**3GPP TSG-SA5 Meeting #130eS5-203259**

**e-meeting, 25 May – 3 June 2020**

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| *CR-Form-v11.4* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.541** | **CR** | **0310** | **rev** | **-** | **Current version:** | **16.4.1** |  |
|  | | | | | | | | |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Add RIM RS attributes stage 2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, China Mobile | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | eNRM | | | | |  | ***Date:*** | | | 2020-05-14 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Remote Interference Management (RIM) WI was agreed and developed in RAN. RAN 1 and RAN 3 sent LS to SA5 to specify the OAM configurations for RIM Reference Signal (RS) and Victim/Aggressor Set to support RIM operation | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add NRM fragment to support RIM RS and Sets and related configurations | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | RIM operation is not supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.3.1, 4.3.5, 4.3.x (new clause), 4.3.y (new clause), 4.3.z (new clause), 4.3.a (new clause), 4.3.b (new clause), 4.3.c (new clause), 4.4.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Refer to S5-202370 | | | | | | | | |

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| **Start of 1st modification** |

## 4.3 Class definitions

### 4.3.1 GNBDUFunction

#### 4.3.1.1 Definition

For non-split NG-RAN deployment scenario, this IOC together with GNBCUCPFunction IOC and GNBCUUPFunction IOC provide the management of gNB defined in clause 6.1.1 in 3GPP TS 38.401 [4].

For 2-split and 3-split NG-RAN architecture, this IOC provides the management representation of tgNB-DU defined in clause 6.1.1 in 3GPP TS 38.401 [4].

The following table identifies the necessary end points required for the representation of gNB and en-gNB, of all deployment scenarios.

|  |  |  |  |
| --- | --- | --- | --- |
| Req  Role | End point requirement for 3-split deployment scenario | End point requirement for 2-split deployment scenario | End point requirement for Non-split deployment scenario |
| gNB | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | None. |
| en-gNB | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | <<IOC>>EP\_F1C, <<IOC>>EP\_F1U | None. |

#### 4.3.1.2 Attributes

The GNBDUFunction IOC includes attributes inherited from ManagedFunction IOC (defined in TS 28.622[30]) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| gNB­DUId | M | T | T | F | T |
| gNBDUName | O | T | T | F | T |
| gNBId | M | T | F | F | T |
| gNBIdLength | M | T | T | F | T |
| aggressorSetID | CM | T | F | T | T |
| victimSetID | CM | T | F | T | T |
| rimRSReportConf | O | T | F | T | T |

#### 4.3.1.3 Attribute constraints

|  |  |
| --- | --- |
| Name | Definition |
| aggressorSetID | Condition: Remote Interference Management function is supported. |
| victimSetID | Condition: Remote Interference Management function is supported. |

#### 4.3.1.4 Notifications

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

4.3.5 NRCellDU

4.3.5.1 Definition

This IOC represents the part of NR cell information that describes s the specific resources instances.

An NR cell transmits SS/PBCH block and always requires downlink transmission at a certain carrier frequency with a certain channel bandwidth. Transmission may be performed from multiple sector-carriers using different transmission points, and these may be configured with different carrier frequencies and channel bandwidths, as long as they are aligned to the cell's downlink resource grids as defined in subclause 4.4 in TS 38.211 [32]. The values of arfcnDL and bSChannelBwDL attributes define the resource grids which each sector-carrier needs to be aligned to. See subclauses 5.3 and 5.4.2 of TS 38.104 for definitions of BS channel bandwidth and NR-ARFCN, respectively.

An NR cell requires an uplink in order to provide initial access. In case of TDD, the values of arfcnUL and bSChannelBwUL have to always be set to the same values as for the corresponding DL attributes. For both FDD and TDD, the arfcnUL and bSChannelBwUL define uplink resource grids to which each sector-carrier needs to align to.

An NR cell can in addition be configured with a supplementary uplink, which has its own arfcnSUL and bSChannelBwSUL, which define resource grids for supplementary uplink sector-carriers.

