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Foreword

This Technical Report 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; as identified below:

32.771: Telecommunication management; Home Node B Subsystem (HNS) Network Resource Model (NRM) Integration Reference Point (IRP): Requirements

32.772: Telecommunication management; Home Node B Subsystem (HNS) Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)

32.773: Telecommunication management; Home Node B Subsystem (HNS) Network Resource Model (NRM) Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)

32.775: Telecommunication management; Home Node B Subsystem (HNS) Network Resource Model (NRM) Integration Reference Point (IRP): Bulk CM eXtensible Markup Language (XML) file format definition

The present document is part of a set of specifications, which describe the requirements and information model necessary for the standardised Operation, Administration and Maintenance (OA&M) of a multi-vendor 3G-system.

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 optimization 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.

During the lifetime of a 3G network, its logical and physical configuration will undergo changes of varying degrees and frequencies in order to optimise the utilisation of the network resources. These changes will be executed through network configuration management activities and/or network engineering, see 3GPP TS 32.600 [5].

1 Scope

The present document is an Integration Reference Point (IRP) named "Home Node B Subsystem (HNS) network resources IRP ", through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate Configuration Management information to one or several 'IRPManagers' (typically Network Managers) concerning HNS resources.

The present document specifies the protocol neutral HNS Network Resources IRP: Network Resource Model. It reuses relevant parts of the generic NRM in 3GPP TS 32.622 [6], either by direct reuse or sub-classing, and in addition to that defines HNS specific Information Object Classes.

In order to access the information defined by this NRM, an IRP IS is needed, such as the Basic CM IRP IS (3GPP TS 32.602 [7]) or the Bulk CM IRP IS (3GPP TS 32.612 [8]). However, which IS that is applicable is outside the scope of the present document.

The present document (NRM specification) is related to the IS in 3GPP TS 32.672 [9]

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 32.101: "Telecommunication management; Principles and high level requirements".

[3] 3GPP TS 32.102: "Telecommunication management; Architecture".

[4] 3GPP TS 25.467: " Technical Specification Group Radio Access Network (UTRAN); UTRAN Architecture for 3G HNB".

[5] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".

[6] 3GPP TS 32.622: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Network Resource Model (NRM)".

[7] 3GPP TS 32.602: "Telecommunication management; Configuration Management (CM); Basic Configuration Management Integration Reference Point (IRP): Information Service (IS)".

[8] 3GPP TS 32.612: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP): Information Service (IS)".

[9] Void.

[10] 3GPP TS 32.632: "Telecommunication management; Configuration Management (CM); Core network resources Integration Reference Point (IRP): Network Resource Model (NRM)"

[11] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects"

[12] 3GPP TS 23.002: "Network Architecture".

[13] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".

[14] IETF RFC 4293: "SNMPv2 Management Information Base for the Internet Protocol using SMIv2".

[15] IETF RFC3873: "Stream Control Transmission Protocol (SCTP) Management Information Base (MIB)".

[16] 3GPP TS 32.583: "Home Node B (HNB) Operations, Administration, Maintenance and Provisioning (OAM&P); Procedure flows for Type 1 Interface HNB to HNB Management System (HMS)"

[17] 3GPP TS 23.002: "Technical Specification Group Services and Systems Aspects; Network architecture"

[18] 3GPP TS 22.220: "Service requirements for Home Node B (HNB) and Home eNode B (HeNB)"

[19] 3GPP TS 32.111-2: "Telecommunication management; Fault Management; Part 2: Alarm Integration Reference Point (IRP): Information Service (IS)".

[20] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description;Stage 2".

[21] 3GPP TS 23.401 "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [2], 3GPP TS 32.102 [3] and 3GPP TS 32.600 [5].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings;

(2) reference attributes; and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams).

Managed Element (ME): an instance of the Information Object Class `ManagedElement` defined in 3GPP TS 32.622 [6].

