**3GPP TSG-RAN WG4 Meeting #98-e *R4-2102982***

Electronic meeting, January 25th – February 5th, 2021

**Agenda item:** 10.1

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [98e][134] FS\_6425\_10500MHz \_NR

**Document for:** Information

# Introduction

ITU-R WP5D has sent LS to request parameters in a set of frequency ranges.

For frequency ranges below 6GHz, the LS reply has already be sent in last RAN4#95-e meeting and no contribution has been submitted in this meeting for this topic.

For 6.425-7.025GHz, 7.025-7.125 and 10.0-10.5 GHz, the request will be addressed via a new SI (RP-200513) to agree on associated parameters:

* Topic#1 is covering the last version of TR 38.921, plus some TPs to fix or clarify some issues in the last version.
* Topic#2 is covering the coexistence simulation results and the UE parameters challenged in last RAN4#96-e.
* Topic#3 is covering discussion on the BS and UE parameters which were not yet agreed.
* Topic#4 is covering discussion on additional information relevant for the sharing and compatibility studies.

The proposal is to:

* 1st round:
  + Comment the proposed TPs to TR.
  + Discuss and align on first the simulation results, and then corresponding UE/BS ACLR/ACS.
  + Align on indoor scenario consideration.
  + Discuss and possibly agree on the remaining parameters (BS and UE)
  + Discuss on the relevance of the additional information and decide on their inclusion in the LS reply
* 2nd round:
  + If not done, agree on the UE/BS ACLR/ACS limits and any other not yet agreed limits.

# Topic #1: Simulations results – Remaining BS and UE requirements

This topic is focusing on the coexistence simulation results and the remaining BS/UE RF requirements.

