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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management; as identified below:

28.661: Generic Radio Access Network (RAN) Network Resource Model (NRM); Integration Reference Point (IRP); Requirements;

28.662: Generic Radio Access Network (RAN) Network Resource Model (NRM); Integration Reference Point (IRP); Information Service (IS);

28.663: Generic Radio Access Network (RAN) Network Resource Model (NRM); Integration Reference Point (IRP); Solution Set (SS) definitions.

1 Scope

The present document specifies the Generic Radio Access Network (RAN) network resource model (NRM) that can be communicated between an IRPAgent and an IRPManager for telecommunication network management purposes, including management of converged networks.

This 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.

In order to access the information defined by this NRM, an Interface IRP such as the "Basic CM IRP" is needed (3GPP TS 32.602 [5]). However, which Interface IRP is applicable is outside the scope of the present document.

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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".

[3] 3GPP TS 32.102: "Telecommunication management; Architecture".

[4] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and definitions".

[5] 3GPP TS 32.602: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP) ; Information Service (IS)".

[6] Void.

[7] 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E_UTRA); Base Station (BS) radio transmission and reception".

[8] Void.

[9] Void.

[10] 3GPP TS 28.661: "Telecommunication management; Generic Radio Access Network (RAN) Network Resource Model (NRM) Integration Reference Point (IRP); Requirements".

[11] 3GPP TS 32.111-2: "Telecommunication management; Fault Management; Part 2: Alarm Integration Reference Point (IRP): Information Service (IS)".

[12] 3GPP TS 28.652: "Telecommunication management; Universal Terrestrial Radio Access Network (UTRAN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS) ".

[13] 3GPP TS 28.658: "Telecommunication management; Evolved Universal Terrestrial Radio Access Network (E-UTRAN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[14] 3GPP TS 28.655:"Telecommunication management; GSM/EDGE Radio Access Network (GERAN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[15] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[16] 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Information Service (IS)".

[17] 3GPP TS 32.662: "Telecommunication management; Configuration Management (CM); Kernel CM Information Service (IS)".

[18] 3GPP TS 25.106: "Technical Specification Group Radio Access Network; UTRA repeater radio transmission and reception".

[19] 3GPP TS 45.005: "Radio transmission and reception".

[20] 3GPP TS 45.010: "Radio subsystem synchronization".

[21] 3GPP TS 25.104: "Base Station (BS) radio transmission and reception (FDD)".

[22] 3GPP TS 25.105: "Base Station (BS) radio transmission and reception (TDD)".

[23] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[24] 3GPP TS 28.541: "NR and NG-RAN Network Resource Model (NRM) stage 2 and stage 3".

[25] 3GPP TS 28.652: "UTRAN Network Resource Model (NRM) Integration Reference Point (IRP): Information Service (IS)".

[26] 3GPP TS 37.466: "Iuant Interface: Application Part".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the definitions given in TR 21.905 [1], TS 32.150 [4], TS 32.101 [2], TS 32.102 [3] and the following apply. The definitions defined in the present document take precedence over those, if any, in TS 32.150 [4], TS 32.101 [2], TS 32.102 [3] and TR 21.905 [1], in that order.

Network Resource Model (NRM): See definition in TS 28.622 [15].

3.2 Abbreviations

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

CM	Configuration Management
DN	Distinguished Name
IOC	Information Object Class
RDN	Relative Distinguished Name
SS	Solution Set

4 Model

4.1 Imported information entities and local labels

Label reference	Local label
3GPP TS 28.622 [15], IOC, ManagedFunction	ManagedFunction
3GPP TS 28.652 [12], IOC, UtranGenericCell	UtranGenericCell
3GPP TS 28.658 [13], IOC, EUtranGenericCell	EUtranGenericCell
3GPP TS 28.655 [14], IOC, GSMCell	GSMCell
3GPP TS 28.541 [24], IOC, NRSectorCarrier	NRSectorCarrier
3GPP TS 28.541 [24], IOC, NRCellDU	NRCellDU
3GPP TS 28.658 [13], IOC, ENBFunction	ENBFunction
3GPP TS 28.652 [25], IOC, NodeBFunction	NodeBFunction
3GPP TS 28.655 [14], IOC, BssFunction	BssFunction

4.2 Class diagrams

4.2.1 Relationships

This subclause depicts the set of classes (e.g. IOCs) that encapsulates the information relevant for this IRP. This subclause provides the overview of the relationships of relevant classes in UML. Subsequent subclauses provide more detailed specification of various aspects of these classes.

