**3GPP TSG-RAN WG3 Meeting #119bis-eR3-23xxxx**

**Online, 17th – 26th April, 2023**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.423** | **CR** | **1018** | **rev** | **1** | **Current version:** | **17.4.0** |  |
|  |
| *For* [***HE******LP***](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:***  | Network energy saving techniques |
|  |  |
| ***Source to WG:*** | Huawei, ? |
| ***Source to TSG:*** | R3 |
|  |  |
| ***Work item code:*** | Netw\_Energy\_NR-Core |  | ***Date:*** | 2023-04-17 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-18 |
|  | *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 canbe 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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | The WID on Network energy savings for NR was approved in RP-230566. There is a need to specify the functions by signalling procedures of the Xn interface.  |
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| ***Summary of change:*** | * Support the inter-node beam activation between the neighboring NG-RAN nodes.

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| ***Consequences if not approved:*** | No support of the energy saving features |
|  |  |
| ***Clauses affected:*** | 8.4.3.2, 8.4.3.3, 9.1.3.7, 9.1.3.8, 9.3.4, 9.3.7 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 38.473 CR 1129  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** | Rev0: R3-231494Rev1: R3-23xxxx Update based on the agreements at the RAN3-119bis meeting. Add editor’s note, and correct ASN.1 etc |

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| **Change Begins** |

### 8.4.3 Cell Activation

#### 8.4.3.1 General

The purpose of the Cell Activation procedure is to enable an NG-RAN node to request a neighbouring NG-RAN node to switch on one or more cells, previously reported as inactive due to energy saving.

The procedure uses non UE-associated signalling.

#### 8.4.3.2 Successful Operation



Figure 8.4.3.2-1: Cell Activation, successful operation

The NG-RAN node1 initiates the procedure by sending the CELL ACTIVATION REQUEST message to the peer NG-RAN node2.

Upon receipt of this message, the NG-RAN node2 should activate the cell/s indicated in the CELL ACTIVATION REQUEST message and shall indicate in the CELL ACTIVATION RESPONSE message for which cells the request was fulfilled.

If case of network sharing with multiple cell ID broadcast with shared Xn-C signalling transport, as specified in TS 38.300 [9], the CELL ACTIVATION REQUEST message and the CELL ACTIVATION RESPONSE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

If the *NR Cells and SSBs List* IE is included in the CELL ACTIVATION REQUEST message, the NG-RAN node2 shall, if supported, activate the SSBs and indicate in the CELL ACTIVATION RESPONSE message for which SSBs the request was fulfilled.

**Interactions with NG-RAN Configuration Update procedure:**

The NG-RAN node2 shall not send the NG-RAN CONFIGURATION UPDATE message to the NG-RAN node1 just for the reason of the cell/s or the SSB/s indicated in the CELL ACTIVATION REQUEST message changing cell or SSB activation state, as the receipt of the CELL ACTIVATION RESPONSE message by the NG-RAN node1 is used to update the information about the activation state of NG-RAN node2 cells/SSBs in the NG-RAN node1.

#### 8.4.3.3 Unsuccessful Operation



Figure 8.4.3.3-1: Cell Activation, unsuccessful operation

If the NG-RAN node2 cannot activate any of the cells or any of the SSBs indicated in the CELL ACTIVATION REQUEST message, it shall respond with the CELL ACTIVATION FAILURE message with an appropriate cause value.

If case of network sharing with multiple cell ID broadcast with shared Xn-C signalling transport, as specified in TS 38.300 [9], the CELL ACTIVATION REQUEST message and the CELL ACTIVATION FAILURE message shall include the *Interface Instance Indication* IE to identify the corresponding interface instance.

#### 8.4.3.4 Abnormal Conditions

Void.

**<Unchanged Text Omitted>**

#### 9.1.3.7 CELL ACTIVATION REQUEST

This message is sent by the NG-RAN node1 to the peer NG-RAN node2 to request a previously switched-off cell/s or SSB/s to be re-activated.

