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SERIES X: DATA NETWORKS AND OPEN SYSTEM
COMMUNICATION

Public data networks – Maintenance

**Definition of management information for
customer network management service
for public data networks to be used with
the CNMc interface**

ITU-T Recommendation X.162

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(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION X.162

DEFINITION OF MANAGEMENT INFORMATION FOR CUSTOMER NETWORK MANAGEMENT SERVICE FOR PUBLIC DATA NETWORKS TO BE USED WITH THE CNM_c INTERFACE

Summary

This Recommendation intends to become one of a set of Recommendations for the customer network management service for data networks, which cover the architecture, services, and management information required to achieve such services between a network and a customer.

This Recommendation is, in particular, concerned with the definition of information for the customer network management service, such as managed objects, attributes, name bindings, in the OSI Systems Management context (CMISE).

This Recommendation corresponds to Recommendation X.163, which defines management information to be used with the CNM_e interface.

Source

ITU-T Recommendation X.162 was revised by ITU-T Study Group 7 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 9th of August 1997.

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FOREWORD

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

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

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

NOTE

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

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Recommendation X.162

DEFINITION OF MANAGEMENT INFORMATION FOR CUSTOMER NETWORK MANAGEMENT SERVICE FOR PUBLIC DATA NETWORKS TO BE USED WITH THE CNMc INTERFACE

(revised 1997)

1 Scope

This Recommendation:

- applies to the CNMc interface defined in Recommendation X.160;
- corresponds to Recommendation X.163, which defines management information to be used with the CNMe interface;
- defines management information, such as the Managed Object (MO) classes, attribute types, action types, notification types, etc., for the customer network management service specified in Recommendation X.161, documented in accordance with Recommendation X.722, the Guidelines for the Definition of Managed Objects;
- specifies compliance requirements placed on other Recommendations definitions;
- specifies conformance requirements.

This Recommendation is applicable to the development of the customer network management service and provides generic definitions which support that service. These definitions may also be used in other Recommendations specifying MO classes, attributes, notifications and action types.

NOTE – Currently, this Recommendation only considers the definition of management information for X.25 packet-mode access to PSPDNs. These definitions use some of the Managed Information definitions under development within ISO/IEC JTC 1 and ITU-T.

It is recognized that other types of access to PSPDNs exist; PADs, X.32 (PSTN access to X.25), and other networks, e.g. ISDN, and CSPDN. The definition of management information specifically related to each of these is for further study. Some definitions within the current version of this Recommendation are, however, generic to all access types and networks.

2 References

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

NOTE – The CNM service sets will conform to specific elements of the part of the functional ISPs. These functional ISPs include 11183-1, 11183-2 and 11183-3, 1206 and 12059 series.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.701 (1997) | ISO/IEC 10040:1997, *Information technology – Open Systems Interconnection – System management overview*.
- CCITT Recommendation X.720 (1992) | ISO/IEC 10165-1:1993, *Information technology – Open Systems Interconnection – Structure of management information: Management information model*.
- CCITT Recommendation X.721 (1992) | ISO/IEC 10165-2:1992, *Information technology – Open Systems Interconnection – Structure of Management Information: Part 2: Definition of Management Information*.
- ITU-T Recommendation X.723 (1993) | ISO/IEC 10165-5:1994, *Information technology – Open Systems Interconnection – Structure of management information – Generic management information*.

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- ITU-T Recommendation X.724 (1996) | ISO/IEC 10165-6:1997, *Information technology – Open Systems Interconnection – Structure of management information – Requirements and guidelines for Implementation conformance statement proformas associated with OSI information.*
- CCITT Recommendation X.730 (1992) | ISO/IEC 10164-1:1993, *Information technology – Open Systems Interconnection – Systems Management: Object management function.*
- CCITT Recommendation X.731 (1992) | ISO/IEC 10164-2:1992, *Information technology – Open Systems Interconnection – Systems Management: State management function.*
- CCITT Recommendation X.732 (1992) | ISO/IEC 10164-3:1993, *Information technology – Open Systems Interconnection – Systems Management: Attributes for representing relationships.*
- CCITT Recommendation X.733 (1992) | ISO/IEC 10164-4:1992, *Information technology – Open Systems Interconnection – Systems Management: Alarm reporting function.*
- CCITT Recommendation X.734 (1992) | ISO/IEC 10164-5:1993, *Information technology – Open Systems Interconnection – Systems Management: Event report management function.*
- CCITT Recommendation X.735 (1992) | ISO/IEC 10164-6:1993, *Information technology – Open Systems Interconnection – Systems Management: Log control function.*
- CCITT Recommendation X.736 (1992) | ISO/IEC 10164-7:1992, *Information technology – Open Systems Interconnection – Systems Management: Security alarm reporting function.*
- ITU-T Recommendation X.737 (1995) | ISO/IEC 10164-14:1996, *Information technology – Open Systems Interconnection – Systems Management: Confidence and diagnostic test categories.*
- ITU-T Recommendation X.738 (1993) | ISO/IEC 10164-13:1995, *Information technology – Open Systems Interconnection – Systems Management: Summarization function.*
- ITU-T Recommendation X.739 (1993) | ISO/IEC 10164-11:1994, *Information technology – Open Systems Interconnection – Systems Management: Metric objects and attributes.*
- ITU-T Recommendation X.740 (1992) | ISO/IEC 10164-8:1993, *Information technology – Open Systems Interconnection – Systems Management: Security and trail function.*
- ITU-T Recommendation X.742 (1995) | ISO/IEC 10164-10:1995, *Information technology – Open Systems Interconnection – Systems Management: Usage metering function for accounting purposes.*
- ITU-T Recommendation X.745 (1993) | ISO/IEC 10164-12:1994, *Information technology – Open Systems Interconnection – Systems Management: Test management function.*

2.2 Paired Recommendations | International Standards equivalent in technical content

- ITU-T Recommendation X.281 (1995), *Information Technology – Elements of management information related to OSI physical layer.*
ISO/IEC 13642:1996, *Information technology – Elements of management information related to OSI physical layer.*
- ITU-T Recommendation X.282 (1995), *Elements of management information related to OSI data link layer.*
ISO/IEC 10742:1994, *Information technology – Telecommunications and information exchange between systems – Elements of management information relating to OSI Data Link Layer standards.*
- ITU-T Recommendation X.283 (1993), *Elements of management information related to the OSI network layer.*
ISO/IEC 10733:1993, *Information technology – Telecommunications and information exchange between systems – Elements of management information relating to OSI Network Layer standards.*
- CCITT Recommendation X.700 (1992), *Management framework for Open Systems Interconnection (OSI) for CCITT applications.*
ISO/IEC 7498-4:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4: Management framework.*
- CCITT Recommendation X.710 (1991), *Common management information service definition for CCITT applications.*

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

- CCITT Recommendation X.711 (1991), *Common management information protocol specification for CCITT applications*.

ISO/IEC 9596-1:1991, *Information technology – Open Systems Interconnection – Common management information protocol – Part 1: Specification*.

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

ISO/IEC 10165-4:1992, *Information technology – Open Systems Interconnection – Structure of management information – Part 4: Guidelines for the definition of managed objects*.

2.3 Additional references

- ITU-T Recommendation M.3010 (1996) – *Principles for a telecommunications management network*.
- ITU-T Recommendation M.3020 (1995) – *TMN interface specification methodology*.
- ITU-T Recommendation M.3100 (1995) – *Generic network information model*.
- ITU-T Recommendation Q.822 (1994) – *Stage 1, stage 2 and stage 3 description for the Q3 interface – Performance management*.
- ITU-T Recommendation X.2 (1996), *International data transmission services and optional user facilities in public data networks and ISDNs*.
- ITU-T Recommendation X.160 (1996), *Architecture for customer network management service for public data networks*.
- ITU-T Recommendation X.161 (1997), *Definition of customer network management services for public data networks*.
- ITU-T Recommendation X.163 (1995), *Definition of management information for customer network management service for public data networks to be used with the CNMe Interface*.
- ITU-T Recommendation X.790 (1995), *Trouble management function for ITU-T applications*.

3 Definitions

This Recommendation defines the following terms.

3.1 X.160 definitions

This Recommendation makes use of the following terms defined in Recommendation X.160:

- Customer Network Management;
- CNM;
- CNMc;
- CNMe.

3.2 X.701 management framework definitions

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

- managed object;
- agent;
- manager;
- notification;
- managed object class.

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3.3 X.710 CMIS definitions

This Recommendation makes use of the following terms defined in CCITT Rec. X.710 and ISO/IEC 9595:

- attribute;
- M-REPORT operation;
- M-GET operation;
- M-SET operation;
- M-ACTION operation;
- M-CREATE operation;
- M-DELETE operation;
- M-CANCEL-GET operation.

3.4 X.722 GDMO definitions

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

- behaviour;
- package;
- conditional package;
- name binding;
- action type;
- parameter.

3.5 M.3020 definition

This Recommendation makes use of the following term defined in Recommendation M.3020:

- TMN Management Function (or function).

3.6 Imported definitions

Some of the MO classes, the attributes, and the ASN.1 Module definitions are imported from ITU-T Recommendations or ISO/IEC JTC 1 International Standards. These definitions are expressed as "derived from Rec. XXX | ISO/IEC YYY", or "'Rec. ZZZ': ---" in the clauses of the Management Information definitions. They are also identified in each clause of specific service related management information.

4 Abbreviations

This Recommendation uses the following abbreviations:

CMIP	Common Management Information Protocol
CMISE	Common Management Information Service Element
CNM	Customer Network Management
CNM _c	CNM interface using CMIP
CNM _e	CNM interface using EDI/MHS
CSPDN	Circuit Switched Public Data Network
CUG	Closed User Group (see also Recommendation X.25)
DLE	Data Link Layer Entity

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DLMO	Data Link Layer Managed Object (see also ITU-T Rec. X.282 ISO/IEC 10742)
DMI	Definition of Management Information (see also CCITT Rec. X.721 ISO/IEC 10165-2)
DTE	Data Terminal Equipment (see also Recommendation X.25)
EFD	Event Forwarding Discriminator (see also CCITT Rec. X.721 ISO/IEC 10165-2)
GDMO	Guidelines for the Definition of Managed Objects (see also Recommendation X.722)
GMI	Generic Management Information (see also ITU-T Rec. X.723 ISO/IEC 10165-5)
GNM	Generic Network Information Model (see also Recommendation M.3100)
HG	Hunt Group (see also Recommendation X.25)
ICS	Implementation Conformance Statement (see also ITU-T Rec. X.724 ISO/IEC 10165-6)
ISDN	Integrated Services Digital Network
MLP	Multi-Link Procedure (see also Recommendation X.25)
MO	Managed Object
MORT	MO Referring Test (see also ITU-T Rec. X.745 ISO/IEC 10164-12)
NLMO	Network Layer Managed Object (see also ITU-T Rec. X.283 and ISO/IEC 10733)
PAD	Packet Assembly and Disassembly
PDN	Public Data Network
PLE	Packet Layer Entity
PSPDN	Packet Switched Public Data Network
PSTN	Public Switched Telephone Network
PVC	Permanent Virtual Circuit (see also Recommendation X.25)
RDN	Relative Distinguished Name
SLP	Single Link Procedure (see also Recommendation X.25)
TARR	Test Action Request Receiver (see also ITU-T Rec. X.745 ISO/IEC 10164-12)

5 Conventions

The convention applied to this Recommendation is the Guidelines for the Definition of Managed Objects (GDMO), defined in Recommendation X.722.

6 Management information overview for CNM

This Recommendation defines generic management information for the CNM services. It includes the definition of MO classes, related attribute, package, action type, etc. This Recommendation is referenced by the other CNM related Recommendations, i.e. Recommendations X.160 and X.161. For providing the services, the generic definition in this Recommendation is to be used, and may be extended or refined by adding specific properties in some cases, e.g. for extended services.

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6.1 Basic concept of management information in the CNM service

When the CNMc interface is used, the management information is defined as below.

Management information for the CNM services is defined based on customers' concerns and service providers' security. CNM MOs contain common elements or characteristics of CNM services defined in Recommendation X.161. Information elements provided to customers are limited due to security reasons.

These MOs are defined as generic MO classes and they may be refined by adding specific features to extend CNM services by each service provider, i.e. a network that provides CNM services. Other MOs which exhibit customer network management properties, can also be defined by using the static packages defined in this Recommendation.

There are many generic MO definitions in other Recommendations and International Standards which can also be used in the CNM service. Such MOs are imported to this Recommendation, some being subclassed to define CNM MOs. However, it is recognized that the suitability of certain generic MOs for importing and subclassing is for further study.

Which object may be accessed by its customer or which conditional package should be offered, is based on the agreement between the service provider and the customer.

6.2 Management information structure

This subclause will describe an overview of the Management Information Model for CNM.

The CNM object hierarchy consists of several levels as shown in Figure 1. Each level is categorized as follows:

- **Level 1:** The service provider's network (the starting point of the naming).
- **Level 2:** A subset of the network related to a customer (customer network).

NOTE – This object represents all the resources that a customer possesses. Note that if the customer wants to have a hierarchical customer network structure, it may recursively contain other network objects.
- **Level 3-1:** Customer specific objects (objects owned by the customer) except the DTE address related objects (level 3-2).
- **Level 3-2:** Objects related to a DTE address owned by the customer.
- **Level 4-1:** Objects that are subordinated to objects of level 3-1 and are irrelevant to the DTE address (customer related objects).
- **Level 4-2:** Objects that are subordinated to objects of level 3-2 (DTE address related objects).
- **Level 4-3:** Objects related to an access line or a data link (SLP).
- **Level 5:** Objects that are subordinated to objects of level 4-3.

What object each level includes is explained in the next subclause.

6.3 Management information models for specific CNM services

This subclause will describe the management information model for each CNM service in accordance with the TMN methodology defined in Recommendation M.3020.

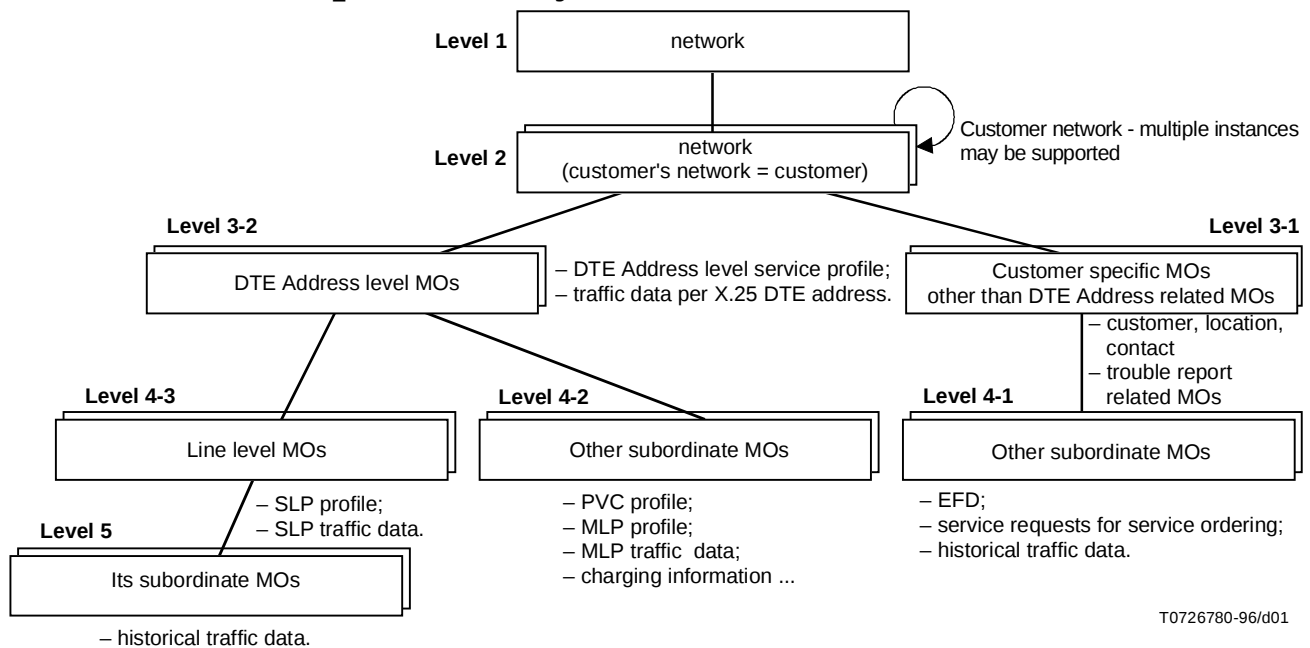
6.3.1 Fault management

6.3.1.1 Alarm notification service model

This subclause is intended to provide a conceptual framework for understanding how the various MO classes are used to provide the Alarm Notification service.

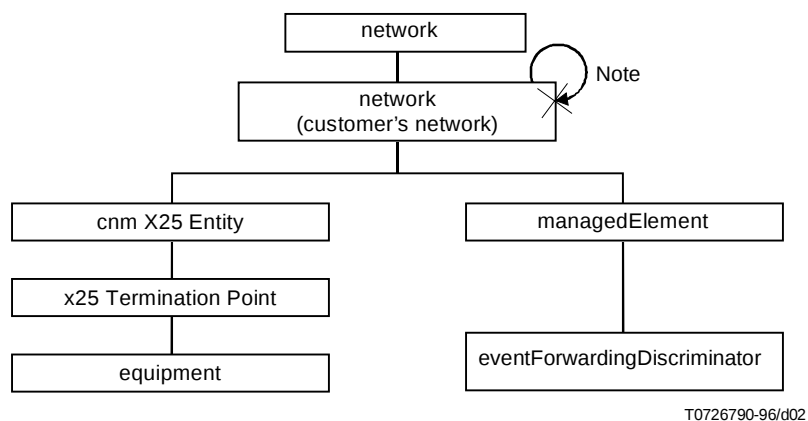
The object model for the alarm notification service is shown in Figure 2. When a trouble is detected in a resource involved in a customer's communication, an alarm is issued. Alarms related to the customer's equipment are emitted from the Equipment object, and ones related to the X.25 communication are emitted from the X.25 Termination Point object.

Superseded by a more recent version



NOTE – This figure does not specify a specific instance containment tree.

Figure 1/X.162 – The CNM information general structure



NOTE – The part owned by a customer. It may have a hierarchical structure.

Figure 2/X.162 – Alarm notification information structure

Alarms may be discriminated in accordance with a criterion. This criterion may be controlled by the Event Forwarding Discriminator (EFD) defined in CCITT Rec. X.721 | ISO/IEC 10165-2. This object is contained in the Managed Element object.

The specific MOs in the model are:

- **cnmX25Entity** – The cnmX25Entity MO class represents the entity that is related to a DTE address. This object is used to contain one or more X.25 Termination Points for this service.
- **x25TerminationPoint** – The x25TerminationPoint MO class, derived from terminationPoint defined in Recommendation M.3100, represents the access line, which corresponds to the Data Link. Alarms related to an access line or the Data Link are emitted from this object. This object is contained by the cnmX25Entity object.
- **equipment** – The equipment MO class, imported from Recommendation M.3100, represents a resource dedicated to a customer. From this object, alarms related to the equipment are emitted.

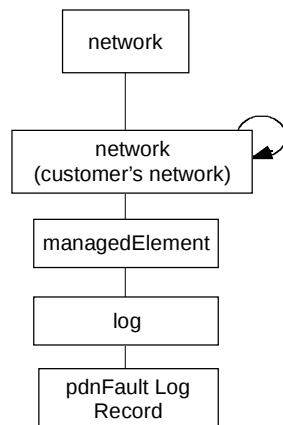
Superseded by a more recent version

- **managedElement** – The managedElement MO class, of which the class definition is imported from Recommendation M.3100, is used for the name binding. That is, it is the superior object of the eventForwardingDiscriminator object.
- **eventForwardingDiscriminator** – The eventForwardingDiscriminator MO class, imported from CCITT Rec. X.721 | ISO/IEC 10165-2, discriminates notifications in accordance with a criterion of the customer.

6.3.1.2 Fault history service model

This subclause is intended to provide a conceptual framework for understanding how the various managed object classes are used to provide the fault log service.

The object model for the fault log service is shown in Figure 3.



T0726800-96/d03

Figure 3/X.162 – Fault history information structure

Alarms are logged in the form of the fault log record in the CNM service provider. A customer may retrieve his own fault log records by using PT-GET service defined in CCITT Rec. X.730 | ISO/IEC 10164-1. The logging is controlled by the log object defined in CCITT Rec. X.735 | ISO/IEC 10164-6. A customer may change criteria for logging by modifying the logDiscriminatorConstruct attribute in the fault log object.

The specific objects in the model are:

- **log** – This managed object class controls the logging of alarms related to failure or event occurrence which affect the normal operation of the customer's dedicated resources. This object shall be contained in the **managedElement** object instance.
- **faultLogRecord** – This managed object class records alarms related to failure or event occurrence which affect the normal operation of the customer's dedicated resources. This object shall be contained in the log object instance.

6.3.1.3 Trouble report service model

This subclause is intended to provide a conceptual framework for understanding how the various MO classes are used to provide the trouble report service.

The object model for the trouble report service is shown in Figure 4. When a customer finds the occurrence of trouble in his communication, he informs the service provider by creating a Telecommunications Trouble Report object containing attributes that represents information about the trouble. The customer can retrieve the format provided by the service provider. Several formats, as defined in Recommendation X.790, may be offered. Repair activities can be retrieved from the Repair Activity object, which has attributes for records of activities performed to resolve the trouble, such as activity information and activity person.

Superseded by a more recent version

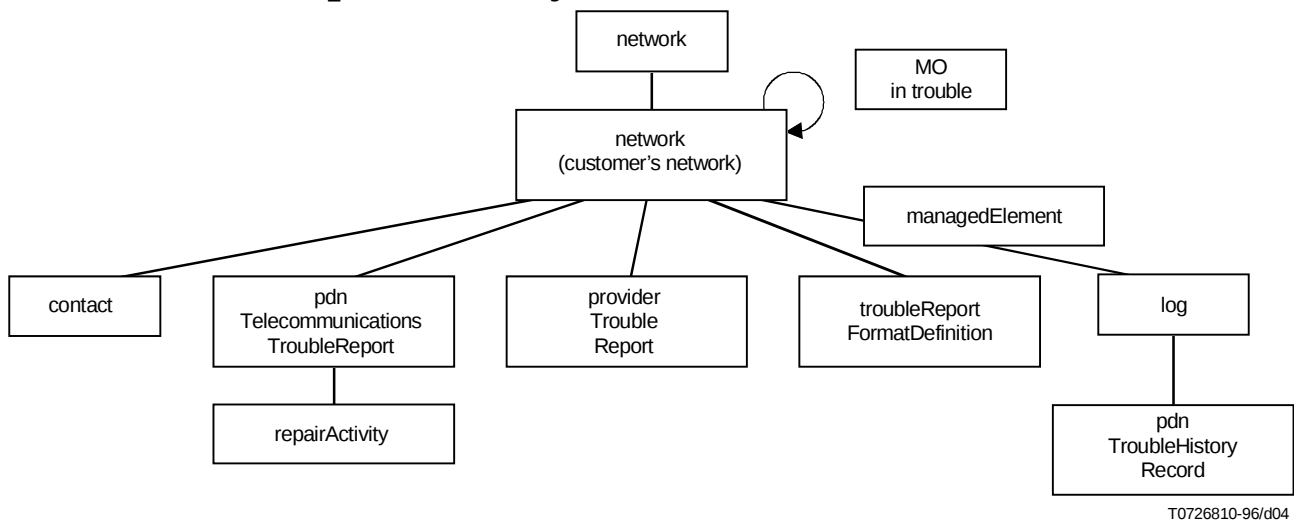


Figure 4/X.162 – Trouble report information structure

When the network (the service provider) finds the occurrence of trouble in a customer's communication, the provider creates a Telecommunications Trouble Report object and notifies the customer of the trouble.

The Telecommunications Trouble Report object has linkage with the object which represents a resource in trouble.

Customers are notified also when planned maintenance or preventive maintenance action is scheduled, to prevent future trouble. The Provider Trouble Report object is used for this purpose.

This Recommendation uses the definition of these MO classes defined in or derived from Recommendation X.790. In the CNM environment, they are modelled as follows:

- **managedObjectInTrouble** – This MO class, for which a trouble report is created, represents any resource in trouble related to the customer's communication.
- **pdnTelecommunicationsTroubleReport** – The pdnTelecommunicationsTroubleReport MO class, derived from telecommunicationsTroubleReport defined in Recommendation X.790, is created by a customer or by the service provider to notify the occurrence of a trouble in a resource related to the customer's communication. This object is contained by the managedElement object.
- **providerTroubleReport** – The providerTroubleReport MO class, imported from Recommendation X.790, is created by the service provider to inform the customer of plans of maintenance that affects the customer's communication. It is contained by the network (customer network) object.
- **troubleReportFormatDefinition** – The troubleReportFormatDefinition MO class, imported from Recommendation X.790, represents a format defined for expressing a trouble report. This object is contained by the network (customer network) object.
- **contact** – The contact MO class, imported from Recommendation X.790, represents information about contact persons of either the service provider. Necessary object instances are created and pointed by the pdnTelecommunicationsTroubleReport object. It is contained by the network (customer network) object.
- **repairActivity** – The repairActivity MO class, imported from Recommendation X.790, represent records of activities performed to resolve the trouble. This object is used unless the Repair Activity List is used. It is contained by the pdnTelecommunicationsTroubleReport object.
- **pdnTroubleHistoryRecord** The pdnTroubleHistoryRecord MO class, derived from Trouble History Record defined in Recommendation X.790, represents records of trouble occurrence and results of repair activities. This object is contained by the log object.
- **log** – The log MO class, imported from CCITT Rec. X.721 | ISO/IEC 10165-2, is used for logging trouble history records. This object is contained by the managedElement object.

Superseded by a more recent version

6.3.1.4 Loop setup service model

This subclause is intended to provide a conceptual framework for understanding how the various managed object classes are used to provide the loop set-up service.

The object model for the loop set-up service is shown in Figure 5.

