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Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Services and System Aspects;

Telecommunication management;   
Home enhanced Node B (HeNB) Subsystem (HeNS)   
Network Resource Model (NRM)   
Integration Reference Point (IRP);   
Solution Set (SS) definitions

(Release 17)



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# 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.

# 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; Configuration Management (CM); as identified below:

28.674: Telecommunication management; Home enhanced Node B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP); Requirements.

28.675: Telecommunication management; Home enhanced Node B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS).

**28.676: Telecommunication management; Home enhanced Node B Subsystem (HeNS) 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 HeNS Network Resource Model (NRM) IRP, through which an IRPAgent can communicate configuration management information to one or several IRPManagers concerning HeNS resources. The HeNS 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 HeNS NRM IRP, see 3GPP TS 28.675 [2]..

# 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 TR 21.905: “Vocabulary for 3GPP Specifications”.

[2] 3GPP TS 28.675: “Telecommunication management; Home enhanced Node B (HeNB) Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)”.

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

[4] Void.

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

[6] Void

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

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

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

[10] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[11] 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 the purposes of the present document, the terms and definitions given in TR 21.905 [1] 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].

**XML file:** See definition of [3].

**XML document:** See definition of [3].

**XML declaration:** See definition of [3]

**XML element:** See definition of [3].

**empty XML element:** See definition of [3].

**XML content (of an XML element):** See definition of [3]

**XML start-tag:** See definition of [3].

**XML end-tag:** See definition of [3]

**XML empty-element tag:** See definition of [3].

**XML attribute specification:** See definition of [3].

**DTD:** See definition of [3].

**XML schema:** See definition of [3].

**XML namespace:** See definition of [3].

**XML complex type:** See definition of [3].

**XML element type:** See definition of [3].

## 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

HeNB Home enhanced Node B

HeNS Home enhanced Node B Subsystem

HeNB-GW Home enhanced Node B Gateway

IS Information Service

IDL Interface Definition Language

IRP Integration Reference Point

MO Managed Object

MOC Managed Object Class

NRM Network Resource Model

OMG Object Management Group

SS Solution Set

XML eXtensible Markup Language

# 4 Solution Set Definitions

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

- 3GPP HeNS NRM IRP CORBA SS (Annex A)

- 3GPP HeNS 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 HeNS NRM IRP: Information Service (TS 28.675 [2]).

# A.1 Architectural features

The overall architectural feature of HeNS Network Resources IRP is specified in 3GPP TS 29.675 [2].   
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 [10].

## A.1.2 Rules for NRM extensions

See clause A.1.1 of [11].

# A.2 Mapping

## A.2.1 General mappings

See clause A.1.1 of [11].

## A.2.2 Information Object Class (IOC) mapping

This SS supports reference attributes for relations other than containment relations between objects. Reference attributes are therefore introduced in each MOC where needed.

### A.2.2.1 IOC HeNBGWFunction

| IS Attributes | SS Attributes | SS Type |
| --- | --- | --- |
| id | henbgwFunctionId | string |
| henbgwId | henbgwId | long |
| userLabel | userLabel | string |
| ipConfigInfo | ipConfigInfo | string |
| maxNbrHeNBRegistered | maxNbrHeNBRegistered | Integer |
| maxPacketCapability | maxPacketCapability | integer |

### A.2.2.2 IOC HeNBProfile

| IS Attributes | SS Attributes | SS Type |
| --- | --- | --- |
| id | henbProfileId | string |
| userLabel | userLabel | string |
| Configuration | configuration | string |
| Criterion | criterion | string |

### A.2.2.3 IOC HeMSFunction

| IS Attributes | SS Attributes | SS Type |
| --- | --- | --- |
| userLabel | userLabel | string |

# A.3 Solution Set definitions

## A.3.1 IDL definition structure

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

## A.3.2 IDL specification “HensNetworkResourcesNRMDefs.idl”

//File: HensNetworkResourcesNRMDefs.idl

#ifndef \_*HENSNETWORKRESOURCESNRMDEFS\_*IDL\_

#define \_*HENSNETWORKRESOURCESNRMDEFS\_*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 HensNetworkResourcesNRMDefs

{

/\*\*

\* Definitions for MO class HeNBGWFunction

\*/

interface HeNBGWFunction : GenericNetworkResourcesNRMDefs::ManagedFunction

{

const string CLASS = "HeNBGWFunction";

// Attribute Names

//

const string henbgwFunctionId = "henbgwFunctionId";

const string henbgwId = "henbgwId";

const string ipConfigInfo = "ipConfigInfo";

const string maxNbrHeNBRegistered = "maxNbrHeNBRegistered";

const string maxPacketCapability = "maxPacketCapability";

};

/\*\*

\* Definitions for MO class HeNBProfile

\*/

interface HeNBProfile : GenericNetworkResourcesNRMDefs::ManagedFunction

{

const string CLASS= "HeNBProfile";

// Attribute Names

//

const string henbProfileId = "henbProfileId";

const string configuration = "configuration";

const string criterion = "criterion";

};

/\*\*

\* Definitions for MO class HeMSFunction

\*/

interface HeMSFunction : GenericNetworkResourcesNRMDefs::ManagedFunction

{

const string CLASS= "HeMSFunction";

// Attribute Names

//

};

};

#endif //\_*HENSETWORKRESOURCESNRMDEFS\_*IDL\_

Annex B (normative):  
XML Definitions

# B.0 General

This annex contains the XML Definitions for the HeNS NRM IRP as it applies to Itf-N, in accordance with HeNS NRM IRP Information Service (TS 28.765 [2]).

