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TECHNICAL SPECIFICATION

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LTE;
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Transport Network (TN)
interface Network Resource Model (NRM)
Integration Reference Point (IRP);
Information Service (IS)
(3GPP TS 28.732 version 19.0.0 Release 19)

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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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Version x.y.z

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x the first digit:

1 presented to TSG for information;

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; as identified below:

28.731: Transport Network (TN) interface Network Resource Model (NRM) Integration Reference Point (IRP); Requirements.

28.732: Transport Network (TN) interface Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS).

28.733: Transport Network (TN) interface Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions.

1 Scope

The present document specifies the Transport Network (TN) interface Network Resource Model (NRM) that can be communicated between an IRPAgent and an IRPManager for telecommunication network management purposes, including management of converged networks.

This document specifies the semantics and behaviour of information object class attributes and relations visible across the reference point in a protocol and technology neutral way. It does not define their syntax and encoding.

The "Transport Network (TN) Interface Network Resource Model (NRM) IRP" comprises a set of specifications defining Requirements, a protocol neutral Network Resource Model (NRM) and corresponding Solution Set(s).

The present document:

- Specifies the protocol neutral Transport Network (TN) interface Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS). It reuses relevant parts of the generic NRM in TS 28.622 [6], either by direct reuse or sub-classing, and in addition to that defines Transport specific Managed Object Classes.

The Configuration Management (CM) area is very large. The intention is to split the specification of the related interfaces in several IRPs - as described in the Introduction clause above. An important aspect of such a split is that the Network Resource Models (NRMs) defined in different IRPs containing NRMs are consistent, and that NRMs supported by an IRPAgent implementation can be accessed as one coherent model through one IRP Information Service.

In order to access the information defined by this NRM, an IRP Information Service (IS) is needed, such as the Basic CM IRP: IS (TS 32.602 [7]) or the Bulk CM IRP: IS (TS 32.612 [8]). However, which Information Service that is applicable is outside the scope of this document.

Finally, regarding the support of the State Management IRP: IS (TS 28.625 [16]), all NRM's of one release shall support the same State Management IRP version.

This specification is related to 3GPP TS 28.625 [16].

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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[1] 3GPP TS 32.101: "Telecommunication Management, Principles and high level requirements".

[2] 3GPP TS 32.102: "Telecommunication management; Architecture".

[3] Void.

[4] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[5] ITU-T Recommendation I.361 (11/95):"B-ISDN ATM Layer Specification".

[6] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[7] 3GPP TS 32.602: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP) Information Service (IS)".

[8] 3GPP TS 32.612: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP): Information Service (IS)".

[9] 3GPP TS 25.430: "UTRAN Iub interface:general aspects and principles".

[10] 3GPP TS 25.431: "UTRAN Iub interface Layer 1".

[11] 3GPP TS 25.411: "UTRAN Iu interface Layer 1".

[12] 3GPP TS 28.652:" UTRAN Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS) ".

[13] 3GPP TS 32.111-2: "Telecommunication management; Fault Management; Part 2: Alarm Integration Reference Point (IRP): Information Service (IS)".

[14] 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Information Service (IS)".

[15] 3GPP TS 32.662: "Telecommunication management; Configuration Management (CM); Kernel CM Information Service (IS)".

[16] 3GPP TS 28.625: "Telecommunication management; State Management Integration Reference Point (IRP): Information Service (IS)".

[17] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) concept and definitions".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions and abbreviations apply. For definitions and abbreviations not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.150 [17] and 3GPP TS 28.622 [6].

Association: See definition in TS 28.622 [6].

Network Resource Model (NRM): See definition in TS 28.622 [6].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.150 [17] and the following apply:

DN	Distinguished Name (see 3GPP TS 32.300 [4])
IOC	Information Object Class
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Sector
Iub	Interface between RNC and Node B
NRM	Network Resource Model
RDN	Relative Distinguished Name (see 3GPP TS 32.300 [4])
RNC	Radio Network Controller
UML	Unified Modelling Language

4 Model

4.1 Imported information entities and local labels

Label reference	Local label
3GPP TS 28.622 [6], IOC, `ManagedElement`	`ManagedElement`
3GPP TS 28.652 [12], IOC, `IubLink`	`IubLink`
3GPP TS 28.622 [6], IOC, `VsDataContainer`	`VsDataContainer`

4.2 Class diagram

4.2.1 Relationships

This clause depicts the set of classes (e.g. IOCs) that encapsulates information relevant for this IRP. This subclause provides the overview of the relationships of relevant classes in UML. Subsequent subclasses provide more detailed specification of various aspects of these classes.

