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Telecommunication management;
Generic Radio Access Network (RAN)
Network Resource Model (NRM)
Integration Reference Point (IRP);
Solution Set (SS) definitions
(3GPP TS 28.663 version 17.1.0 Release 17)

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Contents

Foreword

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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:

28.661: Generic Radio Access Network (RAN) Network Resource Model (NRM); Integration Reference Point (IRP); Requirements;

28.662: Generic Radio Access Network (RAN) Network Resource Model (NRM); Integration Reference Point (IRP); Information Service (IS);

28.663: **Generic Radio Access Network (RAN) 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 Generic Radio Access Network (RAN) Network Resource Model (NRM) IRP, through which an `IRPAgent` can communicate configuration management information to one or several `IRPManagers` concerning Generic RAN resources. The Generic RAN 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 Generic RAN NRM IRP, see 3GPP TS 28.662 [4]..

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 21.905: "Vocabulary for 3GPP Specifications".

[2] Void

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

[4] 3GPP TS 28.662: "Generic Radio Access Network (RAN) 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] 3GPP TS 32.606: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP); Solution Set (SS) definitions".

[7] 3GPP TS 32.616: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP); Solution Set (SS) definitions".

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

[9] Void.

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

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

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

[13] 3GPP TS 28.623: "Generic network resources Integration Reference Point (IRP); Solution Set (SS) definition".

[14] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1], 3GPP TS 32.600 [3] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1] and 3GPP TS 32.600 [3].

XML file: See definition of [7].

XML document: See definition of [7].

XML declaration: See definition of [7].

XML element: See definition of [7].

empty XML element: See definition of [7].

XML content (of an XML element): See definition of [7].

XML start-tag: See definition of [7].

XML end-tag: See definition of [7].

XML empty-element tag: See definition of [7].

XML attribute specification: See definition of [7].

DTD: See definition of [7].

XML schema: See definition of [7].

XML namespace: See definition of [7].

XML complex type: See definition of [7].

XML element type: See definition of [7].

Network Resource Model (NRM): See definition in TS 28.622 [14].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], 3GPP TS 32.600 [3], and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1] and 3GPP TS 32.600 [3].

CM	Configuration Management
DTD	Document Type Definition
IOC	Information Object Class
MO	Managed Object
MOC	Managed Object Class
SS	Solution Set

4 Solution Set (SS) definition

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

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

Annex A (normative): CORBA Solution Set

A.0 Introduction

This clause contains the CORBA Solution Set for the IRP whose semantics is specified in Generic RAN NRM IRP: Information Service (TS 28.662 [4]).

A.1 Architectural features

The overall architectural feature of Generic RAN Network Resources IRP is specified in 3GPP TS 28.662 [4].
This clause specifies features that are specific to the CORBA SS.

A.1.1 Syntax for Distinguished Names

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

A.1.2 Rules for NRM extensions

See clause A.1.2 of [13].

A.1.2.1 Allowed extensions

See clause A.2.1 of [13].

A.1.2.2 Extensions not allowed

See clause A.2.1 of [13].

A.2 Mapping

A.2.1 General mapping

See clause A.2.1 of [13].

A.2.2 Information Object Class (IOC) mapping

A.2.2.1 IOC SectorEquipmentFunction

Mapping from NRM IOC SectorEquipmentFunction attributes and associations to SS equivalent MOC SectorEquipmentFunction attributes

IS Attribute	SS Attribute	SS Type
id	id	string
fqBand	fqBand	short
eUTRANFqBands	eUTRANFqBands	GenericRanNRMAttributeTypes:: eUTRANFqBandsListType
nRFqBands	nRFqBands	GenericRanNRMAttributeTypes:: nRFqBandsListType
uTRANFDDFqBands	uTRANFDDFqBands	GenericRanNRMAttributeTypes:: uTRANFDDFqBandsListType
uTRANTDDFqBands	uTRANTDDFqBands	GenericRanNRMAttributeTypes:: uTRANTDDFqBandsListType
confOutputPower	confOutputPower	short
relatedTmaList	relatedTmaList	GenericNetworkResourcesIRPSystem:: AttributeTypes::MOReferenceSet
relatedAntennaList	relatedAntennaList	GenericNetworkResourcesIRPSystem:: AttributeTypes::MOReferenceSet
relatedCellList	relatedCellList	GenericNetworkResourcesIRPSystem:: AttributeTypes::MOReferenceSet