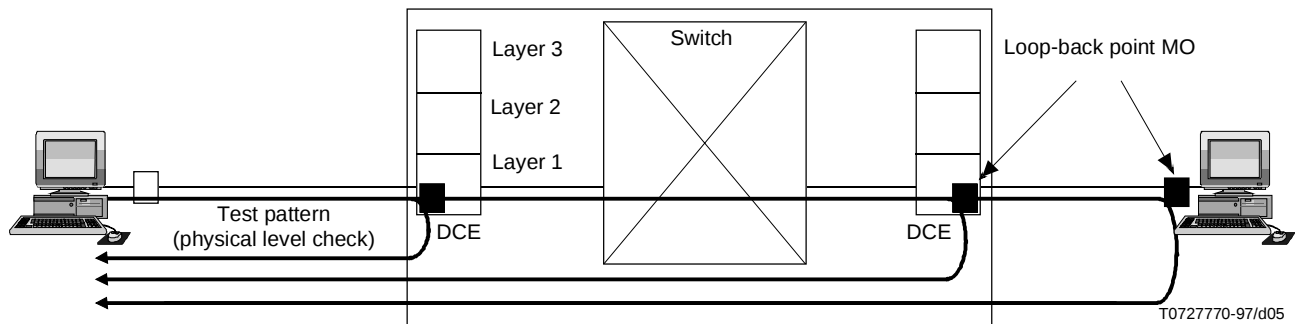


Figure 5/X.162 – Loop setup service model

By a customer's request, a loop-back point is set at a designated location. By this operation, normal protocol operation (communication) is suspended. Also, the loop back point can be reset and the communication is resumed.

The specific object in the model is:

- **loopbackpoint** – This managed object class or its subclass has the attributes that indicate the loop-back status "loopbackStatus" and a resource at which a loop-back point is set (an object pointer). The resource to be looped back is represented as a managed object. The loop-back point is set by changing the loopbackStatus attribute, which has values "true" and "false". By this operation, the service provider returns an attribute change report. The loop-back object is contained by the network (customer network) object.

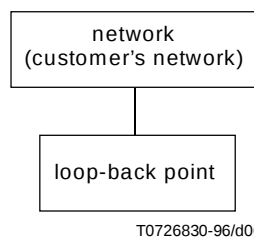


Figure 6/X.162 – Loop set-up related objects

6.3.1.5 Test host service model

6.3.1.5.1 Test host service model

This subclause is intended to provide a conceptual framework for understanding how the various managed object classes are used to provide the test host service.

The object model for the test host service is shown in Figure 7.

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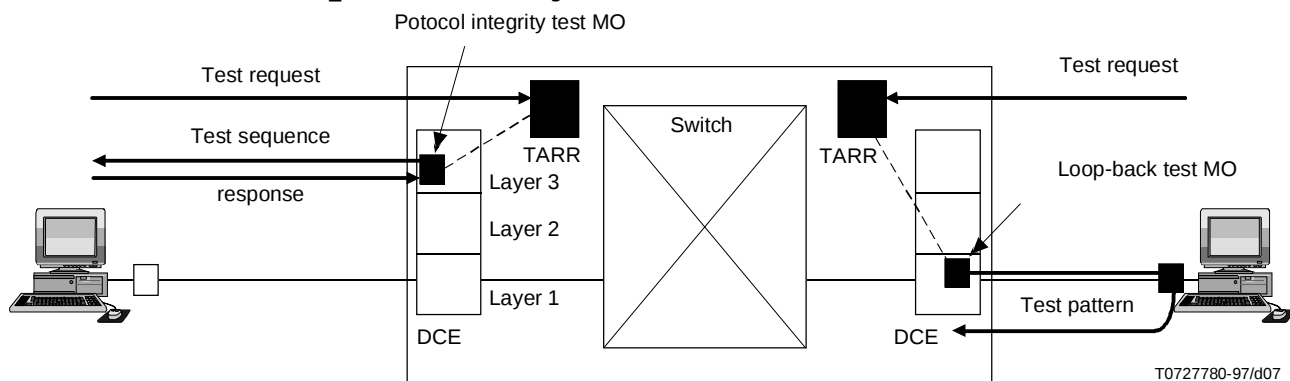


Figure 7/X.162 – Test host service model

6.3.1.5.2 loop-back test

The resource on which the loop-back test is executed is the X.25 physical connection. This object also has a functionality to receive the customer's test action request, which designates test conditions. Upon the receipt of the test request, a loop-back test object is created for the execution of the test. Test results are emitted from this object.

The specific objects in the model are (see Figure 8):

- **x25PhysicalConnection** – This managed object class or its subclass represents the resource to be tested (MORT). This object has also TARR functionality. This object is contained in the x25TerminationPoint object.
- **loopbacktest** – This managed object is created by the customer's request through TARR in the x25PhysicalConnection object. This object controls the execution of the loop-back test and emits test results. This object is contained in the managedElement object.

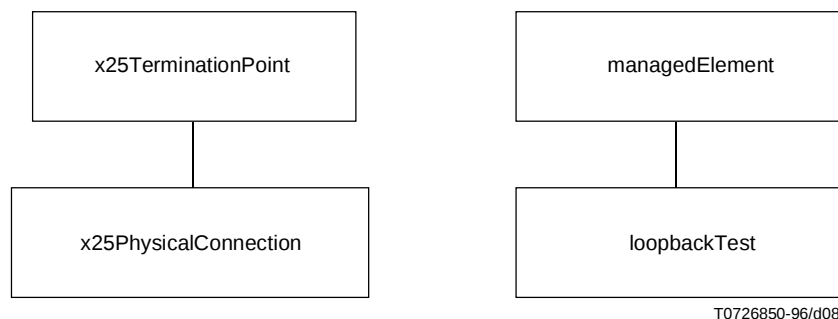


Figure 8/X.162 – Loop back test related objects

6.3.1.5.3 protocol integrity test

The resource on which the protocol integrity test is executed is the X.25 Entity. This object also has a functionality to receive the customer's test action request, which designates the object to be tested and other test conditions. Upon the receipt of the test request, a protocol integrity test object is created for the execution of the test. The packet-layer protocol is tested. Test results are emitted from this object.

The specific objects in the model are (see Figure 9):

- **cnmX25EntityTested** – This managed object class represents the resource to be tested (MORT). This object has also TARR functionality for the packet-layer protocol testing. This object is a subclass of cnmX25Entity and it is contained in the network (customer network) object.
- **protocolIntegrityTest** – This managed object is created by the customer's request through TARR in the cnmX25EntityTested object. This object controls the execution of the packet-layer protocol test and emits test results. This object is defined and contained in the managedElement object.

Superseded by a more recent version

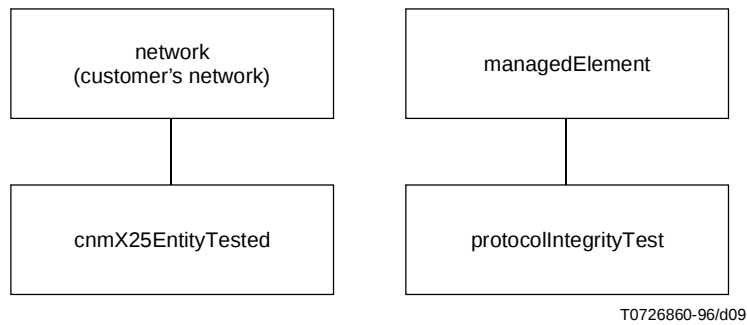


Figure 9/X.162 – Protocol integrity related objects

6.3.1.6 Protocol monitoring service model

This service is for further study.

6.3.2 Configuration management

6.3.2.1 Configuration inquiry service model

This subclause is intended to provide a conceptual framework for understanding how the various MO classes are used to provide the Configuration Inquiry service.

The object model for the Configuration Inquiry service is shown in Figure 10. To retrieve configuration information, the customer may access the contact, location, customer, cnmUser, x25TerminationPoint, equipment, and all of the service profile objects.

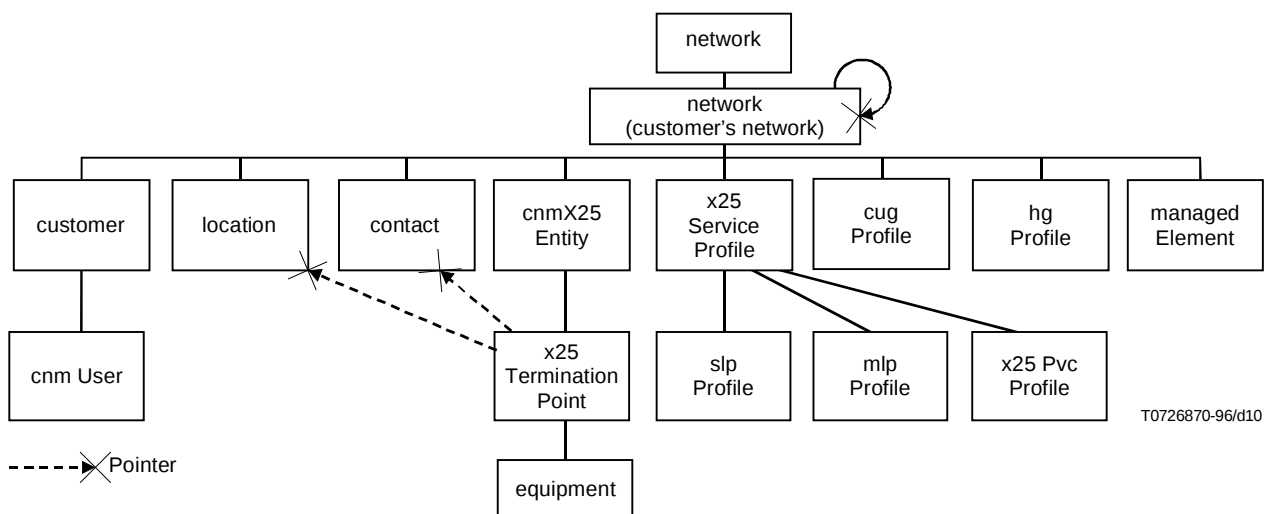


Figure 10/X.162 – Configuration inquiry information structure

The specific objects in the model are:

- **contact** – This MO class is the same as that defined for the trouble report service. It includes the service provider's telephone number, facsimile number, name, or other details so that customers can correspond with the service provider.
- **location** – The location MO class contains the postal address, geographic coordinate, etc. for each access line, to confirm information about the customer's own equipment.
- **customer** – The customer MO class includes attributes for representing the customer title, etc.
- **cnmUser** – The cnmUser MO class has information about a sub-organization or an access-line-group under a customer.

Superseded by a more recent version

- **x25TerminationPoint** – In addition to the Alarm Notification service, the x25TerminationPoint MO class is used also for the Configuration Inquiry service. This MO class represents an access line or a Data Link. The customer who owns it may retrieve its communication status from this object.
- **equipment** – This MO class is imported from Recommendation M.3100. From this object, the customer may retrieve equipment data such as the operating system, the release version number, the function name, the product label, and the software name.
- **service Profile objects** – These MO classes represent subscription data of X.25 services. They include the service profiles for the X.25 Packet Layer, the Multi-Link Procedure (MLP), the Single-Link Procedure (SLP), the Permanent Virtual Circuit (PVC), the Closed User Group (CUG), and the Hunt Group (HG).

6.3.2.2 CNM reconfiguration service model

This subclause is intended to provide a conceptual framework for understanding how the various MO classes are used to provide the CNM Reconfiguration service.

The object model for the CNM Reconfiguration service is similar to the Configuration Inquiry service as shown in Figure 11. The customer may modify parameters associated with configurable aspects of his network services. MO classes that do not have configurable attributes, e.g. the contact MO, are outside the scope of this service.

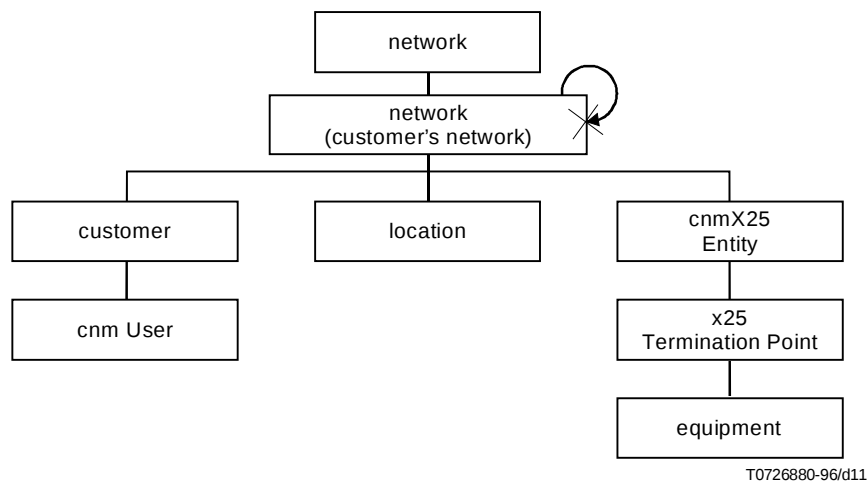


Figure 11/X.162 – CNM reconfiguration information structure

The specific objects in the model are:

- **location** – The location MO class is the same as that for the Service Inquiry service. The attributes representing the postal address, geographic coordinate, etc. may be modified by the customer.
- **customer** – The customer MO class is the same as that for the Service Inquiry service. The attributes representing the customer title, etc. may be modified by the customer.
- **cnmUser** – The cnmUser MO class is the same as that for the Service Inquiry service. The attributes representing information about the customer's sub-organization or an access-line-group under the customer may be modified by the customer.
- **cnmX25Entity** – The cnmX25Entity MO class is the same as that for the Alarm Notification service. The X.25 service may be suspended or resumed by controlling the administrative state of this object.
- **x25TerminationPoint** – The x25TerminationPoint MO class is the same as that for the Alarm Notification service. Each physical line and the Data Link overriding it may be activated or deactivated by controlling the administrative state of this object.
- **equipment** – The equipment MO class is the same as that for the Alarm Notification service. The attributes representing equipment data may be modified by the customer.

Superseded by a more recent version

6.3.2.3 Ordering service model

This subclause is intended to provide a conceptual framework for understanding how the various MO classes are used to provide the service ordering service.

The object model for the service ordering is shown in Figure 12. There are two cases for X.25 service subscription:

- one without MLP; and
- one with MLP.

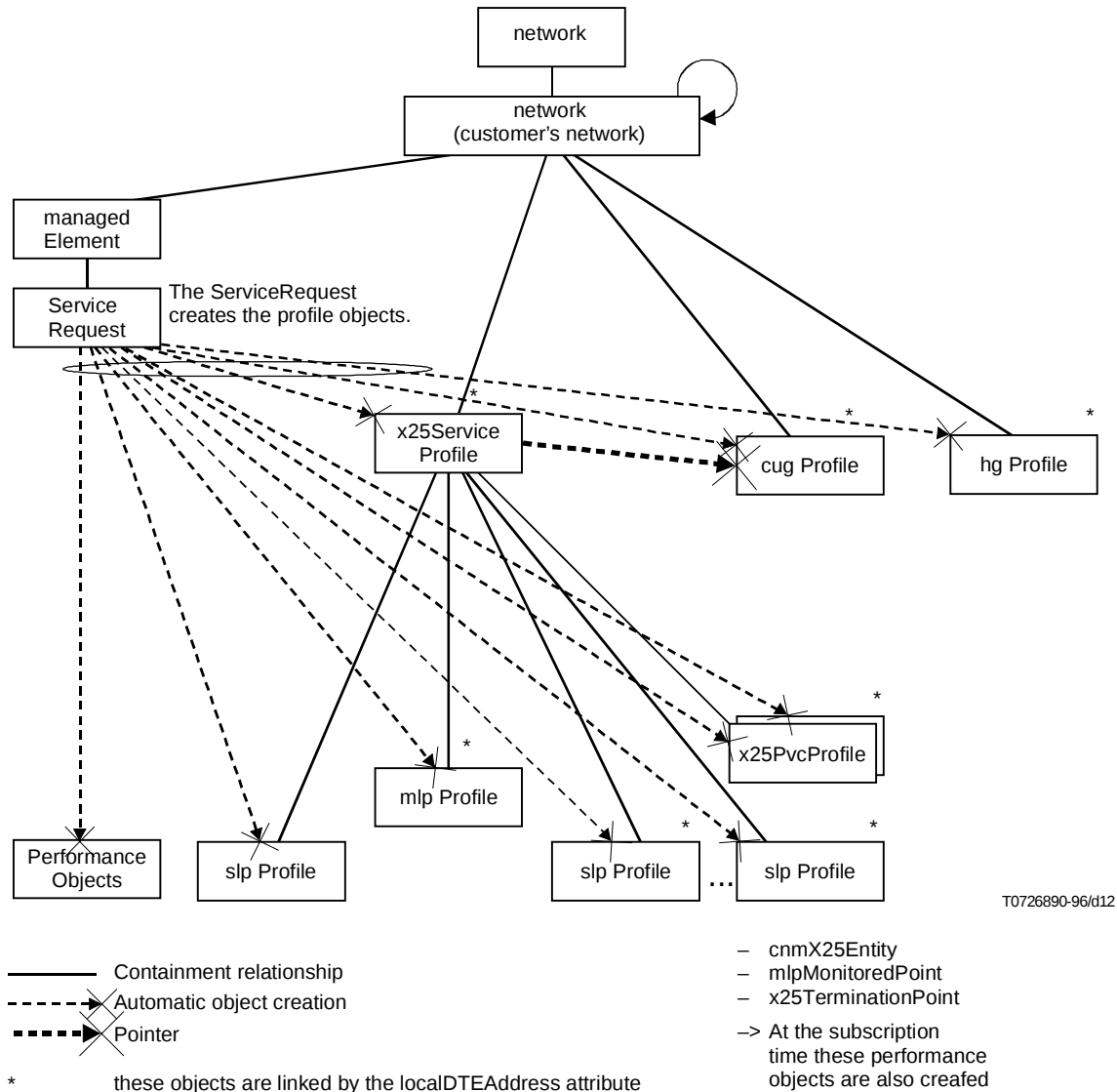


Figure 12/X.162 – Service ordering related objects

For the first case, necessary attributes of the X.25 Service Profile (x25ServiceProfile) and SLP Profile (slpProfile) objects are set through the Service Request object. The x25ServiceProfile has the necessary parameters for the packet layer. The SLP Profile object has the necessary parameters for the data link layer. To indicate the linkage with the X.25 Service Profile object, the SLP Profile object has the localDTEAddress attribute to point to the x25ServiceProfile object.

For the second case, the necessary attributes of the X.25 Service Profile, the MLP Profile and as many SLP Profile as required, are set through a Service Request object.

At the time of subscription, also performance related objects (x25MonitoredPoint, mlpMonitoredPoint and x25TerminationPoint) shall be created. Note that the MLP Monitored Point and additional X.25 Termination Point objects are created when MLP service is subscribed to.

Superseded by a more recent version

All these profile object and performance related objects with initial attribute values are specified by the Create Argument parameter of the Service Profile object.

The modification of service items and the deletion of the subscription are also done through a Service Request object newly instantiated for that purpose. This object allows negotiation between the customer and the service provider, and the delay or scheduling of the activation of the X.25 service.

The CUG Profile and the HG Profile objects are defined as X.25 additional service profiles. They include necessary service information, i.e. member DTE Addresses. Each object is also controlled by a Service Request object.

The X.25 PVC Profile object includes parameters necessary for setting a PVC. It is created by a Service Request object.

The specific objects in the model are:

- **x25ServiceProfile, mlpProfile, slpProfile** – These MO classes include the X.25 packet layer parameters, multi-link parameters and data link layer parameters, respectively. The x25ServiceProfile object is contained by the network (customer network) object. In turn, the mlpProfile object and slpProfile object(s) is contained by it. Creation, modification and deletion of the subscription are handled through a ServiceRequest object. At the same time, they also create performance related objects, i.e. cnmX25Entity, mlpMonitoredPoint and x25TerminationPoint for that interface.
- **x25PvcProfile** – The x25PvcProfile MO class includes parameters necessary for establishing a PVC. This object is created through the ServiceRequest. Modification of the subscription is done by deletion of the x25PvcProfile object by a serviceRequest object and the re-creation of a new x25PvcProfile object by another serviceRequest.
- **cugProfile** – The cugProfile MO class contains the service items necessary for the CUG facility defined in Recommendation X.25. The DTE addresses within a closed user group are defined in this object in accordance with the type of CUG. Creation, modification and addition of the subscription shall be handled through serviceRequest objects.
- **hgProfile** – The hgProfile MO class contains the service items necessary for the Hunt Group facility defined in Recommendation X.25. The DTE addresses within a Hunt Group are defined in this object. The identifications of the Hunt Group address are also defined in this object. Creation, modification and addition of the subscription shall be handled through ServiceRequest objects.

6.3.2.4 Cancellation service model

This service is for further study.

6.3.2.5 Systematic call redirection service model

This subclause is intended to provide a conceptual framework for understanding how the various managed object classes are used to provide the call redirection service.

The object model for the systematic call redirection service is shown in Figure 13.

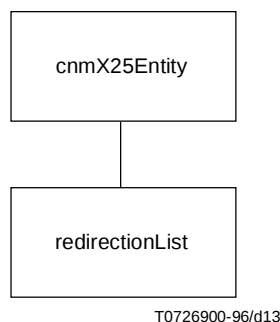


Figure 13/X.162 – Systematic call redirection related object

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By a customer's request, a systematic call redirection list is created within the service provider. The request contains a parameter that indicates whether the call redirection is on duty (expressed as "availabilityState") and a call redirection list. For this service, the customer shall specify the DTE address where calls are redirected and also the call redirection list that contains one or more DTE addresses to which calls are redirected. By the customer's request, the call redirection may suspend and resume. The list may be modified while the call redirection is either on-duty or off-duty. The call redirection may be activated selectively for part of destination DTE addresses in the list.

NOTE 1 – The criteria shall be other than DTEs out of order or busy state. For the time being, this Recommendation provides the following two criteria:

- the customer's request to start and stop the use of this facility;
- the schedule, e.g. daily, weekly, monthly, periodic.

NOTE 2 – The handling of the redirection list is permitted, if the network offers multiple alternatives of DTEs.

The execution of the call redirection may be controlled by a schedule. In this case, the customer shall specify the interval start time and the interval end time (the duration). The customer may use the daily scheduling. They are defined in CCITT Rec. X.721| ISO/IEC 10165-2.

The specific object in the model is:

- **redirectionList** – This managed object class or its subclass shall have the attributes that indicate whether the call redirection is on duty (expressed as "availabilityState") and a call redirection list, which contains one or more DTE addresses to which calls are redirected. This object is contained in the cnmX25Entity object instance.

6.3.2.6 Inventory inquiry service model

This service is for further study.

6.3.3 Accounting management

6.3.3.1 Periodic billing service model

This subclause is intended to provide a conceptual framework for understanding how the various managed object classes are used to provide the periodic billing service.

The object model for the detailed accounting service is shown in Figure 14.

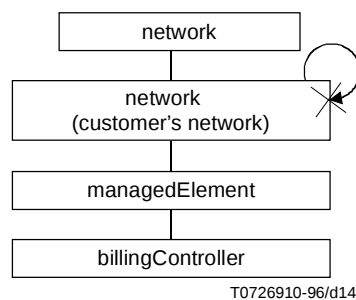


Figure 14/X.162 – Periodic billing information structure

An invoice is sent to the customer periodically or when some event occurs to notify an invoice. Invoice items are defined in the form of a notification of the cnmBillingController object class. However, this Recommendation does not define any normative invoice items. CNM service providers who want to offer this service shall define these items.

By setting the administrative state, the emission of notifications may be suspended and resumed.

The specific object in the model is:

- **cnmBillingController** – This managed object emits invoices and controls the emission of invoices. This object shall be contained in the managed element object instance.

Superseded by a more recent version

6.3.3.2 Detailed accounting service model

This subclause is intended to provide a conceptual framework for understanding how the various managed object classes are used to provide the detailed accounting service.

The object model for the detailed accounting service is shown in Figure 15.

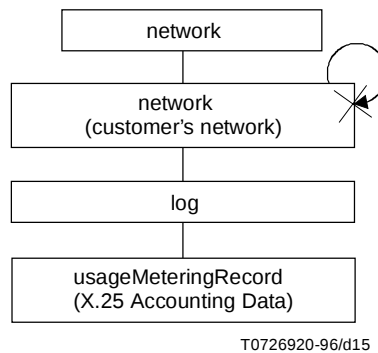


Figure 15/X.162 – Detailed accounting information structure

Accounting records are accumulated in the form of the usage metering record in the CNM service provider. A customer may retrieve his own usage metering records by using PT-GET service defined in CCITT Rec. X.730 | ISO/IEC 10164-1. Although the usageMetering object class defined in ITU-T Rec. X.742 | ISO/IEC 10164-10 is used, the usage metering items are defined in this Recommendation.

usageMeteringRecord objects are automatically created as a consequence of the occurrence of accountable events in a customer's communication. An accounting record contains information elements and counters that identify the customer, the used resources, the usage time, and the usage volume.

The specific object in the model is:

- **usageMeteringRecord** – This managed object class records accountable items. This object shall be contained in the network (customer network) object instance.

6.3.3.3 Quota control service model

This service is for further study.

6.3.3.4 Real time charging information service model

This service is for further study.

6.3.4 Performance management

6.3.4.1 Traffic information service model

This subclause is intended to provide a conceptual framework for understanding how the various managed object classes are used to provide the traffic information service.

The object model for the traffic information service is shown in Figure 16. Current traffic data is collected for a Monitored Object by a subclass of Current Traffic Data object defined in Recommendation Q.822. Instances of it are contained by the monitored object. This object may always be accessed for the retrieval of current traffic measurement data. At the end of each performance interval, the duration of which is determined by the granularityPeriod attribute, an instance of a subclass of the History Traffic Data MO class, defined in Recommendation Q.822, may be created to record the traffic measurements for that interval. The aggregation of traffic measurement is not supported for the time being.