The XML file formats are based on XML [5], XML Schema [7] [8] and XML Namespace [9] standards.

# B.1 Architectural features

The overall architectural feature of HeNS Network Resources IRP is specified in 3GPP TS 28.675 [2].   
This clause specifies features that are specific to the Schema definitions.

## B.1.1 Syntax for Distinguished Names

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [10].

# 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

Annex B.3.3 of the present document defines the NRM-specific XML schema hensNrm.xsd for the HeNS Network Resources IRP NRM defined in 3GPP TS 28.675 [2].

XML schema hensNrm.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 [3].

## B.3.2 Graphical Representation

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

## B.3.3 XML schema "hensNrm.xsd"

<?xml version="1.1" encoding="UTF-8"?>  
  
<!--  
 3GPP TS 28.676 HeNS Network Resources IRP  
 Bulk CM Configuration data file NRM-specific XML schema  
 hensNrm.xsd  
-->  
  
<schema  
 targetNamespace=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.676#hensNrm"  
 elementFormDefault="qualified"  
 xmlns="http://www.w3.org/2001/XMLSchema"  
 xmlns:xn=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.623#genericNrm"  
 xmlns:un=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.676#hensNrm"  
 xmlns:gn=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.656#geranNrm"  
 xmlns:sm=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.626#stateManagementIRP"  
 xmlns:epc=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.709#epcNrm"  
>

<import  
 namespace=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.656#genericNrm"  
 />  
 <import  
 namespace=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.656#geranNrm"  
 />  
 <import  
 namespace=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.709#epcNrm"  
 />  
 <import  
 namespace=  
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.626#stateManagementIRP"  
 />  
  
 <!-- HeNS network Resources IRP NRM class associated XML elements -->  
  
 <element  
 name="HeNBGWFunction"  
 substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"  
 >  
 <complexType>  
 <complexContent>  
 <extension base="xn:NrmClass">  
 <sequence>  
 <element name="attributes" minOccurs="0">  
 <complexType>  
 <all>  
 <element name="henbgwId" type="string"/>

<element name="userLabel" type="string"/>

<element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>  
 <element name="iPConfigInfo" type="string"/>  
 <element name="maxNbrHeNBRegistered" type="integer"/>  
 <element name="maxPacketCapability" type="integer"/>  
 </all>  
 </complexType>  
 </element>

<choice minOccurs="0" maxOccurs="unbounded">

<element ref="epc:EP\_RP\_EPS"/>  
 <element ref="xn:VsDataContainer"/>  
 </choice>  
 </sequence>  
 </extension>  
 </complexContent>  
 </complexType>  
 </element>

<element name="HeNBProfile">  
 <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="configuration" type="string"/>  
 <element name="criterion" type="string" minOccurs="0"/>  
 </all>  
 </complexType>  
 </element>

<choice minOccurs="0" maxOccurs="unbounded">  
 <element ref="xn:VsDataContainer"/>  
 </choice>  
 </sequence>  
 </extension>  
 </complexContent>  
 </complexType>  
 </element>  
  
 <element name="HeMSFunction">  
 <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"/>  
 </all>  
 </complexType>  
 </element>

<choice minOccurs="0" maxOccurs="unbounded">  
 <element ref="xn:VsDataContainer"/>

<element ref="un:HeNBProfile"/>  
 </choice>  
 </sequence>  
 </extension>  
 </complexContent>  
 </complexType>  
 </element>

</schema>

Annex C (informative):  
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 06-2014 | SA#64 | SP-140332 | 0001 | - |  | Upgrade W3C XML Schema version from 1.0 to 1.1 | 11.1.0 |
|  |  | SP-140360 | 0002 | - |  | remove the feature support statements | 11.1.0 |
| 09-2014 | SA#65 | SP-140560 | 0003 | - |  | Update the link from Solution Set to Information Service due to the end of Release 12 | 12.0.0 |
| 01-2016 | SA#70 |  |  |  |  | Update to Rel-13(MCC) | 13.0.0 |
| 2016-06 | SA#72 | SP-160407 | 0004 | - | F | Update the link from IRP Solution Set to IRP Information Service | 13.1.0 |
| 2017-03 | SA#75 | - | - | - |  | Promotion to Release 14 without technical change | **14.0.0** |
| 2017-06 | SA#76 | SP-170514 | 0005 | - | F | Update link from IRP SS to IS | 14.1.0 |
| 2017-06 | SA#76 | SP-170510 | 0006 | 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** |
| 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 | 0007 | 1 | F | Rel-17 CR TS 28.676 Correction of XML references | **17.1.0** |