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Signalling Protocols and Switching (SPS); Q3 interface at the Local Exchange (LE) for configuration management of V5 interfaces and associated customer profiles; Part 1: Q3 interface specification

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Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols and Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS is part 1 of a multi-part standard covering the Q3 interface specification at the Local Exchange (LE) for configuration management of V5 interfaces and associated customer profiles as described below:

Part 1: "Q3 interface specification";

Part 2: "Managed Object Conformance Statement (MOCS) proforma specification".

The following multi-part standards are directly related to this ETS:

ETS 300 376: "Q3 interface at the Access Network (AN) for configuration management of V5 interfaces and associated user ports";

ETS 300 378: "Q3 interface at the Access Network (AN) for fault and performance management of V5 interfaces and associated user ports";

ETS 300 379: "Q3 interface at the Local Exchange (LE) for for fault and performance management of V5 interfaces and associated customer profiles".

Transposition dates	
Date of latest announcement of this ETS (doa):	31 March 1995
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	30 September 1995
Date of withdrawal of any conflicting National Standard (dow):	30 September 1995

Introduction

Customer administration is a management activity that the network operator performs in order to exchange with the customer all the customer related management data and functions required to offer a telecommunications service and to exchange with the network all the customer related management data and functions necessary for the network to produce that telecommunications service.

It is considered that the customer's terminal equipment can be connected directly to the Local Exchange (LE) or via a V5 interface.

In a wide sense, this could include interactions for the purpose of service provision management, configuration administration, fault administration, charging (including detailed billing) administration, complaints administration, quality of service administration, traffic measurement administration etc. In this ETS, however, only customer administration in the more traditional sense of service provision and service configuration has been included.

In particular, the tasks to be performed in the LE to provide service for customers which are connected via a V5 interface to the LE are considered.

Administration of V5 interface related data is a management activity that the network operator performs in order to configure initially or to reconfigure a V5 interface to enable and maintain the service offering for the customers connected.

An agreement was reached to consider all items concerning configuration management of V5 interfaces. This covers:

- the labelling of a V5 interface with protocol version and provisioning variant;
- a switch-over possibility between V5 interface datasets with different provisioning variants and protocol versions for reconfiguration of a V5 interface;
- allocation of communication and bearer channels for a V5 interface;
- handling of customer port related data relevant for the LE;
- administrative blocking of user ports within a V5 interface;
- association of user ports to a specific V5 interface;
- marking of ISDN user port B-channels as unavailable when used for the permanent line service in the AN;
- upgrading a V5.1 interface to a V5.2 interface.

1 Scope

This European Telecommunication Standard (ETS) specifies the Q3 interface between a Local Exchange (LE) and the Telecommunications Management Network (TMN) for the support of configuration management functions for V5 interfaces, as described in ETS 300 324-1 [2] and ETS 300 347-1 [3], and their associated customer profiles. The management of transmission, media and services which are not related to V5 interfaces is outside the scope of this ETS.

The Q3 interface is the TMN interface between Network Elements (NEs) or Q-adapters which interface to Operations Systems (OSs) without mediation and between OSs and mediation devices. The location of the Q3 interface is illustrated in annex G of ETS 300 376-1 [4].

Generic modelling of leased line ports which are associated with a V5 interface is within the scope of this ETS, but the traffic from these ports can only be associated with 64 kbit/s bearer channels on the V5 interface.

The definition of OS functionality, and the specification of Qx interfaces and proprietary interfaces are outside the scope of this ETS.

Existing protocols are used where possible, and the focus of this ETS is on defining the object models.

Although security management is excluded from this ETS, any aspects of security relating to configuration management are included as an integral part of configuration management.

NOTE: Configuration management includes provisioning and the provisioning activity may include testing, but this testing is not included in this ETS. It is included in the specification relating to fault and performance management, ETS 300 379-1 [6].

2 Normative references

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

[1] I-ETS 300 291 (1995): "Network Aspects (NA); Functional specification of Customer Administration (CA) on the Operations Systems/Network Element (OS/NE) interface".

[2] ETS 300 324-1 (1994): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification".

[3] ETS 300 347-1 (1994): "Signalling Protocols and Switching (SPS); V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN); Part 1: V5.2 interface specification".

[4] ETS 300 376-1 (1994): "Signalling Protocols and Switching (SPS); Q3 interface at the Access Network (AN) for configuration management of V5 interfaces and associated user ports; Part 1: Q3 interface specification".

[5] ETS 300 378-1: "Signalling Protocols and Switching (SPS); Q3 interface at the Access Network (AN) for fault and performance management of V5 interfaces and associated user ports; Part 1: Q3 interface specification".

[6] ETS 300 379-1: "Signalling Protocols and Switching (SPS); Q3 interface at the Local Exchange (LE) for fault and performance management of V5 interfaces and associated customer profiles; Part 1: Q3 interface specification".

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

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

[9] ITU-T Recommendation Q.811 (1993): "Lower layer protocol profiles for the Q3 interface".

[10] ITU-T Recommendation Q.812 (1993): "Upper layer protocol profiles for the Q3 interface".

[11] CCITT Recommendation X.208 (1988): "Specification of Abstract Syntax Notation One (ASN.1)".

[12] CCITT Recommendation X.711 (1991): "Common management information protocol definition for CCITT applications".

[13] CCITT Recommendation X.720 | ISO/IEC 10165-1 (1992): "Information technology - Open systems interconnection - Structure of management information: Management information model".

[14] CCITT Recommendation X.721 | ISO/IEC 10165-2 (1992): "Information technology - Open systems interconnection - Structure of management information: Definition of management information".

[15] CCITT Recommendation X.730 | ISO/IEC 10164-1 (1992): "Information technology - Open systems interconnection - Systems management: Object management function".

[16] CCITT Recommendation X.731 | ISO/IEC 10164-2 (1992): "Information technology - Open systems interconnection - Systems management: State management function".

[17] CCITT Recommendation X.732 | ISO/IEC 10164-3 (1992): "Information technology - Open systems interconnection - Systems management: Attributes for representing relationships".

3 Definitions

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

Access Network (AN): See ETS 300 324-1 [2].

B-channel number: Identifies a B-channel on the ISDN basic User-Network Interface (UNI) and ISDN primary rate UNI.

bearer channel: See ETS 300 324-1 [2].

Bearer Channel Connection (BCC): See ETS 300 347-1 [3].

Communication channel (C-channel): See ETS 300 324-1 [2].

Communication path (C-path): See ETS 300 324-1 [2].

control protocol: See ETS 300 324-1 [2].

D-channel signalling type (Ds-type) data: ISDN D-channel signalling type data with Service Access Point Identifier (SAPI) not equal to 16, and not equal to 32 to 62 (see ETS 300 324-1 [2], subclause 8.4).

envelope function address: See ETS 300 324-1 [2].

frame type (f-type) data: ISDN D-channel data with SAPI in the range from 32 to 62 (see ETS 300 324-1 [2], subclause 8.4).

layer 3 address: See ETS 300 324-1 [2].

Local Exchange (LE): See ETS 300 324-1 [2].

Operations System (OS): See CCITT Recommendation M.3010 [7].

packet type (p-type) data: ISDN D-channel data with SAPI equal to 16 (see ETS 300 324-1 [2], subclause 8.4).

Permanent line (PL): See ETS 300 324-1 [2].

protection protocol: See ETS 300 347-1 [3].

provisioning variant: See ETS 300 324-1 [2].

semi-permanent leased line: See ETS 300 324-1 [2].

time slot number: See ETS 300 324-1 [2].

V5 interface: See ETS 300 324-1 [2].

V5 time slot: Is an object class representing a 64 kbit/s channel of a V5 interface that is used as bearer or communication channel. It is a subclass of "CCITT Recommendation M.3100:1992":connectionTerminationPointBidirectional.

V5 Trail Termination Point (TTP): Is an object class representing a 2 Mbit/s interface that is used as V5.1 interface or as part of a V5.2 interface. It is a subclass of "CCITT Recommendation M.3100:1992":trailTerminationPointBidirectional.

virtual access channel: Is an object class representing an individual ISDN B-/D-channel of an ISDN access port, or an individual channel of a digital access port, or the bearer channel for an analogue access port. It is a subclass of "I-ETS 300 291":accessChannel.

virtual access port: Is an object class representing an image of the customer access port which is located in an AN and connected to the LE via V5 interface. It is a subclass of "I-ETS 300 291":accessPort and used for provisioning services to the customer. This object class is subclassed for the different types of customer access ports.

4 Abbreviations

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

AN	Access Network
ASN.1	Abstract Syntax Notation One (see CCITT Recommendation X.208 [11])
BCC	Bearer Channel Connection
C-channel	Communication channel
C-path	Communication path
CTP	Connection Termination Point
Ds-type	D-channel signalling type
DS	Default Standby
ET	Exchange Termination

f-type	frame type
FSM	Finite State Machine
ID	Identity, Identifier
ISDN	Integrated Services Digital Network
LE	Local Exchange
M/C/O	Mandatory/Conditional/Optional
MDU	Management Data Unit
MPH	primitive between Physical layer and layer 2 Management
NE	Network Element
OS	Operations System
p-type	packet type
PH	primitive between Physical layer and layer 2
PL	Permanent Line
PSTN	Public Switched Telephone Network
$Q3_{AN}$	Q3 interface at the Access Network
$Q3_{LE}$	Q3 interface at the Local Exchange
RDN	Relative Distinguished Name
SAPI	Service Access Point Identifier
TIB	Task Information Base
TMN	Telecommunications Management Network
TTP	Trail Termination Point
UNI	User Network Interface

5 Information model diagrams

The entity relationship diagram is given in subclause 5.1 and the inheritance hierarchy (is-a relationships) and naming hierarchy (containment relationships) are given in subclauses 5.2 and 5.3, respectively.

5.1 Entity relationship diagram

Figures 1 to 5 show the overall relationships between the various entities. These correspond to the managed objects which are manipulated at the Q3 interface.

For V5.1 interfaces, access channels on access ports are associated with bearer time slots on a V5.1 interface by configuration over the Q3 interface of the LE. For V5.2, access channels on access ports are associated with bearer time slots on a V5.2 interface by the V5.2 Bearer Channel Connection (BCC) protocol. For both V5.1 and V5.2, the association of user signalling with communication paths and the association between communication paths and logical communication channels on the V5 interface is by configuration over the Q3 interface of the LE. The association of logical communication channels with physical communication time slots on the V5 interface is initially established over the Q3 interface, but can be changed for V5.2 interfaces by the V5.2 protection protocol.

Signalling protocols and their associated communication are modelled using various objects which represent the communication paths and the communication time slots. There are six classes of communication path objects. There is a single class for all Integrated Services Digital Network (ISDN) signalling with an attribute to distinguish between Ds-type, p-type, and f-type data. There are classes for Public Switched Telephone Network (PSTN) signalling, the control protocol, the BCC protocol, the link control protocol, and the protection protocol. In addition to these six communication path object classes, there is also an object class which represents communication channels.

There is one instance of the appropriate object class per communication path and per communication channel. These are contained in instances of v5Interface.

V5 control messages relating to provisioning are managed by an optional object on the Q3 interface. These messages may not be required once a TMN X interface or an integrated OS is available.

If control messages relating to provisioning are not supported on the Q3 interface then a default value for provisioning variant will be automatically used on the V5 interface. All V5 interfaces will use this default value unless actively changed via the Q3 interface. The value of this default is all zeroes.

Protection group 1 and its contained protection unit(s) are to be instantiated for the V5.2 case even if there is only one 2,048 Mbit/s link.

5.1.1 Overview

A single managedElement can contain a number of virtualAccessPorts, a number of v5Interfaces, and a number of v5Ttps (which each represent a 2,048 Mbit/s link). There is a bi-directional association between each v5Interface and all of its related virtualAccessPorts. Likewise there is a bi-directional relationship between each v5Interface and all of its related v5Ttps (2,048 Mbit/s links).

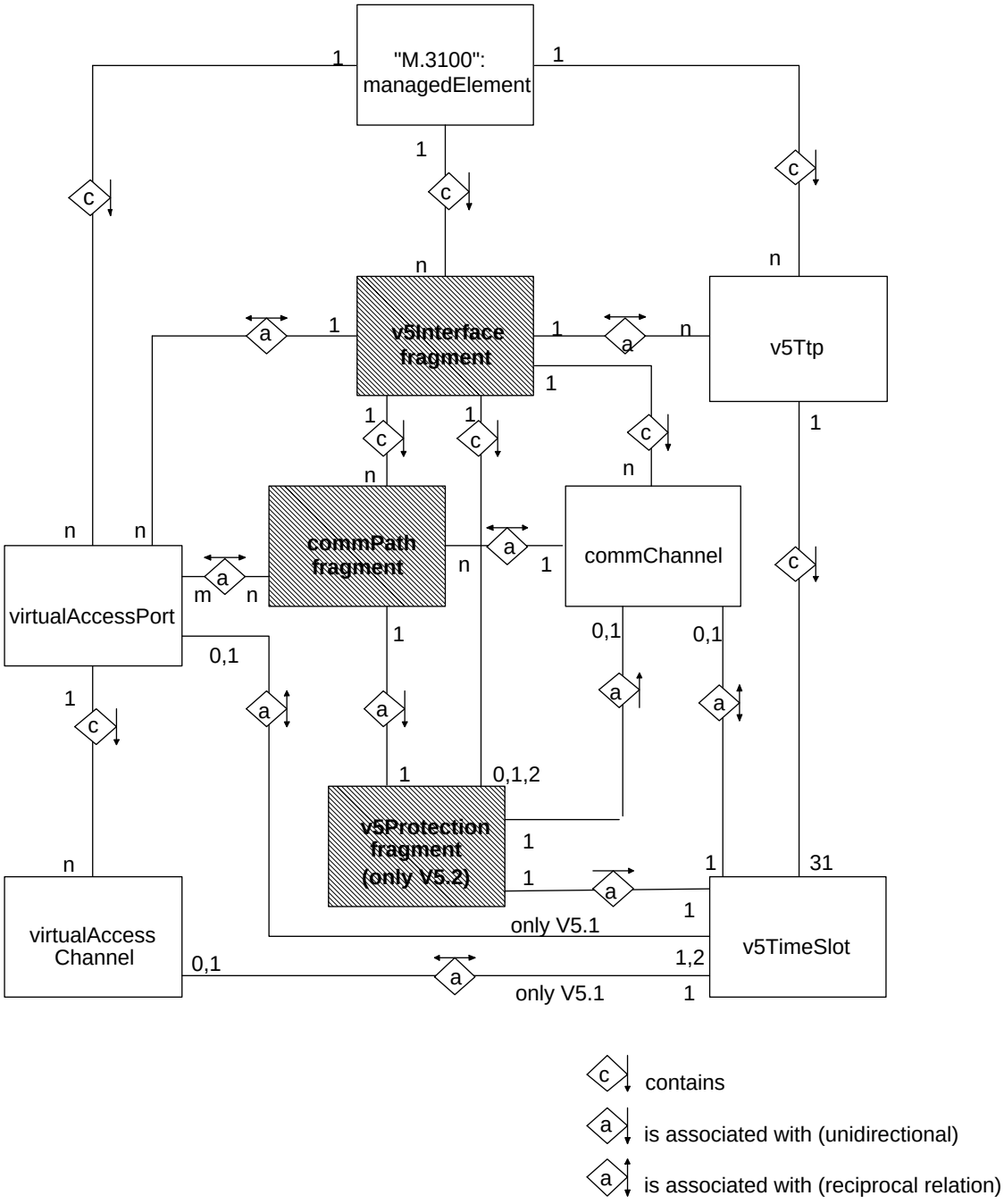


Figure 1: Entity relationship diagram - overview

Each virtualAccessPort can contain a number of virtualAccessChannels, each representing 64 kbit/s bearer channels. Each v5Ttp contains 31 v5TimeSlots which represent the CTPs corresponding to each of the 31 physical time slots. Each virtualAccessChannel can be associated with a unique v5TimeSlot for a V5.1

interface, but for the V5.2 case there is no corresponding association because the relationship is controlled by the V5.2 BCC protocol.

5.1.2 V5 interface fragment

Each v5Interface contains a number of communication path objects in its commPath fragment, a number of commChannels, and one or two v5ProtectionGroup objects if it represents a V5.2 interface. Each instance of v5Interface may contain an instance of v5Provision to support the V5 pre-provisioning messages.

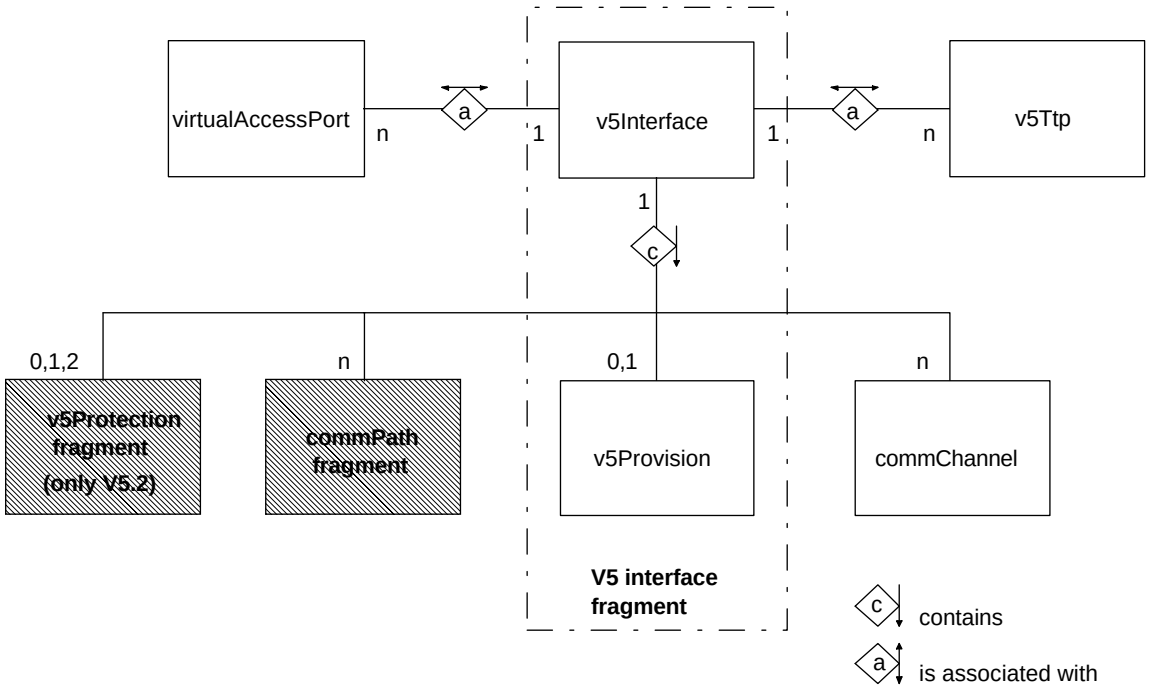


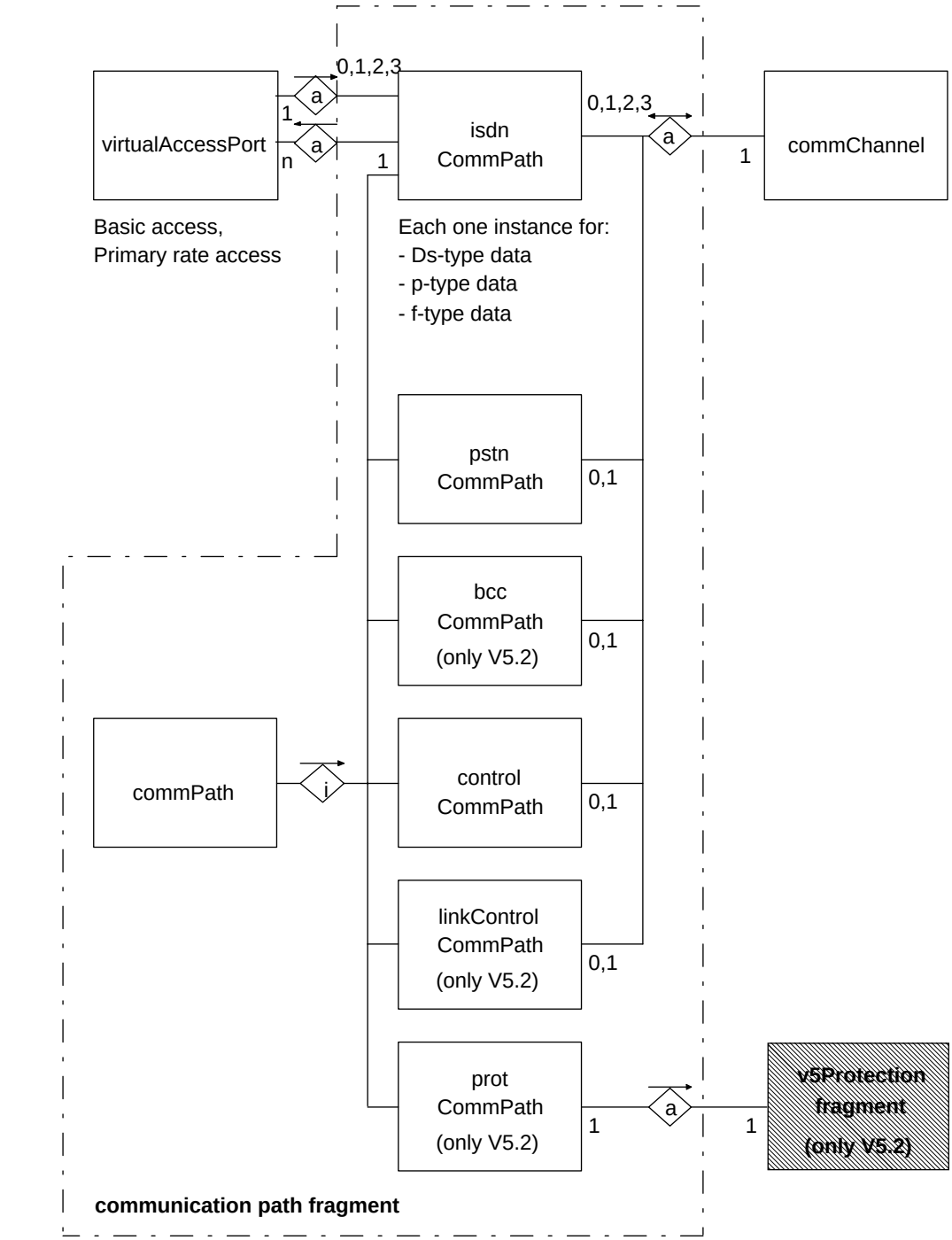
Figure 2: Entity relationship diagram - V5 interface fragment

5.1.3 Communication path fragment

Each ISDN virtualBasicRateAccess or virtualPrimaryRateAccess can be associated with up to three isdnCommPaths, one for each type of ISDN signalling. Each isdnCommPath handles a certain type of ISDN signalling for a number of virtualBasicRateAccesses and/or virtualPrimaryRateAccesses, and is associated with these. There may be more than one isdnCommPath contained in the v5Interface for each type of ISDN signalling.

The v5Interface contains a single controlCommPath. It contains a single pstnCommPath, but only if there are any virtualAnalogueAccesses associated with it. It also contains a single bccCommPath, a single protCommPath, and a single linkControlCommPath if it represents a V5.2 interface.

Each commChannel can be associated with up to three isdnCommPaths representing three different types of ISDN signalling. It can also be associated with the pstnCommPath. The commChannel which is associated with controlCommPath shall also be associated with the bccCommPath and with the linkControlCommPath if the v5Interface which contains it represents a V5.2 interface.



a is associated with (unidirectional)

a is associated with (reciprocal relation)

i is a

Figure 3: Entity relationship diagram - communication path fragment

5.1.4 Protection fragment

There is a bi-directional one-to-one association between commChannels and certain v5TimeSlots. Not every v5TimeSlot is associated with a commChannel. Some are used for bearer traffic and others are available for protection of commChannels on V5.2 interfaces. This protection adds onto the modelling for the V5.1 interfaces, and does not affect that modelling.

The time slots which may be associated with the commChannel which is associated with the controlCommPath are constrained by the V5 interface specifications ETS 300 324-1 [2] and ETS 300 347-1 [3]. A v5Interface which represents a V5.2 interface shall contain a v5ProtectionGroup of type 1 which contains two v5ProtectionUnits (see figure 4). One of these v5ProtectionUnits points to the protected commChannel which is associated with both the controlCommPath, the bccCommPath, and the linkControlCommPath. The corresponding pointer in the other v5ProtectionUnit is null. Both v5ProtectionUnits point to their associated v5TimeSlots. The containing v5ProtectionGroup of type 1 is pointed to by the protCommPath for the v5Interface, so there is an indirect mapping from the protCommPath through the v5ProtectionGroup of type 1, through its two contained v5ProtectionUnits onto its related v5TimeSlots.