Superseded by a more recent version

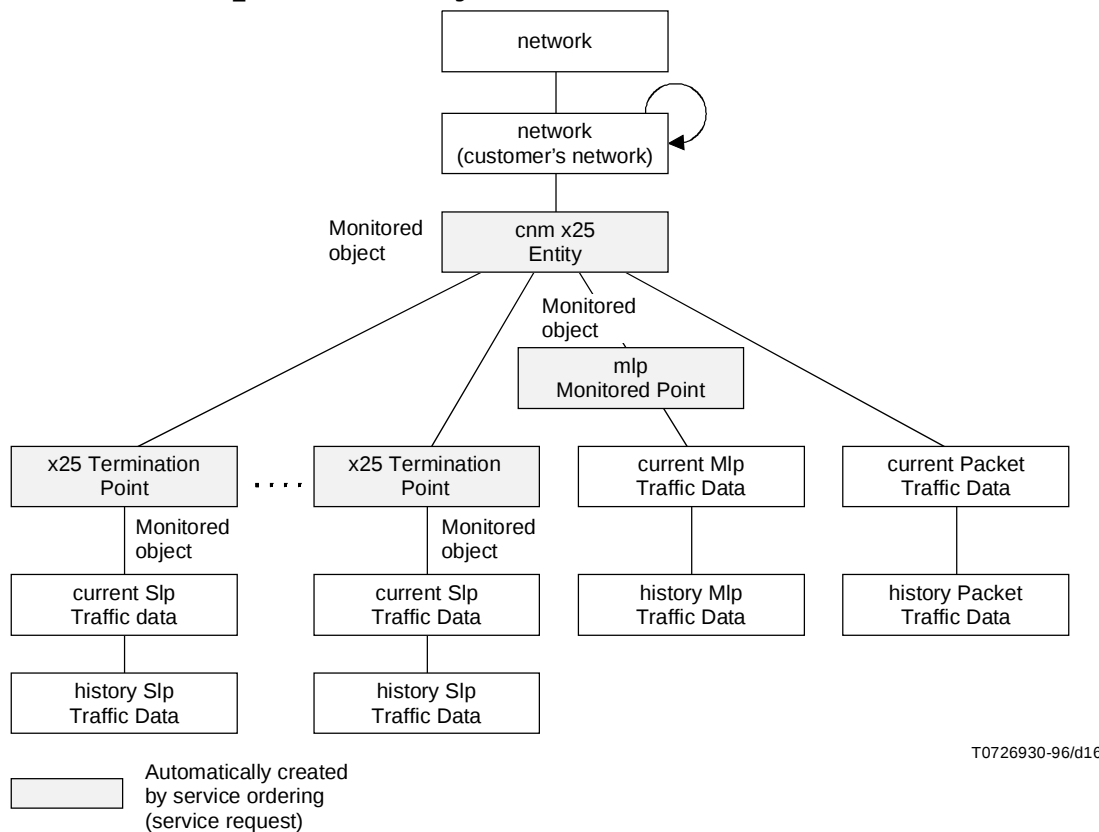


Figure 16/X.162 – Traffic information structure

For an X.25 subscription with MLP, the necessary traffic counters are as follows:

[SLP level]:

- SLP counters.

[X.25 interface level (DTE address level)]:

- packet counters;
- MLP counters.

To count these traffic items, a scanner is necessary for each of them. A subclass of the "Recommendation Q.822": currentData MO class is used.

The specific objects in the model are:

- **Monitored Object** – This object is the managed object for which the traffic measurements are being collected. It represents the resource being measured that is dedicated for a specific customer. There are three types of objects, i.e. cnmX25Entity, mlpMonitoredPoint, and x25TerminationPoint objects. Monitored objects contain no counters as ITU-T Rec. X.283 and ISO/IEC 10733. In the containment tree, this object shall contain currentTrafficData object instance and be used for naming.
- **currentTrafficData related objects** – The currentTrafficData MO class includes the measurements for the resource being monitored for a specified time interval (typically 1 hour). It is a subclass of currentData defined in Recommendation Q.822 and shall have traffic measurement attributes for the X.25 packet layer, the MLP, or one or more SLPs. This object may be accessed at any time after the creation. At the end of each interval, a historyTrafficData object for each type of the current data may be created containing the same attributes as the currentTrafficData object with values of the traffic measurements at the end of the interval.

Superseded by a more recent version

- **historyTrafficData related object** – The historyTrafficData MO class is imported from Recommendation Q.822. This object has a copy of traffic related attributes that are present in the object for the current Traffic Data at the end of the current interval (typically 1 hour). A new instance of this MO class is created automatically at the end of each interval. There are three types, i.e. the historyPacketTrafficData, historyMlpTrafficData, and historySlpTrafficData.

6.3.4.2 Quality of service information service model

This service is for further study.

6.3.4.3 Network statistic service model

This service is for further study.

6.3.5 Security management

6.3.5.1 Password change service model

This service is for further study.

6.3.5.2 Access rights definition service model

This service is for further study.

6.3.6 CNM supporting services

The service request function is required when the provision of a service is not automated but necessitates a human intervention on a piece of equipment or a specific human procedure. Thus the service is not provided in real time but on a delayed basis. Since CMIP is really oriented towards real time operations, a new mechanism is required.

The mechanism is based on the instantiation of an object class which models the service requested and provides information on the different phases of the request processing. For this purpose, the Service Request object is used. The basic idea is to provide the manager with the capability to request a list of CMIP operations on designated managed objects. These operations are authorized through the parameterization of a serviceRequest managed object. The mechanism is defined in Annex C.

Specific properties of this MO class are as follows.

The dateRequest attribute is used to specify the date at which the service must be provided.

The possible values are: dontCare, now, or a precise date. The default value is dontCare.

The operationList attribute is used to specify the CMIP requested operations. The syntax used is the syntax of the CMIP operations themselves.

The processingMode attribute allows the managing system to specify if the operations must be processed in an orderly manner or if it does not matter. In the case where the order is not relevant, the action to be taken after a failure of an operation is to be specified (either abort or continue).

The operations are processed by the service provider but the results are not sent to the customer. In some cases, creation, deletion and attribute value change notifications are used to give information on the service provision. Nevertheless, the resultList attribute gives information on the result. It is a read only attribute whose value is an empty list until the object status is set to endOfProcessing. When the service has been delivered, this attribute specifies a diagnostic for each operation: success, failure or not attempted (i.e. abort after a previous failure and application of the stopAfterFailure policy).

Conditional Packages allow the specification of contacts at the manager and agent side. The choice between an existing contact instance or an attribute with a PersonReach syntax is possible. A dialogue attribute is also imported from the telecommunicationsTroubleReport managed object class defined in Recommendation X.790. It is used for the exchange of certain information during the negotiation phase.

The new serviceRequest MO class proposed hereafter is instantiable. The Name Binding does not allow the deletion of a serviceRequest object by the manager.

Superseded by a more recent version

7 Definition of managed object classes

7.1 Managed objects for fault management

7.1.1 Managed objects for alarm notification service

7.1.1.1 Referenced managed objects

- 1) This Recommendation references the following support MO classes for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - a) top;
 - b) event forwarding discriminator.
- 2) This Recommendation references the following support MO classes for which the abstract syntax is specified in Recommendation M.3100:
 - a) network;
NOTE 1 – This object is the superior object for all the CNM objects.
 - b) termination point;
 - c) managed element;
NOTE 2 – This object is used for containing the objects that provides general functions irrespective of the types of network service. The Event Forwarding Discriminator or the Log object is contained by this object.
 - d) equipment.

7.1.1.2 Defined managed objects

7.1.1.2.1 CNM X.25 entity

cnmX25Entity MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY cnmX25Entity-P PACKAGE

BEHAVIOUR cnmX25Entity-B BEHAVIOUR

DEFINED AS This object represents the entity that is related to a DTE address and for which traffic data are measured as a monitored object. It is used to contain one or more X.25 Termination Points. It is also used to suspend or resume the X.25 packet level communication This object is created at the time of subscription.;;

ATTRIBUTES

cnmX25EntityId GET,

"DMI": administrativeState GET-REPLACE;;;

REGISTERED AS {cnmObjectClass cnmX25Entity(1)};

7.1.1.2.2 X.25 termination point

x25TerminationPoint MANAGED OBJECT CLASS

DERIVED FROM "GMN": terminationPoint;

CHARACTERIZED BY x25TerminationPoint-P PACKAGE

BEHAVIOUR x25TerminationPoint-B BEHAVIOUR

DEFINED AS This MO represents the termination point of the access line, on which one data link is overridden. It emits alarms related to the access line and the data link. It also represents the monitored resource for which data-link-traffic-data are measured.;;

ATTRIBUTES

x25TerminationPointId GET,

"DMI": administrativeState GET-REPLACE;

NOTIFICATIONS

"DMI": qualityofServiceAlarm,

"DMI": processingErrorAlarm,

"DMI": equipmentAlarm,

"DMI": environmentalAlarm

;;;

REGISTERED AS {cnmObjectClass x25TerminationPoint(2)};

Superseded by a more recent version

7.1.2 Managed objects for fault history service

7.1.2.1 Referenced managed objects

This Recommendation references the following support MO classes for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:

- a) top;
- b) log;
- c) eventLogRecord.

7.1.2.2 Defined managed objects

This Recommendation defines the following MO classes by inheriting the logRecord MO classes:

7.1.2.2.1 PDN fault log record

pdnFaultLogRecord MANAGED OBJECT CLASS

DERIVED FROM "DMI" :eventLogRecord;

CHARACTERIZED BY faultLogRecord-P PACKAGE

BEHAVIOUR faultLogRecord-B BEHAVIOUR

DEFINED AS This MO class is used to represent logged information that resulted from alarm notification related to CNM. The attributes represent causes of all types of fault alarms.;;

ATTRIBUTES

"DMI" : probableCause GET;

"DMI" : perceivedSeverity GET;;;

CONDITIONAL PACKAGES

specificProblems-P PACKAGE

ATTRIBUTES

"DMI" : specificProblems GET;;

PRESENT IF "the 'specific problems' parameter is present in the alarm notification to be logged.",

backedUpStatus-P PACKAGE

ATTRIBUTES

"DMI" : backedUpStatus GET;;

PRESENT IF "the 'backedUpStatus' attribute has a value TRUE and the back-up status parameter is present in the alarm notification to be logged.",

backUpObject-P PACKAGE

ATTRIBUTES

"DMI" : backUpObject GET;;

PRESENT IF "the 'backup object' parameter is present in the alarm notification to be logged.",

trendIndication-P PACKAGE

ATTRIBUTES

"DMI" : trendIndication GET;;

PRESENT IF "the 'trend indication' parameter is present in the alarm notification to be logged.",

thresholdInfo-P PACKAGE

ATTRIBUTES

"DMI" : thresholdInfo GET;;

PRESENT IF "the value for the 'probableCause' attribute is 'thresholdCrossed'.",

stateChangeDefinition-P PACKAGE

ATTRIBUTES

"DMI" : stateChangeDefinition GET;;

PRESENT IF "there is a state transition in the alarm notification to be logged.",

monitoredAttributes-P PACKAGE

ATTRIBUTES

"DMI" : monitoredAttributes GET;;

PRESENT IF "the 'monitoredAttributes' parameter is present in the alarm notification to be logged.",

proposedRepairActions-P PACKAGE

ATTRIBUTES

"DMI" : proposedRepairActions GET;;

PRESENT IF "the 'proposedRepairActions' parameter is present in the alarm notification to be logged.",

Superseded by a more recent version

attributeList-P PACKAGE

ATTRIBUTES

"DMI" : attributeList GET;;

PRESENT IF "the 'attributeList' parameter is present in the object creation (or deletion) notification or event report corresponding to the instance of object creation (or deletion) record.",

sourceIndicator-P PACKAGE

ATTRIBUTES

"DMI" : sourceIndicator GET;;

PRESENT IF "the 'sourceIndicator' parameter is present in the object creation (or deletion) notification or event report corresponding to the instance of object creation (or deletion) record.",

REGISTERED AS {cnmObjectClass pdnAlarmLogRecord(22)};

7.1.3 Managed objects for trouble report service

7.1.3.1 Referenced managed objects

- 1) This Recommendation references the following support MO classes for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - a) top;
 - b) log.
- 2) This Recommendation references the following support MO class for which the abstract syntax is specified in Recommendation M.3100:
 - network.

NOTE – This object is the superior object for all the CNM objects.
- 3) This Recommendation references the following support MO classes for which the abstract syntax is specified in Recommendation X.790:
 - a) telecommunicationsTroubleReport;
 - b) providerTroubleReport;
 - c) contact;
 - d) repairActivity;
 - e) troubleHistoryRecord;
 - f) troubleReportFormatDefinition.

7.1.3.2 Defined managed objects

This Recommendation defines the following MO classes by inheriting the telecommunicationsTroubleReport and troubleHistory MO classes.

7.1.3.2.1 PDN telecommunications trouble report

pdnTelecommunicationsTroubleReport MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.790": telecommunicationsTroubleReport;

CHARACTERIZED BY pdnTTR-P PACKAGE

BEHAVIOUR pdnTTR-B BEHAVIOUR

DEFINED AS This object has trouble types specific to packet communication.

The trouble type attribute defined in the super class is not used for the trouble management of PDN.;

ATTRIBUTES

troubleTypePspdn GET;;

REGISTERED AS {cnmObjectClass pdnTelecommunicationsTroubleReport(3)};

7.1.3.2.2 PDN trouble history record

pdnTroubleHistoryRecord MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. X.790": troubleHistory;

CONDITIONAL PACKAGES

troubleTypePspdnPkg PACKAGE

ATTRIBUTES

troubleTypePspdn GET;

REGISTERED AS {cnmObjectClass pdnTroubleHistoryRecord(4)};

Superseded by a more recent version

7.1.4 Managed objects for loop set-up service

7.1.4.1 Defined managed objects

This Recommendation defines the following MO class.

7.1.4.1.1 CNM loopback point

cnmLoopbackPoint MANAGED OBJECT CLASS

DERIVED FROM x25TerminationPoint;

CHARACTERIZED BY cnmLoopbackPointPackage PACKAGE

BEHAVIOUR cnmLoopbackPoint-B BEHAVIOUR

DEFINED AS This object sets or resets the loop-back point by the loopbackStatus attribute. The location at which the loop-back point is set is represented by the locationPointer attribute.;

ATTRIBUTES

locationPointer GET,

loopbackStatus GET-REPLACE;;;

REGISTERED AS {cnmObjectClass cnmLoopbackPoint(23)};

7.1.5 Managed objects for test host service

7.1.5.1 Referenced managed objects

- 1) This Recommendation references the following support MO class for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - top.
- 2) This Recommendation references the following support MO classes for which the abstract syntax is specified in ITU-T Rec. X.737 | ISO/IEC 10164-14:
 - a) loop-backTest;
 - b) protocolIntegrityTest.

7.1.5.2 Defined managed objects

7.1.5.2.1 X.25 physical connection

x25PhysicalConnection MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY

x25PhysicalConnection-P PACKAGE

BEHAVIOUR x25PhysicalConnection-B BEHAVIOUR

DEFINED AS This object includes the TARR package for performing a loop-back test.;;

ATTRIBUTES

x25PhysicalConnectionId GET;;;

cnmLoopbackTestTARRPackage PACKAGE

BEHAVIOUR A managed object containing this package supports receiving a loop-back test request in the form of the testRequestControlledAction action with the appropriate parameters defined for loop-back testing. Test results are returned in a testResultNotification with the loopbackControlledResultsParam parameter by the loopback Test Object.;

ACTIONS

"ITU-T Rec. X.745 | ISO/IEC 10164-12":testRequestControlledAction

"ITU-T Rec. X.737 | ISO/IEC 10164-14":loopbackTestInfoParam

"ITU-T Rec. X.745 | ISO/IEC 10164-12":associatedObjectNotAvailable

"ITU-T Rec. X.745 | ISO/IEC 10164-12":independentTestInvocationError

"ITU-T Rec. X.745 | ISO/IEC 10164-12":mistypedTestCategoryId

"ITU-T Rec. X.745 | ISO/IEC 10164-12":mistypedTestRequestInformation

"ITU-T Rec. X.745 | ISO/IEC 10164-12":mORTNotAvailable

"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchAssociatedObject

"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchMORT

"ITU-T Rec. X.745 | ISO/IEC 10164-12":relatedTOError,

"ITU-T Rec. X.745 | ISO/IEC 10164-12":testSuspendResumeAction

"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestInvocationId

"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestSessionId

Superseded by a more recent version

"ITU-T Rec. X.745 | ISO/IEC 10164-12":invalidTestOperation
"ITU-T Rec. X.745 | ISO/IEC 10164-12":testSuspendResumeError,
"ITU-T Rec. X.745 | ISO/IEC 10164-12":testTerminateAction
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestInvocationId
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestSessionId
"ITU-T Rec. X.745 | ISO/IEC 10164-12":invalidTestOperation
"ITU-T Rec. X.745 | ISO/IEC 10164-12":testTerminateError,
REGISTERED AS {cnmObjectClass x25PhysicalConnection(24)};

NOTE 1 – The difference between this service and the definition of ITU-T Rec. X.737 | ISO/IEC 10164-14 is that no PDU sequence is handed from the customer to the test action request receiver in the CNM provider but several test patterns are prepared and emitted to the tested customer by the CNM provider.

NOTE 2 – In the LoopbackTestInfo data type associated to the testRequestControlledAction action, loopbackData, testStartTime GeneralizedTime, testIntervalTime, reportingIntervalTime, loopbackErrorThreshold may be specified.

NOTE 3 – In the LoopbackTestResults data type associated the loop-back test object, loopbackDataReceived and loopbackErrorReceived for a successful test and reasons for failure. The testInvocationId, testSessionId, testOutcome, mORTs, associatedObjects, monitoredAttributes, proposedRepairActions, additionalText, additionalInformation, notificationIdentifier, and correlatedNotifications attributes are returned.

7.1.5.2.2 CNM X.25 entity tested

cnmX25EntityTested MANAGED OBJECT CLASS

DERIVED FROM cnmX25Entity;

CHARACTERIZED BY

cnmX25EntityTested-P PACKAGE

BEHAVIOUR cnmX25EntityTested-B BEHAVIOUR

DEFINED AS This object includes the TARR package for performing a protocol integrity test.;;;,

cnmProtocolIntegrityTestTARRPackage PACKAGE

BEHAVIOUR A managed object containing this package supports receiving a protocol integrity test request in the form of the testRequestControlledAction action with the appropriate parameters defined for protocol integrity testing. Test results are returned in a testResultNotification with the protocolIntegrityControlledResultsParam parameter by the protocolIntegrity Test Object.;

ACTIONS

"ITU-T Rec. X.745 | ISO/IEC 10164-12":testRequestControlledAction
"ITU-T Rec. X.737 | ISO/IEC 10164-14":protocolIntegrityTestInfoParam
"ITU-T Rec. X.745 | ISO/IEC 10164-12":associatedObjectNotAvailable
"ITU-T Rec. X.745 | ISO/IEC 10164-12":independentTestInvocationError
"ITU-T Rec. X.745 | ISO/IEC 10164-12":mistypedTestCategoryId
"ITU-T Rec. X.745 | ISO/IEC 10164-12":mistypedTestRequestInformation
"ITU-T Rec. X.745 | ISO/IEC 10164-12":mORTNotAvailable
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchAssociatedObject
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchMORT
"ITU-T Rec. X.745 | ISO/IEC 10164-12":relatedTOError,
"ITU-T Rec. X.745 | ISO/IEC 10164-12":testSuspendResumeAction
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestInvocationId
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestSessionId
"ITU-T Rec. X.745 | ISO/IEC 10164-12":invalidTestOperation
"ITU-T Rec. X.745 | ISO/IEC 10164-12":testSuspendResumeError,
"ITU-T Rec. X.745 | ISO/IEC 10164-12":testTerminateAction
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestInvocationId
"ITU-T Rec. X.745 | ISO/IEC 10164-12":noSuchTestSessionId
"ITU-T Rec. X.745 | ISO/IEC 10164-12":invalidTestOperation
"ITU-T Rec. X.745 | ISO/IEC 10164-12":testTerminateError,
REGISTERED AS {cnmObjectClasscnmX25EntityTested(25)};

7.1.6 Managed objects for protocol monitoring service

This service is for further study.

7.2 Managed objects for configuration management

7.2.1 Managed objects for configuration inquiry service

7.2.1.1 Referenced managed objects

- 1) This Recommendation references the following support MO class for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - top.

Superseded by a more recent version

- 2) This Recommendation references the following support MO classes for which the abstract syntax is specified in Recommendation M.3100:
 - a) network;
 - b) termination point;
 - c) managed element;
 - d) equipment.
- 3) This Recommendation references the following support MO class for which the abstract syntax is specified in Recommendation X.790:
 - contact.

7.2.1.2 Defined managed objects

7.2.1.2.1 CNM X.25 entity

This object class is defined in 7.1.1.2.1.

7.2.1.2.2 X.25 termination point

This object class is defined in 7.1.1.2.2.

7.2.1.2.3 X.25 service profile

x25ServiceProfile MANAGED OBJECT CLASS
DERIVED FROM "DMI": top;
CHARACTERIZED BY
 x25ServiceProfile-P,
 pleProfile-P;
 CONDITIONAL PACKAGES
 slpTimersProfile-P
 PRESENT IF the timers may be specified by customers;
REGISTERED AS {cnmObjectClass x25BasicServiceProfile(5)};

7.2.1.2.4 MLP profile

mlpProfile MANAGED OBJECT CLASS
DERIVED FROM "DMI": top;
CHARACTERIZED BY
 mlpProfile-P PACKAGE
 BEHAVIOUR mlpProfile-B BEHAVIOUR
 DEFINED AS This object is used to represent the service profile necessary for providing the MLP. Creation, modification and deletion of this object are controlled by the Service Request object.;
 ATTRIBUTES
 mlpProfileId GET,
 "DLMO": mW GET,
 "DLMO": mX GET;;;
 CONDITIONAL PACKAGES
 mlpTimer-PACKAGE
 ATTRIBUTES
 "NLMO": localDTEAddress GET,
 "DLMO": mT1Timer GET,
 "DLMO": mT3Timer GET,
 "DLMO": mT2Timer GET;;
 PRESENT IF "The provider allows customers to set and modify these attributes.";
REGISTERED AS {cnmObjectClass mlpProfile(6)};

7.2.1.2.5 SLP profile

slpProfile MANAGED OBJECT CLASS
DERIVED FROM "DMI": top;
CHARACTERIZED BY
 slpProfile-P;
 CONDITIONAL PACKAGES
 slpTimersProfile-P
 PRESENT IF the timers may be specified by customers;
REGISTERED AS {cnmObjectClass slpProfile(7)};

Superseded by a more recent version

7.2.1.2.6 X.25 PVC profile

x25PvcProfile MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY x25PvcProfile-P PACKAGE

BEHAVIOUR x25PvcProfile-B BEHAVIOUR

DEFINED AS This MO class represents subscription data, i.e. the service profile of each PVC. Necessary PVC parameters are included in this MO. Creation, modification and deletion of this object are controlled by the Service Request object.;;

ATTRIBUTES

x25PvcProfileId GET,

"NLMO": chargingDirection GET,

"NLMO": localDTEAddress GET,

"NLMO": logicalChannel GET,

"DMI" : operationalState GET,

"NLMO": packetSize GET,

"NLMO": remoteDTEAddress GET,

"NLMO": remoteLogicalChannel GET,

"NLMO": throughputClasses GET,

"NLMO": virtualCircuitId GET,

"NLMO": windowSize GET;

NOTIFICATIONS

"DMI" : objectCreation,

"DMI" : objectDeletion;;;

REGISTERED AS {cnmObjectClass x25PvcProfile(8)};

7.2.1.2.7 Closed user group profile

cugProfile MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY cugProfile-P PACKAGE

BEHAVIOUR cugProfile-B BEHAVIOUR

DEFINED AS This MO class is used for managing the subscription of each CUG. The attributes represent the list of DTE addresses that belong to the same CUG. Creation, modification and deletion of this object are controlled by the Service Request object.;;

ATTRIBUTES

cugProfileId GET,

"NLMO": cUGWithIncomingAccess GET,

"NLMO": cUGWithOutgoingAccess GET,

"NLMO": bilateralCUG GET,

"NLMO": bilateralCUGWithOutgoingAccess GET,

dTEAddressList GET;;;

NOTIFICATIONS

"DMI" : objectCreation,

"DMI" : objectDeletion;;;

CONDITIONAL PACKAGES

interlockCodePkg PACKAGE

ATTRIBUTES

interlockCode GET;;

PRESENT IF "The service provider allows customers to use the international CUG service and to handle the interlock code value.",

cugIndexPkg PACKAGE

ATTRIBUTES

cugIndex GET;;

PRESENT IF "The service provider offers multiple CUGs and a customer subscribes to more than one CUG.";

REGISTERED AS {cnmObjectClass cugProfile(9)};

7.2.1.2.8 Hunt group profile

hgProfile MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY hgProfile-P PACKAGE

BEHAVIOUR hgProfile-B BEHAVIOUR

DEFINED AS This MO class is used for managing the subscription of each HG. The attributes represent the list of DTE addresses that belong to the same HG. Creation, modification and deletion of this object are controlled by the Service Request object.;;

ATTRIBUTES

hgProfileId GET,

hgAddress GET,

dTEAddressList GET;;;

Superseded by a more recent version

NOTIFICATIONS

"DMI": objectCreation,
"DMI": objectDeletion;;;

REGISTERED AS {cnmObjectClass hgProfile(10)};

7.2.1.2.9 CNM user

cnmUser MANAGED OBJECT CLASS

DERIVED FROM "DMI": customer;

CHARACTERIZED BY cnmUser-P PACKAGE

BEHAVIOUR cnmUser-B BEHAVIOUR

DEFINED AS This MO represents a customer's suborganization and/or access line group. The suborganizationObjectList points all the relevant objects that belong to that suborganization.;;

ATTRIBUTES

cnmUserId GET,

suborganizationObjectList GET-REPLACE;;;

REGISTERED AS {cnmObjectClass cnmUser(11)};

7.2.1.2.10 Customer

customer MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY

customerPkg,

"GNM": attributeValueChangeNotificationPackage,

contactListPkg,

"GNM": createDeleteNotificationsPackage;

CONDITIONAL PACKAGES

customerTypesPkg

PRESENT IF "an instance supports it.",

opNetworkListPkg

PRESENT IF "an instance supports it.",

serviceListPkg

PRESENT IF "an instance supports it.",

typeTextPkg

PRESENT IF "an instance supports it.",

"GNM": userLabelPackage

PRESENT IF "an instance supports it.",

;

REGISTERED AS {cnmObjectClass customer(12)};

7.2.1.2.11 Location

location MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY

locationPkg,

"GNM": attributeValueChangeNotificationPackage,

"GNM": createDeleteNotificationsPackage;

CONDITIONAL PACKAGES

contactListPkg

PRESENT IF "an instance supports it.",

typeTextPkg

PRESENT IF "an instance supports it.",

"GNM": userLabelPackage

PRESENT IF "an instance supports it.";

REGISTERED AS {cnmObjectClass location(13)};

7.2.2 Managed objects for CNM reconfiguration service

7.2.2.1 Referenced managed objects

- This Recommendation references the following support MO class for which the abstract syntax is specified by Recommendation M.3100:
 - equipment.

