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Technical Specification

**Digital cellular telecommunications system (Phase 2+);  
Universal Mobile Telecommunications System (UMTS);  
LTE;  
Telecommunication management;  
Inventory Management (IM) Network Resource Model (NRM)  
Integration Reference Point (IRP);  
Solution Set (SS) definitions  
(3GPP TS 32.696 version 11.0.0 Release 11)**



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## Foreword

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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:

- 32.690: Inventory Management (IM); Requirements
- 32.691: Inventory Management (IM) network resources Integration Reference Point (IRP); Requirements
- 32.692: Inventory Management (IM) network resources Integration Reference Point (IRP); Network Resource Model (NRM)
- 32.696: Inventory Management (IM) network resources 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 definitions.

---

# 1 Scope

The present document provides the NRM-specific part related to the Inventory Management NRM IRP IS in 3GPP TS 32.692 [1] of solution set definitions.

This Solution Set definitions specification is related to 3GPP TS 32.692 V110..X.

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# 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 32.692: "Telecommunication management; Inventory Management (IM) Network Resource Model (NRM) Integration Reference Point (IRP): Network Resource Model (NRM)".
- [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-xml-20001006: "Extensible Markup Language (XML) 1.0 (Second Edition)".
- [5] W3C REC-xmlschema-0-20010502: "XML Schema Part 0: Primer".
- [6] W3C REC-xmlschema-1-20010502: "XML Schema Part 1: Structures".
- [7] W3C REC-xmlschema-2-20010502: "XML Schema Part 2: Datatypes".
- [8] W3C REC-xml-names-19990114: "Namespaces in XML".
- [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)".

---

# 3 Definitions and abbreviations

## 3.1 Definitions

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

**XML file:** file containing an XML document

**XML document:** composed of the succession of an optional XML declaration followed by a root XML element

NOTE: See [4]; in the scope of the present document.

**XML declaration:** it specifies the version of XML being used

NOTE: See [4].

**XML element:** has a type, is identified by a name, may have a set of XML attribute specifications and is either composed of the succession of an XML start-tag followed by the XML content of the XML element followed by an XML end-tag, or composed simply of an XML empty-element tag; each XML element may contain other XML elements

NOTE: See [4].

**empty XML element:** having an empty XML content; an empty XML element still possibly has a set of XML attribute specifications; an empty XML element is either composed of the succession of an XML start-tag directly followed by an XML end-tag, or composed simply of an XML empty-element tag

NOTE: See [4].

**XML content (of an XML element):** empty if the XML element is simply composed of an XML empty-element tag; otherwise the part, possibly empty, of the XML element between its XML start-tag and its XML end-tag

**XML start-tag:** the beginning of a non-empty XML element is marked by an XML start-tag containing the name and the set of XML attribute specifications of the XML element.

NOTE: See [4].

**XML end-tag:** the end of a non-empty XML element is marked by an XML end-tag containing the name of the XML element

NOTE: See [4].

**XML empty-element tag:** an empty XML element is composed simply of an empty-element tag containing the name and the set of XML attribute specifications of the XML element

NOTE: See [4].

**XML attribute specification:** has a name and a value

NOTE: See [4].

**DTD:** defines structure and content constraints to be respected by an XML document to be valid with regard to this DTD

NOTE: See [4].

**XML schema:** more powerful than a DTD, an XML schema defines structure and content constraints to be respected by an XML document to conform with this XML schema; through the use of XML namespaces several XML schemas can be used together by a single XML document; an XML schema is itself also an XML document that shall conform with the XML schema for XML schemas

NOTE: See [5], [6] and [7].

**XML namespace:** enables qualifying element and attribute names used in XML documents by associating them with namespaces identified by different XML schemas

NOTE: See [8], in the scope of the present document.

**XML complex type:** defined in an XML schema; cannot be directly used in an XML document; can be the concrete type or the derivation base type for an XML element type or for another XML complex type; ultimately defines constraints for an XML element on its XML attribute specifications and/or its XML content

NOTE: See [5], [6] and [7].

**XML element type:** declared by an XML schema; can be directly used in an XML document; as the concrete type of an XML element, directly or indirectly defines constraints on its XML attribute specifications and/or its XML content; can also be the concrete type or the derivation base type for another XML element type

NOTE: See [5], [6] and [7].

## 3.2 Abbreviations

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

CORBA	Common Object Request Broker Architecture
DTD	Document Type Definition
EDGE	Enhanced Data rates for GSM Evolution
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 resources IRP Solution Set definitions:

- 3GPP Inventory Management (IM) network resources IRP NRM XML definitions (Annex A)

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

---

## Annex A (normative): XML definitions

This annex provides the NRM-specific part related to the Inventory Management NRM IRP IS in 3GPP TS 32.692 [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 Transfer IRP [10].

---

### A.1 Architectural features

The overall architectural feature of Inventory Management NRM IRP IS is specified in 3GPP TS 32.692 [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

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 32.692 [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 32.692 [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 32.692 [1].

```
<?xml version="1.0" encoding="UTF-8"?>

<!--
 3GPP TS 32.696 Inventory Management NRM IRP
 Inventory data file NRM-specific XML schema
 inventoryNrm.xsd
-->

<schema
  targetNamespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.696#inventoryNrm"
  elementFormDefault="qualified"
  xmlns="http://www.w3.org/2001/XMLSchema"
  xmlns:xn=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.626#genericNrm"
  xmlns:in=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.696#inventoryNrm"
>

  <import
    namespace=
"http://www.3gpp.org/ftp/specs/archive/32_series/32.626#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"
                  />
                </all>
            </element>
          </sequence>
        </extension>
      </complexContent>
    </complexType>
  </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"/>

```

```

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 32.692 [1].

```

<?xml version="1.0" encoding="UTF-8"?>
<!--
  3GPP TS 32.696 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/32_series/32.626#genericNrm"
xmlns:in="http://www.3gpp.org/ftp/specs/archive/32_series/32.696#inventoryNrmAlt2"

```

```

targetNamespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.696#inventoryNrmAlt2"
elementFormDefault="qualified">
  <import namespace="http://www.3gpp.org/ftp/specs/archive/32_series/32.626#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="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
05-2010	SA-48	SP-100277	--	--	Presentation to SA for information and approval	---	1.0.0
06-2010	SA-48	--	--	--	Publication	1.0.0	10.0.0
10-2010	SA-49	SP-100489	001	--	Correct the support qualifier of attribute minventoryUnitType and vendorName to be aligned with IS	10.0.0	10.1.0
06-2011	SA-52	SP-110295	002	-	Add missing common RAT inventory	10.1.0	10.2.0
06-2011	SA-52	SP-110290	003	2	Inventory Model Enhancements - SS XML	10.1.0	10.2.0
12-2011	SA-54	SP-110717	004	1	Correct syntax errors in XML schemas inventoryNrmAlt2	10.2.0	10.3.0
12-2011	SA-54	SP-110722	005	1	Correct identifier for InventoryUnitHw	10.2.0	10.3.0
09-2012	SA-57	SP-120563	007	1	Addition of swInstallationTime , swActivationTime and licActivationTime	10.3.0	11.0.0

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# History

<b>Document history</b>		
V11.0.0	October 2012	Publication