Each of downlink, uplink and supplementary uplink (if configured) need an initial bandwidth part (BWP), which defines resources to be used by UEs during and immediately after initial access. Additional BWPs can be either configured or calculated by gNB internally and be applied to UEs dynamically by gNB based on e.g. UE capability and bandwidth need of each UE.

NOTE: Void

4.3.5.2 Attributes

The NRCellDU IOC includes attributes inherited from ManagedFunction IOC (defined in TS 28.622[30]) and the following attributes:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Support Qualifier** | **isReadable** | **isWritable** | **isInvariant** | **isNotifyable** |
| cellLocalId | M | T | T | F | T |
| operationalState | M | T | F | F | T (see Note 2) |
| administrativeState | M | T | T | F | T (see Note 2) |
| cellState | M | T | F | F | T (see Note 2) |
| pLMNInfoList | M | T | T | F | T |
| nRPCI | M | T | T | F | T |
| nRTAC | CM | T | T | F | T |
| arfcnDL | M | T | T | F | T |
| arfcnUL | CM | T | T | F | T |
| arfcnSUL | CM | T | T | F | T |
| bSChannelBwDL | M | T | T | F | T |
| ssbFrequency | M | T | T | F | T |
| ssbPeriodicity | M | T | T | F | T |
| ssbSubCarrierSpacing | M | T | T | F | T |
| ssbOffset | M | T | T | F | T |
| ssbDuration | M | T | T | F | T |
| bSChannelBwUL | CM | T | T | F | T |
| bSChannelBwSUL | CM | T | T | F | T |
| **Attribute related to role** |  |  |  |  |  |
| nRSectorCarrierRef | M | T | T | F | T |
| bWPRef | M | T | T | F | T |
| nRFrequencyRef | CO | T | T | F | T |
| Note 1: No state propagation is implied.  Note 2: The attribute value change is conveyed by the notifyStateChange notification. | | | | | |

### 4.3.x FrequencyDomainPara <<dataType>>

#### 4.3.x.1 Definition

This data type defines configuration parameters of frequency domain resource to support RIM RS.

#### 4.3.x.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| rimRSSubcarrierSpacing | M | T | T | F | T |
| rIMRSBandwidth | M | T | T | F | T |
| nrofGlobalRIMRSFrequencyCandidates | M | T | T | F | T |
| rimRSCommonCarrierReferencePoint | M | T | T | F | T |
| rimRSStartingFrequencyOffsetIdList | M | T | T | F | T |

#### 4.3.x.3 Attribute constraints

None.

#### 4.3.x.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

### 4.3.y SequenceDomainPara <<dataType>>

#### 4.3.y.1 Definition

This data type defines configuration parameters of sequence domain resource to support RIM RS.

#### 4.3.y.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| nrofRIMRSSequenceCandidatesofRS1 | M | T | T | F | T |
| rimRSScrambleIdListofRS1 | M | T | T | F | T |
| nrofRIMRSSequenceCandidatesofRS2 | O | T | T | F | T |
| rimRSScrambleIdListofRS2 | O | T | T | F | T |
| enableEnoughNotEnoughIndication | M | T | T | F | T |
| RIMRSScrambleTimerMultiplier | M | T | T | F | T |
| RIMRSScrambleTimerOffset | M | T | T | F | T |

#### 4.3.y.3 Attribute constraints

None.

#### 4.3.u.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

### 4.3.z TimeDomainPara <<dataType>>

#### 4.3.z.1 Definition

This data type defines configuration parameters of time domain resource to support RIM RS.

#### 4.3.z.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| dlULSwitchingPeriod1 | M | T | T | F | T |
| symbolOffsetOfReferencePoint1 | M | T | T | F | T |
| dlULSwitchingPeriod2 | O | T | T | F | T |
| symbolOffsetOfReferencePoint2 | O | T | T | F | T |
| totalnrofSetIdofRS1 | M | T | T | F | T |
| totalnrofSetIdofRS2 | O | T | T | F | T |
| nrofConsecutiveRIMRS1 | M | T | T | F | T |
| nrofConsecutiveRIMRS2 | O | T | T | F | T |
| consecutiveRIMRS1List | M | T | T | F | T |
| consecutiveRIMRS2List | M | T | T | F | T |
| enablenearfarIndicationRS1 | O | T | T | F | T |
| enablenearfarIndicationRS2 | O | T | T | F | T |

#### 4.3.z.3 Attribute constraints

None.

