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SERIES Q: SWITCHING AND SIGNALLING
Q3 interface

Routing management model

ITU-T Recommendation Q.826

(Formerly CCITT Recommendation)

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Routing management model

Summary

This Recommendation provides a management information model which covers the management aspects of the "routing and digit analysis" function in an exchange. The scope is further limited to the exchange aspects of circuit switched networks. This model is restricted to the Operations Systems to Network Element (Q3) interface.

Source

ITU-T Recommendation Q.826 was prepared by ITU-T Study Group 4 (1997-2000) and approved under the WTSC Resolution 1 procedure on 4 February 2000.

FOREWORD

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Routing management model

1 Scope

This Recommendation provides a management information model ITU-T X.720 [11] which covers the management aspects of the "routing and digit analysis" function in an exchange. The scope is further limited to the exchange aspects of circuit switched networks. This model is restricted to the Operations Systems to Network Element (Q3) interface (see ITU-T M.3010 [1]).

The information to be managed is limited to the signalling systems DSS1 (Digital Subscriber Signalling System No. 1), C5 (Signalling System CCITT No. 5), SS No. 7 (Signalling System No. 7 – ISUP (ISDN User Part) only) and R2 (Regional Signalling 2). (SS No. 7 with TUP (Telephone User Part) level 4 is not considered.) The information for routing purposes, which needs to be maintained by the manager, depends on the signalling systems used by the exchange. This information model can be applied for exchanges with the known standardized signalling systems DSS1, SS No. 7, R2, C5. Because of the existence of different signalling systems, not all attributes and objects will be applicable for all exchanges. Information about applicability can be found in the object classes behaviour.

As this model only offers an element management layer view (i.e. limited to a switch) of the routing information, and only shows the partial view a switch has of its network environment, and does not show the whole network picture, it does not provide all the information needed for network-wide management application.

The information model covers the management of following aspects:

- incoming digit rebuilding;
- locally originating, locally terminating (up to recognizing that the DN (Directory Number) belongs to the exchange), and transit calls;
- digit analysis;
- circuit end point selection;
- outgoing digit preparation;

as far as they are relevant for routing. It does not cover management of:

- DN portability (this is covered in ITU-T Q.18xx);
- CTM (Cordless Terminal Mobility);

due to lack of stable requirements at the time of writing this Recommendation.

The information model includes entry/exit points (via instances of specific OC) for:

- customer administration (see ITU-T Q.824.x [13]);
- subscriber controlled input (no standard exists yet);
- IN (Intelligent Network) (see Q.18xx);
- specific treatments as, e.g. announcements.

The information model does not cover routing or digit analysis aspects of the following topics:

- traffic management (see ITU-T Q.823 [16]);
- call-control;
- broadband;
- supplementary services;

- IN (Intelligent Network);
- customer administration;
- other services of which the definition is still under study (e.g. tariff management);
- PABX (Private Automatic Branch Exchange) as exchanges or as termination points of subscriber lines (because this is covered by customer administration);
- centrex implementations;
- mobility issues like cellular and personnel mobility;

neither the following specific points:

- characterization of non-blockable digits (e.g. emergency numbers);
- characterization of destinations for which carrier dialling is not allowed or ignored, e.g. service numbers, emergency calls, specific local calls;
- numbering plans for virtual private networks;
- blocking of national and/or international traffic due to subscriber permission;
- echo suppressor handling depending on selected routing possibility;
- use of propagation delay counter;
- permanent connections.

However, the model defined by this Recommendation is designed to be extended to support the routing administration of broadband and mobile networks.

Because the borders between call processing, digit analysis, routing and traffic management are not always clear, the following rules have been used to differentiate between call processing, digit analysis and routing, and traffic management:

- digit analysis and routing processes are related to the end point selection. If a managed item has no relation with the choice of the end point selection, then this managed item is not included in this model;
- call control processes are related to whether or when a call is required to be routed. These processes do not influence the end point selection;
- the border between traffic management and routing is determined by the following conditions:
 - routing management deals with individual calls under normal conditions;
 - traffic management optimizes overall traffic flow in case of overload or network failure.

Modelling described here does not imply any sequencing of call processing activities.

2 Normative references

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

- [1] ITU-T M.3010 (2000), *Principles for a Telecommunications Management Network*.
- [2] ITU-T E.164 (1997), *The international public telecommunication numbering plan*.
- [3] ITU-T E.170 (1992), *Traffic Routing*.
- [4] ITU-T M.3100 (1995), *Generic Network Information Model*.

- [5] ITU-T Q.115 (1999), *Logic for the control of echo control devices.*
- [6] ITU-T Q.751.1 (1995), *Network element management information model for the Message Transfer Part (MTP).*
- [7] ITU-T Q.763 (1999), *Signalling System No. 7 – ISDN User Part formats and codes.*
- [8] ITU-T Q.764 (1999), *Signalling System No. 7 – ISDN User Part signalling procedures.*
- [9] ITU-T Q.850 (1998), *Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part.*
- [10] ITU-T Q.931 (1998), *ISDN user-network interface layer 3 specification for basic call control.*
- [11] ITU-T X.720 (1992) | ISO/IEC 10165-1:1993, *Information Technology – Open Systems Interconnection – Structure of Management Information: Management Information Model.*
- [12] ITU-T X.721 (1992) | ISO/IEC 10165-2:1992, *Information Technology – Open Systems Interconnection – Structure of management information: Definition of Management Information.*
- [13] ITU-T Q.824.x, *Stage 2 and stage 3 description for the Q3 Interface – Customer Administration.*
- [14] ITU-T X.746 (2000) | ISO/IEC 10164-15:1995, *Information Technology – Open Systems Interconnection – Systems Management: Scheduling Function.*
- [15] ITU-T E.410 (1998), *International network management – General information.*
- [16] ITU-T Q.823 (1996), *Stage 2 and Stage 3 functional specifications for traffic management.*
- [17] ITU-T Q.440 (1988), *General.*
- [18] ITU-T Q.441 (1988), *Signalling Code.*
- [19] ITU-T X.710 (1997) | ISO/IEC 9595:1998, *Information Technology – Open Systems Interconnection – Common Management Information Service.*
- [20] ITU-T Q.822 (1994), *Stage 1, stage 2 and stage 3 description for the Q3 Interface – Performance management.*
- [21] ITU-T X.739 (1993) | ISO/IEC 10164-11:1994, *Information technology – Open Systems Interconnection – Systems Management: Metric objects and attributes.*

3 Definitions and abbreviations

3.1 Definitions

This Recommendation defines the following terms:

3.1.1 call routing: The process consisting of digit rebuilding, carrier selection, destination selection, routing possibility selection and digit preparation.

3.1.2 carrier selection: The process of selecting the carrier for a call. The process first determines the type of call based on origin and dialled digits. Customer administration data (which is outside the scope of this Recommendation) is then used to determine the carrier for this type of call. The carrier is then used as part of the routing process.

3.1.3 circuit: Transmission means which allow communication between two exchanges (same definition as in ITU-T E.410 [15]).

3.1.4 circuit end point: Terminates a circuit.

3.1.5 circuit end point subgroup: Terminates a circuit subgroup or (second definition) a set of circuit end points with common characteristics, i.e. the same signalling characteristics, the same bearer capabilities and other characteristics. All circuits in a circuit end point subgroup shall connect the exchange with the same adjacent exchange.

3.1.6 circuit group: The set of all switched circuits which directly interconnects one exchange with another (same definition as in ITU-T E.410 [15]).

3.1.7 circuit subgroup: A set of circuits within a circuit group which is uniquely identifiable for operational or technical reasons (i.e. because they have same signalling characteristics, same bearer capabilities or other common characteristics). A circuit group may consist of one or more circuit subgroups (same definition as in ITU-T E.410 [15]).

3.1.8 destination: A country, an area, an exchange or other location, or a special service, in which a terminal point is located from an exchange point of view.

3.1.9 end point: A physical point in an exchange where any connection set-up inside an exchange starts or ends, e.g. circuit end point, local destination.

3.1.10 exchange: The aggregate of traffic carrying devices, switching stages, controlling and signalling means at a network node that enables subscriber lines to be interconnected and/or packets to be forwarded as required by individual users.

3.1.11 routing: In the scope of the present document, it has the same meaning as call routing.

3.1.12 routing possibility: Abstraction of possible end points to which the call can be routed.

3.1.13 terminal point: Unique geographical address in a telecommunication network where a connection set-up leaves the network because of the conditions given by the connection set-up initiating subscriber and by the telecommunication network (e.g. subscriber line, PABX access, announcement machine, processor or bytes on a tape or on an optical disc).

3.1.14 treatment: The handling of calls in specific situations (e.g. routing to an announcement for incorrect dialled digits).

