



**Universal Mobile Telecommunications System (UMTS);  
LTE;  
Telecommunication management;  
Inventory Management (IM)  
Network Resource Model (NRM)  
Integration Reference Point (IRP);  
Information Service (IS)  
(3GPP TS 28.632 version 16.0.0 Release 16)**



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# Foreword

This Technical Specification has been produced by the 3<sup>rd</sup> 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:

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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

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.

IM actions may be requested to reflect changes initiated by Configuration Management (CM) actions or to make sure that the inventory model is in synch with the actual inventory. IM actions are initiated either as single actions on single NEs of the 3G network or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

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# 1 Scope

The present document specifies the Inventory Management (IM) Network Resource Model (NRM) that can be communicated between an IRP Agent and an IRP Manager for telecommunication network management purposes, including management of converged networks.

The present document specifies the semantics and behaviour of information object class attributes and relations visible across the reference point in a protocol and technology neutral way. It does not define their syntax and encoding.

---

# 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 32.302: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Information Service (IS)".
- [4] 3GPP TS 32.600: "Telecommunication management; Configuration Management (CM); Concept and high-level requirements".
- [5] 3GPP TS 28.662: "Generic Radio Access Network (RAN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".
- [6] 3GPP TS 28.642: "Telecommunication management; Configuration Management (CM); UTRAN network resources Integration Reference Point (IRP): Network Resource Model (NRM)".
- [7] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".
- [8] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and Definitions".
- [9] Void
- [10] 3GPP TS 28.622: "Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".
- [11] 3GPP TS 32.690: "Telecommunication management; Inventory Management (IM): Requirements".
- [12] 3GPP TS 25.466: "UTRAN Iuant interface: Application Part".
- [13] 3GPP TS 23.032: "Universal Geographical Area Description (GAD)".

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [4] and the following apply:

**Association:** See definition in TS 28.622 [10].

**Managed Element (ME):** See definition in TS 28.622 [10].

**Managed Object (MO):** See definition in TS 28.622 [10].

**Management Information Model (MIM):** See definition in TS 28.622 [10].

**Network Resource Model (NRM):** See definition in TS 28.622 [10].

### 3.2 Abbreviations

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

|       |   |
|-------|---|
| DN    | Distinguished Name (see 3GPP TS 32.300 [7])                     |
| IM    | Inventory Management  |
| IOC   | Information Object Class  |
| IRP   | Integration Reference Point                                     |
| ITU-T | International Telecommunication Union, Telecommunication Sector |
| MIM   | Management Information Model                                    |
| MO    | Managed Object  |
| MOC   | Managed Object Class  |
| NE    | Network Element   |
| NM    | Network Manager   |
| NRM   | Network Resource Model  |
| RDN   | Relative Distinguished Name (see 3GPP TS 32.300 [7])            |
| TMN   | Telecommunications Management Network                           |
| UML   | Unified Modelling Language                                      |
| UMTS  | Universal Mobile Telecommunications System                      |
| UTRAN | UMTS Terrestrial Radio Access Network                           |



# 4 Model

## 4.1 Imported information entities and local labels

| Label reference   | Local label     |
|---|-----------------|
| 28.622 [10], Information Object Class, <i>Top</i>             | Top             |
| 28.622 [10], Information Object Class, <i>ManagedElement</i>  | ManagedElement  |
| 28.622 [10], information object class, <i>ManagedFunction</i> | ManagedFunction |

