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Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Transport Network (TN) interface
Network Resource Model (NRM)
Integration Reference Point (IRP);
Solution Set (SS) definitions
(3GPP TS 28.733 version 14.0.0 Release 14)

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Contents

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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 is part of an Integration Reference Point (IRP) named Transport Network (TN) interface Network Resource Model (NRM) IRP, through which an `IRPAgent` can communicate configuration management information to one or several `IRPManagers` concerning TN resources. The TN NRM IRP comprises a set of specifications defining Requirements, a protocol neutral Information Service and one or more Solution Set(s).

The present document specifies the Solution Sets for the TN NRM IRP.

This specification is related to 3GPP TS 28.732 [4] V13.0.X.

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*.

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

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

[3] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".

[4] 3GPP TS 28.732: "Telecommunication management; Transport Network (TN) Interface Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[5] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[6] OMG Notification Service, Version 1.0.

[7] OMG CORBA services: Common Object Services Specification, Update: November 22, 1996.

[8] The Common Object Request Broker: Architecture and Specification (for specification of valid version, see [1]).

[9] 3GPP TS 32.306: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Solution Set (SS) definitions".

[10] 3GPP TS 32.612: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP): Information Service (IS)".

[11] 3GPP TS 32.616: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP): Solution Set (SS) definitions ".

[12] W3C REC-xml11-20060816: "Extensible Markup Language (XML) 1.1 (Second Edition)".

[13] Void

[14] W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures.

[15] W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes.

[16] W3C REC-xml-names-20060816: "Namespaces in XML 1.1 (Second Edition)".

[17] 3GPP TS 28.623: "Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], TS 32.102 [2], TS 32.600 [3] and TS 32.712 [4] and the following apply.

XML file: See definition of [17].

XML document: See definition of [17].

XML declaration: See definition of [17].

XML element: See definition of [17].

empty XML element: See definition of [17].

XML content (of an XML element): See definition of [17].

XML start-tag: See definition of [17].

XML end-tag: See definition of [17].

XML empty-element tag: See definition of [17].

XML attribute specification: See definition of [17].

DTD: See definition of [17].

XML schema: See definition of [17].

XML namespace: See definition of [17].

XML complex type: See definition of [17].

XML element type: See definition of [17].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
DTD	Document Type Definition
EDGE	Enhanced Data for GSM Evolution
GERAN	GSM/EDGE Radio Access Network
GSM	Global System for Mobile communication
IS	Information Service
IDL	Interface Definition Language (OMG)
IOC	Information Object Class
IRP	Integration Reference Point
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set
TN	Transport Network

UMTS	Universal Mobile Telecommunications System
UTRAN	Universal Terrestrial Radio Access Network
XML	eXtensible Markup Language

4 Solution Set Definitions

This specification defines the following 3GPP TN NRM IRP Solution Set Definitions:

- 3GPP TN NRM IRP CORBA SS (Annex A)
- 3GPP TN NRM IRP XML Definitions (Annex B)

Annex A (normative): CORBA Solution Set

A.0 General

This annex contains the CORBA Solution Set for the IRP whose semantics is specified in TN NRM IRP: Information Service (TS 32.712 [4]).

A.1 Architectural features

A.1.0 Introduction

The overall architectural feature of Transport Network Resources IRP is specified in 3GPP TS 28.712 [4].
This clause specifies features that are specific to the CORBA SS.

A.1.1 Syntax for Distinguished Names

See clause A.1.1 of [17].

A.1.2 Rules for NRM extensions

See clause A.1.2 of [17].

A.2 Mapping

A.2.1 General mapping

See clause A.2.1 of [17].

A.2.2 Information Object Class (IOC) mapping

A.2.2.1 IOC TransportNetworkInterface

Table A.2.2.1: Mapping from NRM IOC TransportNetworkInterface attributes to SS equivalent MOC TransportNetworkInterface attributes

NRM Attributes of IOC TransportNetworkInterface in 3GPP TS 28.732 [4]	SS Attributes	SS Type	Support Qualifier	Read	Write
id	transportNetworkInterfaceId	string	M	M	-
userLabel	userLabel	string	M	M	M
transportNetworkType	transportNetworkType	string	M	M	-

A.2.2.2 IOC ATMChannelTerminationPoint

Table A.2.2.2: Mapping from NRM IOC ATMChannelTerminationPoint attributes and associations to SS equivalent MOC ATMTerminationPoint attributes