A.2.2.2 IOC AntennaFunction

Mapping from NRM IOC AntennaFunction attributes and associations to SS equivalent MOC AntennaFunction attributes

IS Attribute	SS Attribute	SS Type
id	id	string
retTiltValue	retTiltValue	short
bearing	bearing	short
retGroupName	retGroupName	string
height	height	short
maxAzimuthValue	maxAzimuthValue	short
minAzimuthValue	minAzimuthValue	short
horizBeamwidth	horizBeamwidth	short
vertBeamwidth	vertBeamwidth	short
relatedCellList	relatedCellList	GenericNetworkResourcesIRPSystem::AttributeTypes:: MOReferenceSet

NOTE: For all support qualifiers with the value "O", see attribute constraints in TS 28.622 [4].

A.2.2.3 IOC TmaFunction

Mapping from NRM IOC TmaFunction attributes and associations to SS equivalent MOC TmaFunction attributes

IS Attribute	SS Attribute	SS Type
id	id	string
tmaSubunitNumber	tmaSubunitNumber	unsigned short
tmaStateFlag	tmaStateFlag	unsigned short
tmaFunctionFlag	tmaFunctionFlag	unsigned short
tmaMinGain	tmaMinGain	unsigned short
tmaMaxGain	tmaMaxGain	unsigned short
tmaResolution	tmaResolution	unsigned short
tmaGainFigure	tmaGainFigure	unsigned short
tmaNumberOfSubunits	tmaNumber OfSubunits	unsigned short
tmaBaseStationId	tmaBaseStationId	string
tmaSectorId	tmaSectorId	string
tmaAntennaBearing	tmaAntennaBearing	unsigned short
tmaInstalledMechanicalTilt	tmaInstalledMechanicalTilt	short
tmaSubunitType	tmaSubunitType	unsigned short
tmaSubunitRxFrequencyBand	tmaSubunitRxFrequencyBand	sequence of unsigned short
tmaSubunitTxFrequencyBand	tmaSubunitTxFrequencyBand	sequence of unsigned short
tmaGainResolution	tmaGainResolution	unsigned short
relatedCellList	relatedCellList	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReferenceSet

Editor's note: The attributes tmaSubunitType, tmaSubunitRxFrequencyBand, tmaSubunitTxFrequencyBand, tmaGainResolution, tmaBaseStationId and tmaSectorId are to be checked if they should be moved to inventory.

A.2.2.4 IOC CommonBSFunction

Mapping from NRM IOC CommonBSFunction attributes and associations to SS equivalent MOC CommonBSFunction attributes

IS Attribute	SS Attribute	SS Type
id	id	string
sharedTechnologies	sharedTechnologies	short

A.2.2.5 IOC GSMCellPart

Mapping from NRM IOC GSMCellPart attributes and associations to SS equivalent MOC GSMCellPart attributes

IS Attribute	SS Attribute	SS Type
id	id	string
aRFCN	aRFCN	string
tsc	tsc	long
aTA	aTA	short
relatedSectorEquipment	relatedSectorEquipment	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReference

A.2.2.6 IOC RepeaterFunction

Mapping from NRM IOC RepeaterFunction attributes to SS equivalent MOC RepeaterFunction attributes

IS Attribute	SS Attribute	SS Type
id	repeaterFunctionId	string
userLabel	userLabel	string
priority	priority	long
latitude	latitude	float
longitude	longitude	float
ctrlConnMode	ctrlConnMode	ctrlConnMode
environmentInfo	environmentInfo	string
powerSwitch	powerSwitch	powerSwitch
ulAttenuation	ulAttenuation	long
dlAttenuation	dlAttenuation	long
firmwareVer	firmwareVer	string
repeaterType	repeaterType	repeaterType
externalUTRANCell	repeaterFunctionExternalUtranCell	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReference

A.3 Solution Set definitions

A.3.1 IDL definition structure

Clauses A.3.2 and A.3.3 define the MO classes for the Generic RAN NRM IRP.