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| **DL simulations** | | |
| R4-2100490 | CATT |  |
| R4-2101497 | Huawei | **Observation 1: Since the DL ACIR for 6.425-7.125 GHz can be set as less than 25.9dB which is less than the agreed value 30.9dB in last meeting, indoor hotspot is not the restricted scenario for 6.425-7.125 GHz.**  **Observation 2: Since the DL ACIR for 10.0-10.5 GHz can be set as less than 25.9dB which is less than the agreed value 29.6dB in last meeting, indoor hotspot is not the restricted scenario for 10.0-10.5 GHz.**  **Proposal: There is no need to change the agreed targeted DL ACIR in last meeting, based on the simulation results of indoor hotspot scenario.** |
| R4-2101794 | Nokia |  |
| R4-2101951 | ZTE | **Proposal 1: reuse the ACLR/ACS requirements of urban macro for that of indoor case.** |
| R4-2102154 | Ericsson |  |
| R4-2105498 | Qualcomm | **Observation 1: For 7GHz and 10GHz with AAS BS, the required DL ACIR is 18dB.**  **Observation 2: For 7GHz and 10GHz with Omni BS, the required DL ACIR is 16dB.**  **Observation 3: The agreed BS ACLR and UE ACS in Urban Marco can be applied for indoor scenario.** |
| **UL simulations** | | |
| R4-2100491 | CATT |  |
| R4-2101498 | Huawei | **Observation 1: Since the UL ACIR for 6.425-7.125 GHz can be set as less than 23.9dB which is less than the agreed value 26dB in last meeting, indoor hotspot is not the restricted scenario for 6.425-7.125 GHz**  **Observation 2: Since the UL ACIR for 10.0-10.5 GHz can be set as less than 23.9dB which is less than the agreed value 24.1dB in last meeting, indoor hotspot is not the restricted scenario for 10.0-10.5 GHz.**  **Proposal: There is no need to change the agreed targeted UL ACIR in last meeting, based on the simulation results of indoor hotspot scenario.** |
| R4-2101795 | Nokia |  |
| R4-2101952 | ZTE | **Proposal 1: reuse the ACLR/ACS requirements of urban macro for that of indoor case.** |
| R4-2102155 | Ericsson |  |
| R4-2102499 | Qualcomm | **Observation 1: For 7GHz and 10GHz with AAS BS, the required UL ACIR is 15dB.**  **Observation 2: For 7GHz and 10GHz with Omni BS, the required UL ACIR is 17dB.**  **Observation 3: The agreed UE ACLR and BS ACS in Urban Marco can be applied for indoor scenario.** |
| **BS parameters** | | |
| R4-2100489 | CATT | **Proposal 1: The ACLR/ACS value in Table 2-1 can be confirmed for 6.425-7.025GHz, 7.025-7.125GHz and 10.0-10.5GHz bands.**  **Proposal 2: It is proposed to adopt the UEM in Table 2-2 for 6.425-7.025GHz, 7.025-7.125GHz and 10.0-10.5GHz bands.**  **Proposal 3: it is proposed to define ΔfOBUE as 100MHz.**  **Proposal4: It is proposed to define the in-band blocking in the range of [-44~-52dB].**  **Proposal5: It is proposed to reuse -15dBm CW interfering signal but reconsider the ΔfOOB.** |
| R4-2100823 | CMCC | **Observation 1: the minimum value of basic limit in the monotone decreasing first step should be modified to equal to the value in second step in OBUE mask.**  **Proposal 1: As ACLR requirement for 6425-7125MHz is relaxed to 38dB, both the stop points of frequency offset in OBUE mask and fOBUE should be modified to higher value.**  **Proposal 2: For wide area BS, the basic limit of first step in OBUE mask should be changed from**  **to ,**  **where the equals to the first stop point of frequency offset of the measurement filter 3dB point.**  **Observation 2: the characteristics of 6425-7125MHz is much more similar to FR1 although larger fundamental channel bandwidth is expected with 700MHz-width operating bands.**  **Proposal 3: It is suggested to define OBUE mask for 6425-7125MHz of wide area/medium range category B(option 1) with following parameters:**   * **The first stop point of frequency offset equals to 10MHz;** * **The second stop point of frequency offset equals to 50MHz;**   **Proposal 4: fOBUE for 6425-7125MHz is suggested as [80-100]MHz.** |
| R4-2101496 | Huawei |  |
| R4-2101792 | Nokia | **1) To apply the BS ACLR agreed in the WF [9] to the Small cell indoor/Indoor urban scenario, i.e. 38dB and 37dB for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz, respectively.**  **2) To apply the BS ACS agreed in the WF [9] to the Small cell indoor/Indoor urban scenario, i.e. 42dB and 40dB for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz, respectively.**  **3) To specify 20MHz as the Frequency offset step size of the BS Spectral mask for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz.**  **4) To keep the currently specified FR1 BS (general) in-band blocking requirements for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz.**  **5) Whether the currently specified BS in-band narrowband blocking requirements below 6GHz should be kept for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz should be decided according to the coexisting systems in each operating band.**  **6) To apply the following BS out of band blocking requirements for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz:**  **• -15 dBm CW interferer applies from 1MHz to FUL,low – 500MHz and from FUL,high + 500MHz up to 12750 MHz**  **• -35 dBm CW interferer applies from FUL,low – 500MHz to FUL,low – 70MHz and from FUL,high + 70MHz up to FUL,high + 500MHz**  **7) To specify ΔfOBUE of 50 MHz for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz.** |
| R4-2101949 | ZTE | **Proposal 1: to adopt the UEM proposed in Table 1/1a/1b/1c for 6425-7125MHz;**  **Proposal 2: to adopt the UEM proposed in Table 2/2a/2b/2c for 10-10.5GHz;**  **Proposal 3: to adopt the ACS requirements proposed in Table 3.2 for 6425-7125MHz;**  **Proposal 4: to adopt the IBB requirements in Table 3.3 for 10-10.5GHz;**  **Proposal 5: to adopt the ΔfOBUE requirements proposed in Table 4.1 for 6425-7125MHz and 10-10.5GHz;**  **Proposal 6: to adopt the ΔfOOB requirements proposed in Table 4.2 for 6425-7125MHz and 10-10.5GHz** |
| R4-2102156 | Ericsson | **Proposal 1: Specify BS OBUE as specified in the updated table 6.6.4.2.1-2 (with 50 and 100 MHz offsets instead of current 5 and 10 MHz in TS 38.104) for 6.425-7.125 GHz and 10.0-10.5 GHz frequency ranges.**  **Proposal 2: Keep same lower interfering signal mean power specified in clauses 7.4.2.2 and 10.5.2.2 of TS 38.104 for 6.425-7.125 GHz and 10.0-10.5 GHz frequency ranges**  **Proposal 3: Specify ΔfOOB value with 100 MHz for 6.425-7.125 GHz and 10.0-10.5 GHz frequency ranges**  **Proposal 4: Specify ΔfOBUE value with 100 MHz for 6.425-7.125 GHz and 10.0-10.5 GHz frequency ranges**  **Proposal 5: No specific BS ACLR and ACS values will be introduced for indoor BS and for 6.425-7.125 GHz frequency range.**  **Proposal 6: No specific BS ACLR and ACS values will be introduced for indoor BS and for 10.0-10.5 GHz frequency range.** |
| **UE parameters** | | |
| R4-2100488 | CATT | **Proposal 1: The ACLR/ACS value in Table 2-1 can be confirmed for 6.425-7.025GHz, 7.025-7.125GHz and 10.0-10.5GHz bands.**  **Proposal 2: reuse the out of band emission in TS 38.101-1 for 6.425-7.125 GHz and 10.0-10.5 GHz bands.** |
| R4-2101495 | Huawei |  |
| R4-2101791 | Nokia | **1) To apply the UE ACS agreed in the WF to the Small cell indoor/Indoor urban scenario, i.e. 32dB and 31dB for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz, respectively.**  **2) To apply the UE ACLR agreed in the WF to the Small cell indoor/Indoor urban scenario, i.e. 26dB and 24dB for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz, respectively.**  **3) To apply the General NR spectrum emission mask specified in clause 6.5.2.2 of TS 38.101-1 for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz** **if no other alternative can be agreed in RAN4#98-e.** |
| R4-2101948 | ZTE | **Proposal 1: certain relaxation for UE SEM requirement could be allowed based on the approved ACLR requirements.**  **Proposal 2: to define ACS requirements for 6425-7125MHz and 10-10.5GHz.** |
| R4-2102157 | Ericsson | **Proposal 1: UE SEM for 6.425-7.125 GHz and 10.0-10.5 GHz frequency range shall be the same one defined in TS 36.101-1 clause 6.5.2.**  **Proposal 2: No specific UE ACLR and ACS values will be introduced for indoor scenario, for 6.425-7.125 GHz frequency range and for 10.0-10.5 GHz frequency range.** |
| R4-2102501 | Qualcomm | **Observation 1: The general NR FR1 SEM is not aligned with ACLR values that were agreed for 6.425-7.125GHz and 10-10.5GHz.**  **Observation 2: Relaxation is needed for general NR SEM to algin with agreed ACLR.**  **Proposal 1: The SEM mask for 6.425-7.125GHz and 10-10.5GHz should be relaxed at the FOOB edge ± 0-1 by at least 3dB (-13dBm/1% BW to -10dBm/1% BW) to avoid additional MPR.** |

## Open issues summary

### Sub-topic 1-1

Sub-topic description: UL and DL simulations results for indoor. Results here after summarize companies results. Values in [] are moderator’s understanding based on the provided results. Conclusion on BS and UE ACLR/ACS is also mentioned.