NRM Associations/Attributes of IOC ATMChannelTerminationPoint in 3GPP TS 28.732 [4]	SS Attributes	SS Type	Support Qualifier	Read	Write
id	aTMChannelTerminationPointId	string	M	M	_
usageChannel	usageChannel	string	M	M	_
virtualPathId	virtualPathId	long	M	M	O
virtualChannelId	virtualChannelId	long	M	M	O
physicalPortId	physicalPortId	string	M	M	O
physicalInterfaceType	physicalLinkType	string	M	M	O
serviceCategoryIn	serviceCategoryIn	long	M	M	O
serviceCategoryEg	serviceCategoryEg	long	M	M	O
usedAAL	usedAAL	long	M	M	O
peakCellRateIn	peakCellRateIn	long	M	M	O
peakCellRateEg	peakCellRateEg	long	M	M	O
sustainableCellRateIn	sustainableCellRateIn	long	O	M	O
sustainableCellRateEg	sustainableCellRateEg	long	O	M	O
maximumBurstSizeIn	maximumBurstSizeIn	long	M	M	O
maximumBurstSizeEg	maximumBurstSizeEg	long	M	M	O
minimumDesiredCellRateIn	minimumDesiredCellRateIn	long	O	M	O
minimumDesiredCellRateEg	minimumDesiredCellRateEg	long	O	M	O
minimumCellRateIn	minimumCellRateIn	long	O	M	O
minimumCellRateEg	minimumCellRateEg	long	O	M	O
aTMChannelTerminationPoint-ATMPathTerminationPoint	aTMChannelTerminationPointATMPathTerminationPoint	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReference	M	M	-
aTMChannelTerminationPoint-IubLink	aTMChannelTerminationPointIubLink	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReferenceSet	M	M	-

A.2.2.3 IOC ATMPathTerminationPoint

Table A.2.2.3: Mapping from NRM IOC ATMPathTerminationPoint attributes and associations to SS equivalent MOC ATMTerminationPoint attributes

NRM Associations/Attributes of IOC ATMPathTerminationPoint in 3GPP TS 28.732 [4]	SS Attributes	SS Type	Support Qualifier	Read	Write
id	aTMPathTerminationPointId	string	M	M	_
virtualPathId	virtualPathId	long	M	M	O
physicalPortIdList	physicalPortIdList	string	M	M	O
peakCellRateIn	peakCellRateIn	long	M	M	O
peakCellRateEg	peakCellRateEg	long	M	M	O
aTMPathTerminationPoint-ATMChannelTerminationPoint	aTMPathTerminationPointATMChannelTerminationPoint	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReferenceSet	M	M	-

A.3 Solution Set definitions

A.3.1 IDL definition structure

Clause A.3.2 defines the MO classes for the TN NRM IRP.

A.3.2 IDL specification "TransportNetworkResourcesNRMDefs.idl"

```
//File: TransportNetworkResourcesNRMDefs.idl
#ifndef _TRANSPORT_NETWORK_RESOURCES_NRM_DEFS_IDL_
#define _TRANSPORT_NETWORK_RESOURCES_NRM_DEFS_IDL_
#include "GenericNetworkResourcesNRMDefs.idl"
#pragma prefix "3gppsa5.org"
/**
 * This module defines constants for each MO class name and
 * the attribute names for each defined MO class.
 */
module TransportNetworkResourcesNRMDefs
{
      /**
       *  Definitions for MO class TransportNetworkInterface
       */
      interface TransportNetworkInterface : GenericNetworkResourcesNRMDefs::ManagedFunction
      {
         const string CLASS = "TransportNetworkInterface";
         // Attribute Names
         //
         const string transportNetworkInterfaceId = "transportNetworkInterfaceId";
         const string transportNetworkType= "transportNetworkType";
      };
      /**
       *  Definitions for MO class ATMChannelTerminationPoint
       */
      interface ATMChannelTerminationPoint
      {
         const string CLASS = "ATMChannelTerminationPoint";
         // Attribute Names
         //
         const string aTMChannelTerminationPointId = "aTMChannelTerminationPointId";
         const string usageChannel= "usageChannel";
         const string virtualPathId= "virtualPathId";
         const string virtualChannelId= "virtualChannelId";
         const string physicalPortId= "physicalPortId";
         const string physicalLinkType= "physicalLinkType";
         const string serviceCategoryIn= "serviceCategoryIn";
         const string serviceCategoryEg= "serviceCategoryEg";
         const string usedAAL= "usedAAL";
         const string peakCellRateIn= "peakCellRateIn";
         const string peakCellRateEg= "peakCellRateEg";
         const string sustainableCellRateIn= "sustainableCellRateIn";
         const string sustainableCellRateEg= "sustainableCellRateEg";
         const string maximumBurstSizeIn= "maximumBurstSizeIn";
         const string maximumBurstSizeEg= "maximumBurstSizeEg";
         const string minimumDesiredCellRateIn= "minimumDesiredCellRateIn";
         const string minimumDesiredCellRateEg= "minimumDesiredCellRateEg";
         const string minimumCellRateIn= "minimumCellRateIn";
         const string minimumCellRateEg= "minimumCellRateEg";
         const string aTMChannelTerminationPointATMPathTerminationPoint =
"aTMChannelTerminationPointATMPathTerminationPoint";
         const string aTMChannelTerminationPointIubLink = "aTMChannelTerminationPointIubLink";
      };
      /**
       *  Definitions for MO class ATMPathTerminationPoint
       */
      interface ATMPathTerminationPoint
      {
         const string CLASS = "ATMPathTerminationPoint";
         // Attribute Names
         //
         const string aTMPathTerminationPointId = "aTMPathTerminationPoint";
         const string virtualPathId= "virtualPathId";
         const string physicalPortIdList= "physicalPortIdList";
         const string peakCellRateIn= "peakCellRateIn";
         const string peakCellRateEg= "peakCellRateEg";
         const string aTMPathTerminationPointATMChannelTerminationPoint =
"aTMPathTerminationPointATMChannelTerminationPoint";
      };
};
#endif // _TRANSPORT_NETWORK_RESOURCES_NRM_DEFS_IDL_
```