Superseded by a more recent version

7.2.2.2 Defined managed objects

7.2.2.2.1 CNM X.25 entity

This object class is defined in 7.1.1.2.1.

7.2.2.2.2 X.25 termination point

This object class is defined in 7.1.1.2.2.

7.2.2.2.3 CNM user

This object class is defined in 7.2.1.2.9.

7.2.2.2.4 Customer

This object class is defined in 7.2.1.2.10.

7.2.2.2.5 Location

This object class is defined in 7.2.1.2.11.

7.2.3 Managed objects for ordering service

7.2.3.1 Referenced managed objects

- This Recommendation references the following support managed object for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - top.

7.2.3.2 Defined managed objects

7.2.3.2.1 X.25 service profile

This object class is defined in 7.2.1.2.3.

7.2.3.2.2 MLP profile

This object class is defined in 7.2.1.2.4.

7.2.3.2.3 SLP profile

This object class is defined in 7.2.1.2.5.

7.2.3.2.4 X.25 PVC profile

This object class is defined in 7.2.1.2.6.

7.2.3.2.5 Closed user group profile

This object class is defined in 7.2.1.2.7.

7.2.3.2.6 Hunt group profile

This object class is defined in 7.2.1.2.8.

7.2.4 Managed objects for systematic call redirection service

7.2.4.1 Referenced managed objects

- This Recommendation references the following support MO class for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - top.

Superseded by a more recent version

7.2.4.2 Defined managed objects

7.2.4.2.1 Redirection list

redirectionList MANAGED OBJECT CLASS

DERIVED FROM top;

CHARACTERIZED BY redirectionListPackage PACKAGE

BEHAVIOUR redirectionListPackage-B BEHAVIOUR

DEFINED AS This object controls call redirection. Calls are redirected to addresses contained in the redirection list attribute.;

ATTRIBUTES

redirectionListId GET,

dTEAddress GET-REPLACE,

DMI:availabilityState GET-REPLACE,

callRedirectionList GET-REPLACE;;

REGISTERED AS {cnmObjectClass redirectionList(26)};

7.3 Managed objects for accounting management

7.3.1 Managed objects for periodic billing service

7.3.1.1 Referenced managed objects

- This Recommendation references the following support MO class for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - top.

7.3.1.2 Defined managed objects

This Recommendation defines the following MO:

cnmBillingController MANAGED OBJECT CLASS

DERIVED FROM "CCITT Rec. X.721 | ISO/IEC 10165-2": top;

CHARACTERIZED BY

cnmBillingController-P PACKAGE

cnmBillingController-B BEHAVIOUR

DEFINED AS This MO controls the emission of invoice notifications. If this MO is in the unlocked state, invoices are sent periodically. If it is locked, no invoice is emitted.;;

ATTRIBUTES

"ITU-T Rec. X.742 | ISO/IEC 10165-10": controlObjectId GET,

"DMI": administrativeState GET-REPLACE;;

NOTIFICATIONS

invoiceReport;

REGISTERED AS {cnmObjectClass cnmBillingController(27)};

7.3.2 Managed objects for detailed accounting service

7.3.2.1 Referenced managed objects

- This Recommendation references the following support MO class for which the abstract syntax is specified in ITU-T Rec. X.742 | ISO/IEC 10164-10:
 - usageMeteringRecord.

7.3.2.2 Defined managed objects

This Recommendation does not define any specific MO classes for this service. However, the following data types are defined to complete the definition of the ITU-T Rec. X.742 | ISO/IEC 10164-10: usageMeteringRecord class for the accounting specific to the accounting service. Related data type is defined in clause 14.

NOTE 1 – ITU-T Rec. X.742 | ISO/IEC 10164-10 defines the UsageInfo data type as follows:

- UsageInfo ::= SEQUENCE {
 serviceType ServiceType,
 usageData ANY DEFINED BY serviceType}

Superseded by a more recent version

This Recommendation adds the following definitions:

- UsageInfo-PacketService;
- PacketUsageData;
- PacketRegistrationType;
- PacketCompleteType;
- UsageMeasurement;
- UsageCounter;
- PacketInterruptType.

NOTE 2 – If a provider needs other usage metering items, another attribute (e.g. usageInfo2) may be defined in a subclass. In this attribute, supplementary service charging items, interworking charging items or any other ones specific to the provider are represented.

7.4 Managed objects for performance management

7.4.1 Managed objects for traffic information service

7.4.1.1 Referenced managed objects

- This Recommendation references the following support MO classes for which the abstract syntax is specified in Recommendation Q.822:
 - a) currentData;
 - b) historyData.

7.4.1.2 Defined managed objects

7.4.1.2.1 CNM X.25 entity

The `cnmX25Entity` object defined in 7.1.1.2.1 is used as the monitored MO for the measurement of packet layer counters of the `currentPacketTrafficData` object.

7.4.1.2.2 Current packet traffic data

currentPacketTrafficData MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. Q.822": `currentData`;

CHARACTERIZED BY `currentPacketTrafficData-P` PACKAGE

BEHAVIOUR `currentPacketTrafficData-B` BEHAVIOUR

DEFINED AS This MO is a subclass of the `currentData` object that has a scanning function to monitor a specified Monitored Object. The traffic measurement parameters shall be explicitly defined as attributes of this MO, not as `measurementListPkg`;;

ATTRIBUTES

"NLMO": `callAttempts` GET,
"NLMO": `callsConnected` GET,
"NLMO": `callTimeouts` GET,
"NLMO": `clearTimeouts` GET,
"NLMO": `dataPacketsReceived` GET,
"NLMO": `dataPacketsSent` GET,
"NLMO": `octetsReceivedCounter` GET,
"NLMO": `octetsSentCounter` GET,
"NLMO": `protocolErrorsAccusedOf` GET,
"NLMO": `protocolErrorsDetectedLocally` GET,
"NLMO": `providerInitiatedDisconnects` GET,
"NLMO": `providerInitiatedResets` GET,
"NLMO": `resetTimeouts` GET,
"NLMO": `remotelyInitiatedResets` GET,
"NLMO": `remotelyInitiatedRestarts` GET,
"NLMO": `segmentsReceived` GET,
"NLMO": `segmentsSent` GET;;;

REGISTERED AS {`cnmObjectClass currentPacketTrafficData(14)`};

Superseded by a more recent version

NOTE 1 – This MO intends to be used by many CNM service providers. However, based on the agreement between the provider and its customers, traffic items may be added by subclassing. If a provider does not collect some of the counters above, another object may be defined by directly inheriting the Recommendation Q.822: currentData object.

NOTE 2 – This MO shall be created on demand before the traffic data collection. The maximum number of observation is determined by the service provider in consideration of the processing load and the capacity.

7.4.1.2.3 History packet traffic data

historyPacketTrafficData MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. Q.822": historyData;

CHARACTERIZED BY historyPacketTrafficData-P PACKAGE

BEHAVIOUR historyPacketTrafficData-B BEHAVIOUR

DEFINED AS This MO is a subclass of the historyData object that has a function for storing monitored measurements of the currentPacketTrafficData object for a specified time interval. The measurement attributes in this object shall be an exact copy of the attributes in the currentPacketTrafficData object at the end of the interval. The traffic parameters shall be explicitly defined as attributes of this object, not as historyDataMeasurementListPkg of the super class.;;

ATTRIBUTES

"NLMO": callAttempts GET,
"NLMO": callsConnected GET,
"NLMO": callTimeouts GET,
"NLMO": clearTimeouts GET,
"NLMO": dataPacketsReceived GET,
"NLMO": dataPacketsSent GET,
"NLMO": octetsReceivedCounter GET,
"NLMO": octetsSentCounter GET,
"NLMO": protocolErrorsAccusedOf GET,
"NLMO": protocolErrorsDetectedLocally GET,
"NLMO": providerInitiatedDisconnects GET,
"NLMO": providerInitiatedResets GET,
"NLMO": resetTimeouts GET,
"NLMO": remotelyInitiatedResets GET,
"NLMO": remotelyInitiatedRestarts GET,
"NLMO": segmentsReceived GET,
"NLMO": segmentsSent GET;;;

REGISTERED AS {cnmObjectClass historyPacketTrafficData(15)};

7.4.1.2.4 MLP monitored point

mlpMonitoredPoint MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY mlpMonitoredPoint-P PACKAGE

BEHAVIOUR mlpMonitoredPoint-B BEHAVIOUR

DEFINED AS This object represents the monitored resource for which MLP-traffic-data are measured.;;

ATTRIBUTES

mlpMonitoredPointId GET;;;

REGISTERED AS {cnmObjectClass mlpMonitoredPoint(16)};

7.4.1.2.5 Current MLP traffic data

currentMlpTrafficData MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. Q.822": currentData;

CHARACTERIZED BY currentMlpTrafficData-P PACKAGE

BEHAVIOUR currentMlpTrafficData-B BEHAVIOUR

DEFINED AS This MO is a subclass of the currentData object that has a scanning function to monitor MLP communication. The traffic measurement parameters shall be explicitly defined as attributes of this MO, not as measurementListPkg.;;

ATTRIBUTES

"DLMO": receivedMlpInGuardRegion GET,
"DLMO": receivedMlpResets GET,
mlpFramesReceived GET,
mlpFramesSent GET,
mlpFramesOutsideWindowGuard GET;;;

REGISTERED AS {cnmObjectClass currentMlpTrafficData(17)};

Superseded by a more recent version

7.4.1.2.6 History MLP traffic data

historyMlpTrafficData MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. Q.822": historyData;

CHARACTERIZED BY historyMlpTrafficData-P PACKAGE

BEHAVIOUR historyMlpTrafficData-B BEHAVIOUR

DEFINED AS This MO is a subclass of the historyData object that has a function for storing monitored measurements of the currentMlpTrafficData object for a specified time interval. The measurement attributes in this object shall be an exact copy of the attributes in the currentMlpTrafficData object at the end of the interval. The traffic parameters shall be explicitly defined as attributes of this object, not as historyDataMeasurementListPkg of the super class.;

ATTRIBUTES

"DLMO": receivedMlpInGuardRegion GET,

"DLMO": receivedMlpResets GET,

mlpFramesReceived GET,

mlpFramesSent GET,

mlpFramesOutsideWindowGuard GET;;;

REGISTERED AS {cnmObjectClass historyMlpTrafficData(18)};

7.4.1.2.7 X.25 termination point

This object is also used for the monitored resource for the measurement of an SLP. This object class is defined in 7.1.1.2.2.

7.4.1.2.8 Current SLP traffic data

currentSlpTrafficData MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. Q.822": currentData;

CHARACTERIZED BY currentSlpTrafficData-P PACKAGE

BEHAVIOUR currentSlpTrafficData-B BEHAVIOUR

DEFINED AS This MO is a subclass of the currentData object that has a scanning function to monitor a specified Monitored Object. The traffic measurement parameters shall be explicitly defined as attributes of this MO, not as measurementListPkg.;

ATTRIBUTES

"DLMO": fCSErrorReceived GET,

"DLMO": fRMRsReceived GET,

"DLMO": fRMRsSent GET,

"DLMO": iFrameDataOctetsReceived GET,

"DLMO": iFrameDataOctetsSent GET,

"DLMO": iFramesReceived GET,

"DLMO": iFramesSent GET,

"DLMO": pollsReceived GET,

"DLMO": rEJsReceived GET,

"DLMO": rEJsSent GET,

"DLMO": rNRsReceived GET,

"DLMO": rNRsSent GET,

"DLMO": sABMsReceived GET,

"DLMO": sABMsSent GET,

"DLMO": timesT1Expired GET;;;

REGISTERED AS {cnmObjectClass currentSlpTrafficData(19)};

7.4.1.2.9 History SLP traffic data

historySlpTrafficData MANAGED OBJECT CLASS

DERIVED FROM "ITU-T Rec. Q.822": historyData;

CHARACTERIZED BY historySlpTrafficData-P PACKAGE

BEHAVIOUR historySlpTrafficData-B BEHAVIOUR

DEFINED AS This MO is a subclass of the historyData object that has a function for storing monitored measurements of the currentSlpTrafficData object for a specified time interval. The measurement attributes in this object shall be an exact copy of the attributes in the currentSlpTrafficData object at the end of the interval. The traffic parameters shall be explicitly defined as attributes of this object, not as historyDataMeasurementListPkg of the super class.;

ATTRIBUTES

"DLMO": fCSErrorReceived GET,

"DLMO": fRMRsReceived GET,

"DLMO": fRMRsSent GET,

"DLMO": iFrameDataOctetsReceived GET,

"DLMO": iFrameDataOctetsSent GET,

"DLMO": iFramesReceived GET,

"DLMO": iFramesSent GET,

Superseded by a more recent version

"DLMO": pollsReceived GET,
"DLMO": rEJsReceived GET,
"DLMO": rEJsSent GET,
"DLMO": rNRsReceived GET,
"DLMO": rNRsSent GET,
"DLMO": sABMsReceived GET,
"DLMO": sABMsSent GET,
"DLMO": timesT1Expired GET;;;

REGISTERED AS {cnmObjectClass historySlpTrafficData(20)};

7.4.2 Managed objects for quality of service information service

This service is for further study.

7.5 Managed objects for security management

7.5.1 Managed objects for password change service

This service is for further study.

7.5.2 Managed objects for access rights definition service

This service is for further study.

7.6 Managed objects for CNM supporting services

7.6.1 Managed objects for generic CNM service request service

7.6.1.1 Referenced managed objects

- This Recommendation references the following support managed object for which the abstract syntax is specified in CCITT Rec. X.721 | ISO/IEC 10165-2:
 - top.

7.6.1.2 Defined managed objects

7.6.1.2.1 Service request

serviceRequest MANAGED OBJECT CLASS

DERIVED FROM "DMI": top;

CHARACTERIZED BY serviceRequestPkg;

CONDITIONAL PACKAGES

"ITU-T Rec. X.790": trAgentContactPersonAttributePkg

PRESENT IF "an instance supports it and the trAgentContactPersonObjectPkg is not present",

"ITU-T Rec. X.790": trAgentContactPersonObjectPkg

PRESENT IF "an instance supports it and the trAgentContactPersonAttributePkg is not present",

"ITU-T Rec. X.790": trAlternateManagerContactPersonAttributePkg

PRESENT IF "an instance supports it and the trAlternateManagerContactPersonObjectPkg is not present",

"ITU-T Rec. X.790": trAlternateManagerContactPersonObjectPkg

PRESENT IF "an instance supports it and the trAlternateManagerContactPersonAttributePkg is not present",

"ITU-T Rec. X.790": trDialogPkg

PRESENT IF "an instance supports it",

"ITU-T Rec. X.790": trManagerContactPersonAttributePkg

PRESENT IF "an instance supports it and the trManagerContactPersonObjectPkg is not present",

"ITU-T Rec. X.790": trManagerContactPersonObjectPkg

PRESENT IF "an instance supports it and the trManagerContactPersonAttributePkg is not present",

negotiationPkg PACKAGE

PRESENT IF "an instance supports it";

REGISTERED AS {cnmObjectClass serviceRequest(21)};

Superseded by a more recent version

8 Name binding for object classes

8.1 Name binding for fault management

8.1.1 Name binding for alarm reporting service

8.1.1.1 Network

This object may recursively be contained by the Network object. The name binding definition between the network and network objects is imported from Recommendation M.3100.

8.1.1.2 CNM X.25 entity

This object shall be contained by the Network (customer network) object.

```
cnmX25Entity-network-NB NAME BINDING
  SUBORDINATE OBJECT CLASS cnmX25Entity;
  NAMED BY
  SUPERIOR OBJECT CLASS network;
  WITH ATTRIBUTE cnmX25EntityId;
REGISTERED AS {cnmNameBinding cnmX25Entity-network-NB(2)};
```

8.1.1.3 X.25 termination point

This object shall be contained by the Network (customer network) object.

```
x25TerminationPoint-network-NB NAME BINDING
  SUBORDINATE OBJECT CLASS x25TerminationPoint;
  NAMED BY
  SUPERIOR OBJECT CLASS cnmX25Entity;
  WITH ATTRIBUTE x25TerminationPointId;
REGISTERED AS {cnmNameBinding x25TerminationPoint-network-NB(3)};
```

8.1.1.4 Equipment

This object shall be contained by the X.25 Termination Point object.

```
equipment-x25TerminationPoint-NB NAME BINDING
  SUBORDINATE OBJECT CLASS equipment;
  NAMED BY
  SUPERIOR OBJECT CLASS x25TerminationPoint;
  WITH ATTRIBUTE equipmentId;
REGISTERED AS {cnmNameBinding equipment-x25TerminationPoint-NB(4)};
```

8.1.1.5 Managed element

This object shall be contained by the Network (customer network) object. The name binding definition between the managed element and network objects is imported from Recommendation M.3100.

8.1.1.6 Event forwarding discriminator

The Event Forwarding Discriminator object shall be contained by the Managed Element object.

```
eventForwardingDiscriminator-managedElement-NB NAME BINDING
  SUBORDINATE OBJECT CLASS eventForwardingDiscriminator;
  NAMED BY
  SUPERIOR OBJECT CLASS managedElement;
  WITH ATTRIBUTE discriminatorId;
REGISTERED AS {cnmNameBinding eventForwardingDiscriminator-managedElement-NB(6)};
```

8.1.2 Name binding for fault history service

8.1.2.1 PDN fault log record

The PDU Fault Log Record object shall be contained by the Log object.

Superseded by a more recent version

pdnFaultLogRecord-managedElement-NB NAME BINDING
SUBORDINATE OBJECT CLASS **pdnFaultLogRecord**;
NAMED BY
SUPERIOR OBJECT CLASS **log**;
WITH ATTRIBUTE **logRecordId**;
REGISTERED AS {cnmNameBinding **pdnFaultLogRecord-log-NB(29)**};

8.1.3 Name binding for trouble report service

8.1.3.1 PDN telecommunications trouble report

This object shall be contained by the Network (customer network) object.

pdnTelecommunicationsTroubleReport-network-NB NAME BINDING
SUBORDINATE OBJECT CLASS **pdnTelecommunicationsTroubleReport**;
NAMED BY
SUPERIOR OBJECT CLASS **network**;
WITH ATTRIBUTE **troubleReportId**;
REGISTERED AS {cnmNameBinding **pdnTelecommunicationsTroubleReport-network-NB(7)**};

8.1.3.2 Provider trouble report

This object shall be contained by the Network (customer network) object. The name binding definition between the provider Trouble Report and network objects is imported from Recommendation X.790.

8.1.3.3 Trouble report format definition

This object shall be contained by the Network (customer network) object. The name binding definition between the Trouble Report Format Definition and network objects is imported from Recommendation X.790.

8.1.3.4 Repair activity

This object shall be contained by the **pdnTelecommunicationsTroubleReport** object.

repairActivity-pdnTelecommunicationsTroubleReport-NB NAME BINDING
SUBORDINATE OBJECT CLASS **repairActivity**;
NAMED BY
SUPERIOR OBJECT CLASS **pdnTelecommunicationsTroubleReport**;
WITH ATTRIBUTE **repairActivityId**;
REGISTERED AS {cnmNameBinding **repairActivity-pdnTelecommunicationsTroubleReport-NB(8)**};

8.1.3.5 PDN trouble history record

This object shall be contained by the **log** object.

pdnTroubleHistoryRecord-log-NB NAME BINDING
SUBORDINATE OBJECT CLASS **pdnTroubleHistoryRecord**;
NAMED BY
SUPERIOR OBJECT CLASS **log**;
WITH ATTRIBUTE **logRecordId**;
REGISTERED AS {cnmNameBinding **pdnTroubleHistoryRecord-log-NB(9)**};

8.1.3.6 Contact

This object shall be contained by the Network (customer network) object. The name binding definition between the contact and network objects is imported from Recommendation X.790.

8.1.3.7 Log

This object shall be contained by the **managedElement** object.

log-managedElement-NB NAME BINDING
SUBORDINATE OBJECT CLASS **log**;
NAMED BY
SUPERIOR OBJECT CLASS **managedElement**;
WITH ATTRIBUTE **logId**;
REGISTERED AS {cnmNameBinding **log-managedElement-NB(11)**};

Superseded by a more recent version

8.1.4 Name binding for loop set-up service

8.1.4.1 loopbackPoint

This object shall be contained by the Network object.

```
loopback-network-NB NAME BINDING
  SUBORDINATE OBJECT CLASS loopbackPoint;
  NAMED BY
  SUPERIOR OBJECT CLASS network;
  WITH ATTRIBUTE x25TerminationPointId;
REGISTERED AS {cnmNameBinding loopback-network-NB(30)};
```

8.1.5 Name binding for test host service

8.1.5.1 cnmX25EntityTested

This object shall be contained by the Network object.

```
cnmX25EntityTested-network-NB NAME BINDING
  SUBORDINATE OBJECT CLASS cnmX25EntityTested;
  NAMED BY
  SUPERIOR OBJECT CLASS network;
  WITH ATTRIBUTE cnmX25EntityId;
REGISTERED AS {cnmNameBinding cnmX25EntityTested-network-NB(31)};
```

8.1.5.2 loopbackTest

This object shall be contained by the managedElement object.

```
loopbackTest-managedElement-NB NAME BINDING
  SUBORDINATE OBJECT CLASS loopbackTest;
  NAMED BY
  SUPERIOR OBJECT CLASS managedElement;
  WITH ATTRIBUTE "ITU-T Rec. X.745 | ISO/IEC 10164-12":testObjectId;
REGISTERED AS {cnmNameBinding loopbackTest-managedElement-NB(32)};
```

8.1.5.3 protocolIntegrityTest

This object shall be contained by the managedElement object.

```
protocolIntegrityTest-managedElement-NB NAME BINDING
  SUBORDINATE OBJECT CLASS protocolIntegrityTest;
  NAMED BY
  SUPERIOR OBJECT CLASS managedElement;
  WITH ATTRIBUTE "ITU-T Rec. X.745 | ISO/IEC 10164-12":testObjectId;
REGISTERED AS {cnmNameBinding protocolIntegrityTest-managedElement-NB(33)};
```

8.1.5.4 X.25 physical connection

This object shall be contained by the x25TerminationPoint object.

```
x25PhysicalConnection-x25TerminationPoint-NB NAME BINDING
  SUBORDINATE OBJECT CLASS x25PhysicalConnection;
  NAMED BY
  SUPERIOR OBJECT CLASS network;
  WITH ATTRIBUTE x25PhysicalConnectionId;
REGISTERED AS {cnmNameBinding x25PhysicalConnection-x25TerminationPoint-NB(34)};
```

8.1.6 Name binding for protocol monitoring service

This service is for further study.

Superseded by a more recent version

8.2 Name binding for configuration management

8.2.1 Name binding for configuration inquiry service

8.2.1.1 Network

The name binding for this service is the same as defined in 8.1.1.1.

8.2.1.2 CNM X.25 entity

The name binding for this service is the same as defined in 8.1.1.2.

8.2.1.3 X.25 termination point

The name binding for this service is the same as defined in 8.1.1.3.

8.2.1.4 Equipment

The name binding for this service is the same as defined in 8.1.1.4.

8.2.1.5 X.25 service profile

This object shall be contained by the Network (customer network) object.

```
x25ServiceProfile-network-NB NAME BINDING
  SUBORDINATE OBJECT CLASS x25ServiceProfile;
  NAMED BY
  SUPERIOR OBJECT CLASS network;
  WITH ATTRIBUTE x25ServiceProfileId;
REGISTERED AS {cnmNameBinding x25ServiceProfile-network-NB(12)};
```

8.2.1.6 MLP profile

This object shall be contained by the X.25 Service Profile object.

```
mlpProfile-x25ServiceProfile-NB NAME BINDING
  SUBORDINATE OBJECT CLASS mlpProfile;
  NAMED BY
  SUPERIOR OBJECT CLASS x25ServiceProfile;
  WITH ATTRIBUTE mlpProfileId;
REGISTERED AS {cnmNameBinding mlpProfile-x25ServiceProfile-NB(13)};
```

8.2.1.7 SLP profile

This object shall be contained by the X.25 Service Profile object.

```
slpProfile-x25ServiceProfile-NB NAME BINDING
  SUBORDINATE OBJECT CLASS slpProfile;
  NAMED BY
  SUPERIOR OBJECT CLASS x25ServiceProfile;
  WITH ATTRIBUTE slpProfileId;
REGISTERED AS {cnmNameBinding slpProfile-x25ServiceProfile-NB(14)};
```

8.2.1.8 X.25 PVC profile

This object shall be contained by the X.25 Service Profile object.

```
x25PvcProfile-x25ServiceProfile-NB NAME BINDING
  SUBORDINATE OBJECT CLASS x25PvcProfile;
  NAMED BY
  SUPERIOR OBJECT CLASS x25ServiceProfile;
  WITH ATTRIBUTE x25PvcProfileId;
REGISTERED AS {cnmNameBinding x25PvcProfile-x25ServiceProfile-NB(15)};
```

8.2.1.9 CUG profile

This object shall be contained by the Network (customer network) object.

```
cugProfile-network-NB NAME BINDING
  SUBORDINATE OBJECT CLASS cugProfile;
  NAMED BY
```

Superseded by a more recent version

SUPERIOR OBJECT CLASS network;
WITH ATTRIBUTE cugProfileId;
REGISTERED AS {cnmNameBinding cugProfile-network-NB(16)};

8.2.1.10 Hunt group profile

This object shall be contained by the Network (customer network) object.

hgProfile-network-NB NAME BINDING
SUBORDINATE OBJECT CLASS hgProfile;
NAMED BY
SUPERIOR OBJECT CLASS network;
WITH ATTRIBUTE hgProfileId;
REGISTERED AS {cnmNameBinding hgProfile-network-NB(17)};

8.2.1.11 Customer

This object shall be contained by the Network (customer network) object.

customer-network-NB NAME BINDING
SUBORDINATE OBJECT CLASS customer;
NAMED BY
SUPERIOR OBJECT CLASS network;
WITH ATTRIBUTE customerID;
REGISTERED AS {cnmNameBinding customer-network-NB(18)};

8.2.1.12 CNM user

This object shall be contained by the Customer object.

cnmUser-customer-NB NAME BINDING
SUBORDINATE OBJECT CLASS cnmUser;
NAMED BY
SUPERIOR OBJECT CLASS customer;
WITH ATTRIBUTE cnmUserId;
REGISTERED AS {cnmNameBinding cnmUser-customer-NB(19)};

8.2.1.13 Contact

The name binding is defined in 8.1.3.6.

