3GPP TSG-RAN WG4 Meeting #102-e R4-2207206

Electronic Meeting, 21 February – 3 March 2022

Agenda Item: 10.20.4

Source: Ericsson

Title: WF on RedCap demodulation and CQI reporting requirements

Document for: Approval

# 1 Configuration for UE demodulation and CSI reporting requirements for RedCap

**Number of Rx antennas, CBW, duplex mode, and frequency range**

* 1Rx RedCap UE: RAN4 define new UE demodulation and CSI reporting requirements with the following configuration:
  + FDD SCS=15kHz in FR1: CBW=10MHz
  + TDD SCS=30kHz in FR1: CBW=20MHz
  + Not to define UE demodulation and CSI requirements with 1Rx for FR2 RedCap UE

**UL/DL pattern used for FDD tests for 1Rx UE**

* Use Full Duplex FDD as the initial simulation assumption.
* For the requirements,
  + Option 1: Consider Full-duplex FDD only
  + Option 2: Consider Full-duplex FDD and half-duplex FDD with applicability rule

**Applicability rule for RedCap UE demodulation and CSI reporting requirements between 1Rx UE and 2Rx UE**

* Define applicability rule for requirements for RedCap UE:
  + If RedCap UE supports only 1 Rx, only 1Rx test is executed
  + If RedCap UE supports only 2 Rx, only 2Rx test is executed
  + If RedCap UE supports both 1 Rx and 2 Rx, only 2 Rx test is executed

# 2 UE demodulation requirements

Interested companies are encouraged to provide the simulation results for the agreed test cases in RAN4#103-e.

## 2.1 PDSCH

### 2.1.1 Scope of demodulation requirements

**Additional PDSCH demodulation requirements**

* Not define the additional PDSCH demodulation requirements other than the candidates discussed in 2.1, in Rel-17 RedCap

**Define 256QAM demodulation requirements or not**

* Option 1: Specify 256QAM demodulation requirements for FR1 only
  + Candidate test setup:
    - TS38.101-4 5.2.2.1.1-3 Test 1-3 for FDD 15kHz
    - TS38.101-4 5.2.2.1.1-3 Test 1-3 for TDD 30kHz
* Option 2: Not to specify 256QAM demodulation requirements.
* Option 3: Discuss whether to specify the requirements for FR1 once we stabilize the discussion on requirements for mandatory features.

### 2.1.2 Simulation assumption

Interested companies are encouraged to provide the simulation results with ‘New’. Interested companies can also provide the simulation results with ‘Reuse’ for reference.

#### 3.1.1.1 FDD 15kHz FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | CBW / SCS | MCS and rank | Propagation condition | Antenna configuration | Metric | Reference from TS38.101-4 Table | New / Reuse |
| 1Rx UE | 10MHz / 15kHz | QPSK 1/3  Rank 1 | TDLB400-400 | 2x1 low | 70% of peak rate | 5.2.2.1.1-3 Test 1-1 | New |
| 1Rx UE | 10MHz / 15kHz | 16QAM 0.48  Rank 1 | TDLC300-100 | 2x1 low | 70% of peak rate | 5.2.2.1.1-3 Test 1-4 | New |
| 1Rx UE | 10MHz / 15kHz | 64QAM 0.50  Rank 1 | TDLA30-10 | 2x1 low | 70% of peak rate | 5.2.2.1.1-4 Test 2-1 | New |
| 2Rx UE | 10MHz / 15kHz | QPSK 1/3  Rank 1 | TDLB400-400 | 2x2 ULA low | 70% of peak rate | 5.2.2.1.1-3 Test 1-1 | Reuse |
| 2Rx UE | 10MHz / 15kHz | 16QAM 0.48  Rank 1 | TDLC300-100 | 2x2 ULA low | 70% of peak rate | 5.2.2.1.1-3 Test 1-4 | New |
| 2Rx UE | 10MHz / 15kHz | 64QAM 0.5 Rank 2 | TDLA30-10 | 2x2 ULA low | 70% of peak rate | 5.2.2.1.1-4 Test 2-1 | Reuse |

