**3GPP TSG-RAN WG4 Meeting # 104-e**

**Electronic Meeting, 15 – 26 August 2022**

**Agenda item:** 9.14.9

**Source:** Moderator (Qualcomm Inc)

**Title:** Email discussion summary for [104-e][111]

# Topic: Unwanted emissions and signal quality

### EVM PTRS processing

*Important to decide as it affects the MPR for 16QAM and 64QAM*

* Proposals

**Proposal 10: The DMRS based channel estimate shall utilize CPE-corrected DMRS symbols**

**Proposal 11: The PTRS extraction and correction stage is used as the final refinement of the received signal.**

**Proposal 12: For CP-OFDM, all non-DMRS symbols in a slot must be equipped with PTRS, and frequency density of PTRS tones maximized.**

**Proposal 13a: For DFT-s-OFDM, PTRS is specified with 4 symbols per group, and the groups are configured in a ‘head and tail’ configuration.**

**Proposal 13b: For DFT-s-OFDM, the number of PTRS groups is maximised so the ratio of PUSCH symbols to PTRS symbols stays at 1 or higher.**

* Recommended WF
	+ Agree with all the proposals

**Discussions:**

**Agreement:**

**Proposal 10: The DMRS based channel estimate shall utilize CPE-corrected DMRS symbols**

**Proposal 11: The PTRS extraction and correction stage is used as the final refinement of the received signal.**

**Proposal 12: For CP-OFDM, all non-DMRS symbols in a slot must be equipped with PTRS, and frequency density of PTRS tones maximized.**

**Proposal 13a: For DFT-s-OFDM, PTRS is specified with 4 symbols per group, and the groups are configured in a ‘head and tail’ configuration.**

**Proposal 13b: For DFT-s-OFDM, the number of PTRS groups is maximised so the ratio of PUSCH symbols to PTRS symbols stays at 1 or higher.**

**FFS:**

* **PTRS configuration during the test will be based on UE declaration.**

**Discussion:**

Oppo: it causes the RAN5 test problem.

Apple: we are open. But we are not sure about the benefit. We should evaluate.

### EVM compliance power levels

*power range over which the EVM requirement applies*

**CCBW = 100 MHz Power class 1 and 2**

* Proposals

Proposal 1: EVM compliance levels for FR2-2 CBW=100MHz in PC2 and PC1 are the same as FR2-1

****

* Recommended WF
	+ Agree proposal 1

**Agreement:**

* Agree proposal 1.

**CCBW = 100 MHz Power class 3**

* Proposals

**Proposal 1: EVM compliance levels for FR2-2 CBW=100MHz in PC3 is the same as FR2-1**

**PC3 FR2-2 proposal**

|  |  |  |
| --- | --- | --- |
| Parameter  | Unit | 100 MHz |
| UE EIRP | dBm | [≥ -13] |
| UE EIRP for UL 16 QAM | dBm | [≥ -10] |
| UE EIRP for UL 64 QAM | dBm | [≥ -6] |

* Recommended WF
	+ Agree proposal 1

**Agreement:**

* Agree proposal 1

**CCBW >= 400 MHz Power class 3**

* Proposals

*Proposals in R4-2111628 and R4-2212372 differ by 3 dB*



* Recommended WF
	+ Discuss between the two proposals

**Discussions:**

Moderator: wonder where 3dB difference comes from in Apple paper.

Apple: the intention is to correct the values. We start with FR2-1 range.

**CCBW >= 400 MHz, Power class 1 and 2**

*Proposal in R4-2111628*



* Recommended WF
	+ Agree the proposal for PC1 and PC2 for CBW >= 400 MHz

Discussions:

LGE: These numbers are aligned with ours.

Agreement:

* The numbers in the table of the proposal are agreeable, but further checking is needed.

### Phase noise mask assumption for EVM

*Companies may choose to align on PN mask assumption as a means to arrive at MPR, however MPR values between companies are pretty close so in the end agreement on PN mask may not be necessary*

* Proposals

**Proposal 1: RAN4 uses the proposed PN mask for development of EVM requirements. (R4-2211628)**

* Recommended WF
	+ Agree proposal 1

### Carrier leakage for PC1 and PC3

*Carrier leakage values*

**Proposal 1: PC1 carrier leakage for n263 as shown in the table:**

|  |  |
| --- | --- |
| **Parameters** | **Relative Limit (dBc)** |
| EIRP > 13.4 dBm | -25 |
| 0.4 dBm ≤ EIRP ≤ 13.4 dBm | -20 |

**Proposal 2: PC3 carrier leakage for n263 as shown in the table:**

|  |  |
| --- | --- |
| **Parameters** | **Relative Limit (dBc)** |
| EIRP > -1.9 dBm | -25 |
| -14.9dBm ≤ EIRP ≤ -1.9 dBm | -20 |

* Recommended WF
	+ Agree with the proposals

Agreement:

* Agree proposal 1 and proposal 2.

### Inband emissions for PC1, PC2, and PC3

* Proposals

**Proposal 1: Use the PC1 and PC3 inband emissions as in the tables. (R4-2211628)**

Table 6.4.2.3.2-1: Requirements for in-band emissions for power class 1

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter description | Unit | Limit (NOTE 1) | Applicable Frequencies |
| General | dB |  | Any non-allocated (NOTE 2) |
|  |  |  | Output power for FR2-1 | Output Power for FR2-2 |  |
| IQ Image | dB | -25 | > 27 dBm | > 23.4 dBm | Image frequencies (NOTES 2, 3) |
|  |  | -20 | ≤ 27 dBm | ≤ 23.4 dBm |  |
| Carrier leakage | dBc | -25 | > 17 dBm | > 13.4 dBm | Carrier frequency (NOTES 4, 5) |
|  |  | -20 | 4 dBm ≤ Output power ≤ 17 dBm | 0.4 dBm ≤ Output power ≤ 13.4 dBm |  |