8.2.1.14 Location

This object shall be contained by the Network (customer network) object.

location-network-NB NAME BINDING
SUBORDINATE OBJECT CLASS location;
NAMED BY
SUPERIOR OBJECT CLASS network;
WITH ATTRIBUTE locationId;
REGISTERED AS {cnmNameBinding location-network-NB(20)};

8.2.2 Name binding for CNM reconfiguration service

All the name binding for this service is the same as defined 8.2.1.

8.2.3 Name binding for ordering service

8.2.3.1 X.25 service profile

The name binding for this object is the same as defined in 8.2.1.5.

8.2.3.2 MLP profile

The name binding for this object is the same as defined in 8.2.1.6.

8.2.3.3 SLP profile

The name binding for this object is the same as defined in 8.2.1.7.

8.2.3.4 X.25 PVC profile

The name binding for this object is the same as defined in 8.2.1.8.

Superseded by a more recent version

8.2.3.5 CUG profile

The name binding for this object is the same as defined in 8.2.1.9.

8.2.3.6 Hunt group profile

The name binding for this object is the same as defined in 8.2.1.10.

8.2.4 Name binding for systematic call redirection service

8.2.4.1 Redirection list

This object shall be contained by the CNM X.25 Entity object.

redirectionList-cnmX25Entity-NB NAME BINDING
SUBORDINATE OBJECT CLASS redirectionList;
NAMED BY
SUPERIOR OBJECT CLASS cnmX25Entity;
WITH ATTRIBUTE redirectionListId;
REGISTERED AS {cnmNameBinding x25PhysicalConnection-x25TerminationPoint-NB(35)};

8.3 Name binding for accounting management

8.3.1 Name binding for periodic billing service

8.3.1.1 CNM billing controller

This object shall be contained by the managedElement.

cnmBillingController-managedElement-NB NAME BINDING
SUBORDINATE OBJECT CLASS billingController;
NAMED BY
SUPERIOR OBJECT CLASS managedElement;
WITH ATTRIBUTE controlObjectId;
CREATE;
DELETE;
REGISTERED AS {cnmNameBinding currentPacketTrafficData-cnmX25Entity-NB(28)};

8.3.2 Name binding for detailed accounting

8.3.2.1 Usage metering record

This object shall be contained by the Network (customer network) object. The name binding definition between the usageMeteringRecord and log objects is imported from ITU-T Rec. X.742 | ISO/IEC 10164-10.

8.4 Name binding for performance management

8.4.1 Name binding for traffic information service

8.4.1.1 CNM X.25 entity

The relationship between the CNM X.25 Entity object and the Network (customer network) object is defined in 8.1.1.2.

8.4.1.2 Current packet traffic data

This object shall be contained by the CNM X.25 Entity object.

currentPacketTrafficData-cnmX25Entity-NB NAME BINDING
SUBORDINATE OBJECT CLASS currentPacketTrafficData;
NAMED BY
SUPERIOR OBJECT CLASS cnmX25Entity;
WITH ATTRIBUTE "X.739": scannerId;
CREATE;
DELETE;
REGISTERED AS {cnmNameBinding currentPacketTrafficData-cnmX25Entity-NB(21)};

8.4.1.3 History packet traffic data

This object shall be contained by the Current Packet Traffic Data object.

historyPacketTrafficData-currentPacketTrafficData-NB NAME BINDING
SUBORDINATE OBJECT CLASS historyPacketTrafficData;
NAMED BY

Superseded by a more recent version

```
SUPERIOR OBJECT CLASS currentPacketTrafficData;  
WITH ATTRIBUTE "ITU-T Rec. Q.822": historyDataId;  
CREATE;  
DELETE;  
REGISTERED AS {cnmNameBinding historyPacketTrafficData-currentPacketTrafficData-NB(22)};
```

8.4.1.4 MLP monitored point

This object shall be contained by the CNM X.25 Entity object.

```
mlpMonitoredPoint-cnmX25Entity-NB NAME BINDING  
SUBORDINATE OBJECT CLASS mlpMonitoredPoint;  
NAMED BY  
SUPERIOR OBJECT CLASS cnmX25Entity;  
WITH ATTRIBUTE mlpMonitoredPointId;  
REGISTERED AS {cnmNameBinding mlpMonitoredPoint-cnmX25Entity-NB(23)};
```

8.4.1.5 Current MLP traffic data

This object shall be contained by the MLP Monitored Point object.

```
currentMlpTrafficData-mlpMonitoredPoint-NB NAME BINDING  
SUBORDINATE OBJECT CLASS currentMlpTrafficData;  
NAMED BY  
SUPERIOR OBJECT CLASS mlpMonitoredPoint;  
WITH ATTRIBUTE "X.739": scannerId;  
CREATE;  
DELETE;  
REGISTERED AS {cnmNameBinding currentMlpTrafficData-mlpMonitoredPoint-NB(24)};
```

8.4.1.6 History MLP traffic data

This object shall be contained by the Current MLP Traffic Data object.

```
historyMlpTrafficData-currentMlpTrafficData-NB NAME BINDING  
SUBORDINATE OBJECT CLASS historyMlpTrafficData;  
NAMED BY  
SUPERIOR OBJECT CLASS currentMlpTrafficData;  
WITH ATTRIBUTE "ITU-T Rec. Q.822": historyDataId;  
CREATE;  
DELETE;  
REGISTERED AS {cnmNameBinding historyMlpTrafficData-currentMlpTrafficData-NB(25)};
```

8.4.1.7 X.25 termination point

The name binding for this object is defined in 8.1.1.3.

8.4.1.8 Current SLP traffic data

This object shall be contained by the X.25 Termination Point object.

```
currentSlpTrafficData-cnmX25Entity-NB NAME BINDING  
SUBORDINATE OBJECT CLASS currentSlpTrafficData;  
NAMED BY  
SUPERIOR OBJECT CLASS x25TerminationPoint;  
WITH ATTRIBUTE "X.739": scannerId ;  
CREATE;  
DELETE;  
REGISTERED AS {cnmNameBinding mlpMonitoredPoint-cnmX25Entity-NB(26)};
```

8.4.1.9 History SLP traffic data

This object shall be contained by the Current SLP Traffic Data object.

```
historySlpTrafficData-currentSlpTrafficData-NB NAME BINDING  
SUBORDINATE OBJECT CLASS historySlpTrafficData;  
NAMED BY  
SUPERIOR OBJECT CLASS currentSlpTrafficData;  
WITH ATTRIBUTE "ITU-T Rec. Q.822": historyDataId;  
CREATE;  
DELETE;  
REGISTERED AS {cnmNameBinding historySlpTrafficData-currentSlpTrafficData-NB(27)};
```

Superseded by a more recent version

8.4.2 Name binding for quality of service information service

This service is for further study.

8.5 Name binding for security management

8.5.1 Name binding for password change service

This service is for further study.

8.5.2 Name binding for access rights definition service

This service is for further study.

8.6 Name binding for CNM supporting services

8.6.1 Service request

The Service Request object shall be contained by the Managed Element object.

```
serviceRequest-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS serviceRequest AND SUBCLASSES;
  NAMED BY SUPERIOR OBJECT CLASS "GMN": managedElement;
  WITH ATTRIBUTE serviceRequestId;
  CREATE
  WITH-REFERENCE-OBJECT,
  WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE sRChangeDenied;
REGISTERED AS {cnmNameBinding serviceRequest-managedElement-NB(28)};
```

9 Definition of packages

9.1 Packages for fault management

9.1.1 Packages for alarm notification service

There is no package definition specific for this service.

9.1.2 Packages for fault history service

There is no package definition specific for this service.

9.1.3 Packages for trouble report service

There is no package definition specific for this service.

9.1.4 Packages for loop set-up service

This service is for further study.

9.1.5 Packages for test host service

This service is for further study.

9.1.6 Packages for protocol monitoring service

This service is for further study.

9.2 Packages for configuration management

9.2.1 Packages for configuration inquiry service

9.2.1.1 X.25 service profile

```
x25ServiceProfile-P PACKAGE
  BEHAVIOUR x25ServiceProfile-B BEHAVIOUR
```

Superseded by a more recent version

DEFINED AS The service profile object represents the X.25 packet layer parameters (i.e. service profile) for each interface (DTE address). This object is created through the Service Request MO, by which subscription data are set to this object. Also replacement, addition and removal of service parameters or deletion are done through the Service Request MO.;;

ATTRIBUTES

x25ServiceProfileId;

REGISTERED AS {cnmPackage x25ServiceProfile-P(1)};

9.2.1.2 PLE profile

pleProfile-P PACKAGE

BEHAVIOUR pleProfile-B BEHAVIOUR

DEFINED AS This package represents the service profile of the X.25 packet layer protocol. Only GET operation is allowed.;;

"NLMO": logicalChannelAssignmentsX25PLE-P-B;

ATTRIBUTES

"NLMO": localDTEAddress GET,

"NLMO": protocolVersionSupported GET,

mlpSubscription GET,

"NLMO": cUG GET,

"NLMO": incomingCallsBarredWithinCUG GET,

"NLMO": outgoingCallsBarredWithinCUG GET,

"NLMO": bilateralCUG GET,

"NLMO": bilateralCUGwithOutgoingAccess GET,

"NLMO": fastSelectAcceptance GET,

"NLMO": flowControlParameterNegotiation GET,

"NLMO": incomingCallsBarred GET,

"DLMO": interfaceType GET,

"NLMO": logicalChannelAssignments GET,

"NLMO": outgoingCallsBarred GET,

"NLMO": oneWayLogicalChannelIncoming GET,

"NLMO": oneWayLogicalChannelOutgoing GET,

"NLMO": throughputClassNegotiation GET,

"NLMO": callDeflectionSubscription GET,

"NLMO": chargingInformation GET,

"NLMO": nonStandardDefaultPacketSizes GET,

"NLMO": defaultThroughputClassAssignment GET,

"NLMO": defaultThroughputClass GET,

"NLMO": defaultWindowSize GET,

"NLMO": defaultPacketSize GET,

"NLMO": nonStandardDefaultWindowSizes GET,

"NLMO": nUISubscription GET,

"NLMO": onlineFacilityRegistration GET,

"NLMO": packetRetransmission GET,

"NLMO": extendedPacketSequenceNumbering GET,

"NLMO": rOASubscription GET,

"NLMO": callRedirection GET,

"NLMO": dBitModification GET,

"NLMO": huntGroup GET,

"NLMO": localChargingPrevention GET,

"NLMO": nUIOverride GET,

"NLMO": reverseChargingAcceptance GET;

NOTIFICATIONS

"DMI": objectCreation,

"DMI": objectDeletion,

"DMI": attributeValueChange;

REGISTERED AS {cnmPackage pleProfile-P(2)};

9.2.1.3 SLP profile

slpProfile-P PACKAGE

BEHAVIOUR slpProfile-B BEHAVIOUR

DEFINED AS This package represents subscription data, i.e. the service profile of the SLP that supports the packet layer entity. The linkage between the slp and x25ServiceProfile objects is done by the dTEAddress attribute. This package includes also the profile of physical properties related to the access line.;;

Superseded by a more recent version

ATTRIBUTES

slpProfileId GET,

"NLMO": localDTEAddress GET,

"ITU-T Rec. X.281 | ISO/IEC 13642": transmissionRate GET,

"DLMO": sequenceModulus GET;

REGISTERED AS {cnmPackage slpProfile-P(3)};

9.2.1.4 SLP timers

slpTimersProfile-P PACKAGE

BEHAVIOUR slpTimersProfile-B BEHAVIOUR

DEFINED AS provides the set of optional timers used for slp communication;;

ATTRIBUTES

"DLMO": k GET,

"DLMO": n1 GET,

"DLMO": n2 GET,

"DLMO": t1Timer GET,

"DLMO": t2Timer GET,

"DLMO": t4Timer GET;

REGISTERED AS {cnmPackage slpTimersProfile-P(4)};

9.2.1.5 Customer

customerPkg PACKAGE

BEHAVIOUR

customerPkgDefinition BEHAVIOUR

DEFINED AS The Customer managed object class refers to a corporation, organization or individual with telecommunication needs to be satisfied via a private network, provider services, or a combination of a private network and provider services,

customerPkg-B BEHAVIOUR

DEFINED AS Attributes whose values are names of other managed object instances (e.g. opNetworkList) must have names of managed objects which already exist or a value of null, if permitted for that attribute.

Conditions under which an attributeValueChange notification is emitted are stated in the behaviour of the appropriate package or attribute. In absence of such a statement in the behaviour, the attribute does not cause an attributeValueChange notification to be emitted. All attributeValueChange notifications shall include the Attribute Identifier List parameter.

A value for the customerID attribute can only be provided when the object is created. Furthermore, once the object is created, the value of customerID may not be modified (i.e. the instance cannot be renamed). When customerTitle is used for naming, the customerID attribute has a NULL value.,

commonCreation-B BEHAVIOUR

DEFINED AS Unless otherwise specified, all attributes can be set by an M-CREATE;

ATTRIBUTES

customerID

PERMITTED VALUES CnmAsn1Module.SystemIdRange

GET,

customerTitle GET;

REGISTERED AS {cnmPackage customerPkg(5)};

9.2.1.6 Contact list

contactList-P PACKAGE

BEHAVIOUR

contactListPkgDefinition BEHAVIOUR

DEFINED AS The Contact List Attribute identifies who (person or organization) should be contacted about the resource.,

contactListPkgBehaviour BEHAVIOUR

DEFINED AS If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the contactList attribute changes value.;

ATTRIBUTES

contactList

PERMITTED VALUES CnmAsn1Module.AnyNamesRange

GET-REPLACE ADD-REMOVE;

REGISTERED AS {cnmPackage customer-P(6)};

Superseded by a more recent version

9.2.1.7 Location

```
locationPkg PACKAGE
  BEHAVIOUR
    locationPkgDefinition,
    locationPkgBehaviour,
    commonCreateBehaviour;
  ATTRIBUTES
    locationID
      PERMITTED VALUES CnmAsn1Module.SystemIdRange
      GET,
    geographicCoordinates
      PERMITTED VALUES CnmAsn1Module.GegraphicCoordinatesRange
      GET-REPLACE,
    locationDetails
      PERMITTED VALUES CnmAsn1Module.LocationDetailesRange
      GET-REPLACE,
    locationTitle GET,
    locationType GET-REPLACE,
    postalAddress
      PERMITTED VALUES CnmAsn1Module.PostalAddressRange
      GET-REPLACE;
REGISTERED AS {cnmPackage locationPkg(7)};
```

9.2.1.8 Type text

```
typeTextPkg PACKAGE
  BEHAVIOUR
    typeTextPkgDefiniton BEHAVIOUR
      DEFINED AS This package serves to supplement and refine individual managed object class attribute.;;
    typeTextPkgBehaviour BEHAVIOUR
      DEFINED AS If the attributeValueChange notification is defined for the managed object class using this package, this
      notification is emitted when the typeText attribute changes value.;
  ATTRIBUTES
    typeText
      PERMITTED VALUES CnmAsn1Module.GraphicString32
      GET-REPLACE;
REGISTERED AS {cnmPackage typeTextPkg(8)};
```

9.2.1.9 Customer types

```
customerTypesPkg PACKAGE
  BEHAVIOUR
    customerTypesPkgDefinition BEHAVIOUR
      DEFINED AS This package contains one attribute that provides information about the types of customer.;;
    customerTypesPkg-B BEHAVIOUR
      DEFINED AS If the attributeValueChange notification is defined for the managed object class using this package, this
      notification is emitted when the customerTypes attribute changes value.;
  ;
  ATTRIBUTES
    customerTypes GET-REPLACE ADD-REMOVE;
REGISTERED AS {cnmPackage customerTypesPkg(9)};
```

9.2.1.10 OP network list

```
opNetworkListPkg PACKAGE
  BEHAVIOUR
    opNetworkListPkgDefinition BEHAVIOUR
      DEFINED AS The opNetworkList attribute indicates what networks use or are dependent on the resource.;;
    opNetworkListPkg-B BEHAVIOUR
      DEFINED AS If the attributeValueChange notification is defined for the managed object class using this package, this
      notification is emitted when the opNetetworkList attribute changes value.;;
  ATTRIBUTES
    opNetworkList
```

Superseded by a more recent version

PERMITTED VALUES CnmAsn1Module.AnyNamesRange
GET-REPLACE
ADD-REMOVE;

REGISTERED AS {cnmPackage opNetworkListPkg(10)};

9.2.1.11 Service list

serviceListPkg PACKAGE

BEHAVIOUR

serviceListPkgDefinition BEHAVIOUR

DEFINED AS ServiceList attribute identifies any services that are supported by the resource.;

serviceListPkg-B BEHAVIOUR

DEFINED AS If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the serviceList attribute changes value.;;

ATTRIBUTES

serviceList

PERMITTED VALUES CnmAsn1Module.AnyNamesRange

GET-REPLACE ADD-REMOVE;

REGISTERED AS {cnmPackage serviceListPkg(11)};

9.2.2 Packages for CNM reconfiguration service

The same packages as defined in 9.2.1 for service profiles are also used for the CNM reconfiguration service.

9.2.3 Packages for systematic call redirection service

This service is for further study.

9.3 Packages for accounting management

9.3.1 Packages for periodic billing service

There is no package definition specific for this service.

9.3.2 Packages for detailed accounting

There is no package definition specific for this service.

9.4 Packages for performance management

9.4.1 Packages for traffic information service

There is no package definition specific for this service.

9.4.2 Packages for quality of service information service

This service is for further study.

9.5 Packages for security management

9.5.1 Packages for password change service

This service is for further study.

9.5.2 Packages for access rights definition service

This service is for further study.

9.6 Packages for CNM service usage management

9.6.1 Packages for negotiation service

9.6.1.1 Negotiation

negotiationPkg PACKAGE

BEHAVIOUR negotiationBehaviour BEHAVIOUR

DEFINED AS

Superseded by a more recent version

The negotiationPkg provides the means for the manager and the agent to negotiate the parameters of the request;

ATTRIBUTES

limitValidityDate GET-REPLACE;

REGISTERED AS {cnmPackage negotiationPkg(12)};

9.6.2 Packages for service request service

9.6.2.1 Service request

serviceRequestPkg PACKAGE

BEHAVIOUR

serviceRequestBehaviour BEHAVIOUR

DEFINED AS When an instance of the serviceRequest MO class is created, all mandatory attributes must be supplied. The attributeValueChange notification is emitted when any of the attributes is changed either by the manager or the agent. The object creation notification is generated when an instance of the serviceRequest is deleted.,

serviceRequestDefinition BEHAVIOUR

DEFINED AS The serviceRequest provides the means for a manager to ask for operations on objects of the interoperable interface that are not directly accessible. It contains the basic attributes that allow a manager to ask for an operation at a given date. It allows an agent to negotiate with the manager the appropriate conditions or the date using the negotiationPkg and the status attribute. When needed, the dialogue attribute is needed in the same way as in the Recommendation X.790: telecommunicationsTroubleReport. The dateRequest attribute is used by the manager to indicate when he wants the service to be provided (dontCare, now, at a precise date). The operationList attribute allows the manager to specify in details the CMISE operations he wants to be performed.;

serviceRequestDefinition;

ATTRIBUTES

serviceRequestId GET,

status INITIAL VALUE CnmAsn1Module.initialStatus

GET-REPLACE,

dateRequest DEFAULT VALUE CnmAsn1Module.defaultDateRequest

GET-REPLACE,

operationList DEFAULT VALUE CnmAsn1Module.defaultOperationList

GET-REPLACE,

resultList INITIAL VALUE CnmAsn1Module.initialResultList

GET,

processingMode DEFAULT VALUE

CnmAsn1Module.defaultProcessingMode

GET-REPLACE;

NOTIFICATIONS

"DMI": attributeValueChange,

"DMI": objectCreation,

"DMI": objectDeletion;

REGISTERED AS {cnmPackage serviceRequestPkg(13)};

10 Definition of attributes

10.1 Attributes for name binding

Currently, there are no attributes for this subclause.

10.2 Attributes for objects identifier

10.2.1 CNM user identifier

cnmUserId ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;

MATCHES FOR Equality, Substrings;

BEHAVIOUR cnmUserId-B BEHAVIOUR

DEFINED AS The naming instance of cnmUser object or subclass;;

REGISTERED AS {cnmAttribute cnmUserId(24)};

Superseded by a more recent version

10.2.2 CNM X.25 entity identifier

cnmX25EntityId ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;
MATCHES FOR Equality, Substrings;
BEHAVIOUR cnmX25EntityId-B BEHAVIOUR
DEFINED AS The naming instance of cnmX25Entity object or subclass;;
REGISTERED AS {cnmAttribute cnmX25EntityId(25)};

10.2.3 CUG profile identifier

cugProfileId ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;
MATCHES FOR Equality, Substrings;
BEHAVIOUR cugServiceProfileId-B BEHAVIOUR
DEFINED AS The naming instance of cugProfile MO or subclass;;
REGISTERED AS {cnmAttribute cugServiceProfileId(26)};

10.2.4 Customer identifier

customerID ATTRIBUTE
DERIVED FROM "CCITT Rec. X.721 | ISO/IEC 10165-2:1992": systemId;
MATCHES FOR EQUALITY;
BEHAVIOUR customerID-B BEHAVIOUR
DEFINED AS The customer attribute is one of the distinguishing attributes in the customer managed object class.;;
REGISTERED AS {cnmAttribute customerId(27)};

10.2.5 Hunt group profile identifier

hgProfileId ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;
MATCHES FOR Equality, Substrings;
BEHAVIOUR hgProfileId-B BEHAVIOUR
DEFINED AS The naming instance of hgProfile MO or subclass;;
REGISTERED AS {cnmAttribute hgServiceProfileId(28)};

10.2.6 MLP monitored point identifier

mlpMonitoredPointId ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;
MATCHES FOR Equality, Substrings;
BEHAVIOUR mlpMonitoredPointId-B BEHAVIOUR
DEFINED AS The naming instance of mlpMonitoredPoint object or subclass;;
REGISTERED AS {cnmAttribute mlpMonitoredPointId(29)};

10.2.7 MLP profile identifier

mlpProfileId ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;
MATCHES FOR Equality, Substrings;
BEHAVIOUR mlpProfileId-B BEHAVIOUR
DEFINED AS The naming instance of mlpProfile object or subclass;;
REGISTERED AS {cnmAttribute mlpProfileId(30)};

10.2.8 Service request Id

serviceRequestId ATTRIBUTE
DERIVED FROM "CCITT Rec. M.3100": NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR
serviceRequestIdBehaviour BEHAVIOUR
DEFINED AS The serviceRequestId is an attribute type whose distinguished value can be used as a RDN when naming an instance of the serviceRequest object class;
REGISTERED AS {cnmAttribute serviceRequest(31)};

10.2.9 SLP profile identifier

slpProfileId ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;
MATCHES FOR Equality, Substrings;

Superseded by a more recent version

BEHAVIOUR slpProfileId-B **BEHAVIOUR**

DEFINED AS The naming instance of slpProfile object or subclass;;

REGISTERED AS {cnmAttribute slpProfileId(32)};

10.2.10 X.25 PVC profile identifier

x25PvcProfileId **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;

MATCHES FOR Equality, Substrings;

BEHAVIOUR x25PvcProfileId-B **BEHAVIOUR**

DEFINED AS The naming instance of x25PvcProfile object or subclass;;

REGISTERED AS {cnmAttribute x25PvcProfileId(33)};

10.2.11 X.25 termination point identifier

x25TerminationPointId **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;

MATCHES FOR Equality, Substrings;

BEHAVIOUR x25TerminationPointId-B **BEHAVIOUR**

DEFINED AS The naming instance of TerminationPoint object or subclass;;

REGISTERED AS {cnmAttribute x25TerminationPointId(34)};

10.2.12 X.25 service profile identifier

x25ServiceProfileId **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;

MATCHES FOR Equality, Substrings;

BEHAVIOUR x25ServiceProfileId-B **BEHAVIOUR**

DEFINED AS The naming instance of x25ServiceProfile object or subclass;;

REGISTERED AS {cnmAttribute x25ServiceProfileId(35)};

10.2.13 Redirection list identifier

redirectionListId **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;

MATCHES FOR Equality, Substrings;

BEHAVIOUR redirectionListId-B **BEHAVIOUR**

DEFINED AS The naming instance of redirectionList object or subclass;;

REGISTERED AS {cnmAttribute redirectionListId(65)};

10.2.14 X.25 physical connection identifier

x25PhysicalConnectionId **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicString;

MATCHES FOR Equality, Substrings;

BEHAVIOUR x25PhysicalConnectionId-B **BEHAVIOUR**

DEFINED AS The naming instance of x25PhysicalConnection object or subclass;;

REGISTERED AS {cnmAttribute x25PhysicalConnectionId(66)};

10.3 Other attributes

10.3.1 Contact list

contactList **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX CnmAsn1Module.AnyNamesBase;

MATCH FOR SET-COMPARISON, SET-INTERSECTION;

BEHAVIOUR

contactList-B **BEHAVIOUR**

DEFINED AS The contactList attribute provides managed object instance information for one or more contacts. The following object classes (or any of their subclasses or allomorphic classes) are valid as contacts: "Rec. X.790": Contact. The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.;

REGISTERED AS {cnmAttribute contactList(36)};

10.3.2 Interlock code

interlockCode **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX CnmAsn1Module.InterlockCode;

MATCHES FOR EQUALITY;

BEHAVIOUR

Superseded by a more recent version

interlockCode-B BEHAVIOUR

DEFINED AS This attribute represents the interlock code of a CUG.;

REGISTERED AS {cnmAttribute interlockCode(65)};

10.3.3 CUG index

cugIndex ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.Integer;

MATCHES FOR EQUALITY;

BEHAVIOUR

cugIndex-B BEHAVIOUR

DEFINED AS The cugIndex attribute identifies each closed user group when a customer subscribes to multiple CUGs.;

REGISTERED AS {cnmAttribute cugIndex(66)};

10.3.4 Customer title

customerTitle ATTRIBUTE

DERIVED FROM "DMI": systemTitle;

MATCHES FOR EQUALITY;

BEHAVIOUR

customerTitle-B BEHAVIOUR

DEFINED AS The customerTitle attribute is one of the distinguishing attributes in the Customer Managed object class for use as described in 6.3 of CCITT Rec. X.720 | ISO/IEC 10165-1.;

REGISTERED AS {cnmAttribute customerTitle(37)};

10.3.5 Customer types

customerTypes ATTRIBUTES

WITH ATTRIBUTES SYNTAX CnmAsn1Module.CustomerTypes;

MATCHES FOR EQUALITY,

SET-COMPARISON,

SET-INTERSECTION;

BEHAVIOUR customerTypes-B BEHAVIOUR

DEFINED AS The customerType attribute identifies the types of customer.;;

REGISTERED AS {cnmAttribute customerTypes(38)};

10.3.6 Date request

dateRequest ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.DateRequest;

MATCHES FOR EQUALITY;

BEHAVIOUR

dateRequestBehaviour BEHAVIOUR

DEFINED AS The dateRequest attribute provides the means for the manager to ask for a special date, when he wants the service to be provided, and for the agent to inform the manager that this date is not acceptable, giving another date;

REGISTERED AS {cnmAttribute dateRequest(39)};

10.3.7 DTE address list

dTEAddressList

WITH ATTRIBUTE SYNTAX CnmAsn1Module.DTEAddressList;

MATCHES FOR EQUALITY;

BEHAVIOUR dTEAddressList-B BEHAVIOUR

DEFINED AS A set of DTE addresses that belong to the same HG.;;

REGISTERED AS {cnmAttribute dTEAddressList(40)};

10.3.8 Geographic coordinates

geographicCoordinates ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.GeographicCoordinates;

MATCHES FOR EQUALITY;

BEHAVIOUR geographicCoordinates-B BEHAVIOUR

DEFINED AS The geographicCoordinates attribute identifies the type of geographic coordinates and the geographic coordinates. Four types of geographic coordinates are defined:

The latitude-longitude coordinates type refers to position on the earth's surface as measured in angular distance from the equator and the meridian which runs between the north and south pole through Greenwich, England.