#### 4.3.z.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

### 4.3.a RimRSReportConf <<dataType>>

#### 4.3.a.1 Definition

This data type defines RIM-RS reporting configuration.

#### 4.3.a.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| reportIndicator | M | T | T | F | T |
| reportInterval | M | T | T | F | T |
| nrofRIMRSReportInfo | M | T | T | F | T |
| maxPropagationDelay | O | T | T | F | T |
| RimRSReportInfoList | M | T | T | F | T |

#### 4.3.a.3 Attribute constraints

None.

#### 4.3.a.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

### 4.3.b RimRSReportInfo <<dataType>>

#### 4.3.b.1 Definition

This data type defines necessary reporting information derived from the detected RIM-RS, including

1) The detected set ID;

2) Propagation delay in number of OFDM symbols

3) Functionality of the RS (RS-1 or RS-2, Enough or Not enough mitigation for RS-1).

#### 4.3.b.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Support Qualifier | isReadable | isWritable | isInvariant | isNotifyable |
| detectedSetID | M | T | T | F | T |
| propagationDelay | O | T | T | F | T |
| functionalityOfRIMRS | M | T | T | F | T |

#### 4.3.b.3 Attribute constraints

None.

#### 4.3.b.4 Notifications

The subclause 4.5 of the <<IOC>> using this <<dataType>> as one of its attributes, shall be applicable.

4.3.c RimRSSet

4.3.c.1 Definition

This data type defines configuration parameters required for periodic RIM-RS monitoring.

4.3.c.2 Attributes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute name** | **Support Qualifier** | **isReadable** | **isWritable** | **isInvariant** | **isNotifyable** |
| rimRSMonitoringWindowDuration | O | T | T | F | T |
| rimRSMonitoringWindowStartingOffset | O | T | T | F | T |
| rimRSMonitoringWindowPeriodicity | O | T | T | F | T |
| rimRSMonitoringOccasionInterval | O | T | T | F | T |
| rimRSMonitoringOccasionStartingOffset | O | T | T | F | T |

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| **End of 1st modification** |

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| **Start of 2nd modification** |

