3GPP TS 28.633 V17.1.0 (2024-09)

Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Services and System Aspects;

Telecommunication management;

Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP);

Solution Set (SS) definitions

(Release 17)

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Keywords

NRM, IRP, Converged Management, Inventory Management

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# Foreword

This Technical Specification 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:

32.690: Inventory Management (IM); Requirements.

28.631: Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP); Requirements.

28.632: Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS).

**28.633: Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions.**

Inventory Management (IM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. IM actions have the objective to 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. The final goal of IM is the establishment of an accurate and timely model of the actual inventory in the NEs or NRs.

The present document covers the Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP): Solution Set (SS) definitions.

# 1 Scope

The present document provides the NRM-specific part related to the Inventory Management NRM IRP IS in 3GPP TS 28.632 [1] of solution set definitions.

# 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 28.632: " Telecommunication management; Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[2] 3GPP TS 32.612: "Telecommunication management; Configuration Management (CM); Bulk CM 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] W3C REC-xml11-20060816: "Extensible Markup Language (XML) 1.1 (Second Edition)".

[5] Void

[6] W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures.

[7] W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes.

[8] W3C REC-xml-names-20060816: "Namespaces in XML 1.1 (Second Edition)".

[9] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[10] 3GPP TS 32.342: "Telecommunication management; File Transfer (FT) Integration Reference Point (IRP): Information Service (IS)".

[11] 3GPP TS 28.623: “Generic network resources Integration Reference Point (IRP); Solution Set (SS) definition”.

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**XML file:** See definition in TS 32.616 [3].

**XML document:** See definition in TS 32.616 [3].

**XML declaration:** See definition in TS 32.616 [3].

**XML element:** See definition in TS 32.616 [3].

**empty XML element:** See definition in TS 32.616 [3].

**XML content (of an XML element):** See definition in TS 32.616 [3].

**XML start-tag:** See definition in TS 32.616 [3].

**XML end-tag:** See definition in TS 32.616 [3].

**XML empty-element tag:** See definition in TS 32.616 [3].

**XML attribute specification:** See definition in TS 32.616 [3].

**DTD:** See definition in TS 32.616 [3].

**XML schema:** See definition in TS 32.616 [3].

**XML namespace:** See definition in TS 32.616 [3].

**XML complex type:** See definition in TS 32.616 [3].

**XML element type:** See definition in TS 32.616 [3].

## 3.2 Abbreviations

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

CORBA Common Object Request Broker Architecture

DTD Document Type Definition

IM Inventory Management

IRP Integration Reference Point

IS Information Service

NRM Network Resource Model

XML eXtensible Markup Language

XSD XML Schema Definition

# 4 Solution Set definitions

This specification defines the following 3GPP Inventory Management (IM) Network Resource Model (NRM) IRP Solution Set (SS) definitions:

- 3GPP Inventory Management (IM) Network Resource Model (NRM) IRP XML definitions (Annex A)

CORBA Solution Set is not present in the current version of this specification.

Annex A (normative):
XML definitions

# A.0 General

This annex provides the NRM-specific part related to the Inventory Management NRM IRP IS in 3GPP TS 28.632 [1] of the XML file format definition for the Bulk Configuration Management IRP IS in 3GPP TS 32.612 [2] as well as for use with File Tranfer IRP [10].

The XML file formats are based on XML [4], XML Schema [6] [7] and XML Namespace [8] standards.

# A.1 Architectural features

## A.1.0 Introduction

The overall architectural feature of Inventory Management NRM IRP IS is specified in 3GPP TS 28.632 [1].

This clause specifies features that are specific to the XML Schema definitions.

## A.1.1 Syntax for Distinguished Names

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [9].

# A.2 Mapping

The mapping is not present in the current version of this specification.

# A.3 Solution Set definitions

## A.3.1 XML definition structure

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

A.3.2 defines the NRM-specific XML schema inventoryNrm.xsd for the Inventory Management NRM IRP IS alternative 1 defined in 3GPP TS 28.632 [1].