**Issue 1-1: DL-UL simulations results – BS/UE ACLR/ACS for indoor**

* Based on simulation results, the DL and UL ACIR for indoor scenario (with omni antenna or AAS) are always lower than the agreed DL and UL ACIR for macro urban scenario, and this for both 6.425-7.125GHz and 10.0-10.5GHz. Every company has proposed to keep agreed BS and UE ACLR/ACS for indoor.
  + Option 1: Agree
  + Option 2: Disagree
* Recommended WF
  + Agree to keep agreed BS/UE ACLR/ACS for indoor and for both frequency ranges.

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| --- | --- | --- | --- | --- | --- |
| **DL simulations** | | | | | |
|  | **ACIR (dB) for Indoor** | | | | **Can we keep agreed BS ACLR (38-37) and UE ACS (32-31) for indoor?** |
|  | **6.425-7.125GHz** | | **10.0-10.5GHz** | |
| **ACIR for macro BS** | **31.0** | | **30.0** | |
|  | **Omni** | **AAS** | **Omni** | **AAS** |
| CATT | [18] | [20] | [18] | [19] | Yes |
| Huawei |  | <25.9 |  | <25.9 | Yes |
| Nokia | <ACIR -5 | <ACIR -5 | <ACIR -5 | <ACIR -5 | Yes |
| ZTE | <ACIR -5 | <ACIR -5 | <ACIR -5 | <ACIR -5 | Yes |
| Ericsson | 17 |  | 17 |  | Yes |
| Qualcomm | 16 | 18 | 16 | 18 | Yes |

|  |  |  |  |  |  |
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| **UL simulations** | | | | | |
|  | **ACIR (dB) for Indoor** | | | | **Can we keep agreed UE ACLR (26-24) and BS ACS (42-40) for indoor?** |
|  | **6.425-7.125GHz** | | **10.0-10.5GHz** | |
| **Macro urban** | **25.9** | | **23.9** | |
|  | **Omni** | **AAS** | **Omni** | **AAS** |
| CATT | [17] | [13] | [17] | [13] | Yes |
| Huawei |  | <23.9 |  | <23.9 | Yes |
| Nokia | <ACIR -5 | <ACIR -5 | <ACIR -5 | <ACIR -5 | Yes |
| ZTE | <ACIR -5 | <ACIR -5 | <ACIR -5 | <ACIR -5 | Yes |
| Ericsson | 17 |  | 17 |  | Yes |
| Qualcomm | 17 | 15 | 17 | 15 | Yes |

### Sub-topic 1-2

Sub-topic description: Several proposals have been made to change the BS OBUE mask, updating the frequency offset edges and some other updating the basic limits.

**Issue 1-2: BS Spectral mask**

* Proposal 1: Foffset edge
  + Option 1a: Min. BW=50MHz, Foffset step size=50MHz (CATT, Huawei, Ericsson)
  + Option 1b: Min. BW=20MHz, Foffset step size=20MHz (Nokia, ZTE)
  + Option 1c: Min. BW=[40,50]MHz, 1st Foffset step size =10MHz, 2nd Foffset step size =50MHz (CMCC).
* Proposal 2: Basic limit for the 1st frequency interval - linear decrease
  + Option 2a: Same as TS 38.104 (CATT, Huawei, Ericsson)

,

* + Option 2b: Updated with 1st Foffset edge (CMCC, ZTE, Nokia)
* Proposal 3: Update of the basic limits
  + Option 3a: No update, keep same ones TS 38.104 table 6.6.4.2.2.1-2 for cat B (CATT, CMCC, Huawei, Ericsson, Nokia)
  + Options 3b: Update basic limits for 10.0-10.5 GHz according:

|  |  |
| --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | *Basic limits* (Note 1, 2) |
| 0 MHz ≤ Δf < 20MHz |  |
| 20 MHz ≤ Δf <  min(40 MHz, Δfmax) | -13dBm |
| 40 MHz ≤ Δf ≤ Δfmax | -14 dBm |

Moderator’s note: It’s proposed to focus on the WA mask first. The others BS classes’ ones should be derived from the WA one and could be discussed later.

* Recommended WF
  + Proposal 1: should be further discussed, indicate which of the 3 options (1a, 1b and 1c) would be acceptable.
  + Proposal 2: The linear decrease for the basic limit in the 1st interval should most likely be updated as proposed by CMCC and ZTE, based on the frequency offset edge.
* Option 2b should be agreeable.
  + Proposal 3: Only one company proposed to relax the basic limits with 0.5dBm for 10.0-10.5GHz, this might not be absolutely necessary.
* Option 3a should be agreeable.

### Sub-topic 1-3

Sub-topic description: Several proposals have been made to update **ΔfOBUE** values.

**Issue 1-3:** **ΔfOBUE**

* Proposals
  + Option 1: 100 MHz (CATT, Ericsson)
  + Option 2: [80-100]MHz (CMCC)
  + Option 3: 80MHz (Huawei)
  + Option 4: 50 MHz (Nokia)
  + Option 5: 40 MHz (ZTE)
* Recommended WF
  + This is somehow related to the previous sub-topic 1-2. To ease the selection, it’s proposed to down-select the different options, and the suggestion is to choose between 100MHz and 50MHz.

