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Telekomunikacijsko upravljavno omrežje (TMN) - Vmesnik Q3 krajevne centrale (LE) za upravljanje konfiguracije vmesnikov V5 in pridruženih uporabniških profilov - 1. del: Specifikacija vmesnika Q3

Telecommunications Management Network (TMN); 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 Standard (Telecommunications series) has been produced by ETSI Technical Committee Telecommunications Management Network (TMN).

The present document is part 1 of a multi-part EN covering the Q3 interface at the Local Exchange (LE) for configuration management of V5 interfaces and associated customer profiles.

Part 1: "Q3 interface specification";

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

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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 the present document, 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 data sets 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

The present document 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 EN 300 324-1 [2] and EN 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 the present document.

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 EN 300 376-1 [4].

Generic modelling of leased line ports which are associated with a V5 interface is within the scope of the present document, 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 the present document.

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

Although security management is excluded from the present document, 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 the present document. It is included in the specification relating to fault and performance management, EN 300 379-1 [6].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] EN 300 291-1: "Telecommunications Management Network (TMN); Functional specification of Customer Administration (CA) on the Operations Systems/Network Element (OS/NE) interface; Part 1: Single line configurations".

[2] EN 300 324-1: "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] EN 300 347-1: "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] EN 300 376-1: "Telecommunications Management Network (TMN); Q3 interface at the Access Network (AN) for configuration management of V5 interfaces and associated user ports; Part 1: Q3 interface specification".

[5] EN 300 378-1: "Telecommunications Management Network (TMN); 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] EN 300 379-1: "Telecommunications Management Network (TMN); 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] ITU-T Recommendation M.3010 (1996): "Principles for a Telecommunications management network".

[8] ITU-T Recommendation M.3100 (1995): "Generic network information model".

[9] ITU-T Recommendation Q.811 (1997): "Lower layer protocol profiles for the Q3 and X interfaces".

[10] ITU-T Recommendation Q.812 (1997): "Upper layer protocol profiles for the Q3 and X interfaces".

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

[12] ETR 047 (1992): "Network Aspects (NA); Telecommunications Management Network (TMN); Management services".

[13] ITU-T Recommendation X.720 / ISO/IEC 10165-1 (1992): "Information technology - Open Systems Interconnection - Structure of management information: Management information model".

[14] ITU-T Recommendation X.721 / ISO/IEC 10165-2 (1992): "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".

[15] ITU-T Recommendation X.730 / ISO/IEC 10164-1 (1992): "Information technology - Open Systems Interconnection - Systems management: Object management function".

[16] ITU-T Recommendation X.731 / ISO/IEC 10164-2 (1992): "Information technology - Open Systems Interconnection - Systems management: State management function".

[17] ITU-T Recommendation X.732 / ISO/IEC 10164-3 (1992): "Information technology - Open Systems Interconnection - Systems Management: Attributes for representing relationships".

[18] ITU-T Recommendation Q.824.5 (1997): "Configuration management of V5 interface environments and associated customer profiles".

[19] ITU-T Recommendation Q.824.0 (1995): "Common information".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Access Network (AN): see EN 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 EN 300 324-1 [2].

Bearer Channel Connection (BCC): see EN 300 347-1 [3].

Communication channel (C-channel): see EN 300 324-1 [2].

Communication path (C-path): see EN 300 324-1 [2].

control protocol: see EN 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 EN 300 324-1 [2]).

envelope function address: see EN 300 324-1 [2].

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

layer 3 address: see EN 300 324-1 [2].

Local Exchange (LE): see EN 300 324-1 [2].

Operations System (OS): see ITU-T Recommendation M.3010 [7].

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

Permanent line (PL): see EN 300 324-1 [2].

protection protocol: see EN 300 347-1 [3].

provisioning variant: see EN 300 324-1 [2].

semi-permanent leased line: see EN 300 324-1 [2].

time slot number: see EN 300 324-1 [2].

V5 interface: see EN 300 324-1 [2].