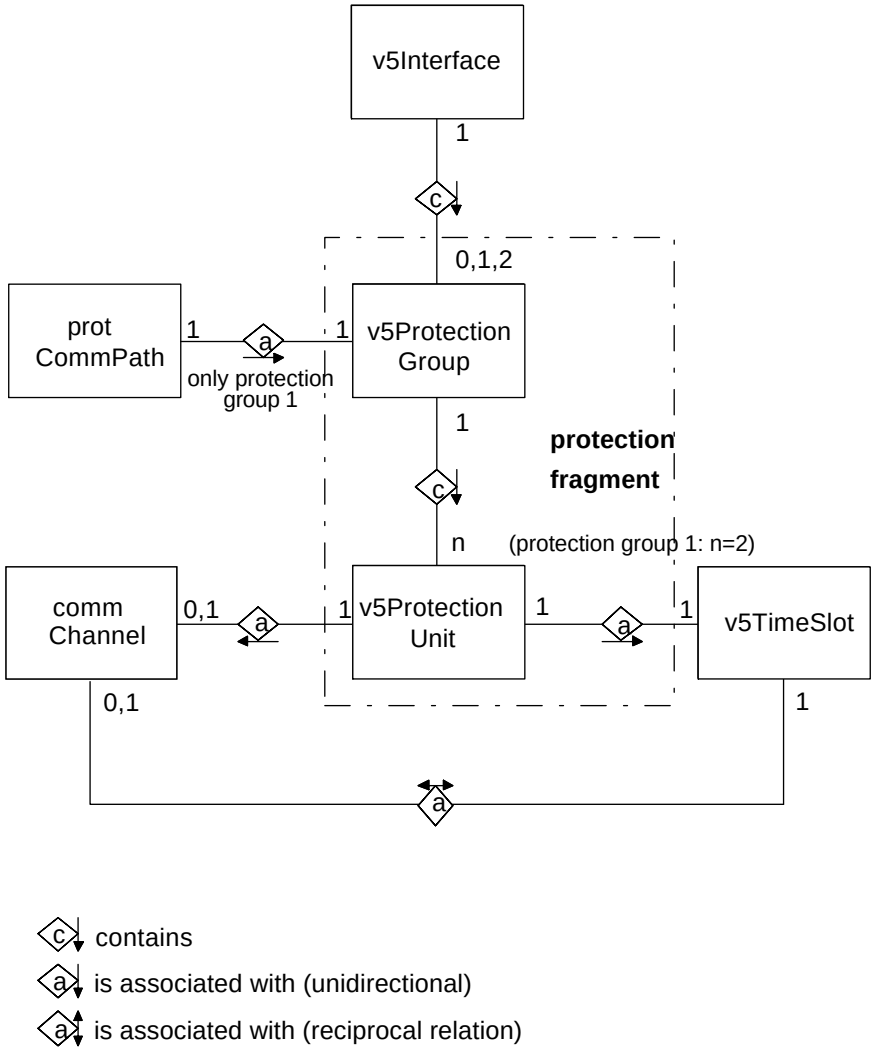


Figure 4: Entity relationship diagram - protection fragment

A v5Interface which represents a V5.2 interface also contains a v5ProtectionGroup of type 2 if other commChannels are protected (see figure 4). The v5ProtectionGroup of type 2 contains a number of v5ProtectionUnits, each of which points to its associated v5TimeSlot. The v5ProtectionUnits which point to active v5TimeSlots also point to the commChannels which are associated with the active v5TimeSlots. The corresponding pointers in the other v5ProtectionUnits are set to null.

5.1.5 Relation to I-ETS 300 291 - customer administration

The provision of service to the customers follows the principles as defined in I-ETS 300 291 [1]. Therefore, the virtualAccessPort, the virtualAccessChannel, and the V5 specific services are derived from the appropriate object classes defined in I-ETS 300 291 [1].

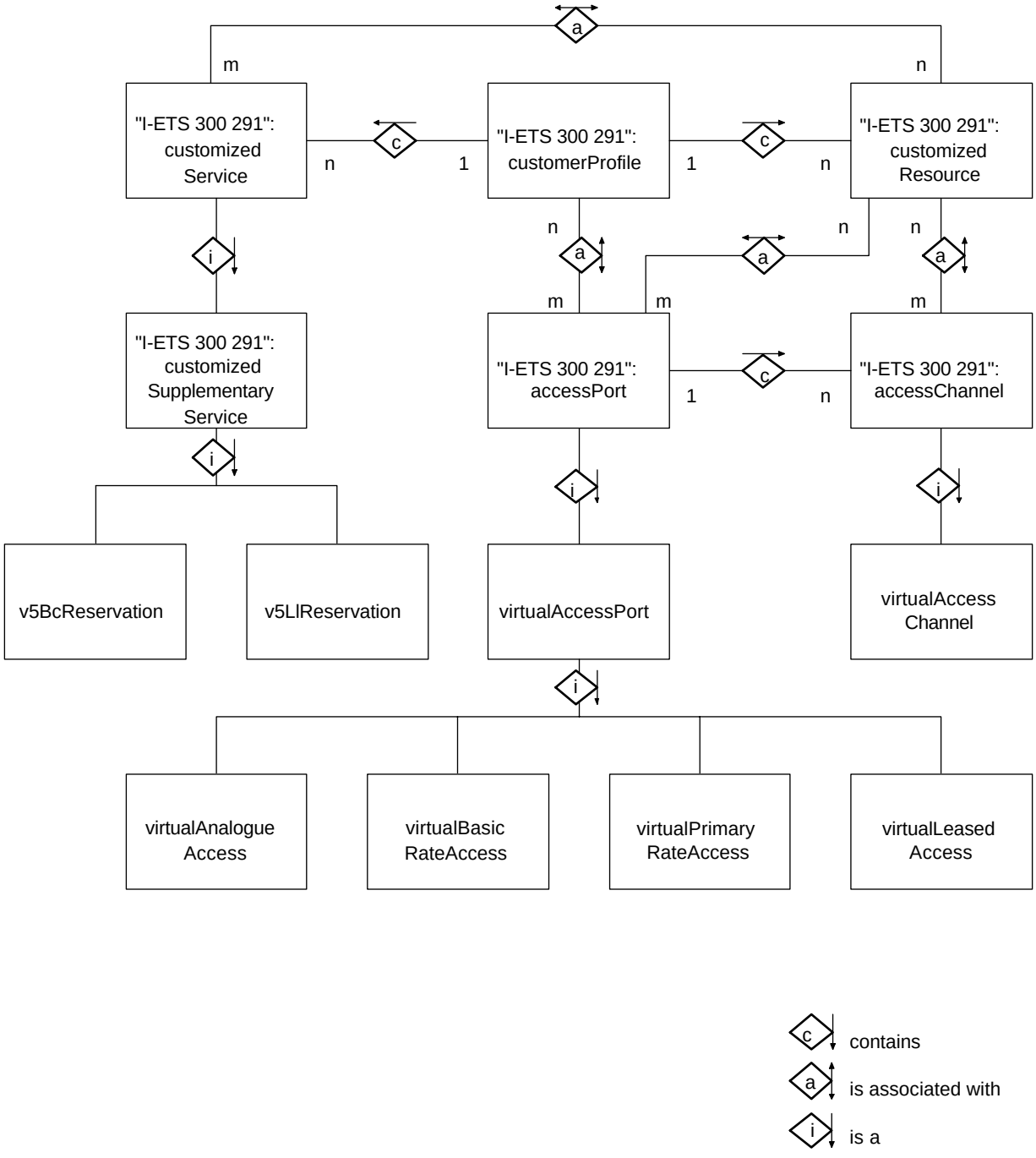
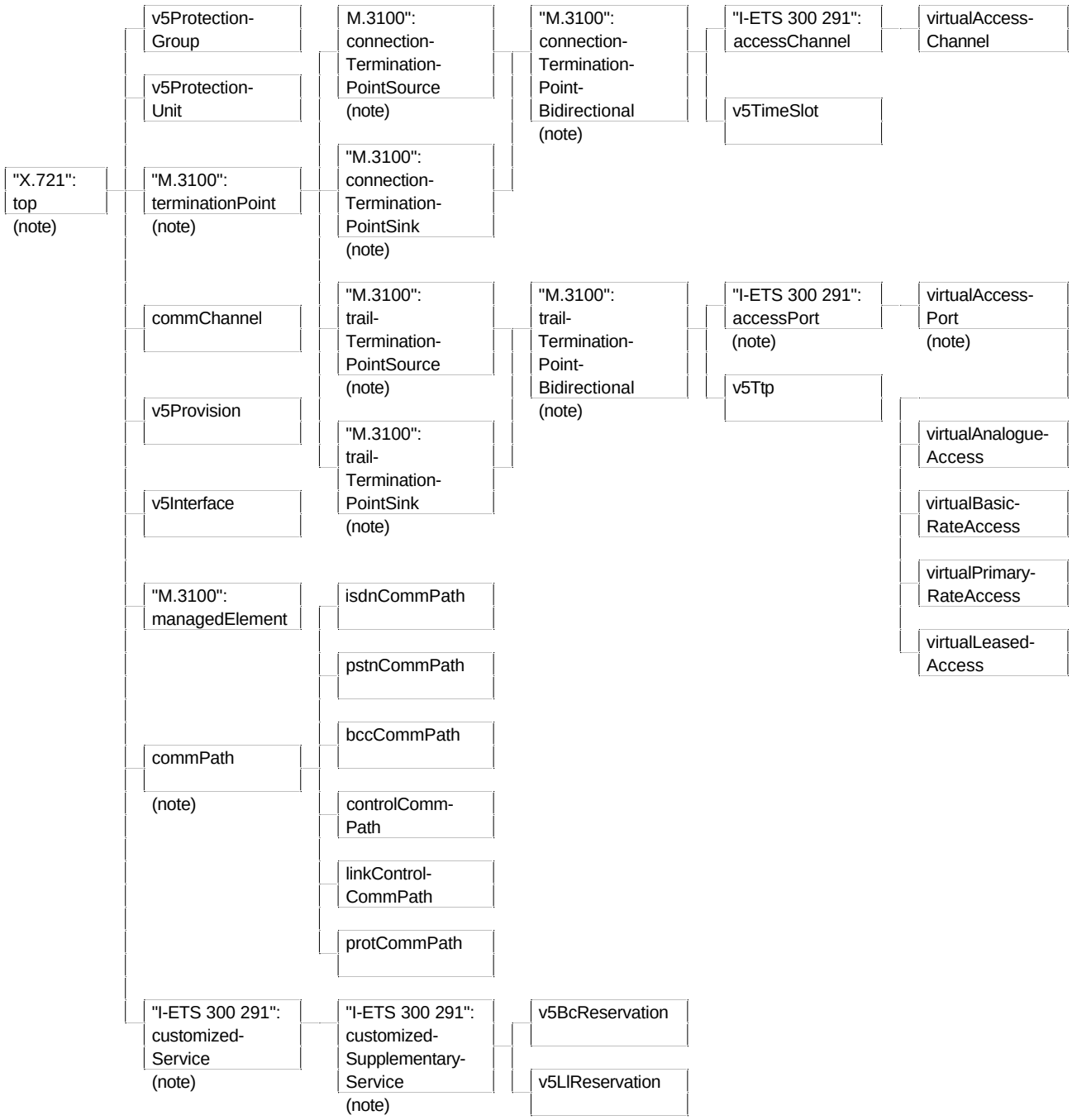


Figure 5: Relation to I-ETS 300 291 [1] - customer administration

5.2 Inheritance hierarchy

Figure 6 traces the inheritance from the highest level object "CCITT Recommendation X.721:1992":top to the managed objects defined in this ETS.



NOTE: Non-instantiable object class.

Figure 6: Inheritance hierarchy

5.3 Naming hierarchy

Figure 7 shows the naming (i.e. containment) relationships for the LE's managed objects associated with configuration management.

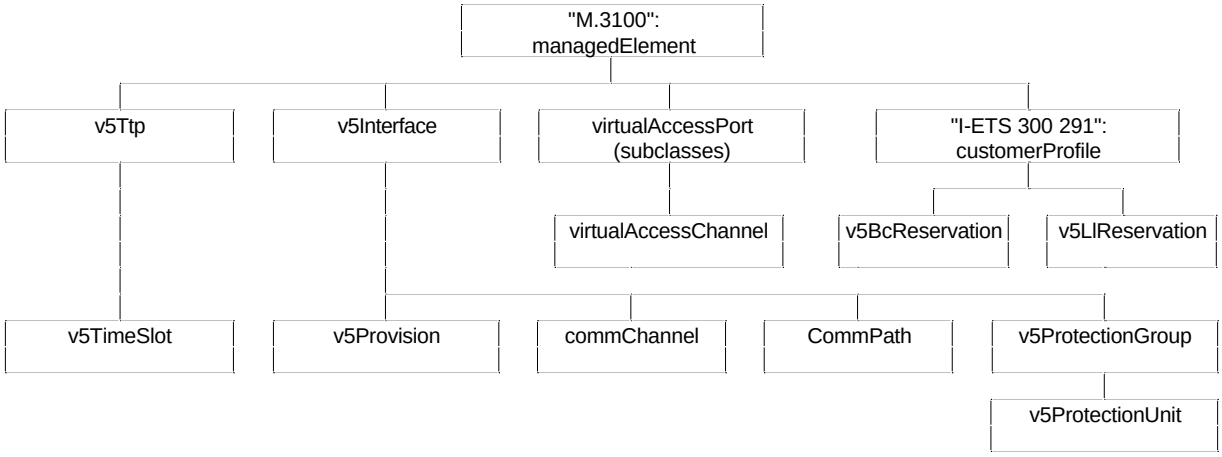


Figure 7: Naming hierarchy

6 Information model description

This clause provides a high-level informal description of the customer administration and administration of V5 interface information model, related to customer installations accessed via V5 interface.

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

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

Subclause 6.2 describes attributes which are common to several object classes in the information model.

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

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

6.1 Object class descriptions

Subclause 6.1 is divided into further subclauses which describe the objects of the information model, as far as they are not described in I-ETS 300 291 [1] and in CCITT Recommendation M.3100 [8].

In the tables listing the attributes of the object classes, the attributes inherited from "CCITT Recommendation X.721":top are not mentioned explicitly, although they are present in these object classes according to the conditions defined in "CCITT Recommendation X.721:1992":top.

Attributes inherited from superclasses are mentioned in the tables if they are mandatory. If they are conditional or optional, they are listed as long as they are to be regarded in the scope of this ETS. Nevertheless, they are present in these object classes. Inherited attributes have references to the documents in which the superclass is defined.

Attributes imported from other documents but not inherited from a superclass have references to the documents in which they are defined.

An instance of an object class mentioned hereafter having reciprocal pointer relationships shall only be deleted if these relationships are released.

6.1.1 Managed element fragment

6.1.1.1 Managed element (managedElement)

The managed element object class is defined in CCITT Recommendation M.3100 [8].

6.1.2 V5 interface fragment

6.1.2.1 V5 interface (v5Interface)

A V5 interface is an object class representing either a V5.1 or a V5.2 interface as an abstract entity of its own right.

A V5 interface may comprise in the case of a V5.1 interface of one, and in the case of a V5.2 interface of one to 16 2 Mbit/s links represented by V5 Trail Termination Point (TTP) object instances, which are listed in the serverV5Ttps attribute.

The clientUserPorts attribute points to the instances of the virtualAccessPort subclasses in a LE, or to the instances of the userPort subclasses in an AN currently assigned to this particular V5 interface.

The actions setReciprocalPointers and releaseReciprocalPointers shall be used to maintain these relationship attributes. They shall not be applied on the reciprocal relationship between a commChannel object instance and a v5TimeSlot object instance if one of the instances or both are pointed at by a v5ProtectionUnit object instance.

The operational state shall be set to "disabled" whenever one of the vital protocols (control, link control, Bearer Channel Connection (BCC), protection) has a persistent failure which cannot be overcome by protection switching. All existing connections shall be released. All associated access port objects shall be set to "disabled" except for the ports with permanent lines assigned.

If all vital protocols are working, this attribute shall be set to "enabled". This shall result in all associated userPort/virtualAccessPort instances being set to "enabled" if there are no other contradictory conditions.

If an instance supports the use of "degraded" then the availabilityStatus shall be set to "degraded" if the PSTN or ISDN services are affected by any interface internal problems, e.g. persistent protocol errors.

If the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage is instantiated, then the communicationsAlarm notification shall be used to report errors related to this object class. The errors to be reported and the usage of the alarm report parameters are specified in ETS 300 378-1 [5] and ETS 300 379-1 [6].

Table 1

Name	M/C/O	Value Set
v5InterfaceId	M	RDN
peerManagedElementId	O	single
supportedProtocolVersion	M	single
serverV5Ttps	M	set according to X.732
clientUserPorts	M	set according to X.732
"X.721":operationalState	O	single
"X.721":availabilityStatus	O	set
"M.3100":supportedByObjectList	C	set
"M.3100":userLabel	O	single
"M.3100":locationName	O	single

v5InterfaceId:	is the object identifier. The Relative Distinguished Name (RDN) is the V5 interface ID. It is an OCTET STRING SIZE(3).
peerManagedElementId:	identifies in a LE the adjacent AN and in an AN the adjacent LE which this particular V5 interface is connected to.
supportedProtocolVersion:	indicates the version of the V5 interface protocol this particular V5 interface is supporting.
serverV5Ttps:	indicates the V5 TTP associated with the V5 interface. It is a group relationship attribute according to CCITT Recommendation X.732 [17]. The V5 interface is the owner object.
clientUserPorts:	lists the associated virtual access port or user port object instances. It is a group relationship attribute according to CCITT Recommendation X.732 [17]. The V5 interface is the owner object.
operationalState:	gives the system internal controlled status whether the object instance is enabled or disabled according to CCITT Recommendation X.731 [16].
availabilityStatus:	indicates the availability status according to CCITT Recommendation X.731 [16].
supportedByObjectList, userLabel, locationName:	are defined in CCITT Recommendation M.3100 [8].

6.1.2.2 V5 TTP (v5Ttp)

A V5 TTP is an object class representing a 2 Mbit/s interface of the LE that is used as V5.1 interface or as part of a V5.2 interface.

A V5 TTP contains 31 V5 time slots. Time slot 0 is not instantiated, as it is an intrinsic part of the 2 Mbit/s link and is modelled as part of the V5 TTP.

The upstreamConnectivityPointer and the downstreamConnectivityPointer attributes have NULL value if this object class is instantiated in a LE. When instantiated in an AN, they will be set to NULL unless they point to TTPs within the transmission part of the AN.

The assocV5Interface attribute gives the relation to the v5Interface that v5Ttp is assigned to. It is a group relationship attribute according to CCITT Recommendation X.732 [17]. The v5Interface is the owner object.

The relationship is maintained by use of the setReciprocalPointers and releaseReciprocalPointers actions of the v5Interface object class.

It is a specialization of the TTP bidirectional object class defined in CCITT Recommendation M.3100 [8].

The operational state of an object shall be set to "disabled" whenever a link is in a non-operational state, e.g. because of a layer 1 failure or a remote link blocking request. Contained time slot objects shall be set to "disabled".

If the link is in the "operational" or "normal" state the attribute shall be set to "enabled". This shall result in contained time slot objects being set to "enabled" if there are no other contradictory conditions.

The administrative state may be set to the values "unlocked", "shutting down" or "locked".

LE: If set to "shutting down", all new call setup requests for time slots of this link will be rejected. Contained time slot objects will be set to "disabled" if the time slot is idle. Existing connections, including the semi-permanent ones, will not be affected.

AN: If set to "shutting down", deferred blocking for this link is requested in the LE via the V5 interface.

Shutting down can be rejected by the LE system management. The requester shall be informed by a shutdownRejected notification. The administrative state is to be set back to unlocked by the requester.

If set to "locked", the immediate (forced) link blocking procedure is initiated for this link and no further traffic is possible. All existing switched connections will be released. Semi-permanent and reserved connections will be re-established onto other links, if possible. Contained time slot objects will be set to "disabled".

If set to "unlocked", first a link unblock procedure followed by a link identification procedure will be initiated. The contained time slot objects shall be set to "enabled" if there are no other contradictory conditions.

If an instance supports the use of "degraded" then the availabilityStatus shall be set to "degraded" if the V5 link is still "enabled" but its ability to provide a transport service is reduced, e.g. if some but not all of the contained time slots are disabled.

If an instance supports the use of "dependency" then the availabilityStatus shall be set to "dependency" if objects on which the V5 link is functionally dependent are unavailable, as described in CCITT Recommendation X.731 [16], e.g. if the time slots 1 to 31 represented by the time slot objects are disabled by any internal reason.

In the Monitored Attributes parameter of the communicationsAlarm notification, the linkId attribute and the assocV5Interface attribute and their values shall be indicated.

If the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage is instantiated, then the communicationsAlarm notification shall be used to report errors related to this object class. The errors to be reported and the usage of the alarm report parameters are specified in ETS 300 378-1 [5] and ETS 300 379-1 [6].

Table 2

Name	M/C/O	Value Set
"M.3100":tTpId	RDN	single
"M.3100":supportedByObjectList	M	set
"M.3100":upstreamConnectivityPointer	M	single
"M.3100":downstreamConnectivityPointer	M	single
"X.721":administrativeState	M	single
"M.3100":operationalState	M	single
"X.721":availabilityStatus	O	set
assocV5Interface	M	single according to X.732
linkId	M	single
blockingStatus	M	single
neSpecificPointer	C	single

tTpId:	is the object identifier. The RDN is the 2 Mbit/s interface number.
supportedByObjectList:	is inherited from "M.3100":trailTerminationPointBidirectional.
upstreamConnectivityPointer, downstreamConnectivityPointer:	are inherited from "M.3100":trailTerminationPointBidirectional. They have NULL value if this object class is instantiated in a LE. When instantiated in an AN, they will be set to NULL unless they point to TTPs within the transmission part of the AN.
administrativeState:	in the case of a V5.2 interface, it gives the operator influenced blocking state according to CCITT Recommendation X.731 [16].
operationalState:	gives the system internal controlled status whether the object instance is enabled or disabled according to CCITT Recommendation X.731 [16].
availabilityStatus:	indicates the availability status according to CCITT Recommendation X.731 [16].
assocV5Interface:	gives the relation to the V5 interface, that 2 Mbit/s interface is assigned to. It is a group relationship attribute according CCITT Recommendation X.732 [17]. The V5 TTP is member.
linkId:	indicates the link ID assigned to the v5Ttp.
blockingStatus:	indicates if the V5 link is blocked for local or remote reasons, or both. If the v5Ttp is associated with a V5.1 interface, this attribute has the value "none".
neSpecificPointer:	points to an object instance specific for an individual NE.

6.1.2.3 V5 time slot (v5TimeSlot)

A V5 time slot is an object class representing a 64 kbit/s channel of a V5 interface that is either used as bearer channel or as C-channel. It is a specialization of the Connection Termination Point (CTP) bidirectional object class defined in CCITT Recommendation M.3100 [8].

Each V5 time slot is either assigned as bearer channel or C-channel by setting the channel type attribute appropriately. In the case of a V5.1 interface, a V5 time slot assigned as a bearer channel points either to the associated virtual access port or to the associated virtual access channel object instance if instantiated in a LE, or to a user port bearer channel CTP if instantiated in an AN.

In the case of a V5.2 interface, V5 time slots foreseen as bearer channels need not be instantiated.

One V5 time slot assigned as C-channel points to the associated (active) communication channel object instance. In V5 time slots assigned as standby C-channels of a V5.2 interface, this pointer is set to NULL.

In a V5.1 interface, time slot 16 is always a communication channel (C-channel 1). A second communication channel (C-channel 2) may be installed in time slot 15. Time slot 31 may be assigned as a third communication channel (C-channel 3).

In a V5.2 interface, time slot 16 of all 2 Mbit/s links may be assigned as C-channel. Time slots 15 and 31 of all 2 Mbit/s links may be assigned as C-channels as well, if all time slots 16 are already used as C-channels.

The upstreamConnectivityPointer and the downstreamConnectivityPointer attributes have NULL value if this object class is instantiated in a LE. When instantiated in an AN, they will be set to NULL unless they point to CTPs within the transmission part of the AN.

The assocResource attribute represents a peer relationship according to CCITT Recommendation X.732 [17] and is maintained by using the setReciprocalPointers and releaseReciprocalPointers actions assigned to the V5 interface object class.

The v5ChannelType attribute of time slots 15, 16, and 31 can only be modified if the assocResource attribute has NULL value and in the case of a V5.2 interface the administrativeState is locked.

The operational state shall be set to "disabled" if one of the following conditions apply:

a) the containing v5Ttp object goes into the "locked" state;
b) the containing v5Ttp object goes into the "disabled" state;
c) the containing v5Ttp object goes into the "shutting down" state and the time slot serves no connection; or
d) any other internal reason.

In addition, this may also impact the operational state of user port/channel objects which are assigned to this time slot directly or via unprotected C-path.

V5.2 only: If the time slot carries a C-channel, then protection switching is initiated when the attribute is set to "disabled".

When the v5Ttp object goes to the state "unlocked"/"enabled" the operational state shall be set to "enabled". This shall result in assigned user port/channel objects being set to "enabled" if there are no other contradictory conditions.

The administrative state may be set to the values "unlocked", "shutting down" or "locked".

If set to "shutting down" the time slot will be locked after an existing connection has been terminated. In addition, this may also impact the operational state of virtualAccessPort/Channel objects which are assigned to this time slot directly or via unprotected C-path. An existing semi-permanent connection will not be affected.

If set to "locked" this time slot is no longer available for use. Any existing switched connection will be released. In addition, this may also impact the operational state of virtualAccessPort/Channel objects which are assigned to this time slot directly or via unprotected C-path.

V5.2 only: A semi-permanent or reserved connection will be re-established onto other links if possible. If the time slot carries a C-channel, then protection switching is initiated when the attribute is set to "locked".

If set to "unlocked" this time slot is available for use. All virtualAccessPort/Channel objects which are assigned to this time slot directly or via unprotected C-path shall be set to "enabled" if there are no other contradictory conditions.

The "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformation package shall only be instantiated if the time slot is used as communication channel.

If the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage is instantiated, then the communicationsAlarm notification shall be used to report errors related to this object class. The errors to be reported and the usage of the alarm report parameters are specified in ETS 300 378-1 [5] and ETS 300 379-1 [6].

If the channelNumberPackage is not instantiated, the cTPId attribute should be used to number the channels consecutively from 1.