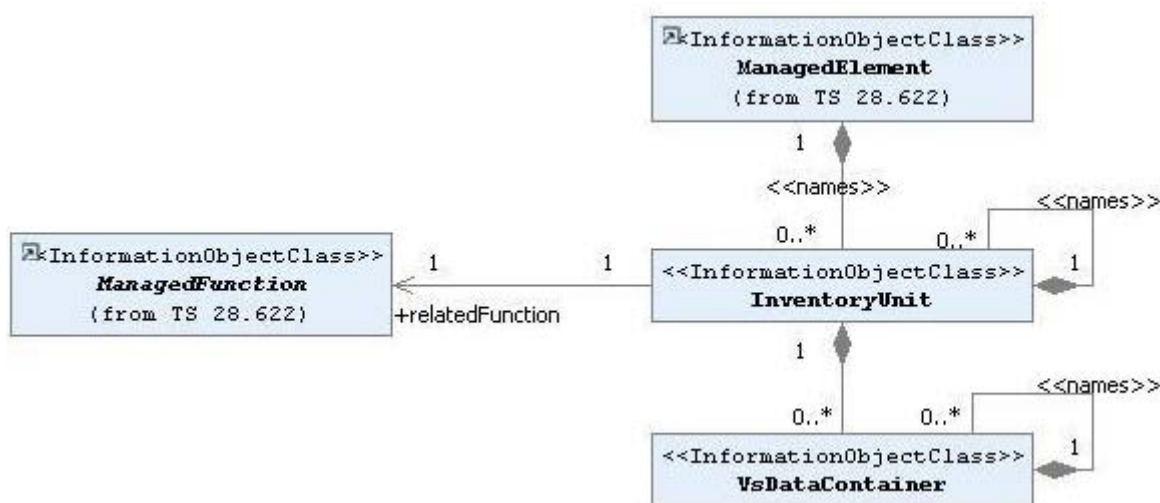
## 4.2 Class diagram

### 4.2.1 Relationships

This clause depicts the set of IOCs that encapsulate information relevant for this service. This clause provides the overview of all information object classes in UML. Subsequent clauses provide more detailed specification of various aspects of these information object classes.

The inventory NRM contains two alternatives for inventory data modeling. Alternative 1 is for NE structure and hardware inventory. Alternative 2 is an extended version for inventory information modeling consisting of NE structure, hardware, software and license data inventory.

Alternative 1, hardware inventory model



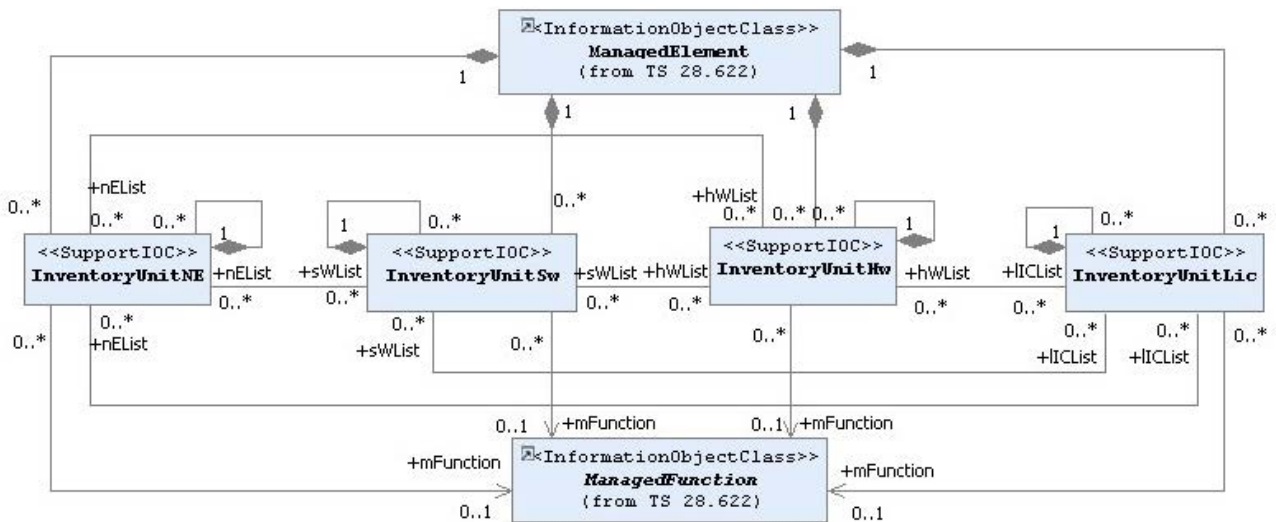
NOTE: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

**Figure 4.2.1-1: Alternative 1 - Inventory Management NRM Containment/Naming and Association diagram**

Each IOC instance is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [7] that expresses its containment hierarchy. As an example, the DN of a IOC representing a InventoryUnit could have a format like:

SubNetwork=Sweden,meContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1,InventoryUnit=Inv-1.