A.3.3 defines the NRM-specific XML schema inventoryNrmAlt2.xsd for the Inventory Management NRM IRP IS alternative 2 as defined in 3GPP TS 28.632 [1].

XML schema inventoryNrmAlt1.xsd and inventoryNrmAlt2.xsd explicitly declare 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].

## A.3.2 XML schema "inventoryNrm.xsd"

The following XML schema inventoryNrm.xsd is the NRM-specific schema for the Inventory Management NRM IRP IS alternative 1 defined in 3GPP TS 28.632 [1].

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

<!--
 3GPP TS 28.633 Inventory Management NRM IRP
 Inventory data file NRM-specific XML schema
 inventoryNrm.xsd
-->

<schema
 targetNamespace=
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.633#inventoryNrm"
 elementFormDefault="qualified"
 xmlns="http://www.w3.org/2001/XMLSchema"
 xmlns:xn=
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.623#genericNrm"
 xmlns:in=
"http://www.3gpp.org/ftp/specs/archive/28\_series/28.633#inventoryNrm"
>

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

 <!-- Inventory Management Alternative 1 NRM IRP NRM class associated XML elements -->
 <simpleType name="eightOctetsType">

 <restriction base="hexBinary">

 <length value="8"/>

 </restriction>

 </simpleType>

 <simpleType name="fourOctetsType">

 <restriction base="hexBinary">

 <length value="4"/>

 </restriction>

 </simpleType>

 <simpleType name="angleValueType">

 <restriction base="short">

 <minInclusive value="0"/>

 <maxInclusive value="3600"/>

 </restriction>

</simpleType>

 <element
 name="InventoryUnit"
 substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass"
 >
 <complexType>
 <complexContent>
 <extension base="xn:NrmClass">
 <sequence>
 <element
 name="attributes"
 minOccurs="0">
 <complexType>
 <all>
 <element
 name="inventoryUnitType"
 type="string"
 />
 <element
 name="vendorUnitFamilyType"
 type="string"
 minOccurs="0"
 />
 <element
 name="vendorUnitTypeNumber"
 type="string"
 minOccurs="0"
 />
 <element
 name="vendorName"
 type="string"/>
 <element
 name="serialNumber"
 type="string"
 minOccurs="0"/>
 <element
 name="dateOfManufacture"
 type="date"
 minOccurs="0"/>
 <element
 name="dateOfLastService"
 type="date"
 minOccurs="0"/>
 <element
 name="unitPosition"
 type="string"
 minOccurs="0"/>
 <element
 name="manufacturerData"
 type="string"
 minOccurs="0"/>
 <element
 name="versionNumber"
 type="string"
 minOccurs="0"/>
 <element name="relatedFunction" type="xn:dn" minOccurs="0"/>

 </all>
 </complexType>
 </element>
 <choice minOccurs="0" maxOccurs="unbounded">
 <element ref="in:InventoryUnit"/>
 <element ref="xn:VsDataContainer"/>
 <element ref="in:TmaInventoryUnit"/>

 <element ref="in:AntennaInventoryUnit"/>
 </choice>
 </sequence>
 </extension>
 </complexContent>
 </complexType>
 </element>
 <element name="TmaInventoryUnit" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">

