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

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

**Agenda item:** 8.15.6

**Source:** Man Hung Ng (Nokia)

**Title:** Topic summary for [107][138] NR\_FR1\_lessthan\_5MHz\_BW

**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.*

Summary for contributions submitted under agenda items 8.15.2 and 8.15.3 for NR support for dedicated spectrum less than 5MHz for FR1.

List of candidate target of discussion for 1st round and 2nd round:

* 1st round: Discussion and agreement on open issues listed below.
* 2nd round: Continue discussion and agreement on open issues listed below.

# Topic #1: System parameters

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2307500 | Nokia, Nokia Shanghai Bell | Proposal 1:  Observation 1: RAN4 needs to wait input from RAN1 about PBCH design.  Observation 2: Among Option I category, Option 2 has the largest frequency separation, 100 kHz, between legacy sync raster and new sync raster. Others (Option 4, 5, and 6) have 20 or 40 kHz separation.  Observation 3: All options support 3 MHz transmission bandwidth, i.e., 15 PRB, at any 100 kHz channel raster point. Option 7 and 8 also support 12 PRB transmission bandwidth at any 100 kHz channel raster point.  Observation 4: All options can support up to 14 PRB PBCH transmission bandwidth without subcarrier-level puncturing. Some of options, i.e., 4, 5, 6 and 7, can support up to 15 PRB PBCH transmission bandwidth for a half of the channel raster points.  Observation 5: It is desirable to have common sync raster design principle for all the bands with less than 5 MHz channel bandwidth including n100.  Observation 6: It is only necessary to consider additional sync raster points with 12 and 20 PRBs PBCH transmission bandwidth for band n100 at the lower band edge of n100. |
| R4-2307843 | ZTE Corporation | Proposal 1: From RAN4 perspective, there is no need to study modifications to PBCH to differentiate sub-5 MHz channel SSBs vs legacy 5 MHz. It is better to define new sync raster design to differentiate the new sync raster from the legacy sync raster.  Proposal 2: From the first metric perspective, option I is preferred for 12 PRBs PBCH transmission bandwidth and option II is better for 15 PRBs PBCH transmission bandwidth.  Proposal 3: From the second metric perspective, it’ s better to define the offset A as 300 kHz.  Proposal 4: For band n100 for 3 MHz channel bandwidth, there are two options:  - Option 1: N \* 600 kHz + M \* 50 kHz + 300 kHz, N ϵ {1:4998}, M ϵ {1,3,5},  - Option 2: N \* 100 kHz + 30 kHz, N ϵ {9206:1:9232}.  Proposal 5: For other bands with 3 MHz channel bandwidth,  - it is proposed to define new sync raster design as N \* 600 kHz + M \* 50 kHz + 300 kHz, N ϵ {1:4998}, M ϵ {1,3,5} if PBCH transmission bandwidth is defined as 12 PRBs,  - it is proposed to define new sync raster design as N \* 100 kHz + 30 kHz if PBCH transmission bandwidth is defined as 15 PRBs.  Proposal 6: Since it is proposed that new sync raster design will be made based on the metric that better facilitate the additional sync-raster points for 12, 15 and 20 PRBs PBCH transmission bandwidth to select one option or have both options for different SSB transmission bandwidths in different bands, we need to discuss this issue based on the result of new sync raster design for 3 MHz channel bandwidth.  Observation 1: |
| R4-2308234 | vivo | Proposal 1: Both 100kHz and 600kHz granularity sync rater should be defined for 3MHz CBW in band n100.  Proposal 2: The distance between the legacy sync raster and the new sync raster should be no less than 40kHz.  Proposal 3: Send LS to RAN1 to suggest that the PBCH transmission bandwidth also should be 12 PRB in bands other than n100 from RAN4 perspective.  Observation 1: 600KHz granularity sync raster is more friendly to UE for energy saving.  Observation 2: If 12 RB maximum transmission channel bandwidth need to be considered in n100 to avoid the complexity of GSM-R network redesign, only sync raster with 100kHz granularity is feasible.  Observation 3: The frequency error of LO needs to be considered for offset value design.  Observation 4: When PBCH transmission is 15PRB, only 100kHz sync raster is feasible and under this condition, UE may hard to distinguish legacy and new sync rasters since the distance between them is too small. |
| R4-2308380 | MediaTek Inc. | Proposal 1: RAN4 to consider 12-RB PBCH is only applicable to n100 in Rel-18 to meet the special purpose for the band migration from GSM-R to FRMCS.  Proposal 2: RAN4 to introduce a new sync raster by shifting the legacy sync raster with 600kHz for 3MHz channel bandwidth operation.  Proposal 3: RAN4 to define GSCN for the new sync raster as: GSCN = 22255 + 3\*N + (M-1)/2, where N=1:2499, M = {1,3,5}.  Proposal 4: If the special use case where only 12 PRBs are available and deployed at a particular position in band n100 is confirmed by RAN plenary, RAN4 to add additional sync raster at the frequency 920.6225 MHz.  Observation 1: The new sync raster for 3MHz channel bandwidth operation should not overlap with legacy sync raster points to avoid power waste for legacy UEs.  Observation 2: There would be unnecessarily too many raster points if introducing 100kHz grid as the new sync raster for 3MHz channel bandwidth. |
