INTERNATIONAL TELECOMMUNICATION UNION

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Q.832.2

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SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – Q3 interface

VB5.2 Management

ITU-T Recommendation Q.832.2

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
General	Q.700
Message transfer part (MTP)	Q.701–Q.709
Signalling connection control part (SCCP)	Q.711–Q.719
Telephone user part (TUP)	Q.720–Q.729
ISDN supplementary services	Q.730–Q.739
Data user part	Q.740–Q.749
Signalling System No. 7 management	Q.750–Q.759
ISDN user part	Q.760–Q.769
Transaction capabilities application part	Q.770–Q.779
Test specification	Q.780–Q.799
Q3 interface	**Q.800–Q.849**
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1999
BROADBAND ISDN	Q.2000–Q.2999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION Q.832.2

VB5.2 MANAGEMENT

Summary

This Recommendation specifies the Q3 interfaces between a Service Node (SN) and the Telecommunications Management Network (TMN) and between an Access Network (AN) and the TMN for the management associated with VB5.2 interfaces [4]. The managed object classes needed in addition to those defined for VB5.1 interfaces [3] in Recommendation Q.832.1 [13] are defined in this Recommendation. The interface specified is that between TMN Network Elements or Q-Adapters which interface to TMN Operations Systems (OSs) without mediation and between OSs and Mediation Devices, as defined in Recommendation M.3010 [5].

Source

ITU-T Recommendation Q.832.2 was prepared by ITU-T Study Group 4 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 26th of March 1999.

FOREWORD

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

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

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

NOTE

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Page

Recommendation G.832.2

VB5.2 MANAGEMENT

(Geneva, 1999)

1 Scope

This Recommendation specifies the Q3 interfaces between a Service Node (SN) and the Telecommunications Management Network (TMN) and between an Access Network (AN) and the TMN for the management associated with VB5.2 interfaces [4]. The managed object classes needed in addition to those defined for VB5.1 interfaces [3] in Recommendation Q.832.1 [13] are defined in this Recommendation. The interface specified is that between TMN Network Elements or Q-Adapters which interface to TMN Operations Systems (OSs) without mediation and between OSs and Mediation Devices, as defined in Recommendation M.3010 [5].

Existing protocols are used where possible, and the focus of the work is on defining the object model. The definition of the functionality of TMN Operations Systems is outside the scope of this Recommendation.

Security management is also outside the scope of this Recommendation.

The coordination of the Operation Systems of the Access Network and the Service Node for both VB5.1 and VB5.2 interfaces is within the scope of the planned ITU-T Recommendation Q.832.3 (Access management for VB5).

2 References

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

[1] ITU-T Recommendation G.853.1 (1999), *Common elements of the information viewpoint for the management of a transport network.*

[2] ITU-T Recommendation G.902 (1995), *Framework Recommendation on functional access networks – Architecture and functions, access types, management and service node aspects.*

[3] ITU-T Recommendation G.967.1 (1998), *V-Interfaces at the Service Node (SN): VB5.1 reference point specification.*

[4] ITU-T Recommendation G.967.2 (1999), *V-Interfaces at the Service Node (SN): VB5.2 reference point specification.*

[5] ITU-T Recommendation M.3010 (1996), *Principles for a telecommunications management network.*

[6] ITU-T Recommendation M.3100 (1995), *Generic network information model.*

[7] ITU-T Recommendation Q.2811[1], *Broadband Q3 and X interfaces – Lower layer protocols*.

[8] ITU-T Recommendation Q.2812[1], *Broadband Q3 and X interfaces – Upper layer protocols.*

[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] ITU-T Recommendation Q.824.5 (1997), *Stage 2 and stage 3 description for the Q3 interface – Customer administration: Configuration management of V5 interface environments and associated consumer profiles.*

[12] ITU-T Recommendation Q.824.6 (1998), *Stage 2 and stage 3 description for the Q3 interface – Customer administration: Broadband switch management*.

[13] ITU-T Recommendation Q.832.1 (1998), *VB5.1 Management*.

[14] CCITT Recommendation X.720 (1992) | ISO/IEC 10165-1:1993, *Information technology – Open Systems Interconnection – Structure of management information: Management information model*.

[15] CCITT Recommendation X.721 (1992) | ISO/IEC 10165-2:1992, *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information*.

[16] CCITT Recommendation X.731 (1992) | ISO/IEC 10164-2:1993, *Information technology – Open Systems Interconnection – Systems management: State management function.*

[17] CCITT Recommendation X.732 (1992) | ISO/IEC 10164-3:1993, *Information technology – Open Systems Interconnection – Systems management: Attributes for representing relationships*.

[18] ITU-T Recommendation I.751 (1996), *Asynchronous transfer mode management of the network element view*.

3 Definitions, abbreviations, and conventions

3.1 Definitions

This Recommendation defines the following term:

VB5 Resources: The management of user port functions and service port functions providing User Network Interface (UNI) and Service Node Interface (SNI) functionality, respectively, are considered in this Recommendation based on the framework defined in Recommendation G.902 [2]. Transmission specific resources lie outside its scope. VB5 Resources are referred to in this Recommendation as resources.

In addition, this Recommendation uses terms defined in ITU-T Recommendations

G.902 [2]: Access network (AN), User port functions, Service node (SN), Service node interface (SNI), Service port functions.

[1] Presently at the stage of draft.

G.967.1 [3]: Logical service port (LSP), Logical user port (LUP), Physical service port (PSP), Physical user port (PUP), Real-time management coordination (RTMC), Virtual user port (VUP).

G.967.2 [4]: Broadband bearer connection control (B-BCC).

I.751 [18]: Message communication function (MCF).

3.2 Abbreviations

This Recommendation uses the following abbreviations:

AAL ATM Adaptation Layer

AIS Alarm Indication Signal

AN Access Network

ASN.1 Abstract Syntax Notation One

ATM Asynchronous Transfer Mode

B-BCC Broadband Bearer Connection Control

ERD Entity-Relationship Diagram

GDMO Guidelines for the Definition Of Managed Objects

LSP Logical Service Port

LUP Logical User Port

MIB Management Information Base

MOC Managed Object Class

OAM Operations, Administration and Maintenance

OLT Optical Line Terminal

ONU Optical Network Unit

OS Operations System

PON Passive Optical Network

RDI Remote Defect Indication

RDN Relative Distinguished Name

RTMC Real-Time Management Coordination

SDH Synchronous Digital Hierarchy

SN Service Node

SNI Service Node Interface

TMN Telecommunications Management Network

TTP Trail Termination Point

UNI User-Network Interface

VC Virtual Channel

VDSL Very high speed Digital Subscriber Line

VP Virtual Path

VPC Virtual Path Connection

VPCI Virtual Path Connection Identifier

3.3 Conventions

NOTE – While this specification on VB5.2 management makes use of Recommendation X.722/Amd.1 (1995) on the SET-BY-CREATE property, the reader should be aware that Recommendation X.722/Amd.1 (1995) has not been applied in the VB5.1 management specification.

Objects and their characteristics and associated ASN.1 defined here are given names with capitals used to indicate the start of the next word and acronyms are treated as if they were words.

Throughout this Recommendation, all new attributes are named according to the following guidelines:

– The name of an attribute ends in the string "Ptr" if and only if the attribute value is intended to identify a single object.

– The name of an attribute ends in the string "PtrList" if and only if the attribute value is intended to identify one or more objects.

– The name of an attribute is composed of the name of an object class followed by the string "Ptr" if and only if the attribute value is intended to identify a specific object class.

– If an attribute is intended to identify different object classes, a descriptive name is given to that attribute and a description is provided in the attribute behaviour.

– The name of an attribute ends in the string "Id" if and only if the attribute value is intended to identify the name of an object, in which case this attribute should be the first one listed, should use ASN.1 NameType and should not be used to convey other information.

– The name of an attribute is composed of the name of an object class followed by the string "Id" if and only if the attribute value is intended to identify the name of the object class holding that attribute.

4 General overview

The following information model diagrams have been drawn for the purpose of clarifying the relations between the different object classes of the model.

1) Entity-relationship models showing the relations of the different managed objects.

2) Inheritance Hierarchy showing how managed objects are derived from each other (i.e. the different paths of inherited characteristics of the different managed objects).

These diagrams are only for clarification. The formal specification in terms of GDMO templates and ASN.1 type definitions are the relevant information for implementations.

4.1 Entity-relationship models

The following conventions (Figure 1) are used in the diagrams:

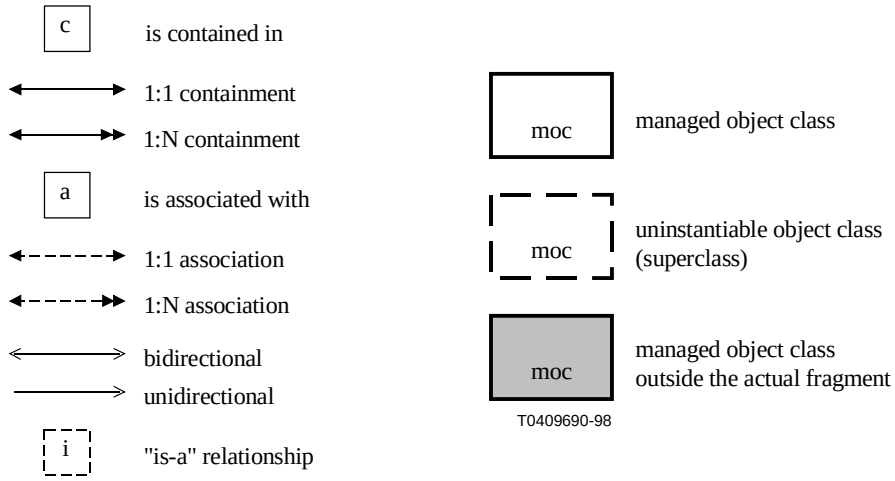
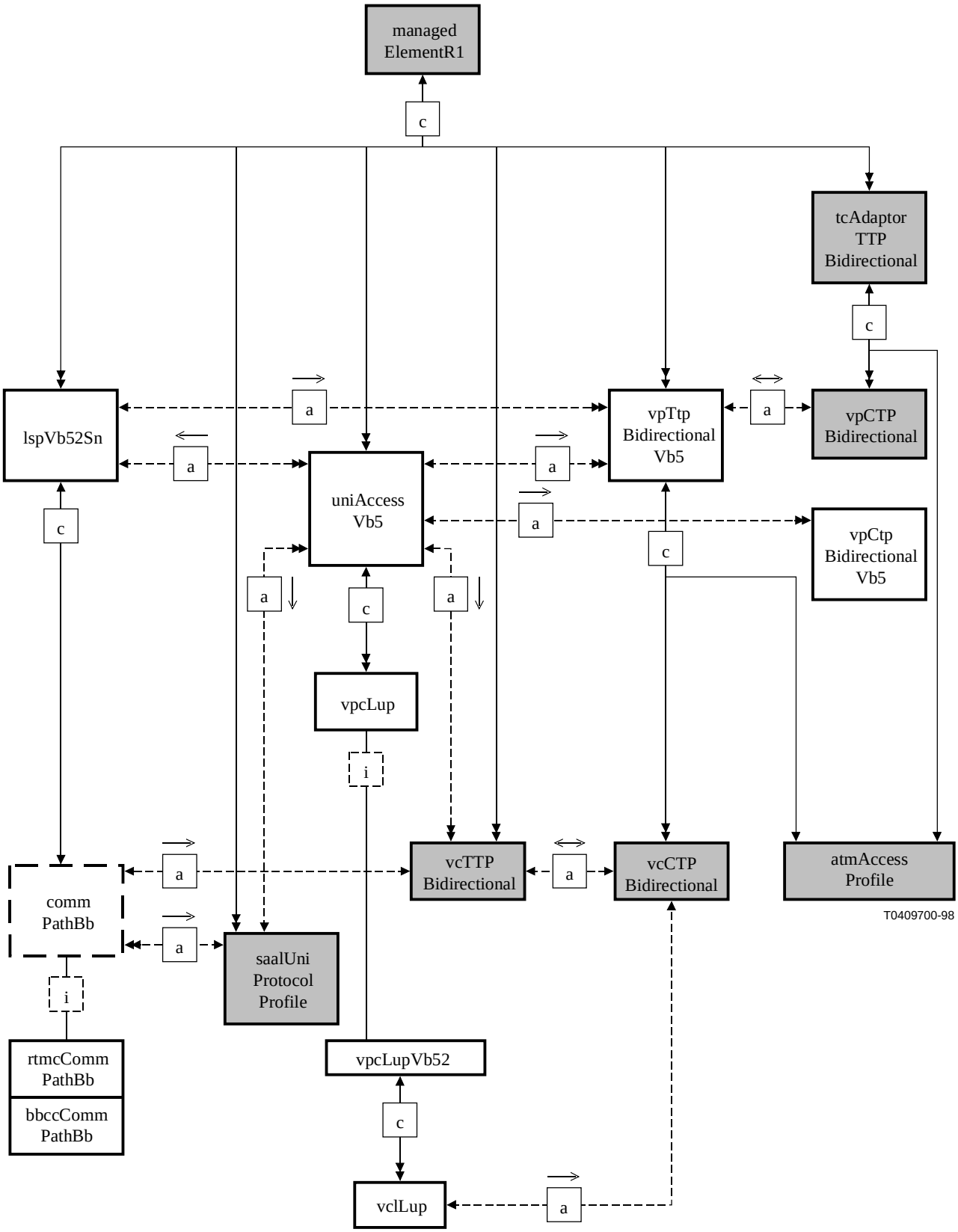


Figure 1/Q.832.2 – Conventions used in diagrams for Entity-relationship models

Where the directionality of containment is not clear, it can be identified by implications since the root class is unique.

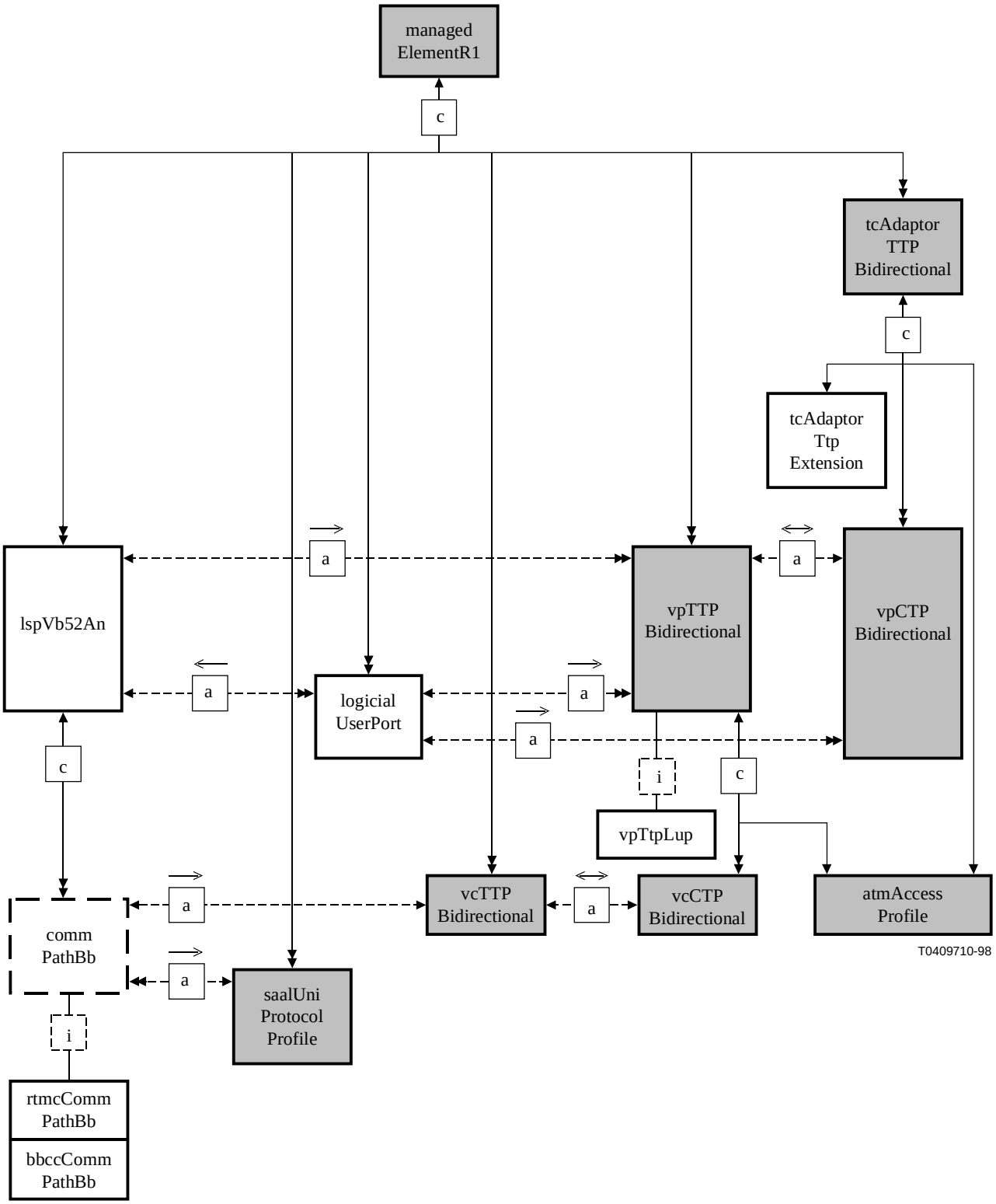
4.1.1 Entity-relationship diagram for the service node (Figure 2)



NOTE – Not all object classes are shown in this diagram as some object classes are reused unchanged from Recommendation l.751.

Figure 2/Q.832.2 – Entity-relationship diagram – Service node

4.1.2 Entity-relationship diagram for the access network (Figure 3)



NOTE – Not all object classes are shown in this diagram as some object classes are reused unchanged from Recommendation l.751.

Figure 3/Q.832.2 – Entity-relationship diagram – Access network

4.2 Inheritance hierarchy

Figure 4 traces the inheritance relationships from the highest level object (Recommendation X.721 [15], "top") to the managed objects which are defined in this Recommendation.

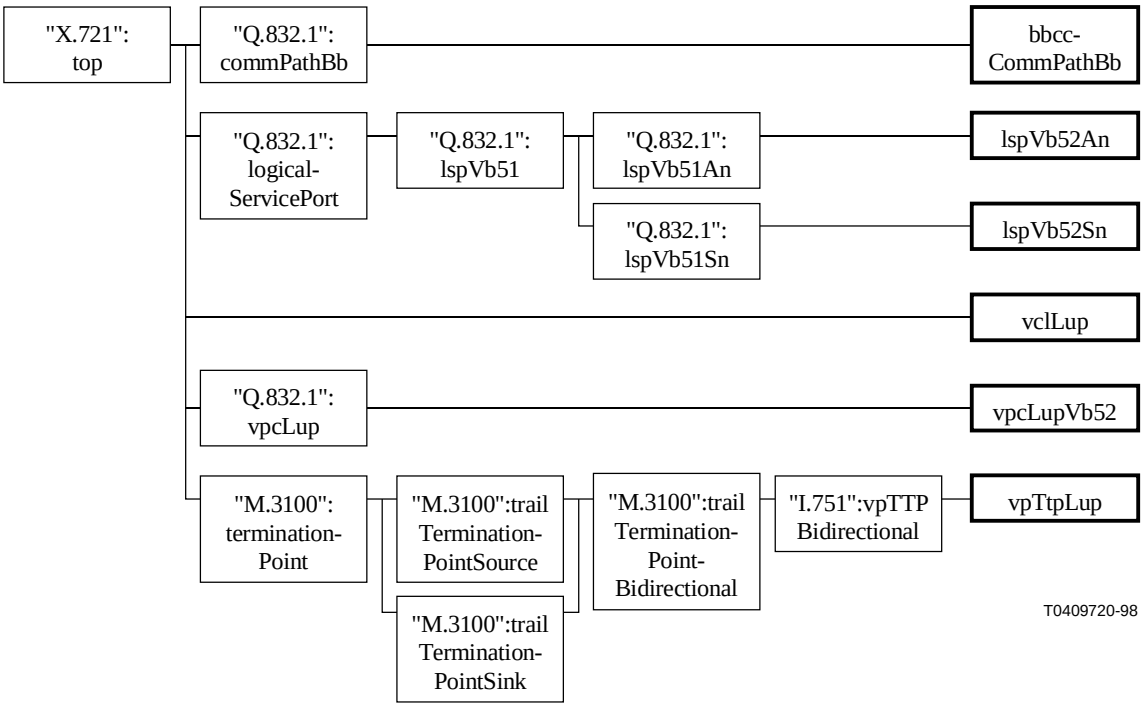


Figure 4/Q.832.2 – Inheritance hierarchy

5 Formal definitions

This clause gives the formal definitions of the managed object classes, name bindings, general packages, behaviours, attributes, actions and notifications.

5.1 Object classes

This subclause specifies the object classes for all of the managed objects used in the management information model. These object classes are either defined here or by reference to other specifications. Classes of managed objects which are defined elsewhere and which are only used for containment are not included, but are identified by the name bindings for the classes specified here.

Unidirectional trails are modelled by bidirectional objects with the traffic descriptor in the unused direction set to a null value.