#### 3.1.1.2 TDD 30kHz FR1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | CBW / SCS | MCS and rank | TDD UL/DL pattern | Propagation condition | Antenna configuration | Metric | Reference from TS38.101-4 Table | New / Reuse |
| 1Rx UE | 20MHz / 30kHz | QPSK 1/3  Rank 1 | FR1.30-1A | TDLB400-400 | 2x1 low | 70% of peak rate | 5.2.2.2.1-3 Test 1-1 | New |
| 1Rx UE | 20MHz / 30kHz | 16QAM 0.48  Rank 1 | FR1.30-1 | TDLC300-100 | 2x1 low | 70% of peak rate | 5.2.2.2.1-3 Test 1-4 | New |
| 1Rx UE | 20MHz / 30kHz | 64QAM 0.50  Rank 1 | FR1.30-1 | TDLA30-10 | 2x1 low | 70% of peak rate | 5.2.2.2.1-4 Test 2-1 | New |
| 2Rx UE | 20MHz / 30kHz | QPSK 1/3  Rank 1 | FR1.30-1A | TDLB400-400 | 2x2 ULA low | 70% of peak rate | 5.2.2.2.1-3 Test 1-1 | New |
| 2Rx UE | 20MHz / 30kHz | 16QAM 0.48  Rank 1 | FR1.30-1 | TDLC300-100 | 2x2 ULA low | 70% of peak rate | 5.2.2.2.1-3 Test 1-4 | New |
| 2Rx UE | 20MHz / 30kHz | 64QAM 0.50  Rank 2 | FR1.30-1 | TDLA30-10 | 2x2 ULA low | 70% of peak rate | 5.2.2.2.1-4 Test 2-1 | New |

#### 3.1.1.3 TDD 120kHz FR2

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | CBW / SCS | MCS and rank | TDD UL/DL pattern | Propagation condition | Antenna configuration | Metric | Reference from TS38.101-4 | New / Reuse |
| 2Rx UE | 100MHz / 120kHz | QPSK 1/3  Rank 1 | FR2.120-1A | TDLC60-300 | 2x2 ULA low | 70% of peak rate | 7.2.2.2.1-3 Test 1-1 | Reuse |
| 2Rx UE | 100MHz / 120kHz | 16QAM 0.48  Rank 2 | FR2.120-1 | TDLA30-300 | 2x2 ULA low | 70% of peak rate | 7.2.2.2.1-4 Test 2-2 | Reuse |
| 2Rx UE | 100MHz / 120kHz | 64QAM 0.46  Rank 2 | FR2.120-2 | TDLA30-75 | 2x2 ULA low | 70% of peak rate | 7.2.2.2.1-4 Test 2-6 | Reuse |

## 2.2 PDCCH

### 2.2.1 Scope of demodulation requirements

**Aggregation level(s)**

* Option 1: Specify PDCCH demodulation requirements with AL4 **and** AL8.
* Option 2: Specify PDCCH demodulation requirements with AL4 **or** AL8.

### 2.2.2 Simulation assumption

Interested companies are encouraged to provide the simulation results with ‘New’. Interested companies can also provide the simulation results with ‘Reuse’ for reference.

#### 2.2.2.1 Candidate options for FDD 15kHz FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | CBW (MHz) | RB size | duration | AL | Propagation condition | Antenna configuration | Metric (Pm-dsg) | Reference from TS38.101-4 | New / Reuse |
| 1Rx UE | 10 | 48 | 2 | 4 | TDLA30-10 | 1x1 | 1% | 5.3.2.1.1-1 Test 3 | New (Option1) |
| 1Rx UE | 10 | 40 | 1 | 4 | TDLA30-10 | 1x1 | 1% | 5.3.2.1.1-1 Test 4 | New (Option2) |
| 1Rx UE | 10 | 48 | 1 | 8 | TDLA30-10 | 2x1 low | 1% | 5.3.2.1.2-1 Test 3 | New |
| 2Rx UE | 10 | 48 | 2 | 4 | TDLA30-10 | 1x2 low | 1% | 5.3.2.1.1-1 Test 3 | Reuse (Option1) |
| 2Rx UE | 10 | 40 | 1 | 4 | TDLA30-10 | 1x2 low | 1% | 5.3.2.1.1-1 Test 4 | Reuse (Option2) |
| 2Rx UE | 10 | 48 | 1 | 8 | TDLA30-10 | 2x2 low | 1% | 5.3.2.1.2-1 Test 3 | Reuse |