Table 6.4.2.3.4-1: Requirements for in-band emissions for power class 3

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter description | Unit | Limit (NOTE 1) | Applicable Frequencies |
| General | dB |  | Any non-allocated (NOTE 2) |
|  |  |  | Output power for FR2-1 | Output Power for FR2-2 |  |
| IQ Image | dB | -25 | > 10 dBm | > 8.1 dBm | Image frequencies (NOTES 2, 3) |
|  |  | -20 | ≤ 10 dBm | ≤ 8.1 dBm |  |
| Carrier leakage | dBc | -25 | > 0 dBm | > -1.9dBm | Carrier frequency (NOTES 4, 5) |
|  |  | -20 | -13 dBm ≤ Output power ≤ 0 dBm | -14.9 dBm ≤ Output power ≤ -1.9 dBm |  |

**Proposal 2 on formatting of PC2 agreed inband emissions (from LGE comment in thread)**



* Recommended WF
	+ WF #1 - Agree with the proposal 1
	+ WF #2 - agree with proposal 2 using modified table title with the “in FR2-1 and FR2-2” removed

Agreement:

* + Agree with the proposal 1
	+ Agree with proposal 2 using modified table title with the “in FR2-1 and FR2-2” removed

# Topic : MPR and A-MPR

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

## Open issues summary

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

### MPR

*MPR for power class 1 and power class 3 all SCS and CBW*

**Power class 1**

* Proposals

**Proposal 1: RAN4 adopt the PC1 MPRWT values in the tables and use the same MPRNARROW definition and values as FR2-1. (R4-2211628). The numbers for 16 and 64QAM assume the PTRS proposal in R4-**

Table 6.2.2.1-3 MPRWT for power class 1, BWchannel = 100 MHz in FR2-2

|  |  |
| --- | --- |
| Modulation | MPRWT (dB), BWchannel = 100 MHz |
|  | Outer RB allocations | Inner RB allocations |
|  |  | Region 1 | Region 2 |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 5.5 | 0.0 | ≤ 3.5 |
|  | QPSK | ≤ 6.5 | 0.0 | ≤ 3.5 |
|  | 16 QAM | ≤ 7.0 | ≤ 2.5 | ≤ 2.5 |
|  | 64 QAM | ≤ 8.0 | ≤ 8.0 | ≤ 8.0 |
| CP-OFDM | QPSK | ≤ 8.0 | ≤ 1.5 | ≤ 3.5 |
|  | 16 QAM | ≤ 8.0 | ≤ 3.5 | ≤ 4.0 |
|  | 64 QAM | ≤ 9.5 | ≤ 9.5 | ≤ 9.5 |

Table 6.2.2.1-4 MPRWT for power class 1, BWchannel >= 400 MHz in FR2-2

|  |  |
| --- | --- |
| Modulation | MPRWT (dB), BWchannel = 400, 800, 1600, 2000 MHz |
|  | Outer RB allocations | Inner RB allocations |
|  |  | Region 1 | Region 2 |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 6.0 | ≤ 1.0 | ≤ 3.5 |
|  | QPSK | ≤ 6.0 | ≤ 1.0 | ≤ 4.0 |
|  | 16 QAM | ≤ 4.5 | ≤ 3.0 | ≤ 3.0 |
|  | 64 QAM | ≤ 8.0 | ≤ 8.0 | ≤ 8.0 |
| CP-OFDM | QPSK | ≤ 6.0 | ≤ 1.5 | ≤ 3.5 |
|  | 16 QAM | ≤ 6.0 | ≤ 4.0 | ≤ 5.5 |
|  | 64 QAM | ≤ 10.0 | ≤ 10.0 | ≤ 10.0 |

* Recommended WF
	+ Agree proposal 1. Note the 16QAM and 64QAM values are valid only if PTRS proposal is agreed as the values will change without PTRS.

Discussions:

Huawei: need further checking.

Nokia: there is significant jump of 64QAM over other modulations.

Qualcomm: to Nokia, 64QAM values that Qualcomm provided are not based on phase noise achievable and we base on the simulation. The phase noise mask is even cleaner. PTRS compensation is conducted to improve the MPR and achievable phase noise.

Ericsson: to look at the implementation of values. We looks at one example of proposal 3 of 16QAM DFT. In practice UE may be better. We recognize the difficulty but we need consider the usefulness of these numbers. We provided the comments and encouraged companies to check.

**Power class 3 100 MHz**

**Proposal 1: Numbers in the “PROP #1” column assuming QCOM PTRS processing is agreed**

**Proposal 2: PROP2 column**

|  |  |
| --- | --- |
| Modulation | PC3 MPRWT, BWchannel = 100 MHz |
| Inner RB allocations,Region 1 | Edge RB allocations |
| ***PROP #1*** | ***PROP #2*** | ***PROP #1*** | ***PROP #2*** |
| DFT-s-OFDM | Pi/2 BPSK | 0.0 | 0 | ≤ 0.5 | 2 |
|  | QPSK | 0.0 | 0 | ≤ 0.5 | 2 |
|  | 16 QAM | ≤ 3.0 | 3 | ≤ 2.5 | 3.5 |
|  | 64 QAM | ≤ 8.5 | 5 | ≤ 8.5 | 5.5 |
| CP-OFDM | QPSK | ≤ 1.5 | 3.5 | ≤ 1.5 | 4 |
|  | 16 QAM | ≤ 4.0 | 5 | ≤ 4.0 | 5 |
|  | 64 QAM | ≤ 10.0 | 7.5 | ≤ 10.0 | 7.5 |

* Recommended WF
	+ Discuss proposal 1 and proposal 2

**Power class 3 > 100 MHz**

**Proposal 1 option A: MPR is the same for 400, 800, 1600, and 200 MHz and uses the PROP#1 numbers**

**Proposal 1 option B: MPR is the same for 400, 800, 1600, and 200 MHz and uses the PROP#2 numbers**

|  |  |
| --- | --- |
| Modulation | PC3 MPRWT, BWchannel >= 400 MHz |
| Inner RB allocations,Region 1 | Edge RB allocations |
| ***PROP #1*** | ***PROP #2*** | ***PROP #1*** | ***PROP #2*** |
| DFT-s-OFDM | Pi/2 BPSK | 1.0 | 0 | ≤ 1.0 | 3 |
|  | QPSK | 1.0 | 0 | ≤ 1.0 | 3 |
|  | 16 QAM | ≤ 3.5 | 4.5 | ≤ 3.0 | 4.5 |
|  | 64 QAM | ≤ 9.5 | 6.5 | ≤ 9.0 | 6.5 |
| CP-OFDM | QPSK | ≤ 2.0 | 5 | ≤ 2.0 | 5 |
|  | 16 QAM | ≤ 4.0 | 6.5 | ≤ 4.0 | 6.5 |
|  | 64 QAM | ≤ 10.0 | 9 | ≤ 10.0 | 9 |