Managed Object (MO): in the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. This class, called **Information Object Class (IOC)** has *attributes* that provide information used to characterize the objects that belong to the class (the term "attribute" is taken from TMN and corresponds to a "property" according to CIM). Furthermore, the IOC can have *operations* that represent the behaviour relevant for that class (the term "operation" is taken from TMN and corresponds to a "method" according to CIM). The IOC may support the emission of *notifications* that provide information about an event occurrence within a network resource.

Management Information Model (MIM): also referred to as NRM - see the definition below.

Network Resource Model (NRM): a model representing the actual managed telecommunications network resources that a System is providing through the subject IRP

An NRM identifies and describes IOCs, their associations, attributes and operations. The NRM is also referred to as "MIM" (see above), which originates from the ITU-T TMN.

Home Node B Management System (HMS): See TS 32.583 [16].

HNB GW: See TS 25.467 [4].

Home Node B Subsystem (HNS): See TS 23.002 [17].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

DN	Distinguished Name
GW	Gateway
HNB	Home Node B
HNS	Home Node B Subsystem
IOCs	Information Object Classes
IRP	Integration Reference Point
ME	Managed Element
NRM	Network Resource Model
UTRAN	Universal Terrestrial Radio Access Network

4 System Overview

4.1 Compliance rules

The following defines the meaning of Mandatory and Optional IOC attributes and associations between IOCs, in Solution Sets to the IRP defined by the present document:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.
- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional information object classes, attributes and associations without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

It is recognised that the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

5 Modelling approach

The modelling approach adopted and used in this IRP is described in TS 32.622 [6].