#### 2.2.2.2 Candidate options for TDD 30kHz FR1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | CBW (MHz) | RB size | duration | AL | Propagation condition | Antenna configuration | Metric (Pm-dsg) | Reference from TS38.101-4 | New / Reuse |
| 1Rx UE | 20 | 48 | 2 | 4 | TDLC300-100 | 1x1 | 1% | 5.3.2.2.1-1 Test 2 | New |
| 1Rx UE | 20 | 48 | 2 | 8 | TDLC300-100 | 2x1 low | 1% | 5.3.2.2.2-1 Test 1 | New |
| 2Rx UE | 20 | 48 | 2 | 4 | TDLC300-100 | 1x2 low | 1% | 5.3.2.2.1-1 Test 2 | New |
| 2Rx UE | 20 | 48 | 2 | 8 | TDLC300-100 | 2x2 low | 1% | 5.3.2.2.2-1 Test 1 | New |

#### 2.2.2.3 Candidate options for TDD 120kHz FR2

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | CBW (MHz) | RB size | duration | AL | Propagation condition | Antenna configuration | Metric (Pm-dsg) | Reference from TS38.101-4 | New / Reuse |
| 2Rx UE | 100 | 60 | 1 | 4 | TDLA30-300 | 1x2 low | 1% | 7.3.2.2.1-1 Test 1-2 | Reuse |
| 2Rx UE | 100 | 60 | 1 | 8 | TDLA30-75 | 2x2 low | 1% | 7.3.2.2.2-1 Test 2-1 | Reuse |

## 2.4 PBCH

### 2.4.1 Scope of demodulation requirements

**Whether to define 1Rx PBCH demodulation requirements in the case SS/PBCH block index is known**

* Not to define 1Rx PBCH demodulation requirements in the case SS/PBCH block index is known
  + Define only 2Rx requirements for FR2

### 2.4.2 Simulation assumption

Interested companies are encouraged to provide the simulation results with ‘New’. Interested companies can also provide the simulation results with ‘Reuse’ for reference.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | BW / SSB SCS | Propagation condition | Antenna configuration | Metric (Pm-bch) | SS/PBCK block index | Reference from TS38.101-4 | New / Reuse |
| 1Rx UE | 10MHz / 15kHz | TDLC300-100 | 1x1 | 1% | Unknown | 5.4.2.1-2 Test 1 | New |
| 1Rx UE | 20MHz / 30kHz | TDLA30-10 | 1x1 | 1% | Unknown | 5.4.2.2-2 Test 1 | New |
| 2Rx UE | 10MHz / 15kHz | TDLC300-100 | 1x2 low | 1% | Unknown | 5.4.2.1-2 Test 1 | Reuse |
| 2Rx UE | 10MHz / 15kHz | TDLC300-100 | 1x2 low | 1% | Known | 5.4.2.1-3 Test 1 | Reuse |
| 2Rx UE | 20MHz / 30kHz | TDLA30-10 | 1x2 low | 1% | Unknown | 5.4.2.2-2 Test 1 | Reuse (\*1) |
| 2Rx UE | 20MHz / 30kHz | TDLA30-10 | 1x2 low | 1% | Known | 5.4.2.2-3 Test 1 | Reuse (\*1) |
| 2Rx UE | 100MHz / 120kHz | TDLA30-300 | 1x2 low | 1% | Unknown | 7.4.2.2-2 Test 1 | Reuse |
| 2Rx UE | 100MHz / 120kHz | TDLA30-300 | 1x2 low | 1% | Known | 7.4.2.2-3 Test 1 | Reuse |
| 2Rx UE | 100MHz / 240kHz | TDLA30-75 | 1x2 low | 1% | Unknown | 7.4.2.2-2 Test 2 | Reuse |
| 2Rx UE | 100MHz / 240kHz | TDLA30-75 | 1x2 low | 1% | Known | 7.4.2.2-3 Test 2 | Reuse |
| Note 1: RAN4 can keep the same SNR requirements but need to change the channel bandwidth configuration. | | | | | | | |

## 2.4 Sustained data rate (SDR)

* Define SDR tests for RedCap 1Rx/2Rx UE
  + Define only 2Rx requirements for FR2.