Alternative 2, extended model for hardware, software and licence inventory:



**Figure 4.2.1-2: Alternative 2 - Inventory Management NRM Containment/Naming and Association diagram**

NOTE: Inventory information upload in alternative 2 is done using the FT IRP and related FT IRP notification capabilities

## 4.2.2 Inheritance

This subclause depicts the inheritance relationships that exist between IOCs.

Figure 4.2.2 shows the inheritance hierarchy for the IM NRM.

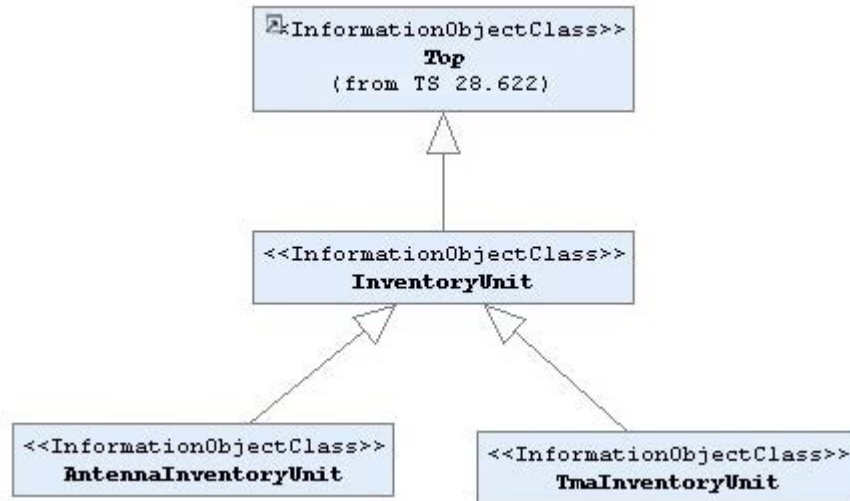


Figure 4.2.2-1: Inventory Management NRM Inheritance Hierarchy

## 4.3 Class definitions

### 4.3.1 InventoryUnit

#### 4.3.1.1 Definition

This IOC represents inventory information for an Inventory Unit.

#### 4.3.1.2 Attributes

| Attribute name                   | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| inventoryUnitType                | M                 | M          | -          | -           | -            |
| vendorUnitFamilyType             | CM                | M          | -          | -           | -            |
| vendorUnitTypeNumber             | CM                | M          | -          | -           | -            |
| versionNumber                    | O                 | M          | -          | -           | -            |
| vendorName                       | M                 | M          | -          | -           | -            |
| serialNumber                     | CM                | M          | -          | -           | -            |
| dateOfManufacture                | O                 | M          | -          | -           | -            |
| dateOfLastService                | O                 | M          | -          | -           | -            |
| unitPosition                     | O                 | M          | -          | -           | -            |
| manufacturerData                 | O                 | M          | -          | -           | -            |
| <b>Attribute related to role</b> |                   |            |            |             |              |
| relatedFunction                  | O                 | M          | -          | -           | -            |

#### 4.3.1.3 Attribute constraints

| Name                                      | Definition                 |
|---|----------------------------|
| vendorUnitFamilyType CM Support Qualifier | The inventory is hardware. |
| vendorUnitTypeNumber CM Support Qualifier | The inventory is hardware. |
| serialNumber CM Support Qualifier         | The inventory is hardware. |

#### 4.3.1.4 Notifications

There is no notification defined.

### 4.3.2 InventoryUnitNE

#### 4.3.2.1 Definition

This SupportIOC represents the logical and physical structure of the NE.

### 4.3.2.2 Attributes

| Attribute name                   | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| neId                             | M                 | M          | -          | -           | -            |
| customerIdentifier               | O                 | M          | -          | -           | -            |
| productName                      | M                 | M          | -          | -           | -            |
| vendorName                       | M                 | M          | -          | -           | -            |
| productType                      | O                 | M          | -          | -           | -            |
| salesUniqueId                    | O                 | M          | -          | -           | -            |
| operatorUniqueName               | O                 | M          | -          | -           | -            |
| siteId                           | O                 | M          | -          | -           | -            |
| additionalInformation            | O                 | M          | -          | -           | -            |
| <b>Attribute related to role</b> |                   |            |            |             |              |
| mFunction                        | O                 | M          | -          | -           | -            |
| lICList                          | O                 | M          | -          | -           | -            |
| hwList                           | O                 | M          | -          | -           | -            |
| sWList                           | O                 | M          | -          | -           | -            |

### 4.3.2.3 Attribute constraints

None.

