Universal Mobile Telecommunications System (UMTS); LTE;
Telecommunication management;
GSM/EDGE Radio Access Network (GERAN)
Network Resource Model (NRM)
Integration Reference Point (IRP);
Solution Set (SS) definitions
(3GPP TS 28.656 version 14.1.0 Release 14)
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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:


1 Scope

The present document is part of an Integration Reference Point (IRP) named GERAN Network Resource Model (NRM) IRP, through which an IRP Agent can communicate configuration management information to one or several IRP Managers concerning GERAN resources. The GERAN NRM IRP comprises a set of specifications defining Requirements, a protocol neutral Information Service and one or more Solution Set definitions.

The present document specifies the Solution Set definitions for the GERAN NRM IRP.

This Solution Set specification is related to 3GPP TS 28.655 V14.0.X [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 32.101: "Telecommunication management; Principles and high level requirements".
[2] 3GPP TS 32.102: "Telecommunication management; Architecture".
[3] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".
[4] 3GPP TS 28.655: "Telecommunication management; GERAN 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 28.623: "Telecommunication management; Generic Network Resource Model (NRM) 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".
[9] Void
3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.600 [3] and 3GPP TS 28.655 [4].

XML file: See definition of [6].

XML document: See definition of [6].

XML declaration: See definition of [6].

XML element: See definition of [6].

empty XML: See definition of [6].

XML content (of an XML element): See definition of [6].

XML start-tag: See definition of [6].

XML end-tag: See definition of [6].

XML empty-element tag: See definition of [6].

XML attribute specification: See definition of [6].

DTD: See definition of [6].

XML schema: See definition of [6].

XML namespace: See definition of [6].

XML complex type: See definition of [6].

XML element type: See definition of [6].

3.2 Abbreviations

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

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM</td>
<td>Configuration Management</td>
</tr>
<tr>
<td>CORBA</td>
<td>Common Object Request Broker Architecture</td>
</tr>
<tr>
<td>DN</td>
<td>Distinguished Name</td>
</tr>
<tr>
<td>DTD</td>
<td>Document Type Definition</td>
</tr>
<tr>
<td>EDGE</td>
<td>Enhanced Data for GSM Evolution</td>
</tr>
<tr>
<td>GERAN</td>
<td>GSM/EDGE Radio Access Network</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile communication</td>
</tr>
<tr>
<td>IS</td>
<td>Information Service</td>
</tr>
<tr>
<td>IDL</td>
<td>Interface Definition Language (OMG)</td>
</tr>
<tr>
<td>IOC</td>
<td>Information Object Class</td>
</tr>
<tr>
<td>IRP</td>
<td>Integration Reference Point</td>
</tr>
<tr>
<td>IS</td>
<td>Information Service</td>
</tr>
<tr>
<td>MO</td>
<td>Managed Object</td>
</tr>
<tr>
<td>MOC</td>
<td>Managed Object Class</td>
</tr>
<tr>
<td>NRM</td>
<td>Network Resource Model</td>
</tr>
<tr>
<td>OMG</td>
<td>Object Management Group</td>
</tr>
<tr>
<td>SS</td>
<td>Solution Set</td>
</tr>
<tr>
<td>UMTS</td>
<td>Universal Mobile Telecommunications System</td>
</tr>
<tr>
<td>UTRAN</td>
<td>Universal Terrestrial Radio Access Network</td>
</tr>
<tr>
<td>XML</td>
<td>eXtensible Markup Language</td>
</tr>
</tbody>
</table>
4 Solution Set Definitions

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

- 3GPP GERAN NRM IRP CORBA SS (Annex A)
- 3GPP GERAN 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 GERAN NRM IRP: Information Service (TS 28.655 [4]).

A.1 Architectural features
The overall architectural feature of GERAN NRM IRP is specified in 3GPP TS 28.655 [4]. This clause specifies features that are specific to the CORBA SS.

A.1.1 Syntax for Distinguished Names
See clause A.1.1 of [5].

A.1.2 Rules for NRM extensions
See clause A.1.2 of [5].
A.2 Mapping

A.2.1 General mapping

See clause A.2.1 of [5].