3.2 Abbreviations

This Recommendation uses the following abbreviations:

ASN.1	Abstract Syntax Notation One
C5	Signalling System CCITT No. 5
CAC	Carrier Access Code
CC	Country Code
CIC	Circuit Identification Code
CTM	Cordless Terminal Mobility
DCME	Digital Circuit Multiplication Equipment
DN	Directory Number
DSS1	Digital Subscriber Signalling System No. 1
E-R	Entity Relationship
ETS	European Telecommunication Standard
FIFO	First In First Out
I-ETS	Interim European Telecommunication Standard
IN	Intelligent Network



IPI	ISDN Preferred Indicator
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
LIFO	Last In First Out
NDC	National Destination Code
NM	Network Management
OC	Object Class
ORM	Object Model for Call Routing Management
OS	Operations System
PABX	Private Automatic Branch eXchange
PCM	Pulse Code Modulation
PSTN	Public Switched Telephone Network
R2	Regional Signalling 2
RDN	Relative Distinguished Name
SCI	Subscriber Controlled Input
SMO	Scheduled Managed Object
SN	Subscriber Number
SO	Scheduler Object
SS No. 7	Signalling System No. 7
TMN	Telecommunication Management Network
TMR	Transmission Medium Requirement
TNS	Transit Network Selection
TUP	Telephone User Part

4 Functional requirements

The ORM Object Model for call routing management is a description of an interface which will be restricted by requirements. This clause gives the functional requirements of the routing process itself and will therefore have its influence on the ORM.

General requirements

- R.1 It is required to find the destination based on at least the digit code.
- R.2 The routing process can be divided into several phases: digit rebuilding, destination selection, routing possibility selection, digit preparation, exception handling.
- R.3 The model shall support the ability to identify the selecting objects of any target objects (given a knowledge of the target) in an efficient manner. For example, the model should be able to identify what routing data structures are applicable for a specific circuit subgroup.

Digit rebuilding

- R.4 Digit rebuilding manages the insertion of digits into the digit code (e.g. for prefixing).
- R.5 The model shall support digit rebuilding based on incoming circuit subgroup.
- R.6 The model shall support digit rebuilding based on nature of address.
- R.7 The model shall support digit rebuilding based on group of subscribers.

Carrier selection

- R.8 The model shall support the ability to determine the type of carrier according to origin and dialled digits.
- R.9 The model shall support the ability to ignore or intercept the carrier selected for certain calls.

Destination selection

- R.10 The model shall support the translation of a digit code into a nature of address and vice versa.
- R.11 The destination shall be determined by the dialled digits and, in addition, possibly by nature of address, selected carriers or others.
- R.12 The model shall support modification of digit codes.
- R.13 The model shall support treatment as a result of destination selection.
- R.14 The model shall support identification of the carrier.
- R.15 The model shall support time dependent selection of destination.
- R.16 The model shall support destination selection based on incoming circuit subgroup.
- R.17 The model shall support destination selection based on group of subscribers.

Routing possibility selection

- R.18 It shall be possible to handle a call as local or outgoing. Depending on special characteristics, a local call can be changed into an outgoing call in the routing sense (e.g. a call arriving within the digital exchange will be routed to the PABX either directly or via the analogue exchange. See Figure 1).

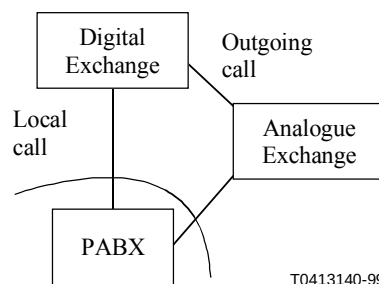


Figure 1/Q.826 – Routing possibility selection

- R.19 Treatment is needed when certain routing possibility selection criteria are encountered (e.g. when an IPI/TMR is not supported, an announcement has to be triggered).
- R.20 Selection of routing possibility is influenced by parameters as signalling capability, bearer capability, presence of echo suppressor on outgoing circuit subgroup, number of satellite links, or others.

R.21 This distribution of traffic on different carriers/destinations has to be possible (by means of network providers or administration):

- on a percentage basis;
- on the proportion of the available outgoing capacity;
- on the proportion of the incoming traffic.

R.22 The model shall support crankback as described in ITU-T E.170 [3].

R.23 The model shall support time dependent selection of routing possibility.

R.24 The model shall support routing possibility selection based on incoming circuit subgroup.

R.25 The model shall support routing possibility selection based on group of subscribers.

Digit preparation

R.26 Digit preparation shall support modification of digit codes based on parameters as, e.g. selected routing possibility, incoming or outgoing circuit subgroups.

R.27 The model shall support digit preparation based on incoming circuit subgroup.

R.28 The model shall support digit preparation based on group of subscribers.

Exception handling

R.29 It shall be possible to associate a treatment with the following exceptional conditions: missing database entry for call routing and cause value received during call routing (refer to ITU-T Q.850 [9]).

5 Information model

5.1 Information model overview

Because the routing function has grown independently of the switching systems, manufacturer specific characteristics are modelled optionally (i.e. with conditional packages).

In order to describe the management aspects of routing, the routing function has been divided into the following parts:

- 1) The translation of incoming dialled digits so that they can be processed by digit analysis.
- 2) The identification of the type of call (local, long distance, etc.) based on the origin of the call and the dialled digits. This information is used as part of carrier selection.
- 3) The identification of the destination is made by analysis of the digit codes and by means of other information.
- 4) The selection of a free circuit within a set of suitable circuits on which the call may be progressed. In case the destination is inside the exchange the appropriate terminal point(s) has to be selected.
- 5) The preparation of the digit string before it is sent to the next exchange.

Exceptional (and error) cases are treated by a final part.

Accordingly, five fragments were defined as:

5.1.1 Digit rebuilding fragment

Digit rebuilding is an activity on incoming digits.

It is possible that digits shall be added to or withdrawn from the original digits before analysis. As an example, this is sometimes necessary if R2 signalling is used.



With digit rebuilding the offered digits themselves can be modified. Examples where this can occur are service numbers, emergency numbers. (See Figure 2.)

5.1.2 Carrier selection fragment

Carrier selection is used by originating traffic. The carrier to be used for the call is selected based on the type of call (e.g. local, local toll, long distance, etc.). The type of call is determined by both the origin of the call and the destination of the call as indicated by the dialled digits. Once the type of call is determined then the particular carrier for this type of call for this customer can be extracted from the customer administration data. (The modelling of this information is outside the scope of this Recommendation.) Once the carrier is identified this information can be used by the destination selection fragment. (See Figure 3.)

5.1.3 Destination selection fragment

Other information of the call, combined with the digit codes, is obtained in order to determine the call destination.

Information, similar to signalling system call parameters, is stored in an exchange and grouped, so that calls matching these parameters will all be routed to the same destination or handled by alternative actions like announcements. Additionally, for locally originating calls also the nature of address and the called numbering plan might be determined for signalling systems which require this. (See Figure 4.)

5.1.4 Routing possibility selection fragment

For circuit selection, management aspects are covered to correlate destination and additional information with a suitable set of circuits. This correlation includes the traffic assignment rules to circuits within the possible set. (See Figure 5.)

5.1.5 Digit preparation fragment

Digit preparation is an activity on outgoing digits. After selection of a free circuit, digit code might need to be prepared for the adjacent exchange. (See Figure 6.)

5.1.6 Exception handling fragment

Exception handling associates a treatment with the following exceptional conditions: missing database entry for call routing and cause value received during call routing. (See Figure 7.)

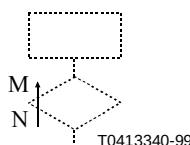
5.2 Information model diagrams

The following information model diagrams have been drawn for the purpose of clarifying the relations between the different object classes of routing management. Three types of diagrams are presented:

- E-R Relationship diagrams, showing relations between the different object classes;
- naming hierarchy showing the derivations of names for managed objects (i.e. the different naming paths for instances of managed objects);
- inheritance hierarchy diagram.

Legend:

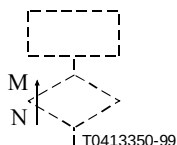
- Classes and relation in dotted lines



mean that the class or relation does

not belong to this fragment. The functionality represented by it is covered in another fragment.

- Classes and relation in dashed lines



mean that the class or relation does

not belong to this Recommendation. The functionality represented is covered in another standard.

- Relationship cardinality is normally $N \rightarrow M$ with N an integer (0...) and M an integer (1...). Other cases are explicitly specified.
- OR means that any or all branches can be present; XOR means that exactly one branch can be present.