**Proposal 3: Consider the following MPR delta for CBW of 800MHz, 1600MHz and 200MHz**

* + X1 = 1.0, Y1 = 1.0 for 800MHz
	+ X2 = 2.0, Y2 = 2.5 for 1600MHz
	+ X3 = 2.0, Y3 = 2.5 for 2000MHz

Table 6.2.2.3-3 MPRWT for power class 3, BWchannel = 800 MHz, FR2-2

|  |  |
| --- | --- |
| Modulation | MPRWT, BWchannel = 800 MHz |
|  | Inner RB allocations,Region 1 | Edge RB allocations |
| DFT-s-OFDM | Pi/2 BPSK | 0.0 | ≤ 4.0 |
|  | QPSK | 0.0 | ≤ 4.0 |
|  | 16 QAM | ≤ 5.5 | ≤ 5.5 |
|  | 64 QAM | ≤ 7.5 | ≤ 7.5 |
| CP-OFDM | QPSK | ≤ 6.0 | ≤ 6.0 |
|  | 16 QAM | ≤ 7.5 | ≤ 7.5 |
|  | 64 QAM | ≤ 10.0 | ≤ 10.0 |

Table 6.2.2.3-4 MPRWT for power class 3, BWchannel = 1600 and 2000 MHz, FR2-2

|  |  |
| --- | --- |
| Modulation | MPRWT, BWchannel = 1600 MHz |
|  | Inner RB allocations,Region 1 | Edge RB allocations |
| DFT-s-OFDM | Pi/2 BPSK | 0.0 | ≤ 5.0 |
|  | QPSK | 0.0 | ≤ 5.0 |
|  | 16 QAM | ≤ 7.0 | ≤ 7.0 |
|  | 64 QAM | ≤ 9.0 | ≤ 9.0 |
| CP-OFDM | QPSK | ≤ 7.5 | ≤ 7.5 |
|  | 16 QAM | ≤ 9.0 | ≤ 9.0 |
|  | 64 QAM | ≤ 11.5 | ≤ 11.5 |

**Proposal 4:** Same as proposal 3 except the 800 MHz table is slightly different.

X1=[1.0], X2=[2.0], X3=[2.0] dB, Y1=[1.5], Y2=[2.5] and Y3=[2.5] dB.

Table 6.2.2.3-3 MPRWT for power class 3, BWchannel = 800 MHz, FR2-2

|  |  |
| --- | --- |
| Modulation | MPRWT, BWchannel = 800 MHz |
|  | Inner RB allocations,Region 1 | Edge RB allocations |
| DFT-s-OFDM | Pi/2 BPSK | 0.0 | ≤ 4.0 |
|  | QPSK | 0.0 | ≤ 4.0 |
|  | 16 QAM | ≤ 6.0 | ≤ 6.0 |
|  | 64 QAM | ≤ 8.0 | ≤ 8.0 |
| CP-OFDM | QPSK | ≤ 6.5 | ≤ 6.5 |
|  | 16 QAM | ≤ 8.0 | ≤ 8.0 |
|  | 64 QAM | ≤ 10.5 | ≤ 10..5 |

* Recommended WF
	+ For PC3 > 100 MHz Discuss between proposal 1, 2, and 3

### A-MPR for EN 303753

*Emissions mask in EN 303753*

* Proposals

**Proposal 1: No A-MPR requirement needed for the EN 303753 emissions mask.**

* Recommended WF
	+ No A-MPR needed for EN 303753

Agreement:

* **No A-MPR requirement needed for the EN 303753 emissions mask.**

# Topic : Other TX power related issues

### PC3 max TRP

*Sub-topic description*

**Issue**

* Proposals

**Observation 1: The 27 dBm value listed for band n263 in Table 6.2.1.3-2 is a conducted limit that can be verified by max TRP ≤ 27dBm when suitable methods to measure maximum power level at antenna port or ports are not available. Therefore, we should consider whether a clarifying note is needed in the table:**

****

* Recommended WF
	+ Discuss in round 1

### UL gap for TX power management

*Sub-topic description*

* Proposals

**Proposal 1: The UL gap for Tx power measurement doesn’t apply to FR2-2 in Rel-17.**

* Recommended WF
	+ Discuss in round 1

Discussions:

Huawei: uplink gap for power measurement is based on FR2-1. We do not think the requirements can be applied for FR2-2.

Apple: We believe that UL gap helps UE handles MPE. I think the basic feature should be equally applicable to FR2-2.

Huawei: we does not object it but we want to check the requirements.

Apple: What do you mean by saying any particular action?

Huawei: the whole discussion of UL gap for requirement is based on the assumption of FR2-1. For example the measurement period and duty cycle. We have not discussed the details for FR2-2.

Apple: FR2-2 is introduce the new band. UL gap is a general feature.

### Multi-band relaxation

*Sub-topic description*

* Proposals

**Proposal 1: Remove the brackets on the multi-band relaxation factors (∆MBP,n and ∆MBS,n) of band n263 and confirm both values are 1.0 dB.**

****

* Recommended WF
	+ Agree proposal 1

Agreement:

* Agree proposal 1.

### Pmin

*Sub-topic description*

**Proposal 1: PC1 Pmin to be 4 dBm. PC2 and PC3 Pmin to be -13 dBm as shown in the tables**

* Recommended WF
	+ PC1 Pmin to be 4 dBm. PC2 and PC3 Pmin to be -13 dBm

Agreement:

* PC1 Pmin to be 4 dBm. PC2 and PC3 Pmin to be -13 dBm

### TX OFF power

*Transmit off power*

* Proposals

**Proposal 1: Reuse FR2-1 requirements for minimum output power and OFF power, specifically remove the [] from this table**

****

* Recommended WF
	+ Agree proposal 1

Agreement:

* Agree proposal 1.