### 4.3.2.4 Notifications

There is no notification defined.

## 4.3.3 InventoryUnitHw

### 4.3.3.1 Definition

This SupportIOC represents the hardware components.

### 4.3.3.2 Attributes

| Attribute name                   | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| hwId                             | M                 | M          | -          | -           | -            |
| hwType                           | M                 | M          | -          | -           | -            |
| hwName                           | O                 | M          | -          | -           | -            |
| hwVersion                        | M                 | M          | -          | -           | -            |
| vendorName                       | O                 | M          | -          | -           | -            |
| salesUniqueId                    | O                 | M          | -          | -           | -            |
| hwUnitLocation                   | M                 | M          | -          | -           | -            |
| model                            | O                 | M          | -          | -           | -            |
| hwCapability                     | O                 | M          | -          | -           | -            |
| modificationDate                 | O                 | M          | -          | -           | -            |
| manualDataEntry                  | O                 | M          | -          | -           | -            |
| additionalInformation            | O                 | M          | -          | -           | -            |
| <b>Attribute related to role</b> |                   |            |            |             |              |
| mFunction                        | O                 | M          | -          | -           | -            |
| lICList                          | O                 | M          | -          | -           | -            |
| nEList                           | O                 | M          | -          | -           | -            |
| sWList                           | O                 | M          | -          | -           | -            |

#### 4.3.3.3 Attribute constraints

None.

#### 4.3.3.4 Notifications

There is no notification defined.

### 4.3.4 InventoryUnitSw

#### 4.3.4.1 Definition

This SupportIOC represents the software components.

#### 4.3.4.2 Attributes

| Attribute name                   | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| swId                             | M                 | M          | -          | -           | -            |
| swName                           | O                 | M          | -          | -           | -            |
| swVersion                        | O                 | M          | -          | -           | -            |
| vendorName                       | O                 | M          | -          | -           | -            |
| salesUniqueId                    | O                 | M          | -          | -           | -            |
| classification                   | M                 | M          | -          | -           | -            |
| swStatus                         | O                 | M          | -          | -           | -            |
| swInstallationTime               | O                 | M          | -          | -           | -            |
| swActivationTime                 | O                 | M          | -          | -           | -            |
| additionalInformation            | O                 | M          | -          | -           | -            |
| <b>Attribute related to role</b> |                   |            |            |             |              |
| mFunction                        | O                 | M          | -          | -           | -            |
| lICList                          | O                 | M          | -          | -           | -            |
| nEList                           | O                 | M          | -          | -           | -            |
| hWList                           | O                 | M          | -          | -           | -            |

#### 4.3.4.3 Attribute constraints

None.

#### 4.3.4.4 Notifications

There is no notification defined.

### 4.3.5 InventoryUnitLic

#### 4.3.5.1 Definition

This SupportIOC represents the licence components.

### 4.3.5.2 Attributes

| Attribute name                   | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| licId                            | M                 | M          | -          | -           | -            |
| licType                          | O                 | M          | -          | -           | -            |
| vendorName                       | O                 | M          | -          | -           | -            |
| validity                         | O                 | M          | -          | -           | -            |
| key                              | O                 | M          | -          | -           | -            |
| licStatus                        | O                 | M          | -          | -           | -            |
| licActivationTime                | O                 | M          | -          | -           | -            |
| salesUniqueId                    | O                 | M          | -          | -           | -            |
| additionalInformation            | O                 | M          | -          | -           | -            |
| <b>Attribute related to role</b> |                   |            |            |             |              |
| mFunction                        | O                 | M          | -          | -           | -            |
| sWList                           | O                 | M          | -          | -           | -            |
| nEList                           | O                 | M          | -          | -           | -            |
| hWList                           | O                 | M          | -          | -           | -            |

### 4.3.5.3 Attribute constraints

None.

### 4.3.5.4 Notifications

There is no notification defined.

## 4.3.6 TmaInventoryUnit

### 4.3.6.1 Definition

This IOC represents inventory information for a Tower Mounted Amplifier Unit.