# 4 CSI reporting requirements

## 4.1 CQI reporting requirements

### 4.1.1 Scope of CQI reporting requirements

**Whether to define CQI reporting test with CQI table 2 for RedCap 2Rx UE supporting 256QAM in FR1 FDD**

* Option 1: Define test with both CQI table 1 and table 2 with applicability of 256QAM support.
* Option 2: Define test with only CQI table 1.

**Test points for CQI reporting test with CQI table 1**

* Set two SNR test points based on simulation results to cover SNR region with CQI report corresponding to:
  + 64QAM
  + QPSK or 16QAM

### 4.1.2 Simulation assumption

Interested companies are encouraged to provide the simulation results with ‘New’. Interested companies can also provide the simulation results with ‘Reuse’ for reference.

#### 4.1.2.1 FDD FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | Reference | CQI test | CBW / SCS | CQI table | Rank | Antenna configuration | New / Reuse |
| 1Rx UE | Table 6.2.2.1.1.1-1 Test 1/2 | CQI report definition test | 10 / 15 | Table 1 | 1 | 2 x 1 | New |
| 1Rx UE | Table 6.2.2.1.2.1-1 Test 1/2 | Wideband CQI reporting test | 10 / 15 | Table 1 | 1 | 2 x 1 | New |
| 2Rx UE | Table 6.2.2.1.1.1-1 Test 1/2 | CQI report definition test | 10 / 15 | Table 1 | 2 | 2 x 2 Low | New |
| 2Rx UE | Table 6.2.2.1.2.1-1 Test 1/2 | Wideband CQI reporting test | 10 / 15 | Table 1 | 1 | 2 x 2 Low | New |

#### 4.1.2.2 TDD FR1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | Reference | CQI test | CBW / SCS | CQI table | Rank | Antenna configuration | New / Reuse |
| 1Rx UE | Table 6.2.2.1.1.1-1 Test 1/2 | CQI report definition test | 20 / 30 | Table 1 | 1 | 2 x 1 | New |
| 1Rx UE | Table 6.2.2.1.2.1-1 Test 1/2 | Wideband CQI reporting test | 20 / 30 | Table 1 | 1 | 2 x 1 | New |
| 2Rx UE | Table 6.2.2.1.1.1-1 Test 1/2 | CQI report definition test | 20 / 30 | Table 1 | 2 | 2 x 2 Low | New |
| 2Rx UE | Table 6.2.2.1.2.1-1 Test 1/2 | Wideband CQI reporting test | 20 / 30 | Table 1 | 1 | 2 x 2 Low | New |

#### 4.1.2.3 TDD FR2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | Reference | CQI test | CBW / SCS | CQI table | Rank | Antenna configuration | New / Reuse |
| 2Rx UE | Table 8.2.2.2.1.1-1 Test 1/2 | CQI report definition test | 100 / 120 | Table 1 | 2 | 2 x 2 | Reuse |
| 2Rx UE | Table 8.2.2.2.2.1-1 Tests 1/2 | Wideband CQI reporting test | 100 / 120 | Table 1 | 1 | 2 x 2 | Reuse |

## 4.2 PMI reporting requirements

### 4.2.1 Scope of PMI reporting requirements

**Whether to define PMI reporting requirements for RedCap UEs**

* Define PMI reporting requirements with 4Tx configuration for FR1 for both 1Rx and 2Rx UEs
* Define PMI reporting requirements with 2Tx configuration for FR2 for 2Rx UE.

### 4.2.2 Simulation assumption

Interested companies are encouraged to provide the simulation results with ‘New’. Interested companies can also provide the simulation results with ‘Reuse’ for reference.

#### 4.2.2.1 FDD FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | Reference | PMI test | CBW / SCS | Tx ports | Antenna Configuration | New / Reuse |
| 1Rx | Table 6.3.2.1.1-1 Test 1 | Single PMI, Type I, rank 1 | 10 / 15 | 4 | 4 x 1 ULA high | New |
| 2Rx | Table 6.3.2.1.1-1 Test 1 | Single PMI, Type I, rank 1 | 10 / 15 | 4 | 4 x 2 XP high | Reuse |

#### 4.2.2.2 TDD FR1

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | Reference | PMI test | CBW / SCS | Tx ports | Antenna Configuration | New / Reuse |
| 1Rx | Table 6.3.2.2.1-1 Test 1 | Single PMI, Type I, rank 1 | 20 / 30 | 4 | 4 x 1 ULA high | New |
| 2Rx | Table 6.3.2.2.1-1 Test 1 | Single PMI, Type I, rank 1 | 20 / 30 | 4 | 4 x 2 XP high | New |