The following classes which are defined in Recommendation Q.832.1 [13] may be instantiated:

– "Q.832.1":logicalUserPort;
– "Q.832.1":rtmcCommPath;
– "Q.832.1":tcAdaptorTtpExtension;
– "Q.832.1":uniAccessVb5;
– "Q.832.1":vpcLup;

– "Q.832.1":vpCtpBidirectionalVb5;

– "Q.832.1":vpCtpBidirectionalVb5.

5.1.1 Profiling notes for imported classes

5.1.1.1 vpcLup (VPC at logical user port)

To avoid the deletion and re-creation of objects, instances of this class are used for the case of semi-permanent connections without the intention of including on-demand connections at a later date, only. Instances of vpcLupVb52 should be used otherwise.

5.1.2 Definition of classes

5.1.2.1 bbccCommPathBb (B-BCC communications path for broadband)

```
bbccCommPathBb MANAGED OBJECT CLASS
        DERIVED FROM "ITU-T Q.832.1":commPathBb;
        CHARACTERIZED BY
                bbccCommPathBbPkg PACKAGE
                        BEHAVIOUR bbccCommPathBbBeh;;;
REGISTERED AS {q832-2ManagedObjectClass 1};

bbccCommPathBbBeh BEHAVIOUR
        DEFINED AS
                "The B-BCC communication path object class carries the B-BCC protocol information. Only one
                object of this class shall be contained within the superior managed object.";
```

5.1.2.2 lspVb52An (logical service port for VB5.2 in the access network)

```
lspVb52An MANAGED OBJECT CLASS
        DERIVED FROM "ITU-T Q.832.1":lspVb51An;
        CHARACTERIZED BY
                lspVb52AnPkg PACKAGE
                        BEHAVIOUR lspVb52AnBeh;
                        NOTIFICATIONS
                                resetBbccResult,
                                presyncBbccResult;;;
REGISTERED AS {q832-2ManagedObjectClass 2};

lspVb52AnBeh BEHAVIOUR
        DEFINED AS
                "This managed object represents a group of VP's coming from the same Service Node and controlled
                by the same VB5.2 protocol.
                The resetBbccResult notification shall be emitted by the AN when a BBCC reset procedure is
                initiated by the SN.
                The presyncBbccResult notification shall be emitted by the AN when a BBCC presynchronization
                procedure is initiated by the SN.";
```

5.1.2.3 lspVb52Sn (logical service port for VB5.2 in the service node)

```
lspVb52Sn MANAGED OBJECT CLASS
        DERIVED FROM "ITU-T Q.832.1":lspVb51Sn;
        CHARACTERIZED BY
                lspVb52SnPkg PACKAGE
                        BEHAVIOUR lspVb52SnBeh;
                        ATTRIBUTES
                                connectionIdentifierFlag
                                        DEFAULT VALUE Q832-2ASN1Module.connectionIdentifierFlagDefault
                                        GET-REPLACE;
```

```
                ACTIONS
                        resetBbcc;
                NOTIFICATIONS
                        resetBbccResult
                        ;;;
REGISTERED AS {q832-2ManagedObjectClass 3};

lspVb52SnBeh BEHAVIOUR
        DEFINED AS
                "This managed object represents a group of VP's coming from the same Access Network and
                controlled by the same VB5.2 protocol.
                The connectionIdentifierFlag attribute indicates whether an exclusive procedure, when the Service
                Node requests a dedicated VPCI/VCI combination, or a non-exclusive procedure, when the Service
                Node proposes a preferred VPCI/VCI combination, is used for the selection of all on-demand
                VPCI/VCI combinations on the Logical Service Port.
                The resetBbcc action initiates the BBCC reset procedure.
                The resetBbccResult notification shall be emitted by the SN when a BBCC reset procedure is
                initiated autonomously by the NE.
                The presyncBbccResult notification shall be emitted by the SN when a BBCC presynchronization
                procedure is initiated autonomously by the NE.";
```

5.1.2.4 vclLup (VC link at the logical user port)

```
vclLup MANAGED OBJECT CLASS
        DERIVED FROM "ITU-T X.721":top;
        CHARACTERIZED BY
                vclLupPkg PACKAGE
                        BEHAVIOUR vclLupBeh;
                        ATTRIBUTES
                                vclLupId
                                        GET
                                        SET-BY-CREATE,
                                bbccRequired
                                        GET
                                        SET-BY-CREATE,
                                vciAtLup
                                        GET
                                        SET-BY-CREATE,
                                vcCtpPtr
                                        GET
                                        SET-BY-CREATE;
                        NOTIFICATIONS
                                "ITU-T X.721": objectDeletion
                        ;;;
REGISTERED AS {q832-2ManagedObjectClass 4};

vclLupBeh BEHAVIOUR
        DEFINED AS
                "The vclLup managed object class is a class of managed objects that provides the SN with additional
                AN information about (semi-)permanent VC connections.
                A vclLup instance may be contained in a vpcLupVb52 instance only if the vpType attribute of
                vpcLupVb52 is set to mixed.
                If the bbccRequired attribute is set to TRUE, the SN triggers the B-BCC protocol to establish the
                VC connection in the AN.
                An object deletion notification is emitted, when an object instance is deleted automatically as a
                consequence of the deletion of the associated vcCTPBidirectional instance.";
```

5.1.2.5 vpcLupVb52 (VPC at the logical user port for VB5.2)

```
vpcLupVb52 MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T Q.832.1":vpcLup;
    CHARACTERIZED BY
        "ITU-T I.751":egressTrafficDescriptorPkg,
        "ITU-T I.751":ingressTrafficDescriptorPkg,
        "ITU-T I.751":qosClassesPkg,
        lupVcLevelProfilePkg ,
        vpcLupVb52Pkg PACKAGE
            BEHAVIOUR vpcLupVb52Beh;
            ATTRIBUTES
                "ITU-T Q.824.6":vpType
                    GET-REPLACE;;;
REGISTERED AS {q832-2ManagedObjectClass 5};

vpcLupVb52Beh BEHAVIOUR
    DEFINED AS
        "Each instance of the vpcLupVb52 managed object class models within the SN a single VPC that
        belongs to an LUP and is terminated at the AN; within these VPCs shall be allocated only VCCs
        carried towards the SN across a VB5.2 interface. Instances of this managed object class provide the
        SN with the relevant information to select at the UNI a VPCs that may contain the VCC requested
        by the user.
        An instance of vpcLupVb52 may contain semi-permanent or on-demand or both types of VC
        connections; the class of the VC connections contained in the VPC is specified by the vpType
        attribute.
        The packages egressTrafficDescriptorPkg and ingressTrafficDescriptorPkg provide information
        concerning the traffic characteristic of the VP in both directions, ingress and egress; the attribute
        values of these packages shall be provided to the managing system of the SN by the managing system
        of the AN.
        The package qosClassesPkg contains the QoS class of the VP. The attribute values of this package
        shall be provided to the managing system of the SN by the managing system of the AN.
        The package lupVcLevelProfilePkg provides the SN with the information concerning the remote VC
        level profiling; the attribute values of this package shall be provided to the managing system of the
        SN by the managing system of the AN.";
```

5.1.2.6 vpTtpLup (VP trail termination point at the logical user port)

```
vpTtpLup MANAGED OBJECT CLASS
    DERIVED FROM "ITU-T I.751":vpTTPBidirectional;
    CHARACTERIZED BY
        "ITU-T Q.824.6": propagationDelayPkg,
        vpTtpLupPkg PACKAGE
            BEHAVIOUR vpTtpLupBeh;;;
REGISTERED AS {q832-2ManagedObjectClass 6};

vpTtpLupBeh BEHAVIOUR
    DEFINED AS
        "Each instance of the vpTtpLup managed object class models (within the AN) a single VPC that
        belongs to an LUP and is terminated at the AN.";
```

5.2 Name bindings

5.2.1 vclLup-vpcLupVb52

```
vclLup-vpcLupVb52 NAME BINDING
    SUBORDINATE OBJECT CLASS vclLup
        AND SUBCLASSES;
    NAMED BY SUPERIOR OBJECT CLASS vpcLupVb52
        AND SUBCLASSES;
```

WITH ATTRIBUTE vclLupId;
BEHAVIOUR vclLup-vpcLupVb52Beh;
CREATE
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {q832-2NameBinding 1};

vclLup-vpcLupVb52Beh BEHAVIOUR
DEFINED AS
"An instance of a vclLup managed object class shall be deleted automatically when the associated vcCTPBidirectional object instance (refered to by the vcCtpPtr) is deleted.";

5.2.2 vpcLupVb52-uniAccessVb5

vpcLupVb52-uniAccessVb5 NAME BINDING
SUBORDINATE OBJECT CLASS vpcLupVb52
AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "ITU-T Q.832.1":uniAccessVb5
AND SUBCLASSES;
WITH ATTRIBUTE "ITU-T Q.832.1":vpcLupId;
BEHAVIOUR vpcLupVb52-uniAccessVb5Beh;
CREATE
WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE
ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {q832-2NameBinding 2};

vpcLupVb52-uniAccessVb5Beh BEHAVIOUR
DEFINED AS
" An instance of vpcLupVb52 of vpType 'on-demand' or 'mixed' may not exist within a uniAccessVb5 instance, when the latter is associated to a vpTTPBidirectionalVB5 instance of vpType 'on-demand' or 'mixed' (by the tpAndVpciSigPtrList).";

5.3 Definition of packages

5.3.1 lupVcLevelProfilePkg (Logical user port VC Level profile package)

lupVcLevelProfilePkg PACKAGE
BEHAVIOUR lupVcLevelProfilePkgBeh;
ATTRIBUTES
"ITU-T I.751":maxNumVCIBitsSupported
GET-REPLACE,
"ITU-T I.751":maxNumActiveVCCsAllowed
GET-REPLACE;
REGISTERED AS {q832-2Package 1};

lupVcLevelProfilePkgBeh BEHAVIOUR
DEFINED AS
"This package contains attributes that model the VC level profiling concerning a VPC of a LUP associated to a VB5.2 interface. The attributes reflect the lower of the values supported by the AN and the user. E.g. if the AN value is 8 and the user value is 6 then the attribute value is 6, and if the AN value is 8 and the user value is 9 then the attribute value is 8.";

5.4 Definition of attributes

5.4.1 bbccRequired (B-BCC required)

bbccRequired ATTRIBUTE
WITH ATTRIBUTE SYNTAX Q832-2ASN1ModuleBoolean;
MATCHES FOR EQUALITY;
BEHAVIOUR bbccRequiredBeh;
REGISTERED AS {q832-2Attribute 1};

bbccRequiredBeh BEHAVIOUR
DEFINED AS
"This attribute defines whether a (semi-)permanent connection in the SN is to be established in the AN by using the B-BCC protocol. Moreover, if this is the case, the SN will re-establish the connection autonomously in case of a failure of the connection in the AN.";