Superseded by a more recent version

The npa-nxx coordinates type refers to a telephone number npa identifies the North America numbering plan area (i.e. area code), and nxx identifies the exchange or central office site.

The v-h coordinates type refers to a vertical and horizontal coordinate system used and originated by the bell System in North America to identify the location of central offices and equipment.

The country-city type refers to the international country and city dialing codes.;;

REGISTERED AS {cnmAttribute geographicCoordinates(41)};

10.3.9 Hunt group address

hgAddress ATTRIBUTE

WITH ATTRIBUTE SYNTAX NLM.DTEAddress;

MATCHES FOR EQUALITY;

BEHAVIOUR hgAddress-B BEHAVIOUR

DEFINED AS The DTE address of the main member of a hunt group expressed as CCITT Recommendations X.121, E.164, etc. address.;;

REGISTERED AS {cnmAttribute hgAddress(42)};

10.3.10 Limit validity date

limitValidityDate ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.Date;

MATCHES FOR EQUALITY;

BEHAVIOUR

limitValidityDateBehaviour BEHAVIOUR

DEFINED AS This date indicates the date when the proposed attributes won't be valid anymore,

negotiationBehaviour BEHAVIOUR

DEFINED AS The negotiationPkg provides the means for the manager and the agent to negotiate the parameters of the request;

REGISTERED AS {cnmAttribute limitValidityDate(43)};

10.3.11 Location detail

locationDetails ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.LocationDetails;

MATCHES FOR EQUALITY, SUBSTRINGS;

BEHAVIOUR locationDetails-B BEHAVIOUR

DEFINED AS The locationDetails attribute provides additional information regarding the location.;;

REGISTERED AS {cnmAttribute locationID(44)};

10.3.12 Location ID

locationID ATTRIBUTE

DERIVED FROM "CCITT Rec. X.721 | ISO/IEC 10165-2": systemID;

MATCHES FOR EQUALITY;

BEHAVIOUR locationID-B BEHAVIOUR

DEFINED AS The locationID attribute is one of the distinguishing attributes of the Location managed object class.;;

REGISTERED AS {cnmAttribute locationID(45)};

10.3.13 Location title

locationTitle ATTRIBUTE

DERIVED FROM "CCITT Rec. X.721 | ISO/IEC 10165-2": systemTitle;

BEHAVIOUR locationTitle-B BEHAVIOUR

DEFINED AS The locationTitle attribute is one of the distinguishing attributes in the Location managed object class for use as described in 6.3 of CCITT Rec.X.720 | ISO/IEC 10165-1.;;

REGISTERED AS {cnmAttribute locationTitle(46)};

10.3.14 Location type

locationType ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.LocationType;

MATCHES FOR EQUALITY;

BEHAVIOUR locationType-B BEHAVIOUR

DEFINED AS The locationType attribute shall indicate the type of location.;;

REGISTERED AS {cnmAttribute locationType(47)};

10.3.15 MLP frames outside window guard

mlpFramesOutsideWindowGuard ATTRIBUTE

DERIVED FROM "GMI": nonwrapping64bitCounter;

Superseded by a more recent version

BEHAVIOUR mlpFramesOutsideWindowGuard-B BEHAVIOUR

DEFINED AS Counter: Total number of MLP frames outside the window guard that have been received.;

REGISTERED AS {cnmAttribute mlpFramesOutsideWindowGuard(48)};

10.3.16 MLP frames received

mlpFramesReceived ATTRIBUTE

DERIVED FROM "GMI": nonwrapping64bitCounter;

BEHAVIOUR mlpFramesReceived-B BEHAVIOUR

DEFINED AS Counter: Total number of MLP frames received.;

REGISTERED AS {cnmAttribute mlpFramesReceived(49)};

10.3.17 MLP frames sent

mlpFramesSent ATTRIBUTE

DERIVED FROM "GMI": nonwrapping64bitCounter;

BEHAVIOUR mlpFramesSent-B BEHAVIOUR

DEFINED AS Counter: Total number of MLP frames sent.;

REGISTERED AS {cnmAttribute mlpFramesSent (50)};

10.3.18 MLP subscription

mlpSubscription ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.Boolean;

MATCHES FOR EQUALITY;

BEHAVIOUR mlpSubscription-B BEHAVIOUR

DEFINED AS This attribute identifies whether or not the MLP service is subscribed to. Expressed as a boolean where value of 'True' indicates subscription.;

REGISTERED AS {cnmAttribute mlpSubscription(51)};

10.3.19 Operation list

operationList ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.OperationList;

MATCHES FOR EQUALITY;

REGISTERED AS {cnmAttribute operationList(55)};

10.3.20 Postal address

postalAddress ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.PostalAddress;

MATCHES FOR EQUALITY;

BEHAVIOUR postalAddress-B BEHAVIOUR

DEFINED AS The postalAddress attribute specifies the address information required for the physical delivery of postal messages by the postal authority to the named object. The postal address is limited to six(6) lines of thirty(30) characters each, including a Postal Country Name. Normally the information contained in such an address could include an addressee's name, street address, city, state or province, postal code and possibly a post office box number depending on the specific requirements of the named object. Only the GraphicString string choice defined in the selectedAttributesType module defined in Recommendation X.520 must be supported.;;

REGISTERED AS {cnmAttribute postalAddress(56)};

10.3.21 OP network list

opNetworkList ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.AnyNamesBase;

MATCHES FOR SET-COMPARISON,

SET-INTERSECTION;

BEHAVIOUR opNetworkList-B BEHAVIOUR

DEFINED AS The opNetworkList attribute shall provide managed object instance information about a set of networks. The following object class (or any of their subclasses or allomorphic classes) are valid as networks.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.;;

REGISTERED AS {cnmAttribute opNetworkList(57)};

10.3.22 Processing mode

processingMode ATTRIBUTE

WITH ATTRIBUTE SYNTAX CnmAsn1Module.ProcessingMode;

MATCHES FOR EQUALITY;

REGISTERED AS {cnmAttribute processingMode(58)};

Superseded by a more recent version

10.3.23 Result list

resultList ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.ResultList;
MATCHES FOR EQUALITY;
REGISTERED AS {cnmAttribute resultList(59)};

10.3.24 Service list

serviceList ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.AnyNamesBase;
MATCHES FOR SET-COMPARISON;
BEHAVIOUR service-B BEHAVIOUR
DEFINED AS The serviceList attribute provides managed object instance information about one or more services. The following object classes (or any of their subclasses or allomorphic classes) are valid as services. The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.;;
REGISTERED AS {cnmAttribute serviceList(60)};

10.3.25 Suborganization object list

suborganizationObjectList ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.SuborganizationObjectList;
MATCHES FOR EQUALITY;
BEHAVIOUR
suborganizationObjectList-B BEHAVIOUR
DEFINED AS This attribute indicates objects that belong to a customer's suborganization.;;
REGISTERED AS {cnmAttribute suborganizationObjectList(61)};

10.3.26 Status

status ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.Status;
MATCHES FOR EQUALITY;
BEHAVIOUR
statusBehaviour BEHAVIOUR
DEFINED AS This attribute indicates the status or phase of the request.;;
REGISTERED AS {cnmAttribute status(62)};

10.3.27 Trouble type PSPDN

troubleTypePspdn ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.TroubleTypePspdn;
MATCHES FOR EQUALITY;
BEHAVIOUR troubleTypePspdn-B BEHAVIOUR
DEFINED AS This attribute represents types of trouble for PDNs. It may or may not supersede the trouble type attribute of ITU-T Recommendation X.790.
REGISTERED AS {cnmAttribute troubleTypePspdn(63)}

10.3.28 Type text

typeText ATTRIBUTE
WITH ATTRIBUTE SYNTAX CnmAsn1Module.GraphicStringBase;
MATCH FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR
typeTextBehaviour BEHAVIOUR
DEFINED AS The typeText attribute serves to supplement and refine individual managed object class attributes. If none of the named items defined for the 'type' attribute are appropriate, or the 'type' attribute requires refinement, the typeText attribute contains supplemental information.;;
REGISTERED AS {cnmAttribute typeText(64)};

10.3.29 Call redirection list

callRedirectionList
WITH ATTRIBUTE SYNTAX CnmAsn1Module.DTEAddressList;
MATCHES FOR EQUALITY;
BEHAVIOUR callRedirectionList-B BEHAVIOUR
DEFINED AS A set of DTE addresses to be redirected.;;
REGISTERED AS {cnmAttribute callRedirectionList(67)}

Superseded by a more recent version

10.3.30 Location pointer

locationPointer

WITH ATTRIBUTE SYNTAX OBJECT INSTANCE;
MATCHES FOR EQUALITY;
BEHAVIOUR locationPointer-B BEHAVIOUR
DEFINED AS represents the point where a loop-back point is set.;;

REGISTERED AS {cnmAttribute locationPointer(68)}

10.3.31 Loop-back status

loopbackStatus

WITH ATTRIBUTE SYNTAX BOOLEAN;
MATCHES FOR EQUALITY;
BEHAVIOUR loopbackStatus-B BEHAVIOUR
DEFINED AS represents whether or not the loop-back point is set. By setting value 'true', the loop-back point is set.
By setting value 'false', the loop-back point is released.;;

REGISTERED AS {cnmAttribute loop-backStatus(69)}

10.4 Attributes for further studying services

The following services are for further study. The attributes for them have not yet been defined:

- access rights definition service;
- cancellation service;
- inventory inquiry service;
- network statistic service;
- password change service;
- protocol monitoring service;
- quality of service information service;
- quota control service;
- real time charging information service.

10.5 Services that define no attribute on this Recommendation

No attributes are defined for the following services. Several attributes defined in other clauses are referenced for these services:

- CNM Reconfiguration service;
- service ordering service.

11 Definition of notifications

11.1 Derived notification definitions

Notifications defined in CCITT Rec. X.721 | ISO/IEC 10165-2 are derived and incorporated into managed object classes that emit alarms. They are:

- attribute value change;
- communication alarm;
- equipment alarm;
- environmental alarm;
- object creation;
- object deletion;
- quality of service alarm; and
- processing error alarm.

Superseded by a more recent version

11.2 Defined notifications

11.2.1 Invoice report

invoiceReport NOTIFICATION
BEHAVIOUR
invoiceReport-B BEHAVIOUR
DEFINED AS represents invoice items;
WITH INFORMATION SYNTAX
invoiceInfo;
REGISTERED AS {cnmNotification invoiceReport (1)};

12 Definition of parameters

12.1 Service request change denied

sRChangeDenied PARAMETER
CONTEXT SPECIFIC-ERROR;
WITH SYNTAX CnmAsn1Module.SRChangeDenied;
BEHAVIOUR sRChangeDenied-B BEHAVIOUR
DEFINED AS This error message is sent to the manager when the manager attempts to change a service request which is not in an appropriate state to accept the change.;;
REGISTERED AS {cnmParameter sRChangeDenied(1)};

13 Definitions of action types

Currently, no Action Types are imported or defined for the use of this Recommendation.

14 ASN.1 production definitions

CnmAsn1Module {itu-t(0) recommendation(0) x(24) 162 cnmAsn1Module(2) version2(2)};

DEFINITIONS IMPLICIT TAGS ::= BEGIN

EXPORTS everything

IMPORTS

GroupObjects, ObservedValue, PerceivedSeverity

FROM Attribute-ASN1 Module {joint-iso-itu-t ms(9) smi(3) part2(2) asn1Module(2) 1}

SetInfoStatus, AttributeId, ObjectInstance, ActionArgument, CreateArgument, DeleteArgument, GetArgument, SetArgument

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

NameType

FROM ASN1DefinedTypesModule {itu-t(0) recommendation(0) m(13) gnm
(3100) informationModel(0) asn1Modules(2) asn1DefinedTypesModule(0)}

DTEAddress

FROM NLM {joint-iso-itu-t network-layer(15) management(0) nLM(20)
asn1Module(2) 0} ;

cnmObjectClass OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmObjectClass(3)}

cnmPackage OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmPackage(4)}

cnmParameter OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmParameter(5)}

cnmNameBinding OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmNameBinding(6)}

cnmAttribute OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmAttribute(7)}

cnmAttributeGroup OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmAttributeGroup(8)}

cnmAction OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmAction(9)}

cnmNotification OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmNotification(10)}

cnmFunctionalUnit
version1(1)} OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 cnmFunctionalUnit(11)}

miscellaneous OBJECT IDENTIFIER ::= {itu-t(0) recommendation(0) x(24) 162 miscellaneous(12)}

Superseded by a more recent version

-- default value definition

```
defaultDateRequest      DateRequest      ::= dontCare : NULL
defaultInitialResultList initialResultList ::= {}
defaultOperationList    OperationList    := {}
defaultProcessingMode    ProcessingMode    ::= sequential : NULL
```

-- initial value definition

```
InitialResultList ResultList ::= {}
```

-- supporting production

```
AnyNamesBase      ::= SET OF ObjectInstance
AnyNamesRange     ::= SET SIZE(0..64) OF ObjectInstance
Boolean           ::= BOOLEAN
CustomerType      ::= SET OF INTEGER (0..255)
Date              ::= SEQUENCE {
    hour  INTEGER (0 .. 23),
    day   INTEGER (1 .. 31),
    month INTEGER (1 .. 12),
    year  INTEGER (0 .. 99)}
DateRequest       ::= CHOICE {
    dontCare  NULL ,
    request   RequestedTime}
DTEAddressList    ::= SET OF DTEAddress
GeographicCoordinates ::= INTEGER {
    v-h-Coordinates      (0),
    latitude-longitude   (1),
    npa-nxx              (2),
    country-city          (3)}
GraphicString     ::= GRAPHICSTRING
GraphicString64   ::= GraphicString(SIZE(0..64))
GraphicStringBase ::= GraphicString
InitialStatus     ::= 0
Integer           ::= INTEGER
InterlockCode     ::= GraphicString
InvoiceInfo ::= SET OF SEQUENCE {
    serviceProviderName  GraphicString
    invoiceData          ANY DEFINED BY serviceProviderName}
InvoiceInfo-PacketService ::= InvoiceInfo (WITH COMPONENTS
    {serviceType (packetService)
    usageData (INCLUDES PacketInvoiceData)})
LocationDetails   ::= CHOICE {
    unknown  NULL,
    details  GraphicString}
LocationType      ::= INTEGER {
    other      (0),
    customer   (1),
    provider   (2)
    } (0..255)
OperationArgument ::= CHOICE {
    actionArgument [0] ActionArgument,
    createArgument [1] CreateArgument,
    deleteArgument [2] DeleteArgument,
    getArgument [3] GetArgument,
    setArgument [4] SetArgument}
OperationList     ::= SEQUENCE OF OperationArgument
PacketCompleteType ::= SEQUENCE {
    providerName      [0]IMPLICIT GraphicString,
    originatingAddress [1]IMPLICIT DTEAddress,
    destinationAddress [2]IMPLICIT DTEAddress,
    logicalChannel     [3]IMPLICIT LogicalChannel --X.283
    usageMeasurement    [4]IMPLICIT SET OF UsageMeasurement
    connectionType     [5]IMPLICIT ConnectionType,
    reverseChargingIndication [6]IMPLICIT Boolean}
-- Other items such as supplementaryCharge, supplementaryServiceList, interworking charge should be defined
-- by using another attribute (e.g. usageInfo2).
-- We can use this type for the recording of PVC charging data.
```

Superseded by a more recent version

- In case of PVC, basically, the same information as the SVC should be provided periodically (e.g. the interval = 1 hour or 12 hours) or when one of the charging conditions is changed, e.g. at the time when the discount rate is changed.
- reverseChargingIndication: the 'TRUE' value of this attribute means that the packetUsageData has been created by an incoming SVC that requests reverse charging.

```

PacketInterruptType ::= SEQUENCE {
    interruptionTime    [0]IMPLICIT GeneralizedTime,
    durationTime        [1]IMPLICIT DurationTime,
    cause               [2]IMPLICIT ENUMERATED {
                        unknown(0),
                        hostBusy(1),
                        systemFailure(2),
                        planedMaintenance(3)}
}

PacketInvoiceData ::= ANY
PacketRegistrationType ::= SET OF CHOICE {
    -- Identification of a user, several types of identifier
    userId              [0]IMPLICIT DTEAddress,
    -- Directory number
    userName            [1]IMPLICIT GraphicString,
    -- user title
    accountId           [2]IMPLICIT NumericString
    -- invoice number }

packetService OBJECT IDENTIFIER ::= {itu(0) recommendation(0) x(24) 162 miscellaneous(12) 1}
PacketUsageData ::= SEQUENCE {
    registration        [0]PacketRegistrationType,
    complete            [1]PacketCompleteType,
    interrupt           [2]PacketInterruptType    OPTIONAL,
    correspondent       [3]PacketCorrespondingType OPTIONAL
    -- The other items shown in Recommendation X.742 are not necessary.
}

ProcessingMode ::= CHOICE {
    sequential Sequential,
    independent NULL}

RequestedTime ::= CHOICE {
    now [0] NULL,
    scheduled [1] Date}

Result ::= INTEGER {
    fullySucceeded (0),
    failed (1),
    cancelled (2)}

ResultList ::= SEQUENCE OF Result
Sequential ::= CHOICE {
    stopAfterFailure    [0] NULL,
    bestEffort          [1] NULL}

serviceType ServiceType ::= packetService -- value declaration
sRChangeDenied ::= INTEGER {negotiationAlreadyEnded(0)}
Status ::= INTEGER {
    customerAgreement (0),
    providerAgreement (1),
    serviceBeingProcessed (2),
    endOfProcessing (3)}

suborganizationObjectList ::= SEQUENCE OF
    SEQUENCE {
        managedObjectClass    ObjectClass,
        managedObjectInstance ObjectInstance}

SystemIdRange ::= CHOICE {
    name      GraphicString64,
    number    Integer,
    nothing    NULL}

TroubleTypePspdn ::= CHOICE {
    INTEGER {
        unknown (0),
        physicalLayerGroup (1),
        disconnect (2),
        tooManyBitErrors (3),
        lossOfSyncFpattern (4),
        datalinkLayerGroup (30),

```

Superseded by a more recent version

canNotSetUpDataLink	(31),
noResponse	(32),
dataLinkProtocolError	(33),
frameReject	(34),
undefinedFrame	(35),
overSizeIFrame	(36),
unpermittedFrameWithInformation	(37),
abnormalNumber	(38),
n2TimerExpiration	(39),
packetLayerGroup	(60),
errorSequence	(61),

-- Items from 70 to 192 correspond to the X.25 diagnostics.
 -- Trouble type value = X.25 diagnostic code + 70

invalidPS	(71),
invalidPR	(72),
packetTypeInvalid	(86),
pTypeInvalidForStateR1	(87),
pTypeInvalidForStateR2	(88),
pTypeInvalidForStateR3	(89),
pTypeInvalidForStateP1	(90),
pTypeInvalidForStateP2	(91),
pTypeInvalidForStateP3	(92),
pTypeInvalidForStateP4	(93),
pTypeInvalidForStateP5	(94),
pTypeInvalidForStateP6	(95),
pTypeInvalidForStateP7	(96),
pTypeInvalidForStateD1	(97),
pTypeInvalidForStateD2	(98),
pTypeInvalidForStateD3	(99),
packetNotAllowed	(102),
unidentifiablePacket	(103),
callOnOnewayLC	(104),
invalidPTypeOnPVC	(105),
packetOnUnassignedLC	(106),
rejectNotSubscribedTo	(107),
packetTooShort	(108),
packetTooLong	(109),
invalidGFI	(110),
restartRegistrationPacketWithNonzero	(111),
pTypeNotCompatibleWithFacility	(112),
unauthorizedInterruptConf	(113),
unauthorizedInterrupt	(114),
unauthorizedReject	(115),
timeExpired	(118),
tOForIncomingCall	(119),
tOForClearIndication	(120),
tOForResetIndication	(121),
tOForRestartIndication	(122),
tOForCallDeflection	(123),
callSetupClearingRegistrationProblem	(134),
facilityRegistrationCodeNotAllowed	(135),
invalidCalledDTEAddress	(136),
invalidCallingDTEAddress	(137),
invalidSendAddress	(138),
invalidFacilityRegistrationLength	(139),
incomingCallsBarred	(140),
noLogicalChanelAvailable	(141),
callCollision	(142),
duplicateFacilityRequested	(143),
nonZeroAddressLength	(144),
nonZeroFacilityLength	(145),
facilityNotProvidedWhenExpected	(146),
invalidDTEFacility	(147),
maxNumberRedirectionDeflectionExceed	(148),

Superseded by a more recent version

miscellaneous	(150),
improperCauseCodeFromDTE	(151),
notAlignedOctet	(152),
inconsistentQbitSetting	(153),
nUIProblem	(154),
iCRDProblem	(155),
internationalProblem	(182),
remoteNetworkProblem	(183),
internationalProtocolProblem	(184),
internationalLinkOutOfOrder	(185),
internationalLinkBusy	(186),
transitNetworkFacilityProblem	(187),
remoteNetworkFacilityProblem	(188),
internationalRoutingProblem	(189),
temporaryRoutingProblem	(190),
unknownCalledDNIC	(191),
maintenanceAction	(192),

-- *unexpected call disconnection during ordinary communication*

clearIndicationCause	(200),
remoteProcedureError	(201),
localProcedureError	(202),
restartIndicationCause	(205),
remoteProcedureError	(206),
localProcedureError	(207)},
OBJECT IDENTIFIER}	

UsageInfo-PacketService ::= UsageInfo (WITH COMPONENTS

{serviceType (packetService)
usageData (INCLUDES PacketUsageData))}

UsageMeasurement ::= SEQUENCE {

serviceClass	[0]ANY DEFINED BY providerName OPTIONAL,
usageCounterSent	[1]IMPLICIT SET OF UsageCounter,
usageCounterReceived	[2]IMPLICIT SET OF UsageCounter,
usageStartTime	[3]IMPLICIT GeneralizedTime,
usageStopTime	[4]IMPLICIT GeneralizedTime,
durationTime	[5]IMPLICIT INTEGER -- time in seconds}

END

15 Negotiation of functional unit

15.1 General

This Recommendation assigns the following object identifier values:

{itu-t(0) recommendation(0) x(24) 162 cnmFunctionalUnit(11) version1(2) }; as a value of the ASN.1 type FunctionalUnitPackageId defined in ITU-T Rec. X.701 | ISO/IEC 10040 to use for negotiating the following Functional Units:

- 0 Basic report control:
 - The basic report control Functional Unit contains the suspended alarm reporting service and the resume alarm reporting service.
- 1 Enhanced report control:
 - The enhanced report control Functional Unit contains the initiate and terminate alarm and change reporting and set EFD attributes services.
- 2 Monitor Reconfiguration.
- 3 Interval assignment and traffic retrieval.
- 4 Basic traffic data collection control.
- 5 Extended traffic data collection control.
- 6 History duration assignment.

Superseded by a more recent version

- 7 Traffic history retrieval.
- 8 Suppress all zero.
- 9 Service request.
- 10 Basic invoice report.
- 11 Enhanced invoice report,

where the number identifies the bit positions in BIT STRING assigned to the Functional Units, and the names referencing the Functional Units are as defined in the following subclause.

15.2 Functional unit definition

This subclause describes CNM-related functional units to be used across the CNMc interface. Some of them are imported from other Recommendations, and the others are defined in this Recommendation. One or more functional units support a specific "TMN management function" (or simply "function"), defined in Recommendation X.161, for CNM services. Each functional unit is associated with specific managed object classes. Implementation of a Mandatory Functional Unit is essential for the provision of a CNM service. The Optional Functional Units provide additional capabilities that the service provider may wish to offer.

15.2.1 Functional units for fault management

15.2.1.1 Alarm notification service

The following functional units are used or defined in this Recommendation for the object classes of the Alarm Notification service. Some Functional Units are imported from other Recommendations:

- The Report alarm function uses the following functional unit:
 - a) CCITT Rec. X.733 | ISO/IEC 10164-4: alarm reporting functional unit.
This functional unit is associated with all monitored classes.
- The Report state change function uses the following functional unit:
 - b) CCITT Rec. X.731 | ISO/IEC 10164-2: state management functional unit.
This functional unit is associated with all monitored classes.
- The Inhibit/allow alarm and state change reporting function uses the following functional unit:
 - c) basic report functional unit.
This functional unit requires support of:
 - the PT-GET and PT-SET services for instances of the EFD class. This functional unit is used for starting/terminating event reporting.
- The Condition alarm and state change reporting function uses the following functional unit:
 - d) extended report functional unit.
This functional unit requires support of:
 - The PT-CREATE, PT-DELETE, PT-GET, PT-SET and PT-EVENT-REPORT services for instances of the EFD class. This functional unit is used for creating and deleting an EFD instance to initiate and terminate event reporting and modifying discrimination criteria for sieving alarms.
 - Object creation reporting, object deletion reporting, attribute value change reporting and state change reporting services for EFD.
- The Retrieve alarm and state change reporting conditions function uses the following functional unit:
 - e) CCITT Rec. X.734 | ISO/IEC 10164-5: monitor event report function.
This functional unit is associated with the EFD class.

