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**Universal Mobile Telecommunications System (UMTS);  
LTE;  
Telecommunication management;  
Home enhanced Node B (HeNB) Subsystem (HeNS)  
Network Resource Model (NRM)  
Integration Reference Point (IRP);  
Solution Set (SS) definitions  
(3GPP TS 28.676 version 18.1.0 Release 18)**



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650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B  
Association à but non lucratif enregistrée à la  
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# Foreword

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

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# Introduction

The present document is part of a TS-family covering the 3<sup>rd</sup> 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.**

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# 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)



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# 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 28.675 [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.

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## 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	<b>14.0.0</b>
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)	<b>15.0.0</b>
2020-07	-	-	-	-	-	Update to Rel-16 version (MCC)	<b>16.0.0</b>
2022-03	-	-	-	-	-	Update to Rel-17 version (MCC)	<b>17.0.0</b>
2024-04	-	-	-	-	-	Update to Rel-18 version (MCC)	<b>18.0.0</b>
2024-09	SA#105	SP-241164	0008	1	A	Rel-18 CR TS 28.676 Correction of XML references	<b>18.1.0</b>

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# History

<b>Document history</b>		
V18.0.0	May 2024	Publication
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