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Universal Mobile Telecommunications System (UMTS); LTE;

Telecommunication management;
Evolved Packet Core (EPC) Network Resource Model (NRM)
Integration Reference Point (IRP);
Solution Set (SS) definitions
(3GPP TS 28.709 version 11.1.0 Release 11)



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#### **ETSI**

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 - NAF 742 C Association à but non lucratif enregistrée à la Sous-Préfecture de Grasse (06) N° 7803/88

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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; as identified below:

28.707:	Evolved Packet Core	(EPC) Netwo	ork Resource Mode	I (NRM	) Integration Referen	ce Point (IRP)
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Requirements

28.708: Evolved Packet Core (EPC) Network Resource Model (NRM) Integration Reference Point (IRP);

Information Service (IS)

28.709: Evolved Packet Core (EPC) Network Resource Model (NRM) Integration Reference Point

(IRP); Solution Set (SS) definitions

### 1 Scope

The present document specifies the Solution Sets for the EPC NRM IRP.

The Solution Set definition is related to 3GPP TS 28.708 V11.0.X [3].

#### 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*.
- 3GPP TS 21.905: "Vocabulary for 3GPP Specifications". [1] 3GPP TS 28.708: "Telecommunication management; Evolved Packet Core (EPC) Network [2] Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)". 3GPP TS 32.616: "Telecommunication management; Configuration Management (CM); Bulk CM [3] 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-names-20060816: "Namespaces in XML 1.1 (Second Edition)". 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name [6] convention for Managed Objects". W3C REC-xml11-20060816: "Extensible Markup Language (XML) 1.1 (Second Edition)". [7]
- [8] Void
- [9] W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures.
- [10] W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes.
- [11] 3GPP TS 28.623: "Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definition".

#### 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 [11].

XML document: See definition of [11].

XML declaration: See definition of [11].

XML element: See definition of [11].

empty XML element: See definition of [11].

XML content (of an XML element): See definition of [11].

XML start-tag: See definition of [11].

XML end-tag: See definition of [11].

XML empty-element tag: See definition of [11].

XML attribute specification: See definition of [11].

DTD: See definition of [11].

XML schema: See definition of [11].

XML namespace: See definition of [11].

XML complex type: See definition of [11].

#### 3.2 Abbreviations

**XML** element type: See definition of [11].

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

eNodeB evolved NodeB EPC Evolved Packet Core

EPDG Evolved Packet Data Gateway

E-UTRAN Evolved Universal Terrestrial Radio Access Network

GPRS General Packet Radio System

IS Information Service

IDL Interface Definition Language (OMG)

IOC Information Object Class
IRP Integration Reference Point
IS Information Service

MME Mobility Management Entity

MO Managed Object
MOC Managed Object Class
NRM Network Resource Model

OMG Object Management Group

PCRF Policy and Charging Rules Function

P-GW PDN Gateway S-GW Serving Gateway SS Solution Set

XML eXtensible Markup Language

## 4 Solution Set definitions

This specifications defines the following 3GPP EPC NRM IRP Solution Set definitions:

- 3GPP EPC NRM IRP CORBA SS (Annex A)
- 3GPP EPC NRM IRP XML definitions (Annex B)

## Annex A (normative): CORBA Solution Set

This annex contains the CORBA Solution Set for the IRP whose semantics is specified in EPC Network Resource Model (NRM) IRP: Information Service (TS 28.708 [2]).

#### A.1 Architectural features

The overall architectural feature of EPC NRM IRP is specified in 3GPP TS 28.708 [2].

This clause specifies features that are specific to the CORBA SS.

#### A.1.1 Syntax for Distinguished Names

See clause A.1.1 of [11].A.1.2 Rules for NRM extensions

See clause A.1.2 of [11].

## A.2 Mapping

### A.2.1 General mapping

See clause A.1.2.1 of [11].

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

#### A.2.2.1 IOC MMEFunction

IS Attributes	SS Attributes	SS Type
id	id	string
pLMNIdList	pLMNIdList	genericEPCNRMAttributeTypes::AttributeTypes::plmnIdListType
mMEC	mMEC	long
mMEPool	mMEPool	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReference

#### A.2.2.2 IOC MMEPool

IS Attributes	SS Attributes	SS Type
id	id	string
mMEGI	mMEGI	long
mMEPoolMemberL	mMEPoolMemberLi	GenericNetworkResourcesIRPSystem::AttributeTypes::
ist	st	MOReferenceSet
mMEPoolArea	mMEPoolArea	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReference

#### A.2.2.3 IOC MMEPoolArea

IS Attributes	SS Attributes	SS Type
id	id	string
mMEPool	mMEPool	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReference
tACList	tACList	GenericNetworkResourcesIRPSystem::AttributeTypes::LongSet
pLMNIdList	pLMNIdList	genericEPCNRMAttributeTypes::AttributeTypes::plmnldListType

#### A.2.2.4 IOC EP\_RP\_EPS

IS Attributes	SS Attributes	SS Type
farEndNeIpAddr	farEndNeIpAddr	string

#### A.2.2.5 IOC ExternalMMEFunction

IS Attributes	SS Attributes	SS Type
id	id	string
pLMNIdList	pLMNIdList	genericEPCNRMAttributeTypes::AttributeTypes:: plmnldListType
mMEC	mMEC	long
mMEPool	mMEPool	GenericNetworkResourcesIRPSystem::AttributeTypes::MOReference

#### A.2.2.6 IOC ServingGWFunction

IS Attributes	SS Attributes	SS Type
id	id	string
pLMNIdList	pLMNIdList	genericEPCNRMAttributeTypes::AttributeTypes:: plmnldListType
tACList	tACList	GenericNetworkResourcesIRPSystem::AttributeTypes::LongSet

## A.2.2.7 IOC ExternalServingGWFunction

IS Attributes	SS Attributes	SS Type
id	id	string
pLMNIdList	pLMNIdList	genericEPCNRMAttributeTypes::AttributeTypes::plmnIdListType
tACList	tACList	GenericNetworkResourcesIRPSystem::AttributeTypes::LongSet

#### A.2.2.8 IOC QCISet

IS Attributes	SS Attributes	SS Type
id	id	string
qCIList	qCIList	genericEPCNRMAttributeTypes::AttributeTypes:: qciListType

#### A.2.2.9 IOC MBMSGWFunction

IS Attributes	SS Attributes	SS Type
id	id	string

#### A.3 Solution Set definitions

#### A.3.1 IDL definition structure

Clause A.3.2 defines the types and constants which are used by the EPC NRM IRP.