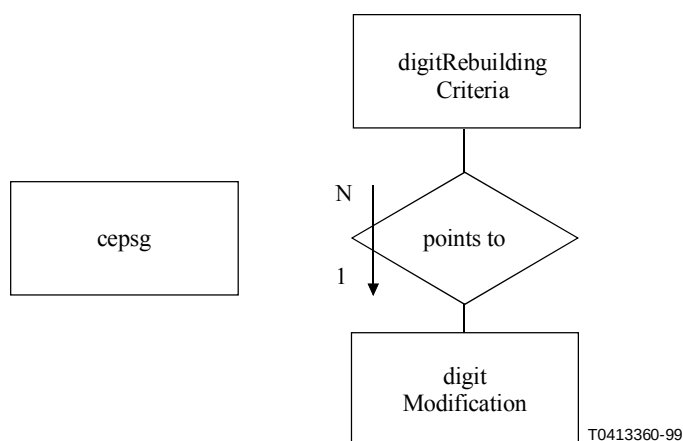


Figure 2/Q.826 – E-R Diagram 1 – Digit rebuilding fragment

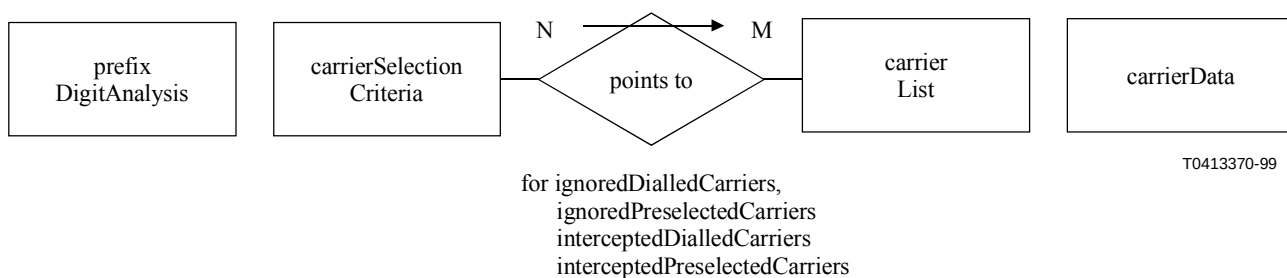
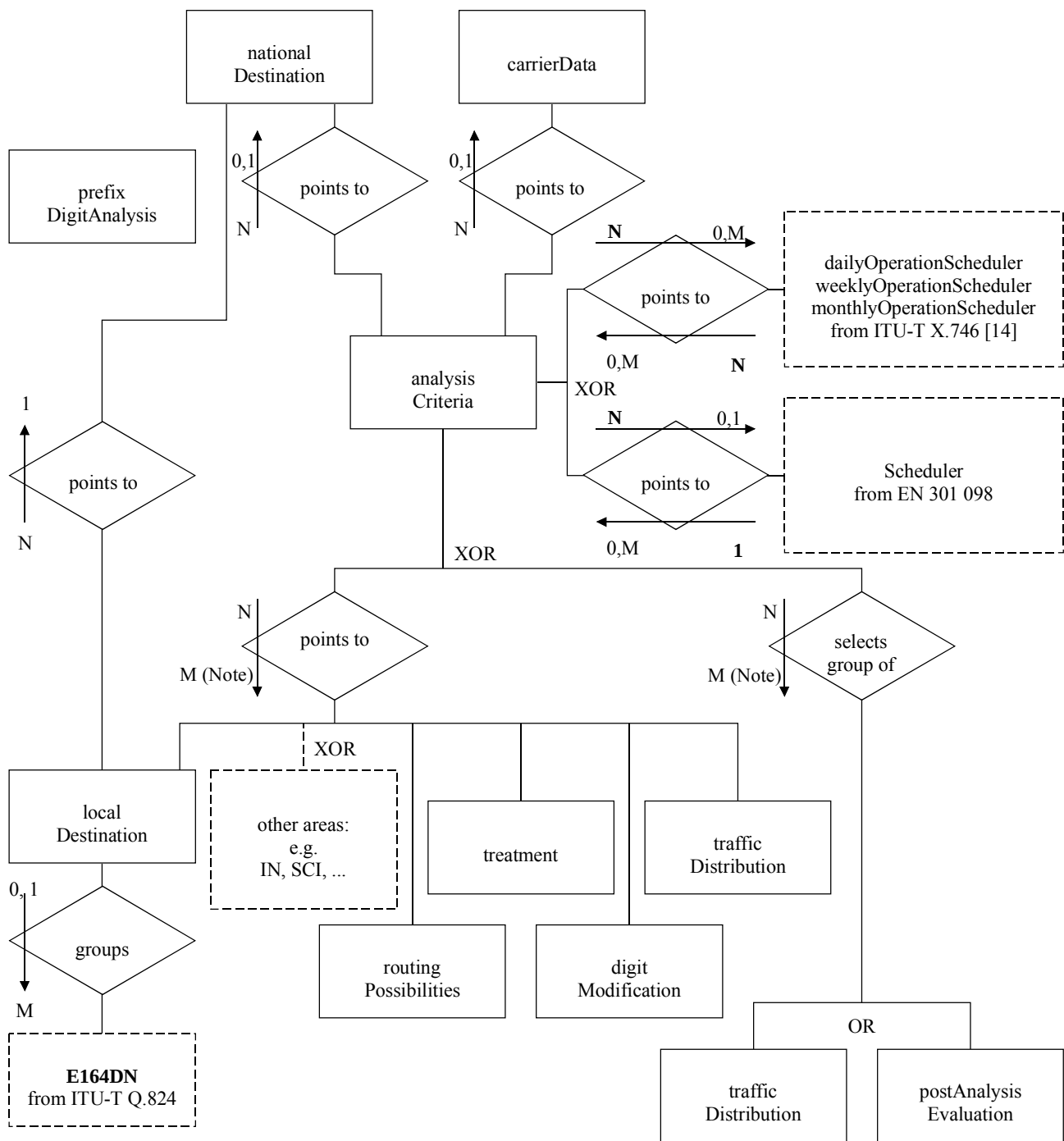


Figure 3/Q.826 – E-R Diagram 2 – Carrier selection fragment



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NOTE – M-cardinality because of Time scheduling;
Without Time scheduling: M = 1