Figure 4.2.1.1 shows the name-containment relation and other types of relations of the Transport Network NRM.

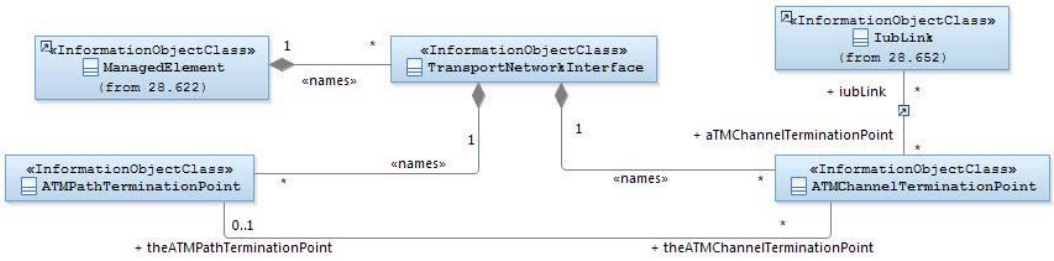
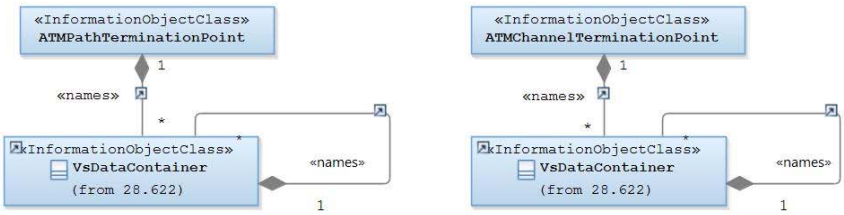


Figure 4.2.1.1: Transport Network NRM Containment/Naming and Association diagram

Each IOC is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [4] that expresses its containment hierarchy. As an example, the DN of a IOC representing a ATMPathTerminationPoint could have a format like:

SubNetwork=Sweden,meContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1, TransportNetworkInterface=ATM-1, ATMPathTerminationPoint=Gbg-1.



NOTE 1: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

Figure 4.2.1.2: `vsDataContainer` in name-containment diagram

4.2.2 Inheritance

This subclause depicts the inheritance relationships that exist between IOCs.

Figure 4.2.2.1 shows the inheritance hierarchy for the Transport Network NRM.

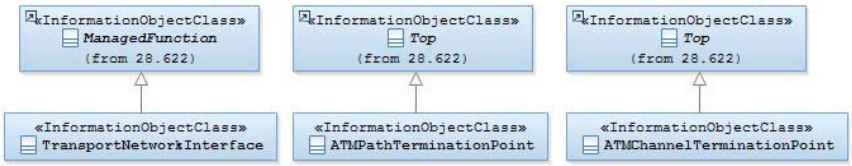


Figure 4.2.2.1: Transport Network NRM Inheritance Hierarchy

4.3 Class definitions

4.3.1 `TransportNetworkInterface`

4.3.1.1 Definition

This IOC represents the Transport Network Interface technology (e.g. ATM, IP).

4.3.1.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
`transportNetworkType`	M	M	-	-	M

4.3.1.3 Attribute constraints

None.

4.3.1.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.3.2 `ATMChannelTerminationPoint`

4.3.2.1 Definition

This IOC represents a bi-directional ATM Virtual Channel Connection Termination Point.