Direction: NG-RAN node1 → NG-RAN node2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.3.1 |  | YES | reject |
| CHOICE *Served Cells To Activate* | M |  |  |  | YES | reject |
| >*NR Cells* |  |  |  |  |  |  |
| **>>NR Cells List** |  | *1* |  |  | – |  |
| **>>>NR Cells item** |  | *1 .. <* *maxnoofCellsinNG-RANnode>* |  |  | – |  |
| >>>>NR CGI | M |  | 9.2.2.7 |  | – |  |
| >*E-UTRA Cells* |  |  |  |  |  |  |
| **>>E-UTRA Cells List** |  | *1* |  |  | – |  |
| **>>>E-UTRA Cells item** |  | *1 .. <* *maxnoofCellsinNG-RANnode>* |  |  | – |  |
| >>>>E-UTRA CGI | M |  | 9.2.2.8 |  | – |  |
| *>NR Cells and SSBs* |  |  |  |  |  |  |
| **>>NR Cells and SSBs List** |  | *1* |  |  | YES | ignore |
| **>>>NR Cells and SSBs item** |  | *1 .. <* *maxnoofCellsinNG-RANnode>* |  |  | – |  |
| >>>>NR CGI | M |  | 9.2.2.7 |  | – |  |
| >>>>NR SSB List |  | *1* |  |  | – |  |
|   **>>>>>SSB Item** |  | *1 .. < maxnoofSSBs>* |  |  | – |  |
|  >>>>>>SSB Index | M |  | INTEGER (0..63) |  | – |  |
| Activation ID | M |  | INTEGER (0..255) | Allocated by the NG-RAN node1 | YES | reject |
| Interface Instance Indication | O |  | 9.2.2.39 |  | YES | reject |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofCellsinNG-RANnode | Maximum no. cells that can be served by an NG-RAN node.Value is 16384. |
| maxnoofSSBs | Maximum no. SSBs that can be served by an NG-RAN node cell. Value is 64. |

Editor’s Note: The *NR Cells and SSBs List* IE may be further refined.

#### 9.1.3.8 CELL ACTIVATION RESPONSE

This message is sent by an NG-RAN node2 to a peer NG-RAN node1 to indicate that one or more cell(s) previously switched-off has (have) been activated.

Direction: NG-RAN node2 → NG-RAN node1.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.3.1 |  | YES | reject |
| CHOICE *Activated Served Cells* | M |  |  |  | YES | reject |
| >*NR Cells* |  |  |  |  |  |  |
| **>>NR Cells List** |  | *1* |  |  | – |  |
| **>>>NR Cells Item** |  | *1 .. <* *maxnoffCellsinNG-RANnode>* |  |  | – |  |
| >>>>NR CGI | M |  | 9.2.2.7 |  | – |  |
| >*E-UTRA Cells* |  |  |  |  |  |  |
| **>>E-UTRA Cells List** |  | *1* |  |  | – |  |
| **>>>E-UTRA Cells Item** |  | *1 .. <* *maxnoofCellsinNG-RANnode>* |  |  | – |  |
| >>>>E-UTRA CGI | M |  | 9.2.2.8 |  | – |  |
| >*NR Cells and SSBs* |  |  |  |  |  |  |
| **>>NR Cells and SSBs List** |  | *1* |  |  | YES | ignore |
| **>>>NR Cells and SSBs Item** |  | *1 .. <* *maxnoffCellsinNG-RANnode>* |  |  | – |  |
| >>>>NR CGI | M |  | 9.2.2.7 |  | – |  |
| >>>>NR SSB List |  | *1* |  |  | – |  |
|   **>>>>>SSB Item** |  | *1 .. < maxnoofSSBs>* |  |  | – |  |
|  >>>>>>SSB Index | M |  | INTEGER (0..63) |  | – |  |
| Activation ID | M |  | INTEGER (0..255) | Allocated by the NG-RAN node1 | YES | reject |
| Criticality Diagnostics | O |  | 9.2.3.3 |  | YES | ignore |
| Interface Instance Indication | O |  | 9.2.2.39 |  | YES | reject |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofCellsinNG-RANnode | Maximum no. cells that can be served by an NG-RAN node. Value is 16384. |
| maxnoofSSBs | Maximum no. SSBs that can be served by a gNB node cell. Value is 64. |

Editor’s Note: This *NR Cells and SSBs List* IE may be further refined.

**<Unchanged Text Omitted>**

### 9.3.4 PDU Definitions

-- ASN1START

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-- PDU definitions for XnAP.