| R4-2308380 | MediaTek Inc. | Proposal 1: Draft CR to TS 38.101-1 on new sync raster.  Observation 1: |
| R4-2308539 | Ericsson | Proposal1: RAN4 shall specify one new synchronization raster scheme only for 3 MHz channel bandwidth based on RAN1 punctured SSB design.  Proposal 2: To address FRMCS deployment migration, RAN4 shall specify one specific sync raster point for 12 RBs transmission bandwidth and another one for 20 RBs transmission bandwidth.  Proposal 3: Specify the new synchronization raster for 3 MHz channel bandwidth according to the following table, based on RAN1 decision.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Punctured SSB size  (RAN1 decision) | Punctured SSB design  (RAN1 decision) | Synchronization raster step size | Synchronization raster offset | Minimum offset between legacy and new sync raster | | 15 RBs | PSS/SSS closer to the top | 100 kHz | 70 kHz | 20 kHz | | PSS/SSS closer to the bottom | 100 kHz | 30 kHz | 20 kHz | | 12 RBs |  | 600 kHz | 300 kHz | 100 kHz |   Proposal 4: Specify a synchronization raster entry at frequency 920.73 MHz for 12 RBs punctured SSB in 3 MHz channel bandwidth signal.  Proposal 5: Specify a new synchronization raster entry at 921.45 MHz for n100 to optimize FRMCS migration.  Observation 1: During the migration phase, FRMCS will be operated at the lower edge of n100 while GSM-R will be at the upper edge. |
| R4-2309271 | Qualcomm Inc. | Proposal 1: Specify a single sync raster point at 920.73 MHz to support 12 RB transmission bandwidth with 3 MHz RF channel. This raster point is specified only for band n100.  Proposal 2: Specify one new sync raster point 200 kHz below GSCN 2303 at 921.45 MHz, allowing use of 5 MHz channel centered at 921.9 MHz. This raster point is specified only for band n100.  Proposal 3: Specify floating raster N \* 600kHz + M \* 50 kHz + 345 kHz, M ϵ {1,3,5} for all operating bands in scope of the WI to support 3 MHz channel bandwidth.  Proposal 4: Send LS to RAN1 to consider early indication to avoid legacy UEs camping on the cells with less than 5MHz operation.  Proposal 5: Define unique GSCN-values for dedicated spectrum less than 5 MHz using ARFCN-values.  Observation 1: ECC Decision (20)02 state that lower edge of the lowest resource block shall be ≥ 919.6 MHz, which means that 3 MHz channel bandwidth cannot be placed immediately adjacent to the low edge of the operating band.  Observation 2: SSB puncturing shall not be used for 5 MHz channel bandwidth according to RAN decision.  Observation 3: *kSSB* will be always equal to zero also for 5 MHz supporting narrowband allocation.  Observation 4: A = 300 kHz will result in sync raster points for different PBCH bandwidths to overlap resulting in blind decoding, and therefore A = 300 kHz is to be avoided.  Observation 5: A = 280 kHz will result in sync raster points for the same PBCH bandwidth to overlap.  Observation 6: A = 345 kHz maintains at least 45 kHz frequency offset between all different rasters in n100, and in all the other operating bands maintains 55 kHz frequency offset to rel-15 raster. According to the criteria in the approved WF from RAN4#106bis-e, A = 345 kHz is the preferred design.  Observation 7: Despite the frequency offset between rasters, early indication to avoid legacy UEs camping on cells with less than 5 MHz operation is useful.  Observation 8: New GSCN-values need to be defined with clear distinction to legacy raster  Observation 9: Using ARFCN values also to indicate GSCN is compatible with RAN2 design and provides a disjoint value range compared to existing GSCN. |
| R4-2309371 | Apple | Proposal 1: For PBCH design, follow RAN1 design.  Proposal#2: For 3MHz Channel Size, use a new finer synchronization raster based on the floating raster approach, with a starting value of the offset A = 300 kHz.  Observation 1: The floating sync raster approach provides a maximum separation of 100 kHz for an offset of 300 kHz, same as minimum separation between legacy raster points.  Observation 2: The 100 kHz based raster approach provides a maximum separation of 50 kHz separation, which is half the frequency separation between raster points that in the legacy raster. |
| R4-2309693 | Huawei Technologies France | Proposal 1: For transmission BW= 15 RBs and PBCH PRB size= 15RB, Option 2 with N=1 and B=0 shall be used. (same as LTE synchronization raster)  Proposal 2: As 50 KHz might not be a sufficient offset between the two synchronization rasters, and legacy UEs might camp on the new raster due to LO jitter errors. So it would be better to implements some of the Physical layer methods, explained in R4-2304156 to avoid such legacy UE encampments. However these methods have to be analyzed in RAN1.  Proposal 3: For transmission BW= 15 RBs and PBCH PRB size= 12RB, Option 1 with N=1 and B=300 KHz shall be used.  Observation 1: The PBCH size of 12PRB in n100 was due to special implementation of GSM-R network in that band, other bands will probably will have a PBCH of 15 PRBs to avoid unnecessary coverage loss. |

