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Technical Specification

**Digital cellular telecommunications system (Phase 2+);  
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 32.786 version 11.0.0 Release 11)**



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## Foreword

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where:

- x the first digit:
  - 1 presented to TSG for information;
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- 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.

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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:

- 32.781: Telecommunication management; Home enhanced Node B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP): Requirements
- 32.782: Telecommunication management; Home enhanced Node B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)
- 32.786: Telecommunication management; Home enhanced Node B Subsystem (HeNS) Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions**

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QoS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

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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.

This Solution Set specification is related to 3GPP TS 32.782 V11.0.X.

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# 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 32.782: '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] 3GPP TS 32.606: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP): Solution Set (SS) definitions".
- [5] W3C REC-xml-20001006: "Extensible Markup Language (XML) 1.0 (Second Edition)".
- [6] W3C REC-xmlschema-0-20010502: "XML Schema Part 0: Primer".
- [7] W3C REC-xmlschema-1-20010502: "XML Schema Part 1: Structures".
- [8] W3C REC-xmlschema-2-20010502: "XML Schema Part 2: Datatypes".
- [9] W3C REC-xml-names-19990114: "Namespaces in XML".
- [10] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

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## 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:** file containing an XML document

**XML document:** composed of the succession of an optional XML declaration followed by a root XML element

NOTE: See [5]; in the scope of the present document.

**XML declaration:** it specifies the version of XML being used

NOTE: See [5].

**XML element:** has a type, is identified by a name, may have a set of XML attribute specifications and is either composed of the succession of an XML start-tag followed by the XML content of the XML element followed by an XML end-tag, or composed simply of an XML empty-element tag; each XML element may contain other XML elements

NOTE: See [5].

**empty XML element:** having an empty XML content; an empty XML element still possibly has a set of XML attribute specifications; an empty XML element is either composed of the succession of an XML start-tag directly followed by an XML end-tag, or composed simply of an XML empty-element tag

NOTE: See [5].

**XML content (of an XML element):** empty if the XML element is simply composed of an XML empty-element tag; otherwise the part, possibly empty, of the XML element between its XML start-tag and its XML end-tag

**XML start-tag:** the beginning of a non-empty XML element is marked by an XML start-tag containing the name and the set of XML attribute specifications of the XML element

NOTE: See [5].

**XML end-tag:** the end of a non-empty XML element is marked by an XML end-tag containing the name of the XML element

NOTE: See [5].

**XML empty-element tag:** composed simply of an empty-element tag containing the name and the set of XML attribute specifications of the XML element

NOTE: See [5].

**XML attribute specification:** has a name and a value

NOTE: See [5].

**DTD:** defines structure and content constraints to be respected by an XML document to be valid with regard to this DTD

NOTE: See [5].

**XML schema:** more powerful than a DTD, an XML schema defines structure and content constraints to be respected by an XML document to conform with this XML schema; through the use of XML namespaces several XML schemas can be used together by a single XML document; an XML schema is itself also an XML document that shall conform with the XML schema for XML schemas

NOTE: See [6], [7] and [8].

**XML namespace:** enables qualifying element and attribute names used in XML documents by associating them with namespaces identified by different XML schemas

NOTE: See [9], in the scope of the present document.

**XML complex type:** defined in an XML schema; cannot be directly used in an XML document; can be the concrete type or the derivation base type for an XML element type or for another XML complex type; ultimately defines constraints for an XML element on its XML attribute specifications and/or its XML content

NOTE: See [6], [7] and [8].

**XML element type:** declared by an XML schema; can be directly used in an XML document; as the concrete type of an XML element, directly or indirectly defines constraints on its XML attribute specifications and/or its XML content; can also be the concrete type or the derivation base type for another XML element type

NOTE: See [6], [7] and [8].

## 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

This annex contains the CORBA Solution Set for the IRP whose semantics is specified in HeNS NRM IRP: Information Service (TS 32.782 [2]).

---

### A.1 Architectural features

The overall architectural feature of HeNS Network Resources IRP is specified in 3GPP TS 32.782 [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

This clause discusses how the models and IDL definitions provided in the present document can be extended for a particular implementation and still remain compliant with 3GPP SA5's specifications.

##### A.1.2.1 Allowed extensions

Vendor-specific MOCs may be supported. The vendor-specific MOCs may support new types of attributes. The 3GPP SA5-specified notifications may be issued referring to the vendor-specific MOCs and vendor-specific attributes. New MOCs shall be distinguishable from 3GPP SA5 MOCs by name. 3GPP SA5-specified and vendor-specific attributes may be used in vendor-specific MOCs. Vendor-specific attribute names shall be distinguishable from existing attribute names.