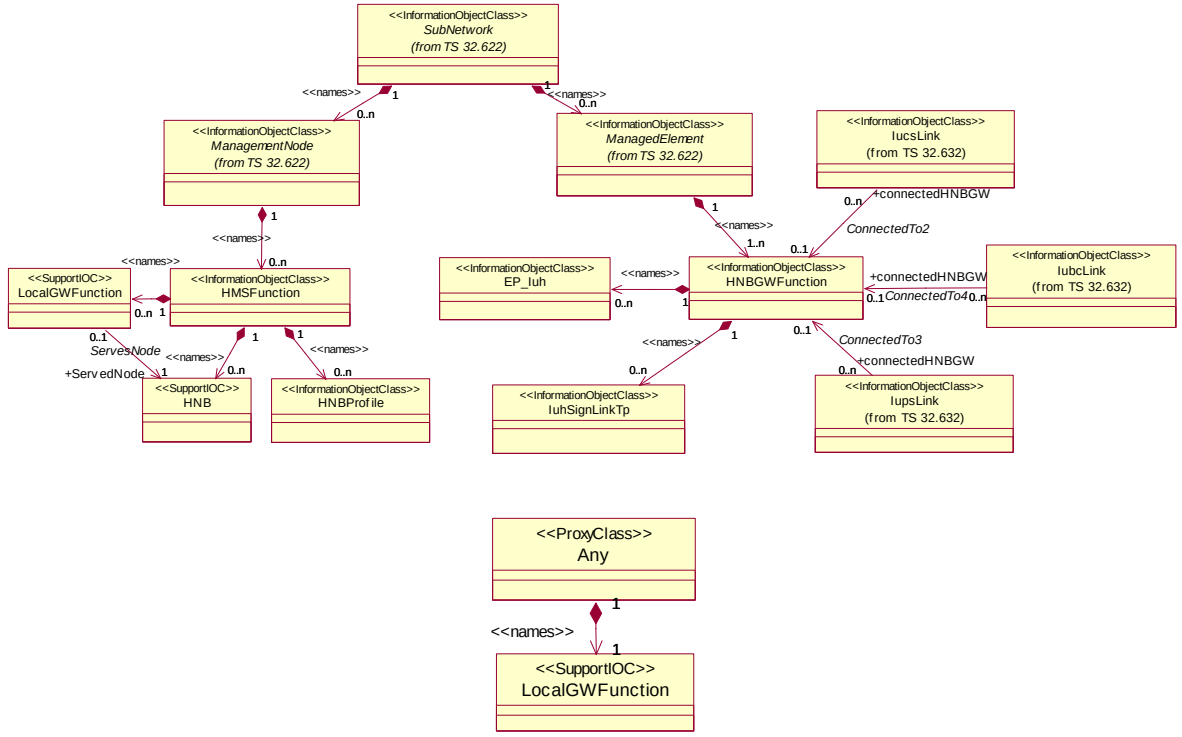
6 Information Object Classes

6.1 Information entities imported and local labels

Label reference	Local label
3GPP TS 32.622 [6], IOC, `ManagedElement`	`ManagedElement`
3GPP TS 32.622 [6], IOC, `ManagedFunction`	`ManagedFunction`
3GPP TS 32.622 [6], IOC, `ManagementNode`	`ManagementNode`
3GPP TS 32.622 [6], IOC, `Subnetwork`	`Subnetwork`
3GPP TS 32.622 [6], IOC, `Top`	`Top`
3GPP TS 32.622 [6], IOC, `VsDataContainer`	`VsDataContainer`
3GPP TS 32.632 [10], IOC, `IupsLink`	`IupsLink`
3GPP TS 32.632 [10], IOC, `IucsLink`	`IucsLink`
3GPP TS 32.632 [10], IOC, `IubcLink`	`IubcLink`

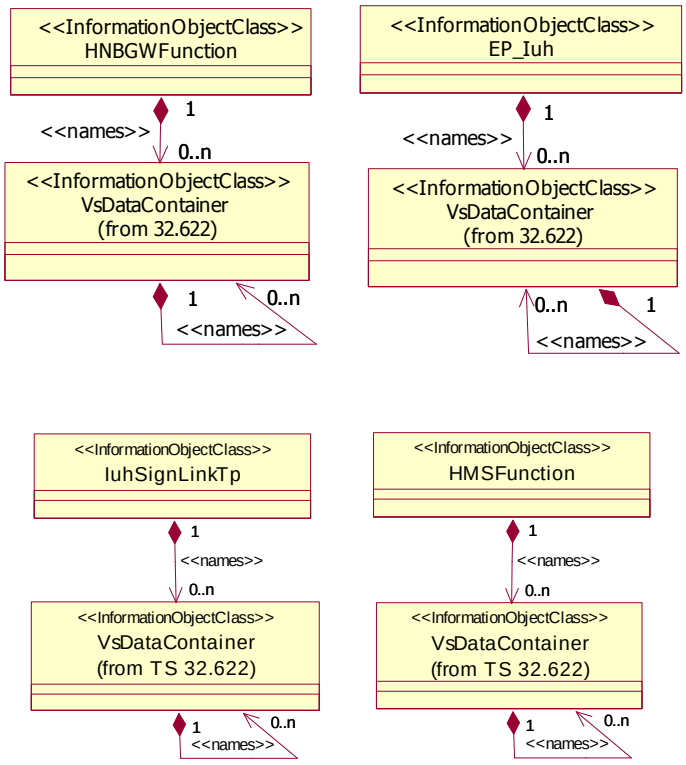
6.2 Class diagram

6.2.1 Attributes and relationships



NOTE 1: The listed cardinality numbers, in particular the use of cardinality number zero, do not represent transient states. The transient state is considered an inherent property of all IOC instances and therefore there is no need to represent them by individual IOC cardinality numbers.

Figure1: Containment/Naming and Association diagram



NOTE 1: The listed cardinality numbers, in particular the use of cardinality number zero, do not represent transient states. The transient state is considered an inherent property of all IOC instances and therefore there is no need to represent them by individual IOC cardinality numbers.

NOTE 2: Each instance of the `VsDataContainer` shall only be contained under one IOC. The `VsDataContainer` can be contained under IOCs defined in other NRMs.