Table 3

Name	M/C/O	Value set
"M.3100":cTPId	M	RDN
"M.3100":supportedByObjectList	M	set
"X.721":administrativeState	C	single
"M.3100":operationalState	M	single
"M.3100":upstreamConnectivityPointer	M	single
"M.3100":downstreamConnectivityPointer	M	single
v5ChannelType	M	single
assocResource	M	single according to X.732

cTPId:	is the object identifier. The RDN is the time slot (channel) number.
supportedByObjectList:	is inherited from "M.3100":connectionTerminationPoint-Bidirectional.
upstreamConnectivityPointer, downstreamConnectivityPointer:	are inherited from "M.3100":connectionTerminationPoint-Bidirectional. They have NULL value if this object class is instantiated in a LE. When instantiated in an AN, they will be set to NULL unless they point to CTPs within the transmission part of the AN.
administrativeState:	gives the operator influenced blocking state according to CCITT Recommendation X.731 [16]. It is present if this object class is instantiated in an LE or an instance in an AN supports it.
operationalState:	gives the system internal controlled status whether the object instance is enabled or disabled according to CCITT Recommendation X.731 [16].
v5ChannelType:	indicates whether the V5 time slot is used as bearer channel or C-channel.
assocResource:	points in the case of being used as C-channel to the associated communication channel object instance. In the case of being used as bearer channel of a V5.1 interface, it points to the associated virtual access port or virtual access channel or user port bearer channel CTP object instance. In the case of being used as bearer channel of a V5.2 interface, it has NULL value. It is a peer relationship according to CCITT Recommendation X.732 [17].

6.1.2.4 V5 provision (v5Provision)

The V5 provision object class represents the messages of the V5 control protocol which communicate the provisioning variant. In this way it gives an OS the possibility to control a synchronized reconfiguration of the V5 interface via $Q3_{LE}$ or $Q3_{AN}$. One instance of this object class is contained in one instance of the V5Interface object class.

Table 4

Name	M/C/O	Value set
provId	M	RDN
ownProvVariant	M	single
provId:	is the object identifier.	
ownProvVariant:	indicates the provisioning variant which is currently valid in the local NE. This attribute will always be set by a management operation of the own OS. When a set operation has been performed on the attribute, the NE shall treat this as a "re-provisioning completed" and act according to ETS 300 324-1 [2], subclause 14 5.4.3.	

6.1.3 Virtual access port fragment

6.1.3.1 Virtual access port (virtualAccessPort)

A virtual access port is an object class representing an image of the customer access port which is located in an AN and connected to the LE via V5 interface. It is a subclass of "I-ETS 300 291":accessPort and used for provisioning services to the customer.

The upstreamConnectivityPointer and the downstreamConnectivityPointer attributes have NULL value.

The inherited operationalStatePackage is mandatory in this object class.

The operationalState attribute indicates whether or not the user port is able to provide its service to the customer's terminal equipment. It reflects the states of the user port Finite State Machine (FSM) in the LE according to annex A.

An access port may have assigned one or more bearer time slots and/or one or more C-paths providing transport for different data types (bearer, signalling, f-type, p-type). The operationalState attribute shall be set to "enabled" as long as the port has access to any service, and if there are no other contradictory conditions.

The operationalState attribute shall be set to "disabled" if an access port has no service at all, i.e. the V5 interface itself or the related ISDN Ds or the PSTN C-path has failed.

The assocV5Interface attribute gives the relation to the V5 interface, that virtual access port is assigned to. It is a group relationship attribute according to CCITT Recommendation X.732 [17]. The V5 interface is the owner object.

The relationships are maintained by use of the setReciprocalPointers and releaseReciprocalPointers actions of the v5Interface object class.

If the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage is instantiated, then the communicationsAlarm notification shall be used to report errors related to this object class. The errors to be reported and the usage of the alarm report parameters are specified in ETS 300 379-1 [6].

This object class is subclassed for the different types of virtual access ports and not instantiated within the scope of this application.

Table 5

Name	M/C/O	Value Set
"M.3100":tTpId	M	RDN
"M.3100":supportedByObjectList	M	set
"M.3100":upstreamConnectivityPointer	M	single
"M.3100":downstreamConnectivityPointer	M	single
"M.3100":administrativeState	C	single
"M.3100":operationalState	M	single
"I-ETS 300 291":assocOwnerCustomizedResources	M	set according toX.732
"I-ETS 300 291":assocOwnerCustomerProfiles	M	set according toX.732
"I-ETS 300 291":lineTestCapability	C	single
assocV5Interface	M	single according toX.732

tTpId:	is the object identifier.
supportedByObjectList, administrativeState: upstreamConnectivityPointer, downstreamConnectivityPointer:	are inherited from "M.3100":trailTerminationPointBidirectional.
operationalState:	are inherited from "M.3100":trailTerminationPointBidirectional. They have NULL value.
	indicates whether or not the user port is able to provide its service to the customer's terminal equipment. It reflects the states of the user port FSM in the LE according to annex A.
assocOwnerCustomizedResources, assocOwnerCustomerProfiles, lineTestCapability:	are inherited from "I-ETS 300 291":accessPort.
assocV5Interface:	gives the relation to the V5 interface, that virtual access port is assigned to. It is a group relationship attribute according to CCITT Recommendation X.732 [17]. The V5 interface is the owner object.

6.1.3.2 Virtual analogue access (virtualAnalogueAccess)

A virtual analogue access is an information entity used for the association of a PSTN customer's layer 3 port address with a V5.1/V5.2 interface. It is a specialization of the virtual access port object class.

Table 6

Name	M/C/O	Value Set
layer3PortAddress	M	single
"I-ETS 300 291":lineSignalling	M	single
assocV5TimeSlot	M	single according to X.732

layer3PortAddress:	gives the layer 3 port address the analogue access is assigned to.
lineSignalling:	is defined in "I-ETS 300 291":analogueAccess.
assocV5TimeSlot:	points to the associated V5 time slot object instance in the case of a V5.1 interface. It is a peer relationship according to CCITT Recommendation X.732 [17].

If no virtual access channel object instance is contained in the virtual analogue access object instance in the case of a V5.1 interface, the assocV5TimeSlot attribute points to the associated V5 time slot object instance. Otherwise it has NULL value. It is a peer relationship according to CCITT Recommendation X.732 [17]. The V5 time slot is provider.

6.1.3.3 Virtual basic rate access (virtualBasicRateAccess)

A virtual basic rate access is an information entity used for the association of an envelope function address representing an ISDN basic access with a V5.1/V5.2 interface. It is a specialization of the virtual access port object class.

Table 7

Name	M/C/O	Value Set
envelopeFunctionAddress	M	single
"I-ETS 300 291":dChannelActivation	M	single
assocV5TimeSlotB1	M	single according to X.732
assocV5TimeSlotB2	M	single according to X.732
assocIsdnSignallingCommPath	M	single according to X.732
assocPacketCommPath	M	single according to X.732
assocFrameCommPath	M	single according to X.732

envelopeFunctionAddress:	gives the envelope function address the basic access is assigned to.
dChannelActivation:	is defined in "I-ETS 300 291":basicRateAccess.
assocV5TimeSlotB1, assocV5TimeSlotB2:	indicates for B-channel 1 or 2 the associated V5 time slot object instance, if no virtual access channel object instance is contained in the virtual basic rate access object instance in the case of a V5.1 interface. It is a peer relationship according to CCITT Recommendation X.732 [17].
assocIsdnSignallingCommPath:	points to the associated ISDN communication path carrying the signalling messages of the assigned ISDN access. It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN communication path is owner.
assocPacketCommPath:	points to the associated ISDN communication path carrying the D-channel packet mode data of the assigned ISDN access if the customer has subscribed to this service. It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN communication path is owner.
assocFrameCommPath:	points to the associated ISDN communication path carrying the D-channel frame mode data of the assigned ISDN access if the customer has subscribed to this service. It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN communication path is owner.

6.1.3.4 Virtual primary rate access (virtualPrimaryRateAccess)

A virtual primary rate access is an information entity used for the association of an envelope function address representing an ISDN primary rate access with a V5.2 interface. It is a specialization of the virtual access port object class.

To the attribute dChannelActivation, the value "0", i.e. link deactivated, shall not be assigned, as layer 1 is permanently activated.

Table 8

Name	M/C/O	Value Set
envelopeFunctionAddress	M	single
"I-ETS 300 291":dChannelActivation	M	single
"I-ETS 300 291":actingRole	C	single
assocIsdnSignallingCommPath	M	single according to X.732
assocPacketCommPath	M	single according to X.732
assocFrameCommPath	M	single according to X.732

envelopeFunctionAddress:	gives the envelope function address the primary rate access is assigned to.
dChannelActivation, actingRole:	are defined in "I-ETS 300 291":primaryRateAccess.
assocIsdnSignallingCommPath:	points to the associated ISDN communication path carrying the signalling messages of the assigned ISDN access. It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN communication path is owner.
assocPacketCommPath:	points to the associated ISDN communication path carrying the D-channel packet mode data of the assigned ISDN access if the customer has subscribed to this service. It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN communication path is owner.
assocFrameCommPath:	points to the associated ISDN communication path carrying the D-channel frame mode data of the assigned ISDN access if the customer has subscribed to this service. It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN communication path is owner.

6.1.3.5 Virtual Leased Access (virtualLeasedAccess)

A Virtual Leased Access is an information entity used for the association of a single analogue or digital semi-permanent leased line or a multiple digital semi-permanent leased line configuration with a V5.1/V5.2 interface. It is a specialization of the Virtual Access Port object class.

Table 9

Name	M/C/O	Value Set
v5UserPortAddress	M	single
assocV5TimeSlot	M	single according to X.732

v5UserPortAddress	gives for a single semi-permanent leased line the layer 3 port address the access is assigned to, otherwise it gives the envelope function address.
assocV5TimeSlot	points to the associated V5 Time Slot object instance in the case of a V5.1 interface. It is a peer relationship according to CCITT Recommendation X.732 [17].

If it is a single semi-permanent leased line, and if no Virtual Access Channel object instance is contained in the Virtual Leased Access object instance, and if it is associated with a V5.1 interface, the assocV5TimeSlot attribute points to the associated V5 Time Slot object instance. Otherwise it has NULL value. It is a peer relationship according to CCITT Recommendation X.732 [17]. The relationship shall be maintained by use of the setReciprocalPointers and releaseReciprocalPointers actions of the V5 Interface object class.

A Virtual Leased Access object instance representing a single semi-permanent leased line shall contain either no or one Virtual Access Channel object instance. In a multiple semi-permanent leased line configuration, the Virtual Leased Access object instance shall contain the appropriate number of Virtual Access Channel object instances.

The v5UserPortAddress attribute gives for a single semi-permanent leased line the layer 3 port address the access is assigned to, otherwise it gives the envelope function address.

6.1.3.6 Virtual access channel (virtualAccessChannel)

A virtual access channel is an object class representing an individual ISDN B-/D-channel of an ISDN access port, or the bearer channel for an analogue access port, or an individual channel of an access port for a semi-permanent leased line. It is a subclass of "I-ETS 300 291":accessChannel.

If the channelNumberPackage is not instantiated, the cTPId attribute should be used to number the channels consecutively from 1.

Table 10

Name	M/C/O	Value set
"M.3100":cTPId	M	RDN
"M.3100":supportedByObjectList	M	set
"I-ETS 300 291":administrativeState	O	single
"M.3100":upstreamConnectivityPointer	M	single
"M.3100":downstreamConnectivityPointer	M	single
"M.3100":channelNumber	O	single
"I-ETS 300 291":channelRate	M	single
"I-ETS 300 291":channelType	M	single
"I-ETS 300 291":assocOwnerCustomizedResources	M	set according to X.732
permanentLineReservation	M	single
assocV5TimeSlot	M	single according to X.732

cTPId:	is the object identifier.
supportedByObjectList:	is inherited from "M.3100":connectionTerminationPoint-Bidirectional.
upstreamConnectivityPointer, downstreamConnectivityPointer, channelNumber:	are inherited from "M.3100":connectionTerminationPoint-Bidirectional. They have NULL value.
administrativeState, channelRate, channelType, assocOwnerCustomizedResources:	are inherited from "I-ETS 300 291":accessChannel.
permanentLineReservation:	indicates whether this access channel is reserved as permanent line or not.
assocV5TimeSlot:	points to the associated V5 time slot object instance if the channel type is an ISDN B-channel or a channel of a non-ISDN access in the case of a V5.1 interface. It is a peer relationship according to CCITT Recommendation X.732 [17].

6.1.4 Communication path fragment

6.1.4.1 V5 communication channel (commChannel)

A V5 communication channel is an object class representing the image of a V5 C-channel that multiplexes one or more C-paths.

One V5 C-channel relates to one V5 time slot with the associated C-paths.

Instances of this object class shall be created for active C-channels only.

The RDN of the commChannel shall be used to indicate the logical C-channel number used on the V5 interface.

Restrictions and guidelines for the allocation of C-paths to C-channels are given in ETS 300 324-1 [2] subclause 8.4 for V5.1 interfaces and in ETS 300 347-1 [3] subclause 8.4 for V5.2 interfaces.

The operationalState attribute shall be set to "disabled" whenever one of the following conditions applies:

1) the assigned time slot is "disabled";
2) no time slot assigned, neither directly nor via protection unit; or
3) any other internal reason.

In addition, this may also impact the operational state of ISDN and PSTN virtualAccessPort objects representing user ports which are served by this C-channel.

The operationalState attribute shall be set to "enabled" when a time slot being in the "enabled" state is assigned, either directly or via protection unit, or if the internal reason has been cleared.

Table 11

Name	M/C/O	Value set
commChannelId	M	RDN
assocV5CommPaths	M	set according to X.732
assocV5TimeSlot	M	single according to X.732
"X.721":operationalState	M	single
"M.3100":supportedByObjectList	C	set

commChannelId:	is the object identifier.
assocV5CommPaths:	points to the associated instances of communication path object classes except protection communication path. It is a group relationship according to CCITT Recommendation X.732 [17]. The V5 communication channel is owner.
assocV5TimeSlot:	points to the associated V5 time slot object instance. It is a peer relationship according to CCITT Recommendation X.732 [17].
operationalState:	gives the system internal controlled status whether the object instance is enabled or disabled according to CCITT Recommendation X.731 [16].
supportedByObjectList:	is defined in CCITT Recommendation M.3100 [8].

6.1.4.2 Communication path (commPath)

The communication path object class is defined as a superclass for the different communication types:

- ISDN communication;
- PSTN communication;
- BCC communication;
- control communication;
- link control communication;
- protection communication.

Restrictions and guidelines for the allocation of C-paths to C-channels are given in ETS 300 324-1 [2] subclause 8.4 for V5.1 interfaces and in ETS 300 347-1 [3] subclause 8.4 for V5.2 interfaces.

This object class is subclassed for the different types of communication paths and not instantiated within the scope of this application.

Table 12

Name	M/C/O	Value set
commPathId	M	RDN
assocCommChannel	M	single according to X.732
"M.3100":supportedByObjectList	C	set

commPathId:	is the object identifier.
assocCommChannel:	points to the associated V5 communication channel object instance. It is a group relationship according to CCITT Recommendation X.732 [17]. The V5 communication channel is owner.
supportedByObjectList:	is defined in CCITT Recommendation M.3100 [8].

6.1.4.3 ISDN communication path (isdnCommPath)

The ISDN communication path object class groups either the Ds-type, or the p-type, or the f-type data of ISDN accesses connected to a LE via a V5 interface. It is a subclass of the communication path object class.

Table 13

Name	M/C/O	Value set
clientUserPorts	M	set according to X.732
dataType	M	single

clientUserPorts:	lists the associated virtual access port or user port object instances. It is a group relationship attribute according to CCITT Recommendation X.732 [17]. The ISDN communication path is the owner object.
dataType:	indicates the type of data which is assigned to this ISDN communication path. This may be p-, f-, or Ds-type data.

6.1.4.4 PSTN communication path (pstnCommPath)

The PSTN communication path object class carries the PSTN protocol information. It is a subclass of the communication path object class.

No specific attributes are needed.

6.1.4.5 BCC communication path (bccCommPath)

The BCC communication path object class carries the BCC protocol information. It is a subclass of the communication path object class.

No specific attributes are needed.

6.1.4.6 Control communication path (controlCommPath)

The control communication path object class carries the control protocol information. It is a subclass of the communication path object class.

No specific attributes are needed.

6.1.4.7 Protection communication path (protCommPath)

The protection communication path object class carries the protection protocol information. It is a subclass of the communication path object class. The assocCommChannel attribute has NULL value.

Table 14

Name	M/C/O	Value set
assocProtectionGroup	M	single
assocProtectionGroup: points to the associated V5 protection group object instance.		

6.1.4.8 Link control communication path (linkControlCommPath)

The link control communication path object class carries the link control protocol information. It is a subclass of the communication path object class.

No specific attributes are needed.

6.1.5 Protection fragment

6.1.5.1 V5 protection group (v5ProtectionGroup)

A v5ProtectionGroup object instance contains zero or more v5ProtectionUnit object instances for defining a protection switching relationship where one or more standby v5TimeSlot object instances provide protection for one or more active v5TimeSlot object instances.

The protectionSwitchReporting notification is emitted from the v5ProtectionGroup object to report any protection switching (automatic, manual, and forced switch over).

The v5ProtectionGroupType attribute shall have the value "colon" when more than one v5ProtectionUnit is protected. Changing the value of this attribute from "plus" to "colon" is allowed when only one protected v5ProtectionUnit and one protecting v5ProtectionUnit are contained by the v5ProtectionGroup, and if the underlying resources support m:n protection.

The v5ProtectionGroupType attribute of protection group 1 shall have the value "plus". For protection group 2, it can have both values.

The v5ProtectionGroupNumber is used to distinguish whether the V5 protection group is V5 protection group 1 or 2.

When a protection switch occurs, the reliableResourcePointer attribute of the protecting V5 protection unit shall be changed to the appropriate C-channel ID, whilst the reliableResourcePointer attribute of the protected V5 protection unit is changed to NULL. In parallel, the reciprocal relationship between the affected commChannel object instance and v5TimeSlot object instance shall be modified accordingly. The configuredReliableResourcePointer attribute of the contained V5 protection unit object instances is not affected by protection switching.

Table 15

Name	M/C/O	Value set
v5ProtectionGroupId	M	RDN
v5ProtectionGroupNumber	M	single
v5ProtectionGroupType	M	single
v5ProtectionGroupId: is the object identifier.		
v5ProtectionGroupNumber: indicates protection group 1 or 2 of a V5 interface.		
v5ProtectionGroupType: indicates whether the protection relation is 1:1 or m:n.		

6.1.5.2 V5 protection unit (v5ProtectionUnit)

A v5ProtectionUnit object instance represents a protected (i.e. active) unit or a protecting (i.e. standby) unit. For a protecting v5ProtectionUnit, the attribute protecting shall have the value TRUE. For a protected v5ProtectionUnit, the attribute protecting shall have the value FALSE. The value of the unreliableResourcePointer points to a v5TimeSlot object instance. In the "protected" case, the value of the

reliableResourcePointer points to a commChannel object instance. In the "protecting" case, the reliableResourcePointer has NULL value.

On creation of a v5ProtectionUnit object instance, the configuredReliableResourcePointer attribute shall be set to the same value as the reliableResourcePointer attribute. The relationship between the affected commChannel object instance and v5TimeSlot object instance shall be maintained accordingly.

Table 16

Name	M/C/O	Value set
v5ProtectionUnitId	M	RDN
protecting	M	single
reliableResourcePointer	M	single
unreliableResourcePointer	M	single
configuredReliableResourcePointer	M	single

v5ProtectionUnitId:	is the object identifier.
protecting:	indicates the active or standby status.
reliableResourcePointer:	points to a commChannel object instance.
unreliableResourcePointer:	points to a v5TimeSlot object instance.
configuredReliableResourcePointer:	points to a commChannel object instance to which the reliableResourcePointer attribute of this object instance shall be set automatically after a V5 interface restart.

On restart of the protection protocol, the reliableResourcePointer attribute shall be set to the same value as the configuredReliableResourcePointer attribute. If this value is NULL, then the "protecting" attribute shall be set to TRUE. If the configuredReliableResourcePointer attribute contains a pointer to a commChannel object instance, the "protecting" attribute shall be set to FALSE. The relationship between the affected commChannel object instance and v5TimeSlot object instance shall be maintained accordingly.

The configuredReliableResourcePointer attribute of the contained V5 protection unit object instances is not affected by protection switching.

6.1.6 V5 service fragment

The management of V5 interfaces requires facilities to be assigned to customer profiles. As they are specific for customers accessed via the V5 interface, they are not modelled within the customer administration model given in I-ETS 300 291 [1].

6.1.6.1 V5 bearer channel reservation (v5BcReservation)

The assignment of a V5 bearer channel reservation object instance to a customized resource indicates that a fixed assignment of bearer channels of a V5.2 interface is made for a customer. Which V5 time slot is assigned is controlled by the resource manager but visible at the Q3 interfaces.

V5 bearer channel reservation is a subclass of "I-ETS 300 291":customizedSupplementaryService.

Table 17

Name	M/C/O	Value Set
"I-ETS 300 291":customizedServiceId	M	RDN
"I-ETS 300 291":administrativeState	C	single
"I-ETS 300 291":assocOwnerCustomizedResources	M	set according to X.732
"I-ETS 300 291":assocOwnerCustomizedServices	M	set according to X.732
noOfBcRequested	M	single
bcReserved	M	set

customizedServiceId, administrativeState,	
assocOwnerCustomizedResources:	are inherited from "I-ETS 300 291":customizedSupplementary-Service.
assocOwnerCustomizedService:	is inherited from "I-ETS 300 291":customizedSupplementary-Service. It has NULL value.
noOfBcRequested:	indicates the number of bearer channels requested for reservation.
bcReserved:	indicates in a set of octets 3 and 4 of V5 time slot identification information elements which time slots are actually assigned by the BCC protocol.

6.1.6.2 V5 leased line reservation (v5LlReservation)

The assignment of a V5 leased line reservation object instance to a customized resource indicates that a fixed assignment of the bearer channel of a V5 interface is made for a customer. It is used either for analogue semi-permanent leased lines without signalling or for digital semi-permanent leased lines without signalling. Which V5 time slot in the case of a V5.2 interface is assigned is controlled by the resource manager but visible at the Q3 interface.

V5 leased line reservation is a subclass of "I-ETS 300 291":customizedSupplementaryService.

Table 18

Name	M/C/O	Value Set
"I-ETS 300 291":customizedServiceId	M	RDN
"I-ETS 300 291":administrativeState	C	single
"I-ETS 300 291":assocOwnerCustomizedResources	M	set according to X.732
"I-ETS 300 291":assocOwnerCustomizedServices	M	set according to X.732
bcReserved	M	set

customizedServiceId, administrativeState,	
assocOwnerCustomizedResources:	are inherited from "I-ETS 300 291":customizedSupplementary-Service.
assocOwnerCustomizedService:	is inherited from "I-ETS 300 291":customizedSupplementary-Service. It has NULL value.
bcReserved:	indicates in a set of octets 3 and 4 of V5 time slot Identification information elements which time slots are actual assigned by the BCC protocol.

6.1.7 Supporting object classes

The following supporting object classes are defined in CCITT Recommendation X.721 [14]:

- attributeValueChangeRecord;
- eventForwardingDiscriminator;
- log;
- objectCreationRecord;
- objectDeletionRecord;

- stateChangeRecord.

For the log and the eventForwardingDiscriminator object classes, the name bindings as defined in CCITT Recommendation M.3100 [8] shall be applied.

6.2 Definition of attributes

This subclause provides the description of all generic attributes used within this information model. The following generic attributes have been identified and its definition can be found within the appropriate standards mentioned in the text:

- relative distinguished name;
- state attributes;
- relationship attributes.

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

6.2.1 Relative distinguished name

The semantics of the RDN attribute type are specified in CCITT Recommendation X.720 [13]. This attribute type is used to identify an instance of a managed object uniquely within the scope of its immediate superior in the management information tree. This is modelled as a single-valued attribute type.

Value type: identifier, graphic string or integer;

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

Permitted operations: get only;

Implicit relations: the object instance is contained in the superior managed object instance;

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

6.2.2 State attributes

State related attributes of managed objects in this information model comprise the generic state model as defined by CCITT Recommendation X.731 [16] and every specific state attribute type related only to object classes defined in this ETS.

6.2.2.1 Operational state

The semantics of the operationalState attribute are specified in the operational state attribute in CCITT Recommendation X.731 [16]. The syntax of the operationalState attribute is specified in the operational state attribute in CCITT Recommendation X.721 [14].

6.2.2.2 Administrative state

The semantics of the administrativeState attribute are specified in the administrative state attribute in CCITT Recommendation X.731 [16]. The syntax of the administrativeState attribute is specified in the administrative state attribute in CCITT Recommendation X.721 [14].

6.2.2.3 Availability status

The semantics of the availabilityStatus attribute are specified in the availability status attribute in CCITT Recommendation X.731 [16]. The syntax of the availabilityStatus attribute is specified in the availability status attribute in CCITT Recommendation X.721 [14].

6.2.3 Relationship attributes

Relationship related attributes of managed objects within the scope of this ETS comprise the generic relationship model as defined by CCITT Recommendation X.732 [17].

The following relationships are used in this ETS:

- group relationship;
- peer relationship.

All reciprocal relationships mentioned in this ETS are maintained by using the setReciprocalPointers and releaseReciprocalPointers actions which are assigned to the V5 interface object class.

6.3 Actions description

All actions described below are performed on the various object classes as indicated in table 19.

