**3GPP TSG-RAN3 Meeting #126** **R3-24xxxx**

**Orlando, US, 18 - 22, November 2024**

**Agenda Item:** 11.3

**Source:** Qualcomm Incorporated, ZTE

**Title:** (TP for TS 38.423) AI/ML enabled CCO

**Document for:**Approval

# Introduction

This paper contains the TP for TS 38.423 to capture the agreement for the AI/ML assisted CCO.

# Text proposal to TS 38.423

8.4.2 NG-RAN node Configuration Update

8.4.2.1 General

The purpose of the NG-RAN node Configuration Update procedure is to update application level configuration data needed for two NG-RAN nodes to interoperate correctly over the Xn-C interface.

NOTE: Update of application level configuration data also applies between two NG-RAN nodes in case the SN (i.e. the gNB) does not broadcast system information other than for radio frame timing and SFN, as specified in the TS 37.340 [8]. How to use this information when this option is used is not explicitly specified.

The procedure uses non UE-associated signalling.

8.4.2.2 Successful Operation

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**Figure 8.4.2.2-1: NG-RAN node Configuration Update, successful operation**

The NG-RAN node1 initiates the procedure by sending the NG-RAN NODE CONFIGURATION UPDATE message to a peer NG-RAN node2.

If Supplementary Uplink is configured at the NG-RAN node1, the NG-RAN node1 shall include in the NG-RAN NODE CONFIGURATION UPDATE message the *SUL Information* IE and the *Supported SUL band List* IE for each cell added in the *Served NR Cells To Add* IE and in the *Served NR Cells To Modify* IE.

If Supplementary Uplink is configured at the NG-RAN node2, the NG-RAN node2 shall include in the NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message the *SUL Information* IE and the *Supported SUL band List* IE for each cell added in the *Served NR Cells* IE if any.

<<<<SKIP UNRELATED PART>>>>

**Update of Cell Coverage:**

If the *Coverage Modification List* IE is present in the NG-RAN NODE CONFIGURATION UPDATE message, the NG-RAN node2 may use the information in the *Cell Coverage State* IE to identify the cell deployment configuration enabled by the NG-RAN node1 and for configuring the mobility towards the cell(s) indicated by the *Global NG-RAN Cell Identity* IE, as described in TS 38.300 [9].

- If the *Cell Deployment Status Indicator* IE is present in the *Coverage Modification List* IE, the NG-RAN node2 shall consider the cell deployment configuration of the cell to be modified as the next planned configuration and shall remove any planned configuration stored for this cell.

- If the *Cell Deployment Status Indicator* IE is present and the *Cell Replacing Info* IE contains non-empty cell list, the NG-RAN node2 may use this list to avoid connection or re-establishment failures during the reconfiguration, e.g. consider the cells in the list as possible alternative handover targets.

- If the *Cell Deployment Status Indicator* IE is not present, the NG-RAN node2 shall consider the cell deployment configuration of cell to be modified as activated and replace any previous configuration for the cells indicated in the *Coverage Modification List* IE.

If the *SSB Coverage Modification List* IE is present in the *Coverage Modification List* IE, the NG-RAN node2 may use the information in the *SSB Coverage State* IE to identify the SSB beam deployment configuration enabled by the NG-RAN node1 and for configuring the mobility towards the beam(s) indicated by the *SSB Index* IE, as described in TS 38.300 [9].

If the *Coverage Modification Cause* IE set to "coverage" or "cell edge capacity" is present in the NG-RAN NODE CONFIGURATION UPDATE message, the NG-RAN node2 may use the information for deducing the CCO issue detected at NG-RAN node1 and for configuring coverage state of its served cell(s).

If the *Coverage Modification Cause* IE set to "network energy saving" is present and the *SSB Coverage State* IE is zero for a set of SSB beams in the NG-RAN NODE CONFIGURATION UPDATE message, the NG-RAN node2 may use the information to decide the SSB beam activation for the concerned beams when necessary.

**Update of Future Cell Coverage:**

If the *Future Coverage Modification List* IE is present in the NG-RAN NODE CONFIGURATION UPDATE message, the NG-RAN node2 may use the information to identify the cell deployment configuration to be enabled by the NG-RAN node1 in a future time indicated by *Time for Future Coverage State* IE and for configuring the mobility towards the cell(s) indicated by the *Global NG-RAN Cell Identity* IE, as described in TS 38.300 [9].

If the *Future SSB Modification List* IE is present in the *Future Coverage Modification List* IE, the NG-RAN node2 may use the information in the *Future SSB Coverage State* IE to identify the SSB beam deployment configuration to be enabled by the NG-RAN node1 in a future time indicated by *Time for Future Coverage State* IE and for configuring the mobility towards the beam(s) indicated by the *SSB Index* IE, as described in TS 38.300 [9].