Figure 2: VsDataContainer Containment/Naming and Association

The `VsDataContainer` is only used for the Bulk CM IRP.

Each IOC is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [11] that expresses its containment

6.2.2 Inheritance

This clause depicts the inheritance relationships that exist between IOCs.

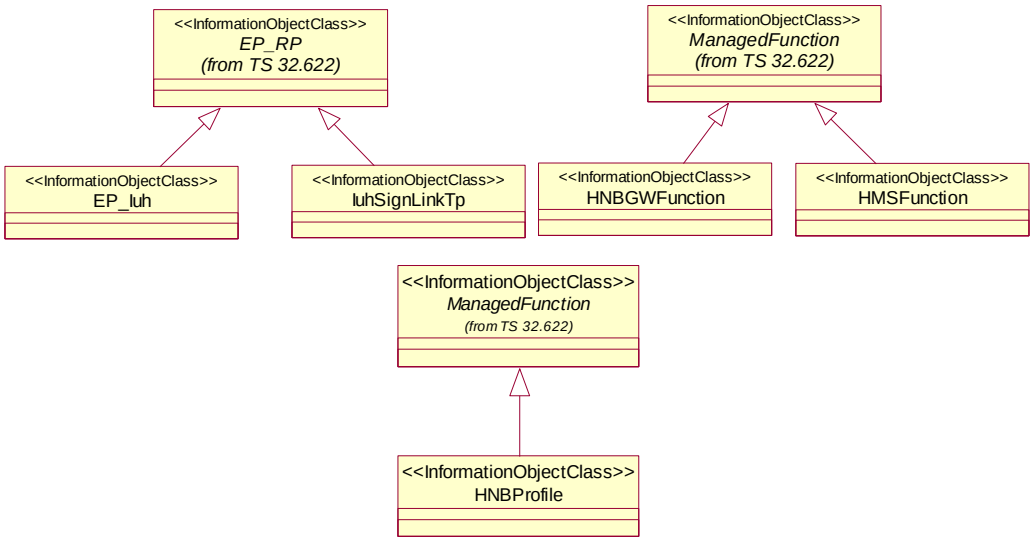


Figure 3: Inheritance Hierarchy

NOTE: IuhSignLinkTp is a special definition for the signalling of the EP-Iuh, and these two IOC inherit from EP-RP.

6.3 Information object class definitions

6.3.1 HNBGWFunction

6.3.1.1 Definition

This IOC represents HNB GW functionality. For more information about the HNB GW, see 3GPP TS 25.467[4].

6.3.1.2 Attributes

Attributes of HNBGWFunction

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
id	M	M	-
hnbGwId	M	M	-
iPConfigInfo	M	M	-
maxNbrHNBRegistered	M	M	-
maxPacketCapability	M	M	-

6.3.1.3 Notifications

See clause 6.6 Alarm and configuration notifications.

6.3.2 IuhSignLinkTp

6.3.2.1 Definition

This IOC represents a signaling link on the Iuh interface and inherits from EP-RP.

6.3.2.2 Attributes

Attributes of IuhSignLinkTp

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
sctpAssocLocalAddr	M	M	-
sctpAssocRemoteAddr	M	M	-

6.3.2.3 Notifications

See clause 6.6 Alarm and configuration notifications.

6.3.3 EP_Iuh

6.3.3.1 Definition

This IOC represents an end point of the Iuh interface. It inherits from EP-RP. For more information Iu-h interface, see 3GPP TS 25.467[4].

6.3.3.2 Attributes

Attributes of EP_Iuh

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
farEndNEIPAddr	O	M	CM

6.3.3.3 Attribute constraints

Name	Definition
Condition for farEndNEIPAddr's write qualifier	The EP_Iuh object belongs to the different Domain Manager as the NE pointed by the farEndNeIpAddr attribute.