Figure 4/Q.826 – E-R Diagram 3 – Destination selection fragment

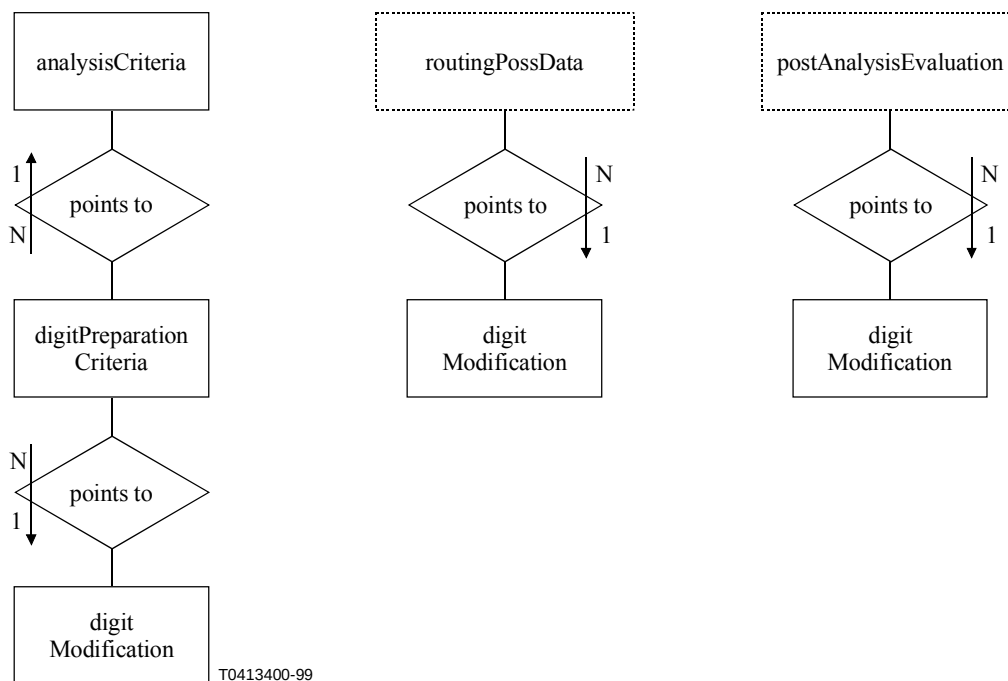


Figure 6/Q.826 – E-R Diagram 5 – Digit preparation fragment

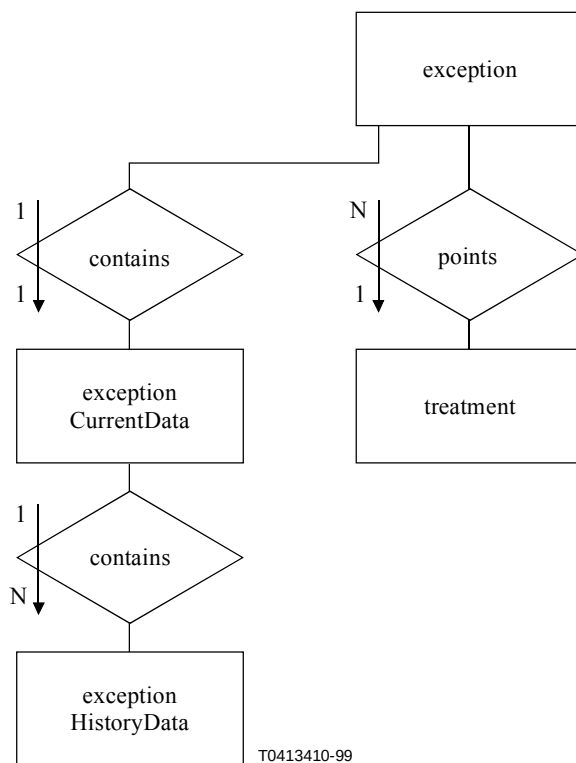


Figure 7/Q.826 – E-R Diagram 6 – Exception handling fragment

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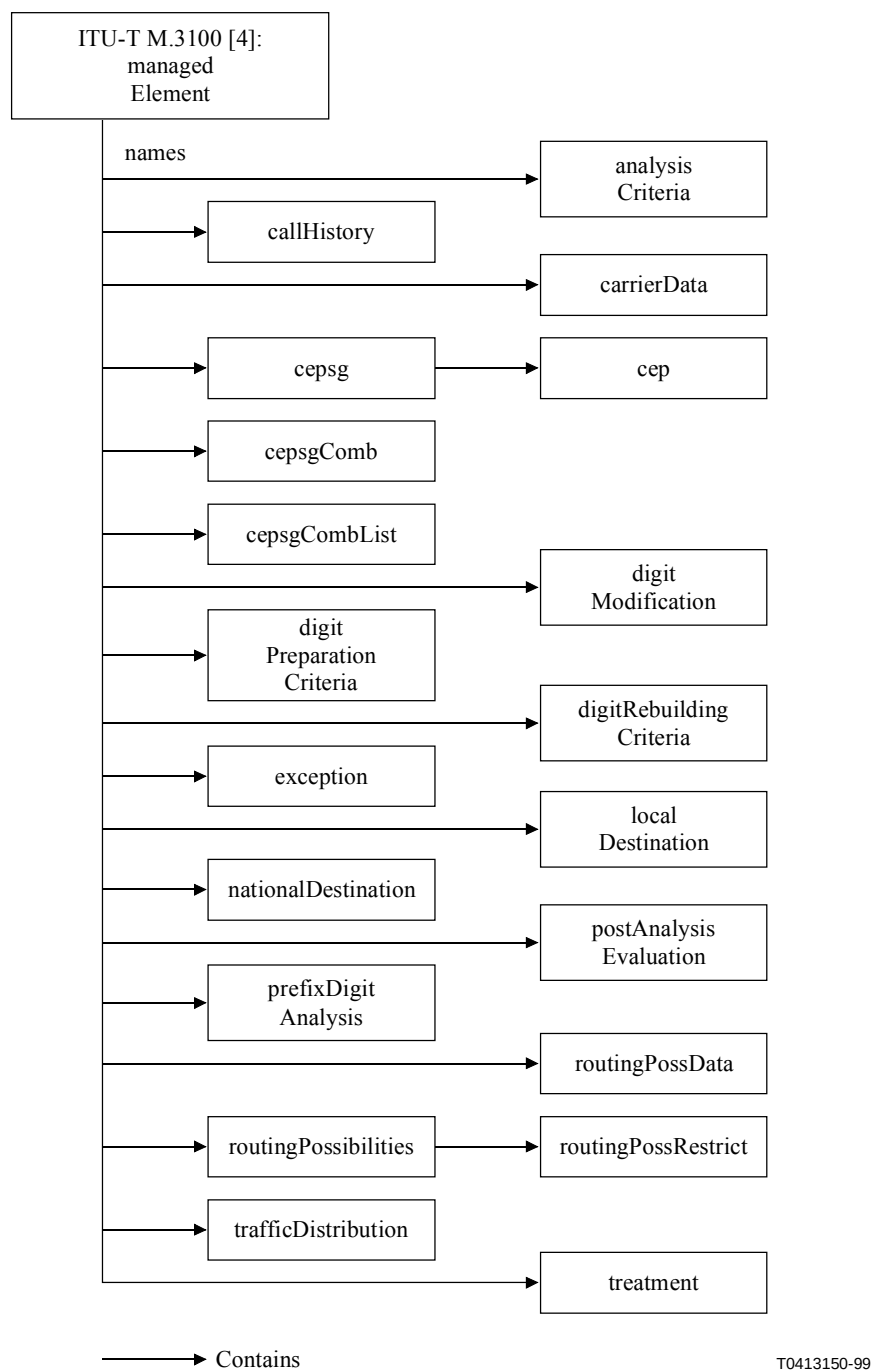


Figure 8/Q.826 – Diagram 7 – Naming relations

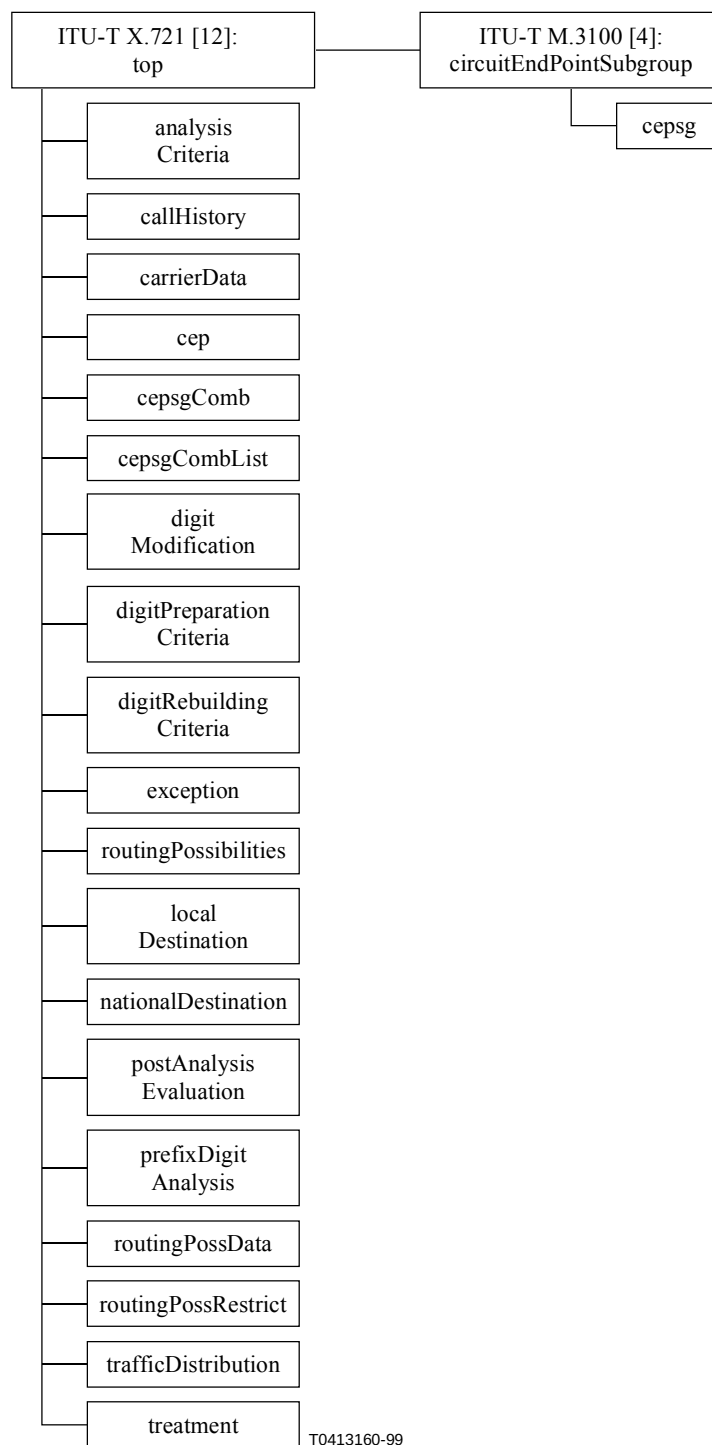


Figure 9/Q.826 – Diagram 8 – Inheritance tree

6 Information model description

In this clause the object classes of the information model are described. For object classes description Table 1 is used.

Table 1/Q.826 – Object class description

Object Class: "Object class name"			
Attributes	M/C	Value Set	Operation
Actions	M/C		
Notifications	M/C		

The column M/C indicates whether the information presented by the attributes/actions/notifications is mandatory (M) or conditional (C).

The column "Value Set" indicates whether the attribute is single-valued or set-valued (see 5.1.2.2/X.720 [11]).

The column "Operation" indicates the operations possible on the attribute.

Combination of key-attributes value shall be unique among all instances of a given object class. An asterisk "*" following an attribute name indicates a key attribute.