### Sub-topic 1-4

Sub-topic description: IBB limits was left open in last meeting, several proposals have been made.

**Issue 1-4: BS in band blocking**

* Proposals
  + Option 1: [-44~-52dB] (CATT)
  + Option 2: -43dBm FR1 (Nokia, Ericsson)
  + Option 3: -40dBm for 6.425-7.125GHz and -41dBm for 10.0-10.5GHz. (ZTE)
  + Option 4: -47dBm for 6.425-7.125GHz and -49dBm for 10.0-10.5GHz (Huawei)
* Recommended WF
  + Indicate which values might be acceptable.

### Sub-topic 1-5

Sub-topic description: It was proposed to update OOB limits.

**Issue 1-5: Out of band blocking**

* Proposals
  + Option 1: Reuse -15dBm CW interfering signal (CATT)
  + Option 2: (Huawei)
    - -15 dBm CW interfering signal applies

from 1 MHz to FUL,low – 200MHz and from FUL,high + 200MHz up to 12750 MHz

* + Option 3: (Nokia)
    - -15 dBm CW interferer applies

from 1MHz to FUL,low – 500MHz and from FUL,high + 500MHz up to 12750 MHz

* + - -35 dBm CW interferer applies

from FUL,low – 500MHz to FUL,low – 70MHz and from FUL,high + 70MHz up to FUL,high + 500MHz

* Recommended WF
  + Indicate which option(s) would be acceptable.

### Sub-topic 1-6

Sub-topic description: Several proposals have been made to update **ΔfOOB** values.

**Issue 1-6: ΔfOOB**

* Proposals
  + Option 1: Reconsider the ΔfOOB (CATT)
  + Option 2: 100 MHz (Huawei, Ericsson)
  + Option 3: 60MHz (ZTE)
  + Option 4: 70MHz, same as n96 (Nokia)
* Recommended WF
  + .
  + Indicate which upper/lower value would be acceptable. Also, indicate if you would agree aligning ΔfOOB andΔfOBUE values.

### Sub-topic 1-7

Sub-topic description: ACS values have been agreed for 6.425-7.125GHz and 10.0-10.5GHz

**Issue 1-7: ACS**

* Proposals
  + Option 1: Interferer for WA BS (ZTE)
    - -49dBm/20MHz for 6.425-7.125GHz
    - -50 dBm/20MHz for10.0-10.5GHz
* Moderator’s note: It’s proposed to focus on the WA first. The others BS classes’ values should be derived from the WA one and could be discussed later.
* Recommended WF
  + Indicate if option 1 is acceptable or not.

### Sub-topic 1-8

Sub-topic description: UE ACLR has been agreed for 6.425-7.125GHz and 10.0-10.5GHz, SEM was left for further study.

**Issue 1-8: UE Spectral mask**

* Proposals
  + Option 1: Out of band emission in clause 6.5.2.2 of TS 38.101-1 for 6.425-7.125 GHz and 10.0-10.5 GHz (CATT, Nokia, Ericsson).
  + Option 2: Relax by 4dB for 6.425-7.125 GHz and by 6dB for 10.0-10.5 GHz. (Huawei)
  + Option 3: Some relaxation added (ZTE)
  + Option 4: relaxed at the FOOB edge ± 0-1 by at least 3dB (-13dBm/1% BW to -10dBm/1% BW) (Qualcomm)
* Recommended WF
  + To be further discussed

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  Proposal 1:  Proposal 2:  Proposal 3:  Sub topic 1-3:  Sub topic 1-4:  Sub topic 1-5:  Sub topic 1-6:  Sub topic 1-7:  Sub topic 1-8:  Others: |
| Huawei | Sub topic 1-1: Option 1  Sub topic 1-2:  Proposal 1: Option 1a. We think small channel bandwidth is less attractive.  Proposal 2: Option 2b.  Proposal 3: open to discuss  Sub topic 1-3: we agree with 80-100 MHz. The major considerations are wide transmission bandwidth and large number of antenna arrays.  Sub topic 1-4: -43 dBm~-47 dBm is acceptable.  Sub topic 1-5: Option2. It is also related to sub topic 1-6.  Sub topic 1-6: 80-100 MHz is acceptable  Sub topic 1-7: proposal -49dBm/20MHz is higher than existing requirements. We can consider to reuse existing -52 dBm for all channel bandwidth.  Sub topic 1-8: Option 2. It is straight forward to relax the SEM as ACLR did.  Others:  Some further comments:  We think the requirement for n96 are based on Micro and Pico hence it may not applicable for 7 GHz Macro BS. And for sub topic 1-8, 3 dB relaxation of UE SEM is ok to us. |
| ZTE | Sub-topic 1-1: **DL-UL simulations results – BS/UE ACLR/ACS for indoor**  Support the proposed WF.  Sub topic 1-2:  Proposal 1: **BS Spectral mask**  Open to further discuss the minimum channel bandwidth, however we think this band should also be comparable with n79 where minimum channel bandwidth is 40MHz.  Proposal 2:  Fine with recommended WF on option 2b;  Proposal 3:  We need some consistency between ACLR and UEM, if agree with option 3a, then relative smaller ACLR for 10-10.5GHz will not have any impact on UEM which seems not reasonable.  **Issue 1-3: ΔfOBUE:**  If the minimum channel bandwidth is 50MHz, then **ΔfOBUE** cannot be less than 100MHz, otherwise when carrier is placed at the band edge, the UEM mask of 2nd adjacent part would be attenuated which is not aligned with precedent requirement design.  Sub topic 1-4:  **BS in band blocking**  This should be also tightly with sub-topic 1-7, we need to decide ACS requirement firstly, then come back to IBB requirements.  Sub topic 1-5:  **Out of band blocking**  Fine with option 1, this value should be tightly related with discussion in Sub topic 1-6.  Sub topic 1-6:  **ΔfOOB**  This value should be dependent on IBB blocking power level and OOBB power level, we agree to have some further relaxation if necessary, however the detailed value, we need to come back next round.  In addition, **ΔfOOB** might be different from **ΔfOBUE** since attenuation between Out of band and in-band of Tx and Rx is different which is also the reason why legacy Rel-15 NR BS has different values between Tx and RX, usually Rx side is more demanding case.  Sub topic 1-7: **ACS**  The reason why ACS interfering signal power level is increased compared with the legacy 5MHz defined for NR BS ACS requirements. Anyway, we need to have clear relationship between ACS, wanted signal and interfering signal power level.  **Sub-topic 1-8: UE Spectral mask**  Fine with Option 1, however also open to further discuss necessary relaxation given relaxed ACLR requirements. |