### 4.3.6.2 Attributes

| Attribute name                       | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
|--------------------------------------|-------------------|------------|------------|-------------|--------------|
| tmaNumberOfNon-LinearGainValues      | CM                | M          | -          | -           | -            |
| tmaNon-LinearGainValue               | CM                | M          | O          | -           | -            |
| tmaAdditionalDataFieldNumber         | CO                | M          | O          | -           | -            |
| tmaAntennaModelNumber                | CO                | M          | O          | -           | -            |
| tmaAntennaOperatingBands             | CO                | M          | O          | -           | -            |
| tmaBeamwidthForEachOpBandInBandOrder | CO                | M          | O          | -           | -            |
| tmaGainForEachOpBandInBandOrder      | CO                | M          | O          | -           | -            |
| tmaInstallationDate                  | CO                | M          | O          | -           | -            |
| tmaInstallersId                      | CO                | M          | O          | -           | -            |
| tmaMaxSupportedGain                  | CO                | M          | O          | -           | -            |
| tmaMinSupportedGain                  | CO                | M          | O          | -           | -            |

### 4.3.6.3 Attribute constraints

| Name  | Definition                                |
|---|---|
| tmaNumberOfNon-LinearGainValues CM Support Qualifier      | It is supported over the luant interface. |
| tmaNon-LinearGainValue CM Support Qualifier               | It is supported over the luant interface. |
| tmaAdditionalDataFieldNumber CO Support Qualifier         | It is supported over the luant interface. |
| tmaAntennaModelNumber CO Support Qualifier                | It is supported over the luant interface. |
| tmaAntennaOperatingBands CO Support Qualifier             | It is supported over the luant interface. |
| tmaBeamwidthForEachOpBandInBandOrder CO Support Qualifier | It is supported over the luant interface. |
| tmaGainForEachOpBandInBandOrder CO Support Qualifier      | It is supported over the luant interface. |
| tmaInstallationDate CO Support Qualifier                  | It is supported over the luant interface. |
| tmaInstallersId CO Support Qualifier                      | It is supported over the luant interface. |
| tmaMaxSupportedGain CO Support Qualifier                  | It is supported over the luant interface. |
| tmaMinSupportedGain CO Support Qualifier                  | It is supported over the luant interface. |

### 4.3.6.4 Notifications

There is no notification defined.

## 4.3.7 AntennaInventoryUnit

### 4.3.7.1 Definition

This IOC represents inventory information for an Antenna Unit.

### 4.3.7.2 Attributes

| Attribute name   | Support Qualifier | isReadable | isWritable | isInvariant | isNotifiable |
|------------------|-------------------|------------|------------|-------------|--------------|
| maxTiltValue     | CO                | M          | O          | -           | -            |
| minTiltValue     | CO                | M          | O          | -           | -            |
| mechanicalOffset | CO                | M          | O          | -           | -            |
| baseElevation    | CO                | M          | O          | -           | -            |
| latitude         | CO                | M          | O          | -           | -            |
| longitude        | CO                | M          | O          | -           | -            |
| patternLabel     | CO                | M          | O          | -           | -            |

### 4.3.7.3 Attribute constraints

| Name                                  | Definition                                |
|---------------------------------------|---|
| maxTiltValue CO Support Qualifier     | It is supported over the luant interface. |
| minTiltValue CO Support Qualifier     | It is supported over the luant interface. |
| mechanicalOffset CO Support Qualifier | It is supported over the luant interface. |
| baseElevation CO Support Qualifier    | It is supported over the luant interface. |
| latitude CO Support Qualifier         | It is supported over the luant interface. |
| longitude CO Support Qualifier        | It is supported over the luant interface. |
| patternLabel CO Support Qualifier     | It is supported over the luant interface. |



#### 4.3.7.4 Notifications

There is no notification defined.