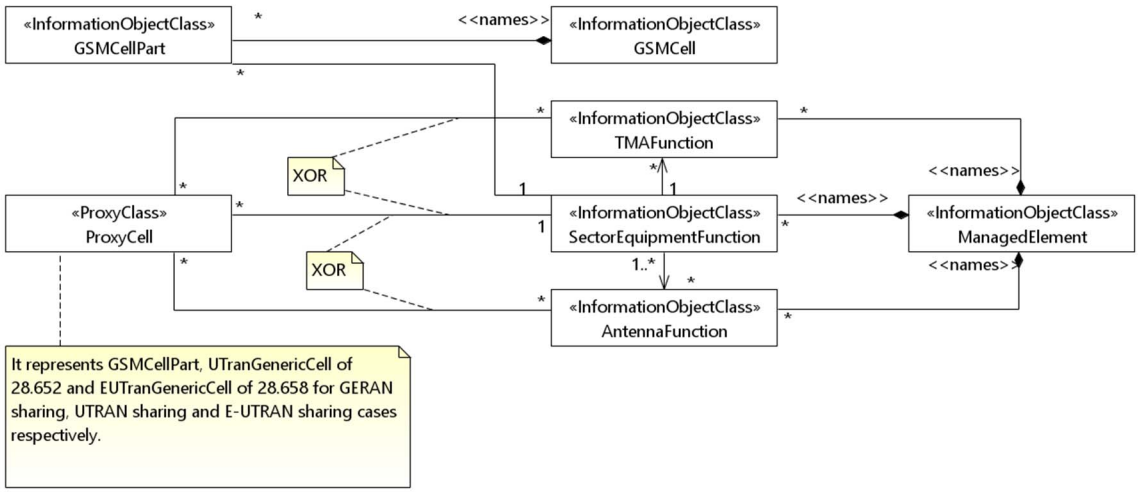

Figure 4.2.1.1: UTRAN/E-UTRAN/NR/GERAN sharing (1/2)

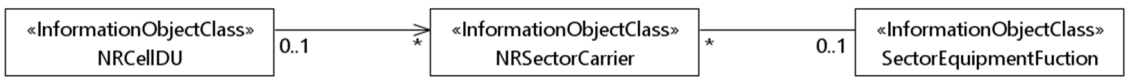

Figure 4.2.1.2: UTRAN/E-UTRAN/NR/GERAN sharing (2/2)

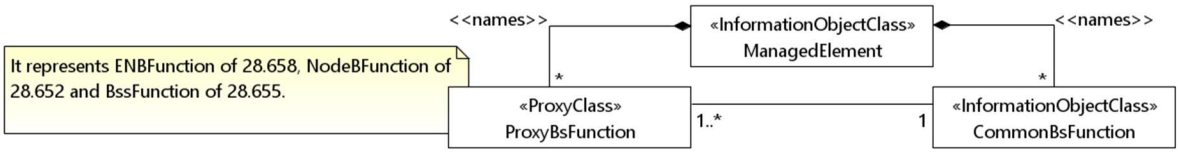

Figure 4.2.1.3: CommonBsFunction NRM fragment

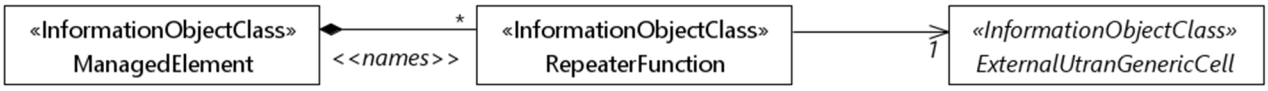

Figure 4.2.1.4: RepeaterFunction NRM fragment

Figure 4.2.1.5: RepeaterFunction related VsDataContainer Containment/Naming and Association diagram

4.2.2 Inheritance

This subclause depicts the inheritance relationships.