A.3.2 IDL specification "GenericRanNRMDefs.idl"

```
//File:GenericRanNRMDefs.idl
#ifndef _GENERICRANNRMDEFS_IDL_
#define _GENERICRANNRMDEFS_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 GenericRanNRMDefs
{

        /**
       *  Definitions for MO class AntennaFunction
       */
      interface AntennaFunction: GenericNetworkResourcesNRMDefs::ManagedFunction
      {
         const string CLASS = "AntennaFunction";
         // Attribute Names
         //
         const string id = "id";
         const string retTiltValue = "retTiltValue";
         const string bearing = "bearing";
         const string retGroupName = "retGroupName";
         const string height = "height";
         const string maxAzimuthValue = "maxAzimuthValue";
         const string minAzimuthValue = "minAzimuthValue";
         const string horizBeamwidth = "horizBeamwidth";
         const string vertBeamwidth = "vertBeamwidth";
         const string relatedCellList = "relatedCellList";
      };

        /**
       *  Definitions for MO class TmaFunction
       */
         interface TmaFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
      {
         const string CLASS = "TmaFunction";
         // Attribute Names
         //
         const string id = "id";
         const string tmaSubunitNumber = "tmaSubunitNumber";
         const string tmaStateFlag = "tmaStateFlag";
         const string tmaFunctionFlag = "tmaFunctionFlag";
         const string tmaMinGain = "tmaMinGain";
         const string tmaMaxGain = "tmaMaxGain";
         const string tmaResolution = "tmaResolution";
         const string tmaGainFigure = "tmaGainFigure";
         const string tmaNumberOfSubunits = "tmaNumberOfSubunits";
         const string tmaBaseStationId = "tmaBaseStationId";
         const string tmaSectorId = "tmaSectorId";
         const string tmaAntennaBearing = "tmaAntennaBearing";
         const string tmaInstalledMechanicalTilt = "tmaInstalledMechanicalTilt";
         const string tmaSubunitType = "tmaSubunitType";
         const string tmaSubunitRxFrequencyBand = "tmaSubunitRxFrequencyBand";
         const string tmaSubunitTxFrequencyBand = "tmaSubunitTxFrequencyBand";
         const string tmaGainResolution = "tmaGainResolution";
         const string relatedCellList = "relatedCellList";
      };


       /*
      * Definitions for MO class SectorEquipmentFunction
      */
```

```
    interface SectorEquipmentFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
    {
        const string CLASS = "SectorEquipmentFunction";
        // Attribute Names
        //
        const string id = "id";
        const string fqBand = "fqBand";
        const string eUTRANFqBands = "eUTRANFqBands";
        const string nRFqBands = "nRFqBands";
        const string uTRANFDDFqBands = "uTRANFDDFqBands";
        const string uTRANTDDFqBands = "uTRANTDDFqBands";
        const string confOutputPower = "confOutputPower";
        const string relatedTmaList = "relatedTmaList";
        const string relatedAntennaList = "relatedAntennaList";
        const string relatedCellList = "relatedCellList";
    };

      /*
     * Definitions for MO class CommonBSFunction
     */
    interface CommonBSFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
    {
        const string CLASS = "CommonBSFunction";
        // Attribute Names
        //
        const string id = "id";
        const string sharedTechnologies = "sharedTechnologies";
    };

      /*
     * Definitions for MO class GSMCellPart
     */
    interface GSMCellPart : GenericNetworkResourcesNRMDefs::ManagedFunction
    {
        const string CLASS = "GSMCellPart";
        // Attribute Names
        //
        const string id = "id";
        const string aRFCN = "aRFCN";
        const string tsc = "tsc";
        const string aTA = "aTA";
        const string relatedSectorEquipment = "relatedSectorEquipment";
    };

};

module GenericRanNRMAttributeTypes
{
    typedef sequence<string> eUTRANFqBandsListType;
    typedef sequence<string> nRFqBandsListType;
    typedef sequence<string> uTRANFDDFqBandsListType;
    typedef sequence<string> uTRANTDDFqBandsListType;
};

#endif //_GENERICRANNRMDEFS_IDL_
```

