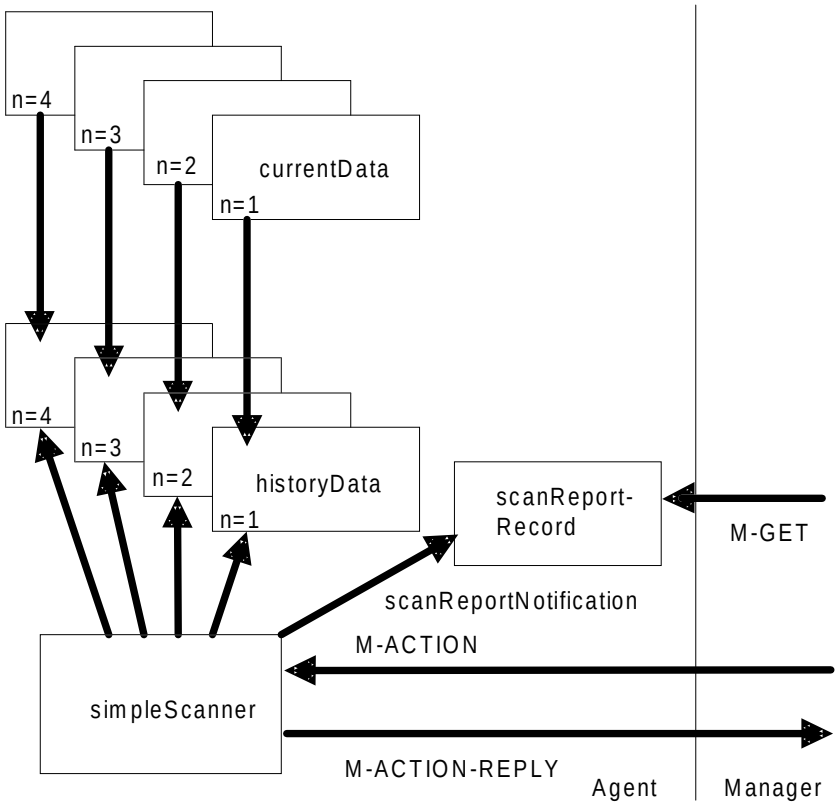


Figure E.2: Polled reporting of measurements

Annex F (informative): Examples to illustrate the effect of the key attribute priority rules of the network management control object classes on the selection of a control instance applicable for a call

F.1 Object class destinationCodeControl

Key attribute priority rule of the object class destinationCodeControl:

"If the destinationType is specified in an instance of this object class, it shall be evaluated at the same level as destinationCode, followed by the components origin and callingPartyCategory of the originationAspect. The more specific value has the priority."

F.1.1 Example 1 for a destinationCodeControl database

This example assumes for the destinationCodeControl database, that the attribute destinationType is equal NULL and that the component additionalAspects of the attribute originationAspect is not present.

Table F.1

destinationCodeControl database			
instance number	**destinationCode**	**originationAspect**	
		origin	**callingPartyCategory**
1	123	--	pay phone
2	123	1	--
3	1234	--	--

Table F.2 shows the instance of the destinationCodeControl database, which is selected as key for call control if the key attribute priority rule is applied.

Table F.2

call characteristics			selected destinationCode-Control database instance
dialled destination code	**call origin**	**calling party category**	
123xyyy (x ≠ 4)	1	pay phone	2 (not 1)
123xyyy (x ≠ 4)	1	≠ pay phone	2
123xyyy (x ≠ 4)	≠ 1 (e.g. 2)	pay phone	1
123xyyy (x ≠ 4)	≠ 1 (e.g. 2)	≠ pay phone	none
1234yyy	1	pay phone	3
1234yyy	1	≠ pay phone	3
1234yyy	≠ 1 (e.g. 2)	pay phone	3
1234yyy	≠ 1 (e.g. 2)	≠ pay phone	3

≠ means not equal

F.1.2 Example 2 for a destinationCodeControl database

This example assumes for the destinationCodeControl database, that the attribute destinationType is equal NULL and that the component additionalAspects of the attribute originationAspect is not present. Compared with the database in example 1, one more instance has been added to the destinationCodeControl database. The calls, applied on the database, are the same as in example 1.

