**3GPP TSG-RAN WG3 Meeting #121 *R3-234668***

**Toulouse, France,** **21 – 25 Aug, 2023**

**Title:** (TP to Netw\_Energy\_NR BLCR for TS 38.423) Network energy saving techniques

**Source:** Huawei

**Agenda item:** 24.2

**Document Type:** Other

# 1. Introduction

This contribution provides the XnAP TP, as per the discussion in **CB: # R18ES**

# 2. TP to 38.423 (based on BLCR R3-233798)

<<<<<<<<<<<<<<<<<<<< First Change >>>>>>>>>>>>>>>>>>>>

#### 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. |

#### 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. |

<<<<<<<<<<<<<<<<<<<< Next Change >>>>>>>>>>>>>>>>>>>>

#### 9.2.3.2 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the XnAP protocol.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE Type and Reference | Semantics Description |
| CHOICE *Cause Group* | M |  |  |  |
| >*Radio Network Layer* |  |  |  |  |
| >>Radio Network Layer Cause | M |  | ENUMERATED (  Cell not Available,  Handover Desirable for Radio Reasons,  Handover Target not Allowed,  Invalid AMF Set ID,  No Radio Resources Available in Target Cell,  Partial Handover,  Reduce Load in Serving Cell,  Resource Optimisation Handover,  Time Critical Handover,  TXnRELOCoverall Expiry,  TXnRELOCprep Expiry,  Unknown GUAMI ID,  Unknown Local NG-RAN node UE XnAP ID,  Inconsistent Remote NG-RAN node UE XnAP ID,  Encryption And/Or Integrity Protection Algorithms Not Supported,  Multiple PDU Session ID Instances,  Unknown PDU Session ID,  Unknown QoS Flow ID,  Multiple QoS Flow ID Instances,  Switch Off Ongoing,  Not supported 5QI value,  TXnDCoverall Expiry,  TXnDCprep Expiry,  Action Desirable for Radio Reasons,  Reduce Load,  Resource Optimisation,  Time Critical action,  Target not Allowed,  No Radio Resources Available,  Invalid QoS combination,  Encryption Algorithms Not Supported,  Procedure cancelled,  RRM purpose,  Improve User Bit Rate,  User Inactivity,  Radio Connection With UE Lost,  Failure in the Radio Interface Procedure,  Bearer Option not Supported,  UP integrity protection not possible, UP confidentiality protection not possible,  Resources not available for the slice(s),  UE Maximum integrity protected data rate reason,  CP Integrity Protection Failure,  UP Integrity Protection Failure,  Slice(s) not supported by NG-RAN,  MN Mobility,  SN Mobility,  Count reaches max value,  Unknown Old NG-RAN node UE XnAP ID,  PDCP Overload,  DRB ID not available,  Unspecified,  …,  UE Context ID not known, Non-relocation of context, CHO-CPC resources to be changed,  RSN not available for the UP,  NPN access denied,  Report Characteristics Empty,  Existing Measurement ID,  Measurement Temporarily not Available,  Measurement not Supported For The Object,  UE Power Saving,  Not existing NG-RAN node2 Measurement ID, Insufficient UE Capabilities, Normal Release,  Value out of allowed range, SCG activation deactivation failure, SCG deactivation failure due to data transmission, SSB not Available) |  |
| *>Transport Layer* |  |  |  |  |
| >>Transport Layer Cause | M |  | ENUMERATED (Transport Resource Unavailable,  Unspecified, …) |  |
| *>Protocol* |  |  |  |  |
| >>Protocol Cause | M |  | ENUMERATED (Transfer Syntax Error, Abstract Syntax Error (Reject), Abstract Syntax Error (Ignore and Notify), Message not Compatible with Receiver State,  Semantic Error,  Abstract Syntax Error (Falsely Constructed Message), Unspecified, …) |  |
| *>Misc* |  |  |  |  |
| >>Miscellaneous Cause | M |  | ENUMERATED (Control Processing Overload, Hardware Failure,  O&M Intervention,  Not enough User Plane Processing Resources,  Unspecified, …) |  |

The meaning of the different cause values is specified in the following table. In general, "not supported" cause values indicate that the related capability is missing. On the other hand, "not available" cause values indicate that the related capability is present, but insufficient resources were available to perform the requested action.