A.2.2 Information Object Class (IOC) mapping

A.2.2.1 IOC BSSFunction

<table>
<thead>
<tr>
<th>IS Attributes</th>
<th>SS Attributes</th>
<th>SS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>bssFunctionId</td>
<td>string</td>
</tr>
<tr>
<td>userLabel</td>
<td>userLabel</td>
<td>string</td>
</tr>
</tbody>
</table>

A.2.2.2 IOC BTSSiteMgr

<table>
<thead>
<tr>
<th>IS Attributes</th>
<th>SS Attributes</th>
<th>SS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>btsSiteMgrId</td>
<td>string</td>
</tr>
<tr>
<td>userLabel</td>
<td>userLabel</td>
<td>string</td>
</tr>
<tr>
<td>latitude</td>
<td>latitude</td>
<td>long</td>
</tr>
<tr>
<td>longitude</td>
<td>longitude</td>
<td>long</td>
</tr>
<tr>
<td>operationalState</td>
<td>operationalState</td>
<td>StateManagementIRPOptConstDefs::OperationalStateTypeOpt</td>
</tr>
</tbody>
</table>
### A.2.2.3 IOC GSMCell

<table>
<thead>
<tr>
<th>IS Attributes</th>
<th>SS Attributes</th>
<th>SS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>gsmCellId</td>
<td>string</td>
</tr>
<tr>
<td>userLabel</td>
<td>userLabel</td>
<td>string</td>
</tr>
<tr>
<td>cellIdentity</td>
<td>cellIdentity</td>
<td>long</td>
</tr>
<tr>
<td>cellAllocation</td>
<td>cellAllocation</td>
<td>GenericNetworkResourcesIRPSystem::AttributesTypes::LongSet</td>
</tr>
<tr>
<td>ncc</td>
<td>ncc</td>
<td>long</td>
</tr>
<tr>
<td>bcc</td>
<td>bcc</td>
<td>long</td>
</tr>
<tr>
<td>lac</td>
<td>lac</td>
<td>long</td>
</tr>
<tr>
<td>mcc</td>
<td>mcc</td>
<td>long</td>
</tr>
<tr>
<td>mnc</td>
<td>mnc</td>
<td>long</td>
</tr>
<tr>
<td>rac</td>
<td>rac</td>
<td>long</td>
</tr>
<tr>
<td>racc</td>
<td>racc</td>
<td>long</td>
</tr>
<tr>
<td>tsc</td>
<td>tsc</td>
<td>long</td>
</tr>
<tr>
<td>rxLevAccessMin</td>
<td>rxLevAccessMin</td>
<td>long</td>
</tr>
<tr>
<td>msTxPwrMaxCCH</td>
<td>msTxPwrMaxCCH</td>
<td>long</td>
</tr>
<tr>
<td>rfHoppingEnabled</td>
<td>rfHoppingEnabled</td>
<td>boolean</td>
</tr>
<tr>
<td>hoppingSequenceList</td>
<td>hoppingSequenceList</td>
<td>GeranNRMAttributeTypes::HoppingSequenceListType</td>
</tr>
<tr>
<td>plmnPermitted</td>
<td>plmnPermitted</td>
<td>long</td>
</tr>
</tbody>
</table>

### A.2.2.4 IOC GSMRelation

<table>
<thead>
<tr>
<th>IS Attributes</th>
<th>SS Attributes</th>
<th>SS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>gsmRelationId</td>
<td>string</td>
</tr>
<tr>
<td>adjacentCell</td>
<td>adjacentCell</td>
<td>string</td>
</tr>
<tr>
<td>bchFrequency</td>
<td>bchFrequency</td>
<td>long</td>
</tr>
<tr>
<td>ncc</td>
<td>ncc</td>
<td>long</td>
</tr>
<tr>
<td>bcc</td>
<td>bcc</td>
<td>long</td>
</tr>
<tr>
<td>lac</td>
<td>lac</td>
<td>long</td>
</tr>
<tr>
<td>isHOAllowed</td>
<td>isHOAllowed</td>
<td>boolean</td>
</tr>
<tr>
<td>isRemoveAllowed</td>
<td>isRemoveAllowed</td>
<td>boolean</td>
</tr>
<tr>
<td>isESCoveredBy</td>
<td>isESCoveredBy</td>
<td>GeranNRMAttributeTypes::IsEsCoveredByEnumType</td>
</tr>
</tbody>
</table>