## 4.4 Attribute definitions

### 4.4.1 Attribute properties

| Attribute Name | Documentation and Allowed Values | Properties |
| --- | --- | --- |
|  |  |  |
| frequencyDomainPara | This attribute defines configuration parameters of frequency domain resource to support RIM RS.  allowedValues: Not applicable. | type: FrequencyDomainPara  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| sequenceDomainPara | This attribute defines configuration parameters of sequence domain resource to support RIM RS.  allowedValues: Not applicable. | type: SequenceDomainPara  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| timeDomainPara | This attribute defines configuration parameters of time domain resource to support RIM RS.  allowedValues: Not applicable. | type: TimeDomainPara  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nRCellDURef | This attribute contains the DN of a NR Cell (NRCellDU)  allowedValues: Not applicable. | type: DN  multiplicity: \*  isOrdered: N/A  isUnique: True  defaultValue: None  isNullable: False |
|  |  |  |
| rimRSSubcarrierSpacing | It is the subcarrier spacing configuration () for the RIM-RS. Subcarrier spacing (see 38.211 [32], subclause 5.3.3).  allowedValues: 0, 1 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rIMRSBandwidth | It is RIM RS bandwidth configuration in number of PRBs (see 38.211 [32], subclause 5.3.3).  For carrier bandwidth larger than 20MHz, this attributer should be   * 96 if subcarrier spacing is15kHz; * 48 or 96 if subcarrier spacing is 30kHz;   For carrier bandwidth smaller than or equal to 20MHz, this attributer should be   * Minimum of {96 , bandwidth of downlink carrier in number of PRBs} if subcarrier spacing is15kHz; * Minimum of {48, bandwidth of downlink carrier in number of PRBs } if subcarrier spacing is 30kHz;   allowedValues: 1,2..96 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nrofGlobalRIMRSFrequencyCandidates | It is the number of candidate frequency resources in the whole network () (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 1,2,4 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSCommonCarrierReferencePoint | It is a configured reference point for RIM RS in NR-ARFCN (see 38.211 [32], subclause 5.4).  allowedValues: 0..maxNARFCN where maxNARFCN = 3279165 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSStartingFrequencyOffsetIdList | It is a list of configured frequency offsets in units of resource blocks, where each element is the frequency offset relative to a configured reference point for RIM-RS. The size of the list is nrofGlobalRIMRSFrequencyCandidates and the resulting frequency resource blocks of RIM-RS corresponding to different configured frequency offset have no overlapping bandwidth. (see 38.211 [32], subclause 7.4.1.6).  .  allowedValues: 0..maxNrofPhysicalResourceBlocks-1 where maxNrofPhysicalResourceBlocks = 550 | type: Integer  multiplicity: 1, 2, 4  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
|  |  |  |
| nrofRIMRSSequenceCandidatesofRS1 | It is the number of candidate sequences assigned for RIM RS-1 () (see 38.211 [32], subclause 7.4.1.6). It should be even when enableEnoughNotEnoughIndication for RS-1 is ON  allowedValues: 1,2..8 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSScrambleIdListofRS1 | It is list of configured scrambling identities for RIM RS-1 (see 38.211 [32], subclause 7.4.1.6). The size of the list is nrofRIMRSSequenceCandidatesofRS1.  allowedValues: 0..2^10-1 | type: Integer  multiplicity: 1, 2..8  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nrofRIMRSSequenceCandidatesofRS2 | It is the number of candidate sequences assigned for RIM RS-2 (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 1,2..8 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSScrambleIdListofRS2 | It is list of configured scrambling identities for RIM RS-2 (see 38.211 [32], subclause 7.4.1.6).. The size of the list is nrofRIMRSSequenceCandidatesofRS2.  allowedValues: 0..2^10-1 | type: Integer  multiplicity: 1, 2..8  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| enableEnoughNotEnoughIndication | It is indication of whether “Enough” / “Not enough” indication functionality is enabled for RIM RS-1 (see 38.211 [32], subclause 7.4.1.6).  If the indication is “enable”,   * the first half of nrofRIMRSSequenceCandidatesofRS1 sequences indicates "Not enough mitigation", and the second half indicates "Enough mitigation", where, * "Enough mitigation" indicates that IoT going back to certain level at victim side and/or no further interference mitigation actions are needed at aggressor side * "Not enough mitigation" indicates that IoT exceeding certain level at victim side and/or further interference mitigation actions are needed at aggressor side   allowedValues: "ENABLE", "DISABLE"  see NOTE z | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: DISABLE  isNullable: False |