5.4.2 connectionIdentifierFlag (Connection identifier flag)

connectionIdentifierFlag ATTRIBUTE
WITH ATTRIBUTE SYNTAX Q832-2ASN1Module.ConnectionIdentifierFlag;
MATCHES FOR EQUALITY;
BEHAVIOUR connectionIdentifierFlagBeh;
REGISTERED AS {q832-2Attribute 2};

connectionIdentifierFlagBeh BEHAVIOUR
DEFINED AS
"This attribute indicates whether an exclusive procedure, when the Service Node requests a dedicated VPCI/VCI combination, or a non-exclusive procedure, when the Service Node proposes a preferred VPCI/VCI combination, is used for the selection of on-demand VPCI/VCI combinations.";

5.4.3 vcCtpPtr (VC CTP pointer)

vcCtpPtr ATTRIBUTE
WITH ATTRIBUTE SYNTAX Q832-2ASN1Module.ObjectInstance;
MATCHES FOR EQUALITY;
BEHAVIOUR vcCtpPtrBeh;
REGISTERED AS {q832-2Attribute 3};

vcCtpPtrBeh BEHAVIOUR
DEFINED AS
"This entity identifies the virtual channel connection termination point associated with the object instance.";

5.4.4 vciAtLup (VCI at the logical user port)

vciAtLup ATTRIBUTE
WITH ATTRIBUTE SYNTAX Q832-2ASN1Module.VciValue;
MATCHES FOR EQUALITY;
BEHAVIOUR vciAtLupBeh;
REGISTERED AS {q832-2Attribute 4};

vciAtLupBeh BEHAVIOUR
DEFINED AS
"This attribute defines the VCI value at the user side of a (semi-)permanent VC connection.";

5.4.5 vclLupId (VC link at the logical user port identifier)

vclLupId ATTRIBUTE
WITH ATTRIBUTE SYNTAX Q832-2ASN1Module.NameType;
MATCHES FOR EQUALITY;
BEHAVIOUR vclLupIdBeh;
REGISTERED AS {q832-2Attribute 5};

vclLupIdBeh BEHAVIOUR
DEFINED AS
"This attribute is used for naming instances of the class vclLup.";

5.5 Definition of actions

5.5.1 resetBbcc (reset BBCC protocol)

resetBbcc ACTION
BEHAVIOUR resetBbccBeh;
MODE CONFIRMED;
WITH REPLY SYNTAX Q832-2ASN1Module.ResetBbccResult;
REGISTERED AS {q832-2Action 1};

resetBbccBeh BEHAVIOUR
DEFINED AS
"This action is used to initiate the BBCC reset procedure.";

5.6 Definition of notifications

5.6.1 presyncBbccResult (result of presynchronization of BBCC protocol)

presyncBbccResult NOTIFICATION
BEHAVIOUR presyncBbccResultBeh;
REGISTERED AS {q832-2Notification 1};

presyncBbccResultBeh BEHAVIOUR
DEFINED AS
"This notification indicates to the operator that a BBCC presynchronization procedure, which was initiated by the SN, took place successfully.";

5.6.2 resetBbccResult (result of reset of BBCC protocol)

resetBbccResult NOTIFICATION
BEHAVIOUR resetBbccResultBeh;
WITH INFORMATION SYNTAX Q832-2ASN1Module.ResetBbccNotificationResult;
REGISTERED AS {q832-2Notification 2};

resetBbccResultBeh BEHAVIOUR
DEFINED AS
"This notification indicates to the operator that a BBCC reset procedure was initiated either by the remote side or autonomously by the NE. The resource affected by the reset procedure (according to the VB5.2 interface standard) is specified by the ResetBbccNotificationResult.";

6 Type definitions

```
Q832-2ASN1Module {
        itu-t(0) recommendation (0) q(17) q832(832) dot(127) vb52(2)
            informationModel(0) asn1Modules(2) asn1DefinedTypesModule(0)}

DEFINITIONS IMPLICIT TAGS ::=

BEGIN
-- EXPORTS everything


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

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

    ProbableCause
        FROM Attribute-ASN1Module {joint-iso-ccitt ms(9)
            smi(3) part2(2) asn1Module(2) 1}        -- X.721

    VciValue
        FROM AtmMIBMod {itu-t(0) recommendation(0) i(9) atmm(751)
            informationModel(0) asn1Module(2) atm(0)};

-- end of imports


-- start of object identifier definitions

q832-2InformationModel
    OBJECT IDENTIFIER ::= {itu-t(0) recommendation (0)
        q(17) q832(832) dot(127) vb52(2) informationModel(0)}
q832-2StandardSpecificExtension
    OBJECT IDENTIFIER ::= {q832-2InformationModel standardSpecificExtension(0)}
q832-2ManagedObjectClass
    OBJECT IDENTIFIER ::= {q832-2InformationModel managedObjectClass(3)}
q832-2Package
    OBJECT IDENTIFIER ::= {q832-2InformationModel package(4)}
q832-2NameBinding
    OBJECT IDENTIFIER ::= {q832-2InformationModel nameBinding(6)}
q832-2Attribute
    OBJECT IDENTIFIER ::= {q832-2InformationModel attribute(7)}
q832-2Action
    OBJECT IDENTIFIER ::= {q832-2InformationModel action(9)}
q832-2Notification
    OBJECT IDENTIFIER ::= {q832-2InformationModel notification(10)}

vb52ProbableCause
    OBJECT IDENTIFIER ::= {q832-2StandardSpecificExtension 0}

-- end of object identifier definitions
```

```
-- The value assignments for the
        -- ProbableCause parameter of the
        -- VB5.2 specific TMN communications alarm notification
        -- are specified below

bbccProtocolError
        ProbableCause ::= globalValue : {vb52ProbableCause 1}
bbccProtocolSyntaxError
        ProbableCause ::= globalValue : {vb52ProbableCause 2}
bbccProtocolTimeOutError
        ProbableCause ::= globalValue : {vb52ProbableCause 3}

-- other ASN.1 definitions in alphabetical order

Boolean ::= BOOLEAN

ConnectionIdentifierFlag ::=INTEGER {
        exclusiveVpciVciCombination     (0),
        preferredVpciVciCombination     (1) }

connectionIdentifierFlagDefault
        ConnectionIdentifierFlag ::= exclusiveVpciVciCombination

ResetBbccNotificationResult ::= SEQUENCE {
        resource                ObjectInstance,
        result                  ResetBbccResult }

ResetBbccResult ::= ENUMERATED{
        notSuccessful (0),
        successful (1)}


END -- of Q832-2 ASN.1Module
```

7 Protocol stacks

The protocol stacks specified in Recommendations Q.811, Q.812, G.773 and the SDH digital cross-connect part of Recommendation G.784 can be used as part of the protocol stack for this Recommendation. The following Recommendations should be used to extend these stacks to include ATM:

– Recommendation Q.2811, Broadband Q3 and X interfaces – Lower layer protocols

– Recommendation Q.2812, Broadband Q3 and X interfaces – Upper layer protocols

ANNEX A

Management requirements

A.1 Q3(AN) and Q3(SN) requirements

A.1.1 General management requirements

Refer to A.1/Q.832.1 [13].

A.1.2 Real-time management coordination requirements

Refer to A.2/Q.832.1 [13].

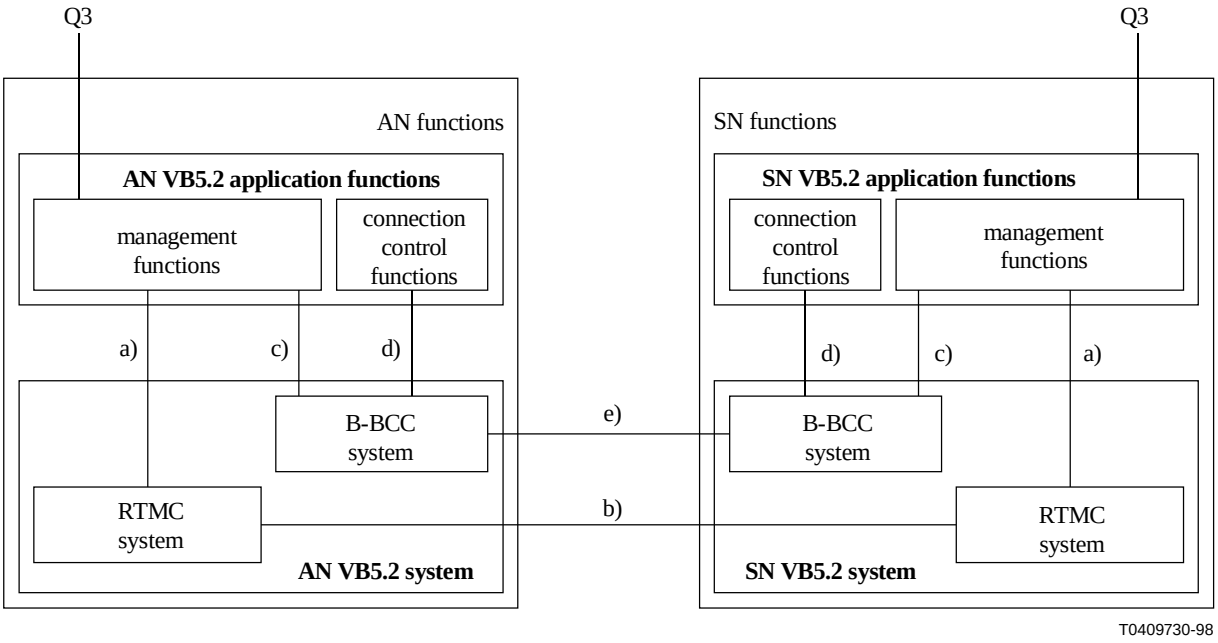
ANNEX B

Relationship between VB5.2 interfaces and the management model

B.1 Introduction

This annex describes the relationships between VB5.2 interfaces and the management model. In particular it describes when primitives (see "General functional architecture" [4]) are created due to messages from the OS and when messages are sent to the OS as a result of primitives generated by the managed system.

Figure B.1 shows the position of the management functions (which works on the management model and sends/receives OS messages) within a VB5.2 NE. The management function generates directly mee-Primitives to the VB5.2 system (channels a and c in the figure) and it triggers the connection control function to send cee-primitives to the VB5.2 system (channel d in the figure). For definition of mee- and cee-primitives, refer to [4]. The interworking between management function and connection control function is not described on primitive level but just verbally.



a) Service primitives between management functions and RTMC system
b) RTMC protocol messages across the VB5.2 reference point
c) Service primitives between management functions and B-BCC system
d) Service primitives between connection control functions and B-BCC system
e) B-BCC protocol messages across the VB5.2 reference point

Figure B.1/Q.832.2 – Overall VB5.2 system specification model

In cases where attributes are changed as a result of primitives generated by the managed system, the OS may be informed by change notifications.