#### 4.2.2.2 TDD FR2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1Rx UE or 2Rx UE | Reference | PMI test | CBW / SCS | Tx ports | Antenna Configuration | New / Reuse |
| 2Rx | Table 8.3.2.2.1-1 Test 1  (TDD FR2.120-2) | Single PMI, Type I, rank 1 | 100 / 120 | 2 | 2 x 2 ULA low | Reuse |
| 2Rx | Table 8.3.2.2.1-1 Test 2  (TDD FR2.120-1) | Single PMI, Type I, rank 1 | 100 / 120 | 2 | 2 x 2 ULA low | Reuse |

## 4.3 RI reporting requirements for 2Rx UE

### 4.3.1 Scope of RI reporting requirements

**Issue 3-1-1: Whether to define CQI reporting test with CQI table 2 for RedCap 2Rx UE supporting 256QAM in FR1 FDD**

* Option 1: Define RI reporting tests for RedCap 2Rx UE.
* Option 2: Not to define RI reporting tests for RedCap 2Rx UE.

# Appendix: Spec structure (For information)

**Table 1 Specification structure for RedCap UE Demodulation performance requirements (FR1 - Conducted requirements).**

|  |  |  |
| --- | --- | --- |
| **Section number** | **Section name** | **Note** |
| 5.1 | General |  |
| 5.1.1 | Applicability of requirements |  |
| 5.1.1.x | Applicability of requirements for RedCap UEs | New section |
| 5.2 | PDSCH demodulation requirements |  |
| 5.2.1 | 1RX requirements |  |
| 5.2.1.1 | FDD |  |
| 5.2.1.1.1 | Minimum requirements for RedCap UEs | New section |
| 5.2.1.2 | TDD |  |
| 5.2.1.2.1 | Minimum requirements for RedCap UEs | New section |
| 5.2.2 | 2RX requirements |  |
| 5.2.2.1 | FDD |  |
| 5.2.2.1.X | Minimum requirements for RedCap UEs | New section |
| 5.2.2.2 | TDD |  |
| 5.2.2.2.X | Minimum requirements for RedCap UEs | New section |
| 5.3 | PDCCH demodulation requirements |  |
| 5.3.1 | 1RX requirements |  |
| 5.3.1.1 | FDD |  |
| 5.3.1.1.1 | Minimum requirements for RedCap UEs | New section |
| 5.3.1.2 | TDD |  |
| 5.3.1.2.1 | Minimum requirements for RedCap UEs | New section |
| 5.3.2 | 2RX requirements |  |
| 5.3.2.1 | FDD |  |
| 5.3.2.1.X | Minimum requirements for RedCap UEs | New section |
| 5.3.2.2 | TDD |  |
| 5.3.2.2.X | Minimum requirements for RedCap UEs | New section |
| 5.4 | PBCH demodulation requirements |  |
| 5.4.1 | 1RX requirements |  |
| 5.4.1.1 | FDD | New section |
| 5.4.1.2 | TDD | New section |
| 5.4.2 | 2RX requirements |  |
| 5.4.2.1 | FDD | Add minimum requirement tables for RedCap UEs |
| 5.4.2.2 | TDD | Add minimum requirement tables for RedCap UEs |
| 5.5 | Sustained downlink data rate provided by lower layers |  |
| 5.5.1 | FR1 single carrier requirements | Add the applicability for RedCap UEs |
| 5.5A | Sustained downlink data rate provided by lower layers |  |
| 5.5A.1 | FR1 CA requirements | Update test parameters for RedCap UEs. |