A.3.3 IDL specification (file name "RepeaterNetworkResourcesNRMDefs.idl")

```
//File:RepeaterNetworkResourcesNRMDefs.idl
#ifndef _REPEATERNETWORKRESOURCESNRMDEFS_IDL_
#define _REPEATERNETWORKRESOURCESNRMDEFS_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 RepeaterNetworkResourcesNRMDefs
{
      /**
       *  Definitions for MO class RepeaterFunction
       */
      interface RepeaterFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
      {
```

```
          const string CLASS = "RepeaterFunction";
         // Attribute Names
         //
         const string repeaterFunctionId = "repeaterFunctionId";
         const string priority = "priority";
         const string latitude = "latitude";
         const string longitude = "longitude";
         const string ctrlConnMode = "ctrlConnMode";
         const string environmentInfo = "environmentInfo";
         const string powerSwitch = "powerSwitch";
         const string dLAttenuation = "dLAttenuation";
         const string uLAttenuation = "uLAttenuation";
         const string firmwareVer = "firmwareVer";
         const string repeaterType = "repeaterType";
         const string repeaterFunctionExternalUtranCell = "repeaterFunctionExternalUtranCell";
    };

      enum ctrlConnMode
      {
         GSM_SMS,
         WCDMA_SMS,
         CIRCLE_SWITCH_DATA_CSD,
            PACKAGE_SWITCH_DATA_IP,
            SERIAL_PORT
      };

       enum powerSwitch {ON,OFF};

     enum repeaterType
     {
       WIDE_BAND_REPT_FUNCTION,
       FREQ_SEL_REPT_FUNCTION,
       FIBER_REPT_FUNCTION,
       INDOOR_REPT_FUNCTION,
       FREQ_SHIFT_REPT_FUNCTION

     };
 };
#endif //_REPEATERNETWORKRESOURCESNRMDEFS_IDL_
```

Annex B (normative): XML definitions

B.0 General

This annex contains the XML Definitions for the Generic RAN NRM IRP as it applies to Itf-N, in accordance with Generic RAN NRM IRP IS definitions [4].

The XML file formats are based on XML [8], XML Schema [10] [11] and XML Namespace [12] standards.

B.1 Architectural features

B.1.0 General

The overall architectural feature of Generic RAN Network Resources IRP is specified in 3GPP TS 28.662 [4].
This clause specifies features that are specific to the Schema definitions.

The XML definitions of this document specify the schema for a configuration content.

When using the XML definitions for a configuration file transfer with the Bulk CM IRP, using either CORBA Solution Set of 3GPP TS 32.616 [7] or SOAP Solution Set of 3GPP TS 32.616 [7], the basic part of the XML file format definition is provided by 3GPP TS 32.616 [7]. The XML definitions of this document provide the schema for the configuration content to be included in such a configuration file.

When using the XML definitions with a SOAP Solution Set of any Interface IRP that perform operations on managed objects, for example the Basic CM IRP SOAP SS of 3GPP TS 32.606 [6], the XML definitions of this document provides the schema for the configuration content operated on by the interface IRP. Such configuration content can be name of managed object and, if applicable, IOC attributes.

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 [7].