The following subclauses within this annex describe the use of the various VB5 labels and VB5.2 procedures and relate the information model of the AN and the SN to the primitives of the VB5.2 system.

B.2 LSP, LUP and VPCI labels

Refer to C.2/Q.832.1 [13].

B.3 Shutting down

Refer to C.3/Q.832.1 [13].

B.4 Blocking and unblocking

Refer to C.4/Q.832.1 [13].

B.5 VPCI consistency checking

Refer to C.5/Q.832.1 [13].

B.6 Interface start-up

The B-BCC start-up provides the communication procedures between SN and AN to initialize the B-BCC protocol entities by setting them to the idle state.

The startupLsp action is normally sent by the operator when no protocol is active (when the operationalState attribute of the related lspVb52 object class has the value 'disabled'). The interface start-up procedure is initiated by a single startupLsp action and should occur in the following sequence:

a) RTMC start-up: Refer to C.6/Q.832.1 [13] but note that the lspActivationState attribute does not change to the value 'activated' and no start-up action reply is sent after the RTMC start-up is finished.

b) B-BCC start-up: Specified in this subclause.

A B-BCC start-up shall be initiated by the NE systems after the RTMC protocol is running without failure. If only one protocol is active, the lspActivationState does not the have value 'activated'. From the view of the management information model, the B-BCC start-up involves the MOCs lspVb52Sn and lspVb52An with their startupLsp action and lspActivationState and operationalState attributes.

Values of the attribute lspActivationState are 'activated', 'restarting' and 'not activated'.

Values of the attribute operationalState are 'enabled' and 'disabled'.

On the VB5.2 interface side the following primitives are related to the B-BCC start-up procedure:

– meeBbccStartupReq (SN side)
– meeBbccStartupConf (SN side)
– meeBbccRestartReq (SN side)
– meeBbccRestartConf (SN side)
– meeBbccStartResetInd (SN side)
– meeBbccStartTrafficInd (SN and AN side)
– meeBbccStartTrafficReq (AN side)
– meeBbccStartTrafficConf (AN side)
– meeBbccPresyncInd (AN side)
– meeBbccPresyncAccRes (AN side)
– meeBbccPresyncRejRes (AN side)

The following options for a start-up procedures are valid:

– B-BCC start-up SN side (see B.6.1);
– B-BCC start-up initiated by SN OS (see B.6.1.1);
– B-BCC start-up initiated autonomously by the SN NE (see B.6.1.2);
– B-BCC start-up from AN side (see B.6.2);
– B-BCC start-up initiated by AN OS (see B.6.2.1);
– Automatically initiated by the SN NE on receipt of an indication that the SAAL for the B-BCC protocol has been established by the AN (called later: B-BCC start-up automatically initiated by the AN NE) (see B.6.2.2).

Details of state transitions are given in the relevant state transition tables of Annex C. Primitives in the SN and in the AN are linked through VB5 messages as described in the VB5 interface standards.

In the diagrams ' - A' indicates an action, ' - R' indicates and action reply, ' - N' indicates a notification and '(...)' indicates a the new value of an attribute. These diagrams do not show all of the possible information flows.

B.6.1 B-BCC start-up from SN side

B.6.1.1 B-BCC start-up initiated by SN OS

SN events

The OS of the SN initiates an interface start-up through the startupLsp action of the lspVb52Sn object class. The action causes the management function to examine the value of the operationalState attribute. If the value is 'enabled', the startupLsp action ends immediately and informs the OS of the SN through the start-up action reply.

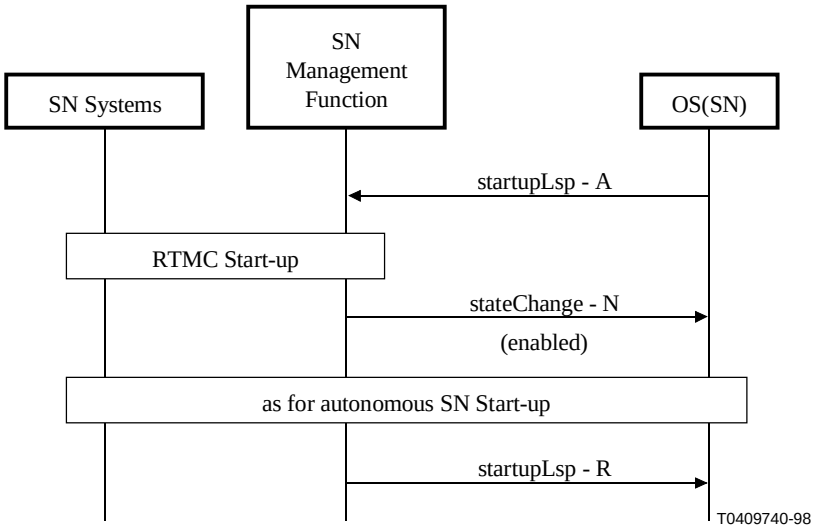
If the value of the operationalState attribute is 'disabled', then the RTMC start-up is initiated, the value is of the changed to 'enabled', and the management function of the SN generates an meeBbccStartupReq primitive towards the SN B-BCC system.

After completion of the procedure, the SN B-BCC system generates an meeBbccStartupConf primitive and the result information is presented to the OS with the action reply StartupLspResult.

The information syntax of this action reply reflects the addressed resource and could have at this stage the following values: 'not successful' and 'successful'.

If the value of the lspActivationState attribute changes, an attributeValueChange notification is sent to the OS but if the state of the operationalState attribute changes, a stateChange notification is sent to the OS.

These information flows are illustrated in Figure B.2.



NOTE – The SN events for the autonomous SN Start-up are shown in Figure B.4.

Figure B.2/Q.832.2 – Interface start-up by OS(SN) – SN events

AN events

The AN management function receives an meeBbccStartTrafficInd primitive from the AN B-BCC system. The AN OS is informed by an attributeValueChange notification of the lspActivationState attribute.

The start-up procedure is completed by a reset. The AN connection control function informs the management function of the AN about a reset request from the SN which causes a resetBbccResult notification to be generated by the appropriate lspVb52An object. The information syntax of this notification reflects the addressed resource and the success/no success of the B-BCC reset procedure.

These information flows are illustrated in Figure B.3.

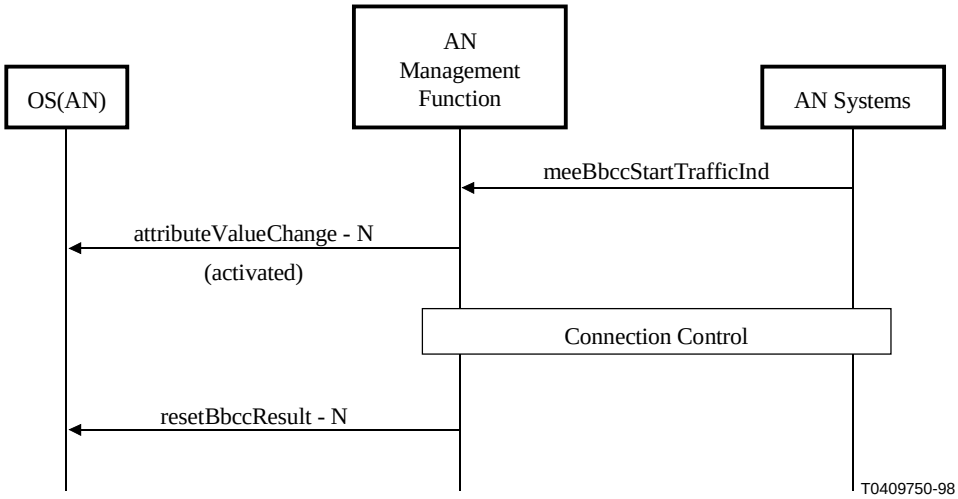


Figure B.3/Q.832.2 – Start-up initiated at SN side – AN events

B.6.1.2 B-BCC start-up initiated autonomously by the SN NE

SN events

In case of an automatic start-up procedure, the management function of the SN generates an meeBbccStartupReq primitive towards the SN B-BCC system. After completion of the procedure, the SN B-BCC system generates an meeBbccStartupConf primitive. If the value of the lspActivationState attribute changes, an attributeValueChange notification is sent to the OS but if the state of the operationalState attribute changes, a stateChange notification is sent to the OS.

These information flows are illustrated in Figure B.4.

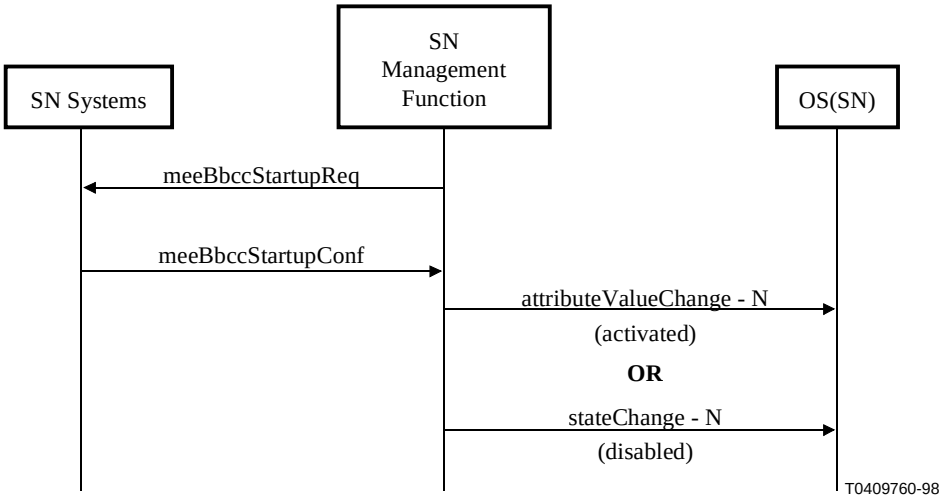


Figure B.4/Q.832.2 – Autonomous interface start-up by SN – SN events

AN events

Refer to the AN events for B-BCC start-up initiated by SN OS in B.6.1.1.

B.6.2 B-BCC start-up from AN side

B.6.2.1 B-BCC start-up initiated by AN OS

AN events

The OS of the AN initiates an interface start-up through the startupLsp action of the lspVb52Sn object class. The action causes the management function to examine the value of the operationalState attribute. If the value is 'enabled', the startupLsp action ends immediately and informs the OS of the AN through the start-up action reply.

