**3GPP TSG-RAN WG4 Meeting # 107 R4-23XXXXX**

**Incheon, KR, May 22nd – May 26th , 2023**

**Agenda item: 8.29.6**

**Source:** Moderator (ZTE Corporation)

**Title:** Topic summary for [107][328] NCR-MT Demodulation performance

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

# Topic #1: NCR\_MT demodulation requirements

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2308190 | CMCC | Proposal 1: it’s suggested to consider additional CBW 5MHz/15kHz considering 5MHz is minimum CBW for certain NCR operation bands.  Proposal 2: requirements for signaling of access link beam change indication should be applicable for both FR1 and FR2.  Observation 1: it’s much important to make sure MT would accurately demod access indication information to avoid connection interruption or severe interference to other UE due to wrong beam direction.  Proposal 3: one suggestion is to use 1% BLER as test metric for MAC-CE access link beam indication transmitted over PDSCH.  Observation 2: RAN1 use DCI format 2\_8 rather than 5\_0 to indicate non-periodic beam indication. The main difference from 1\_0/1\_1 is the payload side difference.  Proposal 4: it’s suggested to define PMI reporting requirements for NCR-MT. |
| R4-2308409 | ZTE Corporation | Proposal 1. No need to consider additional CHBW 5MHz/15kHz  Proposal 2. No need to consider new requirements for signaling of Access link beam indication.  Proposal 3. No need to consider new test metric for PDSCH.  Proposal 4. To consider MCS 4 for QPSK and MCS 13 for 16QAM.  Proposal 5. To consider define new requirements for DCI 2\_8.  Proposal 6. To consider CORESET duration 2 for 1TX.  Proposal 7. No need to define PMI requirements. |
| R4-2308525 | Ericsson | Observation 1 Decisions on whether QPSK is sufficient, whether to support 5MHz and the PDSCH operation point of 1% will have a significant impact on the number of needed simulations.  Observation 2 1% BLER is a correct point for control operation, but there may be a risk of lack of convergence between different companies.  Observation 3 Adding requirements for 5MHz and/or lower than 1% BLER target would add 12-24 simulations.  Observation 4 No new simulations needed for CQI.  Observation 5 In theory, for PMI, if 5MHz is adopted then the requirement should be checked. In practice, for the low delay spread channel it is unlikely the requirement will differ.  Proposal 1 RAN4 decide whether QPSK is sufficient for the 70% throughput requirements  Proposal 2 Use TDLA30-75 as the channel model for FR2.  Proposal 3 Adopt the following for FR1 PDCCH:  1TX: coreset duration 2  2TX: coreset duration 1 |
| R4-2308893 | Huawei, HiSilicon | Proposal 1:Only consider 10MHz for 15kHz SCS and 40MHz for 30kHz SCS for NCR-MT demodulation requirements.  Proposal 2:Define new requirements for 15kHz and 30kHz, same requirements are applicable to FDD and TDD with different UL-DL patterns.  Proposal 3:Do not define new requirements on PDCCH/PDSCH for signaling of Access link beam change indication.  Proposal 4:Do not consider test metric higher than 70%.  Proposal 5:Select coreset duration 2 for 1Tx and coreset duration 1 for 2Tx for NCR-MT PDCCH requirements with 15kHz.  Proposal 6:Define PMI reporting cases for the NCR-MT with the test parameters reused from IAB.  Proposal 7:Define applicability rule that “Testing of performance requirements for PMI reporting is optional”. |
| R4-2309329 | Nokia, Nokia Shanghai Bell | Observation 1: C-link NCR-MT will have low TPUT and, hence, smallest CBW can be allocated for such a link.  Observation 2: NCR will operate in different CBW sizes. Requirements for minimum CBW could be extended/reused to any supported CBW.  Observation 3: The operation of NCR in FR2 will depend on the Access link beam used by the NCR-Fwd. It is unlikely that a FR2 Fwd link NCR will implement FR1 for the backhaul link only, as such we need requirements to cover the FR2 only case.  Observation 4: C-link of NCR-MT must be decoded correctly with as few HARQ retransmission as possible to ensure the best Access link beam is set properly for the NCR-Fwd within the appropriate time (i.e., not outdated and not introducing further latency).  Observation 5: With the low data rate transmission on the C-link NCR-MT and with the requirements of having high reliability in decoding the Access link beam indication MAC CEs, Block Error Rate (BLER) can be considered as a metric for C-link NCR-MT.  Observation 6: For NCR-MT, scheduling grant (i.e., DCI format 1\_0/1\_1) is not typical, whereas DCI type 5\_0/2\_8 can be used for access link beam change indication. The DCI size can have the maximum value of 128.  Observation 7: In 38.101-4, for FDD, the majority test cases have Coreset duration of 2 for 1TX.  Observation 8: NCRs are part of the network and can profit from network planning. Good channel conditions and known spatial transmission/receptions environments can be assumed. Overall low data rates are expected for NCR control information, hence fixed PMI or even no-PMI will be feasible in deployment. Link adaptation is covered in CQI requirements.  Proposal 1: RAN4 shall define new FR1 requirements for 5 MHz/15 KHz.  Proposal 2: New FR2 requirements shall be defined on PDCCH/PDSCH for signaling of the indication of changing the Access link beam.  Proposal 3: RAN4 shall consider no less than 70% throughput in the requirements.  Proposal 4: Additionally, RAN4 shall specify requirements having BLER <1% for the PDSCH C-link NCR-MT without HARQ retransmission.  Proposal 5: RAN4 shall adapt test parameters for NCR PDCCH requirements following DCI format 5\_0/2\_8, e.g., FRC, DCI format, payload size, probability of misdetection.  Proposal 6: RAN4 to down select the test cases in 38.101-4 for NCR-MT by considering Coreset duration 2 for 1TX and Coreset duration 1 for 2TX.  Proposal 7: RAN4 shall not consider defining requirements for PMI reporting. |