Annex B.3.3 of the present document defines the NRM-specific XML schema `genericRanNrm.xsd` for the Generic RAN Network Resources IRP NRM defined in 3GPP TS 28.662 [4] (except Repeater object).

XML schema `genericRanNrm.xsd` explicitly declares NRM-specific XML element types for the related NRM (except Repeater object) Annex B.3.4 of the present document defines the NRM-specific XML schema `repeaterNrm.xsd` for the Repeater object of the Generic RAN Network Resources IRP NRM defined in 3GPP TS 28.662 [4].

XML schema `repeaterNrm.xsd` explicitly declares NRM-specific XML element types for Repeater object defined in the related NRM.

The definition of those NRM-specific XML element types complies with the generic mapping rules defined in 3GPP TS 32.616 [7].

B.3.2 Graphical Representation

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

B.3.3 XML schema "genericRanNrm.xsd"

```
<?xml version="1.1" encoding="UTF-8"?>
<!--
    3GPP TS 28.663 Generic RAN Network Resources IRP
    Bulk CM Configuration data file NRM-specific XML schema
    genericRanNrm.xsd
-->
<schema xmlns="http://www.w3.org/2001/XMLSchema"
xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
xmlns:gn="http://www.3gpp.org/ftp/specs/archive/28_series/28.656#geranNrm"
xmlns:gr="http://www.3gpp.org/ftp/specs/archive/28_series/28.663#genericRanNrm"
targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.663#genericRanNrm"
elementFormDefault="qualified">

  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"/>
  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.656#geranNrm"/>

  <!-- Generic RAN Network Resources IRP NRM attribute related XML types -->

  <simpleType name="angleValue">
    <restriction base="short">
      <minInclusive value="0"/>
      <maxInclusive value="3600"/>
    </restriction>
  </simpleType>

  <simpleType name="retGroupName">
    <restriction base="string">
      <maxLength value="80"/>
    </restriction>
  </simpleType>

  <simpleType name="bearing">
    <restriction base="short">
      <minInclusive value="0"/>
      <maxInclusive value="360"/>
    </restriction>
  </simpleType>

  <simpleType name="tmaFunctionFlag">
    <restriction base="unsignedShort">
      <minInclusive value="0"/>
      <maxInclusive value="1"/>
    </restriction>
  </simpleType>

  <simpleType name="tmaStateFlag">
    <restriction base="unsignedShort">
      <minInclusive value="0"/>
      <maxInclusive value="1"/>
    </restriction>
  </simpleType>

  <simpleType name="fourOctets">
    <restriction base="hexBinary">
      <length value="4"/>
    </restriction>
    </simpleType>

  <complexType name="FqBandsList">
    <sequence>
      <element name="fqBand" type="string" minOccurs="0" maxOccurs="unbounded"/>
    </sequence>
  </complexType>

  <!-- Generic RAN Network Resources IRP NRM class associated XML elements -->

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

```
                                    <element name="userLabel" type="string"/>
                                    <element name="vnfParametersList"
type="xn:vnfParametersListType" minOccurs="0"/>
                                    <element name="fqBand" type="short" />
                                    <element name="eUTRANFqBands" type="gr:FqBandsList" />
                                    <element name="nRFqBands" type="gr:FqBandsList" />
                                    <element name="uTRANFDDFqBands" type="gr:FqBandsList" />
                                    <element name="uTRANTDDFqBands" type="gr:FqBandsList" />
                                    <element name="confOutputPower" type="short" minOccurs="0"/>
                                    <element name="relatedTmaList" type="xn:dnList" />
                                    <element name="relatedAntennaList" type="xn:dnList" />
                                    <element name="relatedCellList" type="xn:dnList" />
                                </all>
                            </complexType>
                        </element>
                        <choice minOccurs="0" maxOccurs="unbounded">
                           <element ref="gr:SectorEquipmentFunctionOptionallyContainedNrmClass"/>