4.3.2.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
usageChannel	M	M	-	-	M
virtualPathId	M	M	O	-	M
virtualChannelId	M	M	O	-	M
physicalPortId	M	M	O	-	M
physicalInterfaceType	M	M	O	-	M
serviceCategoryIn	M	M	O	-	M
ServiceCategoryEg	M	M	O	-	M
usedAAL	M	M	O	-	M
peakCellRateIn	M	M	O	-	M
peakCellRateEg	M	M	O	-	M
sustainableCellRateIn	O	M	O	-	M
sustainableCellRateEg	O	M	O	-	M
maximumBurstSizeIn	M	M	O	-	M
maximumBurstSizeEg	M	M	O	-	M
minimumDesiredCellRateIn	O	M	O	-	M
minimumDesiredCellRateEg	O	M	O	-	M
minimumCellRateIn	O	M	O	-	M
minimumCellRateEg	O	M	O	-	M
Attribute related to role					
theATMPathTerminationPoint	M	M	-		
theIubLink	M	M	-		

4.3.2.3 Attribute constraints

Name	Definition
virtualPathId, virtualChannelId, physicalPortId, physicalInterfaceType, serviceCategoryIn/Eg, usedAAL, peakCellRateIn/Eg, sustainableCellRateIn/Eg, and maximumBurstSizeIn/Eg O Write qualifier	The Write Qualifier shall be supported if these attributes can be set over Itf-N.
sustainableCellRateIn/Eg, maximumBurstSizeIn/Eg	Only applicable for ServiceCategory values RT-VBR, NRT-VBR.
minimumCellRateIn/Eg	Only applicable for Service Category values ABR, GFR.

4.3.2.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.3.3 ATMPathTerminationPoint

4.3.3.1 Definition

This IOC represents a bi-directional ATM Virtual Path Connection Termination Point.

4.3.3.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritetable	isInvariant	isNotifyable
virtualPathId	M	M	O	-	M
physicalPortIdList	M	M	O	-	M
peakCellRateIn	M	M	O	-	M
peakCellRateEg	M	M	O		
Attribute related to role					
theATMChannelTerminationPoint	M	M	-	-	M

NOTE: The attribute peakCellRateIn, peakCellRateEg of ATM Path is the maximum Peak Cell Rate of its channels.

4.3.3.3 Attribute constraints

Name	Definition
for attributes `virtualPathId`, `physicalPortIdList`, `peakCellRateIn`, `peakCellRateEg` O Write qualifier	The Write Qualifier shall be supported if these attributes can be written/set over Itf-N.

4.3.3.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.4 Attribute definitions

4.4.1 Attribute properties

The following table defines the attributes that are present in several IOCs of the present document.

Attribute Name	Documentation and Allowed Values	Properties
`transportNetworkType`	The type of underlying transport network, i.e. ATM, IP. allowedValues: ATM, IP	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`usageChannel`	The logical channel using the transport network connection. Ref. 3GPP TS 25.430 [9]. allowedValues: examples are “Iub-NBAP”, “Iub-ALCAP”.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`virtualPathId`	The ATM Virtual Path Identifier (VPI). Ref. ITU-T Recommendation I.361[5]. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`virtualChannelId`	The ATM Virtual Channel Identifier (VCI). Ref. ITU-T Recommendation I.361 [5]. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
`physicalPortIdList`	The list of identifiers of the ATM physical port containing termination points. allowedValues: N/A	type: String multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: False
`physicalPortid`	The identifier of the ATM physical port containing termination points. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False

Attribute Name	Documentation and Allowed Values	Properties
physicalInterfaceType	The ATM physical interface type. Ref. 3GPP TS 25.431[10], 3GPP TS 25.411[11]. allowedValues: Examples are 'E1', 'STM1'.	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
serviceCategoryIn	The ATM Service Category used for the virtual connection Ingress (incoming) traffic. Ref. ITU-T Recommendation I.361[5]. allowedValues: CBR, RT-VBR, NRT-VBR, ABR, UBR, GFR	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
serviceCategoryEg	The ATM Service Category used for the virtual connection Egress (outgoing) traffic. Ref. ITU-T Recommendation I.361[5] allowedValues: CBR, RT-VBR, NRT-VBR, ABR, UBR, GFR	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
usedAAL	The ATM Adaptation Layer (AAL) used for the virtual connection. Ref. ITU-T Recommendation I.361[5]. allowedValues: Null, AAL1,.....	type: <<enumeration>> multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
peakCellRateIn	Peak Cell Rate (PCR) in kbits/sec for Ingress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
peakCellRateEg	Peak Cell Rate (PCR) in kbits/sec for Egress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
sustainableCellRateIn	Sustainable Cell Rate (SCR) in kbits/sec for Ingress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: 1…n	type: Integer Multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
sustainableCellRateEg	Sustainable Cell Rate (SCR) in kbits/sec for Egress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: 1…n	type: Integer Multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
maximumBurstSizeIn	Maximum Burst Size (MBS) for VBR Service Categories for Ingress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: 1…n	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False