Important notice:

The conflict resolution that shall occur when several instances of a given object class match a specific call is out of the scope of this Recommendation.

6.1 analysisCriteria

The OC analysisCriteria describes the management information needed to make a selection among possible destinations.

For certain calls, e.g. service numbers and originating calls of virtual private networks, it is possible that initial digits need to be modified before the destination can be identified. The destination associated with this new digit string can then be determined by another instance of OC analysisCriteria. (See Table 2.)

Table 2/Q.826 – analysisCriteria

Object Class: analysisCriteria			
Attributes	M/C	Value Set	Operation
analysisCriteriaId	M	Single	GET SET-BY-CREATE
destinationCode*	M	Single	GET-REPLACE
analysisOrigin*	M	Single	REPLACE-WITH-DEFAULT GET-REPLACE
activeDestination	M	Single	GET SET-BY-CREATE
	C		REPLACE
callingPartyCategory*	C	Single	REPLACE-WITH-DEFAULT GET-REPLACE

Table 2/Q.826 – analysisCriteria (concluded)

Object Class: analysisCriteria			
Attributes	M/C	Value Set	Operation
nationalDestinationInstance*	C	Single	GET SET-BY-CREATE
destinationType*	C	Single	GET SET-BY-CREATE
extSchedulingAttribute	C	Set	GET-REPLACE ADD-REMOVE
"ITU-T Recommendation X.746 [14]": externalSchedulerName	C	Single	GET-REPLACE
numberOfDigits*	C	Single	GET SET-BY-CREATE
carrierDataInstance*	C	Single	GET SET-BY-CREATE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC analysisCriteria:

- analysisCriteriaId
This attribute is the naming attribute (RDN) of OC analysisCriteria.
- destinationCode
This attribute characterizes a destination by specifying the country code, or/and area code, or/and exchange identifying code, or/and individual line number, etc. to which the call can be routed.
- analysisOrigin
This attribute identifies the originForAnalysis group value. originForAnalysis can be defined in, e.g. incoming or two-ways cepsg or in subscriber data as described in Customer Administration Model. An instance of the OC analysisCriteria being independent of the analysis origin gets the value anyOrigin.
- activeDestination
This attribute either references an object instance or selects a group of instances via a label. If scheduling is supported, then this attribute contains the target, which is currently selected by the scheduler object. This attribute is read only in case of a scheduler being connected, otherwise read/write.
- callingPartyCategory
This attribute identifies the calling party category (according to ITU-T Q.763 [7], ITU-T Q.440 [17], or ITU-T Q.441 [18]) which have to be considered for routing purposes. Calling party categories include operator, test or normal subscriber call.
- nationalDestinationInstance
This attribute identifies the instance of OC nationalDestination which is applicable if the destinationCode value has to be assigned unambiguously to a national destination.

- destinationType
This attribute indicates the type of destination.
- extSchedulingAttribute
This attribute provides the scheduling information in the SMO, if external scheduling is supported as in ITU-T X.746 [14].
- externalSchedulerName
This attribute is used in the SMO for referencing the external SOs. (See ITU-T X.746 [14].)
- numberOfDigits
This attribute indicates the number of digits in the digit string. The existence of multiple analysisCriteria instances with different values for this attribute allows the administration of variable length digit strings that shall be routed to the same destination. It also allows the specification of a destination that depends not only on the leading digits as indicated in the attribute destinationCode, but also on the length of the digit string. In this way digit strings with identical leading digits, but with different lengths can be routed to different destinations.

When a specific number of digits is specified, this number cannot be smaller than the number of digits in the digit string as specified in the destinationCode attribute.
- carrierDataInstance
This attribute allows the selection of destinations depending on the dialled or assigned carrier code of the call.

6.2 callHistory

This OC describes criteria and/or restrictions related to the history of a call, e.g. the number of satellite links. It can be used, for example, to restrict the propagation delay. (See Table 3.)

Table 3/Q.826 – callHistory

Object Class: callHistory			
Attributes	M/C	Value Set	Operation
callHistoryId	M	Single	GET SET-BY-CREATE
echoSuppressor*	C	Single	GET-REPLACE
numberOfSatLinks*	C	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation M.3100 [4]": createDeleteNotificationsPackage	M		
"ITU-T Recommendation M.3100 [4]": attributeValueChangeNotificationPackage	C		

The following attributes describe the OC callHistory:

- callHistoryId
This attribute is the naming attribute (RDN) of OC callHistory.

- **echoSuppressor**
This attribute reflects whether an echo suppressor is required or not depending on whether an echo suppressor has already been included. If an echo suppressor is required, then cepsgs of suitable capability need to be identified, if the exchange does not provide the use of echo control devices inserted from a common pool (see ITU-T Q.115 [5]).
- **numberOfSatLinks**
This attribute represents the number of satellite links in the history of the call. The number of hops allowed for a certain call can be limited. In general, the limitation values for telephony are zero or one, for data no limitations are present.

6.3 carrierData

This OC represents – via the carrier code – carriers that can be used in the exchange for call routing purposes. (See Table 4.)

Table 4/Q.826 – carrierData

Object Class: carrierData			
Attributes	M/C	Value Set	Operation
carrierDataId	M	Single	GET SET-BY-CREATE
carrierCode*	M	Single	GET SET-BY-CREATE
ownCac	M	Single	GET-REPLACE
carrierType*	C	Single	GET SET-BY-CREATE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC carrierData:

- **carrierDataId**
This attribute is the naming attribute (RDN) of OC carrierData.
- **carrierCode**
This attribute describes the unambiguous carrier specific code that identifies a carrier. It can be dialled by a subscriber or supplied by the exchange.
- **ownCac**
This attribute describes whether the carrier access code identifies the network where the exchange is located.
- **carrierType**
This optional attribute identifies this carrierData object as pertaining to this carrier when performing the role as a carrier of this type. A carrier (with a particular carrierCode) may perform as several different types of carrier. The routing data may need to be different when the carrier is acting as these different carrier types due to a variety of reasons (for example regulator requirements). When present, this key attribute allows the same carrier (i.e. the same carrier code) to have different routing data when acting as different types of carriers.

6.4 carrierList

This OC is referenced by attributes in the carrierSelectionCriteria OC. It is used to define a list of carriers that are either ignored or intercepted. (See Table 5.)

Table 5/Q.826 – carrierList

Object Class: carrierList			
Attributes	M/C	Value Set	Operation
carrierListId	M	Single	GET SET-BY-CREATE
listOfCarriers	M	Set	GET-REPLACE ADD-REMOVE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC carrierList:

- carrierListId
This attribute is the naming attribute (RDN) of OC carrierList.
- listOfCarriers
This attribute contains a list of carriers.

6.5 carrierSelectionCriteria

This OC is used to determine the kind of call (for carrier selection purposes) based on the called destination and the origin of the call. It also allows carrier selection to be ignored for certain dialled or preselected carriers. If carrier selection is ignored for certain carriers, then either call processing can continue with the network provider default carrier or the call can be intercepted with some form of treatment. (See Table 6.)

Table 6/Q.826 – carrierSelectionCriteria

Object Class: carrierSelectionCriteria			
Attributes	M/C	Value Set	Operation
carrierSelectionCriteriaId	M	Single	GET SET-BY-CREATE
destinationCode*	M	Single	GET-REPLACE
carrierSelectionOrigin*	M	Single	GET-REPLACE
selectedCarrierType	M	Single	GET-REPLACE
ignoredDialledCarriers	C	Single	GET-REPLACE
ignoredPreselectedCarriers	C	Single	GET-REPLACE
interceptedDialledCarriers	C	Single	GET-REPLACE
interceptedPreselectedCarriers	C	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		



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The following attributes describe the OC carrierSelectionCriteria:

- carrierSelectionCriteriaId
This attribute is the naming attribute (RDN) of OC carrierSelectionCriteria.
- destinationCode
This attribute describes the destination for which carrier type is to be selected.
- carrierSelectionOrigin
This attribute describes the origin for this carrier type selection. It is related to data in the customer administration model identifying a set of customers (e.g. rate centre).
- selectedCarrierType
This attribute describes the type of carrier selected. The syntax of this attribute is a CarrierType or NULL. If it contains a CarrierType then an attribute that is identified by this CarrierType in the customer administration data and associated with the customer originating the call will contain the selected carrier identification information (carrierCode). This value is used to match the value of the carrierCode attribute in the carrierData OC. If the value of this attribute is NULL then the network provider default selection mechanism will be used to select the carrier. (The definition of the network provider default selection mechanism is outside the scope of this Recommendation.)
- ignoredDialledCarriers
This attribute points to carrierList OC that contains a list of carriers that will be ignored if selected by customer dialling for this type of call. Call processing will continue. The network provider default selection mechanism will be used to select the carrier.
- ignoredPreselectedCarriers
This attribute points to a carrierList OC that contains a list of carriers that will be ignored if preselected for this type of call. Call processing will continue. The network provider default selection mechanism will be used to select the carrier.
- interceptedDialledCarriers
This attribute points to carrierList OC that contains a list of carriers that will be intercepted with either an announcement or treatment if selected by customer dialling for this type of call.
- interceptedPreselectedCarriers
This attribute points to a carrierList OC that contains a list of carriers that will be intercepted with either an announcement or treatment if preselected for this type of call.

