**3GPP TSG-RAN WG3 Meeting #119bis-e *R3-232083***

**Online, 17th – 26th April, 2023**

|  |
| --- |
| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.423** | **CR** | **1018** | **rev** | **2** | **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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

|  |
| --- |
|  |
| ***Title:***  | Network energy saving techniques |
|  |  |
| ***Source to WG:*** | Huawei, Samsung, Nokia, Nokia Shanghai Bell, ZTE, Ericsson, CATT, Intel |
| ***Source to TSG:*** | R3 |
|  |  |
| ***Work item code:*** | Netw\_Energy\_NR-Core |  | ***Date:*** | 2023-04-26 |
|  |  |  |  |  |
| ***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. This CR is to specify the functions, and update relevant parts of the specfication.  |
|  |  |
| ***Summary of change:*** | * Support the inter-node beam activation between the neighboring NG-RAN nodes.

  |
|  |  |
| ***Consequences if not approved:*** | No support of the energy saving features.  |
|  |  |
| ***Clauses affected:*** | 8.4.3.1, 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 CR1129  |
| ***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: R3-231984 Update based on the agreements at the RAN3-119bis meeting. Update the cover page, add editor’s note, and correct ASN.1 etcRev2: R3-232083 Update the procedure texts, and the tabular.  |

|  |
| --- |
| **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 all the SSB beams or only some of the SSB beams within 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, only activate the SSB beams indicated by the *SSBs to be Activated List* IE if included. If the *SSBs to be Activated List* IE associated with the cell indicated by the *NG CGI* IE is not included, the NG-RAN node2 shall, if supported, activate all the inactive SSB beams in the cell.

If at least one requested SSB beam in the *SSBs to be Activated List* IE is activated, the NG-RAN node2 includes the *NR SSBs Activated List* IE in the CELL ACTIVATION RESPONSE message. The NG-RAN node1 shall consider that the SSB beams indicated by the *NR SSBs Activated List* IE as activated.

**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 beam/s indicated in the CELL ACTIVATION REQUEST message changing cell or SSB beam 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 or SSB beam/s 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 SSB beams 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 beam(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 |  | – |  |
| **>>>>SSBs to be Activated List** |  | *0..1* |  |  | – |  |
|   **>>>>>SSBs to be Activated Item** |  | *1 .. <* maxnoofSSBAreas *>* |  |  | – |  |
|  >>>>>>SSB Index | M |  | INTEGER (0..63) | Identifier of the SSB beam requested to be activated. | – |  |
| 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. |
| maxnoofSSBAreas | Maximum no. SSB Areas that can be served by a 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 |  | – |  |
| **>>>>SSBs Activated List** |  | *1* |  |  | – |  |
|   **>>>>>SSB Activated Item** |  | *1 .. < maxnoofSSBAreas >* |  |  | – |  |
|  >>>>>>SSB Index | M |  | INTEGER (0..63) | Identifier of the activated SSB beam. | – |  |
| 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. |
| *maxnoofSSBAreas* | Maximum no. SSB Areas that can be served by a NG-RAN node cell. Value is 64. |

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

**<Unchanged Text Omitted>**

### 9.3.4 PDU Definitions

-- ASN1START

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

--

-- PDU definitions for XnAP.

--

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

**<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,

 maxnoofSSBAreas

**<Unchanged Text Omitted>**

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

--

-- CELL ACTIVATION REQUEST

--

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

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,

 sSBstobeActivatedList SEQUENCE (SIZE(1.. maxnoofSSBAreas)) OF SSBs-Item OPTIONAL,

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

 ...

}

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

}

SSBs-Item ::= SEQUENCE {

 ssbIndex INTEGER(0..63),

 ...

}

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

--

-- CELL ACTIVATION RESPONSE

--

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

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,

 sSBsActivatedList SEQUENCE (SIZE(1..maxnoofSSBAreas)) OF SSBs-Item ,

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

 ...

}

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

}

**<Unchanged Text Omitted>**

### 9.3.7 Constant definitions

-- ASN1START

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

--

-- Constant definitions

--

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

**<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 ::= 888 -- to be allocated

id-ActivatedNrCellsAndSSBsList ProtocolIE-ID ::= 999 -- to be allocated

|  |
| --- |
| **Change Ends** |