Annex B (normative): XML Definitions

B.0 General

This annex contains the XML Definitions for the TN NRM IRP as it applies to Itf-N, in accordance with TN NRM IRP Information Service (TS 32.712 [4]).

The XML file formats are based on XML [12], XML Schema [14] [15] and XML Namespace [16] standards.

B.1 Architectural features

B.1.0 Introduction

The overall architectural feature of Transport Network Resources IRP is specified in 3GPP TS 32.712 [4].
This clause specifies features that are specific to the XML Definitions.

B.1.1 Syntax for Distinguished Names

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [5].

B.2 Mapping

B.2.1 General mapping

An IOC maps to an XML element of the same name as the IOC's name in the IS. An IOC attribute maps to a sub-element of the corresponding IOC's XML element, and the name of this sub-element is the same as the attribute's name in the IS.

B.2.2 Information Object Class (IOC) mapping

The mapping is not present in the current version of this specification.

B.3 Solution Set definitions

B.3.1 XML definition structure

The overall description of the file format of configuration data XML files is provided by 3GPP TS 32.616 [11].

Annex B.3.3 of the present document defines the NRM-specific XML schema `transportNrm.xsd` for the Transport interface Network Resources IRP NRM defined in 3GPP TS 32.712 [4].

XML schema `transportNrm.xsd` explicitly declares NRM-specific XML element types for the related NRM.

The definition of those NRM-specific XML element types complies with the generic mapping rules defined in 3GPP TS 32.616 [11].

B.3.2 Graphical Representation

The graphical representation is not present in the current version of this specification.