Attribute Name	Documentation and Allowed Values	Properties
maximumBurstSizeEg	Maximum Burst Size (MBS) for VBR Service Categories for Egress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: 1…n	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
minimumCellRateIn	Minimum Cell Rate (MCR) in kbits/sec for ABR, GFR Service Categories for Ingress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: 1…n	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
minimumCellRateEg	Minimum Cell Rate (MCR) in kbits/sec for ABR, GFR Service Categories for Egress traffic. Ref. ITU-T Recommendation I.361 [5].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A allowedValues: 1…n isNullable: False
minimumDesiredCellRateIn	Minimum Desired Cell Rate (MDCR) in kbits/sec for UBR Service Category for Ingress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: 1..n	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
minimumDesiredCellRateEg	Minimum Desired Cell Rate (MDCR) in kbits/sec for UBR Service Category for Egress traffic. Ref. ITU-T Recommendation I.361 [5]. allowedValues: 1..n	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: N/A isNullable: False
Role-Attribute Name		
theATMChannelTerminationPoint	It carries zero or more DNs of ATMChannelTerminationPoint. allowedValues: N/A Null value means no DN is carried.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False
theATMPathTerminationPoint	It carries zero or one DN of ATMPathTerminationPoint. allowedValues: N/A Null value means no DN is carried.	type: DN multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False
theIubLink	It carries zero or more DNs of IubLink. allowedValues: N/A Null value means no DN is carried.	type: DN multiplicity: * isOrdered: False isUnique: True defaultValue: None isNullable: False

4.4.2 Constraints

None.

4.5 Common notifications

4.5.1 Alarm notifications

This subclause presents a list of notifications, defined in [13], that IRPManager can receive. The notification header attribute `objectClass/objectInstance`, defined in [14], would capture the DN of an instance of an IOC defined in this IRP specification.

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [13])	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [13])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [13])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [13])	
`notifyComments`	See Alarm IRP (3GPP TS 32.111-2 [13])	
`notifyAlarmListRebuilt`	See Alarm IRP (3GPP TS 32.111-2 [13])	
`notifyPotentialFaultyAlarmList`	See Alarm IRP (3GPP TS 32.111-2 [13])	

4.5.2 Configuration notifications

This subclause presents a list of notifications, defined in [15], that IRPManager can receive. The notification header attribute `objectClass/objectInstance`, defined in [14], would capture the DN of an instance of an IOC defined in this IRP specification.

Name	Qualifier	Notes
`notifyAttributeValueChange`	O	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

