**3GPP TSG-RAN WG4 Meeting # 102-e R4-2206307**

**Electronic Meeting, Feb. 21- Mar. 03, 2022**

**Agenda item:** 9.3

**Source:** Moderator (Huawei, HiSilicon)

**Title:** Email discussion summary for [101-bis-e][107] NR\_6 GHz\_licensed

**Document for:** Information

# Introduction

This email thread discuss the band definition for 6GHz licensed band. The contributions are in agenda 9.3, which includes:

* Topic #1: General aspects
* Topic #2: System parameters
* Topic #3: UE RF requirements
* Topic #4: BS RF requirements

# Topic #1: General aspects

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2203665](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203665.zip) | Apple | In this contribution we have presented summary our initial view on the several open technical issues for the upper 6GHz licensed band and potential co-existence scenarios, both with services running in the same frequency band in the RCC countries and cross-border areas, as well as with services in lower frequencies. Based on that we suggest asking RCC to provide further technical feedback on co-existence issues [3]. |
| [R4-2203666](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203666.zip) | Apple | [Draft] Further Reply LS on inclusion of the 6425-7125 MHz frequency band in the 3GPP specification for 5G-NR/IMT-2000 systems |
| [R4-2203868](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203868.zip) | Skyworks Solutions Inc. | Proposal:   * RAN4 captures that coexistence with other services be based on vacating 10 MHz blocks aligned with the 5 MHz channel raster to generate guard bands as appropriate in each country and that it is under the BS responsibility to ensure that the normal UE OOB emission are taken into account (especially with relaxed ACLR and SEM) in defining those guard bands * In absence of such common understanding, RAN4 refer to RCC for clarifications * Even with the understanding expressed in the first bullet as a starting point, seeking clarification from RCC on how each country will manage coexistence is useful to ensure there will be no impact on the UE requirement in the future. This should include questions addressed to observations 2 and 3 in this contribution. |
| [R4-2203918](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203918.zip) | CATT | Proposal 1: RAN4 doesn’t need to specify additional RF requirements to ensure compatibility with other non-IMT systems. The co-existence issue between IMT and other non-IMT systems within the same band if identified can be solved by site engineering approach.  Proposal 2: RAN4 should define RF requirements for 6425-7125 MHz based on existing reply LS and RCC recommendation 1/21 without waiting for further response from RCC. |
| [R4-2204564](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204564.zip) | CMCC | Observation 1: RCC has already recommended output power level restrictions on the device side. And there is no need to send the first issue in previous LS to RCC again to avoid duplicated work.  Observation 2: the first sub-issue in issue 2 is the regional operation requirements and will not impact 3GPP RF definition.  Observation 3: at least in R17, there is no need to define additional regional spurious emission requirements.  Observation 4: WAS/RLAN unlicensed spectrum shall not require any protection.  Proposal 1: it seems we don’t need LS [1] to RCC. |
| [R4-2205059](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205059.zip) | Ericsson | Observation1: As mentioned in RCC Recommendation, RCC has considered coexistence with incumbent services and proposes a flexible band plan to address this issue.  Observation2: RCC Recommendation has not specified any additional limit for the 6425-7125GHz band for co-existence with services in the same or adjacent band.  Observation3: Any country specific requirement could easily be handled via specific BS variant and UE NS signalling, as RAN4 uses to do for such case.  Observation4: ECC Decisions are not binding regulations for CEPT countries. In particular, ECC Decision(20)01 will not be implemented by all RCC countries and should be managed at country level.  Proposal: RCC Recommendation is self-sufficient to introduce band n104 in RAN4 specifications. |
| [R4-2205143](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205143.zip) | Huawei, HiSilicon | In the contribution, we provided some considerations for clarification on RCC Recommendation. We propose to further discussion the following two options:  Option 1: the issue is solved within RAN4 and no LS is needed  Option 2: RAN4 work on the band definition will based on the understanding that no additional spurious emissions and blocking requirements is expected to be defined in the 3GPP UE specification and send RCC a LS to confirm the understanding. |
| [R4-2205144](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205144.zip) | Huawei, HiSilicon | Draft LS on further clarification on RCC Recommendation 1/21 |
| [R4-2205452](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205452.zip) | ZTE Corporation | Proposal 1:RAN4 work on licensed band 6425-7125MHz could start with existing RCC LS without the need of waiting for RCC reply LS. |
| [R4-2206129](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206129.zip) | MediaTek (Chengdu) Inc. | Proposal 1: We recommend to send the LS proposed in [4] to RCC to request further clarification on the flexibility to national administrations in RCC countries that is considered in-scope of the RCC recommendation , so that RAN4 can take this into account when developing specifications.  Proposal 2: Request RAN plenary to capture in 3GPP TR37.890 that, when defining the band in the range 6425-7125MHz for the RCC region, coexistence of 5G NR operating in >6425MHz with RLAN systems operating in <6425MHz has not been taken into account by 3GPP, due to it not being indicated as a requirement from RCC |

## Open issues summary

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

### Sub-topic 1-1 –Clarification on RCC Recommendation

Regarding the RCC Recommendation 1/21, some contributions have been submitted in this meeting to discuss the co-existence issue raised in last meeting.