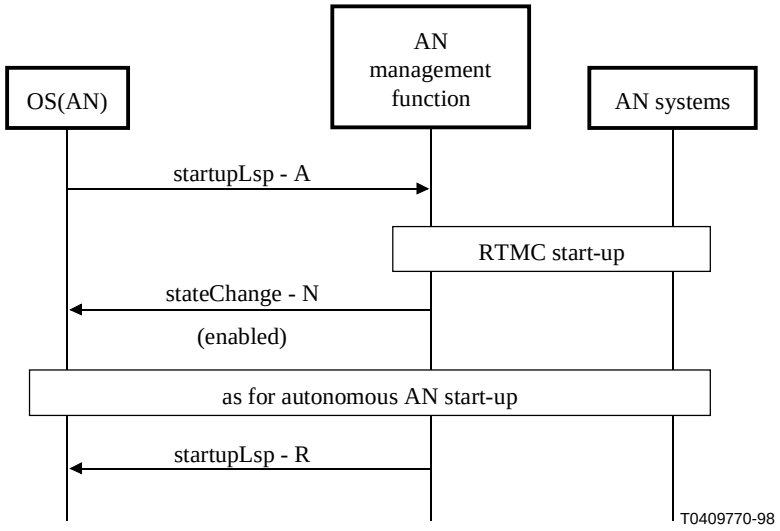
If the value of the operationalState attribute is 'disabled', then the RTMC start-up is initiated, the value is of the changed to 'enabled', and the management function of the AN generates an meeBbccStartupReq primitive towards the AN B-BCC system. After an establishment of the SAAL has taken place, the AN B-BCC system sends an meeBbccStartTrafficConf primitive to the AN management function.

The result information is presented to the OS with the action reply StartupLspResult. The information syntax of this action reply reflects the addressed resource and could have at this stage the following values: 'not successful' and 'successful'.

If the value of the lspActivationState attribute changes, an attributeValueChange notification is sent to the OS but if the state of the operationalState attribute changes a stateChange notification is sent to the OS.

From this point on, refer to B.6.2.2.1 (if the SN side decides for a B-BCC start-up) or to B.6.2.2.2 (if the SN decides for a B-BCC Restart).

These information flows are illustrated in Figure B.5.



NOTE – The AN events for the autonomous AN start-up are shown in Figure B.6

Figure B.5/Q.832.2 – Interface start-up by OS(AN) – AN events

SN events

Refer to the SN events for B-BCC start-up automatically initiated by the AN NE in B.6.2.2.

B.6.2.2 B-BCC start-up automatically initiated by the AN NE

AN events

In the case of an automatic start-up procedure, the management function of the AN generates an meeBbccStartTrafficReq primitive towards the AN B-BCC system.

After an establishment of the SAAL has taken place, the AN B-BCC system sends an meeBbccStartTrafficConf primitive to the AN management function.

If the value of the lspActivationState attribute changes, an attributeValueChange notification is sent to the OS, but if the state of the operationalState attribute changes, a stateChange notification is sent to the OS.

These information flows are illustrated in Figure B.6.

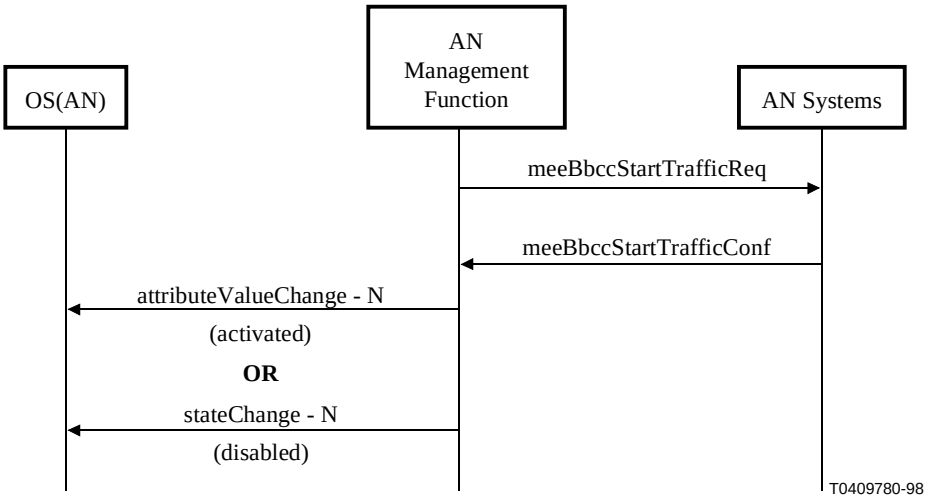


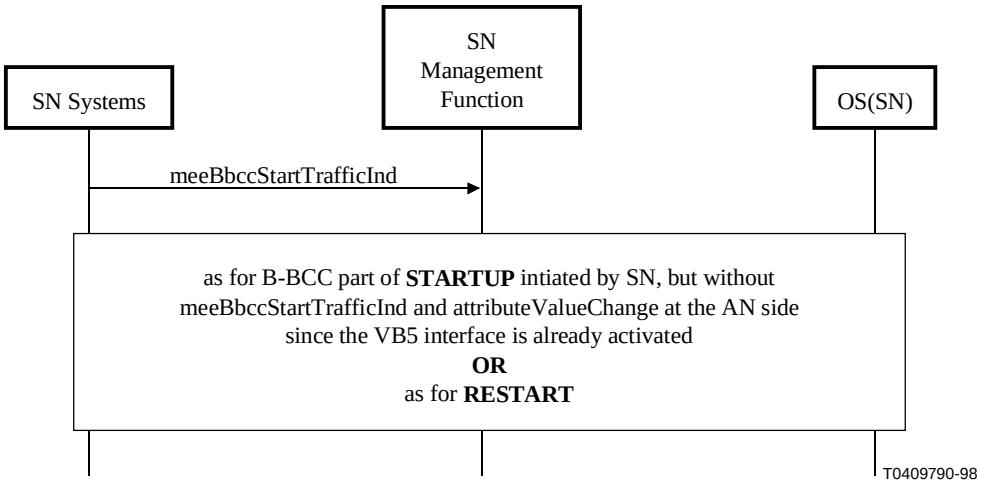
Figure B.6/Q.832.2 – Autonomous interface start-up by AN – AN events

SN events

On the SN side, the B-BCC system indicates with an meeBbccStartTrafficInd primitive that an SAAL establishment has taken place.

At this point the SN connection control function decides whether the SN proceeds with a B-BCC start-up as described in B.6.2.2.1 or a B-BCC restart as described in B.6.2.2.2. The SN OS is neither involved nor informed about this decision.

These information flows are illustrated in Figure B.7.



NOTE – The STARTUP option is shown in Figures B.3 and B.4. The RESTART option is shown in Figures B.8 and B.9.

Figure B.7/Q.832.2 – Start-up initiated at AN side – SN events

B.6.2.2.1 B-BCC start-up in SN due to automatic initiation of start-up in AN

SN events

Refer to the SN events for B-BCC start-up automatically initiated by the SN NE in B.6.1.2.

AN events

The AN connection control function informs the management function of the AN about a reset request from the SN which causes a resetBbccResult notification to be generated by the appropriate lspVb52An object. The information syntax of this notification reflects the addressed resource and the success/no success of the B-BCC reset procedure.

B.6.2.2.2 B-BCC restart in SN due to automatic initiation of start-up in AN

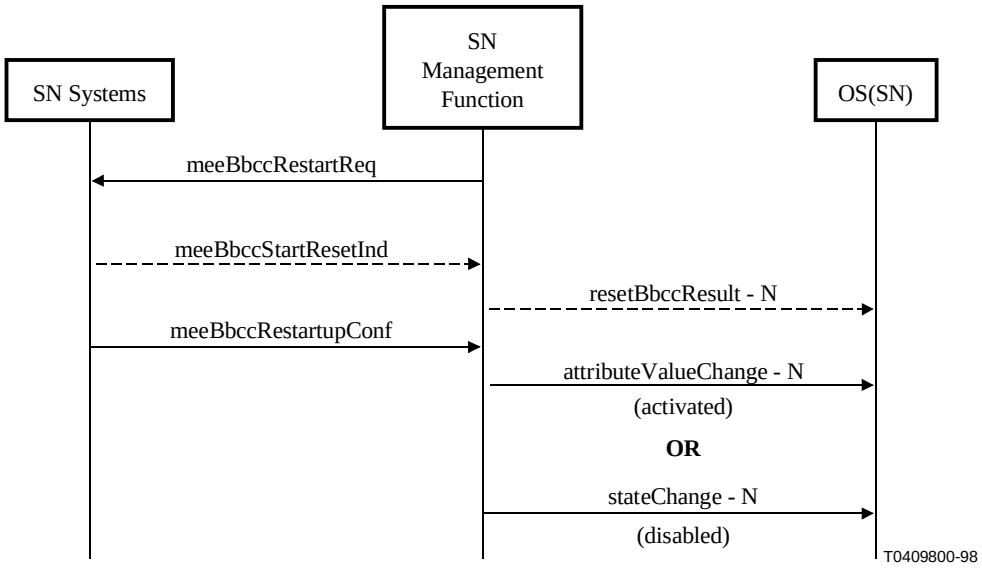
SN events

The SN management function responds with an meeBbccRestartReq primitive towards the SN B-BCC system. If the result of a presync is that a reset is necessary, the SN B-BCC system indicates this towards the SN management function by sending an meeBbccStartResetInd primitive. This causes a resetBbccResult notification to be generated by the appropriate lspVb52Sn object. The information syntax of this notification reflects the addressed resource and the success/no success of the B-BCC reset procedure.

After completion, the SN B-BCC system generates an meeBbccRestartConf primitive.

If the value of the lspActivationState attribute changes, an attributeValueChange notification is sent to the OS, but if the state of the operationalState attribute changes, a stateChange notification is sent to the OS.

These information flows are illustrated in Figure B.8.



NOTE – The meeBbccStartResetInd primitive and the resetBbccResult notification only occur if the result of the presynchronization process is that a reset is necessary.