Table 19

Actions	Defined in object class	Remarks
setReciprocalPointers	v5Interface	with reply syntax
releaseReciprocalPointers	v5Interface	with reply syntax
restart	v5Interface	no reply syntax
systemStartup	v5Interface	no reply syntax
verifyRemoteProvVariant	v5Provision	no reply syntax
readyForReprovisioning	v5Provision	no reply syntax
notReadyForReprovisioning	v5Provision	no reply syntax
requestRemoteProvVariant	v5Provision	no reply syntax
switchOverToNewVariant	v5Provision	no reply syntax
anReprovisioningStarted	v5Provision	no reply syntax
leBlockingStarted	v5Provision	no reply syntax
cannotReprovision	v5Provision	no reply syntax
v5ProtectionAnSwitch	v5ProtectionGroup	no reply syntax
v5ProtectionLeSwitch	v5ProtectionGroup	no reply syntax
checkLinkId	v5Ttp	no reply syntax

setReciprocalPointers:	is used to set reciprocal pointers between instances of two different object classes. The applicable relationship types are peer relationship and group relationship.
releaseReciprocalPointers:	is used to release reciprocal pointers between instances of two different object classes. The applicable relationship types are peer relationship and group relationship.
restart:	is used for initiating the restart procedure as specified in annex C of ETS 300 324-1 [2], which will be performed automatically by the NE. The result of the restart procedure will be reported to the OS in the restartResult notification.
systemStartup:	is used for initiating the system startup procedure as specified in annex C of ETS 300 324-1 [2], which will be performed automatically by the NE. The successful or failed completion of the procedure will be reported to the OS in the systemStartupResult notification.
verifyRemoteProvVariant:	initiates sending of the V5 control protocol message "Verify re-provisioning". The message will include the new variant as given in the information syntax of the action request. The verifyRemoteProvVariant notification will reflect the response of the remote NE which may be "Ready for re-provisioning" or "Not ready for re-provisioning".
readyForReprovisioning:	initiates sending of the V5 control protocol message "Ready for re-provisioning" as a positive reply on a previously received "Verify re-provisioning" message after the OS has compared its own new provisioning variant value with the value of the other side contained in the "Verify re-provisioning" message.
notReadyForReprovisioning:	initiates sending of the V5 control protocol message "Not ready for re-provisioning" as a negative reply on a previously received "Verify re-provisioning" message after the OS has compared its own new provisioning variant value with the value of the other side contained in the "Verify re-provisioning" message.
requestRemoteProvVariant:	initiates sending of the V5 control protocol message "Request variant and interface ID". The requestRemoteProvVariantResult notification will contain the provisioning variant and the interface ID which will be sent from the remote NE as a response to this message. The V5 control protocol message "Request variant and interface ID" may also be triggered by internal events in the NE (e.g. startup procedure).

(continued)

Table 19 (concluded)

switchOverToNewVariant:	may be used to initiate the re-provisioning procedure from the AN side. It shall initiate sending of the V5 control protocol message "Switch-over to new variant" which will cause an appropriate notification to the OS at the remote side of the V5 interface.
anReprovisioningStarted:	may be used to indicate to the AN that the OS has accepted a previous switch over request by the LE and that the management operations required for the re-provisioning will be performed afterwards. The action shall initiate sending of the V5 control protocol message "Re-provisioning started" to the LE.
leBlockingStarted:	may be used to indicate to the LE that a previous switch over request by the AN will be accepted and that the OS will start to block all affected user ports. The action shall initiate sending of the V5 control protocol message "Blocking started" to the AN.
cannotReprovision:	may be used to indicate to the NE that the OS has rejected a previous switch over request by the other side and that the management operations required for the re-provisioning can not be performed afterwards. The action shall initiate sending of the V5 control protocol message "Cannot re-provision" across the V5 interface.
v5ProtectionAnSwitch:	is used for manual protection switching of V5 time slot object instances being assigned as active or standby C-channel, respectively. It may only be requested on v5protectionGroup number 2 and shall be rejected otherwise. This action shall change the Protecting attributes in the appropriate V5 protection unit object instances to TRUE or FALSE, respectively. The reliableResourcePointer attribute of the protecting V5 protection unit shall be changed to the appropriate C-channel ID, whilst the reliableResourcePointer attribute of the protected V5 protection unit shall be changed to NULL. In parallel, the reciprocal relationship between the affected commChannel object instance and v5TimeSlot object instance shall be modified accordingly. The successful or failed protection switch will be reported to the OS by using v5ProtectionSwitchReporting Notification.
v5ProtectionLeSwitch:	is used for both manual and forced protection switching of V5 time slot object instances being assigned as active or standby C-channel. It may only be requested on v5protectionGroup number 2 and shall be rejected otherwise. A forced switch request permits the allocation of a C-channel to an already active channel (protecting attribute of related protection unit is FALSE). The preempted c-channel is switched to the time slot of the preempting c-channel. A manual switch request permits the allocation of a C-channel only to a stand-by channel (protecting attribute of related protection unit is TRUE). This action shall change the Protecting attributes in the appropriate V5 protection unit object instances to TRUE or FALSE, respectively. The reliableResourcePointer attribute of the protecting V5 protection unit shall be changed to the appropriate C-channel ID, whilst the reliableResourcePointer attribute of the protected V5 protection unit shall be changed to NULL. In parallel, the reciprocal relationship between the affected commChannel object instance and v5TimeSlot object instance shall be modified accordingly. The successful or failed protection switch will be reported to the OS by using v5ProtectionSwitchReporting Notification.
checkLinkId:	is used for triggering the V5 link identification check procedure on the 2 Mbit/s link the action is addressed to. The checkLinkIdResult notification will indicate whether the result of the procedure was positive or negative or that the check was rejected from the other side of the V5 interface.

6.4 Notifications description

The following generic notifications will be utilized:

- object creation according to CCITT Recommendations X.721 [14] and X.730 [15];
- object deletion according to CCITT Recommendations X.721 [14] and X.730 [15];
- attribute value change according to CCITT Recommendations X.721 [14] and X.730 [15];
- state change according to CCITT Recommendations X.721 [14] and X.731 [16];
- relationship change according to CCITT Recommendations X.721 [14] and X.732 [17].

The following specific notifications will be utilized:

- switchOverRequest;
- switchOverToNewVariantResult;
- anBlockingStarted;
- verifyRequest;
- verifyRemoteProvVariantResult;
- requestRemoteProvVariantResult;
- v5ProtectionSwitchReporting;
- checkLinkIdResult;
- restartResult;
- systemStartupResult.

The switchOverRequest notification indicates that a V5 control protocol message "Switch-over to new variant" has been received from the remote NE. The information syntax contains the new variant.

The switchOverToNewVariantResult notification indicates that the V5 control protocol message "Re-provisioning started" or "Cannot re-provision" has been received from the remote NE as a response to a previous switch over request

The anBlockingStarted notification indicates that the V5 control protocol message "Blocking started" has been received in the AN as a first positive response to a previous switch over request.

The verifyRequest notification indicates that the V5 control protocol message "Verify re-provisioning" has been received in the NE to verify whether a switch over has been prepared at both sides of the V5 interface.

The verifyRemoteProvVariantResult notification indicates that the V5 control protocol message "Ready for re-provisioning" or "Not ready for re-provisioning" has been received from the remote NE as a response to a previous verify re-provisioning request.

The requestRemoteProvVariantResult notification indicates that the V5 control protocol message "Provisioning variant and interface ID" has been received from the remote NE as a response to a previous remote provisioning variant request.

The v5ProtectionSwitchReporting notification shall be emitted in case of any successful or failed protection switching attempt (automatic, manual or forced) at both the requesting and responding sides. It indicates the origin of the protection switch and which V5 protection units have changed or tried to be changed from standby to active and vice versa.

The checkLinkIdResult notification indicates that the V5 link identification procedure was performed by the NE as a consequence of a previous checkLinkId action.

The successful or failed completion of the restart procedure shall be reported to the OS in the restartResult notification.

The successful or failed completion of the system startup procedure shall be reported to the OS in the systemStartupResult notification.

7 Formal object class definitions

7.1 Definition of object classes

7.1.1 Managed element fragment

7.1.1.1 Managed element (managedElement)

The managed element object class is defined in CCITT Recommendation M.3100 [8].

7.1.2 V5 interface fragment

7.1.2.1 V5 interface (v5Interface)

```
v5Interface MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation X.721:1992":top;
CHARACTERIZED BY
        commonDeleteBehaviourPackage,
        v5InterfacePackage PACKAGE
                BEHAVIOUR
                        v5InterfaceBehaviour BEHAVIOUR
                        DEFINED AS "A V5 interface is an object class representing either a V5.1 or a V5.2
                        interface as an abstract entity of its own right.
                        A V5 interface may comprise in the case of a V5.1 interface of one, and in the case of
                        a V5.2 interface of one to 16 2 Mbit/s links represented by V5 TTP object instances,
                        which are listed in the serverV5Ttps attribute.
                        The clientUserPorts attribute points to the instances of the virtualAccessPort
                        subclasses in a LE, or userPort subclasses in an AN currently assigned to this
                        particular V5 interface.
                        The actions setReciprocalPointers and releaseReciprocalPointers shall be used to
                        maintain these relationship attributes. They shall not be applied on the reciprocal
                        relationship between a commChannel object instance and a v5TimeSlot object instance
                        if one of the instances or both are pointed at by a v5ProtectionUnit object instance.
                        The operational state shall be set to 'disabled' whenever one of the vital protocols
                        (control, link control, BCC, protection) has a persistent failure which cannot be
                        overcome by protection switching. All existing connections will be released. All
                        associated access port objects will be set to 'disabled' except for the ports with
                        permanent lines assigned.
                        If all vital protocols are working, this attribute shall be set to 'enabled'. This shall result
                        in all associated userPort/virtualAccessPort instances being set to 'enabled' if there are
                        no other contradictory conditions.
                        If an instance supports the use of 'degraded' then the availabilityStatus shall be set to
                        'degraded' if the PSTN or ISDN service is affected by any interface internal problems,
                        e.g. persistent protocol errors.
                        If the 'CCITT Recommendation M.3100:1992':tmnCommunicationsAlarmInformation-
                        Package is instantiated, then the communicationsAlarm notification shall be used to
                        report errors related to this object class. The errors to be reported and the usage of
                        the alarm report parameters are specified in ETS 300 378-1 [5] and
                        ETS 300 379-1 [6]."
                ;;
                ATTRIBUTES
                        v5InterfaceId                                                   GET,
                        supportedProtocolVersion                                        GET,
                        serverV5Ttps INITIAL VALUE ASN1DefinedTypesModule.initialPointerS       GET,
                        clientUserPorts INITIAL VALUE ASN1DefinedTypesModule.initialPointerS    GET;
                ACTIONS
                        setReciprocalPointers,
                        releaseReciprocalPointers,
```

```
                restart,
                systemStartup;
        NOTIFICATIONS
                restartResult,
                systemStartupResult;
    ;;
CONDITIONAL PACKAGES
    peerManagedElementPackage          PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":operationalStatePackage
                                       PRESENT IF "an instance supports it",
    v5AvailabilityStatusPackage        PRESENT IF "an instance supports it",
    supportedByObjectListPackage       PRESENT IF "the information model is not only used
                                       for provisioning",
    "CCITT Recommendation M.3100:1992":userLabelPackage
                                       PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":locationNamePackage
                                       PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":objectManagementNotificationsPackage
                                       PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":stateChangeNotificationPackage
                                       PRESENT IF "an instance supports it",
    relationshipChangeNotificationPackage  PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage
                                       PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":alarmSeverityAssignmentPointerPackage
                                       PRESENT IF "an instance supports it";
REGISTERED AS {managedObjectClass 1};
```

7.1.2.2 V5 TTP (v5Ttp)

```
v5Ttp MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation M.3100:1992":trailTerminationPointBidirectional;
CHARACTERIZED BY
    "CCITT Recommendation M.3100:1992":ttpInstancePackage,
    "CCITT Recommendation X.721:1992":administrativeStatePackage,
    "CCITT Recommendation M.3100:1992":createDeleteNotificationsPackage,
    commonDeleteBehaviourPackage,
    v5TtpPackage PACKAGE
        BEHAVIOUR
            v5TtpBehaviour BEHAVIOUR
            DEFINED AS "A V5 TTP is an object class representing a 2 Mbit/s interface of the LE
            that is used as V5.1 interface or as part of a V5.2 interface.
            A V5 TTP contains 31 V5 time slots. Time slot 0 is not instantiated, as it is an intrinsic
            part of the 2 Mbit/s link and is modelled as part of the V5 TTP.
            The upstreamConnectivityPointer and the downstreamConnectivityPointer attributes
            have NULL value if this object class is instantiated in a LE. When instantiated in an AN,
            they will be set to NULL unless they point to TTPs within the transmission part of the
            AN.
            The assocV5Interface attribute gives the relation to the v5Interface that v5Ttp is
            assigned to. It is a group relationship attribute according to CCITT Recommendation
            X.732 [17]. The v5Interface is the owner object.
            The relationship is maintained by use of the setReciprocalPointers and
            releaseReciprocalPointers actions of the v5Interface object class.
            If the v5Ttp is associated with a V5.1 interface, the blockingStatus attribute shall
            always have the value 'none'.
            The operational state of an object shall be set to 'disabled' whenever a link is in a non-
            operational state, e.g. because of a layer 1 failure or a remote link blocking request.
            Contained time slot objects will be set to 'disabled'.
```

```
                    If the link is in the 'operational' or 'normal' state, the attribute shall be set to 'enabled'.
                    This shall result in contained time slot objects being set to 'enabled' if there are no
                    other contradictory conditions.
                    The administrative state may be set to the values 'unlocked', 'shutting down' or 'locked'.
                    LE:  If set to 'shutting down' all new call setup requests for time slots of this link will
                         be rejected. Contained time slot objects will be set to 'disabled' if the time slot is
                         idle. Existing connections including the semi-permanent will not be affected.
                    AN:  If set to 'shutting down' deferred blocking for this link is requested in the LE via
                         the V5 interface.
                    Shutting down can be rejected by the LE system management. The requester shall be
                    informed by a shutdownRejected notification. The administrative state is to be set back
                    to 'unlocked' by the requester.
                    If set to 'locked' the immediate (forced) link blocking procedure is initiated for this link,
                    no traffic is possible any longer. All existing switched connections will be released.
                    Semi-permanent and reserved connections will be re-established onto other links if
                    possible. Contained time slot objects will be set to 'disabled'.
                    If set to 'unlocked' first a link unblock procedure followed by a link identification
                    procedure will be initiated. The contained time slot objects shall be set to 'enabled' if
                    there are no other contradictory conditions.
                    If an instance supports the use of 'degraded' then the availabilityStatus shall be set to
                    'degraded' if the V5 link is still 'enabled' but its ability to provide a transport service is
                    reduced, e.g. if some but not all of the contained time slots are disabled.
                    If an instance supports the use of 'dependency' then the availabilityStatus shall be set
                    to 'dependency' if objects on which the V5 link is functionally dependent are unavailable
                    as described in CCITT Recommendation X.731 [16], e.g. if the time slots 1 to 31
                    represented by the time slot objects are disabled by any internal reason.
                    In the Monitored Attributes parameter of the communicationsAlarm notification, the
                    linkId attribute and the assocV5Interface attribute and their values shall be indicated.
                    If the 'CCITT Recommendation M.3100:1992':tmnCommunicationsAlarmInformation-
                    Package is instantiated, then the communicationsAlarm notification shall be used to
                    report errors related to this object class. The errors to be reported and the usage of
                    the alarm report parameters are specified in ETS 300 378-1 [5] and
                    ETS 300 379-1 [6].
                    The checkLinkId action can only be performed if the v5Ttp is associated with a V5.2
                    interface."
            ;;
            ATTRIBUTES
                    assocV5Interface INITIAL VALUE ASN1DefinedTypesModule.initialPointer GET,
                    linkId GET-REPLACE,
                    blockingStatus GET;
            ACTIONS
                    checkLinkId;
            NOTIFICATIONS
                    shutdownRejected,
                    checkLinkIdResult;
    ;;
CONDITIONAL PACKAGES
    v5AvailabilityStatusPackage         PRESENT IF "an instance supports it",
    neSpecificPointerPackage            PRESENT IF "an NE specific object instance is
                                        assigned",
    "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage
                                        PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":alarmSeverityAssignmentPointerPackage
                                        PRESENT IF "an instance supports it";
REGISTERED AS {managedObjectClass 2};
```

7.1.2.3 V5 time slot (v5TimeSlot)

v5TimeSlot MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation M.3100:1992":connectionTerminationPointBidirectional;
CHARACTERIZED BY
"CCITT Recommendation M.3100:1992":ctpInstancePackage,
"CCITT Recommendation M.3100:1992":operationalStatePackage,
"CCITT Recommendation M.3100:1992":createDeleteNotificationsPackage,
commonDeleteBehaviourPackage,
v5TimeSlotPackage PACKAGE
BEHAVIOUR
v5TimeSlotBehaviour BEHAVIOUR
DEFINED AS "A V5 time slot is an object class representing a 64 kbit/s channel of a V5 interface that is either used as bearer channel or as C-channel.
Each V5 time slot is either assigned as bearer channel or C-channel by setting the channel type attribute appropriately. In the case of a V5.1 interface, a V5 time slot assigned as a bearer channel points either to the associated virtual access port or to the associated virtual access channel object instance if instantiated in a LE, or to a user port bearer channel CTP if instantiated in an AN.
In the case of a V5.2 interface, V5 time slots foreseen as bearer channels need not be instantiated.
One V5 time slot assigned as C-channel points to the associated (active) communication channel object instance. In V5 time slots assigned as standby C-channels of a V5.2 interface, this pointer is set to NULL.
In a V5.1 interface, time slot 16 is always a communication channel (C-channel 1). A second communication channel (C-channel 2) may be installed in time slot 15. Time slot 31 may be assigned as a third communication channel (C-channel 3).
In a V5.2 interface, time slot 16 of all 2 Mbit/s links may be assigned as C-channel. Time slots 15 and 31 of all 2 Mbit/s links may be assigned as C-channels as well, if all time slots 16 are already used as C-channels.
The upstreamConnectivityPointer and the downstreamConnectivityPointer attributes have NULL value if this object class is instantiated in a LE. When instantiated in an AN, they will be set to NULL unless they point to connection termination points within the transmission part of the AN.
The assocResource attribute represents a peer relationship according to CCITT Recommendation X.732 [17] and is maintained by using the setReciprocalPointers and releaseReciprocalPointers actions assigned to the V5 interface object class.
The v5ChannelType attribute of time slots 15, 16, and 31 can only be modified if the assocResource attribute has NULL value and in the case of being instantiated in an LE the administrativeState is locked.
The operational state shall be set to 'disabled' if one of the following conditions apply:
1) the containing v5Ttp object goes into the 'locked' state;
2) the containing v5Ttp object goes into the 'disabled' state;
3) the containing v5Ttp object goes into the 'shutting down' state and the time slot serves no connection;
4) any other internal reason.

In addition, this may also impact the operational state of user port/channel objects which are assigned to this time slot directly or via unprotected C-path.
V5.2 only: If the time slot carries a C-channel, then protection switching is initiated when the attribute is set to 'disabled'.
When the v5Ttp object goes to the state 'unlocked'/'enabled' the operational state shall be set to 'enabled'. This shall result in assigned user port/channel objects being set to 'enabled' if there are no other contradictory conditions.
The administrative state may be set to the values 'unlocked', 'shutting down' or 'locked'.
If set to 'shutting down' the time slot will be locked after an existing connection has been terminated. In addition, this may also impact the operational state of virtualAccessPort/Channel objects which are assigned to this time slot directly or via unprotected C-path. An existing semi-permanent connection will not be affected.
If set to 'locked' this time slot is no longer available for use. Any existing switched connection will be released. In addition, this may also impact the operational state of

virtualAccessPort/Channel objects which are assigned to this time slot directly or via unprotected C-path.
V5.2 only: A semi-permanent or reserved connection will be re-established onto other links if possible. If the time slot carries a C-channel, then protection switching is initiated when the attribute is set to 'locked'.
If set to 'unlocked' this time slot is available for use. All virtualAccessPort/ Channel objects which are assigned to this time slot directly or via unprotected C-path shall be set to 'enabled' if there are no other contradictory conditions.
The 'CCITT Recommendation M.3100:1992':tmnCommunicationsAlarmInformation package shall only be instantiated if the time slot is used as communication channel.
If the 'CCITT Recommendation M.3100:1992':tmnCommunicationsAlarmInformation-Package is instantiated, then the communicationsAlarm notification shall be used to report errors related to this object class. The errors to be reported and the usage of the alarm report parameters are specified in ETS 300 378-1 [5] and ETS 300 379-1 [6].
If the channelNumberPackage is not instantiated, the cTPId attribute should be used to number the channels consecutively from 1."

```
        ;;
        ATTRIBUTES
            v5ChannelType                GET-REPLACE,
            assocResource INITIAL VALUE ASN1DefinedTypesModule.initialPointer    GET;
    ;;
CONDITIONAL PACKAGES
    v5TsAdministrativeStatePackage          PRESENT IF "this object class is instantiated in an LE
                                            or an instance in an AN supports it.",
    "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage
                                            PRESENT IF "an instance supports it",
    "CCITT Recommendation M.3100:1992":alarmSeverityAssignmentPointerPackage
                                            PRESENT IF "an instance supports it";
REGISTERED AS {managedObjectClass 3};
```

7.1.2.4 V5 provision (v5Provision)

```
v5Provision MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation X.721:1992":top;
CHARACTERIZED BY
    v5ProvisionPackage PACKAGE
        BEHAVIOUR
            v5ProvisionBehaviour BEHAVIOUR
            DEFINED AS "The V5 provision object class represents the messages of the V5
            control protocol which communicate the provisioning variant. In this way it gives an OS
            the possibility to control a synchronized reconfiguration of the V5 interface via Q3LE or
            Q3AN. One instances of this object class is contained in one instance of the V5
            interface object class."
        ;;
        ATTRIBUTES
            provId              GET,
            ownProvVariant      GET-REPLACE;
        ACTIONS
            requestRemoteProvVariant;
        NOTIFICATIONS
            requestRemoteProvVariantResult;
    ;;
CONDITIONAL PACKAGES
    leSwitchOverToNewVariantPackage   PRESENT IF "this object class is instantiated in an LE and
                                      if the re-provisioning procedure is applied",
    anSwitchOverToNewVariantPackage   PRESENT IF "this object class is instantiated in an AN
                                      and if the re-provisioning procedure is applied";
REGISTERED AS {managedObjectClass 4};
```

7.1.3 Virtual access port fragment

7.1.3.1 Virtual access port (virtualAccessPort)

This object class is subclassed for the different types of customer access ports and not instantiated within the scope of this application.

```
virtualAccessPort MANAGED OBJECT CLASS
DERIVED FROM "I-ETS 300 291":accessPort;
CHARACTERIZED BY
        "CCITT Recommendation M.3100:1992":ttpInstancePackage,
        commonDeleteBehaviourPackage,
        virtualAccessPortPackage PACKAGE
                BEHAVIOUR
                        virtualAccessPortBehaviour BEHAVIOUR
                        DEFINED AS "A virtual access port is an object class representing an image of the
                        customer access port which is located in an AN and connected to the LE via V5
                        interface.
                        The upstreamConnectivityPointer and the downstreamConnectivityPointer attributes
                        have NULL value.
                        The inherited operationalStatePackage is mandatory in this object class.
                        The operationalState attribute indicates whether or not the user port is able to provide
                        its service to the customer's terminal equipment. It reflects the states of the user port
                        FSM in the LE according to annex A.
                        An access port may have assigned one or more bearer time slots and/or one or more
                        C-paths providing transport for different data types (bearer, signalling, f-type, p-type).
                        The operationalState attribute shall be set to 'enabled' as long as the port has access
                        to any service, and if there are no other contradictory conditions.
                        The operationalState attribute shall be set to 'disabled' if an access port has no service
                        at all, i.e. the V5 interface itself or the related ISDN Ds or the PSTN C-path has failed.
                        The assocV5Interface attribute gives the relation to the V5 interface, that virtual access
                        port is assigned to. It is a group relationship attribute according to CCITT
                        Recommendation X.732 [17]. The V5 interface is the owner object.
                        The relationships are maintained by use of the setReciprocalPointers and
                        releaseReciprocalPointers actions of the v5Interface object class.
                        If the "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformation-
                        Package is instantiated, then the communicationsAlarm notification shall be used to
                        report errors related to this object class. The errors to be reported and the usage of
                        the alarm report parameters are specified in ETS 300 379-1 [6]."
                ;;
                ATTRIBUTES
                        assocV5Interface INITIAL VALUE ASN1DefinedTypesModule.initialPointer GET;
        ;;
CONDITIONAL PACKAGES
        "CCITT Recommendation M.3100:1992":tmnCommunicationsAlarmInformationPackage
                                                PRESENT IF "an instance supports it",
        "CCITT Recommendation M.3100:1992":alarmSeverityAssignmentPointerPackage
                                                PRESENT IF "an instance supports it",
        anFaultReportedPackage                  PRESENT IF "the associated interface is a V5.2
                                        interface and an instance supports it";
REGISTERED AS {managedObjectClass 5};
```

7.1.3.2 Virtual analogue access (virtualAnalogueAccess)

```
virtualAnalogueAccess MANAGED OBJECT CLASS
DERIVED FROM virtualAccessPort;
CHARACTERIZED BY
        virtualAnalogueAccessPackage PACKAGE
                BEHAVIOUR
                        virtualAnalogueAccessBehaviour BEHAVIOUR
```

```
                DEFINED AS "A virtual analogue access is an information entity used for the
                association of a PSTN customer's layer 3 port address with a V5.1/V5.2 interface.
                If no virtual access channel object instance is contained in the virtual analogue access
                object instance in the case of a V5.1 interface, the assocV5TimeSlot attribute points to
                the associated V5 time slot object instance. Otherwise it has NULL value. It is a peer
                relationship according to CCITT Recommendation X.732 [17]. The V5 time slot is
                provider."
        ;;
        ATTRIBUTES
                "I-ETS 300 291":lineSignalling                                  GET-REPLACE,
                layer3PortAddress                                               GET-REPLACE,
                assocV5TimeSlot
                        INITIAL VALUE ASN1DefinedTypesModule.initialPointer     GET;
    ;;
REGISTERED AS {managedObjectClass 6};
```