**Issue 1-1-1: Clarification on RCC Recommendation 1/21**

* Proposals:
  + **Proposal 1**: RAN4 captures that coexistence with other services be based on vacating 10 MHz blocks aligned with the 5 MHz channel raster to generate guard bands as appropriate in each country and that it is under the BS responsibility to ensure that the normal UE OOB emission are taken into account in defining those guard bands.
  + **Proposal 2**: Send an LS to RCC to request further feedback on the co-existence issue as proposed in R4-2203666.
  + **Proposal 3**: RCC Recommendation 1/21 is sufficient to introduce the 6GHz band in RAN4 specifications.
  + **Proposal 4**: RAN4 work on the band definition based on the understanding that no additional spurious emissions and blocking requirements is expected to be defined in the 3GPP UE specification and send RCC a LS to confirm the understanding.
  + **Proposal 5**: Request RAN plenary to capture in 3GPP TR37.890 that, when defining the band in the range 6425-7125MHz for the RCC region, coexistence of 5G NR operating in >6425MHz with RLAN systems operating in <6425MHz has not been taken into account by 3GPP, due to it not being indicated as a requirement from RCC
* Recommended WF
  + TBA based on 1st round discussion

**Issue 1-1-2: Comments collection for the draft LS**

* Proposals:
  + **Option 1**: R4-2203666
  + **Option 2**: R4-2205144
* Recommended WF
  + Comments collection on 1st round discussion

## Companies views’ collection for 1st round

### Open issues

**Collection of comments:**

**Issue 1-1-1 –Clarification on RCC Recommendation 1/21**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Charter Communications Inc | * + **Issue 1-1-1:** *We prefer* **Proposal 2**: Send an LS to RCC to request further feedback on the co-existence issue as proposed in R4-2203666. |
| CATT | **Issue 1-1-1:** OK with proposal 3 and proposal 4. |
| Huawei | **Issue 1-1-1:** We are ok to proposal 1, 3 and 4.  On proposal 2, we are open to send RCC a LS but we think there should be no need to wait for RCC reply to finalize the work.  On proposal 5, TP for TR37.890 should be RAN plenary discussion in our understanding. |
| Qualcomm | Proposal 2 is preferred rather than making assumptions in RAN4. Given that many companies have different interpretation of RCC regulations, it is apparent that there is ambiguity and it would be best to get clarification. |
| Ericsson | Proposal 1 would be acceptable, still it’s not really “BS responsibility” but operator/national regulator to do so. The BS will tell the UE what frequency to anchor and then the UE will fulfill the 3GPP defined ACLR, SEM, .. limits. There is nothing else that the BS can do.  We support proposal 3.  For proposals 2 and 4, we still don’t see the need for sending a LS to RCC.  For proposal 5, everyone is free to propose TP to TR 37.890. Still, note that this TR captures the regulatory status for the 6GHz frequency range, not how 3GPP will implement the corresponding bands. |
| Apple | Proposal 2 is our main preference. As explained in our discussion paper R4-2203665, the RCC recommendation is not entirely clear with regards to certain aspects so we cannot see how the additional clarifications from RCC may harm.  On Proposal 5, TR 37.890 captures the regulatory related status, not how 3GPP implements certain regulations. |
| CableLabs | Issue 1-1-1: We support proposal 2. We agree with the reason that Apple commented. |
| Skyworks | In our view the best compromise is that RAN4/RAN captures the assumptions under which it does the specification work (combination of proposals 1 and 4 and 5) and sends an LS to RCC to confirm those assumptions and still addresses Apple’s concern on how coexistence will be implemented, especially in our view if NS and A-MPR may be needed, it is in contradiction with assumptions in P1,3,4 |
| ZTE | **Issue 1-1-1:**  Proposal 1: For 10MHz guard band, we are not ready to agree it since this is out of 3GPP scope similar as empty 20MHz for n96 at the lowest edge..  Proposal 2 and proposal 4, we still don’t see the necessity to send the LS to RCC.  Proposal 3 is fine for us.  Proposal 5 could be further discussed in RAN-P since this is not within RAN4 scope. |
| Nokia | We agree to send LS to RCC to confirm no additional spurious emissions and blocking requirements for co-existence are necessary to be defined for this band in 3GPP specifications, further clarifications from RCC are encouraged |
| Hewlett Packard Enterprise | We support proposal 2. In our view, additional clarification from RCC is necessary. |
| MediaTek | **Issue 1-1-1:**  Proposal 2 is the preferred way forward, as indicated in our paper. Normally CEPT provides concrete recommendations, it seems there is a lot left open to interpretation at first glance. We would at least like clarity on how much freedom there is for National Administrations that follow the recommendation, so that we can set requirements appropriately, and be clear on whether NS values would be a suitable mechanism for UE requirements. (I don’t believe that CEPT normally leaves the question of coexistence requirements entirely up to National Administrations).  Our point on proposal 5 is that we would not like any misunderstandings about the assumptions under which requirements were defined, as commented by Skyworks. We can also capture a note in the specs of course, but we thought capturing in the TR may be more acceptable. So we support proposal 5. |
| Spark NZ | We agree with all proposals, but see no reason to send LS for clarification to RCC on Proposal 2 and 4. There is interest in this band in countries of other regions – the will likely become clearer as part of WRC-23. |
| Broadcom | As we’ve been asking for few meetings now, we see the need of further clarifications from RCC. Therefore we only support Proposal 2. |
| CHTTL | Prefer Proposal 3 or Proposal 4 but without sending LS to RCC. |