6.6 cep

This OC describes a circuit end point.

One cep belongs only to one set of circuit end points, the cepsg (circuit end point subgroup). (See Table 7.)

Table 7/Q.826 – cep

Object Class: cep			
Attributes	M/C	Value Set	Operation
cepId	M	Single	GET SET-BY-CREATE
"ITU-T Recommendation X.721 [12]": administrativeState	M	Single	GET-REPLACE
"ITU-T Recommendation X.721 [12]": usageState	M	Single	GET
ctpbInstance*	M	Single	GET SET-BY-CREATE
circuitNumber	M	Single	GET SET-BY-CREATE
officeEquipment*	C	Single	GET SET-BY-CREATE
cic	C	Single	GET SET-BY-CREATE
Notifications			
"ITU-T Recommendation M.3100 [4]": createDeleteNotificationsPackage	M		
"ITU-T Recommendation X.721 [12]": stateChange	M		

The following attributes describe the OC cep:

- cepId
This attribute is the naming attribute (RDN) of OC cep.
- administrativeState
This attribute indicates whether the circuit end point is administratively permitted to carry traffic (value "unlocked") or not (value "locked"). When in the locked state normal traffic may not be carried (i.e. the usage state must be idle). If placed directly into the locked state any existing call is cleared. If placed into the shutting down state an existing call is not cleared but when the call does clear via normal means the administrative state will transition to the locked state (and the cep will have a usage state of idle). Test calls and other testing procedures may be performed in the locked state.
- usageState
This attribute indicates whether there is traffic using the cep. Changes to the value of this attribute do not generate state change notifications. Note that the value of this attribute may not accurately reflect the usage of the cep if it is queried using multiple object operations. The initial value is idle.
- ctpbInstance
This attribute points to an instance of a subclass of the OC "ITU-T Recommendation M.3100 [4]": connectionTerminationPointBidirectional. Only one cep in the switch may point to a particular connectionTerminationPoint managed object.

- circuitNumber
This attribute indicates the logical circuit end point number within the containing circuit end point subgroup. It is unique within the containing circuit end point subgroup. It provides for the ordering of the cep instances contained within a circuit end point subgroup to support such functions as hunting.
- officeEquipment
This attribute references the physical equipment the circuit end point is associated with. If the inst choice is used, it references an instance of OC "ITU-T Recommendation M.3100 [4]": circuitPack. If the string choice is used, the value is technology specific.
- cic
This attribute indicates the circuit identification code (CIC) of the circuit which is terminated by the circuit end point. This attribute is applicable if SS No. 7 is used.

6.7 cepsg

This OC represents a circuit end point subgroup. An instance of cepsg has directionality one-way incoming, one-way outgoing or two-way. This OC is in fact a subclass of OC circuitEndPointSubgroup registered in ITU-T M.3100 [4] as M3100ObjectClass 31. (See Table 8.)

Table 8/Q.826 – cepsg

Object Class: cepsg			
Attributes	M/C	Value Set	Operation
"ITU-T Recommendation M.3100 [4]": transmissionCharacteristics	M	Single	REPLACE
"ITU-T Recommendation M.3100 [4]": labelOfFarEndExchange	M	Single	REPLACE
"ITU-T Recommendation X.721 [12]": administrativeState	M	Single	GET-REPLACE
assocSignRouteSetNePart	M	Single	REPLACE-WITH-DEFAULT GET-REPLACE
boundaryCrossing	M	Single	REPLACE-WITH-DEFAULT GET-REPLACE
prefixDigits	C	Single	REPLACE-WITH-DEFAULT GET-REPLACE
searchMethod	C	Single	GET-REPLACE
originForRebuilding	C	Single	GET-REPLACE
originForAnalysis	C	Single	GET-REPLACE
originForRouting	C	Single	GET-REPLACE
originForPreparation	C	Single	GET-REPLACE
termForPreparation	C	Single	GET-REPLACE
languageDigitProc	C	Single	REPLACE-WITH-DEFAULT GET-REPLACE

Table 8/Q.826 – cepsg (concluded)

Object Class: cepsg			
Attributes	M/C	Value Set	Operation
prefTrafficDirect	C	Single	GET-REPLACE
suppressOwnCac	C	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation X.721 [12]": stateChange	M		

The following attributes describe the OC cepsg:

- transmissionCharacteristics
This attribute is inherited from OC "ITU-T Recommendation M.3100 [4]": circuitEndPointSubgroup. Operation REPLACE is added here.
- labelOfFarEndExchange
This attribute is inherited from OC "ITU-T Recommendation M.3100 [4]": circuitEndPointSubgroup. Operation REPLACE is added here.
- administrativeState
This attribute – defined in ITU-T X.721 [12] – indicates whether the circuit end point subgroup is administratively permitted to be offered traffic (value "unlocked") or not (value "locked"). When moved to the locked state calls are **not** automatically cleared. Note that this state does not control traffic originating on ceps contained in this cepsg. Only the locked and unlocked values are supported (i.e. shutting down is not a valid value).
- assocSignRouteSetNePart
This attribute references a sigSetNePart instance (ITU-T Q.751.1 [6]) which represents the signalling point of the adjacent exchange connected by the cepsg. The attribute references no object instance (default value) for non SS No. 7 procedures.
- boundaryCrossing
This attribute indicates whether the circuit end point subgroup contains only circuit end points terminating circuits which cross international or organizational boundaries. The default value is "national".
- prefixDigits
This attribute defines the digit string which has to be inserted in front of the destination code arriving at the exchange. An empty digit string, which is the default value, means that no digits have to be inserted. The attribute is only applicable for circuit end point subgroups which have directionality incoming or two-way.
- searchMethod
The attribute is applicable if the circuit end point subgroup has directionality one-way outgoing or two-way.
This attribute describes the method to select idle circuits within a circuit end point subgroup. The following algorithms are defined for that purpose:
 - **fifoEvenElseLifoOdd**: The idle circuits are distributed in two lists. One list contains only idle circuits with even CICs, the other list contains only idle circuits with odd CICs. The circuits of the even CIC list are first choice, the circuits of the odd CIC list

are selected if the even CIC list is empty. The FIFO method is used for the even CIC list, the LIFO method is used for the odd CIC list.

- **fifoOddElseLifoEven:** The idle circuits are distributed in two lists. One list contains only idle circuits with even CICs, the other list contains only idle circuits with odd CICs. The circuits of the odd CIC list are first choice, the circuits of the even CIC list are selected if the odd CIC list is empty. The FIFO method is used for the odd CIC list, the LIFO method is used for the even CIC list.
- **fifoEvenGrpElseLifoOddGrp** (for PCM 30 circuits): The idle circuits are distributed in two lists. One list contains only idle circuits with an even value of the integer part of the expression CIC divided by 16, the other list contains only idle circuits with an odd value for the integer part of the expression CIC divided by 16. The circuits of the even group CIC list are first choice, the circuits of the odd group CIC list are selected if the even group CIC list is empty. The FIFO method is used for the even group CIC list, the LIFO method is used for the even group CIC list.
- **fifoOddGrpElseLifoEvenGrp** (for PCM 30 circuits): The idle circuits are distributed in two lists. One list contains only idle circuits with an even value of the integer part of the expression CIC divided by 16, the other list contains only idle circuits with an odd value for the integer part of the expression CIC divided by 16. The circuits of the odd group CIC list are first choice, the circuits of the even group CIC list are selected if the odd group CIC list is empty. The FIFO method is used for the odd group CIC list, the LIFO method is used for the even group CIC list.
- **fifo:** This algorithm uses only one list for the idle circuits. The FIFO method is used to select the circuits.
- **forwardSequential:** This algorithm selects the idle circuit with the lowest circuit/CIC number.
- **backwardSequential:** This algorithm selects the idle circuit with the highest circuit/CIC number.
- **forwardOddElseBackwardEven:** This algorithm selects the idle circuit with the lowest odd circuit/CIC number. If no idle circuit with an odd circuit/CIC number is available, it selects the idle circuit with the highest even circuit/CIC number.
- **forwardEvenElseBackwardOdd:** This algorithm selects the idle circuit with the lowest even circuit/CIC number. If no idle circuit with an even circuit/CIC number is available, it selects the idle circuit with the highest odd circuit/CIC number.
- **forwardCyclic:** This algorithm selects the idle circuit with the lowest circuit/CIC number that is larger than the circuit/CIC number of the previously selected circuit. If no such idle circuit exists, it selects the idle circuit/CIC with the lowest circuit/CIC number that is less than the circuit/CIC number of the previously selected circuit.
- **backwardCyclic:** This algorithm selects the idle circuit with the highest circuit/CIC number that is less than the circuit/CIC number of the previously selected circuit. If no such idle circuit exists, it selects the idle circuit/CIC with the highest circuit/CIC number that is larger than the circuit/CIC number of the previously selected circuit.
- **random:** This algorithm selects an idle circuit at random.