7.1.3.3 Virtual basic rate access (virtualBasicRateAccess)

```
virtualBasicRateAccess MANAGED OBJECT CLASS
DERIVED FROM virtualAccessPort;
CHARACTERIZED BY
    virtualBasicRateAccessPackage PACKAGE
        BEHAVIOUR
            virtualBasicRateAccessBehaviour BEHAVIOUR
            DEFINED AS "A virtual basic rate access is an information entity used for the
            association of an envelope function address representing an ISDN basic access with a
            V5.1/V5.2 interface.
            The assocIsdnSignallingCommPath attribute points to the associated ISDN
            communication path carrying the signalling messages of the assigned ISDN access.
            The assocPacketCommPath attribute points to the associated ISDN communication
            path carrying the D-channel packet mode data of the assigned ISDN access if the
            customer has subscribed to this service. Else, it has NULL value.
            The assocFrameCommPath attribute points to the associated ISDN communication
            path carrying the D-channel frame mode data of the assigned ISDN access if the
            customer has subscribed to this service. Else, it has NULL value.
            They are group relationships according to CCITT Recommendation X.732 [17]. The
            ISDN communication path is owner.
            The assocV5TimeSlotB1 and assocV5TimeSlotB2 attributes indicate for both
            B-channels the associated V5 time slot object instances, if no virtual access channel
            object instance is contained in the virtual basic rate access object instance in the case
            of a V5.1 interface. Otherwise it has NULL value. It is a peer relationship according to
            CCITT Recommendation X.732 [17].
            These relationships are maintained by use of the setReciprocalPointers and
            releaseReciprocalPointers actions of the v5Interface object class."
        ;;
        ATTRIBUTES
            "I-ETS 300 291":dChannelActivation                                  GET-REPLACE,
            envelopeFunctionAddress                                             GET-REPLACE,
            assocIsdnSignallingCommPath
                INITIAL VALUE ASN1DefinedTypesModule.initialPointer             GET,
            assocPacketCommPath
                INITIAL VALUE ASN1DefinedTypesModule.initialPointer             GET,
            assocFrameCommPath
                INITIAL VALUE ASN1DefinedTypesModule.initialPointer             GET,
            assocV5TimeSlotB1
                INITIAL VALUE ASN1DefinedTypesModule.initialPointer             GET,
            assocV5TimeSlotB2
                INITIAL VALUE ASN1DefinedTypesModule.initialPointer             GET;
    ;;
CONDITIONAL PACKAGES
```

```
        qualityOfServiceAlarmPackage        PRESENT IF "there is a remote digital subclause or if
                                            performance parameters are to be monitored against a
                                            pre-defined threshold";
REGISTERED AS {managedObjectClass 7};
```

7.1.3.4 Virtual primary rate access (virtualPrimaryRateAccess)

```
virtualPrimaryRateAccess MANAGED OBJECT CLASS
DERIVED FROM virtualAccessPort;
CHARACTERIZED BY
        virtualPrimaryRateAccessPackage PACKAGE
                BEHAVIOUR
                        virtualPrimaryRateAccessBehaviour BEHAVIOUR
                        DEFINED AS "A virtual primary rate access is an information entity used for the
                        association of an envelope function address representing an ISDN primary rate access
                        with a V5.2 interface.
                        The assocIsdnSignallingCommPath attribute points to the associated ISDN
                        communication path carrying the signalling messages of the assigned ISDN access.
                        The assocPacketCommPath attribute points to the associated ISDN communication
                        path carrying the D-channel packet mode data of the assigned ISDN access if the
                        customer has subscribed to this service. Else, it has NULL value.
                        The assocFrameCommPath attribute points to the associated ISDN communication
                        path carrying the D-channel frame mode data of the assigned ISDN access if the
                        customer has subscribed to this service. Else, it has NULL value.
                        They are group relationships according to CCITT Recommendation X.732 [17]. The
                        ISDN communication path is owner. These relationships are maintained by use of the
                        setReciprocalPointers and releaseReciprocalPointers actions of the v5Interface object
                        class.
                        To the attribute dChannelActivation, the value '0', i.e. link deactivated, shall not be
                        assigned, as layer 1 is permanently activated."
                ;;
                ATTRIBUTES
                        "I-ETS 300 291":dChannelActivation                              GET-REPLACE,
                        envelopeFunctionAddress                                         GET-REPLACE,
                        assocIsdnSignallingCommPath
                                INITIAL VALUE ASN1DefinedTypesModule.initialPointer     GET,
                        assocPacketCommPath
                                INITIAL VALUE ASN1DefinedTypesModule.initialPointer     GET,
                        assocFrameCommPath
                                INITIAL VALUE ASN1DefinedTypesModule.initialPointer     GET;
        ;;
CONDITIONAL PACKAGES
        "I-ETS 300 291:1992":actingRolePkg      PRESENT IF "this object class supports the primary
                                                and secondary role according to CCITT
                                        Recommendation I.310.",
        qualityOfServiceAlarmPackage            PRESENT IF "there is a remote digital subclause or if
                                                performance parameters are to be monitored against
                                                a pre-defined threshold";
REGISTERED AS {managedObjectClass 8};
```

7.1.3.5 Virtual leased access (virtualLeasedAccess)

```
virtualLeasedAccess MANAGED OBJECT CLASS
        DERIVED FROM virtualAccessPort;
        CHARACTERIZED BY
        virtualLeasedAccessPackage PACKAGE
                BEHAVIOUR
                        virtualLeasedAccessBehaviour BEHAVIOUR
```

```
                DEFINED AS "A Virtual Leased Access is an information entity used for the association
                of a single analogue or digital semi-permanent leased line or a multiple digital semi-
                permanent leased line configuration with a V5.1/V5.2 interface.
                If it is a single semi-permanent leased line, and if no Virtual Access Channel object
                instance is contained in the Virtual Leased Access object instance, and if it is
                associated with a V5.1 interface, the assocV5TimeSlot attribute points to the
                associated V5 Time Slot object instance. Otherwise it has NULL value. It is a peer
                relationship according to CCITT Recommendation X.732 [17]. The relationship shall be
                maintained by use of the setReciprocalPointers and releaseReciprocalPointers actions
                of the V5 Interface object class.
                A Virtual Leased Access object instance representing a single semi-permanent leased
                line shall contain either no or one Virtual Access Channel object instance. In a multiple
                semi-permanent leased line configuration, the Virtual Leased Access object instance
                shall contain the appropriate number of Virtual Access Channel object instances.
                The v5UserPortAddress attribute gives for a single semi-permanent leased line the
                layer 3 port address the access is assigned to, otherwise it gives the envelope function
                address."
        ;;
        ATTRIBUTES
                v5UserPortAddress
                        INITIAL VALUE ASN1DefinedTypesModule.initialPointer   GET-REPLACE,
                assocV5TimeSlot
                        INITIAL VALUE ASN1DefinedTypesModule.initialPointer   GET;
    ;;
REGISTERED AS {managedObjectClass 9};
```

7.1.3.6 Virtual access channel (virtualAccessChannel)

```
virtualAccessChannel MANAGED OBJECT CLASS
DERIVED FROM "I-ETS 300 291":accessChannel;
CHARACTERIZED BY
    commonDeleteBehaviourPackage,
    "CCITT Recommendation M.3100:1992":ctpInstancePackage,
    virtualAccessChannelPackage PACKAGE
        BEHAVIOUR
                virtualAccessChannelBehaviour BEHAVIOUR
                DEFINED AS "A virtual access channel is an object class representing an individual
                ISDN B-/D-channel of an ISDN access port, or the bearer channel for an analogue
                access port, or an individual channel of an access port for a semi-permanent leased
                line.
                If the channel type is an ISDN B-channel or a channel of a non-ISDN access in the case
                of a V5.1 interface, the assocV5TimeSlot attribute points to the associated V5 time slot
                object instance. Otherwise it has NULL value. It is a peer relationship according to
                CCITT Recommendation X.732 [17].
                The relationship is maintained by use of the setReciprocalPointers and
                releaseReciprocalPointers actions of the v5Interface object class.
                The upstreamConnectivityPointer and the downstreamConnectivityPointer attributes
                have NULL value.
                If the channelNumberPackage is not instantiated, the cTPId attribute should be used to
                number the channels consecutively from 1."
        ;;
        ATTRIBUTES
                permanentLineReservation                                    GET-REPLACE,
                assocV5TimeSlot
                        INITIAL VALUE ASN1DefinedTypesModule.initialPointer   GET;
    ;;
REGISTERED AS {managedObjectClass 10};
```

7.1.4 Communication path fragment

7.1.4.1 V5 communication channel (commChannel)

```
commChannel MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation X.721:1992":top;
CHARACTERIZED BY
        "CCITT Recommendation M.3100:1992":operationalStatePackage,
        commonDeleteBehaviourPackage,
        commChannelPackage PACKAGE
                BEHAVIOUR
                        commChannelBehaviour BEHAVIOUR
                        DEFINED AS "A V5 communication channel is an object class representing the image
                        of a V5 C-channel that multiplexes one or more C-paths.
                        One V5 communication channel relates to one V5 time slot with the associated
                        C-paths.
                        Instances of this object class have only to be created for active C-channels.
                        Restrictions and guidelines for the allocation of C-paths to C-channels are given in
                        ETS 300 324-1 [2] subclause 8.4 for V5.1 interfaces and in ETS 300 347-1 [3]
                        subclause 8.4 for V5.2 interfaces.
                        The assocV5TimeSlot attribute points to the associated V5 time slot object instance. It
                        is a peer relationship according to CCITT Recommendation X.732 [17].
                        The assocV5CommPaths attribute points to the associated instances of communication
                        path object classes. It is a group relationship according to CCITT Recommendation
                        X.732 [17]. The V5 communication channel is owner.
                        The relationships are maintained by use of the setReciprocalPointers and
                        releaseReciprocalPointers actions of the v5Interface object class.
                        The operationalState attribute shall be set to 'disabled' whenever one of the following
                        conditions apply:
                        1)      the assigned time slot is 'disabled';
                        2)      no time slot assigned, neither directly nor via protection unit;
                        3)      any other internal reason.
                        In addition, this may also impact the operational state of ISDN and PSTN
                        virtualAccessPort objects representing user ports which are served by this C-channel.
                        The operationalState attribute shall be set to 'enabled' when a time slot being in the
                        'enabled' state is assigned, either directly or via protection unit, or if the internal reason
                        has been cleared."
                ;;
                ATTRIBUTES
                        commChannelId                                                   GET,
                        assocV5TimeSlot
                                INITIAL VALUE ASN1DefinedTypesModule.initialPointer     GET,
                        assocV5CommPaths
                                INITIAL VALUE ASN1DefinedTypesModule.initialPointerS    GET;
                NOTIFICATIONS
                        "CCITT Recommendation X.721:1992":objectCreation,
                        "CCITT Recommendation X.721:1992":objectDeletion;
        ;;
CONDITIONAL PACKAGES
        supportedByObjectListPackage    PRESENT IF "the information model is not only used for
                                        provisioning";
REGISTERED AS {managedObjectClass 11};
```

7.1.4.2 Communication path (commPath)

This object class is subclassed for the different types of communication paths and not instantiated within the scope of this application.

```
commPath MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation X.721:1992":top;
CHARACTERIZED BY
        commonDeleteBehaviourPackage,
        commPathPackage PACKAGE
                BEHAVIOUR
                        commPathBehaviour BEHAVIOUR
                        DEFINED AS "The communication path object class represents a V5 communication
                        path.
                        Restrictions and guidelines for the allocation of C-paths to C-channels are given in
                        ETS 300 324-1 [2] subclause 8.4 for V5.1 interfaces and in ETS 300 347-1 [3]
                        subclause 8.4 for V5.2 interfaces.
                        The assocCommChannel attribute points to the associated V5 communication channel
                        object instance. It is a group relationship according to CCITT Recommendation
                        X.732 [17]. The V5 communication channel is owner.
                        The relationship is maintained by use of the setReciprocalPointers and
                        releaseReciprocalPointers actions of the v5Interface object class."
                ;;
                ATTRIBUTES
                        commPathId                                                      GET,
                        assocCommChannel
                                INITIAL VALUE ASN1DefinedTypesModule.initialPointer     GET;
                NOTIFICATIONS
                        "CCITT Recommendation X.721:1992":objectCreation,
                        "CCITT Recommendation X.721:1992":objectDeletion;
        ;;
CONDITIONAL PACKAGES
        supportedByObjectListPackage    PRESENT IF "the information model is not only used for
                                        provisioning";
REGISTERED AS {managedObjectClass 12};
```

7.1.4.3 ISDN communication path (isdnCommPath)

```
isdnCommPath MANAGED OBJECT CLASS
DERIVED FROM commPath;
CHARACTERIZED BY
        isdnCommPathPackage PACKAGE
                BEHAVIOUR
                        isdnCommPathBehaviour BEHAVIOUR
                        DEFINED AS "The ISDN communication path object class groups either the Ds-type, or
                        the p-type, or the f-type data of ISDN accesses connected to an LE via a V5 interface.
```

```
                The clientUserPorts attribute points to the associated instances of virtual access port
                subclasses or user port subclasses. It is a group relationship according to CCITT
                Recommendation X.732 [17]. The ISDN communication path is owner. The relationship
                is maintained by use of the setReciprocalPointers and releaseReciprocalPointers
                actions of the v5Interface object class."
        ;;
        ATTRIBUTES
                clientUserPorts
                        INITIAL VALUE ASN1DefinedTypesModule.initialPointerS        GET,
                dataType                                                            GET;
    ;;
REGISTERED AS {managedObjectClass 13};
```

7.1.4.4 PSTN communication path (pstnCommPath)

```
pstnCommPath MANAGED OBJECT CLASS
DERIVED FROM commPath;
CHARACTERIZED BY
    pstnCommPathPackage PACKAGE
        BEHAVIOUR
                pstnCommPathBehaviour BEHAVIOUR
                DEFINED AS "The PSTN communication path object class carries the PSTN protocol
                information."
        ;;
    ;;
REGISTERED AS {managedObjectClass 14};
```

7.1.4.5 BCC communication path (bccCommPath)

```
bccCommPath MANAGED OBJECT CLASS
DERIVED FROM commPath;
CHARACTERIZED BY
    bccCommPathPackage PACKAGE
        BEHAVIOUR
                bccCommPathBehaviour BEHAVIOUR
                DEFINED AS "The BCC communication path object class carries the BCC protocol
                information."
        ;;
    ;;
REGISTERED AS {managedObjectClass 15};
```

7.1.4.6 Control communication path (controlCommPath)

```
controlCommPath MANAGED OBJECT CLASS
DERIVED FROM commPath;
CHARACTERIZED BY
    controlCommPathPackage PACKAGE
        BEHAVIOUR
                controlCommPathBehaviour BEHAVIOUR
                DEFINED AS "The control communication path object class carries the control protocol
                information."
        ;;
    ;;
REGISTERED AS {managedObjectClass 16};
```

7.1.4.7 Protection communication path (protCommPath)

```
protCommPath MANAGED OBJECT CLASS
DERIVED FROM commPath;
CHARACTERIZED BY
        protCommPathPackage PACKAGE
                BEHAVIOUR
                        protCommPathBehaviour BEHAVIOUR
                        DEFINED AS "The protection communication path object class carries the protection
                        protocol information. The assocCommChannel attribute has NULL value."
                ;;
                ATTRIBUTES
                        assocProtectionGroup        GET-REPLACE;
        ;;
REGISTERED AS {managedObjectClass 17};
```

7.1.4.8 Link control communication path (linkControlCommPath)

```
linkControlCommPath MANAGED OBJECT CLASS
DERIVED FROM commPath;
CHARACTERIZED BY
        linkControlCommPathPackage PACKAGE
                BEHAVIOUR
                        linkControlCommPathBehaviour BEHAVIOUR
                        DEFINED AS "The link control communication path object class carries the link control
                        protocol information."
                ;;
        ;;
REGISTERED AS {managedObjectClass 18};
```

7.1.5 Protection fragment

7.1.5.1 V5 protection group (v5ProtectionGroup)

```
v5ProtectionGroup MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation X.721:1992":top;
CHARACTERIZED BY
        v5ProtectionGroupPackage PACKAGE
                BEHAVIOUR
                        v5ProtectionGroupBehaviour BEHAVIOUR
                        DEFINED AS "A v5ProtectionGroup object instance contains zero or more
                        v5ProtectionUnit object instances for defining a protection switching relationship where
                        one or more standby v5TimeSlot object instances provide protection for one or more
                        active v5TimeSlot object instances.
                        The protectionSwitchReporting notification is emitted from the v5ProtectionGroup
                        object to report any protection switch events, such as protection switching, protection
                        release, lockout, or release of lockout.
                        The v5ProtectionGroupType attribute shall have the value 'colon' when more than one
                        v5ProtectionUnit is protected. Changing the value of this attribute from 'plus' to 'colon' is
                        allowed when only one protected v5ProtectionUnit and one protecting v5ProtectionUnit
                        are contained by the v5ProtectionGroup, and if the underlying resources support m:n
                        protection.
                        The v5ProtectionGroupType attribute of protection group #1 shall have the value 'plus'.
                        For protection group #2, both values are possible, depending on the number of
                        contained protecting and protected units. The value 'colon' for the
                        v5ProtectionGroupType attribute of V5 protection group #1 shall be rejected.
                        The v5ProtectionGroupNumber attribute indicates whether this protection group
                        instance is used for protection group #1 or #2 of V5 interface.
                        When an automatic, manual, or forced protection switch occurs, the
                        reliableResourcePointer attribute of the protecting V5 protection unit shall be changed
```

```
                to the appropriate C-channel ID, whilst the reliableResourcePointer attribute of the
                protected V5 protection unit is changed to NULL. In parallel, the reciprocal relationship
                between the affected commChannel object instance and v5TimeSlot object instance
                shall be modified accordingly. The configuredReliableResourcePointer attribute of the
                contained V5 protection unit object instances is not affected by protection switching."
        ;;
        ATTRIBUTES
                v5ProtectionGroupId             GET,
                v5ProtectionGroupType           GET-REPLACE,
                v5ProtectionGroupNumber         GET;
        NOTIFICATIONS
                v5ProtectionSwitchReporting;
;;
CONDITIONAL PACKAGES
        v5ProtectionLeSwitchPackage     PRESENT IF "an instance of this object class is
                                        instantiated in an LE",
        v5ProtectionAnSwitchPackage     PRESENT IF "an instance of this object class is
                                        instantiated in an AN";
REGISTERED AS {managedObjectClass 19};
```

7.1.5.2 V5 protection unit (v5ProtectionUnit)

```
v5ProtectionUnit MANAGED OBJECT CLASS
DERIVED FROM "CCITT Recommendation X.721:1992":top;
CHARACTERIZED BY
        v5ProtectionUnitPackage PACKAGE
                BEHAVIOUR
                        v5ProtectionUnitBehaviour BEHAVIOUR
                        DEFINED AS "A v5ProtectionUnit object instance represents a protected (i.e. active)
                        unit or a protecting (i.e. standby) unit. For a protecting v5ProtectionUnit, the attribute
                        protecting shall have the value TRUE. For a protected v5ProtectionUnit, the attribute
                        protecting shall have the value FALSE. The value of the unreliableResourcePointer
                        points to a v5TimeSlot object instance. In the 'protected' case, the value of the
                        reliableResourcePointer points to a commChannel object instance. In the 'protecting'
                        case, the reliableResourcePointer has NULL value.
                        On creation of a v5ProtectionUnit object instance, the configuredReliable-
                        ResourcePointer attribute shall be set to the same value as the reliableResource-
                        Pointer attribute. The relationship between the affected commChannel object instance
                        and v5TimeSlot object instance shall be maintained accordingly.
                        On restart of the protection protocol the reliableResourcePointer attribute shall be set
                        to the same value as the configuredReliableResourcePointer attribute. If this value is
                        NULL then the 'protecting' attribute shall be set to TRUE. If the
                        configuredReliableResourcePointer attribute contains a pointer to a commChannel
                        object instance the 'protecting' attribute shall be set to FALSE. The relationship
                        between the affected commChannel object instance and v5TimeSlot object instance
                        shall be maintained accordingly.
                        The configuredReliableResourcePointer attribute of the contained V5 protection unit
                        object instances is not affected by protection switching."
                ;;
                ATTRIBUTES
                        v5ProtectionUnitId                      GET,
                        protecting                              GET,
                        reliableResourcePointer                 GET,
                        unreliableResourcePointer               GET,
                        configuredReliableResourcePointer       GET-REPLACE;
        ;;
REGISTERED AS {managedObjectClass 20};
```

7.1.6 V5 service fragment

7.1.6.1 V5 bearer channel reservation (v5BcReservation)

```
v5BcReservation MANAGED OBJECT CLASS
DERIVED FROM "I-ETS 300 291":customizedSupplService;
CHARACTERIZED BY
        v5BcReservationPackage PACKAGE
                BEHAVIOUR
                        v5BcReservationBehaviour BEHAVIOUR
                        DEFINED AS "The assignment of a V5 bearer channel reservation object instance to a
                        customize resource indicates that a fixed assignment of bearer channels of a V5.2
                        interface is made for a customer. Which V5 time slot is assigned is controlled by the
                        resource manager but visible at the Q3 interface.
                        The assocOwnerCustomizedService attribute has NULL value."
                ;;
                ATTRIBUTES
                        noOfBcRequested     GET-REPLACE,
                        bcReserved          GET;
        ;;
REGISTERED AS {managedObjectClass 21};
```

7.1.6.2 V5 leased line reservation (v5LlReservation)

```
v5LlReservation MANAGED OBJECT CLASS
DERIVED FROM "I-ETS 300 291":customizedSupplService;
CHARACTERIZED BY
        v5LlReservationPackage PACKAGE
                BEHAVIOUR
                        v5LlReservationBehaviour BEHAVIOUR
                        DEFINED AS "The assignment of a V5 leased line reservation object instance to a
                        customized resource indicates that a fixed assignment of the bearer channel of a V5
                        interface is made for a customer. It is used either for analogue semi-permanent leased
                        lines without signalling or for digital semi-permanent leased lines without signalling.
                        Which V5 time slot in the case of a V5.2 interface is assigned is controlled by the
                        resource manager but visible at the Q3 interface.
                        The assocOwnerCustomizedService attribute has NULL value."
                ;;
                ATTRIBUTES
                        bcReserved  GET;
        ;;
REGISTERED AS {managedObjectClass 22};
```

7.2 Name bindings

7.2.1 v5Interface

```
v5Interface-managedElement NAME BINDING
        SUBORDINATE OBJECT CLASS v5Interface;
        NAMED BY
        SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
        WITH ATTRIBUTE v5InterfaceId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {nameBinding 1};
```

7.2.2 v5Ttp

```
v5Ttp-managedElement NAME BINDING
        SUBORDINATE OBJECT CLASS v5Ttp;
        NAMED BY
        SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
        WITH ATTRIBUTE tTPId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {nameBinding 2};
```

7.2.3 v5TimeSlot

```
v5TimeSlot-v5Ttp NAME BINDING
        SUBORDINATE OBJECT CLASS v5TimeSlot;
        NAMED BY
        SUPERIOR OBJECT CLASS v5Ttp;
        WITH ATTRIBUTE cTPId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE;
REGISTERED AS {nameBinding 3};
```

7.2.4 v5Provision

```
v5Provision-v5Interface NAME BINDING
        SUBORDINATE OBJECT CLASS v5Provision;
        NAMED BY
        SUPERIOR OBJECT CLASS v5Interface;
        WITH ATTRIBUTE provId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE;
REGISTERED AS {nameBinding 4};
```

7.2.5 virtualAccessPort

```
virtualAccessPort-managedElement NAME BINDING
        SUBORDINATE OBJECT CLASS virtualAccessPort AND SUBCLASSES;
        NAMED BY
        SUPERIOR OBJECT CLASS managedElement AND SUBCLASSES;
        WITH ATTRIBUTE tTPId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {nameBinding 5};
```

7.2.6 virtualAccessChannel

```
virtualAccessChannel-virtualAccessPort NAME BINDING
        SUBORDINATE OBJECT CLASS virtualAccessChannel;
        NAMED BY
        SUPERIOR OBJECT CLASS virtualAccessPort AND SUBCLASSES;
        WITH ATTRIBUTE cTPId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE;
REGISTERED AS {nameBinding 6};
```

7.2.7 commChannel

```
commChannel-v5Interface NAME BINDING
        SUBORDINATE OBJECT CLASS commChannel;
        NAMED BY
        SUPERIOR OBJECT CLASS v5Interface;
        WITH ATTRIBUTE commChannelId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE;
REGISTERED AS {nameBinding 7};
```

7.2.8 commPath

```
commPath-v5Interface NAME BINDING
        SUBORDINATE OBJECT CLASS commPath AND SUBCLASSES;
        NAMED BY
        SUPERIOR OBJECT CLASS v5Interface;
        WITH ATTRIBUTE commPathId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE;
REGISTERED AS {nameBinding 8};
```

7.2.9 v5ProtectionGroup

```
v5ProtectionGroup-v5Interface NAME BINDING
        SUBORDINATE OBJECT CLASS v5ProtectionGroup;
        NAMED BY
        SUPERIOR OBJECT CLASS v5Interface;
        WITH ATTRIBUTE v5ProtectionGroupId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {nameBinding 9};
```

7.2.10 v5ProtectionUnit

```
v5ProtectionUnit-v5ProtectionGroup NAME BINDING
        SUBORDINATE OBJECT CLASS v5ProtectionUnit;
        NAMED BY
        SUPERIOR OBJECT CLASS v5ProtectionGroup;
        WITH ATTRIBUTE v5ProtectionUnitId;
        CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
        DELETE;
REGISTERED AS {nameBinding 10};
```

7.3 Definition of packages

7.3.1 anSwitchOverToNewVariantPackage

```
anSwitchOverToNewVariantPackage PACKAGE
        ACTIONS
                switchOverToNewVariant,
                anReprovisioningStarted,
                verifyRemoteProvVariant,
                cannotReprovision,
                readyForReprovisioning,
                notReadyForReprovisioning;
        NOTIFICATIONS
                switchOverRequest,
                switchOverToNewVariantResult,
                verifyRequest,
                verifyRemoteProvVariantResult,
                anBlockingStarted;
REGISTERED AS {package 1};
```

7.3.2 commonDeleteBehaviourPackage

```
commonDeleteBehaviourPackage PACKAGE
        BEHAVIOUR
                commonDeleteBehaviourPackageBehaviour BEHAVIOUR
                DEFINED AS "An instance of this object class shall only be deleted if all reciprocal pointer
                relationships are released."
        ;;
REGISTERED AS {package 2};
```

7.3.3 leSwitchOverToNewVariantPackage

```
leSwitchOverToNewVariantPackage PACKAGE
        ACTIONS
                switchOverToNewVariant,
                leBlockingStarted,
                verifyRemoteProvVariant,
                cannotReprovision,
                readyForReprovisioning,
                notReadyForReprovisioning;
        NOTIFICATIONS
                switchOverRequest,
                switchOverToNewVariantResult,
                verifyRequest,
                verifyRemoteProvVariantResult;
REGISTERED AS {package 3};
```

7.3.4 neSpecificPointerPackage

```
neSpecificPointerPackage PACKAGE
        ATTRIBUTES
                neSpecificPointer GET;
REGISTERED AS {package 4};
```

7.3.5 peerManagedElementPackage

```
peerManagedElementPackage PACKAGE
        ATTRIBUTES
                peerManagedElement GET-REPLACE;
REGISTERED AS {package 5};
```

7.3.6 relationshipChangeNotificationPackage

```
relationshipChangeNotificationPackage PACKAGE
        NOTIFICATIONS
                "CCITT Recommendation X.721:1992":relationshipChange;
REGISTERED AS {package 6};
```

7.3.7 supportedByObjectListPackage

```
supportedByObjectListPackage PACKAGE
        ATTRIBUTES
                "CCITT Recommendation M.3100:1992":supportedByObjectList GET;
REGISTERED AS {package 7};
```

7.3.8 v5AvailabilityStatusPackage

```
v5AvailabilityStatusPackage PACKAGE
        ATTRIBUTES
                "CCITT Recommendation X.721:1992":availabilityStatus GET;
REGISTERED AS {package 8};
```

7.3.9 v5ProtectionAnSwitchPackage

```
v5ProtectionAnSwitchPackage PACKAGE
        ACTIONS
                v5ProtectionAnSwitch;
REGISTERED AS {package 9};
```

7.3.10 v5ProtectionLeSwitchPackage

```
v5ProtectionLeSwitchPackage PACKAGE
        ACTIONS
                v5ProtectionLeSwitch;
REGISTERED AS {package 10};
```

7.3.11 v5TsAdministrativeStatePackage

```
v5TsAdministrativeStatePackage PACKAGE
        ATTRIBUTES
                "CCITT Recommendation X.721:1992":administrativeState GET-REPLACE;
REGISTERED AS {package 11};
```

7.3.12 qualityOfServiceAlarmPackage

```
qualityOfServiceAlarmPackage PACKAGE
        BEHAVIOUR
                qualityOfServiceAlarmPackageBehaviour BEHAVIOUR
                DEFINED AS "This package is used to report threshold violations of performance parameters
                of an ISDN access. The thresholds are assumed to be pre-defined in the NE. The parameter
                violating the threshold and the threshold itself shall be reported using the thresholdInfo field of
                the qualityOfServiceAlarm notification."
        ;;
        NOTIFICATIONS
                "CCITT Recommendation X.721:1992":qualityofServiceAlarm;
REGISTERED AS {package 12};
```

7.3.13 anFaultReportedPackage

```
anFaultReportedPackage PACKAGE
        NOTIFICATIONS
                anFaultReported;
REGISTERED AS {package 13};
```

7.4 Definition of behaviours

No new general behaviours need to be defined in this ETS.