## 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 1-1

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-1: The value of A in N \* 600kHz + M \* 50 kHz + A kHz, N ϵ {1:2499}, M ϵ {1,3,5}**

* Proposals
  + Option 1: 300 (ZTE, Ericsson, Apple, Huawei)
  + Option 2: 345 (Qualcomm)
* Recommended WF
  + Discuss if option 1 can be agreed on condition that N \* 600kHz + M \* 50 kHz + A kHz, N ϵ {1:2499}, M ϵ {1,3,5} is agreed as the finer synchronization raster for 3 MHz channel bandwidth.

### Sub-topic 1-2

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-2: The value of B in N \* 100 kHz + B kHz, N ϵ {9206:1:9232}**

* Proposals
  + Option 1: 30 (ZTE, Ericsson)
  + Option 2: 70 (Ericsson)
* Recommended WF
  + Discuss if option 1 can be agreed on condition that N \* 100 kHz + B kHz, N ϵ {9206:1:9232} is agreed as the finer synchronization raster for 3 MHz channel bandwidth.

### Sub-topic 1-3

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 1-3: Finer synchronization raster design for 3 MHz channel bandwidth**

* Proposals
  + Option 1: Use N \* 600 kHz + M \* 50 kHz + A kHz, N ϵ {1:4998}, M ϵ {1,3,5} for 12 PRBs PBCH transmission bandwidth, use N \* 100 kHz + B kHz, N ϵ {9206:1:9232} for 15 PRBs PBCH transmission bandwidth (ZTE, vivo, Ericsson, Huawei)
  + Option 2: Use N \* 600 kHz + M \* 50 kHz + A kHz (MediaTek, Qualcomm, Apple)
* Recommended WF
  + TBD based on RAN1 decision on number of 12 or 15 PRBs PBCH transmission bandwidth in bands other than n100.

### Sub-topic 1-4

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-4: Additional synchronization raster for 12 PRBs PBCH transmission bandwidth in band n100**

* Proposals
  + Option 1: 920.6225 MHz (MediaTek)
  + Option 2: 920.73 MHz (Ericsson, Qualcomm)
* Recommended WF
  + Discuss if option 1 can be agreed.

### Sub-topic 1-5

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-5: Additional synchronization raster for 20 PRBs PBCH transmission bandwidth in band n100**

* Proposals
  + Option 1: 921.45 MHz (Ericsson, Qualcomm)
* Recommended WF
  + Discuss if option 1 can be agreed.

