**3GPP TSG-RAN3 Meeting #125** **R3-244697**

**Maastricht, Netherlands, Aug 19-23, 2024**

**Agenda Item:** 11.3

**Source:** Qualcomm Incorporated, ZTE, CATT, Samsung, CMCC

**Title:** (TP for TR 38.743) AI/ML enabled CCO

**Document for:**Discussion/Decision

# Introduction

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

# Text proposal to TR 38.743

## 4.2 AI/ML based Coverage and Capacity Optimization

### 4.2.1 Use case description

*Editor Note: Capture the description of use case*

The objective of NR Coverage and Capacity Optimization (CCO) function is to detect and resolve or mitigate CCO issues. An NG-RAN node may autonomously adjust within and switch among coverage configurations. When a change is executed, a NG-RAN node may notify its neighbour NG-RAN nodes with the list of cells and SSBs with modified coverage included.

In the legacy CCO solution, a reactive approach is used: when the gNB (gNB-CU in case of CU-DU split architecture) detects a CCO issue which negatively impacts network and UE performance after it has already occurred, the gNB (gNB-DU in case of CU-DU split architecture) attempts to resolve or mitigate it.

With an AI/ML based CCO, a more proactive approach is used to prevent (or limiting at an early stage) the rise of a CCO issue with the consequent degradation of network (and UE) performance.

### 4.2.2 Solutions and standard impacts

*Editor Note: Capture the solutions for the use case, including potential standard impacts on existing Nodes, functions, and interfaces*

#### 4.2.2.1 Locations for AI/ML Model Training and AI/ML Model Inference

The following solutions can be considered for supporting AI/ML-based CCO:

- AI/ML Model Training is located in the OAM and AI/ML Model Inference is located in the gNB.

- AI/ML Model Training and AI/ML Model Inference are both located in the gNB.

In case of CU-DU split architecture, the following solutions are possible:

- AI/ML Model Training is located in the OAM and AI/ML Model Inference is located in the gNB-CU.

- AI/ML Model Training and Model Inference are both located in the gNB-CU.

#### 4.2.2.2 Input data of AI/ML based CCO

For a proactive prediction and resolution of a CCO issue, a gNB may need the following information as input data for AI/ML-based CCO:

From local node:

- Measured/Predicted radio resource status

- Current CCO State

From neighbouring gNBs:

- Measured/Predicted radio resource status from the UE:

- UE measurement report (e.g., UE RSRP, RSRQ, SINR measurement, etc), including cell level and beam level UE measurements

- SON Reports (e.g., RLF, CEF, RA)

4.2.2.3 Output data of AI/ML based CCO:

AI/ML-based CCO model in a gNB can generate following information as output:

- Predicted CCO issue (including predicted affected cells/beams)

- Future CCO State based on the predicted CCO issue

Note: Future CCO State can also be derived by legacy means. Signalling future CCO state will not be described as prediction over Xn.

Note: Future CCO state and predicted CCO issue will be generated together with timing information.

4.2.2.4 Feedback of AI/ML based CCO:

To optimize the performance of AI/ML-based CCO model, following feedback can be considered to be collected from gNBs:

* Measured radio resource status
* Legacy UE performance feedback for those UEs handed over from the source gNB
* SON Reports (e.g., RLF, CEF, RA)

4.2.2.5 Potential standard impacts:

Following standard impacts are listed for subsequent Rel-19 normative work compared with what was specified during Rel-18.

Xn interface:

* Enhanced existing procedure to collect predicted information between gNBs:
	+ Future CCO State based on the predicted CCO issue

F1 interface:

* Predicted CCO Issue (including predicted affected cells/beams) from gNB-CU to gNB-DU
* Future CCO State based on the predicted CCO issue from gNB-DU to gNB-CU

Note: Whether gNB-CU generates the suggested future CCO state to gNB-DU as assistance information is left to normative discussion.

Note: Future CCO state and predicted CCO issue will be exchanged together with timing information.