#### A.3.2 IDL specification "EPCResourcesNRMDefs.idl"

```
//File:EPCResourcesNRMDefs.idl
#ifndef _EPCNETWORKRESOURCESNRMDEFS_IDL_
#define _EPCNETWORKRESOURCESNRMDEFS_IDL_
#include "GenericNetworkResourcesNRMDefs.idl"
#pragma prefix "3gppsa5.org"
\mbox{\ensuremath{\star}} This module defines constants for each MO class name and
 * the attribute names for each defined MO class.
module EPCNetworkResourcesNRMDefs
       * Definitions for MO class EPDGFunction
      interface EPDGFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "EPDGFunction";
         // No New Attribute Names
         //
       * Definitions for MO class MMEFunction
      interface MMEFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "MMEFunction";
         // Attribute Names
         const string id = "id";
         const string pLMNIdList = "pLMNIdList";
         const string mMEC = "mMEC";
         const string mMEPool = "mMEPool";
       * Definitions for MO class PCRFFunction
      interface PCRFFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "PCRFFunction";
         // No New Attribute Names
         //
      };
         Definitions for MO class PGWFunction
      interface PGWFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "PGWFunction";
         // No New Attribute Names
         //
         //
      };
      * Definitions for MO class ServingGWFunction
      interface ServingGWFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "ServingGWFunction";
```

```
// Attribute Names
  const string id = "id";
  const string pLMNIdList = "pLMNIdList";
  const string tACList = "tACList";
};
* Definitions for MO class MMEPool
interface MMEPool : GenericNetworkResourcesNRMDefs::ManagedFunction
  const string CLASS = "MMEPool";
  // Attribute Names
  //
  const string id = "id";
  const string mMEGI = "mMEGI";
  const string mMEPoolMemberList = "mMEPoolMemberList";
  const string mMEPoolArea = "mMEPoolArea";
* Definitions for MO class MMEPoolArea
* /
interface MMEPoolArea : GenericNetworkResourcesNRMDefs::ManagedFunction
  const string CLASS = "MMEPoolArea";
  // Attribute Names
  //
  const string id = "id";
  const string mMEPool = "mMEPool";
  const string tACList = "tACList";
  const string sGWAddress = "sGWAddress";
  const string pLMNIdList = "pLMNIdList";
};
* Definitions for MO class EP_RP_EPS
interface EP_RP_EPS : GenericNetworkResourcesNRMDefs::EP_RP
  const string CLASS = "EP_RP_EPS";
  // Attribute Names
  const string farEndNeIpAddr = "farEndNeIpAddr";
* Definitions for MO class Link_ENB_MME
interface Link_ENB_MME : GenericNetworkResourcesNRMDefs::Link
{
  const string CLASS = "Link_ENB_MME";
  // No New Attribute Names
  //
};
* Definitions for MO class Link_ENB_ServingGW
interface Link_ENB_ServingGW : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_ENB_ServingGW";
  // No New Attribute Names
  //
};
 * Definitions for MO class Link_EPDG_PCRF
interface Link_EPDG_PCRF : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_EPDG_PCRF";
  // No New Attribute Names
  //
};
* Definitions for MO class Link_EPDG_PGW
```

```
* /
interface Link_EPDG_PGW : GenericNetworkResourcesNRMDefs::Link
{
  const string CLASS = "Link_EPDG_PGW";
  // No New Attribute Names
  //
* Definitions for MO class Link_HSS_MME
interface Link_HSS_MME : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_HSS_MME";
  // No New Attribute Names
  //
};
* Definitions for MO class Link_MME_MME
interface Link_MME_MME : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_MME_MME";
  // No New Attribute Names
  //
};
* Definitions for MO class Link_MME_SGSN
interface Link_MME_SGSN : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_MME_SGSN";
  // No New Attribute Names
  //
* Definitions for MO class Link_MME_ServingGW
interface Link_MME_ServingGW : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_MME_ServingGW";
  // No New Attribute Names
  //
};
* Definitions for MO class Link_PCRF_ServingGW
interface Link_PCRF_ServingGW : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_PCRF_ServingGW";
  // No New Attribute Names
  //
};
* Definitions for MO class Link_PCRF_PGW
interface Link_PCRF_PGW : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_PCRF_PGW";
  // No New Attribute Names
  //
};
* Definitions for MO class Link_PGW_ServingGW
interface Link_PGW_ServingGW : GenericNetworkResourcesNRMDefs::Link
  const string CLASS = "Link_PGW_ServingGW";
  // No New Attribute Names
```

```
* Definitions for MO class Link_SGSN_ServingGW
      \verb|interface Link_SGSN_ServingGW|: GenericNetworkResourcesNRMDefs:: Link|
         const string CLASS = "Link_SGSN_ServingGW";
         // No New Attribute Names
         11
      };
};
      * Definitions for MO class ExternalMMEFunction
      interface ExternalMMEFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "ExternalMMEFunction";
         // Attribute Names
        //
        const string id = "id";
         const string pLMNIdList = "pLMNIdList";
         const string mMEC = "mMEC";
        const string mMEPool = "mMEPool";
      * Definitions for MO class ExternalServingGWFunction
      interface ExternalServingGWFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "ExternalServingGWFunction";
         // Attribute Names
         //
        const string id = "id";
        const string pLMNIdList = "pLMNIdList";
         const string tACList = "tACList";
      };
       * Definitions for MO class QCISet
      interface QCISet: GenericNetworkResourcesNRMDefs::ManagedFunction
      {
         const string CLASS = "QCISet";
         // Attribute Names
         const string id = "id";
         const string qCIList = "qCIList";
      };
       * Definitions for MO class Link_MBMSGW_ENB
        interface Link_MBMSGW_ENB : GenericNetworkResourcesNRMDefs::Link
      {
         const string CLASS = "Link_MBMSGW_ENB";
         // No New Attribute Names
         11
      };
       * Definitions for MO class MBMSGWFunction
        interface MBMSGWFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
         const string CLASS = "MBMSGWFunction";
         // Attribute Names
         //
         const string id = "id";
}
module genericEPCNRMAttributeTypes
       * Definitions for struct PlmnIdType
```

```
struct PlmnIdType
{
    short mcc;
    short mnc;
};

typedef sequence<PlmnIdType> plmnIdListType;

    /**
    * Definitions for struct QciType
    */

struct QciType
{
    short qci;
    boolean resourceType;
    // True is GBR, False is Non-GBR
    short priority;
    short packetDelayBudget;
    float packetErrorLossRate;
};

typedef sequence<QciType> qciListType;

};
#endif // _EPCNETWORKRESOURCESNRMDEFS_IDL_
```

## Annex B (normative): XML definitions

This annex contains the XML definitions for the EPC NRM IRP as it applies to Itf-N, in accordance with EPC NRM IRP IS definitions [2].

The XML file formats are based on XML [7], XML Schema [9] [10] and XML Namespace [5] standards.

#### B.1 Architectural features

The overall architectural feature of EPC Network Resource Model IRP is specified in 3GPP TS 28.708 [2]. This clause specifies features that are specific to the XML definitions SS.

#### B.1.1 Syntax for Distinguished Names

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [6].