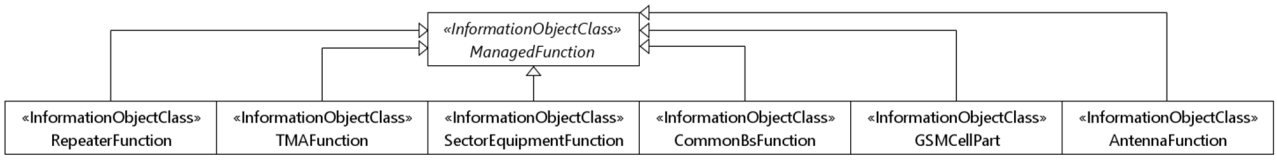

Figure 4.2.2.1: Inheritance diagram (1/2)

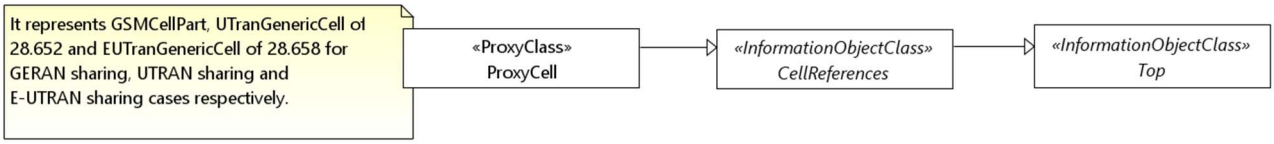

Figure 4.2.21.2: Inheritance diagram (2/2)

4.3 Class definitions

4.3.1 SectorEquipmentFunction

4.3.1.1 Definition

This IOC represents a set of cells within a geographical area that has common functions relating to AntennaFunction, TMAFunction and supporting equipment, such as power amplifier.

This IOC is required as part of the capability to satisfy the Requirements statement identified below.

Referenced TS	Requirement label	Comment
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-001	
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-002	

4.3.1.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
fqBand	CM	T	F	F	T
eUTRANFqBands	CM	T	F	F	T
nRFqBands	CM	T	F	F	T
uTRANFDDFqBands	CM	T	F	F	T
uTRANTDDFqBands	CM	T	F	F	T
confOutputPower	O	T	T	F	F
Attribute related to role					
theTMAList	CM	T	F	F	T
theAntennaList	CM	T	F	F	T
theCellList	CM	T	F	F	T
theNRSectorCarrierList	CM	T	F	F	T

4.3.1.3 Attribute constraints

Name	Definition
fqBand CM Support Qualifier	Condition: EUTRAN is supported, and only one EUTRAN frequency band is supported, and eUTRANFqBands is not used.
eUTRANFqBands CM Support Qualifier	Condition: EUTRAN is supported, and fqBand is not used.
nRFqBands CM Support Qualifier	Condition: NR is supported.
uTRANFDDFqBands CM Support Qualifier	Condition: UTRAN FDD is supported.
uTRANTDDFqBands CM Support Qualifier	Condition: UTRAN TDD is supported.

theTMAList CM Support Qualifier	Condition: Association between SectorEquipmentFunction and AntennaFunction is absent AND is supporting the UTRAN/E-UTRAN sharing/non-sharing case OR is supporting the GERAN sharing case. In such case, at least one TMAFunction is present.
theAntennaList CM Support Qualifier	Condition: Association between SectorEquipmentFunction and TMAFunction is absent AND is supporting the UTRAN/E-UTRAN sharing/non-sharing OR is supporting GERAN sharing case. In such case, at least one AntennaFunction is present.
theCellList CM Support Qualifier	Condition: Supporting UTRAN/E-UTRAN sharing (and non-sharing) cases. In such case, at least one *UtranGenericCell*/*EUtranGenericCell* is present. Condition: Supporting the GERAN sharing case. In such case, at least one GSMCellPart is present.
theNRSectorCarrierList CM Support Qualifier	Condition: Supporting NR sharing and non-sharing cases. In such cases, at least one NRSectorCarrier is present.