– originForRebuilding, originForAnalysis, originForRouting, originForPreparation

These attributes are applicable if the circuit end point subgroup has directionality incoming or two-way. They represent the origin groups to which circuit end point subgroups belong. This grouping can influence digit rebuilding, digit analysis, call routing, digit preparation, respectively.

– termForPreparation

This attribute is applicable if the circuit end point subgroup has directionality outgoing or two-way. It represents the group to which circuit end point subgroups belong. This grouping can influence digit preparation.

– languageDigitProc

This attribute indicates whether the language digit has to be extracted from the transmitted digit string for incoming calls and has to be included into the transmitted digit string for outgoing calls on the position specified by the signalling systems R2 or C5 for international transit or terminating traffic. The default value is FALSE. The attribute is applicable if one of these signalling systems is used.

– prefTrafficDirect

This attribute specifies for circuit end point subgroups with directionality two-way the preferred traffic direction in case of seizure conflicts. If two exchanges at the end of a circuit subgroup try to seize the same circuit, then this attribute determines how to resolve the conflict.

- incoming: the incoming seizure is preferred for this circuit end point subgroup;
- outgoing: the outgoing seizure is preferred for this circuit end point subgroup;
- outgoingFirstChoiceList: the outgoing seizure is preferred for this circuit end point subgroup, if the seizure is performed on a circuit end point of the first choice list. This value can only be used if the attribute searchMethod indicates an algorithm that uses a first choice list.

Otherwise the incoming seizure is preferred.

– suppressOwnCac

This attribute describes whether the own CAC (carrier access code) shall be suppressed, i.e. whether the TNS parameter will be suppressed and/or whether CAC will be taken out of digit string. This attribute is applicable if the possibility to administer suppression of own carrier codes has to be provided and if the circuit end point subgroup has directionality one-way incoming or two-way.

6.8 cepsgComb

This OC describes a set of cepsgs for which a certain algorithm is used to assign traffic to a circuit end point subgroup (of the traffic offered to the set). This includes the detailed information how the traffic is distributed over the elements in the set. The instances of the OC cepsg, which are used in an instance of the OC cepsgComb can be of different characteristics, but shall be of the directionality outgoing or two-way.

Three algorithms are identified to assign traffic to the set of cepsgs:

– the sequential algorithm

For the sequential algorithm, the cepsgs are ordered in a list. The sequential algorithm starts searching for an available cepsg always at the first element of the list.

– the cyclic algorithm

For the cyclic algorithm the cepsgs are also ordered in a list. The cyclic algorithm remembers the cepsg found in the previous search (for another call) and starts searching for an available cepsg beginning with the next element in the list.

- the "proportional bidding" algorithm

Traffic is distributed over "rows" according to a certain assigned percentage. Every "row" consists of cepsgs of an ordered list. If a call is assigned to a "row", then the search for an available cepsg will be done in a sequential way within the ordered list (see Table 9). The sum of "rows" percentage shall be 100%.

Table 9/Q.826 – Example of proportional bidding

ROW: percentage	cepsgCombSelection ----> descending "priority"
"ROW 1": 50%	cepsgId="a", cepsgId="c", cepsgId="f"
"ROW 2": 30%	cepsgId="f", cepsgId="g", cepsgId="i"
"ROW 3": 20%	cepsgId="c", cepsgId="i", cepsgId="g"

It is also possible that each row consists of a list of all the cepsgIds of the cepsgComb, but each time in a shifted permutation (see Table 10), or with a common overflow (see Table 11).

Table 10/Q.826 – Example of proportional bidding with overflow

ROW:percentage	cepsgCombSelection ----> descending "priority"
"ROW 1": 50%	cepsgId="a", cepsgId="c", cepsgId="f"
"ROW 2": 30%	cepsgId="c", cepsgId="f", cepsgId="a"
"ROW 3": 20%	cepsgId="f", cepsgId="a", cepsgId="c"

Table 11/Q.826 – Example of proportional bidding with common overflow

ROW:percentage	cepsgCombSelection ----> descending "priority"
"ROW 1": 50%	cepsgId="a", cepsgId="d", cepsgId="e"
"ROW 2": 30%	cepsgId="b", cepsgId="d", cepsgId="e"
"ROW 3": 20%	cepsgId="c", cepsgId="d", cepsgId="e"

Table 12/Q.826 – cepsgComb

Object Class: cepsgComb			
Attributes	M/C	Value Set	Operation
cepsgCombId	M	Single	GET SET-BY-CREATE
cepsgCombSelection	M	Set/Single	GET-REPLACE
possibilitiesInList	M	Set	GET
usedAlgorithm	M	Single	GET-REPLACE
"ITU-T Recommendation M.3100 [4]": userLabel	C	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC cepsgComb:

- cepsgCombId
This attribute is the naming attribute (RDN) of OC cepsgComb.
- cepsgCombSelection
If the sequential or cyclic algorithms are used, this attribute gives the ordered list of cepsgs belonging to this cepsgComb. If the proportional bidding algorithm is used, this attribute gives the percentage value and the ordered cepsg list, for every "row".
- possibilitiesInList
This attribute gives the set of cepsgs found in cepsgCombSelection. It is automatically updated to be kept in synchronization as the cepsgs are updated in cepsgCombSelection. This attribute is used to support filtering.
- usedAlgorithm
This attribute describes the algorithm that is used: sequential, cyclic or proportional bidding.
- userLabel
This attribute assigns a user friendly name to a cepsgComb object instance. This attribute is defined in ITU-T M.3100 [4].

6.9 cepsgCombList

This OC describes a set of instances of OC cepsgComb or routingPossData for which a certain algorithm is used to assign traffic to a member of the set. (See Table 13.)

Table 13/Q.826 – cepsgCombList

Object Class: cepsgCombList			
Attributes	M/C	Value Set	Operation
cepsgCombListId	M	Single	GET SET-BY-CREATE
cepsgCombListSelection	M	Set/Single	GET-REPLACE
possibilitiesInList	M	Set	GET
usedAlgorithm	M	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC cepsgCombList:

- cepsgCombListId
This attribute is the naming attribute (RDN) of OC cepsgCombList.
- cepsgCombListSelection
This attribute gives a list of instances on which the selection algorithm found in the attribute usedAlgorithm is to apply. These instances can be instances of OC routingPossData or of OC cepsgComb.
- possibilitiesInList
This attribute gives the set of cepsgComb and routingPossData found in cepsgCombListSelection. It is automatically updated to be kept in synchronization as the cepsgComb or routingPossData object instances are updated in cepsgCombListSelection. This attribute is used to support filtering.

- usedAlgorithm

This attribute describes the algorithm that is used: sequential, cyclic or proportional bidding.

6.10 digitModification

The OC digitModification defines how a sequence of digits is to be modified. The cases in which the sequence of digits is to be modified are described by the OCs digitRebuildingCriteria, routingPossData, analysisCriteria, postAnalysisEvaluation and digitPreparationCriteria.

Digit codes modification triggered by instances of OC digitRebuildingCriteria is used, for example, to insert digits into the digit string, which arrives at the exchange, and so to define a new digit sequence. The new digit sequence is used as input for the OC analysisCriteria.

For the OCs analysisCriteria and postAnalysisEvaluation, digit string modification is used, for example, to replace or suppress digits. If necessary, the resulting digit string can be further analysed to determine the ultimate destination.

For the OCs digitPreparationCriteria and routingPossData, the digits can be prepared before they are sent to the next (adjacent) exchange. (See Table 14.)

Table 14/Q.826 – digitModification

Object Class: digitModification			
Attributes	M/C	Value Set	Operation
digitModificationId	M	Single	GET SET-BY-CREATE
digitSuppress	M	Set	GET-REPLACE ADD-REMOVE
digitCombReplace	M	Set	GET-REPLACE ADD-REMOVE
digitCombInsert	M	Set	GET-REPLACE ADD-REMOVE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC digitModification:

- digitModificationId

This attribute is the naming attribute (RDN) of OC digitModification.

- digitSuppress, digitCombReplace, digitCombInsert

These three attributes define which sequence of digits needs to be suppressed, to be replaced (and by which digit string) or to be inserted (and at which position in the digit string), respectively.

All three attributes work independently on the same digit string that has to be modified. Therefore, no precedence is defined for suppression, replacement and insertion. Each attribute is set-valued in order to allow multiple operations of the same kind on the same digit string. Double insertion at one position is not allowed. For the replace and suppress activities, the integer value of the endPosition shall be greater than the startPosition.