7.5 Definition of attributes

7.5.1 assocCommChannel

```
assocCommChannel ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                assocCommChannelBehaviour BEHAVIOUR
                DEFINED AS "It points to the associated V5 communication channel object instance. It is a
                group relationship according to CCITT Recommendation X.732 [17]. The V5 communication
                channel is owner."
        ;;
REGISTERED AS {attribute 1};
```

7.5.2 assocFrameCommPath

```
assocFrameCommPath ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                assocFrameCommPathBehaviour BEHAVIOUR
                DEFINED AS "It points to the associated ISDN communication path carrying the D-channel
                frame mode data of the assigned ISDN access if the customer has subscribed to this service.
                It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN
                communication path is owner."
        ;;
REGISTERED AS {attribute 2};
```

7.5.3 assocIsdnSignallingCommPath

```
assocIsdnSignallingCommPath ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                assocIsdnSignallingCommPathBehaviour BEHAVIOUR
                DEFINED AS "It points to the associated ISDN communication path carrying the signalling
                messages of the assigned ISDN access. It is a group relationship according to CCITT
                Recommendation X.732 [17]. The ISDN communication path is owner."
        ;;
REGISTERED AS {attribute 3};
```

7.5.4 assocPacketCommPath

```
assocPacketCommPath ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                assocPacketCommPathBehaviour BEHAVIOUR
```

DEFINED AS "It points to the associated ISDN communication path carrying the D-channel packet mode data of the assigned ISDN access if the customer has subscribed to this service. It is a group relationship according to CCITT Recommendation X.732 [17]. The ISDN communication path is owner."

;;

REGISTERED AS {attribute 4};

7.5.5 assocProtectionGroup

assocProtectionGroup ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;

MATCHES FOR EQUALITY;

BEHAVIOUR

assocProtectionGroupBehaviour BEHAVIOUR

DEFINED AS "This attribute points to the associated V5 protection group."

;;

REGISTERED AS {attribute 5};

7.5.6 assocResource

assocResource ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;

MATCHES FOR EQUALITY;

BEHAVIOUR

assocResourceBehaviour BEHAVIOUR

DEFINED AS "It points to the associated communication channel object instance if the channel type is C-channel, or points to the associated virtual access port or virtual access channel or user port bearer channel CTP object instance in the case of a V5.1 interface. It is a peer relationship according to CCITT Recommendation X.732 [17]."

;;

REGISTERED AS {attribute 6};

7.5.7 assocV5CommPaths

assocV5CommPaths ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.AssocInstances;

MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;

BEHAVIOUR

assocV5CommPathsBehaviour BEHAVIOUR

DEFINED AS "It points to the associated instances of communication path object classes. It is a group relationship according to CCITT Recommendation X.732 [17]. The V5 communication channel is owner."

;;

REGISTERED AS {attribute 7};

7.5.8 assocV5Interface

assocV5Interface ATTRIBUTE

WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;

MATCHES FOR EQUALITY;

BEHAVIOUR

assocV5InterfaceBehaviour BEHAVIOUR

DEFINED AS "It gives the relation to the V5 interface, that the virtual access port or that the user port or that the 2 Mbit/s interface is assigned to. It is a group relationship attribute according to CCITT Recommendation X.732 [17]. The V5 interface is the owner object."

;;

REGISTERED AS {attribute 8};

7.5.9 assocV5TimeSlot

```
assocV5TimeSlot ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                assocV5TimeSlotBehaviour BEHAVIOUR
                DEFINED AS "It points to the associated V5 time slot object instance."
        ;;
REGISTERED AS {attribute 9};
```

7.5.10 assocV5TimeSlotB1

```
assocV5TimeSlotB1 ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                assocV5TimeSlotB1Behaviour BEHAVIOUR
                DEFINED AS "It indicates for B-channel 1 the associated V5 time slot object instance."
        ;;
REGISTERED AS {attribute 10};
```

7.5.11 assocV5TimeSlotB2

```
assocV5TimeSlotB2 ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                assocV5TimeSlotB2Behaviour BEHAVIOUR
                DEFINED AS "It indicates for B-channel 2 the associated V5 time slot object instance."
        ;;
REGISTERED AS {attribute 11};
```

7.5.12 bcReserved

```
bcReserved ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.BcReserved;
        MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
        BEHAVIOUR
                bcReservedBehaviour BEHAVIOUR
                DEFINED AS "This attribute indicates in a set of octets 3 and 4 of V5 time slot Identification
                information elements (ETS 300 347-1 [18], subclause 17.4.2.3) which time slots are actual
                assigned by the BCC protocol."
        ;;
REGISTERED AS {attribute 12};
```

7.5.13 blockingStatus

```
blockingStatus ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.BlockStatus;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                blockingStatusBehaviour BEHAVIOUR
                DEFINED AS "The blockingStatus attribute indicates if the entity is blocked for local or remote
                reasons or both."
        ;;
REGISTERED AS {attribute 13};
```

7.5.14 clientUserPorts

```
clientUserPorts ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.AssocInstances;
        MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
        BEHAVIOUR
                clientUserPortsBehaviour BEHAVIOUR
                DEFINED AS "This attribute lists the instances of user port or virtual access port subclasses
                currently using this particular object class as a transport and which are therefore associated
                to it. It is a group relationship according to CCITT Recommendation X.732 [17]."
        ;;
REGISTERED AS {attribute 14};
```

7.5.15 commChannelId

```
commChannelId ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                commChannelIdBehaviour BEHAVIOUR
                DEFINED AS "It is the object identifier."
        ;;
REGISTERED AS {attribute 15};
```

7.5.16 commPathId

```
commPathId ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                commPathIdBehaviour BEHAVIOUR
                DEFINED AS "It is the object identifier."
        ;;
REGISTERED AS {attribute 16};
```

7.5.17 configuredReliableResourcePointer

```
configuredReliableResourcePointer ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                configuredReliableResourcePointerBehaviour BEHAVIOUR
                DEFINED AS "This attribute points to a commChannel object instance to which the
                reliableResourcePointer attribute of this object instance shall be set automatically after a V5
                interface restart."
        ;;
REGISTERED AS {attribute 17};
```

7.5.18 dataType

```
dataType ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.DataType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                dataTypeBehaviour BEHAVIOUR
                DEFINED AS "It indicates the type of data which is assigned to this ISDN communication
                path. This may be p-, f-, or Ds-type data."
        ;;
REGISTERED AS {attribute 18};
```

7.5.19 envelopeFunctionAddress

```
envelopeFunctionAddress ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.EnvelopeFunctionAddress;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                envelopeFunctionAddressBehaviour BEHAVIOUR
                DEFINED AS "It gives the envelope function address the ISDN access is assigned to."
        ;;
REGISTERED AS {attribute 19};
```

7.5.20 layer3PortAddress

```
layer3PortAddress ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Layer3PortAddress;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                layer3PortAddressBehaviour BEHAVIOUR
                DEFINED AS "It gives the layer 3 port address the analogue access is assigned to."
        ;;
REGISTERED AS {attribute 20};
```

7.5.21 linkId

```
linkId ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.LinkId;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                linkIdBehaviour BEHAVIOUR
                DEFINED AS "It gives the link ID which is assigned to the v5Ttp."
        ;;
REGISTERED AS {attribute 21};
```

7.5.22 neSpecificPointer

```
neSpecificPointer ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ObjectPointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                neSpecificPackagePointerBehaviour BEHAVIOUR
                DEFINED AS "This attribute points to an object instance specific for an individual NE."
        ;;
REGISTERED AS {attribute 22};
```

7.5.23 noOfBcRequested

```
noOfBcRequested ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NoOf;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                noOfBcRequestedBehaviour BEHAVIOUR
                DEFINED AS "It indicates the number of bearer channels requested for reservation."
        ;;
REGISTERED AS {attribute 23};
```

7.5.24 ownProvVariant

```
ownProvVariant ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ProvVariant;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                ownProvVariantBehaviour BEHAVIOUR
                DEFINED AS "It indicates the provisioning variant which is currently valid in the local NE. This
                attribute will always be set by a management operation of the own OS. When a set operation
                has been performed on the attribute, the NE shall treat this as a 're-provisioning completed'
                and act according to ETS 300 324-1 [2], subclause 14.5.4.3."
        ;;
REGISTERED AS {attribute 24};
```

7.5.25 peerManagedElement

```
peerManagedElement ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                peerManagedElementBehaviour BEHAVIOUR
                DEFINED AS "It identifies in a LE the adjacent AN and in an AN the adjacent LE which this
                particular V5 interface is connected to."
        ;;
REGISTERED AS {attribute 25};
```

7.5.26 permanentLineReservation

```
permanentLineReservation ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.YesNo;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                permanentLineReservationBehaviour BEHAVIOUR
                DEFINED AS "It indicates whether this access channel is reserved as permanent line or not.
                Default value is no (FALSE)."
        ;;
REGISTERED AS {attribute 26};
```

7.5.27 protecting

```
protecting ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.YesNo;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                protectingBehaviour BEHAVIOUR
                DEFINED AS "This attribute indicates the active or standby status of the V5 protection unit."
        ;;
REGISTERED AS {attribute 27};
```

7.5.28 provId

```
provId ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                provIdBehaviour BEHAVIOUR
                DEFINED AS "It is the object identifier."
        ;;
REGISTERED AS {attribute 28};
```

7.5.29 reliableResourcePointer

```
reliableResourcePointer ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                reliableResourcePointerBehaviour BEHAVIOUR
                DEFINED AS "This attribute points to a commChannel object instance. In the 'protecting' case
                (i.e. standby status), it has NULL value."
        ;;
REGISTERED AS {attribute 29};
```

7.5.30 serverV5Ttps

```
serverV5Ttps ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.AssocInstances;
        MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
        BEHAVIOUR
                serverV5TtpsBehaviour BEHAVIOUR
                DEFINED AS "It indicates the V5 TTP associated with the V5 interface. It is a group
                relationship attribute according to CCITT Recommendation X.732 [17]. The V5 interface is the
                owner object."
        ;;
REGISTERED AS {attribute 30};
```

7.5.31 supportedProtocolVersion

```
supportedProtocolVersion ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.ProtocolVersion;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                supportedProtocolVersionBehaviour BEHAVIOUR
                DEFINED AS "It indicates the version of the V5 interface protocol this particular V5 interface
                is supporting."
        ;;
REGISTERED AS {attribute 31};
```

7.5.32 unreliableResourcePointer

```
unreliableResourcePointer ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.Pointer;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                unreliableResourcePointerBehaviour BEHAVIOUR
                DEFINED AS "This attribute points to a v5TimeSlot object instance."
        ;;
REGISTERED AS {attribute 32};
```

7.5.33 v5ChannelType

```
v5ChannelType ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.V5ChannelType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                v5ChannelTypeBehaviour BEHAVIOUR
                DEFINED AS "It indicates whether the V5 time slot is used as bearer channel or C-channel."
        ;;
REGISTERED AS {attribute 33};
```

7.5.34 v5InterfaceId

```
v5InterfaceId ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.V5InterfaceId;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                v5InterfaceIdBehaviour BEHAVIOUR
                DEFINED AS "It is the object identifier. The RDN is the V5 interface ID. It is an OCTET
                STRING SIZE(3)."
        ;;
REGISTERED AS {attribute 34};
```

7.5.35 v5ProtectionGroupId

```
v5ProtectionGroupId ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                v5ProtectionGroupIdBehaviour BEHAVIOUR
                DEFINED AS "It is the object identifier."
        ;;
REGISTERED AS {attribute 35};
```

7.5.36 v5ProtectionGroupNumber

```
v5ProtectionGroupNumber ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NoOf;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                v5ProtectionGroupNumberBehaviour BEHAVIOUR
                DEFINED AS "This attribute indicates whether it is protection group number 1 or number 2 of
                a V5.2 interface. Permitted values are '1' and '2'."
        ;;
REGISTERED AS {attribute 36};
```

7.5.37 v5ProtectionGroupType

```
v5ProtectionGroupType ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.V5ProtectionGroupType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                v5ProtectionGroupTypeBehaviour BEHAVIOUR
                DEFINED AS "It indicates whether the protection relation is 1:1 or m:n. The
                v5ProtectionGroupType attribute shall have the value 'colon' when more than one
                v5ProtectionUnit is protected. Changing the value of this attribute from 'plus' to 'colon' is
                allowed when only one protected v5ProtectionUnit and one protecting v5ProtectionUnit are
                contained by the v5ProtectionGroup, and if the underlying resources support m:n protection."
        ;;
REGISTERED AS {attribute 37};
```

7.5.38 v5ProtectionUnitId

```
v5ProtectionUnitId ATTRIBUTE
        WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.NameType;
        MATCHES FOR EQUALITY;
        BEHAVIOUR
                v5ProtectionUnitIdBehaviour BEHAVIOUR
                DEFINED AS "It is the object identifier."
        ;;
REGISTERED AS {attribute 38};
```

7.5.39 v5UserPortAddress

v5UserPortAddress ATTRIBUTE
WITH ATTRIBUTE SYNTAX ASN1DefinedTypesModule.V5UserPortAddress;
MATCHES FOR EQUALITY;
BEHAVIOUR
v5UserPortAddressBehaviour BEHAVIOUR
DEFINED AS "It gives for a single semi-permanent leased line the layer 3 port address the access is assigned to, otherwise it gives the envelope function address."
;;
REGISTERED AS {attribute 39};

7.6 Definition of actions

7.6.1 setReciprocalPointers

setReciprocalPointers ACTION
BEHAVIOUR
setReciprocalPointersBehavior BEHAVIOUR
DEFINED AS "This action is used to set reciprocal pointers between instances of two different object classes. The applicable relationship types are peer relationship and group relationship.
The following parameters are provided:
- object class #1
- object instance #1
- pointer attribute #1
- object class #2
- object instance #2
- pointer attribute #2

If pointer attribute #1 or #2 are defined as single valued attributes, their original values shall be equal NULL. Otherwise the ACTION shall be rejected by returning the failed parameter as defined in the reply syntax. If pointer attribute #1 or #2 are defined as set valued attributes, object instance #2 or #1, respectively, shall not be present in pointer attribute #1 or #2, respectively. Otherwise the ACTION shall be rejected by returning the failed parameter as defined in the reply syntax.
Pointer attribute #1 in object instance #1 of object class #1 shall be set to or extended by object instance #2, as appropriate. Pointer attribute #2 in object instance #2 of object class#2 shall be set to or extended by object instance #1, as appropriate. Afterwards, the set parameter as defined in the reply syntax shall be returned in the action response."
;;
MODE CONFIRMED;
WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ReciprocalPointersInfo;
WITH REPLY SYNTAX ASN1DefinedTypesModule.SetReciprocalPointersResult;
REGISTERED AS {action 1};

7.6.2 releaseReciprocalPointers

releaseReciprocalPointers ACTION
BEHAVIOUR
releaseReciprocalPointersBehavior BEHAVIOUR
DEFINED AS "This action is used to release reciprocal pointers between instances of two different object classes. The applicable relationship types are peer relationship and group relationship.
The following parameters are provided:
- object class #1
- object instance #1
- pointer attribute #1
- object class #2
- object instance #2
- pointer attribute #2

If neither pointer attribute #1 points to object instance #2 nor pointer attribute #2 points to object instance #1, the action shall be rejected by returning the failed parameter as defined in the reply syntax. In all other cases, object instances #2 and #1 in pointer attributes #1 and #2 are replaced by NULL or removed as appropriate. The replaced or removed original pointer values from pointer attributes #1 and #2 are returned using the released parameter as defined in the reply syntax.

If pointer attribute #1 or #2 are defined as set valued attributes, and object instance #2 or #1, respectively, were not present so that no removal could be performed, the NULL value is returned using the released parameter as defined in the reply syntax."

;;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ReciprocalPointersInfo;

WITH REPLY SYNTAX ASN1DefinedTypesModule.ReleaseReciprocalPointersResult;

REGISTERED AS {action 2};

7.6.3 verifyRemoteProvVariant

verifyRemoteProvVariant ACTION

BEHAVIOUR

verifyRemoteProvVariantBehaviour BEHAVIOUR

DEFINED AS "This action initiates sending of the V5 control protocol message 'Verify re-provisioning'. The message will include the new variant as given in the information syntax of the action request. The verifyRemoteProvVariantResult notification will reflect the response of the remote NE which may be 'Ready for re-provisioning' or 'Not ready for re-provisioning'."

;;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.VerifyRemoteProvVariantInfo;

REGISTERED AS {action 3};

7.6.4 readyForReprovisioning

readyForReprovisioning ACTION

BEHAVIOUR

readyForReprovisioningBehaviour BEHAVIOUR

DEFINED AS "This action initiates sending of the V5 control protocol message 'Ready for re-provisioning' as a positive reply on a previously received 'Verify re-provisioning' message after the OS has compared its own new provisioning variant value with the value of the other side contained in the 'Verify re-provisioning' message."

;;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ProvVariant;

REGISTERED AS {action 4};

7.6.5 notReadyForReprovisioning

notReadyForReprovisioning ACTION

BEHAVIOUR

notReadyForReprovisioningBehaviour BEHAVIOUR

DEFINED AS "This action initiates sending of the V5 control protocol message 'Not ready for re-provisioning' as a negative reply on a previously received 'Verify re-provisioning' message after the OS has compared its own new provisioning variant value with the value of the other side contained in the 'Verify re-provisioning' message."

;;

MODE CONFIRMED;

WITH INFORMATION SYNTAX ASN1DefinedTypesModule.RejectedProvVariant;

REGISTERED AS {action 5};

7.6.6 requestRemoteProvVariant

```
requestRemoteProvVariant ACTION
        BEHAVIOUR
                requestRemoteProvVariantBehaviour BEHAVIOUR
                DEFINED AS "This action initiates sending of the V5 control protocol message 'Request
                variant and interface ID'. The requestRemoteProvVariantResult notification will contain the
                provisioning variant and the interface ID which will be sent from the remote NE as a response
                to this message.
                The V5 control protocol message 'Request variant and interface ID' may also be triggered by
                internal events in the NE (e.g. startup procedure)."
        ;;
        MODE CONFIRMED;
REGISTERED AS {action 6};
```

7.6.7 switchOverToNewVariant

```
switchOverToNewVariant ACTION
        BEHAVIOUR
                switchOverToNewVariantBehaviour BEHAVIOUR
                DEFINED AS "This action may be used to initiate the re-provisioning procedure from the AN
                or the LE side. It shall initiate sending of the V5 control protocol message 'switch-over to new
                variant' which will cause an appropriate notification to the OS at the remote side of the V5
                interface."
        ;;
        MODE CONFIRMED;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ProvVariant;
REGISTERED AS {action 7};
```

7.6.8 anReprovisioningStarted

```
anReprovisioningStarted ACTION
        BEHAVIOUR
                anReprovisioningStartedBehaviour BEHAVIOUR
                DEFINED AS "This action may be used to indicate to the AN that the OS has accepted a
                previous switch over request by the LE and that the management operations required for the
                re-provisioning will be performed afterwards. The action shall initiate sending of the V5 control
                protocol message 'Reprovisioning started' to the LE."
        ;;
        MODE CONFIRMED;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ProvVariant;
REGISTERED AS {action 8};
```

7.6.9 leBlockingStarted

```
leBlockingStarted ACTION
        BEHAVIOUR
                leBlockingStartedBehaviour BEHAVIOUR
                DEFINED AS "This action may be used to indicate to the LE that a previous switch over
                request by the AN will be accepted and that the OS will start to block all affected user ports.
                The action shall initiate sending of the V5 control protocol message 'Blocking started' to the
                AN."
        ;;
        MODE CONFIRMED;
REGISTERED AS {action 9};
```

7.6.10 cannotReprovision

```
cannotReprovision ACTION
    BEHAVIOUR
        cannotReprovisionBehaviour BEHAVIOUR
        DEFINED AS "This action may be used to indicate to the NE that the OS has rejected a
        previous switch over request by the other side and that the management operations required
        for the re-provisioning can not be performed afterwards. The action shall initiate sending of
        the V5 control protocol message 'Cannot re-provision' across the V5 interface."
    ;;
    MODE CONFIRMED;
    WITH INFORMATION SYNTAX ASN1DefinedTypesModule.RejectedProvVariant;
REGISTERED AS {action 10};
```

7.6.11 v5ProtectionAnSwitch

```
v5ProtectionAnSwitch ACTION
    BEHAVIOUR
        v5ProtectionAnSwitchBehaviour BEHAVIOUR
        DEFINED AS "This action is used for manual protection switching of V5 time slot object
        instances being assigned as active or standby C-channel.
        It may only be requested on v5protectionGroup number 2 and shall be rejected otherwise.
        The following parameters are provided:
        - switchType (permitted value: manual);
        - switchFrom (indicates the active, i.e. protected V5 protection unit object instance);
        - switchTo (indicates the standby, i.e. protecting V5 protection unit object instance).
        This action shall change the Protecting attributes in the appropriate V5 protection unit object
        instances to TRUE or FALSE, respectively. The reliableResourcePointer attribute of the
        protecting V5 protection unit shall be changed to the appropriate C-channel ID, whilst the
        reliableResourcePointer attribute of the protected V5 protection unit shall be changed to
        NULL. In parallel, the reciprocal relationship between the affected commChannel object
        instance and v5TimeSlot object instance shall be modified accordingly.
        The successful or failed protection switch will be reported to the OS by using
        v5ProtectionSwitchReporting Notification."
    ;;
    MODE CONFIRMED;
    WITH INFORMATION SYNTAX ASN1DefinedTypesModule.V5ProtectionSwitchInfo;
REGISTERED AS {action 11};
```

7.6.12 v5ProtectionLeSwitch

```
v5ProtectionLeSwitch ACTION
    BEHAVIOUR
        v5ProtectionLeSwitchBehaviour BEHAVIOUR
        DEFINED AS "This action is used for both manual and forced protection switching of V5 time
        slot object instances being assigned as active or standby C-channel. It may only be requested
        on v5protectionGroup number 2 and shall be rejected otherwise.
        A forced switch request permits the allocation of a C-channel to an already active channel
        (protecting attribute of related protection unit is FALSE). The preempted c-channel is
        switched to the time slot of the preempting c-channel.
        A manual switch request permits the allocation of a C-channel only to a stand-by channel
        (protecting attribute of related protection unit is TRUE).
        The following parameters are provided:
        - switchType (indicates whether it is a forced or manual switch request);
        - switchFrom (indicates the active, i.e. protected V5 protection unit object instance);
        - switchTo (indicates the standby, i.e. protecting V5 protection unit object instance or, in
          the case of a forced switch, request the dedicated active channel).
```