### Sub-topic 1-6

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-6: Finer synchronization raster index for 3 MHz channel bandwidth**

* Proposals
  + Option 1: GSCN = 22255 + 3\*N + (M-1)/2, N=1:2499, M = {1,3,5} (MediaTek)
  + Option 2: NREF = (N \* 600 + M \* 50 + 345)/5, N=1534:1538, M ϵ {1,3,5} (Qualcomm)
* Recommended WF
  + TBD based on finer synchronization raster design.

### Sub-topic 1-7

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 1-7: LS to RAN1**

* Proposals
  + Proposal 1: Send LS to RAN1 to suggest that the PBCH transmission bandwidth also should be 12 PRB in bands other than n100 from RAN4 perspective. (vivo)
  + Proposal 2: Send LS to RAN1 to consider early indication to avoid legacy UEs camping on the cells with less than 5MHz operation. (Qualcomm)
* Recommended WF
  + Discuss if proposal 1 and/or 2 can be agreed.

# Topic #2: UE RF requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2307842 | ZTE Corporation | Proposal 1: It is proposed to define added FRCs as Table 2.1, Table 2.2, Table 2.3 and Table 2.4.  Observation 1: |
| R4-2307868 | Nokia, Ericsson, ZTE corporation | Proposal 1: Draft CR to TS 38.101-1  Observation 1: |
| R4-2308382 | MediaTek Inc. | Proposal 1: RAN4 not to consider specifying RF requirements for the special use case in band n100 before RAN plenary confirms it within the WID scope.  Observation 1: |
| R4-2309058 | Apple | Proposal 1: Consider Table 2 when specifying A-MPR for NR\_12.   |  |  |  | | --- | --- | --- | | Waveform | Modulation | A2 | | Outer / Inner | | DFT-s-OFDM | PI/2 BPSK | ≤ 4.5 | | QPSK | ≤ 5.0 | | 16QAM | ≤ 5.0 | | 64QAM | ≤ 5.0 | | 256QAM | ≤ 5.0 | | CP-OFDM | QPSK | ≤ 6.0 | | 16QAM | ≤ 6.0 | | 64QAM | ≤ 6.0 | | 256QAM | ≤ 6.5 |   Proposal 2: Consider Table 4 when specifying A-MPR for NR\_13.   |  |  |  | | --- | --- | --- | | Waveform | Modulation | A4 | | Outer / Inner | | DFT-s-OFDM | PI/2 BPSK | ≤ 3.5 | | QPSK | ≤ 4.0 | | 16QAM | ≤ 4.0 | | 64QAM | ≤ 4.0 | | 256QAM | ≤ 4.5 | | CP-OFDM | QPSK | ≤ 5.5 | | 16QAM | ≤ 5.5 | | 64QAM | ≤ 5.5 | | 256QAM | ≤ 6.5 |   Proposal 3: Consider Table 6 when specifying A-MPR for NR\_15.   |  |  |  | | --- | --- | --- | | Waveform | Modulation | A5 | | Outer / Inner | | DFT-s-OFDM | PI/2 BPSK | ≤ 3.5 | | QPSK | ≤ 4.0 | | 16QAM | ≤ 4.0 | | 64QAM | ≤ 4.0 | | 256QAM | ≤ 4.5 | | CP-OFDM | QPSK | ≤ 5.5 | | 16QAM | ≤ 5.5 | | 64QAM | ≤ 5.5 | | 256QAM | ≤ 6.5 |   Observation 1: |
| R4-2309270 | Qualcomm Inc. | Proposal 1: Take Tables 1 and 2 into account in defining A-MPR for NS\_12 for 3 MHz channel bandwidth.   |  |  |  |  | | --- | --- | --- | --- | | Channel BW | RBStart\*12\*SCS (MHz) | LCRB\*12\*SCS (MHz) | A-MPR | | 3MHz | ≤0.9 | >0 | A2 | | 5MHz | ≤1.8 | >0 | A1 | | 10MHz | ≤3.6 | >0 | A1 |  |  |  |  | | --- | --- | --- | | Modulation/Waveform | A1 | A2 | |  | Outer/Inner | Outer/Inner | | DFT-s-OFDM PI/2 BPSK | ≤ 5 | ≤ 3 | | DFT-s-OFDM QPSK | ≤ 5 | ≤ 4 | | DFT-s-OFDM 16 QAM | ≤ 5.5 | ≤ 4 | | DFT-s-OFDM 64 QAM | ≤ 5.5 | ≤ 4 | | DFT-s-OFDM 256 QAM | ≤ 9.5 | ≤ 4.5 | | CP-OFDM QPSK | ≤ 7 | ≤ 6 | | CP-OFDM 16 QAM | ≤ 7 | ≤ 6 | | CP-OFDM 64 QAM | ≤ 7 | ≤ 6 | | CP-OFDM 256 QAM | ≤ 9.5 | ≤ 6 |   Proposal 2: Take Tables 3 and 4 into account in defining A-MPR for NS\_13 for 3 MHz channel bandwidth.