3GPP TSG-RAN WG4 Meeting #102-e R4-2207254

Electronic Meeting, 21 February – 3 March 2022

Agenda Item: 10.6.5

Source: Ericsson

Title: Way forward for NR DL1024QAM demodulation and CQI reporting requirements

Document for: Approval

# 1 PDSCH demodulation requirements

* Interested companies are encouraged to provide the PDSCH simulation results according to Table 1 in the next meeting to decide the SNR test points.
* Add 1dB additional margin on top of the average of companies’ impairment results for PDSCH 1024QAM.

Table Simulation parameters for PDSCH demodulation for DL 1024QAM in FR1.

|  |  |  |
| --- | --- | --- |
| Parameters | FDD | TDD |
| SCS/CBW | 15kHz and 10MHz | 30kHz and 40MHz |
| TDD UL/DL configuration | N/A | 7D1S2U, with S=6:4:4Schedule PDSCH in the special slots |
| MCS (MCS index table 4) | MCS23 |
| Rank | 1 |
| Antenna configuration | 2x2 with ULA Low2x4 with ULA Low |
| Propagation channel | TDLD30-5 |
| PDSCH configuration | Type A mapping, Start symbol 2, Duration 12 |
| PDSCH DMRS configuration | Type 1, Single symbol, additional DMRS: pos1 |
| Tx EVM assumed for simulation | 2.5% |
| SSB configuration | Periodicity 20 ms, Allocated in first slot within 20ms |
| TRS configuration | 20 ms periodicity, 2 slots, Offset 10 ms |
| Number of HARQ processes | 4 for FDD 15kHz, 8 for TDD 30kHz |
| Transform precoding | CP-OFDM |
| Allocated RBs | Full BWP |
| PRB bundling | 2 |
| Precoding model | Random Precoding, per slot and per RB bundling size granularity (codebook configuration: Single panel Type 1) |
| Receiver type | MMSE-IRC |
| Test metric | 70% of maximum throughput |

# 2 SDR requirements

* Set the practical MCS indexes with MCS index table 4 (TS38.214 Table 5.1.3.1-4) for SDR test for 2Rx as follows:
	+ Rank 1
		- ~~Option 1: MCS25~~
		- ~~Option 2: MCS24~~
		- Option 3: MCS23
	+ Rank 2
		- ~~Option 1: MCS23~~
		- ~~Option 2: MCS24~~
		- Option 3: Not define SDR tests
		- ~~Option 4: MCS 22 or less~~
* Set the practical MCS indexes with MCS index table 4 (TS38.214 Table 5.1.3.1-4) for 4Rx as follows:
	+ Rank 1:
		- Option 1: MCS24
		- ~~Option 2: MCS25~~
	+ Rank 2: MCS23
* Set $MCS\_{req}^{j}$ as shown in Table 2 and Table 3 from the formula:
	+ $MCS\_{req}^{j}= min⁡(MCS\_{upperbound}^{j}, MCS\_{practical}^{j})$

Table MCS indexes for SDR test with 1024QAM for 2Rx

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| $$v\_{Layers}^{j}$$ | $$Q\_{m}^{j}$$ | $$f^{j}$$ | $$MCS\_{upperbound}^{j}$$ | $$MCS\_{practical}^{j}$$ | $$MCS\_{req}^{j}$$ |
| 1 | 10 | 1 | 25 | [23] | [23] |
| 1 | 10 | 0.8 | 21 | [21] |
| 1 | 10 | 0.75 | 19 | [19] |
| 1 | 10 | 0.4 | 9 | [9] |
| ~~2~~ | ~~10~~ | ~~1~~ | ~~25~~ | ~~TBD~~ | ~~TBD~~ |
| ~~2~~ | ~~10~~ | ~~0.8~~ | ~~21~~ | ~~TBD~~ |
| ~~2~~ | ~~10~~ | ~~0.75~~ | ~~19~~ | ~~TBD~~ |
| ~~2~~ | ~~10~~ | ~~0.4~~ | ~~9~~ | ~~TBD~~ |

Table MCS indexes for SDR test with 1024QAM for 4Rx

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| $$v\_{Layers}^{j}$$ | $$Q\_{m}^{j}$$ | $$f^{j}$$ | $$MCS\_{upperbound}^{j}$$ | $$MCS\_{practical}^{j}$$ | $$MCS\_{req}^{j}$$ |
| 1 | 10 | 1 | 25 | [24] | [24] |
| 1 | 10 | 0.8 | 21 | [21] |
| 1 | 10 | 0.75 | 19 | [19] |
| 1 | 10 | 0.4 | 9 | [9] |
| 2 | 10 | 1 | 25 | [23] | [23] |
| 2 | 10 | 0.8 | 21 | [21] |
| 2 | 10 | 0.75 | 19 | [19] |
| 2 | 10 | 0.4 | 9 | [9] |

# 3 CQI reporting tests

* Discuss the final CQI definition requirements with CQI table 4 considering the impairment margin and SNR levels provided by TE with the assumption of Tx EVM 2.5%.
	+ 2Rx UE:
		- This is the common understanding SNR corresponding to CQI index 14 for 1024QAM table is around 28-30dB for 2Rx UE without impairment margin.
			* Option 1: SNR = 28/29dB
			* Option 2: SNR = 29/30dB
	+ 4Rx UE:
		- This is the common understanding SNR corresponding to CQI index 14 for 1024QAM table is around 26-28dB for 4Rx UE without impairment margin.
			* Option 1: SNR = 25/26dB
			* Option 2: SNR = 26/27dB

# 4 CR work split

* Volunteer companies are encouraged to submit the draft CR in RAN4#103-e.

|  |  |  |
| --- | --- | --- |
| Clause | CR | Volunteer company |
| 5.1.1.x6.1.1.xB.2.1.1 | Applicability of demodulation requirements Applicability of CSI reporting requirementsDelay profiles for FR1 (TDLD30-5) | Qualcomm |
| 5.2.2.1.x5.2.3.1.xA.3.2.1.x | PDSCH demodulation requirements for FDD (2Rx and 4Rx)FRC for PDSCH FDD | MediaTek |
| 5.2.2.2.x 5.2.3.2.xA.3.2.2.x | PDSCH demodulation requirements for TDD (2Rx and 4Rx)FRC for PDSCH TDD | Apple |
| 6.2.2.1.x6.2.2.2.xA.4 | CQI reporting definition under AWGN conditions for FDD (2Rx and 4Rx)CSI reference measurement channels | Huawei |
| 6.2.3.1.x6.2.3.2.x5.5A | CQI reporting definition under AWGN conditions for TDD (2Rx and 4Rx)Sustained downlink data rate provided by lower layers | Ericsson |