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| Nokia | Sub topic 1-1: Option 1  Sub topic 1-2:  Proposal 1: Option 1b at least at 7GHz as 20MHz CBW is defined for band n96, can consider option 1a at 10GHz.  Proposal 2: Option 2b.  Proposal 3: Option 3a.  Sub topic 1-3: Option 4 at least at 7GHz as defined for band n96, can consider option 2 at 10GHz.  Sub topic 1-4: Option 2, as our simulation results show no room for relaxation.  Sub topic 1-5: Option 3 at least at 7GHz as defined for band n96, can consider option 2 at 10GHz.  Sub topic 1-6: Option 4 at least at 7GHz as defined for band n96, can consider option 2 at 10GHz.  Sub topic 1-7: Interfering signal power level should be decided together with transmission bandwidth configuration.  Sub topic 1-8: Option 1 at least at 7GHz as defined for band n96, can consider option 2 at 10GHz.  Others: |
| Ericsson | Sub topic 1-1: Agree, option 1.  Sub topic 1-2:  Proposal 1: option 1a. 20MHz looks small and 10MHz is definitively too snall.  Proposal 2: option 2b.  Proposal 3: 1-2 dB relaxation for the 2nd and 3rd interval would be acceptable indeed. It would be good then to align both 6.425-7.125GHz and 10.0-10.5GHz.  Sub topic 1-3: That would depend on 1-2 proposal 1, we still prefer option 1, 100MHz.  Sub topic 1-4: There is no reason to have more stringent blocking requirement. Better to keep current value, option 2.  Sub topic 1-5: option 3  Sub topic 1-6: It would make sense to align ΔfOOB andΔfOBUE, so option 2.  Sub topic 1-7: The requirement would be more stringent than for FR1. It’s better to re-use FR1 requirement.  Sub topic 1-8: From feasability point of view, as stated during the 7-24GHz study, there is no reason to relax UE SEM. Still, considering the agreed, an ACLR relaxation of 3 dB might still be acceptable, but not 4-6dB. |
| Qualcomm | Sub topic 1-1: Option 1  Sub topic 1-8: As shown in paper R4-2102501, the general NR SEM is not in line with the agreed UE ALCR. We need to consider relaxation based on the agreed ACLR. For n96 SEM, it is defined by relative SEM rather than absolute SEM and n96 SEM is different from general NR SEM. So it doesn’t make sense to reuse NR SEM even for 7GHz. Therefore, option 1 is not acceptable for us. We prefer option 4, i.e., at least 3dB relaxation at -13dBm/1% BW. |
| CMCC | Sub topic 1-1: we prefer option 1  Sub topic 1-2: It seems there are some misunderstanding that in our contribution, min BW is [40-50]MHz not 10MHz and the 2nd Foffset step size equals to 50MHz not 20MHz. therefore, for proposal 1 option 1c is not our proposal.  Proposal 1: min. BW is [40-50MHz], the first step size is 10MHz and the 2nd step size is 50MHz.  Proposal 2: option 2b.  Proposal 3: option 3a for 6425-7125MHz  Sub topic 1-3: proposal 2, 3 are both OK |
| CATT | Sub topic 1-1: Support option 1.  Sub topic 1-2:  Proposal 1: Support option 1a.  Proposal 2: Ok with the recommended WF, e.g. Option 2b.  Proposal 3: Open for further discussion between 3a and 3b.  Sub topic 1-3: Prefer Option 1.  Sub topic 1-4: Our simulation results shows -44dBm at 99.99% point. If we stick to use this probability for blocking as usual, then some value around -44dBm is acceptable to us.  Sub topic 1-5: option ?  Sub topic 1-6: OK option 2.  Sub topic 1-7: Propose to reuse ACS for FR1.  Sub topic 1-8: Prefer Option 1 but also open for further discussion on the necessity of UE UEM relaxation. |

