# 3GPP TS 28.733 V11.0.0 (2012-12)

*Technical Specification*

# 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; Transport Network (TN) interface Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions (Release 11)


Keywords
NRM, IRP, Converged Management,Transport Network

***3GPP***

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

# Contents

# Foreword

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

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

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.

### Ready for Converged Management

This specification is part of a set that has been developed for converged management solutions.

# 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] V11.0.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-xml-20001006: "Extensible Markup Language (XML) 1.0 (Second Edition)".

[13] W3C REC-xmlschema-0-20010502: "XML Schema Part 0: Primer".

[14] W3C REC-xmlschema-1-20010502: "XML Schema Part 1: Structures".

[15] W3C REC-xmlschema-2-20010502: "XML Schema Part 2: Datatypes".

[16] W3C REC-xml-names-19990114: "Namespaces in XML".

[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

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

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

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]).

## B.1 Architectural features

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

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

Not present in the current version of this specification.

## B.3.3 XML Schema "transportNrm.xsd"

```
<?xml version="1.0" encoding="UTF-8"?>

<!--
  3GPP TS 32.716 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/32_series/32.716#transportNrm"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xn=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.626#genericNrm"
  xmlns:tn=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.716#transportNrm"
>

  <import
    namespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.626#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** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Cat** | **Old** | **New** |
| 2012-10 | | | | | First draft | | | 0.1.0 |
| 2012-12 | SA#58 | | | | Presented for information and approval | | 0.1.0 | 1.0.0 |
| 2012-12 | | | | | New version after approval | | 1.0.0 | 11.0.0 |