Table F.3

destinationCodeControl database			
instance number	**destinationCode**	**originationAspect**	
		origin	**callingPartyCategory**
1	123	--	pay phone
2	123	1	--
3	1234	--	--
4	123	1	pay phone

Table F.4 shows the instance of the destinationCodeControl database, which is selected as key for call control if the key attribute priority rule is applied.

Table F.4

call characteristics			selected destinationCode-Control database instance
dialled destination code	**call origin**	**calling party category**	
123xyyy (x ≠ 4)	1	pay phone	4
123xyyy (x ≠ 4)	1	≠ pay phone	2
123xyyy (x ≠ 4)	≠ 1 (e.g. 2)	pay phone	1
123xyyy (x ≠ 4)	≠ 1 (e.g. 2)	≠ pay phone	none
1234yyy	1	pay phone	3 (not 4)
1234yyy	1	≠ pay phone	3
1234yyy	≠ 1 (e.g. 2)	pay phone	3
1234yyy	≠ 1 (e.g. 2)	≠ pay phone	3

≠ means not equal

F.2 Object class cancelTo

Key attribute priority rule of the object class cancelTo:

"The circuitEndPointSubgroup attribute is the key with the highest priority, followed by the components origin, callingPartyCategory and additionalAspects of the attribute originationAspect, the destinationAspect attribute and as the least the routingAspect attribute. The more specific value has the priority."

F.2.1 Example 1 for a cancelTo database

This example assumes for the cancelTo database, that the cancelTo instances of table F.5 are assigned to one circuitEndPointSubgroup resp. xtpsg and the component additionalAspects of the attribute originationAspect is not present.

Table F.5

cancelTo database					
instance number	**originationAspect**		**destAspect**	**routingAspect**	**can %**
	origin	**callingPartyCat**			
1	--	--	--	--	100
2	--	priority sub.	--	--	0
3	--	--	nonHTR	--	50

Table F.6 shows the instance of the cancelTo database, which is selected for call control if the key attribute priority rule is applied.

Table F.6

call characteristics				selected
call origin	**calling party category**	**destination aspect**	**routing aspect**	**cancelTo database instance**
1	≠ priority sub.	hardToReach	directRouted	1
1	≠ priority sub.	hardToReach	alternateRouted	1
1	≠ priority sub.	nonHTR	directRouted	3
1	≠ priority sub.	nonHTR	alternateRouted	3
1	priority sub.	hardToReach	directRouted	2
1	priority sub.	hardToReach	alternateRouted	2
1	priority sub.	nonHTR	directRouted	2 (not 3)
1	priority sub.	nonHTR	alternateRouted	2 (not 3)
≠ 1	≠ priority sub.	hardToReach	directRouted	1
≠ 1	≠ priority sub.	hardToReach	alternateRouted	1
≠ 1	≠ priority sub.	nonHTR	directRouted	3
≠ 1	≠ priority sub.	nonHTR	alternateRouted	3
≠ 1	priority sub.	hardToReach	directRouted	2
≠ 1	priority sub.	hardToReach	alternateRouted	2
≠ 1	priority sub.	nonHTR	directRouted	2 (not 3)
≠ 1	priority sub.	nonHTR	alternateRouted	2 (not 3)

≠ means not equal

F.2.2 Example 2 for a cancelTo database

This example assumes for the cancelTo database, that the cancelTo instances of table F.7 are assigned to one circuitEndPointSubgroup resp. xtpsg and the component additionalAspects of the attribute originationAspect is not present. Compared with the database in example 1, one more instance has been added to the cancelTo database. The calls, applied on the database, are the same as in example 1.