6.11 digitPreparationCriteria

The OC digitPreparationCriteria provides the management information for digit preparation for the next exchange. If the attributes preparationOrigin, preparationTerm, analysisCriteriaInstance match with information from a call then the identified instance of OC digitModification is applicable. (See Table 15.)

Table 15/Q.826 – digitPreparationCriteria

Object Class: digitPreparationCriteria			
Attributes	M/C	Value Set	Operation
digitPreparationCriteriaId	M	Single	GET SET-BY-CREATE
preparationOrigin*	M	Single	REPLACE-WITH-DEFAULT GET-REPLACE
preparationTerm*	M	Single	REPLACE-WITH-DEFAULT GET-REPLACE
analysisCriteriaInstance*	M	Single	GET-REPLACE
digitModificationInstance	M	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC digitPreparationCriteria:

- **digitPreparationCriteriaId**
This attribute is the naming attribute (RDN) of OC digitPreparationCriteria.
- **preparationOrigin**
This attribute identifies a group of instances of the OC cepsg (directionality: incoming or two-way) or of subscribers. The corresponding grouping attribute in OC cepsg is originForPreparation. The corresponding grouping attribute for subscribers is the responsibility of customer administration area. An instance of the OC digitPreparationCriteria that is independent of the digit preparation origin gets the default value anyOrigin.
- **preparationTerm**
This attribute identifies a group of instances of the OC cepsg (directionality: outgoing or two-way) or of subscribers. The corresponding grouping attribute in OC cepsg is termForPreparation. The corresponding grouping attribute for subscribers is the responsibility of customer administration area. An instance of the OC digitPreparationCriteria that is independent of the digit preparation termination gets the default value anyTerm.
- **analysisCriteriaInstance**
This attribute indicates the instance of OC analysisCriteria which has to match.
- **digitModificationInstance**
This attribute identifies the instance of OC digitModification which is applicable if key-attributes match with call information.

6.12 digitRebuildingCriteria

The OC digitRebuildingCriteria provides management information for the digit code rebuilding process before the digits are analysed by OC analysisCriteria. This part of the digit rebuilding is independent of incoming digits.

If information, extracted from a call, matches with the attributes rebuildingOrigin, natureOfAddress and calledNumberingPlan, then the digit codes will be modified according to the instance of OC digitModification, addressed by the attribute digitModificationInstance. (See Table 16.)

Table 16/Q.826 – digitRebuildingCriteria

Object Class: digitRebuildingCriteria			
Attributes	M/C	Value Set	Operation
digitRebuildingCriteriaId	M	Single	GET SET-BY-CREATE
rebuildingOrigin*	M	Single	REPLACE-WITH-DEFAULT GET-REPLACE
natureOfAddress*	M	Single	GET-REPLACE
calledNumberingPlan*	M	Single	GET-REPLACE
digitModificationInstance	M	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC digitRebuildingCriteria:

- **digitRebuildingCriteriaId**
This attribute is the naming attribute (RDN) of OC digitRebuildingCriteria.
- **rebuildingOrigin**
This attribute identifies a group of instances of the OC cepsg (directionality: incoming or two-way) or of subscribers. The corresponding grouping attribute in OC cepsg is originForRebuilding. The corresponding grouping attribute for subscribers is the responsibility of customer administration area. An instance of the OC digitRebuildingCriteria that is independent of the digit rebuilding origin gets the default value anyOrigin.
- **natureOfAddress**
This attribute identifies the natureOfAddress that has to be considered for digit rebuilding process. Possible values are defined by ITU-T Q.763 [7] (e.g. national, international or local).
- **calledNumberingPlan**
This attribute identifies the value of called numbering plan that has to be considered for digit rebuilding process. Possible values are defined by ITU-T Q.763 [7] (e.g. ISDN/PSTN, data, telex and operator specific values).
- **digitModificationInstance**
This attribute identifies the instance of OC digitModification which is applicable if key-attributes match with call information.

6.13 exception

The OC exception provides management information to handle exception situations (e.g. of call routing). It applies if:

- a particular instance of an OC is required but not available
The specific OC type is given by the attribute matchesIf. In case of successful routing the OC exception will not be used.
- a particular cause value is received or generated
The specific cause is given by the attribute matchesIf and has been defined in the Cause Indicator Field defined in ITU-T Q.850 [9]. (See Table 17.)

Table 17/Q.826 – exception

Object Class: exception			
Attributes	M/C	Value Set	Operation
exceptionId	M	Single	GET SET-BY-CREATE
matchesIf*	M	Set	GET-REPLACE ADD-REMOVE
treatmentInstance	M	Single	GET-REPLACE
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC exception:

- exceptionId
This attribute is the naming attribute (RDN) of OC exception.
- matchesIf
This attribute gives the cause values and/or the OC types for which the instance of OC exception is applicable. A particular cause value or OC type shall not appear in different instances of the OC exception.
- treatmentInstance
This attribute identifies the treatment which applies if an instance of this OC matches.

6.14 exceptionCurrentData

The OC exceptionCurrentData provides the count of the number of times the containing exception has occurred in the granularity interval. This OC is a subclass of currentData found in ITU-T Q.822 [20]. (See Table 18.)

Table 18/Q.826 – exceptionCurrentData

Object Class: exceptionCurrentData			
Attributes	M/C	Value Set	Operation
exceptionCount	M	Single	GET
Notifications			

The following attribute describes the OC exceptionCurrentData:

- exceptionCount
This attribute is the count of the occurrences of the exception during the current granularity period.

6.15 exceptionHistoryData

The OC exceptionHistoryData provides storage of the count of the number of times the containing exception has occurred in a previous granularity interval. This OC is a subclass of HistoryData found in ITU-T Q.822 [20]. (See Table 19.)

Table 19/Q.826 – exceptionHistoryData

Object Class: exceptionHistoryData			
Attributes	M/C	Value Set	Operation
exceptionCount	M	Single	GET
Notifications			

The following attribute describes the OC exceptionCurrentData:

- exceptionCount
This attribute is the count of the occurrences of the exception during this history period.

6.16 localDestination

The OC localDestination represents the grouping of directory numbers of an exchange (e.g. DNs of local subscribers, PABXs). (See Table 20.)

Table 20/Q.826 – localDestination

Object Class: localDestination			
Attributes	M/C	Value Set	Operation
localDestinationId	M	Single	GET SET-BY-CREATE
nationalDestinationInstance	M	Single	GET SET-BY-CREATE
initialSubscriberCodes	M	Single	GET-REPLACE
excludedSubscriberCodes	C	Set	GET-REPLACE ADD-REMOVE
Actions			
modifyNumberingScheme	M		
Notifications			
"ITU-T Recommendation M.3100 [4]": objectManagementNotificationsPackage	M		

The following attributes describe the OC localDestination:

- localDestinationId
This attribute is the naming attribute (RDN) of OC localDestination.

- **nationalDestinationInstance**
This attribute identifies the instance of OC **nationalDestination** which is applicable.
 - **initialSubscriberCodes**
This attribute contains the codes which characterize the initial digits of a subscriber number (refer to ITU-T E.164 [2]).
A directory number belongs to this local destination:
 - if the directory number is a member of the local area defined by the **nationalDestinationInstance**;
 - if an initial digit string part of the SN part of the directory number (SN part see ITU-T E.164 [2]) matches with one of the codes of this attribute;
 - if it is not excluded by attribute **excludedSubscriberCodes**.
 - **excludedSubscriberCodes**
This attribute is present if it is necessary to exclude DNs from the local destination. It contains the codes, which characterize the initial digits of a subscriber number (refer to ITU-T E.164 [2]). It is possible to specify with this attribute entire SNs explicitly or only initial strings of SNs.
A directory number is excluded from this local destination:
 - if the directory number is a member of the local area defined by the **nationalDestinationInstance** attribute; and
 - if an initial digit string part of the SN part of the directory number matches with one of the codes of this attribute (**excludedSubscriberCodes**).
- The following action is defined for the OC **localDestination**:
- **modifyNumberingScheme**
This action operation modifies data of OC **localDestination** instance and the directory number instances which belong to it. This action does not change the implicit relationship between the directory numbers and the local destination: a directory number that belonged/did not belong to the local destination before the action belongs/does not belong to it after the action is executed on the **localDestination** instance.

6.17 **nationalDestination**

The OC **nationalDestination** describes the national destinations codes (refer to ITU-T E.164 [2]) that are supported in the exchange. (See Table 21.)

Table 21/Q.826 – nationalDestination

Object Class: nationalDestination			
Attributes	M/C	Value Set	Operation
nationalDestinationId	M	Single	GET SET-BY-CREATE
nationalDestinationCode*	M	Single	GET SET-BY-CREATE
Notifications			
"ITU-T Recommendation M.3100 [4]": createDeleteNotificationsPackage	M		