NRM MOCs may be subclassed. Subclassed MOCs shall maintain the specified behaviour of the 3GPP SA5's superior classes. They may add vendor-specific behaviour with vendor-specific attributes. When subclassing, naming attributes cannot be changed. The subclassed MOC shall support all attributes of its superior class. Vendor-specific attributes cannot be added to 3GPP SA5 NRM MOCs without subclassing.

When subclassing, the 3GPP SA5-specified containment rules and their specified cardinality shall still be followed. As an example, ManagementNode (or its subclasses) shall be contained under SubNetwork (or its subclasses).

Managed Object Instances may be instantiated as CORBA objects. This requires that the MOCs be represented in IDL. 3GPP SA5's NRM MOCs are not currently specified in IDL, but may be specified in IDL for instantiation or subclassing purposes. However, management information models should not require that IRPManagers access the instantiated managed objects other than through supported methods in the present document.

Extension rules related to notifications (Notification categories, Event Types, Extended Event Types etc.) are for further study.

##### A.1.2.2 Extensions not allowed

The IDL specifications in the present document cannot be edited or altered. Any additional IDL specifications shall be specified in separate IDL files.

IDL interfaces (note: not MOCs) specified in the present document may not be subclassed or extended. New interfaces may be defined with vendor-specific methods.

## A.2 Mapping

### A.2.1 General mappings

Attributes modelling associations as defined in the NRM (here also called "reference attributes") are in this SS mapped to attributes.

The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the data type for the reference attribute is defined as an MOReference. The value of an MO reference contains the distinguished name of the associated MO.

When the cardinality for an association allows more than one referred MO, the reference attribute will be of type MOReferenceSet, which contains a sequence of MO references.

### 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

NRM Attributes of IOC HeNBGWFunction in TS 32.782 [2]	SS Attributes	SS Type	Support Qualifier	Read	Write
id	henbgwFunctionId	string	M	M	-
henbgwId	henbgwId	long	M	M	-
userLabel	userLabel	string	M	M	M
ipConfigInfo	ipConfigInfo	string	M	M	-
maxNbrHeNBRegistered	maxNbrHeNBRegistered	Integer	M	M	-
maxPacketCapability	maxPacketCapability	integer	M	M	-

#### A.2.2.2 IOC HeNBProfile

NRM Attributes of IOC HeNBProfile in TS 32.782 [2]	SS Attributes	SS Type	Support Qualifier	Read	Write
id	henbProfileId	string	M	M	-
userLabel	userLabel	string	M	M	M
configuration	configuration	string	M	M	-
criterion	criterion	string	O	M	-

#### A.2.2.3 IOC HeMSFunction

NRM Attributes of IOC HeMSFunction in TS 32.782 [2]	SS Attributes	SS Type	Support Qualifier	Read	Write
userLabel	userLabel	string	M	M	M

## 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 // _HENSNETWORKRESOURCESNRMDEFS_IDL_

```

---

## Annex B (normative): XML Definitions

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 32.782 [2]).

---

### B.1 Architectural features

The overall architectural feature of HeNS Network Resources IRP is specified in 3GPP TS 32.782 [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

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 32.782 [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

Not present in the current version of this specification.

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

```

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

<!--
  3GPP TS 32.786 HeNS Network Resources IRP
  Bulk CM Configuration data file NRM-specific XML schema
  hensNrm.xsd
-->

<schema
  targetNamespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.786#hensNrm"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xn=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.626#genericNrm"
  xmlns:un=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.786#hensNrm"
  xmlns:gn=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.656#geranNrm"
  xmlns:sm=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.676#stateManagementIRP"
  xmlns:epc=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.756#epcNrm"
>

  <import
    namespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.626#genericNrm"
  />
  <import
    namespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.656#geranNrm"
  />
  <import
    namespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.756#epcNrm"
  />
  <import
    namespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.676#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="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="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"/>
              </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	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
05-2010	SA-48	SP-100283	--	--	Presentation to SA for information and approval	--	1.0.0
06-2010	SA-48	--	--	--	Publication	1.0.0	10.0.0
10-2010	SA-49	SP-100489	001	--	Correction of HeNS NRM IRP XML Definitions	10.0.0	10.1.0
09-2012	SA-57	-	-	-	Automatic upgrade from previous Release version 10.1.0	10.1.0	11.0.0

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## History

<b>Document history</b>		
V11.0.0	October 2012	Publication