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Channel BW | Carrier Frequency, Fc, MHz | RBStart\*12\*SCS (MHz) | LCRB\*12\*SCS (MHz) | A-MPR | | 3MHz | 818.5 ≤ Fc < 820 | ≤0.54 | >0 | A4 | | 5MHz | 819.5 ≤ Fc < 821.5 | ≤1.44 | <1.08 | A1 | |  |  | ≤1.44 | ≥1.08 | A2 | | 5MHz | Fc ≥ 821.5 | ≤0.54 | <1.08 | A1 | |  |  |  | ≥3.24 | A3 |  |  |  |  |  |  | | --- | --- | --- | --- | --- | | Modulation/Waveform | A1 | A2 | A3 | A4 | |  | Outer/Inner | Outer/Inner | Outer | Outer/Inner | | DFT-s-OFDM PI/2 BPSK | ≤ 3.5 | ≤ 4.5 | ≤ 3 | ≤ 2.5 | | DFT-s-OFDM QPSK | ≤ 3.5 | ≤ 4.5 | ≤ 3 | ≤ 3.5 | | DFT-s-OFDM 16 QAM | ≤ 3.5 | ≤ 5 | ≤ 3 | ≤ 4 | | DFT-s-OFDM 64 QAM | ≤ 4.5 | ≤ 5 | ≤ 3 | ≤ 4 | | DFT-s-OFDM 256 QAM | ≤ 8 | ≤ 6 |  | ≤ 4.5 | | CP-OFDM QPSK | ≤ 5 | ≤ 6.5 | ≤ 4.5 | ≤ 5.5 | | CP-OFDM 16 QAM | ≤ 5 | ≤ 6.5 | ≤ 4.5 | ≤ 5.5 | | CP-OFDM 64 QAM | ≤ 6 | ≤ 6.5 | ≤ 4.5 | ≤ 5.5 | | CP-OFDM 256 QAM | ≤ 8 | ≤ 8 |  | ≤ 6.5 |   Proposal 3: Take Tables 5 and 6 into account in defining A-MPR for NS\_15 for 3 MHz channel bandwidth.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Channel BW | Carrier Frequency, Fc, MHz | RBend\*12\*SCS (MHz) | LCRB\*12\*SCS (MHz) | A-MPR | | 3MHz | 844 < Fc ≤ 847.5 | ≥ 1.44 | > 0 | A5 | | ≤ 0.18 | ≤ 0.36 | A6 | | 5MHz | 840.5 < Fc ≤ 846.5 | ≥3.24 | >0 | A1 | |  |  | <3.24, ≥2.52 | ≥1.44 | A2 | |  |  | <0.9 | ≤0.36 | A3 | | 10MHz | 840 < Fc ≤ 844 | ≥5.76 | >1.08 | A1 | |  |  | ≥5.76 | ≤1.08 | A4 | |  |  | <5.76, ≥4.14 | ≥2.7 | A2 | |  |  | <2.52 | ≤0.36 | A3 | |  | 835 < Fc ≤ 840 | ≥7.2 | >0 | A1 | |  |  | <7.2, ≥5.22 | ≥4.32 | A2 | |  |  | <1.08 | ≤0.36 | A3 | | 15MHz | 837.5 < Fc ≤ 841.5 | ≥9.36 | >1.08 | A1 | |  |  | ≥9.36 | ≤1.08 | A4 | |  |  | <9.36, ≥4.68 | ≥3.6 | A2 | |  |  | <3.96 | ≤0.36 | A3 | |  | 831.5 < Fc ≤ 837.5 | ≥10.8 | >1.08 | A1 | |  |  | ≥10.8 | ≤1.08 | A4 | |  |  | <10.8, ≥6.48 | ≥3.6 | A2 | |  |  | <2.7 | ≤0.36 | A3 | |  | Fc ≤ 831.5 | ≥13.14 | >0 | A1 | |  |  | <13.14, ≥7.92 | ≥3.6 | A2 | |  |  | <0.72 | ≤0.36 | A3 | | 20MHz | 835 < Fc ≤ 839 | ≥12.24 | >1.08 | A1 | |  |  | ≥12.24 | ≤1.08 | A4 | |  |  | <12.24, ≥8.46 | ≥5.4 | A2 | |  |  | <5.58 | ≤0.36 | A3 | |  | Fc ≤ 835 | ≥13.68 | >1.08 | A1 | |  |  | ≥13.68 | ≤1.08 | A4 | |  |  | <13.68, ≥8.46 | ≥5.4 | A2 | |  |  | <4.32 | ≤0.36 | A3 |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Modulation/Waveform | A1 | A2 | A3 | A4 | A5 | A6 | |  | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | Outer/Inner | | DFT-s-OFDM PI/2 BPSK | ≤ 9 | ≤ 5 | ≤ 4 | ≤ 9 | ≤ 4 | ≤ 2 | | DFT-s-OFDM QPSK | ≤ 9 | ≤ 5 | ≤ 4 | ≤ 9 | ≤ 5 | ≤ 2 | | DFT-s-OFDM 16 QAM | ≤ 9 | ≤ 5 | ≤ 4 | ≤ 9 | ≤ 5.5 | ≤ 2 | | DFT-s-OFDM 64 QAM | ≤ 9 | ≤ 5 | ≤ 4 | ≤ 9 | ≤ 5.5 | ≤ 2 | | DFT-s-OFDM 256 QAM | ≤ 9 | ≤ 5 | ≤ 9 | ≤ 13.5 | ≤ 6 | ≤ 2 | | CP-OFDM QPSK | ≤ 10.5 | ≤ 6.5 | ≤ 4 | ≤ 10.5 | ≤ 7 | ≤ 3 | | CP-OFDM 16 QAM | ≤ 10.5 | ≤ 6.5 | ≤ 4 | ≤ 10.5 | ≤ 7 | ≤ 3 | | CP-OFDM 64 QAM | ≤ 10.5 | ≤ 6.5 | ≤ 4 | ≤ 10.5 | ≤ 7 | ≤ 3 | | CP-OFDM 256 QAM | ≤ 10.5 | ≤ 6.5 | ≤ 9 | ≤ 13.5 | ≤ 7 | ≤ 3 |   Proposal 4: Adopt FRCs for 3 MHz as shown in Table 7 to Table 10.  Observation 1: |