### A.2.2.5 IOC ExternalGSMCell

<table>
<thead>
<tr>
<th>IS Attributes</th>
<th>SS Attributes</th>
<th>SS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>externalGsmCellId</td>
<td>string</td>
</tr>
<tr>
<td>userLabel</td>
<td>userLabel</td>
<td>string</td>
</tr>
<tr>
<td>cellIdentity</td>
<td>cellIdentity</td>
<td>long</td>
</tr>
<tr>
<td>bchFrequency</td>
<td>bchFrequency</td>
<td>long</td>
</tr>
<tr>
<td>ncc</td>
<td>ncc</td>
<td>long</td>
</tr>
<tr>
<td>bcc</td>
<td>bcc</td>
<td>long</td>
</tr>
<tr>
<td>lac</td>
<td>lac</td>
<td>long</td>
</tr>
<tr>
<td>mcc</td>
<td>mcc</td>
<td>long</td>
</tr>
<tr>
<td>mnc</td>
<td>mnc</td>
<td>long</td>
</tr>
<tr>
<td>rac</td>
<td>rac</td>
<td>long</td>
</tr>
<tr>
<td>racc</td>
<td>racc</td>
<td>long</td>
</tr>
</tbody>
</table>
A.2.2.6  IOC ExternalBSSFunction

Mapping from NRM IOC ExternalBSSFunction attributes to SS equivalent MOC ExternalBssFunction attributes

<table>
<thead>
<tr>
<th>IS Attributes</th>
<th>SS Attributes</th>
<th>SS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>externalBssFunctionId</td>
<td>string</td>
</tr>
<tr>
<td>userLabel</td>
<td>userLabel</td>
<td>string</td>
</tr>
</tbody>
</table>
A.3 Solution Set definitions

A.3.1 IDL definition structure

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

A.3.2 IDL specification "GeranNetworkResourcesNRMDefs.idl"

```idl
#ifndef GeranNetworkResourcesNRMDefs_idl
#define GeranNetworkResourcesNRMDefs_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 GeranNetworkResourcesNRMDefs {

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

/**
 * Definitions for MO class BtsSiteMgr
 */
interface BtsSiteMgr : GenericNetworkResourcesNRMDefs::ManagedFunction {
    const string CLASS = "BtsSiteMgr";
    // Attribute Names
    const string btsSiteMgrId = "btsSiteMgrId";
    const string latitude = "latitude";
    const string longitude = "longitude";
    const string operationalState = "operationalState";
};

/**
 * Definitions for MO class GsmCell
 */
interface GsmCell : GenericNetworkResourcesNRMDefs::ManagedFunction {
    const string CLASS = "GsmCell";
    // Attribute Names
    const string gsmCellId = "gsmCellId";
    const string cellIdentity = "cellIdentity";
    const string cellAllocation = "cellAllocation";
    const string ncc = "ncc";
    const string bcc = "bcc";
    const string lac = "lac";
    const string mcc = "mcc";
    const string mnc = "mnc";
    const string rac = "rac";
    const string racc = "racc";
    const string tsc = "tsc";
    const string rxLevAccessMin = "rxLevAccessMin";
    const string stxPwrMaxCCH = "stxPwrMaxCCH";
    const boolean rfHoppingEnabled = "rfHoppingEnabled";
    const string hoppingSequenceList = "hoppingSequenceList";
    const string plmnPermitted = "plmnPermitted";
};

/**
 * Definitions for MO class GsmRelation
 */
interface GsmRelation :GenericNetworkResourcesNRMDefs::Top
```

ETSI
const string CLASS = "GsmRelation";
// Attribute Names
//
const string gsmRelationId = "gsmRelationId";
const string adjacentCell = "adjacentCell";
const string bcchFrequency = "bcchFrequency";
const string ncc = "ncc";
const string bcc = "bcc";
const string lac = "lac";
const string isHOAllowed = "isHOAllowed";
const string isRemoveAllowed = "isRemoveAllowed";
const string isESCOveredBy = "isESCoveredBy";
};
/**
* Definitions for MO class ExternalGsmCell
*/
interface ExternalGsmCell : GenericNetworkResourcesNRMDefs::ManagedFunction
{
    const string CLASS = "ExternalGsmCell";
    // Attribute Names
    //
    const string externalGsmCellId = "externalGsmCellId";
    const string cellIdentity = "cellIdentity";
    const string bcchFrequency = "bcchFrequency";
    const string ncc = "ncc";
    const string bcc = "bcc";
    const string lac = "lac";
    const string mcc = "mcc";
    const string mnc = "mnc";
    const string rac = "rac";
    const string racc = "racc";
};
/**
* Definitions for MO class ExternalBssFunction
*/
interface ExternalBssFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
{
    const string CLASS = "ExternalBssFunction";
    // Attribute Names
    //
    const string externalBssFunctionId = "externalBssFunctionId";
};
module GeranNRMAttributeTypes
{
    enum isEsCoveredByEnumType
    {
        no,
        partial,
        yes
    };

typedef sequence<boolean> MAType;

struct HoppingSequenceType
{
    MAType ma;
    short hsn;
};

typedef sequence<HoppingSequenceType> HoppingSequenceListType;

#endif
Annex B (normative):
XML Definitions

B.0  General
This annex contains the XML Definitions for the GERAN NRM IRP as it applies to Itf-N, in accordance with GERAN NRM IRP IS definitions [4].