## 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 overall description of the file format of configuration data XML files is provided by 3GPP TS 32.616 [3].

B.3.2 defines the NRM-specific XML schema epoNrm.xsd for the EPC NRM IRP IS defined in 3GPP TS 28.708 [2].

XML schema epcNrm.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 Solution Set definitions

#### B.3.1 XML definition structure

The XML definitions of this document specify the schema for configuration content.

When using the XML definitions for a configuration file transfer with the Bulk CM IRP, using either CORBA Solution Set of 3GPP TS 32.616 [3] or SOAP Solution Set of 3GPP TS 32.616 [3], the basic part of the XML file format definition is provided by 3GPP TS 32.616 [3]. The XML definitions of this document provide the schema for the configuration content to be included in such a configuration file.

When using the XML definitions with a SOAP solution set of any interface IRP that perform operations on managed objects, for example the Basic CM IRP SOAP SS of 3GPP TS 32.606 [4], the XML definitions of this document

provides the schema for the configuration content operated on by the interface IRP. Such configuration content can be name of managed object and, if applicable, IOC attributes.

#### B.3.2 XML schema "epcNrm.xsd"

```
<?xml version="1.1" encoding="UTF-8"?>
 3GPP TS 28.709 EPC Network Resource Model IRP
 XML schema definition
 epcNrm.xsd
<schema
 targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.709#epcNrm"
 elementFormDefault="qualified"
 attributeFormDefault="unqualified"
 xmlns="http://www.w3.org/2001/XMLSchema"
 xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"
 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/28.623#genericNrm"/>
 <!--EPC NRM IRP IS class associated XML elements -->
 <complexType name="PLMNId">
   <sequence>
     <element name="mcc" type="short" minOccurs="0"/>
<element name="mNc" type="short" minOccurs="0"/>
   </sequence>
 </complexType>
 <complexType name="PLMNIdList">
   <sequence>
     <element name="pLMNId" type="epc:PLMNId" minOccurs="0" />
   </sequence>
 </complexType>
 <complexType name="TACList">
   <sequence>
     <element name="tAC" type="long" minOccurs="0" maxOccurs="unbounded"/>
 </complexType>
 <complexType name="QCIType">
   <sequence>
     <element name="qci" type="short" minOccurs="0"/>
     <element name="resourceType" type="boolean" minOccurs="0"/>
     <!-- True is GBR, and False is Non-GBR -->
     <element name="priority" type="short" minOccurs="0"/>
     <element name="packetDelayBudget" type="short" minOccurs="0"/>
     <element name="packetErrorLossRate" type="decimal" minOccurs="0"/>
   </sequence>
 </complexType>
 <complexType name="QCIListType">
   <sequence>
     <element name="qCIInfo" type="epc:QCIType" minOccurs="0"/>
   </sequence>
 </complexType>
 <element
   name="EPDGFunction"
   substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
   <complexType>
     <complexContent>
       <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
                <element name="userLabel" type="string" minOccurs="0"/>
               <element name="linkList" type="xn:linkListType" minOccurs="0"/>
             </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="epc:EPDGFunctionOptionallyContainedNrmClass"/>
```

```
<element ref="epc:EP_RP_EPS"/>
          <element ref="xn:VsDataContainer"/>
        </choice>
      </sequence>
     </extension>
   </complexContent>
 </complexType>
</element>
 name="MMEFunction"
 substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
 <complexType>
   <complexContent>
     <extension base="xn:NrmClass">
      <sequence>
        <element name="attributes" minOccurs="0">
           <all>
             <element name="userLabel" type="string" minOccurs="0"/>
             <element name="pLMNIdList" type="epc:PLMNIdList" minOccurs="0"/>
             <element name="mMEC" type="long" minOccurs="0"/>
             <element name="mMEPool" type="xn:dn" minOccurs="0"/>
            </all>
          </complexType>
        </element>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="epc:MMEFunctionOptionallyContainedNrmClass"/>
            <element ref="epc:EP_RP_EPS"/>
          <element ref="xn:VsDataContainer"/>
        </choice>
      </sequence>
     </extension>
   </complexContent>
 </complexType>
</element>
<element
 name="PCRFFunction"
 substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
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# Annex C (informative): Change history

	Change history							
Date	Date TSG # TSG CR Rev Subject/Comment						Old	New
		Doc.						
2014-06	SA#64	SP-	001	-	Upgrade W3C XML Schema version from 1.0 to 1.1	F	11.0.0	11.1.0
		140332						
		SP-	002	-	remove the feature support statements	F		
		140358						

## History

Document history		
V11.0.0	January 2013	Publication
V11.1.0	July 2014	Publication