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
|  | *NA* |
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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  Keep same BS/UE ACLR/ACS values for indoor and for 6.425-7.125GHz frequency range  Keep same BS/UE ACLR/ACS values for indoor and for 10.0-10.5GHz frequency range.  *Candidate options:* None  *Recommendations for 2nd round:* No need to further discuss. |
| **Sub-topic#2 – Proposal 1** | *Tentative agreements:* For 10.0-10.5GHz:   * Minimum channel BW = 50 MHz * Foffset step size = 50MHz   *Candidate options:* For 6.425-7.125 GHz:   * Minimum channel BW: 20 or 50MHz. * 1st Foffset step size = 10, 20 or 50MHz * 2nd Foffset step size = 20 or 50MHz   *Recommendations for 2nd round:* We need to provide the OBUE information to ITU-R so we would need at least to agree on the F\_offset\_size values. Even if somehow related, the minimum channel BW doesn’t have to be stated now. Capture final agreement in LS Reply. |
| **Sub-topic#2 – Proposal 2** | *Tentative agreements*: The basic limit for the 1st frequency interval shall be set according to:  With F\_offset\_edge value agreed in proposal 1.  *Candidate options:* None  *Recommendations for 2nd round:* No need to further discuss. |
| **Sub-topic#2 – Proposal 3** | *Tentative agreements:* It looks like companies would be ok to relax 2nd and 3rd interval for 10.0-10.5GHz only  The basic limits for 6.425-7.125GHz should be the same as specified in TS 38.104 table 6.6.4.2.2.1-2 for cat B. (Moderator: and then reuse table 6.6.4.2.1-2 for Cat A.)  The basic limits for 10.0-10.5GHz should be (cat B):   |  |  | | --- | --- | | Frequency offset of measurement filter ‑3dB point, Δf | *Basic limits* (Note 1, 2) | | 0 MHz ≤ Δf < 20MHz |  | | 20 MHz ≤ Δf <  min(40 MHz, Δfmax) | -13dBm | | 40 MHz ≤ Δf ≤ Δfmax | -14 dBm |   *Candidate options:* None  *Recommendations for 2nd round:* No need to further discuss. |
| **Sub-topic#3** | *Tentative agreements*: For 10.0-10.5GHz, **ΔfOBUE** =100MHz*.*  *Candidate options:* For 6.425-7.125GHz:ΔfOBUE = 50 or 100MHz.  *Recommendations for 2nd round:* Capture final agreement in the LS Reply. |
| **Sub-topic#4** | *Tentative agreements:* BS in-band blocking: -43dBm, same as FR1  *Candidate options:* None  *Recommendations for 2nd round:* No need to further discuss. |
| **Sub-topic#5** | *Tentative agreements:*  *Candidate options:* Options 2 and 3 to be further discussed.  *Recommendations for 2nd round:* Align with sub-topic#6 decision and capture agreement in LS Reply. |
| **Sub-topic#6** | *Tentative agreements:*  For 6.425-7.125GHz, the 2 options are 70 and [80,100]MHz, 80MHzcould then be a compromise for 6.425-7.125GHz  Nevertheless, ΔfOOB should be consistent with ΔfOBUE and might then be further discussed  *Candidate options:*  *Recommendations for 2nd round:* Continue discussions based on tentative agreements, keeping consistency with ΔfOBUE agreement. Capture final agreement in the LS Reply.. |
| **Sub-topic#7** | *Tentative agreements:* Reuse FR1 ACS requirement for both frequency ranges.  *Candidate options:*  *Recommendations for 2nd round:* Further discuss might be needed to adapt ACS requirement depending on the minimum channel BW. |
| **Sub-topic#8** | *Tentative agreements:* Relaxation seems agreeable for everyone, aligning with ACLR.  Possible agreement is to relax at the FOOB edge ± 0-1 by at least 3dB (-13dBm/1% BW to -10dBm/1% BW).  *Candidate options:*  *Recommendations for 2nd round:* Further discuss if relaxation could also be applicable to the all OOB frequency ranges*.* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on remaining BS and UE parameters for 6.425-7.125 and 10.0-10.5 GHz |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: LS Reply and relevant information for the sharing and compatibility studies

This topic is collecting any relevant information for the sharing and compatibility studies.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2101797 | Nokia | It is proposed to recommend ITU-R WP5D (in next RAN4 reply LS) to consider the following information for the sharing and compatibility studies between terrestrial and non-terrestrial systems:  1) Horizontal coverage range (deg.) and vertical coverage range (deg.) of AAS BS in RAN4 reply LSs;  2) Spatial emission and interference mitigation for AAS BS in TR 38.921. |
| R4-2101500 | Huawei | Reply LS |
| R4-2102840 | Ericsson | LS reply |

## Open issues summary

### Sub-topic 2-1

**Issue 2-1: Additional information to be mentioned in the ITU-R LS reply**

* Recommend in ITU-R LS reply to consider spatial emission and interference mitigation from TR 39.921
  + Option 1: Agree
  + Option 2: Disagree
* Recommended WF
  + Select one of the 2 options.

### Sub-topic 2-2

**Issue 2-2: Antenna and other parameters for indoor scenario**

* In the simulations, we considered both type of BS antenna, omni and AAS. Should we then consider that BS for indoor scenarios might have both omni and AAS type of antenna. Should we provide parameters for both BS types in the LS Reply to ITU-R?
  + Option 1: Only AAS BS type, even for indoor.
  + Option 2: Both omni and AAS BS type for indoor.
* Recommended WF
  + Select one of the 2 options.