 <complexType>

 <complexContent>

 <extension base="xn:NrmClass">

 <sequence>

 <element name="attributes" minOccurs="0">

 <complexType>

 <all>

 <!-- Inherited attributes from InventoryUnit-->

 <element name="inventoryUnitType" type="string"/>

 <element name="vendorUnitFamilyType" type="string" minOccurs="0"/>

 <element name="vendorUnitTypeNumber" type="string" minOccurs="0"/>

 <element name="vendorName" type="string"/>

 <element name="serialNumber" type="string" minOccurs="0"/>

 <element name="dateOfManufacture" type="date" minOccurs="0"/>

 <element name="dateOfLastService" type="date" minOccurs="0"/>

 <element name="unitPosition" type="string" minOccurs="0"/>

 <element name="manufacturerData" type="string" minOccurs="0"/>

 <element name="versionNumber" type="string" minOccurs="0"/>

 <element name="relatedFunction" type="xn:dn" minOccurs="0"/>

 <!-- End of inherited attributes from InventoryUnit -->

 <element name="tmaNumberOfNonLinearGainValues" type="short" minOccurs="0"/>

 <element name="tmaNonLinearGainValue" type="short" minOccurs="0"/>

 <element name="tmaAdditionalDataFieldNumber" type="short" minOccurs="0"/>

 <element name="tmaAntennaModelNumber" type="string" minOccurs="0"/>

 <element name="tmaAntennaOperatingBands" type="short" minOccurs="0"/>

 <element name="tmaBeamwidthForEachOpBandInBandOrder" type="in:eightOctetsType" minOccurs="0"/>

 <element name="tmaGainForEachOpBandInBandOrder" type="in:fourOctetsType" minOccurs="0"/>

 <element name="tmaInstallationDate" type="string" minOccurs="0"/>

 <element name="tmaInstallersId" type="string" minOccurs="0"/>

 <element name="tmaMaxSupportedGain" type="short" minOccurs="0"/>

 <element name="tmaMinSupportedGain" type="short" minOccurs="0"/>

 </all>

 </complexType>

 </element>

 <choice minOccurs="0" maxOccurs="unbounded">

 <element ref="in:InventoryUnit"/>

 <element ref="xn:VsDataContainer"/>

 </choice>

 </sequence>

 </extension>

 </complexContent>

 </complexType>

 </element>

 <element name="AntennaInventoryUnit" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">

 <complexType>

 <complexContent>

 <extension base="xn:NrmClass">

 <sequence>

 <element name="attributes" minOccurs="0">

 <complexType>

 <all>

 <!-- Inherited attributes from InventoryUnit-->

 <element name="inventoryUnitType" type="string"/>

 <element name="vendorUnitFamilyType" type="string" minOccurs="0"/>

 <element name="vendorUnitTypeNumber" type="string" minOccurs="0"/>

 <element name="vendorName" type="string"/>

 <element name="serialNumber" type="string" minOccurs="0"/>

 <element name="dateOfManufacture" type="date" minOccurs="0"/>

 <element name="dateOfLastService" type="date" minOccurs="0"/>

 <element name="unitPosition" type="string" minOccurs="0"/>

 <element name="manufacturerData" type="string" minOccurs="0"/>

 <element name="versionNumber" type="string" minOccurs="0"/>

 <element name="relatedFunction" type="xn:dn" minOccurs="0"/>

 <!-- End of inherited attributes from InventoryUnit-->

 <element name="maxTiltValue" type="in:angleValueType" minOccurs="0"/>

 <element name="minTiltValue" type="in:angleValueType" minOccurs="0"/>

 <element name="mechanicalOffset" type="in:angleValueType" minOccurs="0"/>

 <element name="baseElevation" type="integer" minOccurs="0"/>

 <element name="latitude" type="decimal" minOccurs="0"/>

 <element name="longitude" type="decimal" minOccurs="0"/>

 <element name="patternLabel" type="string" minOccurs="0"/>

 </all>

 </complexType>

 </element>

 <choice minOccurs="0" maxOccurs="unbounded">

 <element ref="in:InventoryUnit"/>

 <element ref="xn:VsDataContainer"/>

 </choice>

 </sequence>

 </extension>

 </complexContent>

 </complexType>

</element>
</schema>

## A.3.3 XML schema "inventoryNrmAlt2.xsd"

The following XML schema inventoryNrmAlt2.xsd is the NRM-specific schema for the Inventory Management NRM IRP IS alternative 2 defined in 3GPP TS 28.632 [1].