# Topic : CA unwanted emissions and signal quality

### Carrier leakage for power classes 1 and 3 in CA

*Sub-topic description*

* Proposals

**Proposal 1: For CA carrier leakage use the PC1 and PC3 values in the tables.**

**Proposal 2: For n263 PC2 use the same value as in FR2-1 since the min peak EIRP values are nearly the same.**

**PC1 carrier leakage for n263 as shown in the table:**

|  |  |
| --- | --- |
| **Parameters** | **Relative Limit (dBc)** |
| EIRP > 13.4 dBm | -25 |
| 0.4 dBm ≤ EIRP ≤ 13.4 dBm | -20 |

**PC3 carrier leakage for n263 as shown in the table:**

|  |  |
| --- | --- |
| **Parameters** | **Relative Limit (dBc)** |
| EIRP > -1.9 dBm | -25 |
| -14.9dBm ≤ EIRP ≤ -1.9 dBm | -20 |

* Recommended WF
	+ Agree proposal 1 and proposal 2

Agreement:

* Agree proposal 1 and proposal 2.

### Inband emissions for power classes 1 and 3 in CA

*Sub-topic description*

* Proposals

**Proposal 1: Re-use the FR2-1 CA inband emissions method for PC1 and PC3 CA with the same output power values we are proposing for FR2-2 single carrier. (R4-2211628)**

* Recommended WF
	+ Agree proposal 1

Agreement:

* Agree proposal 1.

### SEM for CA

*Sub-topic description*

* Proposals

**Proposal 1: Re-use the FR2-1 CA SEM requirements for FR2-2.**

* Recommended WF
	+ Agree proposal 1

Agreement:

* + Agree proposal 1

### ACLR for CA

*Sub-topic description*

* Proposals

**Proposal 1: Use the FR2-2 single carrier 15 dB ACLR value for CA**

* Recommended WF
	+ Agree proposal 1

Discussion:

Huawei: in previous RAN4 agreement, OBW is more stringent than ACLR. Should we send RAN5 to indicate the RAN4 agreement?

Nokia: We agree with moderator. This is RAN5 discussion. To Huawei, we do not believe it is necessary. Huawei can raised it in RAN5.

Agreement:

* Agree proposal 1
* The common understanding in RAN4 is that OBW requirement is more stringent than ACLR for FR2-2.

### OBW for CA

*Sub-topic description*

* Proposals

**Proposal 1: Re-use the FR2-2 single carrier 99% OBW for CA**

* Recommended WF
	+ Agree proposal 1

Agreement:

* + Agree proposal 1

# Topic : CA output power, MPR, and A-MPR

### Maximum output power for CA

*Sub-topic description:*

* Proposals

**Proposal 1: FR2-2 PC1 and PC3 power classes for CA are the same as for FR2-2 single carrier. Note this is the same approach as in FR2-1.**

* Recommended WF
	+ Agree proposal 1

Agreement:

* Agree proposal 1.

### MPR for CA

*Sub-topic description*

* Proposals

**Proposal 1: Adopt the CA MPR tables for PC1 and PC3. (R4-2211628)**

Table TBD Maximum power reduction (MPRWT\_C\_CA) for FR2-2 UE power class 1

|  |  |
| --- | --- |
| **Waveform Type** | **Cumulative aggregated channel bandwidth** |
| **< 400 MHz** | **≥ 400 MHz and < 800 MHz** | **≥ 800 MHz and ≤ 1400 MHz** | **> 1400 MHz and ≤ 2000 MHz** |
| Pi/2 BPSK | ≤ 7.0 | ≤ 5.0 | ≤ 2.0 | ≤ 2.0 |
| QPSK | ≤ 8.0 | ≤ 6.0 | ≤ 3.0 | ≤ 3.0 |
| 16 QAM | ≤ 8.0 | ≤ 6.0 | ≤ 4.0 | ≤ 4.0 |
| 64 QAM | ≤ 10.0 | ≤ 10.0 | ≤ 10.0 | ≤ 10.0 |

Table TBD Maximum power reduction (MPRWT\_C\_CA) for FR2-2 UE power class 3

|  |  |
| --- | --- |
| **Waveform Type** | **Cumulative aggregated channel bandwidth** |
| **< 400 MHz** | **≥ 400 MHz and < 800 MHz** | **≥ 800 MHz and ≤ 1400 MHz** | **> 1400 MHz and ≤ 2000 MHz** |
| Pi/2 BPSK | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 | ≤ 1.0 |
| QPSK | ≤ 2.0 | ≤ 2.0 | ≤ 2.0 | ≤ 2.0 |
| 16 QAM | ≤ 4.0 | ≤ 4.0 | ≤ 4.0 | ≤ 4.0 |
| 64 QAM | ≤ 10.0 | ≤ 10.0 | ≤ 10.0 | ≤ 10.0 |

* Recommended WF
	+ Agree proposal 1

### A-MPR for CA

*Sub-topic description*

* Proposals

**Proposal 1: No CA A-MPR needed for the EN 303753 emissions mask.**

* Recommended WF
	+ Agree proposal 1

Agreement:

* + Agree proposal 1

# Topic: Other TX or general Issues

### Minimum guard band (Table 5.3.3-1)

*Sub-topic description*

* Proposals

**Proposal 1: Agree TP#1 above to 38.101-2 removing the square brackets in Table 5.3.3-1**

Table 5.3.3-1: Minimum guardband for each UE channel bandwidth and SCS (kHz)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 50 MHz | 100 MHz | 200 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz |
| 60 | 1210 | 2450 | 4930 | N/A | N/A | N/A | N/A |
| 120 | 1900 | 2420 | 4900 | 9860 | N/A | N/A | N/A |
| 480 | N/A | N/A | N/A | 9680 | 42640 | 85520 | N/A |
| 960 | N/A | N/A | N/A | 9440 | 42400 | 85280 | 147040 |

* Recommended WF
	+ Agree proposal 1

Agreement:

* + Agree proposal 1

### PRACH time mask

*Sub-topic description*

* Proposals

**Proposal 1: PRACH ON power measurement period table should be updated for 480 and 960 SCS as shown. (R4-2211628)**

Table 6.3.3.4-1: PRACH ON power measurement period

|  |  |  |  |
| --- | --- | --- | --- |
| Format | SCS | Measurement period | Note |
| A1 | 60 kHz | 0.035677 ms |  |
|  | 120 kHz | 0.017839 ms |  |
|  | 480 kHz | 0.004460 ms |  |
|  | 960 kHz | 0.002230 ms |  |
| A2 | 60 kHz | 0.071354 ms |  |
|  | 120 kHz | 0.035677 ms |  |
|  | 480 kHz | 0.008919 ms |  |
|  | 960 kHz | 0.004460 ms |  |
| A3 | 60 kHz | 0.107031 ms |  |
|  | 120 kHz | 0.053516 ms |  |
|  | 480 kHz | 0.013379 ms |  |
|  | 960 kHz | 0.006690 ms |  |
| B1 | 60 kHz | 0.035091 ms |  |
|  | 120 kHz | 0.0175455 ms |  |
|  | 480 kHz | 0.004386 ms |  |
|  | 960 kHz | 0.002193 ms |  |
| B4 | 60 kHz | 0.207617 ms |  |
|  | 120 kHz | 0.103809 ms |  |
|  | 480 kHz | 0.025952 ms |  |
|  | 960 kHz | 0.012976 ms |  |
| A1/B1 | 60 kHz | 0.035677 ms for front X1 occasion0.035091 ms for last occasion | X1 = [2,5] |
|  | 120 kHz | 0.017839 ms for front X1occasion0.017546 ms for last occasion |
|  | 480 kHz |  0.004460 ms for front X1 occasion 0.004387 ms for last occasion |
|  | 960 kHz | 0.017839 ms for front X1occasion0.017546 ms for last occasion |
| A2/B2 | 60 kHz | 0.071354 ms for front X2 occasion0.069596 ms for last occasion | X2 = [1,2] |
|  | 120 kHz | 0.035677 ms for front X2 occasion0.034798 ms for last occasion |
|  | 480 kHz | 0.008919 ms for front X2 occasion0.008700 ms for last occasion |
|  | 960 kHz | 0.004460 ms for front X2 occasion0.004350 ms for last occasion |
| A3/B3 | 60 kHz | 0.107031 ms for first occasion0.104101 ms for second occasion |  |
|  | 120 kHz | 0.053515 ms for first occasion0.052050 ms for second occasion |  |
|  | 480 kHz | 0.013379 ms for first occasion0.013013 ms for second occasion |  |
|  | 960 kHz | 0.006689 ms for first occasion0.006506 ms for second occasion |  |
| C0 | 60 kHz | 0.026758 ms |  |
|  | 120 kHz | 0.013379 ms |  |
|  | 480 kHz | 0.003345 ms |  |
|  | 960 kHz | 0.001672 ms |  |
| C2 | 60 kHz | 0.083333 ms |  |
|  | 120 kHz | 0.0416667 ms |  |
|  | 480 kHz | 0.010417 ms |  |
|  | 960 kHz | 0.005208 ms |  |
| NOTE: For PRACH on PRACH occasion start from begin of 0ms or 0.5 ms boundary, the measurement period will plus 0.032552 μs |

* Recommended WF
	+ Agree proposal 1

Discussions:

Huawei: I have no concern on the values. The maximum period is only 2us. The off power mask in RAN5. I do not know if 2us is feasible or not for measurement from test perspective.

Qualcomm: we can have discussion with TE vendor.

### Beam correspondence

*Sub-topic description:*

* Proposals

**Proposal 1: All FR2-2 UEs shall support *beamCorrespondenceWithoutUL-BeamSweeping*.**

Proposal 2: RAN4 shall apply the minimum SSB and minimum CSI-RS as provided in Table 1 and Table 2 for band n263. (re: 38.101-2 6.6.4.3.1)

Table 1: Conditions for SSB based L1-RSRP measurements for beam correspondence

|  |  |
| --- | --- |
| **Band** | **Minimum SSB (dBm/SCSSBB)** |
| n257 | -96.2 |
| n258 | -96.2 |
| n259 | -90.7 |
| n260 | -91.9 |
| n261 | -96.2 |
| n262 | -88.5 |
| n263 | -88.2 |

Table 2: Conditions for CSI-RS based L1-RSRP measurements for beam correspondence

|  |  |
| --- | --- |
| **Band** | **Minimum CSI-RS (dBm/SCSSBB)** |
| n257 | -96.2 |
| n258 | -96.2 |
| n259 | -90.7 |
| n260 | -91.9 |
| n261 | -96.2 |
| n262 | -88.5 |
| n263 | -88.2 |

* Recommended WF
	+ Discuss during round 1

Discussions:

Qualcomm: prefer proposal 1.

Huawei: I do think we can agree on proposal 2 without proposal 1. Regarding proposal 1, for FR2-2, people have different design for the antenna the frequency range is different from FR2-1. We can keep the capability optional.

Qualcomm: for table 2, it is said CSI-RS based …

Nokia: we prefer option 1. The UL sweeping is agreed in Rel-15. In Rel-17 it is not needed. Proposal 2 needs further discussions.

OPPO: regarding proposal 1, we slightly prefer not to mandate without beam sweeping. In market no device can support 71. The propagation condition would be different from below 71Ghz. And the antenna is different. We would like to be conservative.

Sony: for proposal 1 we echo Qualcomm and Nokia. From antenna, even if we is moving up to higher frequency, there is no fundamental difference.

### ON/ON transient periods

*Sub-topic description*

* Options

**Option 1: The transient period from FR2-1 is based on the capability of the UE to configure the transmitter and receiver. The same capability will exist in FR2-2. Use the same 5usec for FR2-2.**

**Option 2: Introduce 2 µS improved ON/ON transient period as optional UE capabilities for 480 and 960 kHz SCS.**

* Recommended WF
	+ Discuss during round 1

Discussion:

OPPO: we prefer Option 1. For option 2, where is 2us coming from?

Intel: we had it a few meetings ago. We presented the benefit. If companies want to discuss the exact numbers, we are open to discussion. But we want to have it as optional feature.

AT&T: it was discussed for many meetings. The views are diverse. We agreed the benefit and optional features. We would like to introduce it in Rel-17. We would like to consider it in Rel-18 if needed and if we get the alignment in RAN4 to add it into FR2 enhancement.

Nokia: we support AT&T. We should consider it for Rel-18.

Chair=> align companies’ view if it needs be discussed in Rel-18.

