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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);
Information Service (IS)
(Release 11)**



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Keywords

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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.

Ready for Converged Management

This specification is part of a set that has been developed for converged management solutions.

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.

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.

1 Scope

The present document specifies the Inventory Management (IM) Network Resource Model (NRM) that can be communicated between an IRPAgent and an IRPManager 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] 3GPP TS 32.151: "Telecommunication management; Integration Reference Point (IRP) Information Service (IS) template".
- [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)".

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> | <i>Top</i> |
| 28.622 [10], Information Object Class, <i>ManagedElement</i> | <i>ManagedElement</i> |
| 28.622 [10], information object class, <i>ManagedFunction</i> | <i>ManagedFunction</i> |

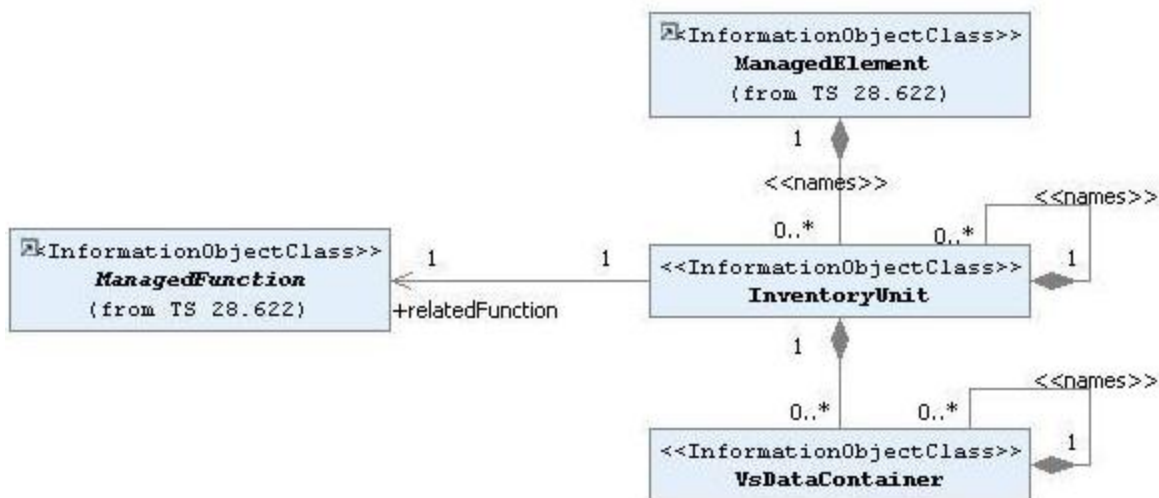
4.2 Class diagram

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:

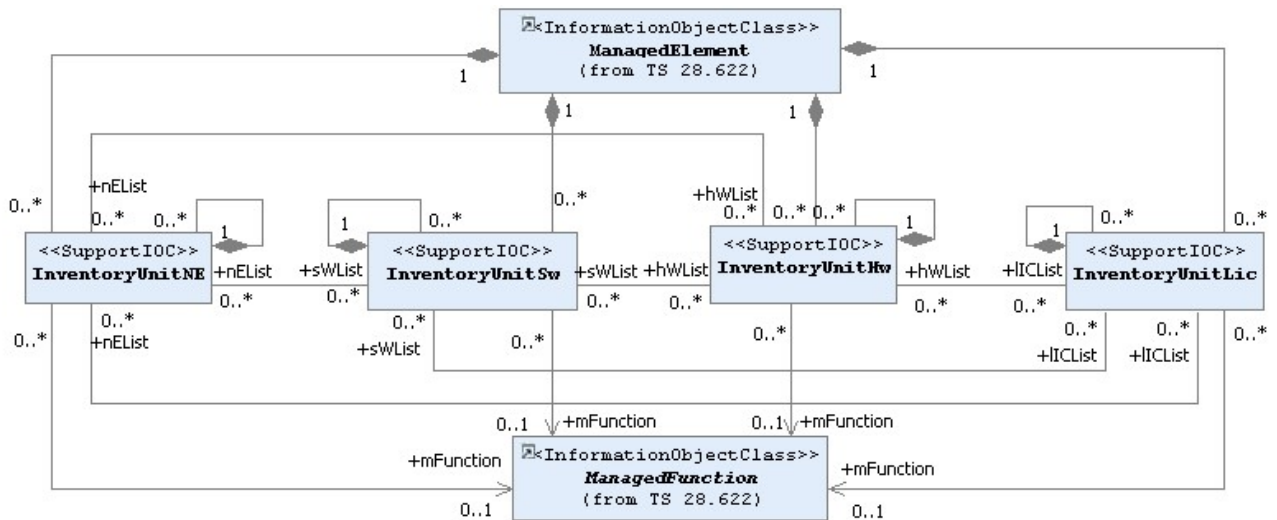


Figure 4.2.1-2: Alternative 2 - Inventory Management NRM Containment/Naming and Association diagram

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.

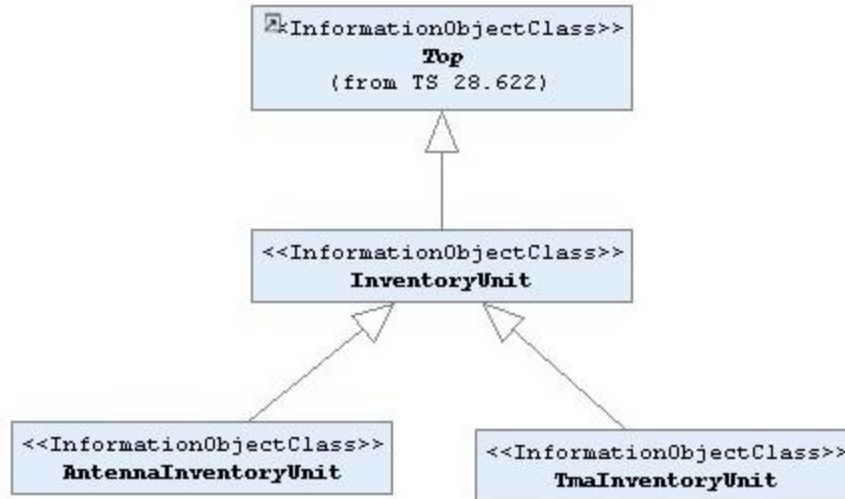


Figure 4.2.2-1: Inventory Management NRM Inheritance Hierarchy

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 | isNotifiable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| 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 | - | - | - |
| Attribute related to role | | | | | |
| 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 | isNotifiable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| 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 | - | - | - |
| Attribute related to role | | | | | |
| 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 | isNotifiable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| 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 | - | - | - |
| Attribute related to role | | | | | |
| 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 | isNotifiable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| 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 | - | - | - |
| Attribute related to role | | | | | |
| 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 | isNotifiable |
|----------------------------------|-------------------|------------|------------|-------------|--------------|
| 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 | - | - | - |
| Attribute related to role | | | | | |
| 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 | isNotifiable |
|--------------------------------------|-------------------|------------|------------|-------------|--------------|
| 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. 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]. allowedValues: An integral value representing a number of meters in 0.1 meter increments. | type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| additionalInformation | Supplementary information about inventory data (if any) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| classification | Name of installed SW (e.g. SW release, SW build, SW patches) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| customerIdentifier | Unique identification of a vendors' customer allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| dateOfManufacture | Date of Manufacture of inventory unit. allowedValues: N/A | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| dateOfLastService | Date of last service or repair of inventory unit. allowedValues: N/A | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| hwCapability | Hardware capability e.g. capacity, size (empty value is possible) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| hwName | Mnemonic of hw inventory unit family type (e.g. Fan, PSU) assigned by vendor. allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |

| | | |
|-------------------|---|---|
| hwType | Type of the HW unit e.g. equipment holder, carriage allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| hwUnitLocation | Unique physical / logical location identifier within NE allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| hwVersion | Version / revision no. of current unit e.g. firm ware version (empty value possible in case no versioning is available) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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. allowedValues: N/A | type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| inventoryUnitType | Type of inventory unit (see TS 32.690 [11]) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| key | License activation key according to the used licensing system allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| licActivationTime | It indicates the date and time when the license was activated. allowedValues: All values indicating valid time. | type: DateTime multiplicity: 0..1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| licId | Unique identifier of a license (e.g. name, code) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| licStatus | License status – applicable only for managed licenses (e.g. scheduled, valid, expired, invalid, capacity violated) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| licType | Describing type of current license (e.g. capacity, particular feature, no. of subscribers) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| latitude | 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. 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]. allowedValues: Valid values described in 3GPP TS 23.032 [13]. | type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| longitude | 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. 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]. allowedValues: Valid values described in 3GPP TS 23.032 [13]. | type: Real multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| manufacturerData | Manufacturer specific data of inventory unit. allowedValues: N/A | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| model | Equipment configuration, e.g. standard hardware unit or a variant that may contain additional disk capacity (empty value possible) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| modificationDate | Date/time stamp of last change (e.g. repair action) allowedValues: N/A | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| neId | Vendor defined unique identifier of a logical or physical network element unit allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| operatorUniqueName | Unique NE identifier used by operator allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |

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| productName | NE name classifying a vendor's product family or function allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| productType | Identifier of the e.g. platform, in case the product can be based on different HW/SW platforms (not used for logical NEs) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| salesUniqueId | Unique identifier used by vendor (used e.g. for ordering a new unit) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| hwId | Hardware identifier allocated by the vendor, e.g. the serial number allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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]. allowedValues: N/A | type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| mechanicalOffset | This is a value representing a non-adjustable tilt value, which is imparted to the antenna due to the physical installation. The actual tilt at any point in time is the summation of <code>mechanicalOffset</code> and <code>retTiltValue</code> . 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]. A single integral value corresponding to an angle in degrees between 0 and 360 with a resolution of 0.1 degrees. allowedValues: N/A | type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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]. allowedValues: N/A | type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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. 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]. allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |

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| serialNumber | Serial number of inventory unit. allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| siteId | NE site in customer network allowedValues: N/A | type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| swActivationTime | It indicates the date and time when the software was activated. allowedValues: All values indicating valid time. | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| swId | Unique identifier of a SW unit allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| swName | Software release name used allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| swInstallationTime | It indicates the date and time when the software installation process ended and the software was installed. allowedValues: All values indicating valid time. | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| swStatus | Status of the SW unit (e.g. installed, archived) allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| swVersion | Version identifier of the software unit allowedValues: N/A | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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]. allowedValues: See TS 25.466 [12]. | type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| tmaAntennaModelNumber | A data field defined in Table B.3 of 3GPP TS 25.466 [12]. allowedValues: See TS 25.466 [12]. | type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |

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

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| 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"> – for the Inventory Unit representing a Rack, the Frame Identification code may be used as the value of this attribute; – for the Inventory Unit representing a Shelf, the Rack Shelf code may be used as the value of this attribute; – for the Inventory Unit representing a Slot, the position code may be used as the value of this attribute. <p>allowedValues: N/A</p> | <p>type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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 multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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 multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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 multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None 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 multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True</p> |
| versionNumber | <p>The version information related to vendorUnitTypeNumber.</p> <p>allowedValues: N/A</p> | <p>type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True</p> |
| Attribute related to role | | |
| hwList | <p>This attribute carries the set of DN(s) of related InventoryUnitHw(s).</p> <p>allowedValues: N/A</p> | <p>type: DN multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True</p> |

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| lICList | This attribute carries the set of DN(s) of related InventoryUnitLic(s). allowedValues: N/A | type: DN multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True |
| mFunction | This attribute carries the DN of related ManagedFunction. allowedValues: N/A | type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| nEList | This attribute carries the set of DN(s) of related InventoryUnitNE(s). allowedValues: N/A | type: DN multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True |
| relatedFunction | This attribute carries the DN of related ManagedFunction. allowedValues: N/A | type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True |
| sWList | This attribute carries the set of DN(s) of related InventoryUnitSw(s). allowedValues: N/A | type: DN multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None 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 |
|---------|-------|----------|----|-----|---------------------------------------|-------|--------|
| 2012-10 | | | | | | --- | 0.0.0 |
| 2012-12 | SA#58 | | | | Draft sent for Information & Approval | | 1.0.0 |
| 2012-12 | | | | | New version after approval | 1.0.0 | 11.0.0 |