This action shall change the Protecting attributes in the appropriate V5 protection unit object instances to TRUE or FALSE, respectively. The reliableResourcePointer attribute of the protecting V5 protection unit shall be changed to the appropriate C-channel ID, whilst the reliableResourcePointer attribute of the protected V5 protection unit shall be changed to NULL. In parallel, the reciprocal relationship between the affected commChannel object instance and v5TimeSlot object instance shall be modified accordingly.
The successful or failed protection switch will be reported to the OS by using v5ProtectionSwitchReporting Notification."
;;
MODE CONFIRMED;
WITH INFORMATION SYNTAX ASN1DefinedTypesModule.V5ProtectionSwitchInfo;
REGISTERED AS {action 12};

7.6.13 checkLinkId

checkLinkId ACTION
BEHAVIOUR
checkLinkIdBehaviour BEHAVIOUR
DEFINED AS "This action is used for triggering the V5 link identification check procedure on the 2 Mbit/s link the action is addressed to. The checkLinkIdResult notification will indicate whether the result of the procedure was positive or negative or that the check was rejected from the other side of the V5 interface."
;;
MODE CONFIRMED;
REGISTERED AS {action 13};

7.6.14 restart

restart ACTION
BEHAVIOUR
restartBehaviour BEHAVIOUR
DEFINED AS "This action is used for initiating the restart procedure as specified in annex C of ETS 300 324-1 [2], which will be performed automatically by the NE. The result of the restart procedure will be reported to the OS in the restartResult notification."
;;
MODE CONFIRMED;
REGISTERED AS {action 14};

7.6.15 systemStartup

systemStartup ACTION
BEHAVIOUR
systemStartupBehaviour BEHAVIOUR
DEFINED AS "This action is used for initiating the system startup procedure as specified in annex C of ETS 300 324-1 [2], which will be performed automatically by the NE. The successful or failed completion of the procedure will be reported to the OS in the systemStartupResult notification."
;;
MODE CONFIRMED;
REGISTERED AS {action 15};

7.7 Definition of notifications

7.7.1 switchOverRequest

```
switchOverRequest NOTIFICATION
        BEHAVIOUR
                switchOverRequestBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that a V5 control protocol message 'switch-over to
                new variant' has been received from the remote NE. The information syntax contains the new
                variant."
                ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ProvVariant;
REGISTERED AS {notification 1};
```

7.7.2 anBlockingStarted

```
anBlockingStarted NOTIFICATION
        BEHAVIOUR
                anBlockingStartedBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that the V5 control protocol message 'Blocking
                Started' has been received in the AN as a first positive response to a previous switch over
                request."
        ;;
REGISTERED AS {notification 2};
```

7.7.3 verifyRequest

```
verifyRequest NOTIFICATION
        BEHAVIOUR
                verifyRequestBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that the V5 control protocol message 'Verify
                re-provisioning' has been received in the NE to verify whether a switch over has been
                prepared at both sides of the V5 interface."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.ProvVariant;
REGISTERED AS {notification 3};
```

7.7.4 v5ProtectionSwitchReporting

```
v5ProtectionSwitchReporting NOTIFICATION
        BEHAVIOUR
                v5ProtectionSwitchReportingBehaviour BEHAVIOUR
                DEFINED AS "This notification shall be emitted in case of any successful or failed protection
                switching attempt (automatic, manual or forced) at both the requesting and responding sides.
                It indicates the origin of the protection switch and which V5 protection units have changed or
                tried to be changed from standby to active and vice versa."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.V5ProtectionSwitchReportingInfo;
REGISTERED AS {notification 4};
```

7.7.5 shutdownRejected

```
shutdownRejected NOTIFICATION
        BEHAVIOUR
                shutdownRejectedBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that shutting down of a link was rejected."
        ;;
REGISTERED AS {notification 5};
```

7.7.6 anFaultReported

```
anFaultReported NOTIFICATION
        BEHAVIOUR
                anFaultReportedBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that the LE has received a V5 BCC protocol
                message 'AN Fault' for the associated user port."
        ;;
REGISTERED AS {notification 6};
```

7.7.7 verifyRemoteProvVariantResult

```
verifyRemoteProvVariantResult NOTIFICATION
        BEHAVIOUR
                verifyRemoteProvVariantResultBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that the V5 control protocol message 'Ready for
                re-provisioning' or 'Not ready for re-provisioning' has been received from the remote NE as a
                response to a previous verify re-provisioning request."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.VerifyRemoteProvVariantResult;
REGISTERED AS {notification 7};
```

7.7.8 switchOverToNewVariantResult

```
switchOverToNewVariantResult NOTIFICATION
        BEHAVIOUR
                switchOverToNewVariantResultBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that the V5 control protocol message 'Re-provisioning
                started' or 'Cannot re-provision' has been received from the remote NE as a response to a
                previous switch over request."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.SwitchOverToNewVariantResult;
REGISTERED AS {notification 8};
```

7.7.9 requestRemoteProvVariantResult

```
requestRemoteProvVariantResult NOTIFICATION
        BEHAVIOUR
                requestRemoteProvVariantResultBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that the V5 control protocol message 'Provisioning
                variant and interface ID' has been received from the remote NE as a response to a previous
                remote provisioning variant request."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.RequestRemoteProvVariantResult;
REGISTERED AS {notification 9};
```

7.7.10 checkLinkIdResult

```
checkLinkIdResult NOTIFICATION
        BEHAVIOUR
                checkLinkIdResultBehaviour BEHAVIOUR
                DEFINED AS "This notification indicates that the V5 link identification procedure was
                performed by the NE as a consequence of a previous checkLinkId action. In case of a
                negative result, i.e. inconsistent link identities on the two sides of the V5 interface, this shall
                be regarded as a disabling reason according to annex B and the operational state of the
                V5Ttp object instance affected shall be set to disabled."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.LinkIdCheckResult;
REGISTERED AS {notification 10};
```

7.7.11 restartResult

```
restartResult NOTIFICATION
        BEHAVIOUR
                restartResultBehaviour BEHAVIOUR
                DEFINED AS "The successful or failed completion of the restart procedure shall be reported
                to the OS in the notification."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.Success;
REGISTERED AS {notification 11};
```

7.7.12 systemStartupResult

```
systemStartupResult NOTIFICATION
        BEHAVIOUR
                systemStartupResultBehaviour BEHAVIOUR
                DEFINED AS "The successful or failed completion of the system startup procedure shall be
                reported to the OS in the notification."
        ;;
        WITH INFORMATION SYNTAX ASN1DefinedTypesModule.Success;
REGISTERED AS {notification 12};
```

7.8 ASN.1 defined types module

Table 20

```
ASN1DefinedTypesModule {ccitt(0) identified-organization(4) etsi(0) v5LeConfigurationManagement(377)
                        informationModel(0) asn1Module(2) asn1DefinedTypesModule(0)}

DEFINITIONS IMPLICIT TAGS ::=

BEGIN   -- EXPORTS everything

IMPORTS
        -- CCITT Recommendation M.3100 [8]
        Failed
        FROM ASN1DefinedTypesModule {ccitt recommendation m gnm(3100) informationModel(0) asn1Modules(2)
                                     asn1DefinedTypesModule(0)}
        -- CCITT Recommendation X.711 [12]
        AttributeId,
        ObjectClass,
        ObjectInstance
        FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) version1(1) protocol(3)};

informationModel                OBJECT IDENTIFIER ::= {ccitt(0) identified-organization(4) etsi(0)
                                                       v5LeConfigurationManagement(377) informationModel(0)}
standardSpecificExtension       OBJECT IDENTIFIER ::= {informationModel standardSpecificExtension(0)}
managedObjectClass              OBJECT IDENTIFIER ::= {informationModel managedObjectClass(3)}
package                         OBJECT IDENTIFIER ::= {informationModel package(4)}
nameBinding                     OBJECT IDENTIFIER ::= {informationModel nameBinding(6)}
attribute                       OBJECT IDENTIFIER ::= {informationModel attribute(7)}
action                          OBJECT IDENTIFIER ::= {informationModel action(9)}
notification                    OBJECT IDENTIFIER ::= {informationModel notification(10)}

initialPointer                  Pointer           ::= null NULL
initialPointerS                 SET OF Pointer    ::= {}

AssocInstances                  ::= SET OF ObjectInstance

BcReserved                      ::= SET OF OCTET STRING (SIZE(2))

BlockStatus                     ::= ENUMERATED {
                                        none                    (0),
                                        local                   (1),
                                        remote                  (2),
                                        both                    (3)}

DataType                        ::= ENUMERATED {
                                        dsType                  (0),
                                        pType                   (1),
                                        fType                   (2)}

EnvelopeFunctionAddress         ::= BIT STRING (SIZE(13))

Layer3PortAddress               ::= BIT STRING (SIZE(15))

LinkId                          ::= OCTET STRING (SIZE(1))

LinkIdCheckResult               ::= ENUMERATED {
                                        linkIdOk                (0),
                                        linkIdNotOk             (1),
                                        linkIdRejected          (2)}

NoOf                            ::= INTEGER
```

Table 21 (continued)

```
ObjectPointer                   ::= SEQUENCE {
                                        objectClass             [0] ObjectClass,
                                        objectInstance          [1] ObjectInstance}

Origin                          ::= ENUMERATED {
                                        localResource           (0),
                                        remoteResource          (1),
                                        manual                  (2)}

OriginalPointer                 ::= Pointer

OriginalPointerInfo             ::= SEQUENCE {
                                        originalPointer1        OriginalPointer,
                                        originalPointer2        OriginalPointer}

Pointer                         ::= CHOICE {
                                        objectInstance          [0] ObjectInstance,
                                        null                    [1] NULL}

ProtocolVersion                 ::= GraphicString

ProvVariant                     ::= BIT STRING (SIZE(7))

ReciprocalPointersInfo          ::= SEQUENCE {
                                        objectClass1            ObjectClass,
                                        objectInstance1         ObjectInstance,
                                        attribute1              AttributeId,
                                        objectClass2            ObjectClass,
                                        objectInstance2         ObjectInstance,
                                        attribute2              AttributeId}

RejectedProvVariant             ::= SEQUENCE {
                                        provVariant             [0] ProvVariant,
                                        rejectionCause          [1] RejectionCause}

RejectionCause                  ::= ENUMERATED {
                                        variantUnknown          (0),
                                        variantKnownNotReady    (1),
                                        reprovisioningInProgress(2)}

ReleaseReciprocalPointersResult ::= SEQUENCE {
                                        originalPointerInfo     OriginalPointerInfo,
                                        CHOICE {
                                            failed              [0] Failed,
                                            released            [1] NULL}}

RequestRemoteProvVariantResult  ::= SEQUENCE {
                                        remoteProvVariant       [1] ProvVariant,
                                        remoteInterfaceId       [2] OCTET STRING (SIZE(3))}

SetReciprocalPointersResult     ::= SEQUENCE{
                                        originalPointerInfo     OriginalPointerInfo,
                                        CHOICE {
                                            failed              [0] Failed,
                                            set                 [1] NULL}}

SwitchOverToNewVariantResult    ::= CHOICE {
                                        reprovisioningStarted   [0] ProvVariant,
                                        cannotReprovision       [1] RejectedProvVariant}
```

Table 22 (concluded)

```
Success                          ::= ENUMERATED {
                                        successful              (0),
                                        unsuccessful            (1)}

SwitchType                       ::= ENUMERATED {
                                        manual                  (0),
                                        forced                  (1),
                                        automatic               (2)}

VerifyRemoteProvVariantInfo      ::= ProvVariant

VerifyRemoteProvVariantResult    ::= CHOICE {
                                        readyForReprovisioning      [0] ProvVariant,
                                        notReadyForReprovisioning   [1] RejectedProvVariant}

V5ChannelType                    ::= ENUMERATED {
                                        bearerChannel           (0),
                                        commChannel             (1)}

V5InterfaceId                    ::= OCTET STRING (SIZE(3))

V5ProtectionFailedSwitchInfo     ::= ENUMERATED{
                                        noStandByCChannelsAvailable     (0),
                                        targetCChannelNotOperational    (1),
                                        targetCChannelNotProvisioned    (2),
                                        protectionSwitchImpossible      (3),
                                        protectionGroupMismatch         (4),
                                        requestedAllocationExisting     (5),
                                        targetCChannelActive            (6)}

V5ProtectionGroupNumber          ::= ENUMERATED {
                                        group1                  (0),
                                        group2                  (1)}

V5ProtectionGroupType            ::= ENUMERATED {
                                        plus                    (0),
                                        colon                   (1)}

V5ProtectionNoSwitchInfo         ::= SEQUENCE{
                                        failedSwitchInfo        [0] V5ProtectionFailedSwitchInfo,
                                        v5ProtectionSwitchInfo  [1] V5ProtectionSwitchInfo}

V5ProtectionSwitchInfo           ::= SEQUENCE {
                                        origin                  Origin,
                                        switchType              SwitchType,
                                        switchFrom              ObjectInstance,
                                        switchTo                ObjectInstance}

V5ProtectionSwitchReportingInfo ::= CHOICE{
                                        switched                [0] V5ProtectionSwitchInfo,
                                        failed                  [1] V5ProtectionNoSwitchInfo}

V5UserPortAddress                ::= CHOICE {
                                        single                  [0] Layer3PortAddress,
                                        multiple                [1] EnvelopeFunctionAddress}

YesNo                            ::= BOOLEAN

END -- of ASN1DefinedTypesModule
```

8 Protocol requirements

Protocol suites are specified in ITU-T Recommendations Q.811 [9] and Q.812 [10]. No special requirements are identified.

Annex A (normative): Mapping of management primitives for user port FSM onto state transitions for virtual analogue accesses, virtual basic rate accesses, and virtual primary rate accesses

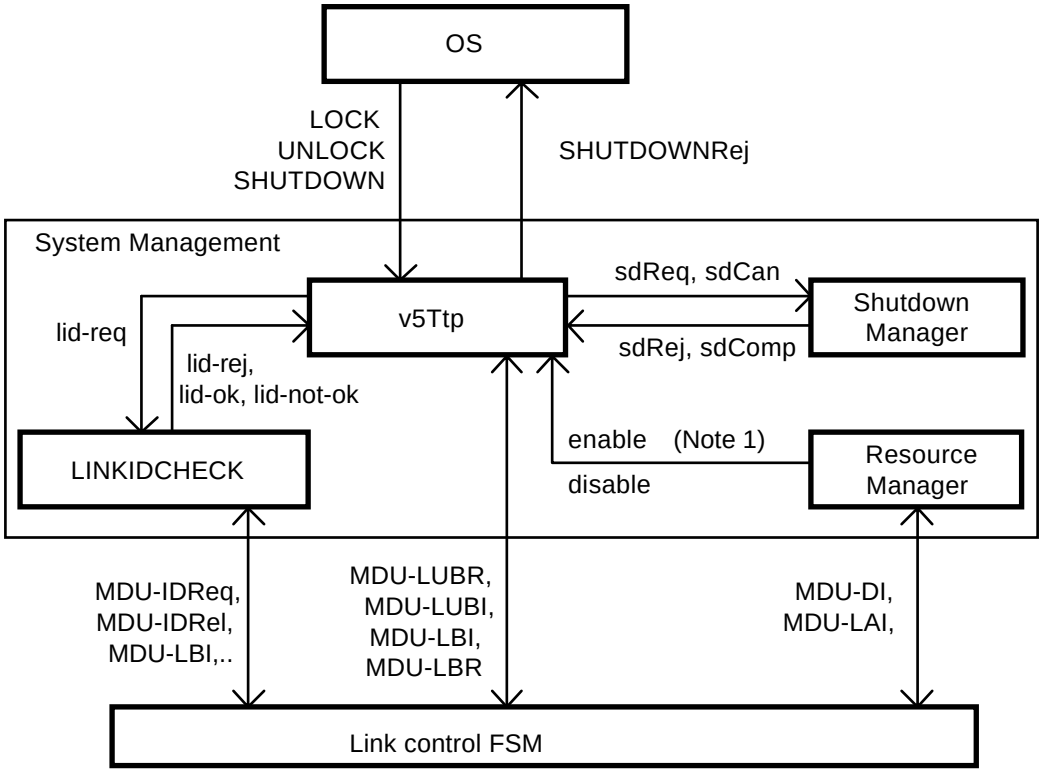
Table A.1

Event	Operational state	
	enabled	**disabled**
MPH-BI	disabled	-
MPH-BR	Ask resource manager to change to disabled as soon as the access becomes idle	/
MPH-UBR	/	Ask resource manager whether change to enabled is allowed
MPH-UBI	-	enabled
Resource manager sets operational state to disabled	MPH-BI; disabled	MPH-BI
Resource manager sets operational state to enabled	-	MPH-UBR
Resource manager rejects to set operational state to enabled	/	MPH-BI
Resource manager confirms to set operational state to enabled	/	MPH-UBR
Key: / = unexpected event - = no action		

Annex B (normative): Mapping of link control states on X.731 states

The tables in clauses B.1 and B.2 specify detailed state machines for the link state mapping at the AN and LE side. They include substates of "disabled" to indicate the disabling reason.

V5 system management is responsible for sequencing of simultaneous link ID requests. This is the case when AN or LE unblocks a link (see e.g. table E.3), and when two links are to be checked at the same time. Figure B.1 indicates that by a separate system management procedure. The primitives MDU-AI, MDU-IDReq, MDU-IDAck, MDU-IDRej, MDU-IDRel, MDU-EIg are related to this procedure. Reactions of the link control FSM on MDU-IDReq are also directed to it.



NOTE 1: enable: disappearance of internal disabling reasons;
disable: occurrence of internal disabling reasons.

NOTE 2: This figure is for information only. The internal communication between Shutdown Manager, Resource Manager and LINKIDCHECK procedure is not shown.

Figure B.1: General relationship between v5Ttp object class and system management at the LE side

If the link ID check is rejected (lid-rej), it can only be invoked again by the OS command sequence LOCK, UNLOCK.

After link control FSM enters the operational state (AN2.0, LE2.0) from one of the blocked states, the link ID shall be checked at both sides, before the link is fully operational, i.e. ENABLED. For this purpose, system management is triggered by "lid-req". System management is responsible for sequencing of simultaneous link ID requests to avoid rejection whenever possible. Unblocking a link always leads to a simultaneous checking of a link by AN and LE, which requires sequencing to avoid the termination of the unblocking procedure at one side.

A shutdown request (sdReq) is handled by LE system management. It gracefully takes communication and switched services out of service. SHUTDOWN from the OS of the AN uses deferred blocking (MDU-LBR). The request can either be rejected (sdRej) or successfully completed (sdComp). LE system management shall reject a shutdown request if the required protection of the logical C-channels is not possible. It shall generate an unblock request (FE301, resulting in MDU-LUBI at the AN) if the shutdown request came from the AN (MDU-LBR, FE305). The OS of the AN shall then be notified by SHUTDOWNRej to change the administrative state from SHUTTINGDOWN back to UNLOCKED. If the shutdown request came from the OS at the LE, the SHUTDOWNRej notification is sent to it. The OS which initiated the shutdown procedure can interrupt it by sending an UNLOCK command, resulting in a shutdown cancel (sdCan) to the LE system management.

Non-deferred blocking (MDU-LBRN) immediately releasing switched connections is not used by the AN. LOCK means immediate (forced) blocking of the link (MDU-LBI), with all its consequences to services provided by this link.

Disabling reasons

None: intermediate state with no fault or blocking reason. It is reached during the unblock procedure.

Local: occurrence of a layer 1 failure (MPH-DI) or any other local reason, e.g. due to dependencies.

Remote: remote reason for blocking the link due to failure or management decision (MDU-LBI).

Sources of messages

LOCK, UNLOCK, SHUTDOWN are generated by the OS.

lid-rej, lid-ok, lid-not-ok are generated by system management at AN and LE side.

MDU-LUBR, MDU-LUBI, MDU-LBI, etc. are generated by the link control FSM.

sdReq and sdCan are sent to system management, e.g. a shutdown manager.

SHUTDOWNRej is sent from the v5Ttp object to the OS.

sdRej and sdComp are generated by LE system management, e.g. its shutdown manager.

"Occurrence of internal disabling reasons", "Disappearance of internal disabling reasons" are generated by system management.

B.1 State mapping tables for the AN side

Table B.1

	state 1 locked disabled			**state 2 locked enabled**	**state 3 shutting down**
	1.1 LBS: local	**1.2 LBS: remote**	**1.3 LBS: both**	**2.0**	**3.0**
LOCK	-	-	-	-	MDU-LBI; 2.0
UNLOCK	MDU-LUBR; 4.1	MDU-LUBR; 4.2	MDU-LUBR; 4.3	MDU-LUBR; 4.0	MDU-LUBR; 5.0
SHUTTING DOWN	/	/	/	/	-
occurrence of internal disabling reasons	-	-; 1.3	-	-; 1.1	-; 1.1
disappearance of internal disabling reasons	-; 2.0	/	-; 1.2	/	/
MDU-LUBR	-	-; 2.0	-; 1.1	-	/
MDU-LUBI	/	/	/	/	SHUTDOWNRej; -
MDU-LBI	-	-	-	-	-; 2.0
lid-rej	-	-	-	-	-
lid-ok	-	-	-	-	-
lid-not-ok	-	-	-	-	-

Key: <output signal>;<new state>
/ = unexpected event
- = no action
LBS = Link Block Status

Table B.2

	state 4 unlocked disabled				**state 5 unlocked enabled**
	4.0 LBS: none	**4.1 LBS: local**	**4.2 LBS: remote**	**4.3 LBS: both**	**5.0**
LOCK	MDU-LBI; 2.0	MDU-LBI; 1.1	MDU-LBI; 1.2	MDU-LBI; 1.3	MDU-LBI; 2.0
UNLOCK	-	-	-	-	-
SHUTTING DOWN	MDU-LBI; 2.0	MDU-LBI; 1.1	MDU-LBI; 1.2	MDU-LBI; 1.3	MDU-LBR; 3.0
occurrence of internal disabling reasons	-; 4.1	-	-; 4.3	-	-; 4.1
disappearance of internal disabling reasons	/	MDU-LUBR; 4.0	/	MDU-LUBR; 4.2	/
MDU-LUBR	MDU-LUBR; -	-	MDU-LUBR; 4.0	/	/
MDU-LUBI	lid-req; -	/	lid-req; 4.0	/	-
MDU-LBI	-; 4.2	-; 4.3	-	-	-; 4.2
lid-rej	-	-	-	-	-
lid-ok	-; 5.0	-	-	-	-
lid-not-ok	-; 4.1	-	-	-	-

Key: <output signal>;<new state>
/ = unexpected event
- = no action
LBS = Link Block Status

B.2 State mapping tables for the LE side

Table B.3

	state 1 locked disabled			**state 2 locked enabled**	**state 3 shutting down**
	1.1 LBS: local	**1.2 LBS: remote**	**1.3 LBS: both**	**2.0**	**3.0**
LOCK	-	-	-	-	MDU-LBI; 2.0
UNLOCK	MDU-LUBR; 4.1	MDU-LUBR; 4.2	MDU-LUBR; 4.3	MDU-LUBR; 4.0	sdCan; 5.0
SHUTTING DOWN	/	/	/	/	-
occurrence of internal disabling reasons	-	-; 1.3	-	-; 1.1	-; 1.1
disappearance of internal disabling reasons	-; 2.0	/	-; 1.2	/	/
MDU-LUBR	-	-; 2.0	-; 1.1	-	/
MDU-LUBI	/	/	/	/	-
MDU-LBI	-	-	-	-	-; 2.0
MDU-LBR	/	/	/	/	/
sdRej	/	/	/	/	SHUTDOWNRej; -
sdComp	/	/	/	/	MDU-LBI; 2.0
lid-rej	-	-	-	-	-
lid-ok	-	-	-	-	-
lid-not-ok	-	-	-	-	-

Key: <output signal>;<new state>
/ = unexpected event
- = no action
LBS = Link Block Status

Table B.4

	state 4 unlocked disabled				**state 5 unlocked enabled**
	4.0 LBS: none	**4.1 LBS: local**	**4.2 LBS: remote**	**4.3 LBS: both**	**5.0**
LOCK	MDU-LBI; 2.0	MDU-LBI; 1.1	MDU-LBI; 1.2	MDU-LBI; 1.3	MDU-LBI; 2.0
UNLOCK	-	-	-	-	-
SHUTTING DOWN	MDU-LBI; 2.0	MDU-LBI; 1.1	MDU-LBI; 1.2	MDU-LBI; 1.3	sdReq; 3.0
occurrence of internal disabling reasons	-; 4.1	-	-; 4.3	-	-; 4.1
disappearance of internal disabling reasons	/	MDU-LUBR; 4.0	/	MDU-LUBR; 4.2	/
MDU-LUBR	MDU-LUBR; -	-	MDU-LUBR; 4.0	/	/
MDU-LUBI	lid-req; -	/	lid-req; 4.0	/	sdCan; -
MDU-LBI	-; 4.2	-; 4.3	-	-	-; 4.2
MDU-LBR	/	/	/	/	sdReq; -
sdRej	/	/	/	/	MDU-LUBR; -
sdComp	/	/	/	/	MDU-LBI; 4.2
lid-rej	-	-	-	-	-
lid-ok	-; 5.0	-	-	-	-
lid-not-ok	-; 4.1	-	-	-	-

Key: <output signal>;<new state>
/ = unexpected event
- = no action
LBS = Link Block Status

Annex C (informative): Telecommunications Management Network (TMN) management service "Customer administration at the V5 interface and administration of V5 interface related data at the LE"

C.1 Task Information Base (TIB) A

NOTE: This TIB A is derived from ETR 047 (1992), subclause 5.6 (customer administration). It has been extended for being applicable to a V5 interface environment. Components of service and management functions, which are out of scope were nevertheless kept for completeness and cross reference.