## 4.4 Attribute definitions

### 4.4.1 Attribute properties

The following table defines the attributes that are present in several Information Object Classes of the present document.

| Attribute Name        | Documentation and Allowed Values  | Properties   |
|-----------------------|---|--|
| baseElevation         | The elevation in meters above sea level at the base of the antenna structure. This value, when subtracted from height (see TS 28.662 [5]), provides the height of the antenna above the ground.<br>Note: The value of this attribute has no operational impact on the network, e.g. the NE behavior is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the luan interface according to Ref. 3GPP TS 25.466 [12].<br><br>allowedValues: An integral value representing a number of meters in 0.1 meter increments. | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |
| additionalInformation | Supplementary information about inventory data (if any)<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| classification        | Name of installed SW (e.g. SW release, SW build, SW patches)<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| customerIdentifier    | Unique identification of a vendors' customer<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| dateOfManufacture     | Date of Manufacture of inventory unit.<br><br>allowedValues: N/A  | type: DateTime<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| dateOfLastService     | Date of last service or repair of inventory unit.<br><br>allowedValues: N/A   | type: DateTime<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| hwCapability          | Hardware capability e.g. capacity, size (empty value is possible)<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| hwName                | Mnemonic of hw inventory unit family type (e.g. Fan, PSU) assigned by vendor.<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| hwType                | Type of the HW unit e.g. equipment holder, carriage<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| hwUnitLocation        | Unique physical / logical location identifier within NE<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |

|                   |   |   |
|-------------------|---|---|
| hwVersion         | Version / revision no. of current unit e.g. firmware version (empty value possible in case no versioning is available)<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True      |
| inventoryUnitId   | An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.<br><br>allowedValues: N/A | type: DN<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True          |
| inventoryUnitType | Type of inventory unit (see TS 32.690 [11])<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True      |
| key               | License activation key according to the used licensing system<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True      |
| licActivationTime | It indicates the date and time when the license was activated.<br><br>allowedValues: All values indicating valid time.  | type: DateTime<br>multiplicity: 0..1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| licId             | Unique identifier of a license (e.g. name, code)<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True      |
| licStatus         | License status – applicable only for managed licenses (e.g. scheduled, valid, expired, invalid, capacity violated)<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True      |
| licType           | Describing type of current license (e.g. capacity, particular feature, no. of subscribers)<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True      |
| manualDataEntry   | Indicates whether unit is passive (manual insertion of inventory data is needed) or active (inventory data can be read from the unit)<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True      |

|                    |  |  |
|--------------------|--|--|
| latitude           | <p>The latitude of the antenna location based on World Geodetic System (1984 version) global reference frame (WGS 84). Positive values correspond to the northern hemisphere.</p> <p>Note: The value of this attribute has no operational impact on the network, e.g. the NE behavior is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the luan interface according to Ref. 3GPP TS 25.466 [12].</p> <p>allowedValues: Valid values described in 3GPP TS 23.032 [13].</p>              | <p>type: Real<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>     |
| longitude          | <p>The longitude of the antenna location based on World Geodetic System (1984 version) global reference frame (WGS 84). Positive values correspond to degrees east of 0 degrees longitude.</p> <p>Note: The value of this attribute has no operational impact on the network, e.g. the NE behavior is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the luan interface according to Ref. 3GPP TS 25.466 [12].</p> <p>allowedValues: Valid values described in 3GPP TS 23.032 [13].</p> | <p>type: Real<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>     |
| manufacturerData   | <p>Manufacturer specific data of inventory unit.</p> <p>allowedValues: N/A</p>   | <p>type: DateTime<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p> |
| model              | <p>Equipment configuration, e.g. standard hardware unit or a variant that may contain additional disk capacity (empty value possible)</p> <p>allowedValues: N/A</p>  | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| modificationDate   | <p>Date/time stamp of last change (e.g. repair action)</p> <p>allowedValues: N/A</p>   | <p>type: DateTime<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p> |
| neId               | <p>Vendor defined unique identifier of a logical or physical network element unit</p> <p>allowedValues: N/A</p>  | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| operatorUniqueName | <p>Unique NE identifier used by operator</p> <p>allowedValues: N/A</p>   | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| productName        | <p>NE name classifying a vendor's product family or function</p> <p>allowedValues: N/A</p>   | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |

|                  |  |   |
|------------------|--|---|
| productType      | Identifier of the e.g. platform, in case the product can be based on different HW/SW platforms (not used for logical NEs)<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |
| salesUniqueId    | Unique identifier used by vendor (used e.g. for ordering a new unit)<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |
| hwId             | Hardware identifier allocated by the vendor, e.g. the serial number<br><br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |
| maxTiltValue     | The maximum amount of tilt the RET system can support. Note: See "Maximum supported tilt" in Ref. 3GPP TS 25.466 [12].<br><br>allowedValues: N/A   | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| mechanicalOffset | This is a value representing a non-adjustable tilt value, which is imparted to the antenna due to the physical installation.<br>The actual tilt at any point in time is the summation of mechanicalOffset and retTiltValue.<br>Note: The value of this attribute has no operational impact on the network, e.g. the NE behavior is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the lunt interface according to Ref. 3GPP TS 25.466 [12].<br>A single integral value corresponding to an angle in degrees between 0 and 360 with a resolution of 0.1 degrees.<br><br>allowedValues: N/A | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| minTiltValue     | The minimum amount of tilt the RET system can support. Note: See "Minimum supported tilt" in Ref. 3GPP TS 25.466 [12].<br><br>allowedValues: N/A   | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| patternLabel     | The pattern name is a textual, alpha-numeric string to allow identification of the antenna pattern along with the antenna vendor information such as model number, etc.<br>Note: The value of this attribute has no operational impact on the network, e.g. the NE behavior is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the lunt interface according to Ref. 3GPP TS 25.466 [12].<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |
| serialNumber     | Serial number of inventory unit.<br><br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |

|                              |   |  |
|------------------------------|---|--|
| siteId                       | NE site in customer network<br>allowedValues: N/A   | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |
| swActivationTime             | It indicates the date and time when the software was activated.<br>allowedValues: All values indicating valid time.   | type: DateTime<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| swId                         | Unique identifier of a SW unit<br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| swName                       | Software release name used<br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| swInstallationTime           | It indicates the date and time when the software installation process ended and the software was installed.<br>allowedValues: All values indicating valid time.   | type: DateTime<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| swStatus                     | Status of the SW unit (e.g. installed, archived)<br>allowedValues: N/A  | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| swVersion                    | Version identifier of the software unit<br>allowedValues: N/A   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| tmaAdditionalDataFieldNumber | This attribute identifies a standard data field which has no operational impact. Used by the procedures SetDeviceData and GetDeviceData. Defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12]. | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |
| tmaAntennaModelNumber        | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12].   | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| tmaAntennaOperatingBands     | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12].   | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True  |

|                                      |   |   |
|--------------------------------------|---|---|
| tmaBeamwidthForEachOpBandInBandOrder | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12]. | type: BitString<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| tmaGainForEachOpBandInBandOrder      | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12]. | type: BitString<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True |
| tmaInstallationDate                  | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12]. | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True    |
| tmaInstallersId                      | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12]. | type: String<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True    |
| tmaMaxSupportedGain                  | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12]. | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| tmaMinSupportedGain                  | A data field defined in Table B.3 of 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12]. | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| tmaNon-LinearGainValue               | Defined in 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12].                           | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |
| tmaNumberOfNon-LinearGainValues      | Defined in 3GPP TS 25.466 [12].<br>allowedValues: See TS 25.466 [12].                           | type: Integer<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True   |



|                                  |  |  |
|----------------------------------|--|--|
| unitPosition                     | <p>Position of inventory unit (e.g. Rack, shelf, slot, etc.).</p> <p>Depending on the implementation of the inventory unit in the managed system, the value and meaning of this attribute may vary.</p> <p>For example, if a system has three levels and types of inventory units representing Rack, Shelf and Slot respectively (i.e. the Managed Element contains multiple Rack inventory units, each Rack inventory unit contains multiple Shelf inventory units and each Shelf inventory unit contains multiple Slot inventory units), then for this example:</p> <ul style="list-style-type: none"> <li>- for the Inventory Unit representing a Rack, the Frame Identification code may be used as the value of this attribute;</li> <li>- for the Inventory Unit representing a Shelf, the Rack Shelf code may be used as the value of this attribute;</li> <li>- for the Inventory Unit representing a Slot, the position code may be used as the value of this attribute.</li> </ul> <p>allowedValues: N/A</p> | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| validity                         | <p>License validity which may include one of the elements duration, end (expiration date) or forever</p> <p>allowedValues: N/A</p>   | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| vendorName                       | <p>Name of inventory unit vendor (or vendors may provide manufacturer name)</p> <p>allowedValues: N/A</p>  | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| vendorUnitFamilyType             | <p>Mnemonic of inventory unit family type (e.g. Fan, PSU) assigned by vendor.</p> <p>allowedValues: N/A</p>  | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| vendorUnitTypeNumber             | <p>A vendor/manufacturer defined and assigned number which uniquely identifies the unit type and optionally for backward compatibility reasons only, also version (used for replacing HW units, spares).</p> <p>allowedValues: N/A</p>   | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| versionNumber                    | <p>The version information related to vendorUnitTypeNumber.</p> <p>allowedValues: N/A</p>  | <p>type: String<br/>multiplicity: 1<br/>isOrdered: N/A<br/>isUnique: N/A<br/>defaultValue: None<br/>isNullable: True</p>   |
| <b>Attribute related to role</b> |  |  |
| hwList                           | <p>This attribute carries the set of DN(s) of related InventoryUnitHw(s).</p> <p>allowedValues: N/A</p>  | <p>type: DN<br/>multiplicity: 1..*<br/>isOrdered: False<br/>isUnique: True<br/>defaultValue: None<br/>isNullable: True</p> |

