**3GPP TSG-RAN WG3 Meeting #120 *R3-233465***

**Incheon, Korea, May 22-26, 2023**

**Title:** (TP to Netw\_Energy\_NR BLCR for TS 38.473) Network energy saving techniques

**Source:** Huawei, Samsung

**Agenda item:** 24.2

**Document Type:** Discussion

# 1. Introduction

This TP implements the following agreements for the R18 NES WI.

Proposal1: For F1AP, change the criticality of the SSBs within the cell to be Activated List IE included in the GNB-CU CONFIGURATION UPDATE message to “ignore”, and remove the editor’s note “Editor’s Note: The SSBs within the cell to be Activated List IE may be further refined (e.g., the assigned criticality).”

Proposal 2: For F1AP, remove the FFS on the maximum number of the SSB areas.

# 7. Annex 3: TP to 38.473 (based on BLCR R3-232082)

#### 9.2.1.10 GNB-CU CONFIGURATION UPDATE

This message is sent by the gNB-CU to transfer updated information associated to an F1-C interface instance.

NOTE: If F1-C signalling transport is shared among several F1-C interface instances, this message may transfer updated information associated to several F1-C interface instances.

Direction: gNB-CU → gNB-DU

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| Transaction ID | M |  | 9.3.1.23 |  | YES | reject |
| **Cells to be Activated List** |  | *0..1* |  | List of cells to be activated or modified | YES | reject |
| **>Cells to be Activated List Item** |  | *1.. <maxCellingNBDU>* |  |  | EACH | reject |
| >> NR CGI | M |  | 9.3.1.12 |  | - |  |
| >> NR PCI | O |  | INTEGER (0..1007) | Physical Cell ID | - |  |
| >> gNB-CU System Information | O |  | 9.3.1.42 | RRC container with system information owned by gNB-CU | YES | reject |
| >>Available PLMN List | O |  | 9.3.1.65 |  | YES | ignore |
| >>Extended Available PLMN List | O |  | 9.3.1.76 | This is included if *Available PLMN List* IE is included and if more than 6 Available PLMNs is to be signalled. | YES | ignore |
| >>IAB Info IAB-donor-CU | O |  | 9.3.1.105 | IAB-related configuration sent by the IAB-donor-CU. | YES | ignore |
| >>Available SNPN ID List | O |  | 9.3.1.163 | Indicates the available SNPN ID list.  If this IE is included, the content of the *Available PLMN List* IE and *Extended Available PLMN List* IE if present in the *Cells to be Activated List Item* IE is ignored. | YES | ignore |
| >>MBS Broadcast Neighbour Cell List | O |  | 9.3.1.226 |  | YES | ignore |
| **>>SSBs within the cell to be Activated List** |  | *0 .. <* *maxnoofSSBAreas>* |  | List of SSB beams within the cell requested to be activated | EACH | ignore |
| >>>SSB Index | M |  | INTEGER (0..63) | Identifier of SSB beam requested to be activated | - |  |
| **Cells to be Deactivated List** |  | *0..1* |  | List of cells to be deactivated | YES | reject |
| **>Cells to be Deactivated List Item** |  | *1.. <maxCellingNBDU>* |  |  | EACH | reject |
| >> NR CGI | M |  | 9.3.1.12 |  | - |  |
| **gNB-CU TNL Association To Add List** |  | *0..1* |  |  | YES | ignore |
| **>gNB-CU TNL Association To Add Item IEs** |  | *1..<maxnoofTNLAssociations>* |  |  | EACH | ignore |
| >>TNL Association Transport Layer Information | M |  | CP Transport Layer Address  9.3.2.4 | Transport Layer Address of the gNB-CU. | - |  |
| >>TNL Association Usage | M |  | ENUMERATED (ue, non-ue, both, ...) | Indicates whether the TNL association is only used for UE-associated signalling, or non-UE-associated signalling, or both. For usage of this IE, refer to TS 38.472 [22]. | - |  |
| **gNB-CU TNL Association To Remove List** |  | *0..1* |  |  | YES | ignore |
| **>gNB-CU TNL Association To Remove Item IEs** |  | *1..<maxnoofTNLAssociation>* |  |  | EACH | ignore |
| >>TNL Association Transport Layer Address | M |  | CP Transport Layer Address  9.3.2.4 | Transport Layer Address of the gNB-CU. | - |  |