                           <element ref="xn:VsDataContainer"/>
                        </choice>
                    </sequence>
                </extension>
            </complexContent>
        </complexType>
    </element>

    <element name="AntennaFunction"
substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
        <complexType>
            <complexContent>
                <extension base="xn:NrmClass">
                    <sequence>
                        <element name="attributes" minOccurs="0">
                            <complexType>
                                <all>
                                    <element name="userLabel" type="string"/>
                                    <element name="vnfParametersList"
type="xn:vnfParametersListType" minOccurs="0"/>
                                    <element name="retTiltValue" type="gr:angleValue"
minOccurs="0"/>
                                    <element name="bearing" type="gr:bearing" minOccurs="0"/>
                                    <element name="retGroupName" type="gr:retGroupName"
minOccurs="0"/>
                                    <element name="height" type="short" minOccurs="0"/>
                                    <element name="maxAzimuthValue" type="gr:angleValue"
minOccurs="0"/>
                                    <element name="minAzimuthValue" type="gr:angleValue"
minOccurs="0"/>
                                    <element name="horizBeamwidth" type="gr:angleValue"
minOccurs="0"/>
                                    <element name="vertBeamwidth" type="gr:angleValue"
minOccurs="0"/>
                                    <element name="relatedCellList" type="xn:dnList" />
                                </all>
                            </complexType>
                        </element>
                        <choice minOccurs="0" maxOccurs="unbounded">
                            <element ref="gr:AntennaFunctionOptionallyContainedNrmClass"/>
                            <element ref="xn:VsDataContainer"/>
                        </choice>
                    </sequence>
                </extension>
            </complexContent>
        </complexType>

    </element>
    <element name="TmaFunction"  substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
        <complexType>
            <complexContent>
                <extension base="xn:NrmClass">
                    <sequence>
                        <element name="attributes" minOccurs="0">
                            <complexType>
                                <all>
                                    <element name="userLabel" type="string"/>
                                    <element name="vnfParametersList"
type="xn:vnfParametersListType" minOccurs="0"/>
                                    <element name="tmaSubunitNumber" type="unsignedShort" />
```

```
                                    <element name="tmaStateFlag" type="gr:tmaStateFlag" />
                                    <element name="tmaFunctionFlag" type="gr:tmaFunctionFlag" />
                                    <element name="tmaMinGain" type="unsignedShort" />
                                    <element name="tmaMaxGain" type="unsignedShort" />
                                    <element name="tmaResolution" type="unsignedShort" />
                                    <element name="tmaGainFigure" type="unsignedShort" />
                                    <element name="tmaNumberOfSubunits" type="unsignedShort" />
                                    <element name="tmaBaseStationId" type="string" minOccurs="0"/>
                                    <element name="tmaSectorId" type="string" minOccurs="0"/>
                                    <element name="tmaAntennaBearing" type="unsignedShort"
minOccurs="0"/>
                                    <element name="tmaInstalledMechanicalTilt" type="short"
minOccurs="0"/>
                                    <element name="tmaSubunitType" type="unsignedShort"
minOccurs="0"/>
                                    <element name="tmaSubunitRxFrequencyBand" type="gr:fourOctets"
minOccurs="0"/>
                                    <element name="tmaSubunitTxFrequencyBand" type="gr:fourOctets"
minOccurs="0"/>
                                    <element name="tmaGainResolution" type="unsignedShort"
minOccurs="0"/>
                                    <element name="relatedCellList" type="xn:dnList"/>
                                </all>
                            </complexType>
                        </element>
                        <choice minOccurs="0" maxOccurs="unbounded">
                            <element ref="gr:TmaFunctionOptionallyContainedNrmClass"/>
                            <element ref="xn:VsDataContainer"/>
                        </choice>
                    </sequence>
                </extension>
            </complexContent>
        </complexType>
    </element>