### Sub-topic 2-3

Sub-topic description:

**Issue 2-3: LS Reply**

* Recommended WF

Provide any early comment to both LS Reply. It’s proposed anyway to finalize the LS in the 2nd round.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  Sub topic 2-3:  Others: |
| Huawei | Sub topic 2-1: Option 1  Sub topic 2-2: prefer to Option 1 with single type.  Sub topic 2-3:  Others: |
| ZTE | **Issue 2-1: Additional information to be mentioned in the ITU-R LS reply**  Fine with option 1.  **Issue 2-2: Antenna and other parameters for indoor scenario**  Support the option 2 which is also aligned with practical implementation. In addition, usually, indoor case is not the main concerns for IMT system coexisting with other non-IMT system.  **Issue 2-3: LS Reply**  For R4-2101500, BS UEM is not correct as commented before, in addition, BS ACS is also not aligned with the agreement before.  For R4-2102840, its LS is more comprehensive and however as mentioned itself, lots of requirements should be updated if agreement in Topic 1 is reached. |
| Nokia | Sub topic 2-1: Option 1  Sub topic 2-2: Option 1, as our simulation results show omni-directional indoor BS antenna cannot achieve sufficient DL SINR to support HOM.  Sub topic 2-3:  Others: |
| Ericsson | Sub topic 2-1: We could refer to TR 39.921 in the LS, that’s fine but better not provide too much extra information to avoid any confusion  Sub topic 2-2: Option 1, at those frequencies, it should only be AAS BS, omni should be an exception. |
| Qualcomm | Sub topic 2-1: We prefer option 2. We can refer to TR39.921 to avoid providing too much information to ITU  Sub topic 2-2: We prefer option 1. But we are fine with option 2 if it is the implementation by infra vendors.  Sub topic 2-3:  Others: |
| CMCC | Sub topic 2-1: option 1  Sub topic 2-2: option 2, both the AAS and omni type.  AAS BS type are preferred if omni-directional indoor BS antenna cannot achieve sufficient DL SINR to support HOM. However, at current stage we don’t suggest exclude the omni type which is the main practical implementation type for FR1 indoor scenarios. |
| CATT | Sub topic 2-1: Option 1  Sub topic 2-2: prefer option 2, both the AAS and omni type. |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2101500 | *LS reply* |
| Nokia: can merge with R4-2102840. |
| ericsson: Ericsson: It seems this LS is not answering last LS received from ITU-R (R4-2017799). Also, some information are missing or not correct, e.g. ACLR/ACS for BS and UE  Qualcomm: ACLR listed in the LS is not in line with agreements from last meeting.  For UE maximum output power and noise figure, we should add notes to clarify the optional case of 20dBm for MoP and 13dB for NF.  Note 1: 20dBm is not precluded for UE maximum output power.  Note 2: Considering UE implementation margin can vary, UE NF value could be larger than 9dB, e.g., 13dB.  Huawei: agree to merge with R4-2102840 and ACLR/ACS can be updated. For NF we do not think we need to mention other value than agreed 9 dB. The NF for licensed can be different with that for unlicensed and not necessary to refer to n96. |
| R4-2102840 | *LS reply* |
| Huawei: as discussed in Sub topic 2-1 and R4-2101500, it is proposed to consider spatial emission and interference mitigation from TR 39.921 in reply LS. |
| Nokia: Band n96 has been specified so the statement 'The bands within 6425 MHz to 10500 MHz are presently not part of 3GPP specifications.' needs to be revised; should inform ITU-R of the new materials on spatial emission and interference mitigation for AAS BS in TR 38.921.  Qualcomm: ACS listed in the LS is not in line with agreements from last meeting.  For UE maximum output power and noise figure, we should add notes to clarify the optional case of 20dBm for MoP and 13dB for NF.  Note 1: 20dBm is not precluded for UE maximum output power.  Note 2: Considering UE implementation margin can vary, UE NF value could be larger than 9dB, e.g., 13dB. |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:* In the LS Reply, refer only to TR 38.921 to recommend ITU-R considering spatial emission and interference mitigation  *Candidate options:*  *Recommendations for 2nd round:* No need to further discuss. |
| **Sub-topic#2** | *Tentative agreements:* none…  *Candidate options:* omni and AAS Bs for indoor.  *Recommendations for 2nd round:*  To simplify the LS Reply, we might only provide parameters for AAS BS for indoor. And we could capture in TR 38.921 that omni BS type is not excluded for indoor.  To be further discussed and capture agreement in the LS Reply and TR 38.921. |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2102840 | Based on the comments received, 2840 should be a better starting point to finalize the LS Reply to ITU-R. R4-2101500 shall be merged and all agreements made in this meeting shall be captured in the revision.  To be revised. |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #3: TR 39.921 v0.3.0

This topic is related to the received LS from ITU-R WP5D

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **TR** | | |
| R4-2101494 | Huawei | TR v 0.3.0 |
| **TP to TR (UE)** | | |
| R4-2101495 | Huawei |  |
| R4-2101948 | ZTE |  |
| **TP to TR (BS)** | | |
| R4-2101496 | Huawei |  |
| R4-2101949 | ZTE |  |
| **TP to TR (Simulations)** | | |
| R4-2101499 | Huawei | ZTE: propose to use ZTE’s TP as baseline to capture more detailed simulation results instead of ACIR proposal only. |
| R4-2101950 | ZTE |  |
| R4-2101793 | Nokia,ZTE |  |
| R4-2101953 | ZTE |  |
| R4-2102500 | Qualcomm |  |
| **TP to TR (antenna)** | | |
| R4-2101182 | Ericsson | ZTE: it seems not necessary to swap vertical and horizontal description, the original one is correct, start with vertical (M) and then horizontal (N)  In addition, omini antenna for indoor deployment should also been included. |
| R4-2101796 | Nokia | ZTE:omni antenna for indoor deployment should also been included. |
| R4-2101954 | ZTE |  |

## Open issues summary

### Sub-topic 3-1

Sub-topic description: A new revision of TR 38.921 is proposed to capture all agreements made

**Issue 3-1: TR 38.921 v0.3.0**

* Proposals
  + Option 1: Approve
  + Option 2: Not approve
* Recommended WF
  + If no comment, approve v0.3.0 as submitted

### Sub-topic 3-2

Sub-topic description: Several TPs to TR 38.921 have been submitted.