Annex A (informative): Example Configuration of ATM Transport Network in UTRAN

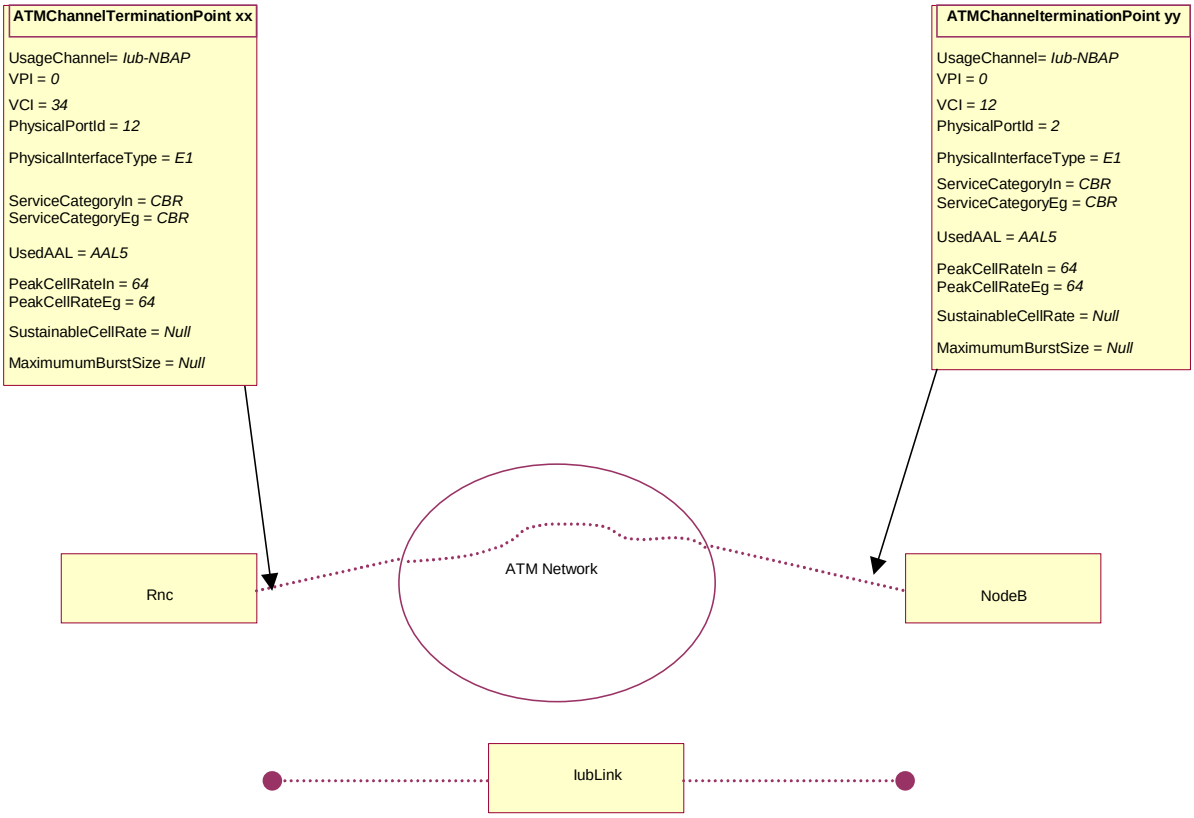


Figure A.1: Virtual connection of a logical Iub interface channel over ATM network

Annex B (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Cat**	**Old**	**New**
2013-09	SA#61	SP-130433	001	1	Removal of wrong and redundant modelling statements	F	11.0.0	11.1.0
2014-06	SA#64	SP-140358	002	-	remove the feature support statements	F	11.1.0	11.2.0
2014-10	-	-	-	-	Update to Rel-12 version (MCC)		11.2.0	**12.0.0**
2016-01	-	-	-	-	Update to Rel-13 version (MCC)		12.0.0	**13.0.0**

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2016-12	SA#74	SP-160854	0003	-	F	Correct the usage of isNullable and multiplicity property	13.1.0
2017-03	SA#75	-	-	-		Promotion to Release 14 without technical change	14.0.0
2018-01	SA#78	SP-170962	0006	1	A	Update erroneous references	14.1.0
2018-06	-	-	-	-	-	Update to Rel-15 version (MCC)	15.0.0
2020-07	-	-	-	-	-	Update to Rel-16 version (MCC)	16.0.0
2022-03	-	-	-	-	-	Update to Rel-17 version (MCC)	17.0.0
2024-04	-	-	-	-	-	Update to Rel-18 version (MCC)	18.0.0
2024-06	SA#104	SP-240817	0014	1	A	Rel-18 CR TS 28.732 correction of attribute definition – the first change could not be implemented due to wrong baseline	18.1.0
2024-09	SA#105	SP-241177	0023	-	A	Rel-18 CR TS 28.732 correction of attribute definition	18.2.0
2025-09	SA#109	-	-	-	-	Update to Rel-19 version (MCC)	19.0.0

History

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