## 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 2-1

*Sub-topic description:*

*Open issues and candidate options before meeting:*

**Issue 2-1: Draft CR to TS 38.101-01**

* Proposals
  + Option 1: Endorse the draft CR in R4-2307868
  + Option 2: Revise the draft CR in R4-2307868
  + Option 3: Postpone the draft CR in R4-2307868
* Recommended WF
  + TBA

### Sub-topic 2-2

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 2-2: ACS for 12 PRBs in band n100**

* Proposals
  + Proposal 1: RAN4 not to consider specifying RF requirements for the special use case in band n100 before RAN plenary confirms it within the WID scope. (MediaTek)
* Recommended WF
  + Discuss if proposal 1 can be agreed.

### Sub-topic 2-3

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 2-3: A-MPR for NR\_12, NR\_13 and NR\_15**

* Proposals
  + Proposal 1: Consider Tables 2, 4 and 6 in R4-2309058. (Apple)
  + Proposal 2: Consider Tables 1 to 6 in R4-2309270. (Qualcomm)
* Recommended WF
  + Define A-MPR as average over all inputs, including those provided in R4-2304095 in last meeting.

### Sub-topic 2-4

*Sub-topic description*

*Open issues and candidate options before meeting:*

**Issue 2-4: FRCs for 3 MHz**

* Proposals
  + Proposal 1: It is proposed to define added FRCs as Table 2.1, Table 2.2, Table 2.3 and Table 2.4 in R4-2307842. (ZTE)
  + Proposal 2: Adopt FRCs for 3 MHz as shown in Tables 7 to 10 in R4-2309270. (Qualcomm)
* Recommended WF
  + No need to discuss as the FRCs in these proposals are the same as those in the draft CR in R4-2307868.

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