| >>TNL Association Transport Layer Address gNB-DU | O |  | CP Transport Layer Address  9.3.2.4 | Transport Layer Address of the gNB-DU. | YES | reject |
| **gNB-CU TNL Association To Update List** |  | *0..1* |  |  | YES | ignore |
| **>gNB-CU TNL Association To Update Item IEs** |  | *1..<maxnoofTNLAssociations>* |  |  | EACH | ignore |
| >>TNL Association Transport Layer Address | M |  | CP Transport Layer Address  9.3.2.4 | Transport Layer Address of the gNB-CU. | - |  |
| >>TNL Association Usage | O |  | ENUMERATED (ue, non-ue, both, ...) | Indicates whether the TNL association is only used for UE-associated signalling, or non-UE-associated signalling, or both. For usage of this IE, refer to TS 38.472 [22]. | - |  |
| **Cells to be barred List** |  | *0..1* |  | List of cells to be barred. | YES | ignore |
| **>Cells to be barred List Item** |  | *1.. <maxCellingNBDU>* |  |  | EACH | ignore |
| >>NR CGI | M |  | 9.3.1.12 |  | - |  |
| >>Cell Barred | M |  | ENUMERATED (barred, not-barred, ...) |  | - |  |
| >>IAB Barred | O |  | ENUMERATED (barred, not-barred, ...) |  | - |  |
| **Protected E-UTRA Resources List** |  | *0..1* |  | List of Protected E-UTRA Resources. | YES | reject |
| **>Protected E-UTRA Resources List Item** |  | *1.. <maxCellineNB>* |  |  | EACH | reject |
| >>Spectrum Sharing Group ID | M |  | INTEGER (1.. maxCellineNB) | Indicates the E-UTRA cells involved in resource coordination with the NR cells affiliated with the same Spectrum Sharing Group ID. | - |  |
| **>> E-UTRA Cells List** |  | *1* |  | List of applicable E-UTRA cells. | - |  |
| **>>> E-UTRA Cells List Item** |  | *1 .. <maxCellineNB>* |  |  | - |  |
| >>>>EUTRA Cell ID | M |  | BIT STRING (SIZE(28)) | Indicates the E-UTRAN Cell Identifier IE contained in the ECGI as defined in subclause 9.2.14 in TS 36.423 [9]. | - |  |
| >>>>Served E-UTRA Cell Information | M |  | 9.3.1.64 |  | - |  |
| **Neighbour Cell Information List** |  | *0..1* |  |  | YES | ignore |
| **>Neighbour Cell Information List Item** |  | *1 .. <maxCellingNBDU>* |  |  | EACH | ignore |
| >>NR CGI | M |  | 9.3.1.12 |  | - |  |
| >>Intended TDD DL-UL Configuration | O |  | 9.3.1.89 |  | - |  |
| Transport Layer Address Info | O |  | 9.3.2.5 |  | YES | ignore |
| Uplink BH Non-UP Traffic Mapping | O |  | 9.3.1.103 |  | YES | reject |
| BAP Address | O |  | 9.3.1.111 | Indicates a BAP address assigned to the IAB-donor-DU. | YES | ignore |
| CCO Assistance Information | O |  | 9.3.1.211 | Indicates CCO Assistance Information for cells and beams served by the gNB-DU of the same NG-RAN node or for cells and beams not served by the gNB-DU. | YES | Ignore |
| Cells for SON List | O |  | 9.3.1.214 |  | YES | ignore |
| gNB-CU Name | O |  | PrintableString(SIZE(1..150,...)) | Human readable name of the gNB-CU. | YES | ignore |
| Extended gNB-CU Name | O |  | 9.3.1.206 |  | YES | ignore |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxCellingNBDU | Maximum numbers of cells that can be served by a gNB-DU. Value is 512. |
| maxnoofTNLAssociations | Maximum numbers of TNL Associations between the gNB-CU and the gNB-DU. Value is 32. |
| maxCellineNB | Maximum no. cells that can be served by an eNB. Value is 256. |
| *maxnoofSSBAreas* | Maximum no. SSB Areas that can be served by a cell. Value is 64. |

**<Unchanged Text Omitted>**

#### 9.2.1.11 GNB-CU CONFIGURATION UPDATE ACKNOWLEDGE

This message is sent by a gNB-DU to a gNB-CU to acknowledge update of information associated to an F1-C interface instance.

NOTE: If F1-C signalling transport is shared among several F1-C interface instance, this message may transfer updated information associated to several F1-C interface instances.