| RIMRSScrambleTimerMultiplier | It is parameter multiplier factor for initialization seed (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 0,1,….2^31-1 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| RIMRSScrambleTimerOffset | It is parameter offset for initialization seed (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 0,1,….2^31-1 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
|  |  |  |
| dlULSwitchingPeriod1 | This attribute is used to configure the first uplink-downlink switching period (P1) for RIM RS transmission in the network, where one RIM RS is configured in one uplink-downlink switching period. (see 38.211 [32], subclause 7.4.1.6).   * When only one TDD-UL-DL-Pattern is configured, only dl-UL-SwitchingPeriod1 is configured, where P1 equals to the transmission periodicity of the TDD-UL-DL-Pattern. * When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources is configured only in one of the TDD patterns, only dl-UL-SwitchingPeriod1 is configured, where P1 equals to the addition of the concatenated transmission periodicity of the two TDD-UL-DL-Patterns. * When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, both dl-UL-SwitchingPeriod1 and dl-UL-SwitchingPeriod2 are configured, where P1 equals to the transmission periodicity of the first TDD-UL-DL-Pattern.   See NOTE x  allowedValues:   * MS0P5, MS0P625, MS1, MS1P25, MS2, MS2P5, MS4, MS5, MS10, MS20, if a single uplink-downlink period is configured for RIM-RS purposes; * MS0P5, MS0P625, MS1, MS1P25, MS2, MS2P5, MS3, MS4, MS5, MS10, MS20, if two uplink-downlink periods are configured for RIM-RS purposes.   see NOTE a | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| symbolOffsetOfReferencePoint1 | This attribute is used to configure the reference point in the first uplink-downlink switching period, which is the symbols offset of the reference point after the starting boundary of the first uplink-downlink switching period. It’s Configured together with dl-UL-SwitchingPeriod1 (see 38.211 [32], subclause 7.4.1.6).   * When only one TDD-UL-DL-Pattern is configured, the reference point configured for the first uplink-downlink switching period is the DL transmission boundary of the TDD-UL-DL-Pattern. * When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources is configured only in one of the TDD patterns, the reference point configured for the first uplink-downlink switching period is the DL transmission boundary of the TDD-UL-DL-Pattern where the RIM-RS resource is configured. * When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, the reference points configured for first uplink-downlink switching period is the DL transmission boundary of the first TDD-UL-DL-Pattern.   allowedValues: 2, 3..20\*2\*maxNrofSymbols-1, where maxNrofSymbols=14 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| dlULSwitchingPeriod2 | This attribute is used to configure the second uplink-downlink switching period (P2) for RIM RS transmission in the network, where one RIM RS is configured in one uplink-downlink switching period (see 38.211 [32], subclause 7.4.1.6).   * When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, both dl-UL-SwitchingPeriod1 and dl-UL-SwitchingPeriod2 are configured, where P2 equals to the transmission periodicity of the second TDD-UL-DL-Pattern, and where (P1 + P2) divides 20 ms.   allowedValues: MS0P5, MS0P625, MS1, MS1P25, MS2, MS2P5, MS3, MS4, MS5, MS10, MS20  See NOTE a | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| symbolOffsetOfReferencePoint2 | This attribute is used to configure the reference point in the second uplink-downlink switching period, which is the symbol offset of the reference point after starting boundary of the second uplink-downlink switching period. Configured together with dl-UL-SwitchingPeriod2 (see 38.211 [32], subclause 7.4.1.6).   * When two concatenated TDD-UL-DL-Patterns are configured, and RIM-RS resources are configured in both TDD patterns, the reference points configured for second uplink-downlink switching period is the DL transmission boundary of the second TDD-UL-DL-Pattern.   .  allowedValues: 2, 3..20\*2\*maxNrofSymbols-1, where maxNrofSymbols=14 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| totalnrofSetIdofRS1 | It is the total number of set IDs for RIM RS-1 () (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 0,1...2^22-1 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| totalnrofSetIdofRS2 | It is the total number of set IDs for RIM RS-2 (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 0,1...2^22-1 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nrofConsecutiveRIMRS1 | It is number of consecutive uplink-downlink switching periods for RS-1 (R1) for repetition/near-far indication:. (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 1,2,4,8  see NOTE y | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nrofConsecutiveRIMRS2 | It is number of consecutive uplink-downlink switching periods for RS-2 (R2) for repetition/near-far indication. (see 38.211 [32], subclause 7.4.1.6).  