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

<!--

 3GPP TS 28.633 Inventory Management NRM IRP

 Inventory data file NRM-specific XML schema

 inventoryNrmAlt2.xsd

-->

<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:xn="http://www.3gpp.org/ftp/specs/archive/28\_series/28.623#genericNrm" xmlns:in="http://www.3gpp.org/ftp/specs/archive/28\_series/28.633#inventoryNrmAlt2" targetNamespace="http://www.3gpp.org/ftp/specs/archive/28\_series/28.633#inventoryNrmAlt2" elementFormDefault="qualified">

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

 <!-- Inventory Management Alternative 2 NRM IRP NRM class associated XML elements -->

 <element name="InventoryUnitNE" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">

 <complexType>

 <complexContent>

 <extension base="xn:NrmClass">

 <sequence>

 <element name="attributes" minOccurs="0">

 <complexType>

 <all>

 <element name="neId" type="string"/>

 <element name="customerIdentifier" type="string" minOccurs="0"/>

 <element name="productName" type="string"/>

 <element name="vendorName" type="string"/>

 <element name="productType" type="string" minOccurs="0"/>

 <element name="salesUniqueId" type="string" minOccurs="0"/> <element name="operatorUniqueName" type="string" minOccurs="0"/>

 <element name="siteId" type="integer" minOccurs="0"/>

 <element name="additionalInformation" type="string" minOccurs="0"/>

 <element name="hWList" type="xn:dnList" minOccurs="0"/>

 <element name="sWList" type="xn:dnList" minOccurs="0"/>

 <element name="lICList" type="xn:dnList" minOccurs="0"/>

 <element name="mFunction" type="xn:dn" minOccurs="0"/>

 </all>

 </complexType>

 </element>

 <element ref="in:InventoryUnitNE" minOccurs="0" maxOccurs="unbounded"/>

 </sequence>

 </extension>

 </complexContent>

 </complexType>

 </element>

 <element name="InventoryUnitHw" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">

 <complexType>

 <complexContent>

 <extension base="xn:NrmClass">

 <sequence>

 <element name="attributes" minOccurs="0">

 <complexType>

 <all>

 <element name="hwId" type="string"/>

 <element name="hwType" type="string"/>

 <element name="hwName" type="string" minOccurs="0"/>

 <element name="vendorName" type="string" minOccurs="0"/>

 <element name="hwVersion" type="string"/>

 <element name="salesUniqueId" type="string" minOccurs="0"/>

 <element name="hwUnitLocation" type="string"/>

 <element name="model" type="string" minOccurs="0"/>

 <element name="hwCapability" type="string" minOccurs="0"/>

 <element name="modificationDate" type="string" minOccurs="0"/>

 <element name="manualDataEntry" type="string" minOccurs="0"/>

 <element name="additionalInformation" type="string" minOccurs="0"/>

 <element name="nEList" type="xn:dnList" minOccurs="0"/>

 <element name="sWList" type="xn:dnList" minOccurs="0"/>

 <element name="lICList" type="xn:dnList" minOccurs="0"/>

 <element name="mFunction" type="xn:dn" minOccurs="0"/>

 </all>

 </complexType>

 </element>

 <element ref="in:InventoryUnitHw" minOccurs="0" maxOccurs="unbounded"/>

 </sequence>

 </extension>

 </complexContent>

 </complexType>

 </element>

 <element name="InventoryUnitSw" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">