**Table 2 Specification structure for RedCap UE CSI reporting requirements (FR1 - Conducted requirements).**

|  |  |  |
| --- | --- | --- |
| **Section number** | **Section name** | **Note** |
| 6.1 | General |  |
| 6.1.1 | Applicability of requirements |  |
| 6.1.1.x | Applicability of requirements for RedCap UEs | New section |
| 6.2 | Reporting of Channel Quality Indicator (CQI) |  |
| 6.2.1 | 1RX requirements |  |
| 6.2.1.1 | FDD |  |
| 6.2.1.1.1 | CQI reporting definition under AWGN conditions for RedCap UEs | New section |
| 6.2.1.1.2 | CQI reporting under fading conditions for RedCap UEs | New section |
| 6.2.1.2 | TDD |  |
| 6.2.1.2.1 | CQI reporting definition under AWGN conditions for RedCap UEs | New section |
| 6.2.1.2.2 | CQI reporting under fading conditions for RedCap UEs | New section |
| 6.2.2 | 2RX requirements |  |
| 6.2.2.1 | FDD |  |
| 6.2.2.1.X | CQI reporting definition under AWGN conditions for RedCap UEs | New section |
| 6.2.2.1.X | CQI reporting under fading conditions for RedCap UEs | New section |
| 6.2.2.2 | TDD |  |
| 6.2.2.2.X | CQI reporting definition under AWGN conditions for RedCap UEs | New section |
| 6.2.2.2.X | CQI reporting under fading conditions for RedCap UEs | New section |
| 6.3 | Reporting of Precoding Matrix Indicator (PMI) |  |
| 6.3.1 | 1RX requirements |  |
| 6.3.1.1 | FDD |  |
| 6.3.1.1.1 | Single PMI with Y TX TypeI-SinglePanel Codebook for RedCap UEs | New section |
| 6.3.1.2 | TDD |  |
| 6.3.1.2.1 | Single PMI with Y TX TypeI-SinglePanel Codebook for RedCap UEs | New section |
| 6.3.2 | 2RX requirements |  |
| 6.3.2.1 | FDD |  |
| 6.3.2.1.X | Single PMI with Y TX TypeI-SinglePanel Codebook for RedCap UEs | New section |
| 6.3.2.2 | TDD |  |
| 6.3.2.2.X | Single PMI with Y TX TypeI-SinglePanel Codebook for RedCap UEs | New section |

**Table 3 Specification structure for RedCap UE Demodulation performance requirements (FR2 - Radiated requirements).**

|  |  |  |
| --- | --- | --- |
| **Section number** | **Section name** | **Note** |
| 7.1 | General |  |
| 7.1.1 | Applicability of requirements |  |
| 7.1.1.x | Applicability of requirements for RedCap UEs | New section |
| 7.2 | PDSCH demodulation requirements |  |
| 7.2.2 | 2RX requirements |  |
| 7.2.2.2 | TDD |  |
| 7.2.2.2.X | Minimum requirements for RedCap UEs | New section |
| 7.3 | PDCCH demodulation requirements |  |
| 7.3.2 | 2RX requirements |  |
| 7.3.2.2 | TDD |  |
| 7.3.2.2.X | Minimum requirements for RedCap UEs | New section |
| 7.4 | PBCH demodulation requirements |  |
| 7.4.2 | 2RX requirements |  |
| 7.4.2.2 | TDD | Add minimum requirement tables for RedCap UEs |
| 7.5 | Sustained downlink data rate provided by lower layers |  |
| 7.5.1 | FR2 single carrier requirements | Add the applicability for RedCap UEs |
| 7.5A | Sustained downlink data rate provided by lower layers |  |
| 7.5A.1 | FR2 CA requirements | Update test parameters for RedCap UEs. |

**Table 4 Specification structure for RedCap UE CSI reporting requirements (FR2 - Radiated requirements).**

|  |  |  |
| --- | --- | --- |
| **Section number** | **Section name** | **Note** |
| 8.1 | General |  |
| 8.1.1 | Applicability of requirements |  |
| 8.1.1.x | Applicability of requirements for RedCap UEs | New section |
| 8.2 | Reporting of Channel Quality Indicator (CQI) |  |
| 8.2.2 | 2RX requirements |  |
| 8.2.2.2 | TDD |  |
| 8.2.2.2.X | CQI reporting definition under AWGN conditions for RedCap UEs | New section |
| 8.2.2.2.X | CQI reporting under fading conditions for RedCap UEs | New section |
| 8.3 | Reporting of Precoding Matrix Indicator (PMI) |  |
| 8.3.2 | 2RX requirements |  |
| 8.3.2.2 | TDD |  |
| 8.3.2.2.X | Single PMI with 2 TX TypeI-SinglePanel Codebook for RedCap UEs | New section |