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**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Evolved Packet Core (EPC) and
non-3GPP access interworking system
Network Resource Model (NRM)
Integration Reference Point (IRP);
Solution Set (SS) definitions
(3GPP TS 28.616 version 14.1.0 Release 14)**



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Foreword

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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:

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- 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.

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:

TS 28.611: "Evolved Packet Core (EPC) and non-3GPP access interworking system Network Resource Model (NRM) Integration Reference Point (IRP); Requirements".

TS 28.612: "Evolved Packet Core (EPC) and non-3GPP access interworking system Network Resource Model (NRM); Integration Reference Point (IRP) Information Service (IS)".

TS 28.616: "Evolved Packet Core (EPC) and non-3GPP access interworking system Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

1 Scope

The present document is part of an Integration Reference Point (IRP) named Evolved Packet Core (EPC) and non-3GPP access Interworking System Network Resource Model (NRM) IRP, through which an IRPAgent can communicate configuration management information to one or several IRPManagers concerning EPC and non-3GPP access interworking system resources. The EPC and non-3GPP access Interworking System NRM IRP comprises a set of specifications defining requirements, a protocol neutral information service and one or more solution sets.

The present document specifies the solution sets for the EPC and non-3GPP access interworking system NRM IRP.

This solution set specification is related to 3GPP TS 28.612 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 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 32.153: "Telecommunication management; Integration Reference Point (IRP) technology specific templates, rules and guidelines".
- [3] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".
- [4] 3GPP TS 28.612: "Telecommunication management; Evolved Packet Core (EPC) and non-3GPP access interworking system 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 32.606: "Telecommunication management; Configuration Management (CM); Basic CM 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".
- [8] 3GPP TS 28.623: "Generic network resources Integration Reference Point (IRP); Solution Set (SS) definitions".
- [9] W3C REC-xml11-20060816: "Extensible Markup Language (XML) 1.1 (Second Edition)".
- [10] W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures.
- [11] W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes.
- [12] W3C REC-xml-names-20060816: "Namespaces in XML 1.1 (Second Edition)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1], TS 32.600 [3] 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 in 3GPP TS 28.623 [8].

XML document: See definition in 3GPP TS 28.623 [8].

XML declaration: See definition in 3GPP TS 28.623 [8].

XML element: See definition in 3GPP TS 28.623 [8].

empty XML element: See definition in 3GPP TS 28.623 [8].

XML content (of an XML element): See definition in 3GPP TS 28.623 [8].

XML start-tag: See definition in 3GPP TS 28.623 [8].

XML end-tag: See definition in 3GPP TS 28.623 [8].

XML empty-element tag: See definition in 3GPP TS 28.623 [8].

XML attribute specification: See definition in 3GPP TS 28.623 [8].

DTD: See definition in 3GPP TS 28.623 [8].

XML schema: See definition in 3GPP TS 28.623 [8].

XML namespace: See definition in 3GPP TS 28.623 [8].

XML complex type: See definition in 3GPP TS 28.623 [8].

XML element type: See definition in 3GPP TS 28.623 [8].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], TS 32.600 [3], and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

CM	Configuration Management
CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
DTD	Document Type Definition
EDGE	Enhanced Data for GSM Evolution
GERAN	GSM/EDGE Radio Access Network
GSM	Global System for Mobile communication
IS	Information Service
IDL	Interface Definition Language (OMG)
IOC	Information Object Class
IRP	Integration Reference Point
IS	Information Service
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set
UMTS	Universal Mobile Telecommunications System

UTRAN	Universal Terrestrial Radio Access Network
XML	eXtensible Markup Language
XSD	XML Schema Definition

4 Solution set definitions

This specification defines the following 3GPP Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP solution set definitions:

- 3GPP Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP CORBA SS (see Annex A)
- 3GPP Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP XML definitions (see 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 Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP: Information Service (IS) (3GPP TS 28.612 [4]).

A.1 Architectural features

A.1.0 Introduction

The overall architectural feature of Evolved Packet Core (EPC) and non-3GPP access interworking system Network Resources IRP is specified in 3GPP TS 28.612 [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 3GPP TS 28.623 [8].

A.1.2 Rules for NRM extensions

See clause A.1.2 of 3GPP TS 28.623 [8].

A.2 Mapping

A.2.1 General mapping

See clause A.2.1 of 3GPP TS 28.623 [8].