Direction: gNB-DU → gNB-CU

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| Transaction ID | M |  | 9.3.1.23 |  | YES | reject |
| **Cells Failed to be Activated List** |  | *0..1* |  | List of cells which are failed to be activated | YES | reject |
| **>Cells Failed to be Activated Item** |  | *1.. <maxCellingNBDU>* |  |  | EACH | reject |
| >> NR CGI | M |  | 9.3.1.12 |  | - |  |
| >>Cause | M |  | 9.3.1.2 |  | - |  |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |
| **gNB-CU TNL Association Setup List** |  | 0..1 |  |  | YES | ignore |
| **>gNB-CU TNL Association Setup Item IEs** |  | 1..<maxnoofTNLAssociations> |  |  | EACH | ignore |
| >>TNL Association Transport Layer Address | M |  | CP Transport Layer Address  9.3.2.4 | Transport Layer Address of the gNB-CU | - |  |
| **gNB-CU TNL Association Failed to Setup List** |  | 0..1 |  |  | YES | ignore |
| **>gNB-CU TNL Association Failed To Setup Item IEs** |  | 1..<maxnoofTNLAssociations> |  |  | EACH | ignore |
| >>TNL Association Transport Layer Address | M |  | CP Transport Layer Address  9.3.2.4 | Transport Layer Address of the gNB-CU | - |  |
| >>Cause | M |  | 9.3.1.2 |  | - |  |
| **Dedicated SI Delivery Needed UE List** |  | *0..1* |  | List of UEs unable to receive system information from broadcast | YES | ignore |
| **>Dedicated SI Delivery Needed UE List** |  | *1 .. <maxnoofUEIDs>* |  |  | EACH | ignore |
| >>gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | - | - |
| >>NR CGI | M |  | 9.3.1.12 |  | - | - |
| Transport Layer Address Info | O |  | 9.3.2.5 |  | YES | ignore |
| **Cells with SSBs Activated List** |  | *0.. <**maxCellingNBDU>* |  |  | YES | ignore |
| >NR CGI | M |  | 9.3.1.12 |  | - |  |
| **>SSBs activated List** |  | *1 .. < maxnoofSSBAreas >* |  |  | EACH | ignore |
| >>SSB Index | O |  | INTEGER (0..63) | Identifier of the SSB beam activated | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxCellingNBDU | Maximum no. cells that can be served by a gNB-DU. Value is 512. |
| maxnoofTNLAssociations | Maximum no. of TNL Associations between the gNB-CU and the gNB-DU. Value is 32. |
| maxnoofUEIDs | Maximum no. of UEs that can be served by a gNB-DU. Value is 65536. |
| *maxnoofSSBAreas* | Maximum no. SSB Areas that can be served by a cell. Value is 64. |

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

**<Unchanged Text Omitted>**

#### 9.2.2.6 UE CONTEXT RELEASE COMPLETE

This message is sent by the gNB-DU to confirm the release of the UE-associated logical F1 connection or candidate cells in conditional handover or conditional PSCell addition or conditional PSCell change.

Direction: gNB-DU → gNB-CU

| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| --- | --- | --- | --- | --- | --- | --- |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| gNB-CU UE F1AP ID | M |  | 9.3.1.4 |  | YES | reject |
| gNB-DU UE F1AP ID | M |  | 9.3.1.5 |  | YES | reject |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | Ignore |
| **Recommended SSBs for Paging List** |  | *0 .. <* *maxCellingNBDU>* |  |  | YES | ignore |
| >NR CGI | M |  | 9.3.1.12 |  | - |  |
| **>SSBs for Paging List** |  | *1 .. < maxnoofSSBAreas >* |  |  | EACH | ignore |
| >>SSB Index | O |  | INTEGER (0..63) | Identifier of the recommended SSB beam for paging | - |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| *maxnoofSSBAreas* | Maximum no. SSB Areas that can be served by a cell. Value is 64. |

**<Unchanged Text Omitted>**

### 9.2.6 Paging messages

#### 9.2.6.1 PAGING

This message is sent by the gNB-CU and is used to request the gNB-DU to page UEs.