|                 |   |  |
|-----------------|---|--|
| lICList         | This attribute carries the set of DN(s) of related InventoryUnitLic(s).<br><br>allowedValues: N/A | type: DN<br>multiplicity: 1..*<br>isOrdered: False<br>isUnique: True<br>defaultValue: None<br>isNullable: True |
| mFunction       | This attribute carries the DN of related ManagedFunction.<br><br>allowedValues: N/A               | type: DN<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True       |
| nEList          | This attribute carries the set of DN(s) of related InventoryUnitNE(s).<br><br>allowedValues: N/A  | type: DN<br>multiplicity: 1..*<br>isOrdered: False<br>isUnique: True<br>defaultValue: None<br>isNullable: True |
| relatedFunction | This attribute carries the DN of related ManagedFunction.<br><br>allowedValues: N/A               | type: DN<br>multiplicity: 1<br>isOrdered: N/A<br>isUnique: N/A<br>defaultValue: None<br>isNullable: True       |
| sWList          | This attribute carries the set of DN(s) of related InventoryUnitSw(s).<br><br>allowedValues: N/A  | type: DN<br>multiplicity: 1..*<br>isOrdered: False<br>isUnique: True<br>defaultValue: None<br>isNullable: True |

#### 4.4.2 Constraints

None.

### 4.5 Common notifications

#### 4.5.1 Alarm notifications

None.

#### 4.5.2 Configuration notifications

None.

## Annex A (informative): Change history

| Date    | TSG # | TSG Doc.  | CR  | Rev | Subject/Comment                                    | Old    | New           |
|---------|-------|-----------|-----|-----|--|--------|---------------|
| 2014-06 | SA#64 | SP-140358 | 001 | -   | remove the feature support statements              | 11.0.  | 11.1.0        |
| 2014-09 | -     | -         | -   | -   | Update to Rel-12 version (MCC)                     | 11.1.0 | <b>12.0.0</b> |
| 2014-10 | -     | -         | -   | -   | Editorial correction: removal of hidden text (MCC) | 12.0.0 | <b>12.0.1</b> |
| 2016-01 | -     | -         | -   | -   | Update to Rel-13 version (MCC)                     | 12.0.1 | <b>13.0.0</b> |
| 2017-03 | SA#75 | -         | -   | -   | Promotion to Release 14 without technical change   | 13.0.0 | <b>14.0.0</b> |

| Change history |         |           |      |     |     |                                |               |
|----------------|---------|-----------|------|-----|-----|--------------------------------|---------------|
| Date           | Meeting | TDoc      | CR   | Rev | Cat | Subject/Comment                | New version   |
| 2018-01        | SA#78   | SP-170964 | 0004 | 1   | F   | Remove unused reference        | 14.1.0        |
| 2018-06        | -       | -         | -    | -   | -   | Update to Rel-15 version (MCC) | <b>15.0.0</b> |
| 2020-07        | -       | -         | -    | -   | -   | Update to Rel-16 version (MCC) | <b>16.0.0</b> |

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# History

| <b>Document history</b> |             |             |
|-------------------------|-------------|-------------|
| V16.0.0                 | August 2020 | Publication |
|                         |             |             |
|                         |             |             |
|                         |             |             |
|                         |             |             |