Table F.7

cancelTo database					
instance number	**originationAspect**		**destAspect**	**routingAspect**	**can %**
	origin	**callingPartyCat**			
1	--	--	--	--	100
2	--	priority sub.	--	--	0
3	--	--	nonHTR	--	50
4	1	--	nonHTR	directRouted	25

Table F.8 shows the instance of the cancelTo database, which is selected for call control if the key attribute priority rule is applied.

Table F.8

call characteristics				selected cancelTo database instance
call origin	**calling party category**	**destination aspect**	**routing aspect**	
1	≠ priority sub.	hardToReach	directRouted	1
1	≠ priority sub.	hardToReach	alternateRouted	1
1	≠ priority sub.	nonHTR	directRouted	4
1	≠ priority sub.	nonHTR	alternateRouted	3
1	priority sub.	hardToReach	directRouted	2
1	priority sub.	hardToReach	alternateRouted	2
1	priority sub.	nonHTR	directRouted	4 (not 2)
1	priority sub.	nonHTR	alternateRouted	2 (not 3)
≠ 1	≠ priority sub.	hardToReach	directRouted	1
≠ 1	≠ priority sub.	hardToReach	alternateRouted	1
≠ 1	≠ priority sub.	nonHTR	directRouted	3
≠ 1	≠ priority sub.	nonHTR	alternateRouted	3
≠ 1	priority sub.	hardToReach	directRouted	2
≠ 1	priority sub.	hardToReach	alternateRouted	2
≠ 1	priority sub.	nonHTR	directRouted	2 (not 3)
≠ 1	priority sub.	nonHTR	alternateRouted	2 (not 3)

≠ means not equal

F.3 Other circuitEndPointSubgroup related control object classes

The effect of the key attribute priority rules of these object classes on the selection of a control instance for a call, is analogous to that of the cancelTo control.

Annex G (informative): Object classes defined in other documents providing reference data relevant for traffic management

G.1 Circuit sub-group reference data

As object classes providing circuit sub-group related reference data the individual subclasses of xtpsg (Table G.1) or an equivalent circuitEndPointSubgroup were identified.

Table G.1

Attribute	Meaning	Defined in
objectClass (note)	traffic direction	X.721: top
signCapab	signalling capability	prI-ETS 300 293 [2]
bearerCapab	bearer capability	prI-ETS 300 293 [2]
totalTpCount	total number of circuits in xtpsg	M.3100: tpPool
adjacentXId	adjacent exchange id	prI-ETS 300 293 [2]
The traffic direction is determined by the individual xtpsg subclasses (xtpsgIn, xtpsgOut, and xtpsgBid).		

G.2 Destination related reference data

No object classes providing destination related reference data were identified, neither for the htrDestination nor for the observedDestination object class.

G.3 Exchange related reference data

No object classes providing specific exchange related reference data were identified.

G.4 Call routing related reference data

G.4.1 xtpsgComb

Table G.2

Attribute	Meaning	Defined in
xtpsgCombId	xtpsgComb identity	I-ETS 300 292 [1]
listOfXTPSGs	set of corresponding xtpsgs	I-ETS 300 292 [1]
usedAlgorithm	algorithm used for assigning traffic to the corresponding xtpsgs	I-ETS 300 292 [1]

The correlation to a set of destinations that, when dialled, result in a call using circuit sub-groups belonging to either xtspgComb, can be retrieved from the call routing information model (I-ETS 300 292 [1]).

G.4.2 orderedListXTPSGComb

Table G.3

Attribute	Meaning	Defined in
orderedListXTSGCombId	orderedListXTPSGComb identity	I-ETS 300 292 [1]
listOfXTPSGCombs	set of corresponding xtpsgCombs	I-ETS 300 292 [1]
usedAlgorithm	algorithm used for assigning traffic to the corresponding xtpsgCombs	I-ETS 300 292 [1]

The correlation to a set of destinations that, when dialled, result in a call using circuit sub-groups belonging to either orderedListXTPSGComb, can be retrieved from the call routing information model (I-ETS 300 292 [1]).