4.3.1.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.3.2 AntennaFunction

4.3.2.1 Definition

This IOC represents an array of radiating elements that may be tilted to adjust the RF coverage of a cell(s).

This IOC is required as part of the capability to satisfy the Requirements statement identified below.

Referenced TS	Requirement label	Comment
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-001	
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-002	

4.3.2.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	IsNotifyable
retTiltValue	O	T	T	F	T
bearing	O	T	T	F	T
retGroupName	O	T	T	F	T
height	O	T	T	F	T
maxAzimuthValue	O	T	T	F	T
minAzimuthValue	O	T	T	F	T
horizBeamwidth	O	T	T	F	T
vertBeamwidth	O	T	T	F	T
Attribute related to role					
theCellList	CM	T	F	F	T

4.3.2.3 Attribute constraints

Name	Definition
theCellList CM Support Qualifier	Condition: Association between SectorEquipmentFunction and ProxyCell is absent; and association SectorEquipmentFunction and NRSectorCarrier is absent..

4.3.2.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.3.3 TMAFunction

4.3.3.1 Definition

This IOC represents a Tower Mounted Amplifier or a number of TMA subunits within one TMA, each separately addressable by a specific index at the application layer.

This IOC is required as part of the capability to satisfy the Requirements statement identified below.

Referenced TS	Requirement label	Comment
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-001	
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-002	

4.3.3.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
tmaSubunitNumber	M	T	T	F	T
tmaStateFlag	M	T	O	F	T
tmaFunctionFlag	M	T	T	F	T
tmaMinGain	M	T	F	F	T
tmaMaxGain	M	T	F	F	T
tmaResolution	M	T	F	F	T
tmaGainFigure	M	T	O	F	T
tmaNumberOfSubunits	M	T	F	F	T
tmaBaseStationId	CO	T	CO	F	T
tmaSectorId	CO	T	CO	F	T
tmaAntennaBearing	CO	T	CO	F	T
tmaInstalledMechanicalTilt	CO	T	CO	F	T
tmaSubunitType	CO	T	CO	F	T
tmaSubunitRxFrequencyBand	CO	T	CO	F	T
tmaSubunitTxFrequencyBand	CO	T	CO	F	T
tmaGainResolution	CO	T	CO	F	T
Attribute related to role					
theCellList	CM	T	F	F	T

4.3.3.3 Attribute Constraints

Name	Definition
theCellList CM Support Qualifier	Condition: Association between SectorEquipmentFunction and ProxyCellList is absent ; and association between SectorEquipmentFunction and NRSectorCarrier is absent.

Name	Definition
The CO support qualifier of the attributes tmaBaseStationId through tmaGainResolution	Condition: The TMA subunit supports the read operation in 3GPP TS 37.466 [26]
The CO write qualifier of the attributes tmaBaseStationId through tmaGainResolution	Condition: The TMA subunit supports the write operation in 3GPP TS 37.466 [26]

4.3.3.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.3.4 GSMCellPart

4.3.4.1 Definition

A GSM cell can consist of a number of carriers. These carriers can be configured in a number of ways, for example, the carriers can have different propagation properties which are sent with different antenna tilt, with different RF power, different radio band and even possibly different antenna.

The various GSMCellPart instances capture different radio propagation properties allowing different frequency planning schemes, e.g. some GSMCellPart instances can use frequency groups planned for tighter frequency reuse.

Hence, a GSM cell can, and in some cases must, be distributed on more than one SectorEquipmentFunction.

This IOC is required as part of the capability to satisfy the Requirements statement identified below.

Referenced TS	Requirement label	Comment
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-001	
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-002	

4.3.4.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	IsNotifyable
aRFCN	M	T	T	F	T
tsc	M	T	T	F	T
aTA	M	T	T	F	T
Attribute related to role					
theSectorEquipment	M	T	F	F	T

4.3.4.3 Attribute constraints

None

4.3.4.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.3.5 CommonBsFunction

4.3.5.1 Definition

This IOC represents common aspects of Base Station (BS) functionality shared by several radio access technologies.