### Beam direction only switching time

*Sub-topic description*

* Proposals

**Proposal 1: Use a UE beam direction switching time of 59 ns.**

* Recommended WF
	+ Discuss during round 1

Discussions:

Ericsson: 200us requirement is not feasible. It is longer than CP. I wonder if we could consider the compromised value 100ns at least for 480KHz SCS.

Nokia: from many meetings, we know 200us is longer than CP which does not work.

Qualcomm: the UE architecture of FR2-2 is similar as FR2-1. From feasibility perspective, it does not work. We think 200ns is needed for FR2-2.

Huawei: we agree with Qualcom’s view. 200ns is generated based on practical design. 59ns is not feasible.

# Topic: RX issues

### REFSENS

*Sub-topic description:*

* Proposals

**Proposal 1: Implement the agreed PC1 REFSENS in the specification. (-79 dBm/400 MHz)**

**Proposal 2: Specify the uplink configuration for band n263 as in Table 2.6-1. (R4-2213369)**

Table 2.6-1

|  |  |
| --- | --- |
| Operating band | NR Band / Channel bandwidth / NRB / SCS / Duplex mode |
|  | 50 MHz | 100 MHz | 200 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz | SCS | Duplex Mode |
| n257 | 32 | 64 | 128 | 256 | N.A | N.A | N.A | 120 kHz | TDD |
| n258 | 32 | 64 | 128 | 256 | N.A | N.A | N.A | 120 kHz | TDD |
| n260 | 32 | 64 | 128 | 256 | N.A | N.A | N.A | 120 kHz | TDD |
| n261 | 32 | 64 | 128 | 256 | N.A | N.A | N.A | 120 kHz | TDD |
| n262 | 32 | 64 | 128 | 256 | N.A | N.A | N.A | 120 kHz | TDD |
| n263 | N.A | 64 | N.A | 256 | N.A | N.A | N.A | 120 kHz | TDD |
| N.A | N.A | N.A | N.A | 120 | 243 | N.A | 480 kHz | TDD |
| N.A | N.A | N.A | N.A | N.A | N.A | 144 | 960 kHz | TDD |

**Proposal 3: vivo in thread**

The NRB number for uplink configuration for band n263 is not the same with what we agreed for.

The numbers for 400M with 480/960k and 800M/1600M with 960k are missing.

Table 5.3.2-1: Maximum transmission bandwidth configuration NRB

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SCS (kHz) | 50 MHz | 100 MHz | 200 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz |
|  | NRB | NRB | NRB | NRB | NRB | NRB | NRB |
| 60 | 66 | 132 | 264 | N/A | N/A | N/A | N/A |
| 120 | 32 | 66 | 132 | 264 | N/A | N/A | N/A |
| 4801 | N/A | N/A | N/A | 66 | [124] | [248] | N/A |
| 9601 | N/A | N/A | N/A | 33 | [62] | [124] | 148 |
| Note 1: This SCS is optional in this release of the specification. |

* Recommended WF
	+ WF #1 Agree proposal 1
	+ WF #2 - discuss the discrepancy between proposals 2 and 3

Discussions:

Huawei: Proposal 2 comes from Huawei. The uplink configuration is not targeting to provide all the combinations of channel bandwidth and SCS. When the REFSEN test is conducted for one SCS, we do not need to do it for other SCS. We are not sure if UE can support 480KHz all the time. So we should add 800 and 1600MHz for 960KHz to ensure all the bandwidths combination can be tested.

Agreement:

* Agree proposal 1.

### EIS relaxation for intraband contiguous CA

*Sub-topic description:*

* Proposals

**Proposal 1: Use the same values as in FR2-1. For 1600-2000 MHz FR2-2 EIS relaxation dB value as [1.5]**

Table 7.3A.2.1-1: EIS Relaxation for CA operation by aggregated channel bandwidth

|  |  |
| --- | --- |
| Aggregated Channel BW 'BWChannel\_CA' (MHz) | (dB) |
| BWChannel\_CA ≤ 800 | 0 |
| 800 < BWChannel\_CA ≤ 1200 | 0.5 |
| 1200 < BWChannel\_CA ≤ 1600 | 1.0 |
| 1600 < BWChannel\_CA ≤ 2000 | [1.5] |

* Recommended WF
	+ Agree proposal 1

Agreement:

* Agree proposal 1.

### In-band blocking

*Sub-topic description*

* Proposals

**Proposal 1: Agree the IBB values as shown in the table (R4-2213221 and identical proposal in R4-2211629)**

**Table 7.6.2-1: In band blocking requirements**

|  |  |  |
| --- | --- | --- |
| **Rx parameter** | **Units**  | **Channel bandwidth** |
|  |  | **50 MHz**  | **100 MHz** | **200 MHz** | **400 MHz** | **800 MHz** | **1600 MHz** | **2000 MHz** |
| Power in Transmission Bandwidth Configuration | dBm | REFSENS + 14 dB |  |  |  |
| BWInterferer | MHz | 50 | 100 | 200 | 400 | 800 | 1600 | 2000 |
| PInterfererfor bands n257, n258, n261 | dBm | REFSENS + 35.5 dB | REFSENS + 35.5 dB | REFSENS + 35.5 dB | REFSENS + 35.5 dB | N.A. | N.A. | N.A. |
| PInterfererfor bands n259, n260, n262 | dBm | REFSENS + 34.5 dB | REFSENS + 34.5 dB | REFSENS + 34.5 dB | REFSENS + 34.5 dB | N.A. | N.A. | N.A. |
| PInterfererfor band n263 | dBm | N.A. | REFSENS + 33.5 dB | N.A. | REFSENS + 33.5 dB | REFSENS + 33.5 dB | REFSENS + 33.5 dB | REFSENS + 33.5 dB |
| FIoffset | MHz | ≤ -100 & ≥ 100NOTE 5 | ≤ -200 & ≥ 200NOTE 5 | ≤ -400 & ≥ 400NOTE 5 | ≤ -800 & ≥ 800NOTE 5 | ≤ -1600 & ≥ 1600NOTE 5 | ≤ -3200 & ≥ 3200 | ≤ -4000 & ≥ 4000 |
| FInterferer | MHz | FDL\_low + 25to FDL\_high - 25 | FDL\_low + 50to FDL\_high - 50 | FDL\_low + 100to FDL\_high - 100 | FDL\_low + 200to FDL\_high - 200 | FDL\_low + 400to FDL\_high - 400 | FDL\_low + 800to FDL\_high - 800 | FDL\_low + 1600to FDL\_high - 1600 |

* Recommended WF
	+ Agree proposal 1

Discussions:

Huawei: to the format, we have similar changes with different format to introduce the requirements in the separate tables.