**Issue 1-1-2: Comments collection for the draft LS**

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| **Tdoc number** | **Comments collection** |
| [R4-2203666](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203666.zip) | Charter Communications Inc. We support the proposal in the draft LS R4-2203666 |
| Huawei: On the second question, we think it is not needed. We tend to agree the observation from [R4-2205059](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205059.zip), in future if needed country specific requirement can be handled by regional BS requirement and UE NS signaling |
| Ericsson: the first question has already its answer in RCC recommendation: the RCC Recommendation is clear, “Administrations may restrict”. Also, the allowed power level has been specified, referring to Article 21 of RR.  The second question is also inadequate: national regulators could always decide of additional requirements, exactly like with CEPT. And if this happens, this could be easily managed, adding a new NS on the UE side.  Those questions are not needed. |
| Skyworks: we support the LS and possibly asking any confirmation of any other common understanding of the group. Especially we do not agree that use of NS on the UE side is the common understanding from what is written in the RCC recommendation. If Huawei and Ericsson think NS and A-MPR is needed for the UE this exactly the kind of information we need to understand from RCC. |
| Hewlett Packard Enterprise: We support the proposed LS. |
| To Skyworks (Ericsson): I don’t think we have mentioned anywhere that we would need any NS/A-MPR if RAN4 implements RCC Recommendation. What we have said is that, if one specific country would like to add a requirement (like a CEPT country might also do on top of any ECC Decision), this can be managed using a new NS. We think so we don’t need any NS when specifying n104 according to RCC Recommendation. |
| Huawei: response to Skyworks, we share similar view as Ericsson. According to RCC recommendation, recommendation ITU-R 329 should be fulfilled which can be covered by general unwanted emission requirements, hence no additional requirements to be defined for the WI. At the same time, if in future a country specific limits want to be added, it can be easily managed by a NS. It is a business as usual. The approach applies to all licensed bands. |
| [R4-2205144](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205144.zip) | Qualcomm: We don’t agree that RAN4 should assume no additional requirements are needed. There are different opinions and interpretations in RAN4, so it’s best to get clarification.O |
| Apple: As there are indeed different opinions and interpretations of the RCC recommendation, we cannot assume that "*no additional requirements are needed*” and thus prefer having more clarifications from RCC. |
| Skyworks: since even companies that interpret the RCC recommendation is sufficient and no additional emission requirements are needed are still saying that NS might be needed. If so we believe that any LS to RCC should seek for RCC feedback on whether additional emission requirement may be needed for the deployment in RCC countries to coexist with existing services and potential services in adjacent bands. I our view this is the main uncertainty left to alleviate. |
| Hewlett Packard Enterprise: We share the views expressed by Qualcomm, Apple, and Skyworks that it cannot be assumed that “no additional requirements are needed” and that additional clarification from RCC is needed. |
| MediaTek: It seems best to get clarification from RCC from the other R4-2203666 version of the LS. Indicating to RCC that “In RAN4 understanding the compatibility and co-existence can be ensured by deployment measures”, seems an inappropriate statement for 3GPP to make externally. |