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**<Unchanged Text Omitted>**

 id-SDTDataForwardingDRBList,

 id-PEIPSassistanceInformation,

 id-UESliceMaximumBitRateList,

 id-S-NG-RANnodeUE-Slice-MBR,

 id-ManagementBasedMDTPLMNModificationList,

 id-F1-terminatingIAB-donorIndicator,

 id-AdditionalListofPDUSessionResourceChangeConfirmInfo-SNterminated,

 id-NrCellsAndSSBsList,

 id-ActivatedNrCellsAndSSBsList,

 maxnoofCellsinNG-RANnode,

 maxnoofDRBs,

 maxnoofPDUSessions,

 maxnoofQoSFlows,

 maxnoofServedCellsIAB,

 maxnoofTrafficIndexEntries,

 maxnoofTLAsIAB,

 maxnoofBAPControlPDURLCCHs,

 maxnoofServingCells,

 maxnoofSSBs

**<Unchanged Text Omitted>**

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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-- CELL ACTIVATION REQUEST

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CellActivationRequest ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{ CellActivationRequest-IEs}},

 ...

}

CellActivationRequest-IEs XNAP-PROTOCOL-IES ::= {

 { ID id-ServedCellsToActivate CRITICALITY reject TYPE ServedCellsToActivate PRESENCE mandatory}|

 { ID id-ActivationIDforCellActivation CRITICALITY reject TYPE ActivationIDforCellActivation PRESENCE mandatory}|

 { ID id-InterfaceInstanceIndication CRITICALITY reject TYPE InterfaceInstanceIndication PRESENCE optional },

 ...

}

ServedCellsToActivate ::= CHOICE {

 nr-cells SEQUENCE (SIZE(1..maxnoofCellsinNG-RANnode)) OF NR-CGI,

 e-utra-cells SEQUENCE (SIZE(1..maxnoofCellsinNG-RANnode)) OF E-UTRA-CGI,

 choice-extension ProtocolIE-Single-Container { {ServedCellsToActivate-ExtIEs} }

}

ServedCellsToActivate-ExtIEs XNAP-PROTOCOL-IES ::= {

 { ID id-NrCellsAndSSBsList CRITICALITY ignore TYPE NrCellsAndSSBsList PRESENCE mandatory},

 ...

}

NrCellsAndSSBsList ::= SEQUENCE (SIZE(1..maxnoofCellsinNG-RANnode)) OF NrCellsAndSSBs-Item

NrCellsAndSSBs-Item ::= SEQUENCE {

 nrCGI NR-CGI,

 nrSSBList SEQUENCE (SIZE(1.. maxnoofSSBs)) OF SSBs-Item,

 iE-Extensions ProtocolExtensionContainer { { NrCellsAndSSBs-Item-ExtIEs} } OPTIONAL,

 ...

}

NrCellsAndSSBs-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
 ...

}

SSBs-Item ::= SEQUENCE {

 ssb-Index INTEGER(0..63),

 ...

}

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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-- CELL ACTIVATION RESPONSE

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

CellActivationResponse ::= SEQUENCE {

 protocolIEs ProtocolIE-Container {{CellActivationResponse-IEs}},

 ...

}

CellActivationResponse-IEs XNAP-PROTOCOL-IES ::= {

 { ID id-ActivatedServedCells CRITICALITY reject TYPE ActivatedServedCells PRESENCE mandatory}|

 { ID id-ActivationIDforCellActivation CRITICALITY reject TYPE ActivationIDforCellActivation PRESENCE mandatory}|

 { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional }|

 { ID id-InterfaceInstanceIndication CRITICALITY reject TYPE InterfaceInstanceIndication PRESENCE optional },

 ...

}

ActivatedServedCells ::= CHOICE {

 nr-cells SEQUENCE (SIZE(1..maxnoofCellsinNG-RANnode)) OF NR-CGI,

 e-utra-cells SEQUENCE (SIZE(1..maxnoofCellsinNG-RANnode)) OF E-UTRA-CGI,

 choice-extension ProtocolIE-Single-Container { {ActivatedServedCells-ExtIEs} }

}

ActivatedServedCells-ExtIEs XNAP-PROTOCOL-IES ::= {

 { ID id-ActivatedNrCellsAndSSBsList CRITICALITY ignore TYPE ActivatedNrCellsAndSSBsList PRESENCE mandatory},

 ...