Referenced TS	Requirement label	Comment
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-001	
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-002	

4.3.5.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
sharedTechnologies	M	T	O	F	T
Attribute related to role					
theProxyBsList	M	T	F	F	T

4.3.5.3 Attribute constraints

None

4.3.5.4 Notifications

There is no notification defined.

4.3.6 *CellReferences*

4.3.6.1 Definition

This IOC represents the three references to TMAFunction, SectorEquipmentFunction and AntennaFunction. The references are used by various classes of cells, e.g. *UtranGenericCell*.

This is an abstract class.

4.3.6.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
Attribute related to role					
relatedSectorEquipment	CM	T	F	F	T
relatedTMAList	CM	T	F	F	T
relatedAntennaList	CM	T	F	F	T

4.3.6.3 Attribute constraints

Name	Definition
relatedSectorEquipment CM Support Qualifier	Condition: Supporting the GERAN sharing case. In such case, there shall be at least one GSMCellPart present at one end of this association.
relatedAntennaList CM Support Qualifier	Condition: Association between SectorEquipmentFunction and ProxyCell is absent.
relatedTMAList CM Support Qualifier	Condition: Association between SectorEquipmentFunction and ProxyCell is absent.

4.3.6.4 Notifications

There is no notification defined.

4.3.7 RepeaterFunction

4.3.7.1 Definition

This IOC represents the management aspect of a repeater. For the information on repeater see 3GPP TS 25.106 [18].

This IOC is required as part of the capability to satisfy the Requirements statement identified below.

Referenced TS	Requirement label	Comment
3GPP TS 28.661 [10]	REQ-GRAN_NRM-CON-003	

4.3.7.2 Attributes

Attribute name	Support Qualifier	isReadable	isWritable	isInvariant	isNotifyable
priority	M	T	T	F	T
latitude	M	T	F	F	F
longitude	M	T	F	F	F
ctrlConnMode	M	T	T	F	T
environmentInfo	M	T	-	F	-
powerSwitch	M	T	T	F	T
ulAttenuation	M	T	T	F	T
dlAttenuation	M	T	T	F	T
firmwareVer	M	T	F	F	F
repeaterType	M	T	F	F	F

Attribute related to role					
externalUTRANCell	M	T	F	F	T

4.3.7.3 Attribute constraints

None.

4.3.7.4 Notifications

The common notifications defined in subclause 4.5 are valid for this IOC, without exceptions or additions.

4.3.8 ProxyCell <<ProxyClass>>

4.3.8.1 Definition

This IOC represents GSMCellPart, UTranGenericCell and EUtranGenericCell.

4.3.8.3 Attribute constraints

See respective IOCs

4.3.8.4 Notifications

See respective IOCs.

4.3.9 ProxyBsFunction <<ProxyClass>>

4.3.8.1 Definition

This IOC represents ENBFunction, NodeBFunction and BssFunction.

4.3.8.3 Attribute constraints

See respective IOCs.

4.3.8.4 Notifications

See respective IOCs.