allowedValues: 1,2,4,8  see NOTE y | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| consecutiveRIMRS1List | It is used to configure the OFDM symbol position(s) of RIM RS-1 within the uplink-downlink switching period. It is a list of symbol offset of RIM RS-1 before the reference point. The size of the list is nrofConsecutiveRIMRS1 (see 38.211 [32], subclause 7.4.1.6).  The resulting RIM RS-1 symbols and its reference point shall belong to the same 10ms frame.  .  allowedValues: 2,3..20\*2\*maxNrofSymbols-1, where maxNrofSymbols=14 | type: Integer  multiplicity: \*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| consecutiveRIMRS2List | It is used to configure the OFDM symbol position(s) of RIM RS-2 within the uplink-downlink switching period. It is a list of symbol offset of RIM RS-2 before the reference point. The size of the list is nrofConsecutiveRIMRS2 (see 38.211 [32], subclause 7.4.1.6).  The resulting RIM RS-2 symbols and its reference point shall belong to the same 10ms frame.  .  allowedValues: 2,3..20\*2\*maxNrofSymbols-1, where maxNrofSymbols=14 | type: Integer  multiplicity: \*  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| enablenearfarIndicationRS1 | It is indication of whether near-far functionality is enabled for RIM RS1.  If the indication is “enable”,   * the first half of nrofConsecutiveRIMRS1 (R1) consecutive uplink-downlink switching period is for "Near" indication with R1/2 repetitions, * the second half of R1 consecutive uplink-downlink switching period is for "Far" indication with R1/2 repetitions.   allowedValues: "ENABLE", "DISABLE" | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: DISABLE  isNullable: False |
| enablenearfarIndicationRS2 | It is indication of whether near-far functionality is enabled for RIM RS2.  If the indication is “enable”,   * the first half of nrofConsecutiveRIMRS2 (R2) consecutive uplink-downlink switching period is for "Near" indication with R2/2 repetitions, * the second half of R2 consecutive uplink-downlink switching period is for "Far" indication with R2/2 repetitions.   allowedValues: "ENABLE", "DISABLE" | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: DISABLE  isNullable: False |
| rimRSReportConf | It is used to configure gNBs to report the all necessary information derived from the detected RIM-RS to OAM.  allowedValues: Not applicable | type: RimRSReportConf  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: False |
| reportIndicator | It is used to enable or disable the RS report on a gNB.  If the indication is “enable”, the gNB starts to periodically report necessary information derived from the detected RIM-RS to OAM.  If the indication is “disable”, the gNB stops reporting.  allowedValues: ENABLE, DISABLE | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: DISABLE  isNullable: False |
| reportInterval | It is used to define reporting interval of a gNB in ms.  allowedValues: Not applicable | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| nrofRIMRSReportInfo | It is used to define the maximum number of RIMRSReportInfo in a single report.  allowedValues: Not applicable | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| maxPropagationDelay | It is used to define the maximum reported OFDM symbol number for the propagation delay of the detected RIM-RS in each RIMRSReportInfo.  allowedValues: 0, 1..20\*2\*maxNrofSymbols-1, where maxNrofSymbols=14. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
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| rimRSReportInfoList | It represents a list (the length of the list is nrofRIMRSReportInfo) of necessary information derived from the detected RIM-RS.  allowedValues: Not applicable | type: RimRSReportInfo  multiplicity:  isOrdered: N/A  isUnique: N/A  defaultValue: N/A  isNullable: False |
| detectedSetID | This attributer indicates the Set ID of the detected RIM-RS.  allowedValues: 0,1...max{totalnrofSetIdofRS1, totalnrofSetIdofRS2}. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| propagationDelay | This attributer indicates the propagation delay of the detected RIM-RS, in number of OFDM symbol.  allowedValues: 0, 1.. maxPropagationDelay. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| functionalityOfRIMRS | This attributer indicates the functionality of the detected RIM-RS.   * If the indication of enableEnoughNotEnoughIndication is “enable”, valid values are {RS2, RS1forEnoughMitigation, RS1forNotEnoughMitigation}; * If the indication of enableEnoughNotEnoughIndication is “disable”, valid values are {RS1, RS2}.   allowedValues: RS1, RS2, RS1forEnoughMitigation, RS1forNotEnoughMitigation | type: Enum  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
|  |  |  |