Agreement:

* Agree the IBB values as shown in the table in proposal 1
	+ FFS whether to use one table or separate tables to capture the requriements.

### CA In-band blocking

*Sub-topic description*

* Proposals

**Proposal 1: Agree CA IBB requirements as given in TP#3 and TP#4. (R4-2213221 and identical proposal6 in R4-2211629 )**

**Table 7.6A.2.1-1: In band blocking minimum requirements for intra-band contiguous CA**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units | All CA bandwidth classes |
| Power in Transmission Bandwidth Configuration, per CC |  | REFSENS + 14 dB |
| Pinterferer for band n257, n258, n261 | dBm | Aggregated power + 21.5 |
| Pinterferer for band n260, n262 | dBm | Aggregated power + 20.5 |
| Pinterferer for band n263 | dBm | Aggregated power + 19.5 |

* Recommended WF
	+ Agree proposal 1

Agreement:

* + Agree proposal 1

### Maximum input level for Intra-band contiguous CA

*Sub-topic description*

* Proposals

**Proposal 1: Use the FR2-1 max input for intra-band contiguous requirement for FR2-2.**

* Recommended WF
	+ Agree proposal 1

Agreement:

* + Agree proposal 1

### Adjacent channel selectivity

*Sub-topic description*

* Proposals

**The tables below with:**

**Option 1: using 21 dB for the ACS for all CCBWs.**

**Option 2: using 21 dB for CCBW <= 400 MHz and 20 dB for > 400 MHz.**

**Table 7.5-1: Adjacent channel selectivity**

|  |  |  |
| --- | --- | --- |
| Operating band | Units | Adjacent channel selectivity / Channel bandwidth |
|  |  | 50MHz  | 100MHz | 200MHz | 400MHz | 800 MHz | 1600 MHz | 2000 MHz |
| n257, n258, n261 | dB | 23 | 23 | 23 | 23 | N.A. | N.A. | N.A. |
| n259, n260, n262 | dB | 22 | 22 | 22 | 22 | N.A. | N.A. | N.A. |
| n263 | dB | N.A. | 21 | N.A. | 21 | 21 or 20 | 21 or 20 | 21 or 20 |

**Table 7.5-2: Adjacent channel selectivity test parameters, Case 1**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units  | Channel bandwidth |
|  |  | 50 MHz  | 100 MHz | 200 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz |
| Power in Transmission Bandwidth Configuration | dBm | REFSENS + 14 dB |
| PInterferer for band n257, n258, n261 | dBm | REFSENS + 35.5 dB | REFSENS +35.5 dB | REFSENS +35.5 dB | REFSENS +35.5 dB | N.A. | N.A. | N.A. |
| PInterferer for band n259, n260, n262 | dBm | REFSENS + 34.5 dB | REFSENS +34.5 dB | REFSENS +34.5 dB | REFSENS +34.5 dB | N.A. | N.A. | N.A. |
| PInterferer for band n263 | dBm | N.A. | REFSENS +33.5 dB | N.A. | REFSENS +33.5 dB | REFSENS +33.5 dB or 32.5 | REFSENS +33.5 dB or 32.5 | REFSENS +33.5 dBor 32.5 |
| BWInterferer  | MHz | 50 | 100 | 200 | 400 | 800 | 1600 | 2000 |
| FInterferer (offset) | MHz | 50/-50NOTE 3 | 100/-100NOTE 3 | 200/-200NOTE 3 | 400/-400NOTE 3 | 800/-800NOTE 3 | 1600/-1600NOTE 3 | 2000/-2000NOTE 3 |

**Table 7.5-3: Adjacent channel selectivity test parameters, Case 2**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units  | Channel bandwidth |
|  |  | 50 MHz  | 100 MHz | 200 MHz | 400 MHz | 800 MHz | 1600 MHz | 2000 MHz |
| Ptxbc for bands n257, n258, n261 | dBm | -46.5 | -46.5 | -46.5 | -46.5 | -N.A. | -N.A. | -N.A. |
| Ptxbc for bands n259, n260, n262 | dBm | -45.5 | -45.5 | -45.5 | -45.5 | -N.A. | -N.A. | -N.A. |
| Ptxbc for band n263 | dBm | -N.A. | -44.5 | -N.A. | -44.5 | -44.5 or -43.5 | -44.5or -43.5 | -44.5 or -43.5 |
| PInterferer | dBm | -25 |
| BWInterferer  | MHz | 50 | 100 | 200 | 400 | 800 | 1600 | 2000 |
| FInterferer (offset) | MHz | 50/-50NOTE 2 | 100/-100NOTE 2 | 200/-200NOTE 2 | 400/-400NOTE 2 | 800/-800NOTE 2 | 1600/-1600NOTE 2 | 2000/-2000NOTE 2 |
| NOTE 1: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern TDD as described in Annex A and set-up according to Annex C.NOTE 2: The absolute value of the interferer offset FInterferer (offset) shall be further adjusted to (CEIL(|FInterferer|/SCS) + 0.5)\*SCS MHz with SCS the sub-carrier spacing of the wanted signal in MHz. Wanted and interferer signal have same SCS. NOTE 3: The transmitter shall be set to 4 dB below the PUMAX,f,c as defined in clause 6.2.4, with uplink configuration specified in Table 7.3.2.1-2.NOTE 4: Ptxbc is the power in the transmission bandwidth configuration |

* Recommended WF
	+ Discuss between options 1 and 2

Discussions:

Apple: 1dB relaxation is needed.