B.3.3 XML Schema "transportNrm.xsd"

```
<?xml version="1.1" encoding="UTF-8"?>

<!--
  3GPP TS 28.733 Transport Network Interface NRM IRP
  Bulk CM Configuration data file NRM-specific XML schema
  transportNrm.xsd
-->

<schema
  targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.733#transportNrm"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
  xmlns:tn="http://www.3gpp.org/ftp/specs/archive/28_series/28.733#transportNrm"
>

  <import
    namespace=
"http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
  />

<!--Transport Network Interface Resources IRP NRM attribute related XML types -->

  <simpleType name="transportNetworkType">
    <restriction base="string">
      <enumeration value="ATM"/>
      <enumeration value="IP"/>
    </restriction>
  </simpleType>

  <simpleType name="serviceCategoryIn">
    <restriction base="string">
      <enumeration value="CBR"/>
      <enumeration value="RT-VBR"/>
      <enumeration value="NRT-VBR"/>
      <enumeration value="ABR"/>
      <enumeration value="UBR"/>
      <enumeration value="GFR"/>
    </restriction>
  </simpleType>

  <simpleType name="serviceCategoryEg">
    <restriction base="string">
      <enumeration value="CBR"/>
      <enumeration value="RT-VBR"/>
      <enumeration value="NRT-VBR"/>
      <enumeration value="ABR"/>
      <enumeration value="UBR"/>
      <enumeration value="GFR"/>
    </restriction>
  </simpleType>

  <simpleType name="usedAAL">
    <restriction base="string">
      <enumeration value="Null"/>
      <enumeration value="AAL1"/>
      <enumeration value="AAL2"/>
      <enumeration value="AAL3"/>
      <enumeration value="AAL4"/>
      <enumeration value="AAL5"/>
    </restriction>
  </simpleType>

  <simpleType name="virtualPathId">
    <restriction base="integer">
      <minInclusive value="0"/>
    </restriction>
  </simpleType>

  <simpleType name="virtualChannelId">
    <restriction base="integer">
      <minInclusive value="0"/>
    </restriction>
  </simpleType>
```

```
<complexType name="physicalPortIdList">
  <sequence>
    <element name="physicalPortId" type="string" minOccurs="1" maxOccurs="unbounded">
    </element>
  </sequence>
</complexType>

<simpleType name="peakCellRateIn">
  <restriction base="integer">
    <minInclusive value="1"/>
  </restriction>
</simpleType>

<simpleType name="peakCellRateEg">
  <restriction base="integer">
    <minInclusive value="1"/>
  </restriction>
</simpleType>

<simpleType name="sustainableCellRateIn">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<simpleType name="sustainableCellRateEg">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<simpleType name="maximumBurstSizeIn">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<simpleType name="maximumBurstSizeEg">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<simpleType name="minimumCellRateIn">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<simpleType name="minimumCellRateEg">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<simpleType name="minimumDesiredCellRateIn">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<simpleType name="minimumDesiredCellRateEg">
   <restriction base="integer">
    <minInclusive value="1"/>
   </restriction>
</simpleType>

<!-- Transport Network Interface Resources IRP NRM class associated XML elements -->

<element
  name="TransportNetworkInterface"
  substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
>
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
```

```
            <complexType>
              <all>
                <element name="userLabel" type="string"/>
                <element
                  name="transportNetworkType"
                  type="tn:transportNetworkType"
                />
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="tn:ATMPathTerminationPoint"/>
            <element ref="tn:ATMChannelTerminationPoint"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="ATMChannelTerminationPoint">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element name="usageChannel" type="string"/>
                <element
                  name="virtualPathId"
                  type="tn:virtualPathId"
                />
                <element
                  name="virtualChannelId"
                  type="tn:virtualChannelId"
                />
                <element
                  name="physicalPortId"
                  type="string"
                />
                <element name="physicalInterfaceType" type="string" minOccurs="0"/>
                <element
                  name="serviceCategoryIn"
                  type="tn:serviceCategoryIn"
                />
                <element
                  name="serviceCategoryEg"
                  type="tn:serviceCategoryEg"
                />
                <element
                  name="usedAAL"
                  type="tn:usedAAL"
                />
                <element
                  name="peakCellRateIn"
                  type="tn:peakCellRateIn"
                />
                <element
                  name="peakCellRateEg"
                  type="tn:peakCellRateEg"
                />
                <element
                  name="sustainableCellRateIn"
                  type="tn:sustainableCellRateIn"
                  minOccurs="0"
                />
                <element
                  name="sustainableCellRateEg"
                  type="tn:sustainableCellRateEg"
                  minOccurs="0"
                />
                <element
                  name="maximumBurstSizeIn"
                  type="tn:maximumBurstSizeIn"
                />
                <element
```

```
                  name="maximumBurstSizeEg"
                  type="tn:maximumBurstSizeEg"
                />
                <element
                  name="minimumDesiredCellRateIn"
                  type="tn:minimumDesiredCellRateIn"
                  minOccurs="0"
                />
                <element
                  name="minimumDesiredCellRateEg"
                  type="tn:minimumDesiredCellRateEg"
                  minOccurs="0"
                />
                <element
                  name="minimumCellRateIn"
                  type="tn:minimumCellRateIn"
                  minOccurs="0"
                />
                <element
                  name="minimumCellRateEg"
                  type="tn:minimumCellRateEg"
                  minOccurs="0"
                />
                <element name="aTMChannelTerminationPointATMPathTerminationPoint" type="xn:dn"/>
                <element name="aTMChannelTerminationPointIubLink" type="xn:dnList"/>
              </all>
            </complexType>
          </element>
          <choice>
            <element ref="xn:VsDataContainer" minOccurs="0" maxOccurs="unbounded"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="ATMPathTerminationPoint">
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element
                  name="virtualPathId"
                  type="tn:virtualPathId"
                />
                <element
                  name="physicalPortIdList"
                  type="tn:physicalPortIdList"
                />
                <element
                  name="peakCellRateIn"
                  type="tn:peakCellRateIn"
                />
                <element
                  name="peakCellRateEg"
                  type="tn:peakCellRateEg"
                />
                <element name="aTMPathTerminationPointATMChannelTerminationPoint"
type="xn:dnList"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

</schema>
```

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2014-06	SA#64	SP-140358	001	-	F	Upgrade W3C XML Schema version from 1.0 to 1.1	11.1.0
		SP-140332	002	-	F	remove the feature support statements	11.1.0
2014-09	SA#65	SP-140560	003	-	C	Update the link from Solution Set to Information Service due to the end of Release 12	12.0.0
2016-01						Update to Rel-13 (MCC)	13.0.0
2016-03	SA#71	SP-160031	006	-	A	Make the XML schema well formed	13.1.0
2016-06	SA#72	SP-160407	0007	-	F	Update the link from IRP Solution Set to IRP Information Service	13.2.0
2017-03	SA#75	-	-	-		Promotion to Release 14 without technical change	**14.0.0**

History

Document history		
V14.0.0	April 2017	Publication