    <element name="GSMCellPart" substitutionGroup="gn:GsmCellOptionallyContainedNrmClass">
        <complexType>
            <complexContent>
                <extension base="xn:NrmClass">
                    <sequence>
                        <element name="attributes" minOccurs="0">
                            <complexType>
                                <all>
                                    <element name="userLabel" type="string"/>
                                    <element name="vnfParametersList"
type="xn:vnfParametersListType" minOccurs="0"/>
                                    <element name="aRFCN" type="string"/>
                                    <element name="tsc" type="long"/>
                                    <element name="aTA" type="short"/>
                                    <element name="relatedSectorEquipment" type="xn:dn"/>
                                </all>
                            </complexType>
                        </element>
                        <choice minOccurs="0" maxOccurs="unbounded">
                            <element ref="gr:GSMCellPartOptionallyContainedNrmClass"/>
                            <element ref="xn:VsDataContainer"/>
                        </choice>
                    </sequence>
                </extension>
            </complexContent>
        </complexType>
    </element>

    <element name="CommonBSFunction"
substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">
        <complexType>
            <complexContent>
                <extension base="xn:NrmClass">
                    <sequence>
                        <element name="attributes" minOccurs="0">
                            <complexType>
                                <all>
                                    <element name="userLabel" type="string"/>
                                    <element name="vnfParametersList"
type="xn:vnfParametersListType" minOccurs="0"/>
                                    <element name="sharedTechnologies" type="short"/>
                                </all>
                            </complexType>
```

```
                        </element>
                        <choice minOccurs="0" maxOccurs="unbounded">
                            <element ref="gr:CommonBSFunctionOptionallyContainedNrmClass"/>
                            <element ref="xn:VsDataContainer"/>
                        </choice>
                    </sequence>
                </extension>
            </complexContent>
        </complexType>
    </element>

    <element name="SectorEquipmentFunctionOptionallyContainedNrmClass" type="xn:NrmClass"
abstract="true"/>
    <element name="AntennaFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
    <element name="TmaFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
    <element name="GSMCellPartOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
    <element name="CommonBSFunctionOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
</schema>
```

B.3.4 XML schema (file name "repeaterNrm.xsd")

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

<!--
  3GPP TS 28.663 Generic RAN Network Resources IRP
  Bulk CM Configuration data file NRM-specific XML schema
  repeaterNrm.xsd
-->

<schema
  targetNamespace=
"http://www.3gpp.org/ftp/specs/archive/28_series/28.663#repeaterNrm"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xn=
"http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
  xmlns:rn=
"http://www.3gpp.org/ftp/specs/archive/28_series/28.663#repeaterNrm"
>

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

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

  <simpleType name="priority">
    <restriction base="integer">
      <minInclusive value="0"/>
      <maxInclusive value="268435455"/>
    </restriction>
  </simpleType>

  <simpleType name="dLAttenuation">
    <restriction base="integer">
      <minInclusive value="0"/>
      <maxInclusive value="268435455"/>
    </restriction>
  </simpleType>

  <simpleType name="uLAttenuation">
    <restriction base="integer">
      <minInclusive value="0"/>
      <maxInclusive value="268435455"/>
    </restriction>
  </simpleType>


  <simpleType name="latitude">
    <restriction base="decimal">
      <fractionDigits value="4"/>
      <minInclusive value="-90.0000"/>
      <maxInclusive value="90.0000"/>
    </restriction>
  </simpleType>
```

```
  <simpleType name="longitude">
    <restriction base="decimal">
      <fractionDigits value="4"/>
      <minInclusive value="-180.0000"/>
      <maxInclusive value="180.0000"/>
    </restriction>
  </simpleType>

  <simpleType name="ctrlConnMode">
    <restriction base="string">
      <enumeration value="GSM_SMS"/>
      <enumeration value="WCDMA_SMS"/>
      <enumeration value="CIRCLE_SWITCH_DATA_CSD"/>
      <enumeration value="PACKAGE_SWITCH_DAT_IP"/>
      <enumeration value="SERIAL_PORT"/>
    </restriction>
  </simpleType>

  <simpleType name="powerSwitch">
    <restriction base="string">
      <enumeration value="ON"/>
      <enumeration value="OFF"/>
    </restriction>
  </simpleType>
  <simpleType name="repeaterType">
    <restriction base="string">
      <enumeration value="WideBandReptFunction"/>
      <enumeration value="FreqSelReptFunction"/>
      <enumeration value="FiberReptFunction"/>
      <enumeration value="IndoorReptFunction"/>
      <enumeration value="FreqShiftReptFunction"/>
    </restriction>
  </simpleType>

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

  <element
    name="RepeaterFunction "
    substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
  >
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes" minOccurs="0">
              <complexType>
                <all>
                  <element name="userLabel" type="string"/>
                  <element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
                  <element name="priority" type="rn:priority"/>
                  <element name="latitude" type="rn:latitude"/>
                  <element name="longitude" type="rn:longitude"/>
                  <element name="ctrlConnMode" type="rn:ctrlConnMode"/>
                  <element name="environmentInfo" type="string"/>
                  <element name="powerSwitch" type="rn:powerSwitch"/>
                  <element name="dLAttenuation" type="rn:dLAttenuation"/>
                  <element name="uLattenuation" type="rn:uLAttenuation"/>
                  <element name="firmwareVer" type="string"/>
                  <element name="repeaterType" type="rn:repeaterType"/>
                  <element name="repeaterFunctionExternalUtranCell" type="xn:dn"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="xn:VsDataContainer"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>
</schema>
```