Agreement:

* **Option 2: using 21 dB for CCBW <= 400 MHz and 20 dB for > 400 MHz.**

### Adjacent channel selectivity for Intra-band contiguous CA

*Sub-topic description*

* Proposals

**Proposal1: For CA Agree ACS the tables below based on 21 dB ACS. This proposal may need modification based on the single carrier ACS discussion above as 20 dB is being proposed for BW > 400 MHz.**

**Table 7.5A.1-1: Adjacent channel selectivity for intra-band contiguous CA**

|  |  |  |
| --- | --- | --- |
| Operating band | Units | Adjacent channel selectivity / CA bandwidth class |
|  |  | All CA bandwidth class |
| n257, n258, n261 | dB | 23 |
| n259, n260, n262 | dB | 22 |
| n263 | dB | 21 |

**Table 7.5A.1-2: Adjacent channel selectivity test parameters for intra-band contiguous CA, Case 1**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units  | All CA bandwidth Classes |
| Pw in Transmission Bandwidth Configuration, per CC |  | REFSENS + 14 dB |
| PInterferer for band n257, n258, n261 | dBm | Aggregated power + 21.5 |
| PInterferer for band n259, n260, n262 | dBm | Aggregated power + 20.5 |
| PInterferer for band n263 | dBm | Aggregated power + 19.5 |
| BWInterferer | MHz | BWChannel\_CA |
| FInterferer (offset) | MHz | + BWchannel CA/- BWchannel CANOTE 3 |
|
|
| NOTE 1: The interferer consists of the Reference measurement channel specified in Annex 3.2 with one sided dynamic OCNG Pattern as described in Annex A and set-up according to Annex C.NOTE 2: The Finterferer (offset) is the frequency separation between the center of the aggregated CA bandwidth and the center frequency of the Interferer signalNOTE 3: The absolute value of the interferer offset FInterferer (offset) shall be further adjusted to (CEIL(|FInterferer|/SCS) + 0.5)\*SCS MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interfering signal has the same SCS as that of the closest carrier.NOTE 4: The transmitter shall be set to 4 dB below the PUMAX,f,c as defined in clause 6.2.4, with uplink configuration specified in Table 7.3.2.1-2. |

**Table 7.5A.1-3: Adjacent channel selectivity test parameters for intra-band contiguous CA, Case 2**

|  |  |  |
| --- | --- | --- |
| Rx Parameter | Units  | All CA bandwidth classes |
| Pw in Transmission Bandwidth Configuration, aggregated power for band n257, n258, n261 | dBm | - 46.5 |
| Pw in Transmission Bandwidth Configuration, aggregated power for band n259, n260, n262 | dBm | - 45.5 |
| Pw in Transmission Bandwidth Configuration, aggregated power for band n263 | dBm | - 44.5 |
| Pinterferer | dBm | - 25 |
| BWInterferer | MHz | BWChannel\_CA |
| FInterferer (offset) | MHz | + BWchannel CA/- BWchannel CANOTE 3 |
|
|
| NOTE 1: The interferer consists of the Reference measurement channel specified in Annex A.3.3.2 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1 and set-up according to Annex C.NOTE 2: The Finterferer (offset) is the frequency separation between the center of the aggregated CA bandwidth and the center frequency of the Interferer signalNOTE 3: The absolute value of the interferer offset FInterferer (offset) shall be further adjusted to (CEIL(|FInterferer|/SCS) + 0.5)\*SCS MHz with SCS the sub-carrier spacing of the carrier closest to the interferer in MHz. The interfering signal has the same SCS as that of the closest carrier.NOTE 4: The transmitter shall be set to 4 dB below the PUMAX,f,c as defined in clause 6.2.4, with uplink configuration specified in Table 7.3.2.1-2. |

* Recommended WF
	+ Agree proposal 1. If 20 dB ACS is decided for BW> 400 MHz there would need to be modification.

# Tdocs

**Existing tdocs**

|  |  |  |
| --- | --- | --- |
| **Tdoc number** | **Title** | **Source** |
| [**R4-2211626**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211626.zip) |  Draft CR to 38.101-2 on band n263 Tx aspects  | Qualcomm Inc |
| [**R4-2211628**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211628.zip) | 60GHz UE TX | Qualcomm Inc |
| [**R4-2211950**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211950.zip) | Multi-band relaxation for FR2-2 handheld UE | Murata Manufacturing Co Ltd. |
| [**R4-2212119**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212119.zip) | Open issues for UE Tx requirements in FR2-2 | Intel Corporation |
| [**R4-2212278**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212278.zip) | Draft CR to 38.101-2 on minimum peak EIRP for PC3 band n263 | Murata Manufacturing Co Ltd. |
| [**R4-2212372**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212372.zip) | Discussion on minimum UE EIRP scaling for FR2-2 | Apple |
| [**R4-2212373**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212373.zip) | CR for TS 38.101-2: Correcting oversight with UE EIRP CBW scaling for FR2-2 | Apple |
| [**R4-2213220**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213220.zip) | On UE Tx RF aspects for FR2-2 | Nokia, Nokia Shanghai Bell |
| [**R4-2213232**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213232.zip) | SSB side conditions for band n263 | Apple |
| [**R4-2213366**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213366.zip) | Draft CR for n263 RF Tx requirements | Huawei, HiSilicon |
| [**R4-2213369**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213369.zip) | On remaining RF requirements on n263 | Huawei, HiSilicon |
| [**R4-2213466**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213466.zip) | CR on FR2-2 PC3 MPR | LG Electronics Finland |
| [**R4-2213573**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213573.zip) | Discussion on MPR values for FR2-2 PC3 | LG Electronics Finland |
| [**R4-2213744**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213744.zip) | UE Tx requirements for band n263 | Apple |
| [**R4-2211627**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211627.zip) |  Draft CR to 38.101-2 on band n263 Rx aspects  | Qualcomm Inc |
| [**R4-2211629**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211629.zip) | 60GHz UE RX | Qualcomm Inc |
| [**R4-2213203**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213203.zip) | draftCR on the UE RX requirement for band n263 | Xiaomi |
| [**R4-2213221**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213221.zip) | On UE Rx RF aspects for FR2-2 | Nokia, Nokia Shanghai Bell |
| [**R4-2213231**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213231.zip) | UE Rx requirements for band n263 | Apple |
| [**R4-2213367**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213367.zip) | Draft CR for n263 RF Rx requirements | Huawei, HiSilicon |
| [**R4-2213368**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213368.zip) | Draft CR for n263 RMC | Huawei, HiSilicon |