4.4 Attribute definitions

4.4.1 Attribute properties

Attribute Name	Documentation and Allowed Values	Properties
aRFCN	This attribute (Absolute Radio Frequency Channel Number) defines a pair of Radio Frequency (RF) channel frequencies for uplink and downlink use. See 3GPP TS 45.005 [19] clause 2 for the ARFCN for GSM. ARFCN are based on a 200 kHz channel raster. allowedValues: See 3GPP TS 45.005 [19] clause 2	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
aTA	This attribute (allowed Timing Advance) defines the signal sent by the BTS to the MS which the MS uses to advance its timings of transmissions to the BTS so as to compensate for propagation delay. allowedValues: See 3GPP TS 45.010 [20]	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
bearing	The bearing in degrees that the antenna is pointing in. Antenna bearing" in Ref. 3GPP TS 25.463 [8]. allowedValues: See "Antenna bearing" in 3GPP TS 25.463 [8].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
confOutputPower	It defines the allowed total power to use for all cells together in this sector. It may be set by the operator and/or limited by HW limitation or licensed power, e.g.: 20, 40, 60, 80,120 watts allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
ctrlConnMode	Remote communication mode used by a repeater to send and receive control message, such as GSM SMS, WCDMA SMS, Circle Switch Data-CSD, Package Switch Dat-IP, Serial port. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
dlAttenuation	Downlink signal attenuation of the device to change downlink gain. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
environmentInfo	The repeater device is located either in the building or out of the building. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
eUTRANFqBands	This is the list of LTE frequency bands supported by the hardware associated with the SectorEquipmentFunction. The earfcnDl and earfcnUl or earfcn of LTE cells associated with the SectorEquipmentFunction must be assigned with value within one of the specified eUTRANFqBands values. allowedValues: A list of frequency bands expressed as strings. Valid frequency band values are specified in sub-clause 5.7.3 in 36.104 [7]. For HW not supporting LTE frequency bands, the list shall be empty.	type: String multiplicity: 1..* isOrdered: N/A isUnique: True defaultValue: None isNullable: True

Attribute Name	Documentation and Allowed Values	Properties
firmwareVer	Version of the device firmware. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
fqBand	This is the LTE frequency band supported by the hardware associated with the SectorEquipmentFunction. The earfcnDl and earfcnUl of cells associated with the SectorEquipmentFunction must be assigned with value within this fqBand value. allowedValues: See clause 5 Table 5.2-1 “E-UTRA frequency band” of 3GPP TS 36.104 [7].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
nRFqBands	This is the list of NR frequency bands supported by the hardware associated with the SectorEquipmentFunction. The arfcnDl and arfcnUl of the NRSectorCarrier must be assigned with value within one of the specified nRFqBands values – if the attributes on NRSectorCarriers are set. The arfcnDl and arfcnUl of the NRCellDU associated with the NRSectorCarrier must be assigned with value within one of the specified nRFqBands values – if there is a NRCellDU associated with the NRSectorCarrier. allowedValues: A list of frequency bands expressed as strings. Valid frequency band values are specified in sub-clause 5.4.2 in 3GPP TS 38.104 [23]. For HW not supporting NR frequency bands, the list shall be empty.	type: String multiplicity: 1..* isOrdered: N/A isUnique: True defaultValue: None isNullable: False
height	The height of an antenna above sea level. 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 Iuant interface according to Ref. 3GPP TS 37.466 [26]. An integral value representing a number of meters in 0.1 meter increments. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
horizBeamwidth	The 3 dB power beamwidth of the antenna pattern in the horizontal plane. A value of 360 indicates an omni-directional antenna. Note: The value of this attribute has no operational impact on the network, e.g. the NE behaviour is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the Iuant interface according to Ref. 3GPP TS37.466 [26]. A single integral value corresponding to an angle in degrees between 0 and 360. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

Attribute Name	Documentation and Allowed Values	Properties
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. allowedValues: -90.0000 to +90.0000	type: Integer 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. allowedValues: -180.0000 to +180.0000	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
maxAzimuthValue	The maximum amount of change of azimuth the RET system can support. This is the change in degrees clockwise from bearing. Note: The value of this attribute has no operational impact on the network, e.g. the NE behaviour is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the Iuant interface according to Ref. 3GPP TS 37.466 [26]. 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
minAzimuthValue	The minimum amount of change of azimuth the RET system can support. This is the change in degrees counter-clockwise from bearing. Note: The value of this attribute has no operational impact on the network, e.g. the NE behaviour is not affected by the value setting of this attribute. Note as well that this attribute is not supported over the Iuant interface according to Ref. 3GPP TS 25.466 [9]. 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
priority	The priority of a repeater decided by an operator. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
powerSwitch	Power switch of device which has two status: ON/OFF. allowedValues: ON, OFF	type: Boolean multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
relatedAntennaList	This attribute contains the DNs of one or more AntennaFunction. allowedValues: N/A	type: DN multiplicity: 1..* isOrdered: N/A isUnique: T defaultValue: None isNullable: True