Superseded by a more recent version

Table 1/X.162 – Alarm notification functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object class	FU
Report alarm	M	Alarm Reporting	Objects representing resources	Alarm Reporting
Report state change	O	State Change Reporting	Objects representing resources	State management
Inhibit/allow alarm and state change reporting	O	Alarm/state-change report suspension/resumption	EFD	Basic report control
Condition alarm and state change reporting	O	Alarm/state-change reporting control	EFD	Extend report control
Retrieve alarm and state change reporting conditions	O	Alarm/state-change reporting condition retrieval	EFD	Monitor event report function

15.2.1.2 Fault history service

The following functional units are used or defined in this Recommendation for the object classes of the Fault history service. Some Functional Units are imported from other Recommendations.

- The Retrieve fault history log records function uses the following functional unit:
 - a) CCITT Rec. X.734 | ISO/IEC 10164-5: monitor log functional unit.
This functional unit is associated with the fault log record class.
- The Select specific fault log records function uses the following functional unit:
 - b) CCITT Rec. X.710 and ISO/IEC 9595: filter functional unit.
 - c) CCITT Rec. X.710 and ISO/IEC 9595: multiple reply functional unit.
This functional unit is associated with the fault log record class.
- The Modify the criteria for logging fault log records function uses the following functional unit:
 - d) CCITT Rec. X.734 | ISO/IEC 10164-5: control log functional unit.
This functional unit is associated with the fault log class.

Table 2/X.162 – Fault history functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Retrieve fault history log records	M	fault log retrieval	fault log record	Monitor Log
Select specific fault log records	O	fault log Selective retrieval	fault log record	Filter and Multiple Reply
Modify the criteria for logging fault log records	O	fault log logging criteria change	log	Control Log

Superseded by a more recent version

15.2.1.3 Trouble report service

The following functional units are used or defined in this Recommendation for the object classes of the Trouble Report service. Some Functional Units are imported from other Recommendations.

- The Control basic trouble report function uses the following functional units:
 - a) Recommendation X.790: Kernel;
 - b) Recommendation X.790: Request Trouble Report Format;
 - c) Recommendation X.790: Add Trouble Information;
 - d) Recommendation X.790: Trouble Report Status/Commitment Time Update Notification;
 - e) Recommendation X.790: Verify Trouble Repair Completion;
 - f) Recommendation X.790: Modify Trouble Administration information;
 - g) Recommendation X.790: Trouble Administration Configuration Event Notification;
 - h) Recommendation X.790: Trouble Report Progress Notification;
 - i) Recommendation X.790: Cancel Trouble Report;
 - j) Recommendation X.790: Extended Modify Trouble Administration Information;
 - k) Recommendation X.790: Delete Telecommunications Trouble Report;
 - l) Recommendation X.790: Refer Telecommunications Trouble Report;
 - m) Recommendation X.790: Update State and Status;
 - n) Recommendation X.790: Repair Activity Object.

These functional units are associated with the telecommunications trouble report, trouble report format definition, repair activity, contact and EFD classes.

When the Basic Trouble Report Function is provided, the Kernel functional unit shall be supported. The other ones are optional. The service provider may select the functional units to be supported:

- The Report maintenance plan function uses the following functional unit:
 - o) Recommendation X.790: Provider Trouble Report Control;

This functional unit is associated with the provider trouble report.
- The Trouble History function uses the following functional units:
 - p) Recommendation X.790: Review Trouble History Record;
 - q) Recommendation X.790: Trouble History Event Notification.

These functional units are associated with the trouble history record log class.

The support of these two functional units is optional.

Superseded by a more recent version

Table 3/X.162 – Trouble report functions, service, MO classes and FUs

Function (X.161)	a)	Purpose (X.161)	Object Class	FU
Control basic trouble report	M	Basic Trouble Report Handling	PDN TTR, TR format definition, repair activity, contact, EFD	– Kernel – Request Trouble Report Format – Add Trouble Information – Trouble Report Status/Commitment Time Update Notification – Verify Trouble Repair Completion – Modify Trouble Administration Information – Trouble Administration Configuration Event Notification – Trouble Report Progress Notification – Cancel Trouble Report – Extended Modify Trouble Administration Information – Delete Telecommunications Trouble Report – Refer Telecommunications Trouble Report – Update State and Status – Repair activity Object (all of them are imported from Rec. X.790)
Report maintenance plan	O	Planned maintenance information notification	PTR	– Provider Trouble Report Control
Retrieve trouble history	O	Trouble History Retrieval	PDN Trouble History, log	– Review Trouble History Record – Trouble History Event Notification
a) Support (X.161)				

15.2.1.4 Loop set-up service

The following functional unit is defined in this Recommendation for the object classes of this CNM service:

- The Set/reset loop-back point function uses the following functional unit:
 - loopControl functional unit – This functional unit requires support of:
 - i) the PT-GET and PT-SET services for instances of loopbackPoint and any of its subclasses. This functional unit is used for setting/resetting a loop-back point;
 - ii) attribute value change reporting service for loopbackPoint.

Table 4/X.162 – Loop set-up functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Set/reset loop-back point	M	Loop-back point activation/deactivation	Loop-back point	loopControl

Superseded by a more recent version

15.2.1.5 Test host service

The following functional units are used in this Recommendation for the object classes of this CNM service:

- a) Controlled Test Management Functional Unit of the Test Management Function defined in ITU-T Rec. X.745 | ISO/IEC 10164-12.

NOTE – The ways the test is executed are based on the Confidence and Diagnostic Test Categories defined in ITU-T Rec. X.737 | ISO/IEC 10164-14.

- b) Event Report Functional Unit of the Event Report Management Function defined in CCITT Rec. X.734 | ISO/IEC 10164-5, when the service provider offers the message discrimination function.
- c) Control Log Functional Unit defined in CCITT Rec. X.735 | ISO/IEC 10164-6, when the service provider offers the logging of test results.

Table 5/X.162 – Test Host functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Execute loop-back test	C1	Loop-back test control	x25Physical Connection, loopbackTest	Controlled Test Management, Event Report, Control Log
Execute protocol integrity test	C1	Protocol integrity test control		Controlled Test Management, Event Report, Control Log
C1 At least one of these functions shall be provided if the CNM Test host is supported.				

15.2.2 Functional units for configuration management

15.2.2.1 CNM configuration inquiry service

The following functional units are used or defined in this Recommendation for the object classes of the CNM Configuration Inquiry service:

- The Retrieve full configuration information function uses the following functional units:
 - a) CCITT Rec. X.710 and ISO/IEC 9595: Managed Object Selection (MOS) functional unit.
 - b) CCITT Rec. X.710 and ISO/IEC 9595: multiple reply (MR) functional unit.
 - c) CCITT Rec. X.730 | ISO/IEC 10164-1: monitor functional unit.

These functional units are associated with all monitored objects, location, contact, customer, and cnmUser classes.

- The Retrieve partial configuration information function uses the following functional units:
 - d) CCITT Rec. X.710 and ISO/IEC 9595: managed object selection (MOS) functional unit.
 - e) CCITT Rec. X.710 and ISO/IEC 9595: multiple reply (MR) functional unit.
 - f) CCITT Rec. X.710 and ISO/IEC 9595: filter functional unit.
 - g) CCITT Rec. X.730 and ISO/IEC 10164-1: monitor functional unit.

These functional units are associated with all monitored objects, location, contact, customer, and cnmUser classes.

Superseded by a more recent version

- The Update configuration information function uses the following functional units:
 - h) CCITT Rec. X.730 | ISO/IEC 10164-1: object event functional unit.
 - i) CCITT Rec. X.731 | ISO/IEC 10164-2: state change reporting functional unit.

These functional units are associated with all monitored objects, location, contact, customer, and cnmUser classes.

Table 6/X.162 – Configuration inquiry functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Retrieve full configuration information	M	Complete configuration acquisition	All monitored objects, location, contact, customer, cnmUser	– MOS – MR – Monitor
Retrieve partial configuration information	O	Partial configuration acquisition	All monitored objects, location, contact, customer, cnmUser	– MOS – MR – Filter – Monitor
Update configuration information	O	Automatic configuration update	All monitored objects, location, contact, customer, cnmUser	– Object event – State change reporting

15.2.2.2 CNM reconfiguration service

The following functional units are used or defined in this Recommendation for the object classes of the CNM Reconfiguration service:

- The control immediate reconfiguration function uses the following functional unit:
 - a) CCITT Rec. X.730 | ISO/IEC 10164-1: monitor functional unit.

This functional unit is associated with all monitored classes with GET-REPLACE attributes.

- The control delayed configuration function uses the following functional unit:
 - b) Service request – This functional unit requires support of functions defined in Annex C.

This functional unit is associated with all monitored classes with GET-REPLACE attributes.

Table 7/X.162 – Reconfiguration functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Control immediate reconfiguration	C2	Configuration setting	All monitored objects with GET-REPLACE attributes	– minor reconfiguration
Control delayed reconfiguration	C2	Service request	All monitored objects with GET-REPLACE attributes	– service request
C2 The control immediate reconfiguration function is mandatory for the CNMc interface. The control delayed reconfiguration function is mandatory for the CNMe interface.				

Superseded by a more recent version

15.2.2.3 Systematic call redirection service

The following functional units are defined in this Recommendation for the object classes of this CNM service:

- The Activate/deactivate call redirection, Suspend/resume call redirection, Modify redirected addresses and Schedule call redirection functions use the following functional units:
 - redirectionControl functional unit – This functional unit requires support of:
 - i) The PT-GET, PT-SET, PT-CREATE and PT-DELETE services for instances of redirectionList and any of its subclasses. This functional unit is used for starting/terminating and suspending/resuming call redirection, for the modification of the call redirection list, and for setting or changing the schedule. Also this functional unit is used to modify the attributes related to scheduling.
 - ii) Object creation reporting, object deletion reporting, attribute value change reporting and state change reporting services for redirectionList.

Table 8/X.162 – Systematic call redirection functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Activate/deactivate call redirection	M	Call redirection activation/deactivation	Redirection controller	Redirection Control
Suspend/resume call redirection	O	Call redirection suspension/resumption	Redirection controller	Redirection Control
Modify redirected addresses	O	Call redirection list modification	Redirection controller	Redirection Control
Schedule call redirection	O	Call redirection scheduling	Redirection controller	Redirection Control

15.2.3 Accounting management

15.2.3.1 CNM periodic billing service

The following functional units are used or defined in this Recommendation for the object classes of the CNM Periodic Billing service:

- The notify invoice function uses the following functional unit:
 - a) basic invoice report functional unit.

This functional unit requires support of:

 - The PT-GET and PT-EVENT-REPORT services for instances of the cnm billing controller class. This functional unit is used for retrieving an invoice from the service provider and receiving an invoice sent from the service provider.
- The control invoice notification function uses the following functional unit:
 - b) enhanced invoice report functional unit.

This functional unit requires support of:

 - The PT-GET, PT-SET and PT-EVENT-REPORT services for instances of the cnm billing controller class. This functional unit is used for retrieving an invoice from the service provider, receiving an invoice sent from the service provider and modifying the condition of invoice report.

Superseded by a more recent version

Table 9/X.162 – Periodic billing functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Notify invoice	M	Invoice periodic report	cnm Billing Controller	– basic invoice report
Control invoice notification	O	Invoice report control	cnm Billing Controller	– enhanced invoice report

15.2.3.2 CNM detailed accounting service

The following functional units are used or defined in this Recommendation for the object classes of the CNM Periodic Billing service.

The retrieve accounting records function uses the following functional units:

- CCITT Rec. X.710 and ISO /IEC 9595: Managed Object Selection (MOS) functional unit.
- CCITT Rec. X.710 and ISO /IEC 9595: filter functional unit.
- CCITT Rec. X.710 and ISO/IEC 9595: Multiple Reply (MR) functional unit.
- CCITT Rec. X.730 and ISO/IEC 10164-1: monitor functional unit.

These functional units are associated with the ITU-T Rec. X.742 | ISO/IEC 10164-10: usage metering record class. The data structure of accounting items are defined in accordance with ITU-T Rec. X.742 | ISO/IEC 10164-10.

Table 10/X.162 – Detailed accounting functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Retrieve accounting records	M	Usage metering record retrieval	cnm Billing Controller	– MOS – Filter – MR – Monitor

15.2.4 Performance management

15.2.4.1 CNM traffic information service

The following functional units are used or defined in this Recommendation for the object classes of the CNM Traffic Information service.

- The Assign collection interval, Assign history duration, Suspend/resume traffic data collection, Schedule traffic data collection and Suppress all zero data functions use the following functional unit:
 - control traffic information collection functional unit.

This functional unit requires support of:

 - The PT-GET, PT-SET, PT-CREATE and PT-DELETE services for instances of the current data object classes, i.e. currentMLPTrafficData, currentPacketTrafficData, currentSLPTrafficData.
 - Object creation reporting, object deletion, and attribute change reporting for these classes.
- The Retrieve traffic data function uses the following functional units:
 - CCITT Rec. X.710 and ISO/IEC 9595: managed object selection (MOS) functional unit.
 - CCITT Rec. X.710 and ISO/IEC 9595: filter functional unit.

Superseded by a more recent version

- d) CCITT Rec. X.710 and ISO/IEC 9595: multiple reply (MR) functional unit.
- e) CCITT Rec. X.730 and ISO/IEC 10164-1: monitor functional unit.

These functional units are associated with all current data objects, and all history data objects.

Table 11/X.162 – Traffic information functions, service, MO classes and FUs

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Assign collection interval	M	Traffic data retrieval	– currentXXX TrafficData	– Control traffic information collection
Assign history duration			– currentXXX TrafficData	– Control traffic information collection
Retrieve traffic data			– currentXXX TrafficData – historyXXX TrafficData	– MOS – Filter – MR – Monitor
Suspend/resume traffic data collection	O	Traffic data collection suspension/ resumption	– currentXXX TrafficData	– Control traffic information collection
Schedule traffic data collection	O	Traffic data collection scheduling	– currentXXX TrafficData	– Control traffic information collection
Suppress all zero data	O	Zero suppression	– currentXXX TrafficData	– Control traffic information collection

15.2.5 Security management

This service is for further study.

15.2.6 Service supporting service

15.2.6.1 CNM service request service

The following functional units are defined in this Recommendation for the object classes of this CNM service:

- The Service request function uses the following functional unit:
 - service request functional unit - This functional unit requires support of:
 - i) The PT-GET, PT-SET, PT-CREATE and PT-DELETE services for instances of serviceRequest and any of its subclasses. This functional unit is used for initiating a service request, deleting a service request, negotiating service request and retrieving service request.
 - ii) Object creation reporting, object deletion reporting, attribute value change reporting and reporting services for serviceRequest.

Superseded by a more recent version

Table 12/X.162 – Service request function, service, MO classes and FU

Function (X.161)	Support (X.161)	Purpose (X.161)	Object Class	FU
Service request	M	– Initiation of a service request – Deletion of a service request – Negotiation of a service request – Retrieval of a service request	– serviceRequest	Service request control

NOTE 1 – The CMIP argument optional parameter accessControl has no utility in the service request service.

NOTE 2 – The serviceRequest object allows the request of operation on instance. The concerned CMIP operations are ACTION, CREATE, DELETE, GET, SET (and not CANCEL-GET). A particular implementation may limit the number of CMIP operations.

16 Conformance for the CNMc interface

If a service defined in Recommendation X.161 or a service set in Annex B/X.161 is implemented, then at least the mandatory parts of that service shall be implemented.

NOTE – Detailed conformance to ICS, specified in ITU-T Rec. X.724 | ISO/IEC 10165-6 is for further study.

Annex A

Index of defined information elements

A.1 List of defined information elements

A.1.1 Object classes

Items	Subclause No.
cnmUser	7.2.1.2.9
	7.2.2.2.3
cnmBillingController	7.3.1.2
	7.2.2.2.3
cnmLoopbackPoint	7.1.4.1.1
cnmX25Entity	7.1.1.2.1
	7.2.1.2.1
	7.2.2.2.1
	7.4.1.2.1
cnmX25EntityTested	7.1.5.2.2
cugProfile	7.2.1.2.7
	7.2.3.2.5
currentMlpTrafficData	7.4.1.2.5
currentPacketTraffic Data	7.4.1.2.2
currentSlpTrafficData	7.4.1.2.8
customer	7.2.1.2.10
	7.2.2.2.4
historyMlpTraffic Data	7.4.1.2.6
historyPacketTraffic Data	7.4.1.2.3
historySlpTraffic Data	7.4.1.2.9
hgProfile	7.2.1.2.8
	7.2.3.2.6

Superseded by a more recent version

location	7.2.1.2.11
	7.2.2.2.5
mlpMonitoredPoint	7.4.1.2.4
mlpProfile	7.2.3.2.2
	7.2.1.2.4
pdnFaultLogRecord	7.1.2.2
pdnTelecommunicationsTroubleReport	7.1.3.2.1
pdnTroubleHistoryRecord	7.1.3.2.2
redirectionList	7.2.4.2.1
serviceRequest	7.6.1.2.1
slpProfile	7.2.3.2.3
	7.2.1.2.5
x25PhysicalConnection	7.1.5.2.1
x25PvcProfile	7.2.3.2.4
	7.2.1.2.6
x25ServiceProfile	7.2.1.2.3
	7.2.3.2.1
x25TerminationPoint	7.1.1.2.2
	7.2.1.2.2
	7.2.2.2.2
	7.4.1.2.7

A.1.2 Name binding for object classes

Items	Subclause No.
cnmUser	8.2.1.12
cnmX25Entity	8.1.1.2
	8.2.1.2
	8.4.1.1
cnmX25EntityTested	8.1.5.1
contact	8.1.3.6
	8.2.1.13
cugProfile	8.2.1.9
	8.2.3.5
currentMlpTrafficData	8.4.1.5
currentPacketTrafficData	8.4.1.2
currentSlpTrafficData	8.4.1.8
customer	8.2.1.11
equipment	8.1.1.4
	8.2.1.4
eventForwardingDiscriminator	8.1.1.6
historyMlpTrafficData	8.4.1.6
historyPacketTrafficData	8.4.1.3
historySlpTrafficData	8.4.1.9
hgProfile	8.2.1.10
	8.2.3.6
location	8.2.1.14
log	8.1.3.7
loopbackPoint	8.1.4.1
loopbackTest	8.1.5.2
managedElement	8.1.1.5
mlpMonitoredPoint	8.4.1.4
mlpProfile	8.2.1.6
	8.2.3.2
network	8.1.1.1
	8.2.1.1
pdnFaultLogRecord	8.1.2.1
pdnTelecommunicationsTroubleReport	8.1.3.1
pdnTroubleHistoryRecord	8.1.3.5

Superseded by a more recent version

protocolIntegrityTest	8.1.5.3
providerTroubleReport	8.1.3.2
redirectionList	8.2.4.1
repairActivity	8.1.3.4
serviceRequest	8.6.1
slpProfile	8.2.1.7
	8.2.3.3
troubleReportFormatDefinition	8.1.3.3
x25PhysicalConnection	8.1.5.4
x25PvcProfile	8.2.1.8
	8.2.3.4
x25ServiceProfile	8.2.1.5
	8.2.3.1
x25TerminationPoint	8.1.1.3
	8.2.1.3
	8.4.1.7
cnmBillingController	8.3.1.1

A.1.3 Definition of packages

Items	Subclause No.
contactList	9.2.1.6
customer	9.2.1.5
customerType	9.2.1.9
location	9.2.1.7
negotiation	9.6.1
oPNetworkList	9.2.1.10
pleProfile	9.2.1.2
serviceList	9.2.1.11
serviceRequest	9.6.2
slpProfile-P	9.2.1.3
slpTimersProfile-P	9.2.1.4
typeText	9.2.1.8
x25ServiceProfile	9.2.1.1

A.1.4 Definition of attributes

Items	Subclause No.
callRedirectionList	10.3.29
cnmUserIdentifier	10.2.1
cnmX25EntityIdentifier	10.2.2
contactList	10.3.1
cugIndex	10.3.3
cugProfileIdentifier	10.2.3
customerIdentifier	10.2.4
customerTitle	10.3.4
customerTypes	10.3.5
dateRequest	10.3.6
dTEAddressList	10.3.7
geographicCoordinates	10.3.8
hgAddress	10.3.9
hgProfileIdentifier	10.2.5
interlockCode	10.3.2
limitValidityDate	10.3.10
locationDetail	10.3.11
locationID	10.3.12
locationPointer	10.3.30
locationTitle	10.3.13
locationType	10.3.14

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loopbackPointSetting	10.3.31
mlpFramesOutsideWindowGuard	10.3.15
mlpFramesReceived	10.3.16
mlpFramesSent	10.3.17
mlpMonitoredPointIdentifier	10.2.6
mlpProfileIdentifier	10.2.7
mlpSubscription	10.3.18
oPNetworkList	10.3.21
operationList	10.3.19
pdnTroubleHistoryRecord	10.1.21
postalAddress	10.3.20
pocessingMode	10.3.22
redirectionListId	10.2.13
resultList	10.3.23
serviceList	10.3.24
serviceRequestId	10.2.8
slpProfileIdentifier	10.2.9
status	10.3.26
suborganizationObjectList	10.3.25
troubleTypePSPDN	10.3.27
typeText	10.3.28
x25PhysicalConnectionId	10.2.14
x25PvcProfileIdentifier	10.2.10
x25ServiceProfileIdentifier	10.2.12
x25TerminationPointIdentifier	10.2.11

A.1.5 Definition of notifications

Items	Subclause No.
invoiceReport	11.2.1

A.1.6 Definition of parameters

Items	Subclause No.
serviceRequestChangeDenied	12.1

A.1.7 Definitions of action types

There is no Action type defined in this Recommendation.

A.2 List of imported information elements

A.2.1 Imported object classes

Items	Subclause No.	Rec. No.
contact	7.1.3	X.790
	7.2.1	X.790
currentData	7.4.1	X.721
equipment	7.1.1	M.3100
	7.2.1	M.3100
	7.2.2	M.3100
event forwarding discriminator	7.1.1	X.721
eventLogRecord	7.1.2	X.721
historyData	7.4.1	X.721
log	7.1.3	X.721
loopbackTest	7.1.5.1	X.737
managed element	7.1.1	M.3100
	7.2.1	M.3100

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network	7.1.1	M.3100
	7.1.3	M.3100
	7.2.1	M.3100
protocolIntegrityTest	7.1.5.2	X.737
providerTroubleReport	7.1.3	X.790
repairActivity	7.1.3	X.790
telecommunicationsTroubleReport	7.1.3	X.790
termination point	7.2.1	M.3100
top	7.1.1	X.721
	7.1.2	X.721
	7.1.3	X.721
	7.1.5.1	X.721
	7.2.1	X.721
	7.2.3	X.721
	7.2.4	X.721
	7.6.1	X.721
troubleHistoryRecord	7.1.3	X.790
troubleReportFormatDefinition	7.1.3	X.790

A.2.2 Imported name binding

Items	Subclause No.	Rec. No.
providerTroubleReport-network	8.1.3.2	X.790
repairActivity-telecommunicationsTroubleReport	8.1.3.3	X.790
troubleReportFormatDefinition-network	8.1.3.3	X.790
network-network	8.1.1.1	M.3100
managedElement-network	8.1.1.5	M.3100
contact-network	8.1.3.6	X.790
usageMeteringRecord-log	8.3.1.2	X.742

A.2.3 Imported packages

Items	Subclause No.	MO or Pkg	Rec. No.
attributeValueChangeNotificationPackage	7.2.1.2.11	location	M.3100
createDeleteNotificationsPackage	7.2.1.2.11	location	M.3100
specificProblems	7.1.2.2	pdnFaultLogRecord	X.721
trAgentContactPersonAttributePkg	7.6.1.2.1	serviceRequest	X.790
trAgentContactPersonObjectPkg	7.6.1.2.1	serviceRequest	X.790
trAlternateManagerContactPersonAttributePkg	7.6.1.2.1	serviceRequest	X.790
trAlternateManagerContactPersonObjectPkg	7.6.1.2.1	serviceRequest	X.790
trDialogPkg	7.6.1.2.1	serviceRequest	X.790
trManagerContactPersonAttributePkg	7.6.1.2.1	serviceRequest	X.790
trManagerContactPersonObjectPkg	7.6.1.2.1	serviceRequest	X.790
userLabelPackage	7.2.1.2.11	location	M.3100

A.2.4 Imported notifications

Items	Subclause No.	MO or Pkg	Rec. No.
attributeValueChange	7.1.1.2.2	x25TerminationPoint	X.721
attributeValueChange	9.2.1.2	pleProfile-P	X.721
attributeValueChange	9.6.2	serviceProfilePkg	X.721
communicationsAlarm	7.1.1.2.2	x25TerminationPoint	X.721
environmentalAlarm	7.1.1.2.2	x25TerminationPoint	X.721
equipmentAlarm	7.1.1.2.2	x25TerminationPoint	X.721

Superseded by a more recent version

objectCreation	7.2.1.2.6	pvcProfile	X.721
	7.2.1.2.7	cugProfile	X.721
	7.2.1.2.8	hgProfile	X.721
	9.2.1.2	pleProfile-P	X.721
	9.6.2	serviceProfilePkg	X.721
	7.1.1.2.2	x25TerminationPoint	X.721
ObjectDeletion	7.2.1.2.6	pvcProfile	X.721
	7.2.1.2.7	cugProfile	X.721
	7.2.1.2.8	hgProfile	X.721
	9.2.1.2	pleProfile-P	X.721
	9.6.2	serviceProfilePkg	X.721
	7.1.1.2.2	x25TerminationPoint	X.721
processingErrorAlarm	7.1.1.2.2	x25TerminationPoint	X.721
qualityofServiceAlarm	7.1.1.2.2	x25TerminationPoint	X.721