C.1.1 Description

Customer administration is a management activity that the network operator performs in order to exchange with the customer all the customer related management data and functions required to offer a telecommunications service and to exchange with the network all the customer related management data and functions necessary for the network to produce that telecommunications service.

It is considered that the customer installation can be accessed directly at the LE as well as via a V5 interface.

In a wide sense, this could include interactions for the purpose of service provision management, configuration administration, fault administration, charging (including detailed billing) administration, complaints administration, quality of service administration, traffic measurement administration etc. Here, however, only customer administration in the more traditional sense of service provision and service configuration has been included.

In particular, the tasks to be performed in the LE to provide service for customers which are connected via a V5 interface to the LE are considered.

Administration of V5 interface related data is a management activity that the network operator performs in order to initially configure or to reconfigure a V5 interface to enable and maintain the service offering for the customers connected.

C.1.2 Components of service

C.1.2.1 Manage service provision

After receiving a customer order, find an available directory number and a suitable V5 interface with available time slot(s) in an appropriate exchange and connect these.

The management of service provision to customer installations accessed directly at the LE is covered by I-ETS 300 291 [1].

Here, the additional requirements for managing service provision to customer installations accessed via a V5 interface at the LE are considered.

C.1.2.2 Administer service facilities and supplementary services

Record user service requirements as data related to directory number. Some services can be both customer controlled and operator controlled. Examples are abbreviated dialling, priority, malicious call tracing, charging observation, traffic restriction, free of charge etc.

This item is covered by I-ETS 300 291 [1].

C.1.2.3 Administer customer line

Administer line characteristics which are relevant for the LE, considering lines accessing the LE via a V5 interface (e.g. line status, traffic direction). The administration of customer lines accessed directly at the LE is covered by I-ETS 300 291 [1].

C.1.2.4 Manage line test

Out of scope.

C.1.2.5 Configure and reconfigure V5 interface

Record data related to a specific V5 interface to enable or maintain service offering and to yield data inconsistency detection between AN and LE.

C.2 Management function list

NOTE: This management function list is derived from ETR 047. V5 interface specific extensions/modifications are introduced. Subclause 5.6.2, item 2 and items 4 to 7 of ETR 047 are out of scope of this ETS.

C.2.1 Insert, delete, modify, read single and multi-line customer access (ISDN and analogue access) accessed via a V5 interface

C.2.1.1 Customers accessed via a V5.1 interface (ISDN basic and analogue access)

C.2.1.1.1 Insert customer accesses

Set up relations between:

- directory Number and its assigned customer service profile (see I-ETS 300 291 [1]);
- V5.1 interface;
- time slot(s) in that interface;
- envelope function address (for ISDN access);
- layer 3 port address (for analogue access);
- in case of ISDN, B-channel number (B1, B2);
- in case of ISDN, time slot for D-channel packet and frame data;
- customer resources,

and provide the relevant data.

C.2.1.1.2 Delete customer accesses

Delete relations between the information elements mentioned in subclause C.2.1.1.1 and, if necessary, relevant data assigned to those elements.

C.2.1.1.3 Modify customer accesses

Modify one or more relation(s) and/or assigned data mentioned in subclause C.2.1.1.1.

C.2.1.1.4 Read customer accesses

Read information about one or more relations and/or assigned data mentioned in subclause C.2.1.1.1.

C.2.1.2 Customers accessed via a V5.2 interface (ISDN basic and primary rate and analogue access)

C.2.1.2.1 Insert customer accesses

Set up relations between:

- directory number and its assigned customer service profile (see I-ETS 300 291 [1]);
- V5.2 interface;
- envelope function address (for ISDN access);
- layer 3 port address (for analogue access);
- in case of ISDN, time slot for D-channel packet and frame data;
- customer resources,

and provide the relevant data.

C.2.1.2.2 Delete customer accesses

Delete relations (ISDN basic and analogue access) mentioned in subclause C.2.1.2.1.

C.2.1.2.3 Modify customer accesses

Modify (ISDN basic and analogue access) in subclause C.2.1.2.1.

C.2.1.2.4 Read customer accesses

Read (ISDN basic and analogue access) in subclause C.2.1.2.1.

C.2.2 Insert, delete, modify, read customer (supplementary) service

Out of scope.

C.2.3 Block/unblock single and multi-line customers

It is to be regarded, that dynamic blocking and unblocking can be initiated across the V5 interface, The impact between administrative and dynamic blocking/unblocking needs to be considered.

C.2.4 Block/unblock customer (supplementary) service

Out of scope.

C.2.5 Activate/de-activate malicious call tracing

Out of scope.

C.2.6 Activate/de-activate charging observation

Out of scope.

C.2.7 Activate/de-activate line test and measurement

Out of scope.

C.2.8 Insert, delete, modify, read a V5 interface

C.2.8.1 V5.1 interface

C.2.8.1.1 Insert a V5.1 interface

Add a V5.1 interface:

- V5.1 interface ID;
- time slots for communication and for bearer channels;
- protocol version;
- provisioning variant.

C.2.8.1.2 Delete a V5.1 interface

Remove a V5.1 interface and delete relevant data mentioned in subclause C.2.8.1.1.

C.2.8.1.3 Modify a V5.1 interface

Modify one or more information elements given in subclause C.2.8.1.1. Each modification should result in an appropriate mark in the provisioning variant information element.

C.2.8.1.4 Read a V5.1 interface

Read one or more information element given in subclause C.2.8.1.1. Read AN synchronization state and/or provisioning variant.

C.2.8.2 V5.2 interface

C.2.8.2.1 Insert a V5.2 interface

Add a V5.2 interface and provide relevant data:

- V5.2 interface ID;
- associated 2 Mbit/s link(s);
- time slot(s) for C-channels;
- protocol version;
- provisioning variant.

C.2.8.2.2 Augment a V5.2 interface

Add 2 Mbit/s link(s) to the existing V5.2 interface and provide relevant data:

- associated 2 Mbit/s link(s);
- time slot(s) for C-channels;
- provisioning variant.

C.2.8.2.3 Delete a V5.2 interface

Remove a V5.2 interface ID and delete the relevant data.

C.2.8.2.4 Reducing a V5.2 interface

Remove 2 Mbit/s link(s) from a V5.2 interface and delete the relevant data.

C.2.8.2.5 Modify a V5.2 interface

Modify one or more information elements given in subclause C.2.8.2.1 except of the associated access port (no)s.

C.2.8.2.6 Read a V5.2 interface

Read AN synchronization state and/or provisioning variant in subclause C.2.8.2.1.

C.2.8.2.7 Upgrade a V5.1 to a V5.2 interface

The upgrade is performed by deleting the affected V5.1 interface and inserting a V5.2 interface using the relevant data having been assigned to the V5.1 interface.

Annex D (informative): Functional architecture

The functional architecture is described in annex D of ETS 300 376-1 [4].

Annex E (informative): Link control message flows

A state and a message written in the same line means that this state is entered and the message is sent as part of the transition into this state. There are transitions where more than one message is sent. As explained in annex B, messages concerning the checking procedure of the link ID are sent to a special system management procedure. The V5 messages resulting from the link ID check procedure are not shown in the subsequent tables. MDU-DI and MDU-LAI issued by the link control FSM are sent to a resource manager, which transforms it into "occurrence of internal disabling reasons" and "disappearance of internal disabling reasons", shown in the following tables as dis(MDU-DI) and en(MDU-LAI), respectively. The messages sdReq and sdComp are exchanged with a system management procedure handling the shutdown of a link.

Notifications to the OS due to state transitions are not shown. Where two messages are issued to system management within one state transition, the resulting new states and the messages sent are written in two lines within the same row of the table.

Table E.1: Urgent blocking by AN

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	5.0		2.0		2.0		5.0	
LOCK→								
	2.0	MDU-LBI→						
			1.0	FE304→				
					1.0	MDU-LBI→		
							4.2	

Table E.2: Non urgent blocking by AN

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	5.0		2.0		2.0		5.0	
SHUTDOWN→								
	3.0	MDU-LBR→						
			2.0	FE305→				
					2.0	MDU-LBR→		
						(←sdReq)	5.0	
						(sdComp→)		
						←MDU-LBI	4.2	
				←FE303	1.0			
		←MDU-LBI	1.0					
	2.0							

Table E.3: Unblocking by AN (both sides perform link ID checking)

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	2.0		1.0		1.0		4.2	
UNLOCK→								
	4.0	MDU-LUBR→						
			1.1	FE302→				
					1.2	MDU-LUBR→		
						←MDU-LUBR	4.0	
				←FE301	2.0	MDU-LUBI→		
		←MDU-LUBI	2.0			(←lid-req)	4.0	
	4.0	(lid-req→)				(lid-ok→)		
		(←lid-ok)					5.0	
	5.0							

Table E.4: Urgent blocking by LE

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	5.0		2.0		2.0		5.0	
								←LOCK
						←MDU-LBI	2.0	
				←FE303	1.0			
		←MDU-LBI	1.0					
	4.2							

Table E.5: Unblocking by LE (both sides perform link ID checking)

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	4.2		1.0		1.0		2.0	
								←UNLOCK
						←MDU-LUBR	4.0	
				←FE301	1.1			
		←MDU-LUBR	1.2					
	4.0	MDU-LUBR→						
		MDU-LUBI←	2.0	FE302→				
	4.0	(lid-req→)			2.0	MDU-LUBI→		
		(←lid-ok)				(←lid-req)	4.0	
	5.0					(lid-ok→)	5.0	

Table E.6: Link layer 1 failure and subsequent restoration

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	5.0		2.0		2.0		5.0	
				←MPH-DI				
		←dis(MDU-DI)	0.1					
	4.1			MPH-DI→				
					0.1	dis(MDU-DI)→		
							4.1	
				←MPH-AI				
		←en(MDU-LAI)	2.0					
	4.0	MDU-LUBR→						
		←MDU-LUBI	2.0	FE302→				
	4.0	(lid-req→) (←lid-rej)		←FE303	0.2			
		←MDU-LBI	1.0					
	4.2							
				MPH-AI→				
					1.0	en(MDU-LAI)→ MDU-LBI→		
						←MDU-LUBR	4.0 4.2	
				←FE301	1.1			
		←MDU-LUBR	1.2					
	4.0	MDU-LUBR→						
		←MDU-LUBI	2.0	FE302→				
	4.0	(lid-req→)			2.0	MDU-LUBI→		
		(←lid-ok)				(←lid-req)	4.0	
	5.0					(lid-ok→)		
							5.0	

Although a link failure or restoration happens at the AN and LE at the same time, there will be in general a different delay between the actual event and its observation.

In table E.7, it is assumed that the AN side receives MPH-AI first and tries to unblock the link and to check the link ID. Both will fail since the LE side is still in a failure state.

Table E.7: Link locked by AN, link layer 1 failure, link unlocked by AN, link layer 1 ok

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	5.0		2.0		2.0		5.0	
LOCK								
	2.0	MDU-LBI						
			1.0	FE304				
					1.0	MDU-LBI		
							4.2	
				←MPH-DI				
		←dis(MDU-DI)	0.2					
	1.1			MPH-DI→				
					0.2	dis(MDU-DI)→		
							4.3	
UNLOCK→								
	4.1	MDU-LUBR→						
			0.2	FE304→				
					0.2			
				←MPH-AI				
		←en(MDU-LAI) ←MDU-LBI	1.0					
	4.0 4.2	MDU-LUBR→						
			1.1	FE302→				
				←FE303	0.2			
		←MDU-LBI	1.0					
	4.2							
				MPH-AI→				
					1.0	en(MDU-LAI)→ MDU-LBI→		
						←MDU-LUBR	4.2 4.2	
				←FE301	1.1			
		←MDU-LUBR	1.2					
	4.0	MDU-LUBR→						
		←MDU-LUBI	2.0	FE302→				
	4.0	(lid-req→)			2.0	MDU-LUBI→		
		(←lid-ok)				(←lid-req)	4.0	
	5.0					(lid-ok→)		
							5.0	

Although a link failure or restoration happens at the AN and LE at the same time, there will be in general a different delay between the actual event and its observation.

Table E.8: Link layer 1 failure, link locked by LE, link restoration

AN					LE			
OS command	**X.731 state**	**MDU message**	**Link ctrl state**	**V5 message/ MPH**	**Link ctrl state**	**MDU message**	**X.731 state**	**OS command**
	5.0		2.0		2.0		5.0	
				←MPH-DI				
		←dis(MDU-DI)	0.1					
	4.1			MPH-DI→				
					0.1	dis(MDU-DI)→		
							4.1	
								←LOCK
						←MDU-LBI	1.1	
				←FE303	0.2			
			0.2					
				←MPH-AI				
		←en(MDU-LAI) ←MDU-LBI	1.0		0.2			
	4.0 4.2	MDU-LUBR→						
			1.1	FE302→				
				←FE303	0.2			
			1.0					
		←MDU-LBI						
	4.2							
				MPH-AI→				
					1.0	en(MDU-LAI)→ MDU-LBI→		
							2.0 2.0	

Although a link failure or restoration happens at the AN and LE at the same time, there will be in general a different delay between the actual event and its observation.

Annex F (informative): Message flows for the mapping of virtual access ports on X.731 states

F.1 PSTN X.731 state management

F.1.1 Blocking initiated by the AN

See also ETS 300 324-1 [2], subclause 14.2.3.3.2.

Table F.1: Blocking initiated by the AN

$Q3_{AN}$ AN management	AN primitive	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
SET administrative state = LOCKED						(operational state = ENABLED)
	MPH-BI→					
		AN2.0→AN1.0 →blocked	→FE204			
				LE2.0→LE1.0 →blocked	MPH-BI→	
						change operational state = DISABLED

F.1.2 Blocking request initiated by the AN

See also ETS 300 324-1 [2], subclause 14.2.3.3.3.

Table F.2: Blocking request initiated by the AN

$Q3_{AN}$ AN management	AN primitive	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
SET administrative state = SHUTTING DOWN						(operational state = ENABLED)
	MPH-BR→					
			→FE205			
					MPH-BR→	
						WAIT until access is free (idle), then change operational state = DISABLED
					←MPH-BI	
			←FE203	LE2.0→LE1.0 →blocked		
	←MPH-BI	AN2.0→AN1.0 →blocked				
operational state = ENABLED administrative state = LOCKED						

F.1.3 Blocking initiated by the LE

See also ETS 300 324-1 [2], subclause 14.2.3.3.2.

Table F.3: Blocking initiated by the LE

$Q3_{AN}$ AN management	**AN primitive**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
						(operational state = ENABLED)
						change operational state = DISABLED (e.g. BER too high)
					←MPH-BI	
			←FE203	LE2.0→LE1.0 →blocked		
	←MPH-BI	AN2.0→AN1.0 →blocked				
operational state = DISABLED administrative state = UNLOCKED						

F.1.4 Co-ordinated unblocking initiated by the LE

See also ETS 300 324-1 [2], subclause 14.2.3.3.4.

Table F.4: AN administrative state is UNLOCKED (i.e. AN agrees to unblocking request from LE)

$Q3_{AN}$ AN management	**AN primitive**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
(operational state = DISABLED administrative state = UNLOCKED)						(operational state = DISABLED)
						operational state = ENABLED request
					←MPH-UBR	
			←FE201	LE1.0→LE1.1 →local unblock		
	←MPH-UBR	AN1.0→AN1.2 →remote unblock				
change operational state = ENABLED (note) administrative state = UNLOCKED						
	MPH-UBR→					
	←MPH-UBI	AN1.2→AN2.0 →operational	→FE202			
				LE1.1→LE2.0 →operational	MPH-UBI→	
						change operational state = ENABLED
NOTE: If there is no local disabling reason.						

Table F.5: AN administrative state is LOCKED in the meantime (i.e. AN rejects unblocking request from LE)

$Q3_{AN}$ AN management	AN primitive	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
(operational state = DISABLED administrative state = LOCKED)						(operational state = DISABLED)
						operational state = ENABLED request
					←MPH-UBR	
			←FE201	LE1.0→LE1.1 →local unblock		
	←MPH-UBR	AN1.0→AN1.2 →remote unblock				
administrative state = LOCKED Unblock request is rejected						

F.1.5 Co-ordinated unblocking initiated by the AN

See also ETS 300 324-1 [2], subclause 14.2.3.3.4.

Table F.6: Administrative state = LOCKED, Operational state = ENABLED

$Q3_{AN}$ AN management	AN primitive	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
(operational state = ENABLED administrative state = LOCKED)						
SET administrative state = UNLOCKED						
operational state = DISABLED administrative state = UNLOCKED						
	MPH-UBR→					
		AN1.0→AN1.1 →local unblock	→FE202			
				LE1.0→LE1.2 →remote unblock	MPH-UBR→	
						change operational state = ENABLED
					←MPH-UBR	
			←FE201	LE1.2→LE2.0 →operational	MPH-UBI→	
	←MPH-UBI	AN1.1→AN2.0 →operational				
change operational state = ENABLED						

Table F.7: Administrative state = UNLOCKED, Operational state = DISABLED

$Q3_{AN}$ AN management	**AN primitive**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
(operational state = DISABLED administrative state = UNLOCKED)						
operational state = ENABLED request						
	MPH-UBR→					
		AN1.0→AN1.1 →local unblock	→FE202			
				LE1.0→LE1.2 →remote unblock	MPH-UBR→	
						change operational state = ENABLED
					←MPH-UBR	
			←FE201	LE1.2→LE2.0 →operational	MPH-UBI→	
	←MPH-UBI	AN1.1→AN2.0 →operational				
change operational state = ENABLED						

Table F.8: Administrative state = LOCKED, Operational state = ENABLED, LE local unblocked (LE1.1)

$Q3_{AN}$ AN management	**AN primitive**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
(operational state = ENABLED administrative state = LOCKED)						
SET administrative state = UNLOCKED						
operational state = DISABLED administrative state = UNLOCKED						
	MPH-UBR→					
	←MPH-UBI	AN1.2→AN2.0 →operational	→FE202			
change operational state = ENABLED				LE1.1→LE2.0 →operational	MPH-UBI→	
						change operational state = ENABLED

F.2 ISDN X.731 state management

F.2.1 Blocking initiated by the AN

See also ETS 300 324-1 [2], subclause 14.1.3.3.2.

Table F.9: Port operational deactivated (AN2.0)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
SET administrative state = LOCKED							(operational state = ENABLED)
	MPH-BI→						
			AN2.0→AN1.0 →blocked	→FE204			
					LE2.0→LE1.0 →blocked	MPH-BI→	
							change operational state = DISABLED

Table F.10: Port operational activation initiated (AN2.1)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
SET administrative state = LOCKED							(operational state = ENABLED)
	MPH-BI→						
		DS←ET FE5	AN2.1→AN1.0 →blocked STOP T1	→FE204			
					LE2.1→LE1.0 →blocked	MPH-BI→; PH/MPH-DI	
							change operational state = DISABLED

Table F.11: Port operational and activated (AN2.2)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
SET administrative state = LOCKED							(operational state = ENABLED)
	MPH-BI→						
		DS←ET FE5	AN2.2→AN1.0→ blocked STOP T1	→FE204			
					LE2.2→LE1.0 →blocked	MPH-BI→; PH/MPH-DI	
							change operational state = DISABLED

F.2.2 Blocking request initiated by the AN

See also ETS 300 324-1 [2], subclause 14.1.3.3.3.

Table F.12: Port operational deactivated (AN2.0)

$Q3_{AN}$ AN management	**AN primitive**	**V1 FE**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
SET administrative state = SHUTTING DOWN							(operational state = ENABLED)
	MPH-BR→						
				→FE205			
						MPH-BR→	
							WAIT until access is free (idle), then change operational state = DISABLED
						←MPH-BI	
				←FE203	LE2.0→LE1.0 →blocked		
	←MPH-BI		AN2.0→AN1.0 →blocked				
operational state = ENABLED administrative state = LOCKED							

Table F.13: Port operational activation initiated (AN2.1)

$Q3_{AN}$ AN management	**AN primitive**	**V1 FE**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
SET administrative state = SHUTTING DOWN							(operational state = ENABLED)
	MPH-BR→						
				→FE205			
						MPH-BR→	
							WAIT until access is free (idle), then change operational state = DISABLED
						←MPH-BI	
				←FE203	LE2.1→LE1.0 →blocked		
	←MPH-BI	DS←ET FE5	AN2.1→AN1.0 →blocked STOP T1				
operational state = ENABLED administrative state = LOCKED							

Table F.14: Port operational and activated (AN2.2)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
SET administrative state = SHUTTING DOWN							(operational state = ENABLED)
	MPH-BR→						
				→FE205			
						MPH-BR→	
							WAIT until access is free (idle), then change operational state = DISABLED
						←MPH-BI	
				←FE203	LE2.2→LE1.0 →blocked		
	←MPH-BI	DS←ET FE5	AN2.2→AN1.0→ blocked				
operational state = ENABLED administrative state = LOCKED							

F.2.3 Blocking initiated by the LE

See also ETS 300 324-1 [2], subclause 14.1.3.3.2.

Table F.15: Port operational deactivated (AN2.0)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
							(operational state = ENABLED)
							change operational state = DISABLED (e.g. BER too high)
						←MPH-BI	
				←FE203	LE2.0→LE1.0 →blocked		
	←MPH-BI		AN2.0→AN1.0 →blocked				
operational state = DISABLED administrative state = UNLOCKED							

Table F.16: Port operational activation initiated (AN2.1)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
							(operational state = ENABLED)
							change operational state = DISABLED (e.g. BER too high)
						←MPH-BI	
				←FE203	LE2.1→LE1.0 →blocked		
	←MPH-BI	DS←ET FE5	AN2.1→AN1.0 →blocked STOP T1				
operational state = DISABLED administrative state = UNLOCKED							

Table F.17: Port operational and activated (AN2.2)

$Q3_{AN}$ AN management	**AN primitive**	**V1 FE**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
							(operational state = ENABLED)
							change operational state = DISABLED (e.g. BER too high)
						←MPH-BI	
				←FE203	LE2.1→LE1.0 →blocked		
	←MPH-BI	DS←ET FE5	AN2.2→AN1.0 →blocked				
operational state = DISABLED administrative state = UNLOCKED							

F.2.4 Co-ordinated unblocking initiated by the LE

See also ETS 300 324-1 [2], subclause 14.1.3.3.4.

Table F.18: AN administrative state is UNLOCKED (i.e. AN agrees to unblocking request from LE)

$Q3_{AN}$ AN management	**AN primitive**	**V1 FE**	**AN state change**	**V5 FE**	**LE state change**	**LE primitive**	**$Q3_{LE}$ LE management**
(operational state = DISABLED administrative state = UNLOCKED)							(operational state = DISABLED)
							operational state = ENABLED request
						←MPH-UBR	
				←FE201	LE1.0→LE1.1 →local unblock		
	←MPH-UBR		AN1.0→AN1.2 →remote unblock				
change operational state = ENABLED (note) administrative state = UNLOCKED							
	MPH-UBR→						
	←MPH-UBI		AN1.2→AN2.0 →operational	→FE202			
					LE1.1→LE2.0 →operational	MPH-UBI→	
							change operational state = ENABLED

NOTE: If there is no local disabling reason.

Table F.19: AN administrative state is LOCKED in the meantime (i.e. AN rejects unblocking request from LE)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
(operational state = DISABLED administrative state = UNLOCKED)							(operational state = DISABLED)
							operational state = ENABLED request
						←MPH-UBR	
				←FE201	LE1.0→LE1.1 →local unblock		
	←MPH-UBR		AN1.0→AN1.2 →remote unblock				
administrative state = LOCKED Unblock request is rejected							

F.2.5 Co-ordinated unblocking initiated by the AN

See also ETS 300 324-1 [2], subclause 14.1.3.3.4.

Table F.20: Administrative state = LOCKED, Operational state = ENABLED

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
(operational state = ENABLED administrative state = LOCKED)							
SET administrative state = UNLOCKED							
operational state = DISABLED administrative state = UNLOCKED							
	MPH-UBR→						
			AN1.0→AN1.1 →local unblock	→FE202			
					LE1.0→LE1.2 →remote unblock	MPH-UBR→	
							change operational state = ENABLED
						←MPH-UBR	
				←FE201	LE1.2→LE2.0 →operational	MPH-UBI→	
	←MPH-UBI		AN1.1→AN2.0 →operational				
change operational state = ENABLED							

Table F.21: Administrative state = UNLOCKED, Operational state = DISABLED

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
(operational state = DISABLED administrative state = UNLOCKED)							
operational state = ENABLED request							
	MPH-UBR→						
			AN1.0→AN1.1 →local unblock	→FE202			
					LE1.0→LE1.2 →remote unblock	MPH-UBR→	
							change operational state = ENABLED
						←MPH-UBR	
				←FE201	LE1.2→LE2.0 →operational	MPH-UBI→	
	←MPH-UBI		AN1.1→AN2.0 →operational				
change operational state = ENABLED							

Table F.22: Administrative state = LOCKED, Operational state = ENABLED, LE local unblocked (LE1.1)

$Q3_{AN}$ AN management	AN primitive	V1 FE	AN state change	V5 FE	LE state change	LE primitive	$Q3_{LE}$ LE management
(operational state = ENABLED administrative state = LOCKED)							
SET administrative state = UNLOCKED							
operational state = DISABLED administrative state = UNLOCKED							
	MPH-UBR→						
	←MPH-UBI		AN1.2→AN2.0 →operational	→FE202			
change operational state = ENABLED					LE1.1→LE2.0 →operational	MPH-UBI→	
							change operational state = ENABLED

Annex G (informative): Bibliography

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History

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