6.3.3.4 Notifications

See clause 6.6 Alarm and configuration notifications.

6.3.4 HMSFunction

6.3.4.1 Definition

This IOC represents HMS functionality. For more information about HMS, see 3GPP TS 32.583 [16].

6.3.4.2 Attributes

There are no attributes (other than those inherited).

6.3.4.3 Notifications

There are no Notifications (other than those inherited).

6.3.5 HNB

6.3.5.1 Definition

This SupportIOC represents HNB functionality. For more information about the HNB, see 3GPP TS 25.467 [4]. For definition of HNB, see 3GPP TS 22.220 [18].

The Home NodeB, represented by the <<SupportIOC>> HNB, has registered itself with one node represented by HMSFunction.

6.3.5.2 Attributes

Attributes of HNB

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
id	M	--	-

6.3.5.3 Notifications

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [19])	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [19])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [19])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [19])	

6.3.6 HNBProfile

6.3.6.1 Definition

The HNBProfile is a representation of information that a) identifies a specific set of HNB devices and b) the related configuration parameters (and their values) that are required to be configured in those identified HNB devices during HNB registration procedure.

It contains userLabel, an attribute inherited from ManagedFunction. This is a user friendly label assigned by operator. Examples can be “VIP configuration”, “Gold Tier configuration”, “device vendor XYZ software version 3.4”, “camel”, etc

Editor Note: The userLabel is called configurationKind in previous documents such as in S5-093276 EpCR H(e)NB Profile handling.)

6.3.6.2 Attributes

Attributes of HNBProfile

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
id	M	M	--
configuration	M	M	--
criterion	O	M	--

6.3.7 LocalGWFunction

6.3.7.1 Definition

This SupportIOC represents local Gateway functionality. For more information about the local getway, see 3GPP TS 23.060 [20] and 3GPP TS 23.401[21].

The Local Gateway, represented by the <<SupportIOC>> `LocalGWFunction`, has registered itself with one node represented by `HMSFunction`.

6.3.7.2 Attributes

Attributes of LocalGWFunction

Attribute name	Support Qualifier	Read Qualifier	Write Qualifier
`id`	M	--	-
`iPAddr`	M	--	-
`collocationFlag`	M	--	-
`servedNode`	M	--	-

6.3.7.3 Notifications

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [19])	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [19])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [19])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [19])	

6.4 Information relationship definitions

6.4.1 ConnectedTo2 (M)

6.4.1.1 Definition

This represents a uni-directional relation between the Iucslink and HNBGW Function. The role of the relation shall be mapped to a reference attribute of the IOC.

6.4.1.2 Roles

Name	Definition
`IucsLink-HNBGWFunction`	This role (when present) represents IOC `Iucslink` capability to identify one connected HNBGWFunction. When present, it shall contain one HNBGWFunction DN.

6.4.1.3 Constraints

Name	Definition
–	-

6.4.2 ConnectedTo3 (M)

6.4.2.1 Definition

This represents a uni-directional relation between the Iupslink and HNBGW Function. The role of the relation shall be mapped to a reference attribute of the IOC.

6.4.2.2 Roles

Name	Definition
IupsLink-HNBGWFunction	This role (when present) represents IOC Iupslink capability to identify one connected HNBGWFunction. When present, it shall contain one HNBGWFunction DN.

6.4.2.3 Constraints

Name	Definition
-	-

6.4.3 ConnectedTo4 (M)

6.4.3.1 Definition

This represents a uni-directional relation between the Iubclink and HNBGWFunction. The role of the relation shall be mapped to a reference attribute of the IOC.

6.4.3.2 Roles

Name	Definition
IubcLink-HNBGWFunction	This role (when present) represents IOC Iubclink capability to identify one connected HNBGWFunction. When present, it shall contain one HNBGWFunction DN.

6.4.3.3 Constraints

Name	Definition
-	-

6.4.4 ServesNode (O)

6.4.4.1 Definition

This unidirectional association represents the relation between a Local GW and served HNB instances.