Figure B.8/Q.832.2 – Start-up initiated at AN side – SN events for RESTART

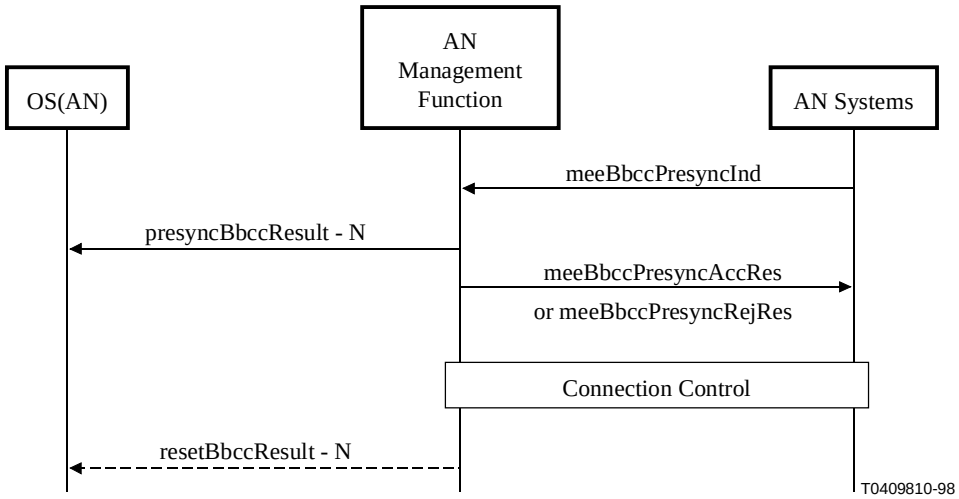
AN events

An meeBbccPresyncInd primitive, generated by the AN B-BCC system and sent towards the AN management function, indicates a request from the SN side to provide the information on whether the B-BCC protocol can resume its normal operation or not. If the B-BCC presync procedure is successful, the AN OS is informed by a presyncBbccResult notification.

An meeBbccPresyncAccRes primitive, sent from the AN management function to the AN B-BCC system, indicates that the B-BCC protocol can resume its normal operation and a B-BCC reset is not necessary.

Alternatively, an meeBbccPresyncRejRes primitive is sent from the AN management function to the AN B-BCC system to indicate that a B-BCC reset shall be initiated before the B-BCC protocol can resume its normal operation. In this case, existing connections over the interface will be lost. If a reset is necessary then the AN connection control function informs the management function of the AN about a reset request from the SN, which causes a resetBbccResult notification to be generated by the appropriate lspVb52An object. The information syntax of this notification reflects the addressed resource and the success/no success of the B-BCC reset procedure.

These information flows are illustrated in Figure B.9.



NOTE – meeBbccPresyncAccRes means that no reset is necessary, whereas meeBbccPresyncRejRes means that a reset is necessary.

Figure B.9/Q.832.2 – Start-up initiated at AN side – AN events for RESTART

B.7 LSP identity checking

Refer to C.7/Q.832.1 [13].

B.8 RTMC reset

Refer to C.8/Q.832.1 [13].

B.9 B-BCC reset

A B-BCC reset may be initiated either by the OS of the SN or autonomously by the SN. If it is initiated by the OS, the B-BCC reset applies to the complete LSP.

The OS of the SN initiates a B-BCC reset through the resetBbcc action of the lspVb52Sn object class. The action causes the management function of the SN to trigger the connection control function to generate a ceeBbccResetReq primitive towards the B-BCC system. The success of the action is presented to the connection control function by the ceeBbccResetAccConf or ceeBbccResetRejConf primitive, given back to the management function and transported to the OS in the resetBbcc action reply syntax.

If a B-BCC reset is initiated autonomously by the SN (i.e. SN connection control function generates a ceeBbccResetReq primitive towards the B-BCC system), the management function in the SN is informed after the completion of the B-BCC reset procedure (i.e. connection control function receives a ceeBbccResetAccConf or ceeBbccResetRejConf primitive from the B-BCC system) and presented to the OS with the resetBbccResult notification. The information syntax of this notification reflects the addressed resource and the success/no success of the B-BCC reset procedure.

When the AN connection control function receives a ceeBbccResetInd primitive it informs the management function of the AN which causes a resetBbccResult notification to be generated by the appropriate lspVb52An object. The information syntax of this notification reflects the addressed resource and the success/no success of the B-BCC reset procedure.

B.10 Congestion

For further study.

ANNEX C

State transitions

C.1 State transition tables for AN

This subclause is the same as D.1/Q.832.1 [13] with the following additions.

Table C.1 maps the transitions of the lspActivationState attribute and the operationalState attribute of MOC lspVb52An on MEE primitives towards the VB5.2 system in the AN. The same conventions as in D.1/Q.832.1 [13] are applied.

Table C.1/Q.832.2 – Mapping of lspActivationState on MEE primitives in AN

OperationalState (Note 1)	**enabled**			**disabled**
lspActivationState (Note 2)	**activated**	**restarting**	**notActivated**	**notActivated**
Event	**1.1**	**1.2**	**1.3**	**2**
Q3 Actions				
start-up LSP	Q3reply (successful); -	Q3reply (restarting); -	Q3reply (activating); -	meeStartupReq; 1.3
RTMC relevance (Note 3)				
meeStartupConf (success)	/	-; 1.1	meeBbccStartTrafficReq;	/
		-; -	-	
meeStartupConf (no success)	/	meeStartupReq; -	Q3reply (unsuccessful);	/
		-; 2	2	
meeStartupInd	-; -	-; -	-; -	-; 1.3
meeLspFailureInd	meeStartupReq; 1.2	meeStartupReq; –	meeStartupReq; 1.2	-; -
B-BCC relevance (Note 4)				
meeBbccStartTrafficConf (success)	/	-; 1.1	Q3reply (successful);	/
		-; -	1.1	
meeBbccStartTrafficConf (no success)	/	meeBbccStartTrafficReq; -	Q3reply (unsuccessful);	/
		-; 2	2	
meeBbccStartTrafficInd	-; -	-; -	-; 1.1	/
meeBbccStopTrafficInd	meeBbccStartTrafficReq; 1.2	meeBbccStartTrafficReq; -	meeBbccStartTrafficReq; 1.2	-; -

NOTE 1 – state change notifications are emitted for the operationalState attribute.

NOTE 2 – attribute value change notifications are emitted for the lspActivationState attribute.

NOTE 3 – If two boxes are present in a single row, the upper one is valid if the B-BBC protocol is active; the lower one is valid if the B-BBC protocol is inactive.

NOTE 4 – If two boxes are present in a single row, the upper one is valid if the RTMC protocol is active; the lower one is valid if the RTMC protocol is inactive.

C.2 State transition tables for SN

This subclause is the same as D.2/Q.832.1 [13] with the following addition.

Table C.2 maps the transitions of the lspActivationState attribute and the operationalState attribute of MOC lspVb52Sn on MEE primitives towards the VB5.2 system in the SN. The same conventions as in D.1/Q.832.1 [13] are applied.

Table C.2/Q.832.2 – Mapping of lspActivationState on MEE primitives in SN

OperationalState (Note 1)	**enabled**			**disabled**
lspActivationState (Note 2)	**activated**	**restarting**	**notActivated**	**notActivated**
Event	**1.1**	**1.2**	**1.3**	**2**
Q3 Actions				
start-up LSP	Q3reply (successful); -	Q3reply (restarting); -	Q3reply (activating); -	meeStartupReq ; 1.3
RTMC relevance (Note 3)				
meeStartupConf (success)	/	-; 1.1	meeBbccRestartReq/meeBbcc StartupReq (Note 5); -	/
		-; -		
meeStartupConf (no success)	/	meeStartupReq; -	Q3reply (unsuccessful); 2	/
		-; 2		
meeStartupInd	-; -	-; -	-; -	-; 1.3
meeLspFailureInd	meeStartupReq; 1.2	meeStartupReq; -	meeStartupReq; 1.2	-; -
B-BCC relevance (Note 4)				
meeBbccStartupConf (success)	/	-; 1.1	Q3reply (successful) (Note 6); 1.1	/
		-; -		
meeBbccStartupConf (no success)	/	meeBbccStartupReq; -	Q3reply (unsuccessful) (Note 6); 2	/
		-; 2		
meeBbccRestartConf (success)	/	-; 1.1	Q3reply (successful) (Note 6); 1.1	/
		-; -		
meeBbccRestartConf (no success)	/	meeBbccStartupReq; -	Q3reply (unsuccessful) (Note 6); 2	/
		-; 2		

Table C.2/Q.832.2 – Mapping of lspActivationState on MEE primitives in SN *(concluded)*

OperationalState (Note 1)	**enabled**			**disabled**
lspActivationState (Note 2)	**activated**	**restarting**	**notActivated**	**notActivated**
Event	**1.1**	**1.2**	**1.3**	**2**
meeBbccStartTrafficInd	-;	-;	meeBbccRestartReq/meeBbccStartupReq (Note 5); -	/
meeBbccStopTrafficInd	meeBbccRestartReq/ meeBbccStartupReq (Note 5); 1.2	meeBbccRestartReq/ meeBbccStartupReq (Note 5); -	meeBbccRestartReq/ meeBbccStartupReq (Note 5); 1.2	-; -

NOTE 1 – state change notifications are emitted for the operationalState attribute.

NOTE 2 – attribute value change notifications are emitted for the lspActivationState attribute.

NOTE 3 – If two boxes are present in a single row, the upper one is valid if the B-BBC protocol is active; the lower one is valid if the B-BBC protocol is inactive.

NOTE 4 – If two boxes are present in a single row, the upper one is valid if the RTMC protocol is active; the lower one is valid if the RTMC protocol is inactive.

NOTE 5 – The decision which of meeBbccRestartReq and meeBbccStartupReq is sent is taken with the help of the connection control function.

NOTE 6 – A Q3reply is only to be sent, if a Q3Action was received originally.

APPENDIX I

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APPENDIX II

Instantiation example

II.1 Conventions

The following conventions are used in the example (Figure II.1):

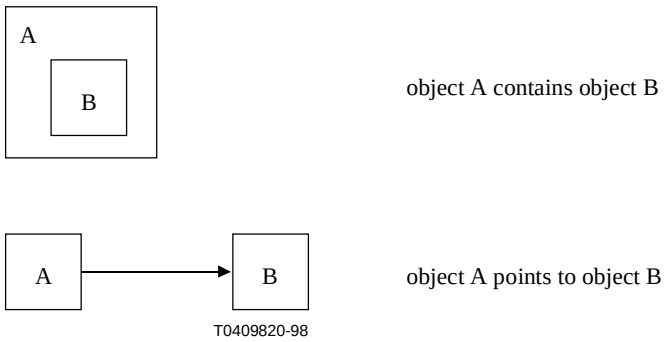

Figure II.1/Q.832.2

II.2 Example of VPs/VCs allocation at the AN and the SN

In the example in Figure II.2, it is supposed that there are two users, User#1 and User#2; User#1 has one VPC with two user VCCs allocated at the PUP, User 2 has two VPCs with one user VCC each. At the VB5.2 interface there are three VPs: VP 4 and VP 5 are used to carry user information, VP 6 contains two VCCs, one for the RTMC protocol and the other for the B-BCC protocol. The AN is a VP/VC cross connect; users' VCCs are semi-permanent VC connections created by provisioning.