A.2.5 Imported attributes

Items	Subclause No.	MO or Pkg	Rec. No.
administrativeState	7.1.1.2.1	cnmX25Entity	X.721
	7.1.1.2.2	x25TerminationPoint	X.721
	7.1.1.2.2	x25TerminationPoint	X.721
attributeList	7.3.1.2	cnmBillingController	X.721
availabilityState	7.2.4.2	redirectionList	X.721
backedUpStatus	7.1.2.2.1	pdnFaultLogRecord	X.721
backUpObject	7.1.2.2.1	pdnFaultLogRecord	X.721
bilateralCUG	9.2.1.2	pleProfile-P	X.283
	7.2.1.2.6	mlpProfile	X.283
	9.2.1.2	pleProfile-P	X.283
bilateralCUGwithOutgoingAccess	7.2.1.2.6	mlpProfile	X.283
	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
callAttempts	9.2.1.2	pleProfile-P	X.283
callDeflectionSubscription	9.2.1.2	pleProfile-P	X.283
callRedirection	7.4.1.2.2	currentPacketTrafficData	X.283
callsConnected	7.4.1.2.3	historyPacketTrafficData	X.283
callTimeouts	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
	7.2.1.2.6	mlpProfile	X.283
chargingDirection	9.2.1.2	pleProfile-P	X.283
chargingInformation	7.4.1.2.2	currentPacketTrafficData	X.283
clearTimeouts	7.4.1.2.3	historyPacketTrafficData	X.283
controlObjectId	7.3.1.2	cnmBillingController	X.742
cUG	9.2.1.2	pleProfile-P	X.283
cugWithIncomingAccess	7.2.1.2.6	mlpProfile	X.283
cugWithOutgoingAccess	7.2.1.2.6	mlpProfile	X.283
dataPacketsReceived	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
	7.4.1.2.2	currentPacketTrafficData	X.283
dataPacketsSent	7.4.1.2.3	historyPacketTrafficData	X.283
	9.2.1.2	pleProfile-P	X.283
	9.2.1.2	pleProfile-P	X.283
dBitModification	9.2.1.2	pleProfile-P	X.283
defaultPacketSize	9.2.1.2	pleProfile-P	X.283
defaultThroughputClass	9.2.1.2	pleProfile-P	X.283
defaultThroughputClassAssignment	9.2.1.2	pleProfile-P	X.283
defaultWindowSize	9.2.1.2	pleProfile-P	X.283
extendedPacketSequenceNumbering	9.2.1.2	pleProfile-P	X.283
fastSelectAcceptance	9.2.1.2	pleProfile-P	X.283
fCSErrorReceived	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.8	currentSlpTrafficData	X.282
	9.2.1.2	pleProfile-P	X.283
flowControlParameterNegotiation	7.4.1.2.8	currentSlpTrafficData	X.282
fRMRsReceived	7.4.1.2.9	historySlpTrafficData	X.282

Superseded by a more recent version

fMRMsSent	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
huntGroup	9.2.1.2	pleProfile-P	X.283
iFrameDataOctetsReceived	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
iFrameDataOctetsSent	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
iFramesReceived	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
iFramesSent	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
incomingCallsBarred	9.2.1.2	pleProfile-P	X.283
incomingCallsBarredWithinCug	9.2.1.2	pleProfile-P	X.283
interfaceType	9.2.1.2	pleProfile-P	X.282
k	9.2.1.4	slpTimersProfile-P	X.282
localChargingPrevention	9.2.1.2	pleProfile-P	X.283
localDTEAddress	7.2.1.2.6	mlpProfile	X.283
	9.2.1.2	pleProfile-P	X.283
	9.2.1.3	slpProfile-P	X.283
logicalChannel	7.2.1.2.6	mlpProfile	X.283
logicalChannelAssignments	9.2.1.2	pleProfile-P	X.283
monitoredAttributes	7.1.2.2	monitoredAttributes-P	X.721
mT1Timer	7.2.1.2.4	mlpProfile	X.282
mT2Timer	7.2.1.2.4	mlpProfile	X.282
mT3Timer	7.2.1.2.4	mlpProfile	X.282
mW	7.2.1.2.4	mlpProfile	X.282
mX	7.2.1.2.4	mlpProfile	X.282
n1	9.2.1.4	slpTimersProfile-P	X.282
n2	9.2.1.4	slpTimersProfile-P	X.282
nonStandardDefaultPacketSizes	9.2.1.2	pleProfile-P	X.283
nonStandardDefaultWindowSizees	9.2.1.2	pleProfile-P	X.283
nUIOverride	9.2.1.2	pleProfile-P	X.283
nUISubscription	9.2.1.2	pleProfile-P	X.283
octetsReceivedCounter	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
octetsSentCounter	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
oneWayLogicalChannelIncoming	9.2.1.2	pleProfile-P	X.283
oneWayLogicalChannelOutgoing	9.2.1.2	pleProfile-P	X.283
onlineFacilityRegistration	9.2.1.2	pleProfile-P	X.283
operationalState	7.2.1.2.6	mlpProfile	X.283
outgoingCallsBarred	9.2.1.2	pleProfile-P	X.283
outgoingCallsBarredWithinCug	9.2.1.2	pleProfile-P	X.283
packetRetransmission	9.2.1.2	pleProfile-P	X.283
packetSize	7.2.1.2.6	mlpProfile	X.283
perceivedSeverity	7.1.2.2.1	pdnFaultLogRecord	X.721
pollsReceived	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
probableCause	7.1.2.2.1	pdnFaultLogRecord	X.721
proposedRepairActions	7.1.2.2.1	pdnFaultLogRecord	X.721
protocolErrorsAccusedOf	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
protocolErrorsDetectedLocally	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
protocolVersionSupported	9.2.1.2	pleProfile-P	X.283
providerInitiatedDisconnects	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
providerInitiatedResets	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
receivedMlpInGuardRegion	7.4.1.2.5	currentMlpTrafficData	X.282
	7.4.1.2.6	historyMlpTrafficData	X.282

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receivedMlpResets	7.4.1.2.5	currentMlpTrafficData	X.282
	7.4.1.2.6	historyMlpTrafficData	X.282
rEJsReceived	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
rEJsSent	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
remoteDTEAddress	7.2.1.2.6	mlpProfile	X.283
remoteLogicalChannel	7.2.1.2.6	mlpProfile	X.283
remotelyInitiatedResets	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
remotelyInitiatedRestarts	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
resetTimeouts	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
reverseChargingAcceptance	9.2.1.2	pleProfile-P	X.283
rNRsReceived	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
rPOASubscription	9.2.1.2	pleProfile-P	X.283
sABMsReceived	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
sABMsSent	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
segmentsReceived	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
segmentsSent	7.4.1.2.2	currentPacketTrafficData	X.283
	7.4.1.2.3	historyPacketTrafficData	X.283
sequenceModulus	9.2.1.3	slpProfile-P	X.282
sourceIndicator	7.1.2.2.1	pdnFaultLogRecord	X.721
stateChangeDefinition	7.1.2.2.1	pdnFaultLogRecord	X.721
t1Timer	9.2.1.4	slpTimersProfile-P	X.282
t2Timer	9.2.1.4	slpTimersProfile-P	X.282
t4Timer	9.2.1.4	slpTimersProfile-P	X.282
thresholdInfo	7.1.2.2.1	pdnFaultLogRecord	X.721
throughputClasses	7.2.1.2.6	mlpProfile	X.283
throughputClassNegotiation	9.2.1.2	pleProfile-P	X.283
timesT1Expired	7.4.1.2.8	currentSlpTrafficData	X.282
	7.4.1.2.9	historySlpTrafficData	X.282
transmissionRate	9.2.1.3	slpProfile-P	X.281
trendIndication	7.1.2.2.1	pdnFaultLogRecord	X.721
virtualCircuitId	7.2.1.2.6	mlpProfile	X.283
windowSize	7.2.1.2.6	mlpProfile	X.283

A.2.6 Imported actions

testRequestControlledAction	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745

A.2.7 Imported parameters

loopbackTestInfoParam	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
protocolIntegrityTestInfoParam	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
associatedObjectNotAvailable	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
independentTestInvocationError	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
mistypedTestCategoryId	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
mistypedTestRequestInformation	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745

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mORTNotAvailable	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
noSuchAssociatedObject	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
noSuchMORT	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
relatedTOError,	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
testSuspendResumeAction	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
noSuchTestInvocationId	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
noSuchTestSessionId	7.1.5.2.1	x25PhysicalConnection	X.745
invalidTestOperation	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
testSuspendResumeError	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
testTerminateAction	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
noSuchTestInvocationId	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
noSuchTestSessionId	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
noSuchTestSessionId	7.1.5.2.1	x25PhysicalConnection	X.745
noSuchTestSessionId	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
invalidTestOperation	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745
testSuspendResumeError	7.1.5.2.1	x25PhysicalConnection	X.745
	7.1.5.2.2	cnmX25EntityTested	X.745

Annex B

Example of invoice definition

This annex presents an example of the definition of the "PacketInvoiceData" data type required for supporting the periodic billing service. The following data types are used for the managed object class definition in 7.3.1.2 and the notification definition in 11.2.1. Each operating company or Administration may define its specific data types.

```

PacketInvoiceData ::= SEQUENCE {
    providerName          [0]IMPLICIT GraphicString,
    customerName         [1]IMPLICIT GraphicString,
    resourcesUsed        [3]IMPLICIT ObjectInstances,
    invoiceNumber        [4]IMPLICIT NumericString,
    invoiceDueDate       [5]IMPLICIT Date,
    invoicePeriod       [6]IMPLICIT INTEGER,
    currency            [7]IMPLICIT GraphicString,
    totalAmountPayable   [8]IMPLICIT INTEGER,
    totalDiscount       [9]IMPLICIT INTEGER,
    subTotalAmount      [10]IMPLICIT SET OF SubTotalAmount}
-- basic charge, communication charge, interworking charge, supplementary charge, etc.

Date ::= SEQUENCE {
    year                [0]IMPLICIT INTEGER,
    month               [1]IMPLICIT INTEGER,
    day                 [2]IMPLICIT INTEGER

```

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```
SubTotalAmount ::= SEQUENCE {  
    serviceType          [0]IMPLICIT GraphicString,  
    amountPayable        [1]IMPLICIT INTEGER,  
    discountAmount       [2]IMPLICIT INTEGER,  
    relatedUsageRecords  [3]IMPLICIT SET OF ObjectInstance OPTIONAL  
}
```

Annex C

Definition of the CNM supporting services

This annex describes detailed functions and procedures used for provision of CNM Service Request Service through the CNMc interface.

The Service Request managed object class defined in 7.6 is used as the generic class to be used for all service requests. It models the service requested and provides information on the different phase of the service processing. By the instantiation of this object class, a customer can send, delete, and modify a service request through the negotiation between the customer and the service provider.

C.1 Detailed description

The serviceRequest object allows the performance of many services in one request, such as the creation of many objects of the same type. The mandatory operationList attribute allows the Customer's Management System to specify the different operation he would like to perform. This attribute is in fact an ordered list of OperationArgument (CMIP syntax OperationArgument). A default value (empty list) is specified.

The Service Provider's CNM System can specify if the realization of the different services should be done in order or not. When the order is important, the Customer's Management System is able to decide what to do in case of operation failure (to stop or to continue the request). Either the treatment of the operation sequence is "atomic", meaning that each operation is performed separately (if one of them leads to an error, then no operation is realized), or the objective is to do "the best possible" (bestEffort), which means that each operation is attempted and succeeds or not. The order in which the operations are attempted is important. Each operation modifies the MIB and so affects the conditions of success of it.

If the Customer's Management System does not specify any "treatment", the default treatment is bestEffort.

The Customer's Management System has the possibility to specify when it wants that the requested services be performed, with a priority order or a precise date. The mandatory dateRequest attribute allows the Customer's Management System to do that. The Service Provider's CNM System can modify this attribute value during the negotiation phase. The attribute syntax can indicate that the date is:

- does not matter;
- immediately;
- a precise date.

The Service Provider's CNM System can negotiate with the Customer's Management System the features of the request with the dialogue attribute of the conditional dialogPackage Package. They can exchange text information. This allows the Customer's Management System to give to the Service Provider more information about the implementation of the service, to help the negotiation.

The Customer's Management System can delete a service request if it is still in negotiation phase with the Service Provider's CNM System. After the service processing has begun, the serviceRequest deletion by the Customer's Management System is impossible. A try of deletion or modification should fail and cause a processingFailure type CMIP error with a specific parameter error: sRChangeDenied.

The contactAgent and contactManager attribute of the serviceRequestobject can identify the contact people, if any, by the Service Provider's CNM System and by the Customer's Management System. The syntax allows to point to a pre-existing contact instance, or to indicate a name in a graphic string or to keep unknown (NULL). A default value is specified (unknown).

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The services are only performed in the direction Service Provider's CNM System for Customer's Management System. The complete answer of the request operation is not returned to the Customer's Management System. Nevertheless, he receives a short report for each operation. The resultList attribute gives the ordered operation result list in the same order as the operation list. Initially, the attribute is an empty list. The list is then filled progressively with the result of the completed operations. In the same time, attributeValueChange Notification is transmitted to the Customer's Management System.

For each operation, the possible result values are:

- fully succeeded;
- failed;
- not attempted.

The different operations can be performed in a different order than the order of the operation list, but the result list is filled in the same order.

C.2 Initiation of a service request

The initiation of a service request service is used to allow the Customer's Management System to request the Service Provider's CNM System to create an instance of the Service Request managed object class. It defines the service request parameters.

When a Service Request managed object is created, it generates an Object Creation notification containing a notification identifier, the status (progress state), the contact name (service request initiator).

C.3 Deletion of a service request

The deletion of an instance of the Service Request managed object class is used to allow the Customer's Management System to request the Service Provider's CNM System to delete a Service Request managed object. At any time after the creation and before the normal end of the negotiation, the customer is able to close the request deleting the ServiceRequest instance. Otherwise, the Service Request instance is normally deleted after all the service request results are provided.

When a Service Request managed object is deleted, it generates an Object Deletion notification containing the deletion date and time.

C.4 Negotiation of a service request

This service is used to allow the Customer's Management System and the Service Provider's CNM System to negotiate the conditions of the service provision. It allows the Service Provider's CNM System to notify the Customer's Management System of the condition it proposes. It allows the Customer's Management System to modify a serviceRequest managed object.

The mandatory status attribute gives the current state of the request. Four states are identified by the integer 0, 1, 2, 3. When a request is created by a Customer's Management System, the initial state is 0 (customer agreement). That means that the Customer's Management System has initialized the parameters of his request and is waiting for the Service Provider's CNM System answer. The state has always this 0 value (customer agreement) when the Customer's Management System agrees with the current term of the request. In this way, the Service Provider's CNM System knows that the Customer's Management System is waiting for an answer.

If the Service Provider's CNM System accepts all the terms of the request, the state takes the value 2 (serviceBeingProcessed). That means that the performance of the request has began (the request can not be cancelled any more).

The state 3 (endOfProcessing) indicates that the service request has been realized. The resultList attribute can be consulted by the Customer's Management System.

If the Service Provider's CNM System cannot accept the proposal of the Customer's Management System, it modifies the parameters which it cannot accept and make a new proposal to the Customer's Management System. In this case, the state attribute changes to 1 (providerAgreement). The new value of the state attribute warns the Customer's Management System that the Service Provider's CNM System is waiting for an answer from him. Then, the Customer's Management System can accept the request (it changes the state attribute to 0) or modify some parameters it does not agree with and make a new proposal (the state attribute changes to 0). This continues until both Service Provider's CNM System and Customer's Management System agree on a proposal.

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The service Provider's CNM System and the Customer's Management System can use a conditional package in the negotiation, the negotiationPackage package which contains the limitValidityDate attribute. This attribute can be used in turn by the Service Provider's CNM System and Customer's Management System during the negotiation phase. Every time one of them makes a new proposal to the other one, the requestor can use this attribute to indicate the limit validity date of its proposal. If there is no response from the interlocutor before this date, the request is not valid anymore and the serviceRequest instance is deleted.

NOTE – When an attribute or a set of attributes is modified, the serviceRequest managed object generates an Attribute Value Change notification containing a list of the modified attributes, their old value(s), their new value(s), and the time of modification .

C.5 Retrieval of a service request

This service is used to allow the Customer's Management System to request the Service Provider's CNM System to retrieve attribute values of a Service Request managed object.

The Customer's Management System is informed that the requested service is available by an objectCreation notification emitted by the instance modelling the service provided.

The state diagram of the service request process is given in Figure C.1.

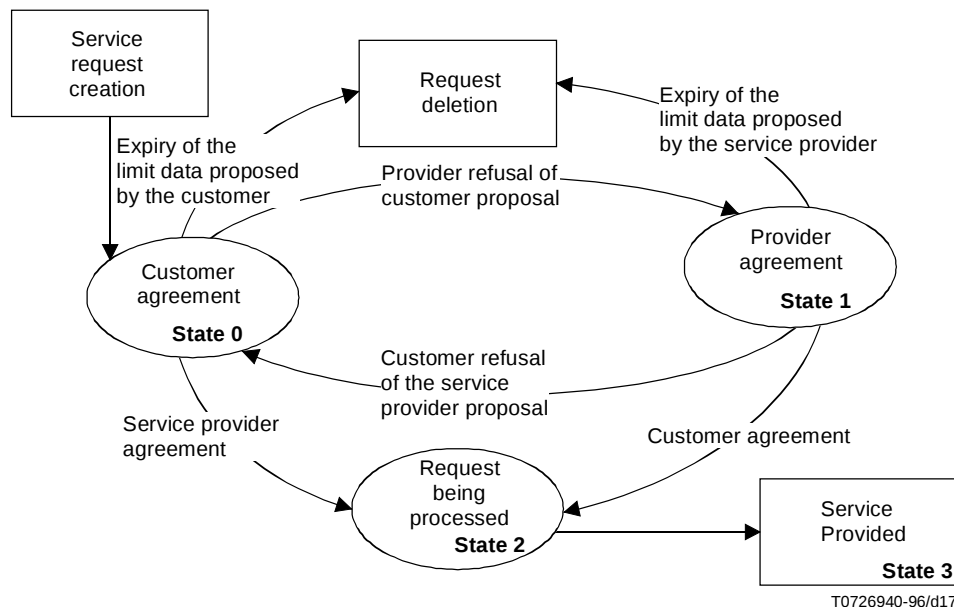


Figure C.1/X.162 – State diagram of the service request process

NOTE 1 – The CMIP argument optional parameter accessControl has no utility in the service request service.

NOTE 2 – The serviceRequest object allows the request of operation on instance. The concerned CMIP operations are ACTION, CREATE, DELETE, GET, SET (and not CANCEL-GET). A particular implementation can limit the number of CMIP operations.

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Annex D

Element of procedure for provision of CNM services

This annex describes the element of procedure to be used for provision of CNM services through the CNMc interface.

D.1 Fault management

D.1.1 CNM alarm reporting service

The Alarm Reporting service is invoked by the Service Provider's CNM management system by issuing an MAPDU corresponding to an Alarm Report notification as defined in CCITT Rec. X.733 | ISO/IEC 10164-4. If the Alarm Report is sent in a confirmed mode, upon its receipt, the Customer's Management System will acknowledge it. This service is invoked only if the discrimination criterion of the EFD permits to report the notification to the Customer's Management System.

The State change reporting service is invoked by the Service Provider's CNM management system by issuing an MAPDU corresponding to a State Change reporting notification. If this MAPDU is sent in a confirmed mode, upon its receipt the Customer's Management System will acknowledge it. This service is invoked only if the discrimination criterion of the EFD permits to report the notification to the Customer's Management System.

The Alarm/state-change report suspension/resumption service is invoked by the Customer's Management System by issuing a PT-GET on the administrative state of the EFD.

The Alarm/state-change reporting control service is invoked by the Customer's Management System by issuing a PT-CREATE with the managed object class parameter set to the EFD OBJECT IDENTIFIER or by issuing a PT-GET to some or all of the GET-REPLACE EFD attributes except the Administrative State attribute.

D.1.2 Fault history service

A log and fault log record object instances used for this CNM service are automatically created in the service provider's CNM system after subscription of this service. This log object sieves alarms generated in the system and related to the customer are stored in the form of the log record. When a customer wants to retrieve a fault log record, he shall issue a PT-GET to the specified fault log record instance. By using the multiple object selection function, he may request multiple object instances. By using the filter function, he may select a log record of specific properties. The logging is controlled by the log object as defined in CCITT Rec. X.735 | ISO/IEC 10164-6. A customer may change criteria for logging by modifying the logDiscriminatorConstruct attribute in the fault log object.

D.1.3 CNM trouble report service

The elements of procedure for this CNM service are as specified in Recommendation X.790.

D.1.4 Loop set-up service

One or more loop-back point object instances used for this CNM service are automatically created in the service provider's CNM system after subscription of this service. This instance has the location pointer attribute, which identifies the point where data are looped back. When a customer wants to set up a loop-back point, he shall issue a PT-SET to the specific loop-back point instance by specifying its object instance identifier in order to activate the loop-back point. Activation and deactivation are controlled by modifying the loopbackPointSetting attribute.

D.1.5 Test host service

There are two types of test host services, that is, the loop-back test and the protocol integrity services.

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D.1.5.1 Loop-back test

The X.25 physical connection is the object to be tested. First, a customer who wants to use this CNM service shall set up a loop-back point at the local end of the subscriber line. The X.25 physical connection object has a functionality to receive the customer's test action request, i.e. "ITU-T Rec. X.745 | ISO/IEC 10164-12": testRequestControlledAction. When a customer wants to let the service provider execute a loop-back test, the customer sends a PT-ACTION to designate test conditions. This PT-ACTION shall contain necessary information with the specified format, i.e. "ITU-T Rec. X.737 | ISO/IEC 10164-14": loopbackTestInfoParam. When this action is not accepted, TARR returns error causes, such as "ITU-T Rec. X.745 | ISO/IEC 10164-12": independentTestInvocationError.

If this action is successfully received, an "ITU-T Rec. X.737 | ISO/IEC 10164-14": loopbackTest instance is created. An object creation notification is sent to the customer. The service provider sends a test pattern and checks the returned pattern. Test data are analysed in the service provider and a PT-EVENT-REPORT containing the result is sent to the customer.

D.1.5.2 Protocol integrity test

The protocol integrity test is executed in the X.25 protocol entity (cnmX25EntityTested). The cnmX25EntityTested object has a functionality to receive the customer's test action request, i.e. "ITU-T Rec. X.745 | ISO/IEC 10164-12": testRequestControlledAction. When a customer wants to let the service provider execute a protocol integrity test, the customer sends a PT-ACTION to designate test conditions. This PT-ACTION shall contain necessary information with the specified format, i.e. "ITU-T Rec. X.737 | ISO/IEC 10164-14": protocolIntegrityTestInfoParam. When this action is not accepted, TARR returns error causes, such as "ITU-T Rec. X.745 | ISO/IEC 10164-12": independentTestInvocationError.

If this action is successfully received, an "ITU-T Rec. X.737 | ISO/IEC 10164-14": protocolIntegrityTest instance is created. An object creation notification is sent to the customer. The customer sends data in the ordinary way and the service provider probes the data sequence. The service provider analyses it and judges whether or not the protocol integrity is kept. Finally, a PT-EVENT-REPORT containing the result is sent to the customer.

D.2 Configuration management

D.2.1 CNM configuration inquiry service

The complete configuration acquisition service is invoked by the Customer's Management System by issuing a scoped PT-GET service on the whole subtree. Upon receipt of the PT-GET, the Service Provider's CNM System will respond with the adequate number of linked replies.

The partial configuration acquisition service is invoked by the Customer's Management System by issuing a scoped and/or filtered PT-GET. Upon receipt of the PT-GET the Service Provider's CNM System will respond with the adequate number of linked replies.

The automatic configuration update service is invoked by the Service Provider's CNM System by spontaneously emitting an objectCreation, objectDeletion, attributeValueChange or stateChangeReporting notifications to the Customer's Management System. Depending on the service provider policy, these notifications may or may not need to be confirmed by the Customer's Management System.

D.2.2 CNM reconfiguration service

The attribute setting service is invoked by the Customer's Management System by issuing a PT-GET which may be scoped to the GET-REPLACE attributes of the objects to be modified.

The attribute setting reporting service is invoked by the Service Provider's CNM System by issuing one (or several) MAPDU corresponding to attribute value change reporting notification(s) of the modified object(s).

D.2.3 Systematic call redirection service

To initiate this CNM service, a customer may create a systematic call redirection list by a PT-CREATE. This PDU shall have information about the DTE address from which incoming calls are redirected and DTE addresses to which calls are redirected. The priority of redirection is the order of the elements in the SEQUENCE OF DTEAddress data type. Also, this object may be instantiated by the service provider after the subscription of this service. The same information is specified *a priori*.

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After the instance is created, call redirection may be activated or deactivated by setting the `availabilityState` attribute by a PT-SET. The contents of the call redirection list may be modified, added or removed by a PT-SET.

The execution of the call redirection may be controlled by a schedule by specifying the interval start time and the duration by a PT-SET base on the daily scheduling definition of CCITT Rec. X.721 | ISO/IEC 10165-2.

D.3 CNM accounting service

D.3.1 Periodic billing service

A PT-EVENT-REPORT containing invoice items is sent from the `cnmBillingController` object to the customer, periodically, or when some event related to billing occurs. Invoice items shall be defined in the form of a notification based on CCITT Rec. X.721 | ISO/IEC 10165-2.

By setting the administrative state attribute by a PT-SET, the emission of notifications may be suspended and resumed.

D.3.2 Detailed accounting service

Accounting records are accumulated as usage metering record object instances. A customer may retrieve his own usage metering records by a PT-GET.

UsageMeteringRecord objects are automatically created as a consequence of the occurrence of accountable events in a customer's communication. Object creation notification may be sent to the customer.

D.4 Performance management

D.4.1 CNM traffic information service

The traffic data collection interval assignment service is invoked by the Customer's Management System by issuing a PT-SET service with the granularity period attributes set to one of the values allowed by the service provider.

The traffic data retrieval service is invoked by the Customer's Management System by issuing a PT-GET service on the `currentPacketTrafficData`, `currentMLPTrafficData` or `currentSLPTrafficData` managed objects.

The traffic data collection suspension/retention service is invoked by the Customer's Management System by issuing a PT-GET service with the `administrativeState` attribute set to the value `Locked/unLocked`.

The traffic data collection scheduling service is invoked by the Customer's Management System by issuing a PT-SET service with the values of the `startTime` and `stopTime` attributes or with the value of the `intervalOfDay` attribute.

The traffic history data duration assignment service is invoked by the Customer's Management System by issuing a PT-SET service with a permissible integer value for the `historyRetention` attribute.

The traffic history data retrieval service is invoked by the Customer's Management System by issuing a PT-SET service on `historyPacketTrafficData`, `historyMLPTrafficData` or `historySLPTrafficData` managed objects. Scoping and/or filtering criteria may be applied.

The zero suppressing service is used if `currentPacketTrafficData`, `currentMLPTrafficData` or `currentSLPTrafficData` managed objects have the `zeroSuppression` package and if an interval terminates with "all-zeros" performance measurements.

D.5 CNM security service

This service is for further study.

D.6 CNM supporting services

See Annex C.

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