6.4.4.2 Roles

Name	Definition
ServedNode	This role represents the HNB instance served by a Local GW instance.

6.4.4.3 Constraints

Name	Definition
-	-

6.5 Information attribute definitions

6.5.1 Definition and legal values

Table 6.5.1.1 defines the attributes that are present in several Information Object Classes (IOCs) of the present document.

Table 6.5.1.1: Attributes definitions and legal values

Attribute Name	Definition	Legal Values
id	An attribute whose 'name+value' can be used as an RDN when naming an instance of the IOC. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
hnbGwId	Unique HNB GW ID. Ref. 3GPP TS 25.467 [4] specifies that HNB GW acts as a RNC to the existing core network using existing Iu interface.	See "RNC-ID" in Ref. 3GPP TS 23.002 [12] and 3GPP TS 25.413 [13]
iPConfigInfo	The IP address, subnetwork mask, default gateway for HNB GW (Ref. IETF RFC 4293 [14]).	
maxNbrHNBRegistered	Maximum number of registered HNB means maximum number of HNB allowed to be registered.	
maxPacketCapability	The HNB GW's ability of forwarding packets, such as maximum number of forwarded packets per second.	
sCTPAssocLocalAddr	The local port and IP address of SCTP association (See RFC3873 [15]).	
sCTPAssocRemoteAddr	The remote port and IP address of SCTP association (See RFC3873 [15]).	
farEndEntity	The value of this attribute shall be the Distinguished Name of the far end network entity to which the reference point is related. As an example, with EP_Iucs, if the instance of EP_Iucs is contained by one RncFunction instance, the farEndEntity is the Distinguished Name of the MscServerFunction instance to which this Iucs reference point is related.	
farEndNeIpAddr	The IP address(s) of the far end network entity to which the reference point is related. This is an IPv4 or an IPv6 address.	
configuration	It is a location of a data set. The data set is a set of HNB attributes (with values) needed to be loaded into the HNB. The data set does not contain all configuration data needed for a device to operate. Some configuration parameters are autonomously and dynamically calculated by the serving HMS.	

criterion	It is a criterion that determines if a HNB should or should not be loaded with a particular configuration. The syntax and semantics of criterion is vendor-specific. Example 1: The syntax and semantics can be "If the HNB ID range is between ABC and DEF then APPLY the related configuration ". Example 2: The syntax is a list of strings where each string is an "attribute == value" pair. An attribute represents a TR-196 parameter. Its value is the corresponding attribute value. The semantics is "if all pairs found in criterion are also found in the home devices, then the determination is positive in that the home device should be loaded with information of the data set identified by configuration; else not".	
iPAddr	The IP address(s) assigned for the Local Gateway.	
collocationFlag	This attribute indicates whether the local gateway is collocated with the HNB or HeNB that it serves (see ServedNode relation in 6.2.1 UML class diagram) or not.	Legal values are: collocated, not-collocated.
servedNode	This attribute contains the DN of a HNB or HeNB that is being served (see ServedNode relation in 6.2.1 UML class diagram).	

6.5.2 Constraints

None.

6.6 Common Notifications

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [19])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [19])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [19])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [19])	
notifyObjectCreation	O	
notifyObjectDeletion	O	
notifyComments	See Alarm IRP (3GPP TS 32.111-2 [19])	

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Sep 2009	SA-45	SP-090549	--	--	Presentation to SA for information	---	1.0.0
Mar 2010	SA-47	SP-100060	--	--	Presentation to SA for approval	1.0.0	2.0.0
Mar 2010	--	--	--	--	Publication of SA approved version	2.0.0	9.0.0
Mar 2011	SA-51	SP-110099	001	2	Add localGWFunction IOC	9.0.0	10.0.0
2012-09	-	-	-	-	Update to Rel-11 version (MCC)	10.0.0	**11.0.0**