| rimRSMonitoringWindowDuration | This attributer configures a duration of the monitoring window in which gNB monitors the RIM-RS, in unit of , where is the RIM-RS transmission periodicity in units of uplink-downlink switching period (see 38.211 [32], subclause 7.4.1.6).   * This field is configured together with rimRSMonitoringInterval, rimRSMonitoringWindowStartingOffset, rimRSMonitoringOccasionInterval and rimRSMonitoringOccasionStartingOffset. * The duration of the monitoring window is expected to be larger than or equal to , where is the interval between adjacent monitoring occasions within the monitoring window (configured by rimRSMonitoringInterval). * The absolute duration of the monitoring window is not expected to be larger than the periodicity of the monitoring window (configured by rimRSMonitoringWindowPeriodicity). * Only the earliest consecutive detection durations in each RIM-RS transmission periodicity () in the monitoring window are taken as valid time for monitoring potential interference, and they are consecutively monitored in the monitoring window, while the residual part of each RIM-RS transmission periodicity is not used for discovering potential interference, where, a consecutive detection duration spans (if only is configured) or (if both and are configured), where,   + is the number of consecutive uplink-downlinkswitching periods for RS-1 (configured by nrofConsecutiveRIMRS1),   + is the first uplink-downlinkswitching period (configured by dlULSwitchingPeriod1),   + is the second uplink-downlink switching period (configured by dlULSwitchingPeriod2), and   + is the total number of set IDs for RIM RS-1 (configured by totalnrofSetIdofRS1),   + is the number of candidate frequency resources in the whole network (configured by nrofGlobalRIMRSFrequencyCandidates), and   + is the number of candidate sequences assigned for RIM RS-1 (configured by nrofRIMRSSequenceCandidatesofRS1).   allowedValues: 1,2,..2^14 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSMonitoringWindowPeriodicity | This attributer configures the periodicity of the monitoring window, in unit of hours.  allowedValues: 1, 2, 3, 4, 6, 8, 12, 24 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSMonitoringWindowStartingOffset | This attributer configures the start offset of the first monitoring window within one day, in unit of hours.  allowedValues: 0,1,2..23 | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSMonitoringOccasionInterval | This attributer configures the interval between adjacent monitoring occasions (*M*) within the monitoring window, in unit of consecutive detection duration.  *M* is expected to be prime to , where is given in above attribute rimRSMonitoringWindowDuration.  allowedValues: 1,2..-1. | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rimRSMonitoringOccasionStartingOffset | This attributer configures the start offset of the first monitoring occasions within the monitoring window (), in unit of consecutive detection duration.  gNB starts monitoring potential interference from the -th consecutive detection duration in the first complete RIM-RS transmission periodicity () within the monitoring window.  allowedValues: 0,1,2..M-1  where M is the the interval between adjacent monitoring occasions within the monitoring window (configured by rimRSMonitoringOccasionInterval) | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
|  |  |  |
| NOTE 1: Void  NOTE 2: The radio resource can be signaling resources (e.g. RRC connected users) or user plane resources (e.g. PRB, DRB).  NOTE 3: The averaging time interval is implementation dependent.  NOTE 4: A RRM Policy can make use of the defined policy RRMPolicyRatio or a vendor specific RRM Policy.  NOTE x: The maximum number of total RIM RS sequence within 10ms is 32 regardless single or two uplink-downlink period are configured in the 10ms..  NOTE y:   * The maximum number of consecutive uplink-downlinkswitching periods for repetition/near-far-functionality is 8 (the number can be either 2, 4, or 8) with near-far functionality and with repetition. * The maximum number of consecutive uplink-downlinkswitching periods for repetition is 4 (the number can be either 1, 2, or 4) without near-far functionality and with repetition only. * The maximum number of consecutive uplink-downlinkswitching periods is 2 with near-far functionality only and without repetition.   NOTE z (for information): “Not enough mitigation” means aggressor gNB needs to increase the interference mitigation level (i.e., further interference mitigation actions) (e.g., further reducing the DL transmission power on DL symbols at aggressor side), while “Enough mitigation” means aggressor gNB keeping the current interference mitigation level unchanged (i.e., no further interference mitigation actions) (e.g., remaining the DL transmission power on DL symbols unchanged at aggressor side).  NOTE a: Value MS0P5 corresponds to 0.5 ms, MS0P625 corresponds to 0.625 ms, MS1 corresponds to 1 ms, MS1P25 corresponds to 1.25 ms, and so on. | | |

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| **End of 2nd modification** |