Attribute Name	Documentation and Allowed Values	Properties
relatedSectorEquipment	This attribute contains the DN of one SectorEquipmentFunction. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
relatedTMAList	This attribute contains the DNs of one or more TmaFunction. allowedValues: N/A	type: DN multiplicity: 1..* isOrdered: N/A isUnique: T defaultValue: None isNullable: True
repeaterType	The repeater type defined by operator, such as wide band, frequency selective, indoor and fiber optic. allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
retGroupName	The group name is a textual, alpha-numeric string to define a logical grouping of antennas which may be in different cells. This attribute permits the definition of a logical grouping of the antennas. This may be defined either at installation time, or by management activity to provisioning the group name via the Itf-N. allowedValues: N/A (String size is bounded to 80 characters.)	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
retTiltValue	The electrical tilt setting of the antenna, "Tilt value" in Ref. 3GPP TS 37.466 [26]. allowedValues: See "Tilt value" in Ref. 3GPP TS 37.466 [26].	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
sharedTechnologies	This attribute defines the radio access technologies sharing the common functionalities of a Base Station (BS). allowedValues: GSM, UMTS, LTE, or any combination thereof	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaAntennaBearing	A data field defined in Table B.3 of 3GPP TS 37.466 [26]. See definition in 3GPP TS 37.466 [26]. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaBaseStationId	A data field defined in Table B.3 of 3GPP TS 37.466 [26] allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

Attribute Name	Documentation and Allowed Values	Properties
tmaFunctionFlag	Defined in 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaGainFigure	Defined in 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaGainResolution	A data field defined in Table B.3 of 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaInstalledMechanicalTilt	A data field defined in Table B.3 of 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaMaxGain	Defined in 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaMinGain	Defined in 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaNumberOfSubunits	Defined in 3GPP TS 37.466 [26] allowedValues: --	Defined in 3GPP TS 37.466 [26] type: -- multiplicity: -- isOrdered: -- isUnique: -- defaultValue: -- isNullable: --
tmaResolution	Defined in 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaSectorId	A data field defined in Table B.3 of 3GPP TS 37.466 [26] allowedValues: N/A	type: String multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True

Attribute Name	Documentation and Allowed Values	Properties
tmaStateFlag	Defined in 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaSubunitNumber	Defined in 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaSubunitRxFrequencyBand	A data field defined in Table B.3 of 3GPP TS 37.466 [26] allowedValues: See 3GPP TS 37.466 [26].	type: Integer multiplicity: 2 isOrdered: True isUnique: True defaultValue: None isNullable: False
tmaSubunitType	A data field defined in Table B.3 of 3GPP TS 37.466 [26] allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
tmaSubunitTxFrequencyBand	A data field defined in Table B.3 of 3GPP TS 37.466 [26] allowedValues: See 3GPP TS 37.466 [26].	type: Integer multiplicity: 2 isOrdered: True isUnique: True defaultValue: None isNullable: False
tsc	This attribute has the same definition as the one used in GsmCell IOC. The presence of GSMCellPart means the tsc attribute in GsmCell IOC instance is irrelevant (not applicable). allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
ulAttenuation	Uplink signal attenuation of the device to change uplink gain. allowedValues: N/A	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
uTRANFDDFqBands	This is the list of UTRAN FDD frequency bands supported by the hardware associated with the SectorEquipmentFunction. The arfcnDl and arfcnUl of UTRAN FDD cells associated with the SectorEquipmentFunction must be assigned with value within one of the specified uTRANFDDFqBands values. allowedValues: A list of frequency bands expressed as strings. Valid frequency band values are specified in sub-clause 5.2 of 3GPP TS 25.104 [21].	type: String multiplicity: 1..* isOrdered: N/A isUnique: True defaultValue: None isNullable: True