A.2.2 Information Object Class (IOC) mapping

A.2.2.1 IOC `Link_3GPPAAAServer_PGW`

All attributes are inherited from `Link`. See mapping of attributes for `Link` IOC in 3GPP TS 28.623 [8].

A.2.2.2 IOC `Link_3GPPAAAServer_HSS`

All attributes are inherited from `Link`. See mapping of attributes for `Link` IOC in 3GPP TS 28.623 [8].

A.2.2.3 IOC `Link_3GPPAAAProxy_3GPPAAAServer`

All attributes are inherited from `Link`. See mapping of attributes for `Link` IOC in 3GPP TS 28.623 [8].

A.2.2.4 IOC 3GPPAAAProxyFunction

Table A.2.2.4: Mapping from NRM IOC 3GPPAAAProxyFunction attributes to SS equivalent MOC 3GPPAAAProxyFunction attributes

IS Attributes	SS Attributes	SS Type
id	id	string

A.2.2.5 IOC 3GPPAAAServerFunction

Table A.2.2.5: Mapping from NRM IOC 3GPPAAAServerFunction attributes to SS equivalent MOC 3GPPAAAServerFunction attributes

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 MO classes for Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP.

A.3.2 IDL specification

"EPCn3aINetworkResourcesNRMDefs.idl"

```
// File: EPCn3aINetworkResourcesNRMDefs.idl
#ifndef _EPCN3AINETWORKRESOURCESNRMDEFS_IDL_
#define _EPCN3AINETWORKRESOURCESNRMDEFS_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 EPCn3aINetworkResourcesNRMDefs
{
    /**
     * Definitions for MO class Link_3GPPAAAServer_PGW
     */
    interface Link_3GPPAAAServer_PGW : GenericNetworkResourcesNRMDefs::Link
    {
        const string CLASS = "Link_3GPPAAAServer_PGW";
        // No New Attribute Names
        //
    };
    /**
     * Definitions for MO class Link_3GPPAAAServer_HSS
     */
    interface Link_3GPPAAAServer_HSS : GenericNetworkResourcesNRMDefs::Link
    {
        const string CLASS = "Link_3GPPAAAServer_HSS";
        // No New Attribute Names
        //
    };
    /**
     * Definitions for MO class Link_3GPPAAAProxy_3GPPAAAServer
     */
    interface Link_3GPPAAAProxy_3GPPAAAServer : GenericNetworkResourcesNRMDefs::Link
    {
        const string CLASS = "Link_3GPPAAAProxy_3GPPAAAServer";
        // No New Attribute Names
        //
    };
    /**
     * Definitions for MO class 3GPPAAAProxyFunction
     */
    interface 3GPPAAAProxyFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
    {
        const string CLASS = "3GPPAAAProxyFunction";
        // Attribute Names
        //
        const string id = "id";
    };
    /**
     * Definitions for MO class 3GPPAAAServerFunction
     */
    interface 3GPPAAAServerFunction : GenericNetworkResourcesNRMDefs::ManagedFunction
    {
        const string CLASS = "3GPPAAAServerFunction";
        // Attribute Names
        //
        const string id = "id";
    };
};
#endif // _EPCN3AINETWORKRESOURCESNRMDEFS_IDL_
```

Annex B (normative): XML definitions

B.0 General

This annex contains the XML definitions for the Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP as it applies to Itf-N, in accordance with Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP IS definitions in 3GPP TS 28.612 [4].

The XML file formats are based on XML [9], XML Schema [10] [11] and XML Namespace [12] standards.

B.1 Architectural features

B.1.0 Introduction

The overall architectural feature of Evolved Packet Core (EPC) and non-3GPP access interworking system Network Resources IRP is specified in 3GPP TS 28.612 [4].

This clause specifies features that are specific to the schema definitions.

The XML definitions in the present document specify the schema for a 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 [7] or SOAP Solution Set of 3GPP TS 32.616 [7], the basic part of the XML file format definition is provided by 3GPP TS 32.616 [7]. The XML definitions in the present 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 [6], the XML definitions in the present document provide 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.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 `EPCn3aINrm.xsd` for the "Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP IS" defined in 3GPP TS 28.612 [4].