|  |  |
| --- | --- |
| Radio Network Layer cause | Meaning |
| Cell not Available | The concerned cell is not available. |
| Handover Desirable for Radio Reasons | The reason for requesting handover is radio related. |
| Handover Target not Allowed | Handover to the indicated target cell is not allowed for the UE in question. |
| Invalid AMF Set ID | The target NG-RAN node doesn’t belong to the same AMF Set of the source NG-RAN node, i.e. NG handovers should be attempted instead. |
| No Radio Resources Available in Target Cell | The target cell doesn’t have sufficient radio resources available. |
| <<<<<<<<<<<<<<<<<<<< Unmodified Text Omitted >>>>>>>>>>>>>>>>>>>> | |
| Insufficient UE Capabilities | The procedure can’t proceed due to insufficient UE capabilities. |
| Normal Release | The release is due to normal reasons. |
| SCG activation deactivation failure | The action failed due to rejection of the SCG activation deactivation request. |
| SCG deactivation failure due to data transmission | The SCG deactivation failure due to ongoing or arriving data transmission. |
| SSB not Available | The concerned SSB is not available. |

<<<<<<<<<<<<<<<<<<<< Unmodified Text Omitted >>>>>>>>>>>>>>>>>>>>

### 9.3.5 Information Element definitions

-- ASN1START

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

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-- Information Element Definitions

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

XnAP-IEs {

itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)

ngran-access (22) modules (3) xnap (2) version1 (1) xnap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

<<<<<<<<<<<<<<<<<<<< Unmodified Text Omitted >>>>>>>>>>>>>>>>>>>>

Cause ::= CHOICE {

radioNetwork CauseRadioNetworkLayer,

transport CauseTransportLayer,

protocol CauseProtocol,

misc CauseMisc,

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

}

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

...

}

CauseRadioNetworkLayer ::= ENUMERATED {

cell-not-available,

handover-desirable-for-radio-reasons,

handover-target-not-allowed,

invalid-AMF-Set-ID,

no-radio-resources-available-in-target-cell,

partial-handover,

reduce-load-in-serving-cell,

resource-optimisation-handover,

time-critical-handover,

tXnRELOCoverall-expiry,

tXnRELOCprep-expiry,

unknown-GUAMI-ID,

unknown-local-NG-RAN-node-UE-XnAP-ID,

inconsistent-remote-NG-RAN-node-UE-XnAP-ID,

encryption-and-or-integrity-protection-algorithms-not-supported,

not-used-causes-value-1,

multiple-PDU-session-ID-instances,

unknown-PDU-session-ID,

unknown-QoS-Flow-ID,

multiple-QoS-Flow-ID-instances,

switch-off-ongoing,

not-supported-5QI-value,

tXnDCoverall-expiry,

tXnDCprep-expiry,

action-desirable-for-radio-reasons,

reduce-load,

resource-optimisation,

time-critical-action,

target-not-allowed,

no-radio-resources-available,

invalid-QoS-combination,

encryption-algorithms-not-supported,

procedure-cancelled,

rRM-purpose,

improve-user-bit-rate,

user-inactivity,

radio-connection-with-UE-lost,

failure-in-the-radio-interface-procedure,

bearer-option-not-supported,

up-integrity-protection-not-possible,

up-confidentiality-protection-not-possible,

resources-not-available-for-the-slice-s,

ue-max-IP-data-rate-reason,

cP-integrity-protection-failure,

uP-integrity-protection-failure,

slice-not-supported-by-NG-RAN,

mN-Mobility,

sN-Mobility,

count-reaches-max-value,

unknown-old-NG-RAN-node-UE-XnAP-ID,

pDCP-Overload,

drb-id-not-available,

unspecified,

...,

ue-context-id-not-known,

non-relocation-of-context,

cho-cpc-resources-tobechanged,

rSN-not-available-for-the-UP,

npn-access-denied,

report-characteristics-empty,

existing-measurement-ID,

measurement-temporarily-not-available,

measurement-not-supported-for-the-object,

ue-power-saving,

unknown-NG-RAN-node2-Measurement-ID,

insufficient-ue-capabilities,

normal-release,

value-out-of-allowed-range,

scg-activation-deactivation-failure,

scg-deactivation-failure-due-to-data-transmission,

ssb-not-available

}

<<<<<<<<<<<<<<<<<<<< End of Changes >>>>>>>>>>>>>>>>>>>>