Attribute Name	Documentation and Allowed Values	Properties
uTRANTDDFqBands	This is the list of UTRAN TDD frequency bands supported by the hardware associated with the SectorEquipmentFunction. The earfcn of UTRAN TDD cells associated with the SectorEquipmentFunction must be assigned with value within one of the specified uTRANTDDFqBands values. allowedValues: A list of frequency bands expressed as strings. Valid frequency band values are specified in sub-clause 5.2 of 3GPP TS 25.105 [22].	type: String multiplicity: 1..* isOrdered: N/A isUnique: True defaultValue: None isNullable: True
vertBeamwidth	The 3 dB power beamwidth of the antenna pattern in the vertical plane. The value of this attribute has no operational impact on the network, e.g. the NE behaviour is not affected by the value setting of this attribute. This attribute is not supported over the Iuant interface according to Ref. 3GPP TS 37.466 [26]. allowedValues: A single integral value corresponding to an angle in degrees between 0 and 180.	type: Integer multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
Attribute related to role		
externalUTRANCell	This role (when present) represents repeaterFunction capability to identify one ExternalUtranCell. When present, it shall contain one ExternalUtranCell DN. allowedValues: N/A	type: DN multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: True
theAntennaList	This attribute contains the DNs of one or more AntennaFunction. allowedValues: N/A	type: DN multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True
theCellList	This attribute contains the DNs of EUtranGenericCell or UtranGenericCell if associations between them exist. This attribute contains the DNs of GSMCellPart if association between them exist. allowedValues: N/A	type: DN multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True
theProxyBsList	A CommonBsFunction instance serves a number of ProxyBsFunction instances. This CommonBsFunction role-attribute contains a list of DNs of ENBFunction (3GPP TS 28.658 [13]), NodeBFunction (3GPP TS 28.652 [12]) and BssFunction (3GPP TS 28.655 [14]) that it serves. allowedValues: N/A	type: DN multiplicity: 1..* isOrdered: False isUnique: True defaultValue: None isNullable: True
theTMAList	This attribute contains the DNs of one or more TMAFunction. 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

This subclause presents a list of notifications, defined in 3GPP TS 32.111-2 [11], that IRPManager can receive. The notification header attribute `objectClass/objectInstance`, defined in 3GPP TS 32.302 [16], would capture the DN of an instance of an IOC defined in this IRP specification.

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyComments`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAlarmListRebuilt`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyPotentialFaultyAlarmList`	See Alarm IRP (3GPP TS 32.111-2 [11])	

4.5.2 Configuration notifications

This subclause presents a list of notifications, defined in 3GPP TS 32.662 [17], that IRPManager can receive. The notification header attribute `objectClass/objectInstance`, defined in 3GPP TS 32.302[16], would capture the DN of an instance of an IOC defined in this IRP specification.

Name	Qualifier	Notes
`notifyAttributeValueChange`	O	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
2013-09	SA#61	SP-130433	0001		F	Add missing Repeater Object IS definitions	11.1.0
2014-06	SA#64	SP-140359	0002		F	remove the feature support statements	11.2.0
2014-10	-	-	-			Update to Rel-12 version (MCC)	**12.0.0**
2016-01	-	-	-			Update to Rel-13 version (MCC)	**13.0.0**
2016-06	SA#72	SP-160408	0005	1	A	Correcting references and reintroducing attributes.	13.1.0
2017-03	SA#75	-	-	-		Promotion to Release 14 without technical change	14.0.0
2018-06	-	-	-	-	-	Update to Rel-15 version (MCC)	15.0.0
2018-12	SA#82	SP-181156	0007	1	F	Correct SectorEquipmentFunction property to support NR.	15.1.0
2018-12	SA#82	SP-181156	0008	2	F	Align NR frequency bands supported by the hardware associated with the SectorEquipmentFunction	15.1.0
2019-09	SA#85	SP-190751	0009	-	F	Correct references and add reference to TR21.905	15.2.0
2019-12	SA#86	SP-191173	0010	1	F	Correct use of ProxyCellList	15.3.0
2020-07	-	-	-	-	-	Update to Rel-16 version (MCC)	**16.0.0**

History

Document history		
V16.0.0	August 2020	Publication