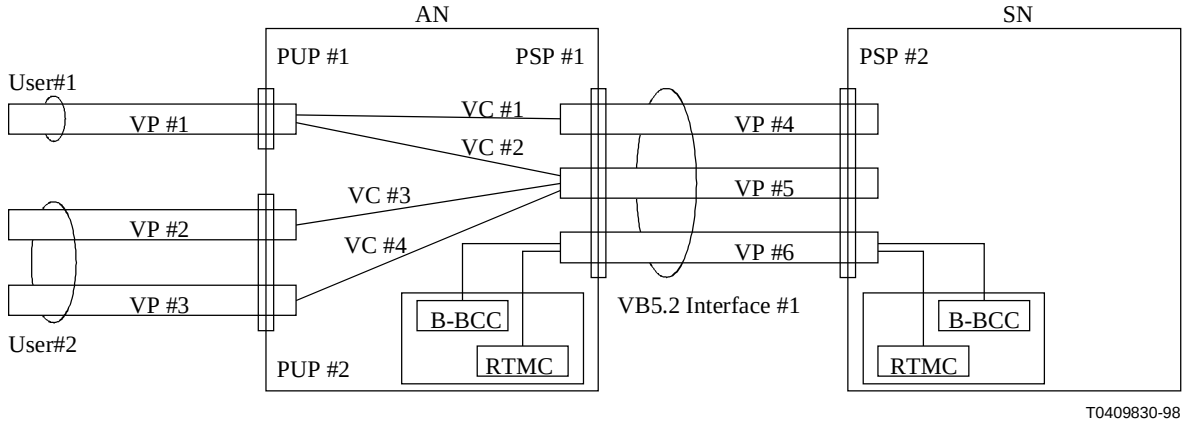

Figure II.2/Q.832.2

II.3 Instantiation of managed objects in the AN

Figure II.3 shows the managed objects that are instantiated in the AN to model the VB5.2 interface and the VPs/VCs associated to the interface.

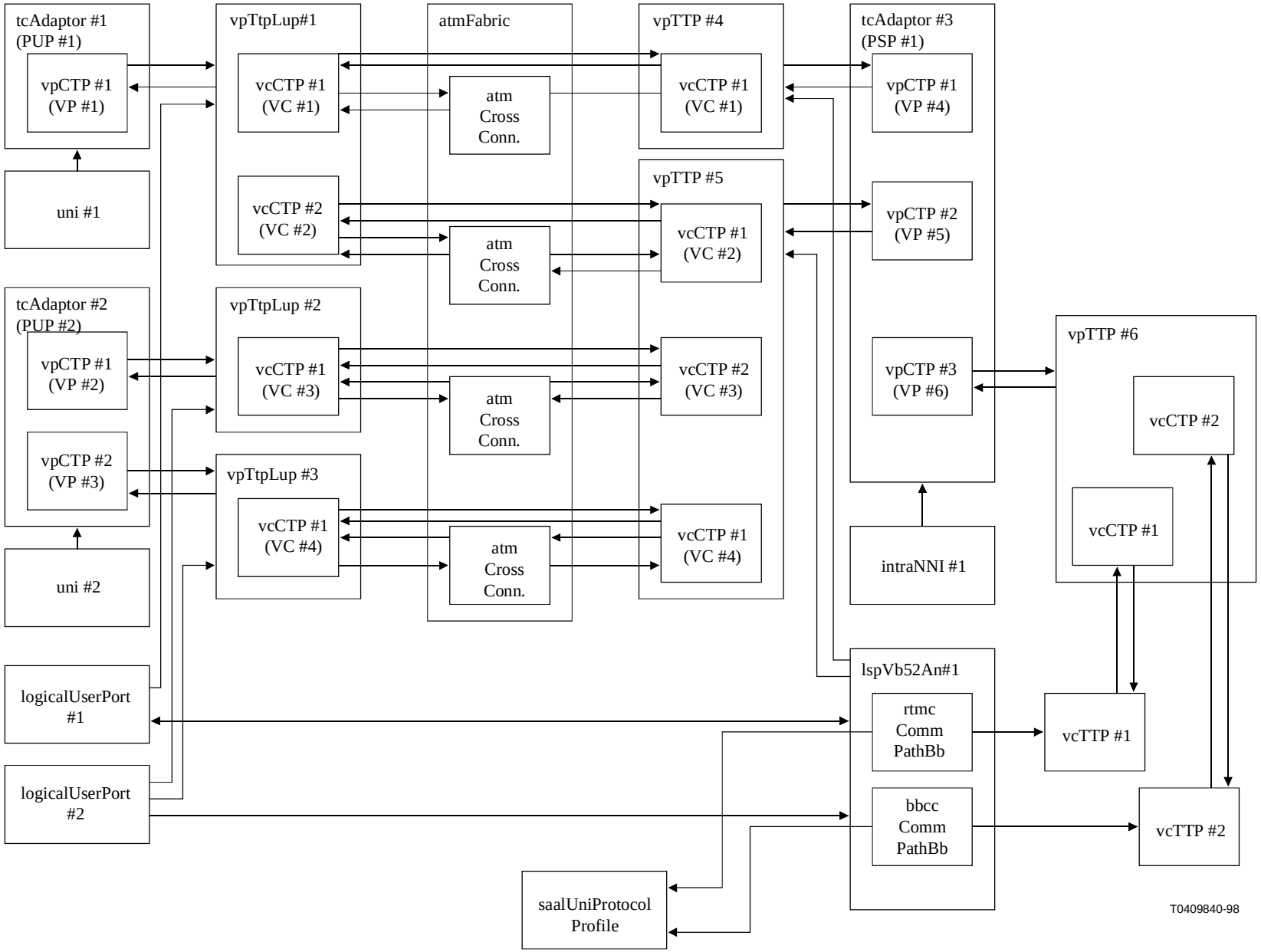

Figure II.3/Q.832.2

The managed objects that have been introduced in addition to the VB5.1 managed objects to model the VB5.2 interface are the following:

- lspVb52An: it models the VB5.2 interface at the AN.
- bbccCommPathBb, it models the VCC used for the B-BCC protocol.

The atmAccessProfile is not drawn in the example, since it need not be instantiated.

II.4 Instantiation of managed objects at the SN

Figure II.4 shows the managed objects that are instantiated in the SN to model the VB5.2 interface and the VPs/VCs associated to the interface.

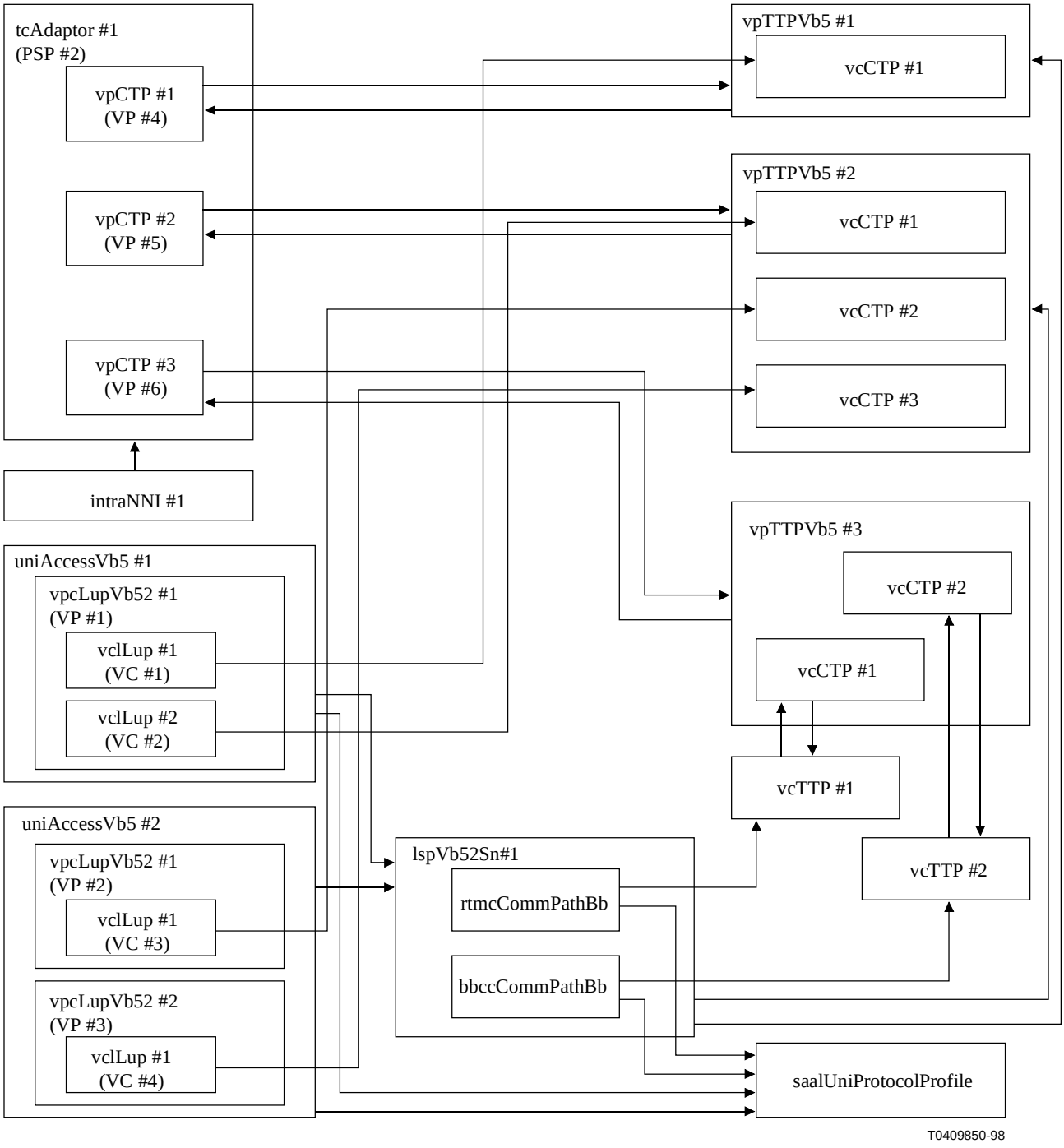

Figure II.4/Q.832.2

The managed objects that have been introduced in addition to the VB5.1 managed objects to model the VB5.2 interface are the following:

- lspVb52Sn: it models the VB5.2 interface at the SN;
- bbccCommPathBb, it models the VCC used for the B-BCC protocol;
- vpcLupVb52, it models the VPs at the UNI that belong to the LUP, and that contain VCCs associated to a VB5.2 interface;
- vclLup, it models the individual VC-links at the UNI.

In this example, all objects point to the same saalUniProtocolProfile; in other cases, the objects may be associated with different saalUniProtocolProfile. Furthermore, the atmAccessProfile is not drawn, since it need not be instantiated.

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