V5 time slot: 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 ITU-T Recommendation M.3100 [8]: connectionTerminationPointBidirectional.

V5 Trail Termination Point (TTP): 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 ITU-T Recommendation M.3100 [8]: trailTerminationPoint-Bidirectional.

virtual access channel: 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 EN 300 291-1 [1]: etsiAccessChannel.

virtual access port: 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 EN 300 291-1 [1]: etsiAccessPort and used for provisioning services to the customer. This object class is subclassed for the different types of customer access ports.

3.2 Abbreviations

For the purposes of the present document, 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
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

4 Information model diagrams

The entity relationship diagram is given in subclause 4.1 and the inheritance hierarchy (is-a relationships) and naming hierarchy (containment relationships) are given in subclauses 4.2 and 4.3, respectively.

4.1 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 only if there is more than one 2,048 Mbit/s link.

4.1.1 Overview

A single managedElement can contain a number of virtualAccessPortR1s, 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 virtualAccessPortR1s. Likewise there is a bi-directional relationship between each v5Interface and all of its related v5Ttps (2,048 Mbit/s links).

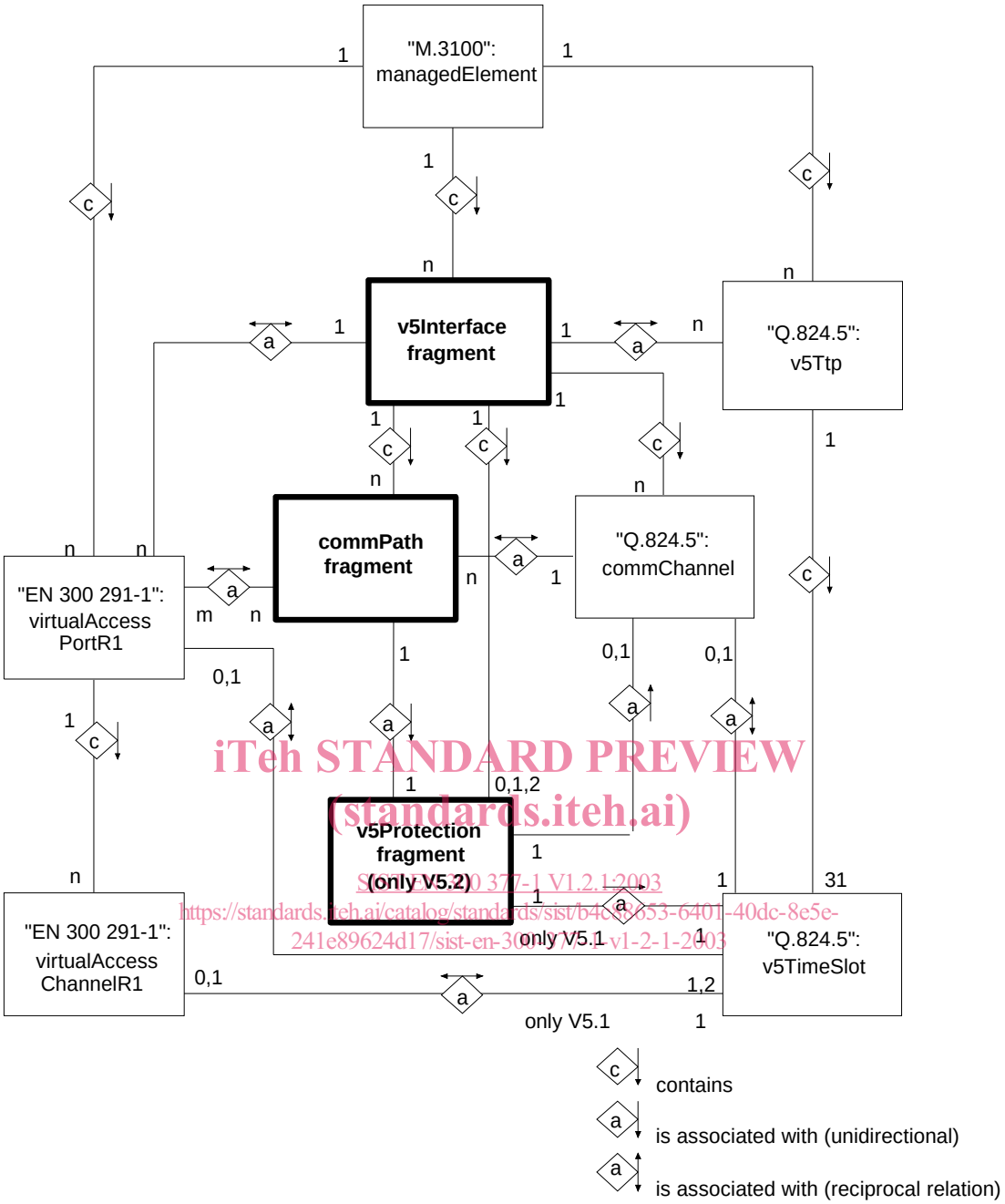

Figure 1: Entity relationship diagram - overview

Each virtualAccessPortR1 can contain a number of virtualAccessChannelR1s, 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 virtualAccessChannelR1 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.

4.1.2 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.

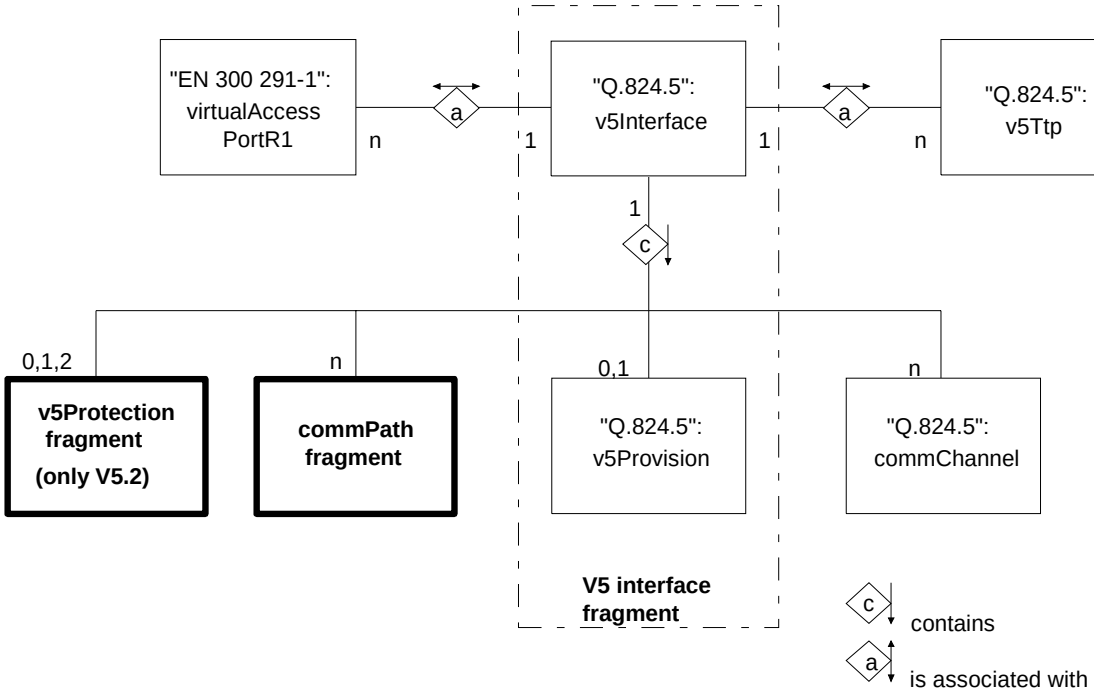

Figure 2: Entity relationship diagram - V5 interface fragment

4.1.3 Communication path fragment

Each ISDN virtualBasicRateAccessR1 or virtualPrimaryRateAccessR1 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 virtualBasicRateAccessR1s and/or virtualPrimaryRateAccessR1s, 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 virtualAnalogueAccessR1s 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.