}

ActivatedNrCellsAndSSBsList ::= SEQUENCE (SIZE(1..maxnoofCellsinNG-RANnode)) OF ActivatedNrCellsAndSSBs-Item

ActivatedNrCellsAndSSBs-Item ::= SEQUENCE {

 nrCGI NR-CGI,

 nrSSBList SEQUENCE (SIZE(1..maxnoofCellsinNG-RANnode)) OF SSBs-Item,

 iE-Extensions ProtocolExtensionContainer { { ActivatedNrCellsAndSSBs-Item-ExtIEs} } OPTIONAL,

 ...

}

ActivatedNrCellsAndSSBs-Item-ExtIEs XNAP-PROTOCOL-EXTENSION ::= {
 ...

}

**<Unchanged Text Omitted>**

### 9.3.5 Information Element definitions

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-- Information Element Definitions

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**<Unchanged Text Omitted>**

 maxnoofBHInfo,

 maxnoofTLAsIAB,

 maxnoofTrafficIndexEntries,

 maxnoofBAPControlPDURLCCHs,

 maxnoofServedCellsIAB,

 maxnoofDUFSlots,

 maxnoofSymbols,

 maxnoofHSNASlots,

 maxnoofRBsetsPerCell,

 maxnoofChildIABNodes,

 maxnoofIABSTCInfo,

 maxnoofPSCellCandidates,

 maxnoofTargetSNs,

 maxnoofUEAppLayerMeas,

 maxnoofSNSSAIforQMC,

 maxnoofCellIDforQMC,

 maxnoofPLMNforQMC,

 maxnoofTAforQMC,

 maxnoofMTCItems,

 maxnoofCSIRSconfigurations,

 maxnoofCSIRSneighbourCells,

 maxnoofCSIRSneighbourCellsInMTC,

 maxnoofNeighbour-NG-RAN-Nodes,

 maxnoofSRBs,

 maxnoofSMBR,

 maxnoofNSAGs,

 maxnoofRBsetsPerCell1,

 maxnoofTargetSNsMinusOne,

 maxnoofThresholdsForExcessPacketDelay,

 maxnoofSSBs

**<Unchanged Text Omitted>**

### 9.3.7 Constant definitions

-- ASN1START

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

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-- Constant definitions

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**<Unchanged Text Omitted>**

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-- Lists

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**<Unchanged Text Omitted>**

maxnoofMTCItems INTEGER ::= 16

maxnoofCSIRSconfigurations INTEGER ::= 96

maxnoofCSIRSneighbourCells INTEGER ::= 16

maxnoofCSIRSneighbourCellsInMTC INTEGER ::= 16

maxnoofNeighbour-NG-RAN-Nodes INTEGER ::= 256

maxnoofSRBs INTEGER ::= 5

maxnoofSMBR INTEGER ::= 8

maxnoofNSAGs INTEGER ::= 256

maxnoofTargetSNsMinusOne INTEGER ::= 7

maxnoofThresholdsForExcessPacketDelay INTEGER ::= 255

maxnoofSSBs INTEGER ::= 64

-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

--

-- IEs

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-- \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**<Unchanged Text Omitted>**

id-S-NG-RANnodeUE-Slice-MBR ProtocolIE-ID ::= 359

id-PositioningInformation ProtocolIE-ID ::= 360

id-UEAssistantIdentifier ProtocolIE-ID ::= 361

id-ManagementBasedMDTPLMNModificationList ProtocolIE-ID ::= 362

id-F1-terminatingIAB-donorIndicator ProtocolIE-ID ::= 363

id-TAINSAGSupportList ProtocolIE-ID ::= 364

id-SCGreconfigNotification ProtocolIE-ID ::= 365

id-earlyMeasurement ProtocolIE-ID ::= 366

id-BeamMeasurementsReportConfiguration ProtocolIE-ID ::= 367

id-CoverageModificationCause ProtocolIE-ID ::= 368

id-AdditionalListofPDUSessionResourceChangeConfirmInfo-SNterminated ProtocolIE-ID ::= 369

id-UERLFReportContainerLTEExtension ProtocolIE-ID ::= 370

id-ExcessPacketDelayThresholdConfiguration ProtocolIE-ID ::= 371

id-NrCellsAndSSBsList ProtocolIE-ID ::= xxx

id-ActivatedNrCellsAndSSBsList ProtocolIE-ID ::= yyy

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| **Change Ends** |