Annex C (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2013-09	SA#61	SP-130443	0001	1	F	Add missing Repeater Object SS definitions	11.1.0
2014-06	SA#64	SP-140332	0002	-	F	Upgrade W3C XML Schema version from 1.0 to 1.1	11.2.0
		SP-140359	0003	-	F	remove the feature support statements	11.2.0
2014-09	SA#65	SP-140560	0004	-	C	Update the link from Solution Set to Information Service due to the end of Release 12	12.0.0
2015-12	SA#70	SP-150691	0005	-	A	Make the XML schema well formed	12.1.0
2016-01	SA#70					Upgrade to Rel-13 (MCC)	13.0.0
2016-06	SA#72	SP-160408	0009	-	A	Make the XML schema well formed	13.1.0
2016-06	SA#72	SP-160407	0010	-	F	Update the link from IRP Solution Set to IRP Information Service	13.1.0
2016-06	SA#72	SP-160408	0012	-	A	XML attribute "longitude" is incorrectly defined	13.1.0
2016-09	SA#73	SP-160620	0014	-	F	Correction in XML code	13.2.0
2017-03	SA#75	-	-	-		Promotion to Release 14 without technical change	14.0.0
2017-06	SA#76	SP-170514	0015	-	F	Update link from IRP SS to IS	14.1.0
2017-06	SA#76	SP-170510	0016	1	B	Update the XML Schema definitions to align with IS to support Configuration Management for mobile networks that include virtualized network functions	14.1.0
2018-06	-	-	-	-	-	Update to Rel-15 version (MCC)	15.0.0
2018-12	SA#82	SP-181156	0018	1	F	Align frequency bands supported by the hardware associated with the SectorEquipmentFunction	15.1.0
2018-12	SA#82	SP-181156	0019	1	F	Align SectorEquipmentFunction properties with that defined in stage 2	15.1.0
2019-09	SA#85	SP-190752	0020	-	F	Correct references and add definition of NRM	15.2.0
2020-07	-	-	-	-	-	Update to Rel-16 version (MCC)	**16.0.0**
2022-03	-	-	-	-	-	Update to Rel-17 version (MCC)	**17.0.0**
2024-09	SA#105	SP-241164	0024	1	F	Rel-17 CR TS 28.663 Correction of XML references	**17.1.0**

History

Document history		
V17.0.0	April 2022	Publication
V17.1.0	October 2024	Publication