Direction: gNB-CU → gNB-DU

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | ignore |
| UE Identity Index value | M |  | 9.3.1.39 |  | YES | reject |
| CHOICE *Paging Identity* | M |  |  |  | YES | reject |
| *>RAN UE Paging identity* |  |  |  |  |  |  |
| >>RAN UE Paging identity | M |  | 9.3.1.43 |  | - |  |
| *>CN UE paging identity* |  |  |  |  |  |  |
| >>CN UE paging identity | M |  | 9.3.1.44 |  | - |  |
| Paging DRX | O |  | 9.3.1.40 | It is defined as the minimum between the RAN UE Paging DRX and CN UE Paging DRX | YES | ignore |
| Paging Priority | O |  | 9.3.1.41 |  | YES | ignore |
| **Paging Cell List** |  | *1* |  |  | YES | ignore |
| **>Paging Cell Item IEs** |  | *1 .. <maxnoofPagingCells>* |  |  | EACH | ignore |
| >>NR CGI | M |  | 9.3.1.12 |  | - |  |
| >>Last Used Cell Indication | O |  | ENUMERATED(true, …) |  | YES | ignore |
| >>PEI Subgrouping Support Indication | O |  | ENUMERATED(true, …) |  | YES | ignore |
| **>>****Recommended SSBs List** |  | *0 .. <* *maxnoofSSBAreas >* |  |  | EACH | ignore |
| >>>SSB Index | O |  | INTEGER (0..63) | Identifier of the recommended SSB beam for paging | - |  |
| Paging Origin | O |  | 9.3.1.79 |  | YES | ignore | |
| RAN UE Paging DRX | O |  | Paging DRX  9.3.1.40 | This IE indicates the RAN paging cycle as defined in TS 38.304 [24]. | YES | ignore | |
| CN UE Paging DRX | O |  | Paging DRX  9.3.1.40 | This IE indicates the UE specific paging cycle as defined in TS 38.304 [24]. | YES | ignore | |
| NR Paging eDRX Information | O |  | 9.3.1.258 |  | YES | ignore | |
| NR Paging eDRX Information for RRC INACTIVE | O |  | 9.3.1.259 |  | YES | ignore | |
| Paging Cause | O |  | ENUMERATED(voice, …) | This IE indicates the paging cause is IMS voice, refer to TS 23.501[21]. | YES | ignore | |
| PEIPS Assistance Information | O |  | 9.3.1.269 |  | YES | ignore | |
| UE Paging Capability | O |  | 9.3.1.270 |  | YES | ignore | |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofPagingCells | Maximum no. of paging cells, the maximum value is 512. |
| *maxnoofSSBAreas* | Maximum no. SSB Areas that can be served by a cell. Value is 64. |

### 9.4.5 Information Element Definitions

-- ASN1START

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

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-- Information Element Definitions

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

**<Unchanged Text Omitted>**

Cells-to-be-Activated-List-Item ::= SEQUENCE {

nRCGI NRCGI,

nRPCI NRPCI OPTIONAL,

iE-Extensions ProtocolExtensionContainer { { Cells-to-be-Activated-List-ItemExtIEs} } OPTIONAL,

...

}

Cells-to-be-Activated-List-ItemExtIEs F1AP-PROTOCOL-EXTENSION ::= {

{ ID id-gNB-CUSystemInformation CRITICALITY reject EXTENSION GNB-CUSystemInformation PRESENCE optional }|

{ ID id-AvailablePLMNList CRITICALITY ignore EXTENSION AvailablePLMNList PRESENCE optional }|

{ ID id-ExtendedAvailablePLMN-List CRITICALITY ignore EXTENSION ExtendedAvailablePLMN-List PRESENCE optional }|

{ ID id-IAB-Info-IAB-donor-CU CRITICALITY ignore EXTENSION IAB-Info-IAB-donor-CU PRESENCE optional}|

{ ID id-AvailableSNPN-ID-List CRITICALITY ignore EXTENSION AvailableSNPN-ID-List PRESENCE optional }|

{ ID id-MBS-Broadcast-NeighbourCellList CRITICALITY ignore EXTENSION MBS-Broadcast-NeighbourCellList PRESENCE optional }|

{ ID id-SSBs-toBeActivated-List CRITICALITY ignore EXTENSION SSBs-toBeActivated-List PRESENCE optional },

...

}

SSBs-toBeActivated-List ::= SEQUENCE (SIZE(1.. maxnoofSSBAreas)) OF SSB-Index,

**<Unchanged Text Omitted>**

### 9.4.7 Constant Definitions

-- ASN1START

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

--

-- Constant definitions

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

F1AP-Constants {

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

ngran-access (22) modules (3) f1ap (3) version1 (1) f1ap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

**<Unchanged Text Omitted>**

maxnoofSuccessfulHOReports INTEGER ::= 64

maxnoofPSCellsPerSN INTEGER ::= 8

maxnoofNR-UChannelIDs INTEGER ::= 16

maxnoofCellsinCHO INTEGER ::= 8

maxnoofCHOexecutioncond INTEGER ::= 2

maxnoofServedCellsIAB INTEGER ::= 512

maxnoofSSBarea INTEGER ::=64