**Issue 3-2: TPs to TR 38.921 v0.3.0**

* Recommended WF
  + Please comment the TPs in below tables.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 3-1:  Others: |
| Huawei | Sub topic 3-2: we can focus on the discussion of remaining issues firstly and then work on the merged TP based on the agreements. |

|  |  |
| --- | --- |
| Nokia | Sub topic 3-1: Option 1  Sub topic 3-2: See comments below on individual TP.  Others: |
| Ericsson | Sub topic 3-1: Option 1 |
| Qualcomm | Sub topic 3-1: Option 1  Sub topic 3-2: See comments below. |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2101494 | *TR v0.3.0* |
| Company A |
| Company B |
| R4-2101495 | *TP to TR 38.921: UE remaining parameters* |
| Ericsson: Ericsson: The 4 and 6dB relaxations seems excessive, there is no feasability issue with existing values. To be merged anyway with R4-2101948. |
| Qualcomm:  For UE maximum output, we prefer to use the wording” Other UE power classes, are not precluded for both frequency ranges, 6.425-7.125GHz and 10.0-10.5GHz. For example, 20dBm is not precluded for UE maximum output power”  For UE noise figure, we prefer to add the worlding, “The UE noise figure of 9dB is selected for the 2 studied frequency ranges as the baseline. Considering UE implementation margin can vary, UE noise figure value could be larger than 9dB, e.g., 13dB”.  Huawei: ok to merge with R4-2101948. Open to add other power classes are not precluded but not ok to include that noise figure could be larger than 9 dB which is concluded in previous meetings.The implementation can be discussed when defining REFSENS requirements. |
| R4-2101948 | *TP to TR 38.921: UE remaining parameters* |
| Ericsson: No value is proposed for the UE SEM, to be merged with R4-2101495 |
| Qualcomm: The supporting CBW was not discussed for 7GHz an 10GHz. It is premature to define the ACS requirements for every channel BW configuration e.g., from 10MHz to 100MHz . We prefer to only capture the agreed ACS for 100MHz from last meeting in the TR. |
| R4-2101496 | *TP to TR 38.921: BS remaining parameters* |
| Ericsson: To be updated based on agreements on above topics. To be merged with R4-2101949. |
| Company B |
| R4-2101949 | *TP to TR 38.921 BS requirements* |
| Ericsson: To be updated based on agreements on above topics. To be merged with R4-2101496 |
| Company B |
| R4-2101499 | *TP for Clause 4.3 co-existence simulation results* |
| Nokia: Can be combined with R4-2101950 which includes throughput results directly from contributions |
| Ericsson: To be merged with R4-2101950 which looks more complete and might be used as a basis.  Huawei: ok to be merged with R4-2101950 |
| R4-2101950 | *TP to TR 38.921 summary of simulation results* |
| Nokia: Should explain the differences for tables with suffix 'a', and can be combined with 1499 which includes ACIR tables. |
| Ericsson: To be updated with latest results and to be merged with R4-2101499.  Qualcomm: We would like to include the simulation results with other simulation assumptions such as 3 UL UEs, 20dBd MoP and NF of 13. We can add the corresponding results into merged TP. |
| R4-2101793 | *TP to TR 38.921: Clarification of BS maximum transmit power on system level simulation assumptions for study on IMT parameters for frequency ranges 6.425-7.125GHz and 10.0-10.5GHz* |
| Company A |
| Company B |
| R4-2101953 | *TP to TR 38.921 Maintenance for simulation assumption* |
| Ericsson: Those updates are not needed |
| Company B |
| R4-2102500 | *TP to TR 38.921: Clarification of beamforming pattern modelling for multiple UL schedued UEs* |
| Nokia: The word 'beamforming' should be added to 'digital and hybrid BS architecture' |
| Ericsson: The model might still be accurate, but how it should be used in the simulations with 3UEs would need some clarifications as the beamforming gain might not be the same for the 3 UEs. |
| Qualcomm: response to Ericsson’s comments, if digital beamforming is used, the beamforming gain is the same for the 3UEs. It is not the case for hybrid beamforming BS architecture. We can revise the TP to clarify. |
| R4-2101182 | *TP to TR 38.921: Addition of in-door antenna parameters and correction to model in subclause 8.1* |
| Nokia: In TR 38.803, M denotes the number of rows and N denotes the number of columns, these were copied from RAN1 TR 38.900 and have since been copied to many other RAN4 TRs, hence it is better to swap the m and n indexes in the formula instead of swapping M. |
| Company B |
| R4-2101796 | *TP to TR 38.921: Proposals of Indoor BS Antenna Characteristics for Frequency Ranges 6.425-7.125GHz and 10.0-10.5GHz* |
| Ericsson: To be merged with our TP R4-2101182. |
| Company B |
| R4-2101954 | *TP to TR 38.921 Antenna configurations* |
| Nokia: omni-directional indoor BS antenna cannot achieve sufficient DL SINR to support HOM. |
| Ericsson: Based on issue 2-2, omni might be added or not but the note in this table is confusing anyway. To be merged anyway with our TP R4-2101182 |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2101494 | To be agreed |
| R4-2101948 | Merge with R4-2101495  To be revised |
| R4-2101496 | Merge with R4-2101949  To be revised |
| R4-2101950 | Merge with R4-2101499  To be revised |
| R4-2101793 | To be agreed |
| R4-2101953 | To be noted |
| R4-2102500 | To be revised |
| R4-2101182 | Merge with R4-2101796 and R4-2101954  To be revised |