**3GPP TSG-RAN WG4 Meeting #112 R4-24xxxxx**

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

**Source: China Telecom**

**Title: Offline minutes for NR\_demod\_Ph5 WI**

**Agenda Item: 8.16.4**

**Document for: discussion**

1. **UE performance requirements for 8Rx**

**Issue 2-1-1: Test scope**

* Proposals:
  + Proposal 1: RAN4 to introduce UE demodulation requirements for both TDD and FDD for 8Rx (Nokia, China Telecom, CMCC, Qualcomm)
  + Proposal 2: RAN4 to discuss whether to cover PDSCH absolute physical layer throughput requirements for 8Rx (China Telecom)
* CTC: PDSCH absolute physical layer throughput requirements are mandatory requirements for 2/4Rx.
  + Proposal 3: Clarify if CQI reporting requirements are needed for 8Rx UE antennas with inter-cell interference (Samsung)
* HW: Only AWGN is covered for 8Rx CQI requirements in current spec. It seems strange that RAN4 skip fading channel requirements and jump directly to requirements with interference.

Discussion:

* Proposal 1: RAN4 to introduce UE demodulation requirements for both TDD and FDD for 8Rx (Nokia, China Telecom, CMCC, Qualcomm)

Tentative consensus: RAN4 to introduce UE demodulation requirements for both TDD and FDD.

* Proposal 2: RAN4 to discuss whether to cover PDSCH absolute physical layer throughput requirements for 8Rx (China Telecom)

Apple, QC: RAN5 didn’t ask RAN4 to define such requirements.

Tentative consensus: Not to cover PDSCH absolute physical layer throughput requirements for 8Rx

* Proposal 3: Clarify if CQI reporting requirements are needed for 8Rx UE antennas with inter-cell interference

CMCC: Can we only use AWGN for ICI requirements?

Apple: In ICI CQI tests, both AWGN and fading channel are involved.

CTC, E///, Nokia, ZTE, HW, CMCC, QC: CQI reporting requirements under ICI should be cover for 8Rx.

Samsung, Apple, MTK: Based on the observation from HW, no need to cover such requirements.

MTK: For Rel-18, we down-select CQI requirements under fading follow LTE approach.

Candidate options on whether to cover CQI requirements for ICI scenario:

* + Option 1: CQI reporting requirements under ICI should be cover for 8Rx (CTC, E///, Nokia, ZTE, HW, CMCC, QC)
  + Option 2: No need to cover such requirements (Samsung, Apple, MTK)

**Issue 2-1-2: 8Rx UE MMSE-IRC receiver assumption**

* UE receiver capability definition in Rel-18:

|  |
| --- |
| *SU-MIMO 8Rx receiver*  *- Baseline SU-MIMO 8Rx receiver: 8Rx receivers for SU-MIMO transmissions with support of up to 8 layers with joint 8Rx MIMO detector in FR1*  *- Simplified SU-MIMO 8Rx receiver: 8Rx receivers for SU-MIMO transmissions with support of up to 4 layers with two joint 4Rx MIMO detectors in FR1.* |

* Proposals:
  + Option 1: Cover both Baseline SU-MIMO 8Rx receiver and Simplified SU-MIMO 8Rx receiver (China Telecom, MTK, Apple if requirements are release independent from Rel-18)
* MTK: The gap between 8Rx MMSE-IRC baseline receiver and 8Rx MMSE-IRC simplified receiver is over 1dB.
  + Option 2: Define requirements only for SU-MIMO baseline receiver (Qualcomm, Huawei)
* QC, HW: Requirements with 4Rx are already defined in 38.101.
* Recommended WF
  + Interested companies are encouraged to bring simulation results to show the gap between the two types of receivers.

Discussion:

Nokia: We introduce 2 types because significant performance gap.

QC: Requirements with 4Rx are already defined in 38.101. simplified 8Rx does not support more than 4 layers.

Apple: IF we only cover Baseline SU-MIMO requirements, what happen if UE only support simplified? No MMSE-IRC requirements for those UEs?

**Issue 2-1-4: Test parameters for different devices with 8Rx**

* Proposals:
  + Proposal 1: Define different parameters for FWA, Vehicular and Industrial deployments respectively (Nokia)

|  |
| --- |
| * For FWA performance requirements   + TDLA 30-10 Low   + MCS 17 (table 2)   + 15 kHz SCS and 50 MHz CBW   + 30 kHz SCS and 100 MHz CBW   + Rank 4 * For vehicular performance requirements   + TDLB 100-400 Low   + MCS 2 (table 1)   + 15 kHz SCS and 5 MHz CBW   + 30 kHz SCS and 10 MHz CBW   + Rank 2 * For industrial performance requirements   + TDLC 300-100 Low   + MCS 13 (table 2)   + 15 kHz SCS and 5 MHz CBW   + 30 kHz SCS and 10 MHz CBW   + Rank 2 |

Discussion:

QC: We already cover TDLA and TDLC for different devices.

MTK: Prefer to keep the same configuration as in Rel-17 MMSE-IRC.

Tentative consensus: Not to define different set of requirements for different device types.

**Issue 2-3-1: Receiver type for MU-MIMO**

* Proposals:
  + Proposal 1: Consider MMSE-IRC and also check the possibility to support R-ML receiver in Rel-19 (China Telecom)
* Samsung: Clarify whether PDSCH demodulation requirements are needed or not for intra-cell inter-user interference with Enhanced receiver Type 2.

Tentative consensus: MMSE-IRC only