G.5 Traffic control related reference data

No object classes providing specific control related reference data have been identified.

Annex H (informative): References to corresponding object classes and name bindings defined in ITU-T Recommendation Q.823 (1996)

I-ETS 300 637 object class template label	Q.823 object class template label
congestionLevelIndication	congestionLevelIndication
observedDestination	observedDestination
htrDestination	htrDestination
tmCircuitEndPointSubgroup	tmCircuitEndPointSubgroup
circuitEndPointSubgroupCurrentData	circuitEndPointSubgroupCurrentData
observedDestinationCurrentData	observedDestinationCurrentData
exchangePerformanceCurrentData	exchangeCurrentData
trafficControlCurrentData	trafficControlCurrentData
tmCircuitEndPointSubgroupCurrentData	tmCircuitEndPointSubgroupCurrentData
controlledCircuitEndPointSubgroupCurrentData	-
tmObservedDestinationCurrentData	tmObservedDestinationCurrentData
tmExchangePerformanceCurrentData	tmExchangeCurrentData
tmTrafficControlCurrentData	tmTrafficControlCurrentData
circuitEndPointSubgroupHistoryData	circuitEndPointSubgroupHistoryData
controlledCircuitEndPointSubgroupHistoryData	-
observedDestinationHistoryData	observedDestinationHistoryData
exchangePerformanceHistoryData	exchangeHistoryData
trafficControlHistoryData	trafficControlHistoryData
trafficControl	trafficControl
destinationCodeControl	destinationCodeControl
dccGroup	dccGroup
cancelTo	cancelTo
cancelFrom	cancelFrom
skip	skip
tarTo	tarTo
tarFrom	tarFrom
cancelRerouted	cancelRerouted
scr	scr
scrAffectedTraffic	scrAffectedTraffic

I-ETS 300 637 name binding template label	Q.823 name binding template label
congestionLevelIndication-managedElement	congestionLevelIndication-managedElement
observedDestination-managedElement	observedDestination-managedElement
htrDestination-managedElement	htrDestination-managedElement
autoHtrDestination-managedElement	autoHtrDestination-managedElement
circuitEndPointSubgroupCurrentData-xtpsg	-
circuitEndPointSubgroupCurrentData-circuitEndPoitSubgroup	tmCircuitEndPointSubgroupCurrentData-tmCircuitEndPoitSubgroup
observedDestinationCurrentData-observedDestination	tmObservedDestinationCurrentData-observedDestination
exchangePerformanceCurrentData-managedElement	tmExchangeCurrentData-managedElement
trafficControlCurrentData-trafficControl	tmTrafficControlCurrentData-trafficControl
dccGroup-managedElement	dccGroup-managedElement
simpleScanner-managedElement	simpleScanner-managedElement
trafficControl-managedElement	trafficControl-managedElement
scrAffectedTraffic-managedElement	scrAffectedTraffic-managedElement

Annex I (informative): Bibliography

- ETR 037: "Network Aspects (NA); Telecommunications Management Network (TMN); Objectives, principles, concepts and reference configurations".

- ETR 046: "Network Aspects (NA); Telecommunications management networks modelling guidelines".

- ETR 047: "Network Aspects (NA); Telecommunications Management Network (TMN) Management services".

- ETR 078: "Maintenance : Telecommunications management network; TMN interface specification methodology [CCITT Recommendation M.3020 (1992)]".

- ETR 088: "Network Aspects (NA); Time/type of day dependant scheduling function support object classes".

- CCITT Recommendation M.3010 (1992): "Principles for a telecommunications management network".

- CCITT Recommendation X.722 (1992): "Information technology - Open Systems Interconnection - Structure of Management Information: Guidelines for the definition of managed objects".

- ITU-T Recommendation Q.823 (1996): "Stage 2 and Stage 3; Function specification for traffic management".

- ITU-T Recommendation M 3100 (1996): "Generic network information model".

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