 <complexType>

 <complexContent>

 <extension base="xn:NrmClass">

 <sequence>

 <element name="attributes" minOccurs="0">

 <complexType>

 <all>

 <element name="swId" type="string"/>

 <element name="swName" type="string" minOccurs="0"/>

 <element name="vendorName" type="string" minOccurs="0"/>

 <element name="swVersion" type="string" minOccurs="0"/>

 <element name="salesUniqueId" type="string" minOccurs="0"/>

 <element name="classification" type="string"/>

 <element name="swInstallationTime" type="dateTime" minOccurs="0"/>

 <element name="swActivationTime" type="dateTime" minOccurs="0"/>

 <element name="swStatus" type="string" minOccurs="0"/>

 <element name="additionalInformation" type="string" minOccurs="0"/>

 <element name="nEList" type="xn:dnList" minOccurs="0"/>

 <element name="hWList" type="xn:dnList" minOccurs="0"/>

 <element name="lICList" type="xn:dnList" minOccurs="0"/>

 <element name="mFunction" type="xn:dn" minOccurs="0"/>

 </all>

 </complexType>

 </element>

 <element ref="in:InventoryUnitSw" minOccurs="0" maxOccurs="unbounded"/>

 </sequence>

 </extension>

 </complexContent>

 </complexType>

 </element>

 <element name="InventoryUnitLic" substitutionGroup="xn:ManagedElementOptionallyContainedNrmClass">

 <complexType>

 <complexContent>

 <extension base="xn:NrmClass">

 <sequence>

 <element name="attributes" minOccurs="0">

 <complexType>

 <all>

 <element name="licId" type="string"/>

 <element name="licType" type="string" minOccurs="0"/>

 <element name="vendorName" type="string" minOccurs="0"/>

 <element name="validity" type="string" minOccurs="0"/>

 <element name="key" type="string" minOccurs="0"/>

 <element name="licActivationTime" type="dateTime" minOccurs="0"/>

 <element name="licStatus" type="string" minOccurs="0"/>

 <element name="salesUniqueId" type="string" minOccurs="0"/>

 <element name="additionalInformation" type="string" minOccurs="0"/>

 <element name="nEList" type="xn:dnList" minOccurs="0"/>

 <element name="hWList" type="xn:dnList" minOccurs="0"/>

 <element name="sWList" type="xn:dnList" minOccurs="0"/>

 <element name="mFunction" type="xn:dn" minOccurs="0"/>

 </all>

 </complexType>

 </element>

 <element ref="in:InventoryUnitLic" minOccurs="0" maxOccurs="unbounded"/>

 </sequence>

 </extension>

 </complexContent>

 </complexType>

 </element>

</schema>

Annex B (informative):
Change history

|  |
| --- |
| **Change history** |
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 2014-06 | SA#64 | SP-140332 | 001 | - | upgrade XSD | 11.0.0 | 11.1.0 |
| SP-140358 | 002 | - | remove the feature support statements |
| 2014-09 | SA#65 | SP-140560 | 003 | - | Update the link from Solution Set to Information Service due to the end of Release 12 | 11.1.0 | 12.0.0 |
| 2016-01 | SA#70 |  |  |  | Upgrade to Rel-13 (MCC) | 12.0.0 | 13.0.0 |
| 2016-03 | SA#71 | SP-160031 | 006 | - | Make the XML schema well formed | 13.0.0 | 13.1.0 |

|  |
| --- |
| **Change history** |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2016-06 | SA#72 | SP-160407 | 0007 | - | F | Update the link from IRP Solution Set to IRP Information Service | 13.2.0 |
| 2017-03 | SA#75 | - | - | - |  | Promotion to Release 14 without technical change | 14.0.0 |
| 2017-06 | SA#76 | SP-170514 | 0008 | - | F | Update link from IRP SS to IS | 14.1.0 |
| 2018-06 | - | - | - | - | - | Update to Rel-15 version (MCC) | **15.0.0** |
| 2020-07 | - | - | - | - | - | Update to Rel-16 version (MCC) | **16.0.0** |
| 2022-03 | - | - | - | - | - | Update to Rel-17 version (MCC) | **17.0.0** |
| 2024-09 | SA#105 | SP-241164 | 0010 | 1 | F | Rel-17 CR TS 28.633 Correction of XML references | **17.1.0** |