## Open issues summary

*Before Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic General

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-1-1: FR1 requirements**

* Agreement in last meeting
* Define new requirements for FDD/15 KHz and TDD/30 KHz for 1 layer only by reusing/adapting requirements for IAB-MT.
  + - 10M/15kHz; 40M/30kHz
    - FFS whether need to consider additional CHBW 5MHz/15kHz
* Proposals
  + Option 1: Define new FR1 requirements for 5 MHz/15 KHz.(CMCC, Nokia)
  + Option 2: Only consider 10MHz for 15kHz SCS and 40MHz for 30kHz SCS for NCR-MT demodulation requirements.(ZTE, HW)
    - * Option 2A: Define new requirements for 15kHz and 30kHz, same requirements are applicable to FDD and TDD with different UL-DL patterns.(HW)
* Recommended WF
  + To be discussed

**Issue 1-1-2: FR2 requirements**

* Agreement in last meeting
  + Reuse IAB-MT requirements for NCR-MT demodulation and only consider Rank 1 with 100MHz/120kHz
  + FFS new requirements on PDCCH/PDSCH for signaling of Access link beam change indication
* Proposals
  + Option 1: New FR2 requirements shall be defined on PDCCH/PDSCH for signaling of the indication of changing the Access link beam. (Nokia,CMCC)
  + Option 2: Do not define new requirements on PDCCH/PDSCH for signaling of Access link beam change indication.(ZTE, HW)
* Recommended WF
  + To be discussed

**Issue 1-1-3: Access link beam change indication**

* Proposals
  + Option 1: requirements for signaling of access link beam change indication should be applicable for both FR1 and FR2.(CMCC)
* Recommended WF
  + To be discussed

### Sub-topic PDSCH requirements

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-2-1: Test metric for FR1 and FR2**

* Agreement in last meeting
  + Both 70% and 30% throughput cases agreed as baseline assumption for the test cases reused from IAB-MT requirements
    - Other values higher than 70% not precluded
  + FFS for the test metric of new test case for specifically for MAC-CE Access link beam indication transmitted over PDSCH if introduced
* Proposals
  + Option 1: <=1% BLER(CMCC, Nokia)
  + Option 2: Do not consider test metric higher than 70%(HW, ZTE)
  + Option 3: Consider no less than 70% throughput in the requirements.(Nokia)
  + Option 4: RAN4 decide whether QPSK is sufficient for the 70% throughput requirements.(Ericsson)
* Recommended WF
  + To be discussed

**Issue 1-2-2: MCS**

* Proposals
  + Option 1: MCS 4 for QPSK and MCS 13 for 16QAM.(ZTE)
* Recommended WF
  + To be discussed

**Issue 1-2-3: Channel model for FR2**

* Proposals
  + Option 1: TDLA30-75 (Ericsson)
* Recommended WF
  + Option 1 can be agreed

### Sub-topic PDCCH requirements

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-3-1: PDCCH requirements**

* Agreement in last meeting
  + Reuse UE requirements for FDD and TDD
  + FFS for adapt PDCCH requirement for testing of DCI type 5\_0 used for access link beam change indication.
* Proposals
  + Option 1: RAN4 shall adapt test parameters for NCR PDCCH requirements following DCI format 5\_0/2\_8, e.g., FRC, DCI format, payload size, probability of misdetection.(Nokia, ZTE)
* Recommended WF
  + To be discussed

**Issue 1-3-2: CORESET for FDD**

* Proposals
  + Option 1: (Ericsson, ZTE, HW, Nokia)
    - * 1TX: coreset duration 2
      * 2TX: coreset duration 1
* Recommended WF
  + Option 1 can be agreed.

### Sub-topic CSI requirements

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-4-1: PMI requirements**

* Agreement in last meeting
  + FFS whether need to define PMI reporting requirements
* Proposals
  + Option 1: Define PMI reporting requirements (CMCC, HW)
  + Option 2: No (Nokia, ZTE)
* Recommended WF
  + To be discussed

**Issue 1-4-2: Applicability rule for PMI reporting**

* Proposals
  + Option 1: Testing of performance requirements for PMI reporting is optional. (HW)
* Recommended WF
  + To be discussed