XML schema `EPCn3aINrm.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 "EPCn3aINrm.xsd"

```
<?xml version="1.1" encoding="UTF-8"?>

<!--
 3GPP TS 28.616 Evolved Packet Core (EPC) and non-3GPP access interworking system NRM IRP
 XML schema definition
 epcn3aiNrm.xsd
-->

<schema
  targetNamespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.616#epcn3aiNrm"
  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:epcn3ai="http://www.3gpp.org/ftp/specs/archive/28_series/28.616#epcn3aiNrm"
>

  <import namespace="http://www.3gpp.org/ftp/specs/archive/28_series/28.623#genericNrm"/>

  <!-- EPC and non-3GPP access Interworking NRM IRP IS class associated XML elements -->

  <element name="Link_3GPPAAAServer_PGW"
    substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass"
  >
    <complexType>
      <complexContent>
        <extension base="xn:NrmClass">
          <sequence>
            <element name="attributes" minOccurs="0">
              <complexType>
                <all>
                  <element name="aEnd" type="xn:dn" minOccurs="0"/>
                  <element name="linkType" type="xn:linkType" minOccurs="0"/>
                  <element name="protocolName" type="string" minOccurs="0"/>
                  <element name="protocolVersion" type="string" minOccurs="0"/>
                  <element name="userLabel" type="string" minOccurs="0"/>
                  <element name="zEnd" type="xn:dn" minOccurs="0"/>
                </all>
              </complexType>
            </element>
            <choice minOccurs="0" maxOccurs="unbounded">
              <element ref="epcn3ai:Link_3GPPAAAServer_PGWOptionallyContainedNrmClass"/>
              <element ref="xn:VsDataContainer"/>
            </choice>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </element>

```

```

</element

<element name="Link_3GPPAAAServer_HSS"
  substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass"
>
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element name="aEnd" type="xn:dn" minOccurs="0"/>
                <element name="linkType" type="xn:linkType" minOccurs="0"/>
                <element name="protocolName" type="string" minOccurs="0"/>
                <element name="protocolVersion" type="string" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <element name="zEnd" type="xn:dn" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="epcn3ai: Link_3GPPAAAServer_HSSOptionallyContainedNrmClass"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element name="Link_3GPPAAAProxy_3GPPAAAServer"
  substitutionGroup="xn:SubNetworkOptionallyContainedNrmClass"
>
  <complexType>
    <complexContent>
      <extension base="xn:NrmClass">
        <sequence>
          <element name="attributes" minOccurs="0">
            <complexType>
              <all>
                <element name="aEnd" type="xn:dn" minOccurs="0"/>
                <element name="linkType" type="xn:linkType" minOccurs="0"/>
                <element name="protocolName" type="string" minOccurs="0"/>
                <element name="protocolVersion" type="string" minOccurs="0"/>
                <element name="userLabel" type="string" minOccurs="0"/>
                <element name="zEnd" type="xn:dn" minOccurs="0"/>
              </all>
            </complexType>
          </element>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="epcn3ai: Link_3GPPAAAProxy_3GPPAAAServerOptionallyContainedNrmClass"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

<element
  name="3GPPAAAProxyFunction"
  substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
>
  <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"/>
          </choice>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</element>

```

```

    </choice>
  </sequence>
</extension>
</complexContent>
</complexType>
</element>

<element
  name="3GPPAAAServerFunction"
  substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
  >
  <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"/>
      </choice>
    </sequence>
  </extension>
</complexContent>
</complexType>
</element>>

  <element name="Link_3GPPAAAServer_PGWOptionallyContainedNrmClass" type="xn:NrmClass"
  abstract="true"/>
  <element name="Link_3GPPAAAServer_HSSOptionallyContainedNrmClass" type="xn:NrmClass"
  abstract="true"/>
  <element name="Link_3GPPAAAProxy_3GPPAAAServerOptionallyContainedNrmClass" type="xn:NrmClass"
  abstract="true"/>

</schema>
```


Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Dec 2013					Version after approval	2.0.0	12.0.0
Jun 2014	SA#64	SP-140333	001	-	Upgrade W3C XML Schema version from 1.0 to 1.1	12.0.0	12.1.0
Sep 2014	SA#65	SP-140614	002	1	Move IOCs/MOCs from discontinued TS 28.606 - align with TSG SA decision to remove I-WLAN	12.1.0	12.2.0
Dec 2014	SA#66	SP-140798	003	1	Remove feature support statement	12.2.0	12.3.0
2016-01	-	-	-	-	Update to Rel-13 version (MCC)	12.3.0	13.0.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
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	14.0.0
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

History

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