If the *Predicted Coverage Modification Cause* IE set to "coverage" or "cell edge capacity" is present in the NG-RAN NODE CONFIGURATION UPDATE message, the NG-RAN node2 may use the information for deducing the CCO issue predicted in NG-RAN node1 and for configuring coverage state of its served cell(s).

**Interactions with other procedures:**

If the NG-RAN node1 receives a NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message containing a Local NG-RAN Node Identifier identical to the Local NG-RAN Node Identifier included in the corresponding NG-RAN NODE CONFIGURATION UPDATE message, the NG-RAN node1 may initiate the NG-RAN node Configuration Update procedure including in the NG-RAN NODE CONFIGURATION UPDATE message a new Local NG-RAN Node Identifier, different from the Local NG-RAN Node Identifierof each of its neighbour NG-RAN Nodes.

If the NG-RAN node1 receives a NG-RAN NODE CONFIGURATION UPDATE ACKNOWLEDGE message containing a Local NG-RAN Node Identifierwithin the *Neighbour NG-RAN Node List* IE identical to the Local NG-RAN Node Identifier included in the corresponding NG-RAN NODE CONFIGURATION UPDATE message, the NG-RAN node1 may initiate the NG-RAN node Configuration Update procedure including in the NG-RAN NODE CONFIGURATION UPDATE message a new Local NG-RAN Node Identifier, different from the Local NG-RAN Node Identifierof each of its neighbour NG-RAN Nodes.

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

9.1.3.4 NG-RAN NODE CONFIGURATION UPDATE

This message is sent by a NG-RAN node to a neighbouring NG-RAN node to transfer updated information for an Xn-C interface instance.

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 |
| TAI Support List | O |  | 9.2.3.20 | List of supported TAs and associated characteristics. | GLOBAL | reject |
| <<<<SKIP UNRELATED PART>>>> |
| **Neighbour NG-RAN Node List** |  | *0..<maxnoofNeighbourNG-RAN nodes>* |  |  | YES | ignore |
| *>*Global NG-RAN Node ID | M |  | 9.2.2.3 |  | – |  |
| >Local NG-RAN Node Identifier | M |  | 9.2.2.101 |  | – |  |
| Local NG-RAN Node Identifier Removal | O |  | Local NG-RAN Node Identifier9.2.2.101 |  | YES | ignore |
| Future Coverage Modification List |  | 0..1 |  |  | YES | ignore |
|  >Future Coverage Modification Item |  | 0..<maxnoofCellsinNG-RAN node> |  |  | - |  |
|  >>Global NG-RAN Cell Identity | M |  | Global NG-RAN Cell Identity 9.2.2.27 | NG-RAN Cell Global Identifier of the cell to be impacted. | - |  |
|  >>Future Cell Coverage State | M |  | INTEGER (0..63, ...) | Value ‘0’ indicates that the cell will be inactive. Other values Indicates that the cell will be active and also indicates the future coverage configuration of the concerned cell. | - |  |
|  >>Future SSB Modification List |  | 0..1 |  | List of SSB beams to be modified coverage. | - |  |
|  >>>Future SSB Coverage Modification Item |  | 0..<maxnoofSSBAreas> |  |  | - |  |
|  >>>>SSB index | M |  | INTEGER (0..63) | Identifier of the SSB to be modified. | - |  |
|  >>>Future SSB Coverage State | M |  | INTEGER (0..15, ...) | Value ‘0’ indicates that the SSB beam will be inactive. Other values indicate that the SSB beams will be active and also indicate the future coverage configuration of the concerned SSB beams. | - |  |
|  >>Predicted Coverage Modification Cause | O |  | ENUMERATED (coverage, cell edge capacity, ...) | Indicates the reasons for the predicted coverage modification in NG-RAN node1. | - |  |
|  >> Time for Future Coverage State | O |  | INTEGER (1..FFS) | Indicates the time when future coverage modification will happen from the time of receiving this information, in seconds. | - |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoofTNLAssociations | Maximum numbers of TNL Associations between the NG RAN nodes. Value is 32. |
| maxnoofCellsinNG-RAN node | Maximum no. cells that can be served by a NG-RAN node. Value is 16384. |
| maxnoofSSBAreas | Maximum no. SSB Areas that can be served by a cell. Value is 64. |
| maxnoofNeighbourNG-RAN nodes | Maximum no. of neighbour NG-RAN nodes. Value is 256. |

|  |  |
| --- | --- |
| **Condition** | **Explanation** |
| ifCellDeploymentStatusIndicatorPresent | This IE shall be present if the *Cell Deployment Status Indicator* IE is present. |

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