B.1  Architectural features

B.1.0  General
The overall architectural feature of GERAN NRM IRP is specified in 3GPP TS 28.655 [4].

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 [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 `geranNrm.xsd` for the GERAN Network Resources IRP NRM defined in 3GPP TS 32.652 [4].

XML schema `geranNrm.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 [7].

B.3.2 Graphical Representation

The graphical representation is not present in the current version of this specification.
B.3.3  XML schema "geranNrm.xsd"

<?xml version="1.1" encoding="UTF-8"?>
<!--
  3GPP TS 28.656 GERAN NRM IRP
  Bulk CM Configuration data file NRM-specific XML schema
  geranNrm.xsd
-->

<schema
  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/28.653#utranNrm"
  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:en="http://www.3gpp.org/ftp/specs/archive/28_series/28.659#eutranNrm"
  xmlns:sp="http://www.3gpp.org/ftp/specs/archive/28_series/28.629#sonPolicyNrm"
  xmlns:gr="http://www.3gpp.org/ftp/specs/archive/28_series/28.663#genericRanNrm"
  targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.656#geranNrm"
  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/28.653#utranNrm"
  />
  <import
    namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.626#stateManagementIRP"
  />
  <import
    namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.659#eutranNrm"
  />
  <import
    namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.629#sonPolicyNrm"
  />
  <import
    namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.663#genericRanNrm"
  />

  <simpleType name="isESCoveredByEnumType">
    <restriction base="string">
      <enumeration value="no"/>
      <enumeration value="partial"/>
      <enumeration value="yes"/>
    </restriction>
  </simpleType>

  <complexType name="MA">
    <sequence>
      <element name="rfSelected" type="boolean" minOccurs="0"/>
    </sequence>
  </complexType>

  <complexType name="HoppingSequence">
    <sequence>
      <element name="ma" type="gn:MA" minOccurs="0"/>
      <element name="hsn" type="short" minOccurs="0"/>
    </sequence>
  </complexType>

  <complexType name="HoppingSequenceList">
    <sequence>
      <element name="hoppingSequence" type="gn:HoppingSequence" minOccurs="0"/>
    </sequence>
  </complexType>

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

  <element
name="BssFunction"
substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"

<complexType>
<complexContent>
<extension base="xn:NrmClass">
<sequence>
<element name="attributes" minOccurs="0">
<complexType>
<all>
<element name="userLabel"/>
<element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
</all>
</complexType>
</element>
<choice minOccurs="0" maxOccurs="unbounded">
<element ref="gn:BtsSiteMgr"/>
<element ref="xn:VsDataContainer"/>
</choice>
</sequence>
</extension>
</complexContent>
</complexType>
</element>

<element name="BtsSiteMgr">
<complexType>
<complexContent>
<extension base="xn:NrmClass">
<sequence>
<element name="attributes" minOccurs="0">
<complexType>
<all>
<element name="userLabel"/>
<element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
<element ref="gr:latitude" minOccurs="0"/>
<element ref="gr:longitude" minOccurs="0"/>
<element name="operationalState" type="sm:operationalStateType" minOccurs="0"/>
</all>
</complexType>
</element>
<choice minOccurs="0" maxOccurs="1">
<element ref="sp:InterRatEsPolicies"/>
</choice>
</sequence>
</extension>
</complexContent>
</complexType>
</element>

<element name="GsmCell">
<complexType>
<complexContent>
<extension base="xn:NrmClass">
<sequence>
<element name="attributes" minOccurs="0">
<complexType>
<all>
<element name="userLabel"/>
<element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
<element name="cellIdentity"/>
<element name="cellAllocation"/>
<element name="ncc"/>
<element name="bcc"/>
<element name="lac"/>
<element name="mcc"/>
<element name="mnc"/>
<element name="rac" minOccurs="0"/>
<element name="racc" minOccurs="0"/>
</all>
</complexType>
</element>
</sequence>
</extension>
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<element name="vnfParametersList" type="xn:vnfParametersListType" minOccurs="0"/>
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<element name="GsmCellOptionallyContainedNrmClass" type="xn:NrmClass" abstract="true"/>
</schema>
### Change history

**Annex C (informative):**

**Change history**

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**Change history**

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## History

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