## 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.*

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|  | **Status summary** |
| **Issue 1-1-1** | **Clarification on RCC Recommendation 1/21**   * **Proposals**:   + **Proposal 1**: RAN4 captures that coexistence with other services be based on vacating 10 MHz blocks aligned with the 5 MHz channel raster to generate guard bands as appropriate in each country and that it is under the BS responsibility to ensure that the normal UE OOB emission are taken into account in defining those guard bands. (Huawei, Skyworks, Spark NZ)   + **Proposal 2**: Send an LS to RCC to request further feedback on the co-existence issue as proposed in R4-2203666. (Charter, Qualcomm, Apple, CableLabs, Skyworks, Hewlett Packard Enterprise, MediaTek, Broadcom)   + **Proposal 3**: RCC Recommendation 1/21 is sufficient to introduce the 6GHz band in RAN4 specifications.( CATT, Huawei, Ericsson, ZTE, Spark NZ, CHTTL)   + **Proposal 4**: RAN4 work on the band definition based on the understanding that no additional spurious emissions and blocking requirements is expected to be defined in the 3GPP UE specification and send RCC a LS to confirm the understanding. ( CATT, Huawei, Skyworks?, Nokai?)   + **Proposal 5**: Request RAN plenary to capture in 3GPP TR37.890 that, when defining the band in the range 6425-7125MHz for the RCC region, coexistence of 5G NR operating in >6425MHz with RLAN systems operating in <6425MHz has not been taken into account by 3GPP, due to it not being indicated as a requirement from RCC (Skyworks, MediaTek, Spark NZ)   *Recommendations for 2nd round:*  *Based on 1st round discussion, companies’ views are still diverse. Basically there are two camps. The issue has been discussed in last meeting and the situation does not change too much. Moderator suggest to have some discussion on second round GTW to seek a compromised WF.* |
| **Issue 1-1-2** | *Recommendations for 2nd round:*  *Based on the comments received on 1st round discussion, neither R4-2203666 nor R4-2205144 is agreeable as it is. Moderator suggest to merge the two LS and assign a new tdoc in case we agree to send the LS as discussed in Issue 1-1-1 on 2nd round.* |

*Suggestion on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on general aspects | Huawei |
| #2 | Revision of R4-2203666 | Apple |

## Discussion on 2nd round

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| --- | --- |
| **Issues** | **Company Comments** |
| WF on general aspects | Huawei: the draft can be found here  [WF on general aspects\_v0](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_102-e/Inbox/Drafts/%5B102-e%5D%5B107%5D%20NR_6%20GHz_licensed/Round%202/General%20aspects/WF%20on%20general%20aspects_v0.docx)  Both option 1 and option 2 have large number companies’ support. We think we should find a compromised proposal. We provide one in the draft for consideration. Comments and suggestions are welcome.  MediaTek: Something like the proposed compromise text could be ok. We should of course ask for them to provide feedback though.  Qualcomm: We also support some kind of compromise, but the wording between the various proposals probably still needs more work. |
| Draft LS to RCC (proposal in R4-2203666) | Charter Communications Inc: Our preference is to send an LS to RCC to request further feedback on the co-existence issue as proposed in R4-2203666.  MediaTek: To be fair to proponents of the LS, there is a draft LS already submitted, so the moderator should really have asked for specific comments to that text as a starting point. I add here what should be requested.Ericsson: If RAN4 agrees to send a LS, R4-2203666 needs to be revised taking into account the comments made in the 1st round:   * The first question 1) should be re-worded to avoid asking anything that is already answered in the RCC Recommendation (e.g. “allow or not allow”, , power levels, guard bands more granular than 5MHz). * The 2nd question 2) should state that RAN4 assumption is that no other more stringent conditions are needed when specifying this new band and, if this is not correct, RCC should warn RAN4, replying to this LS.   Moderator: To MediaTek, there are already some comments made in 1st round to R4-2203666. So the intention is that the proponent can make a revision to capture these comments.  Huawei: we share similar view with Ericsson for the 2nd question.  ZTE: tend to agree with Ericsson and Huawei  Skyworks: the latest version addresses the two aspects that are worth confirming with RCC and similar to moderator input:  -that coexistence with other services is based on vacating blocks (further checking the block size)  -whether adopting countries may apply additional emission requirements. |
| Apple | In the latest version of the draft LS, the wording is simplified as follows below. However, we are open to polish the wording to avoid any ambiguity in the questions.  *It is stated that “Administrations may restrict the use of frequency blocks, including within the 6425-6525 MHz and 7100-7125 MHz frequency bands, in order to ensure compatibility with stations in FS, FSS, SOS, SRS and EESS.”*  *1)     Does the above restricted use of frequency blocks mean only "allowed/not allowed" usage of 5G NR within the block and, if so, in multiples of which NR block size?*  *2)     Will there be further tightening of emissions requirements by national administrations outside of the frequency block when the block is used for 5G NR operation?* |

## 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** |
|  |  |

# Topic #2: System parameters

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2203919**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203919.zip) | CATT | Proposal 1: To follow the legacy approach by using the channel raster of 15kHz and 30kHz as Table 2-1.  Table 2-1: Applicable NR ARFCN   |  |  |  |  | | --- | --- | --- | --- | | NR operating band | ΔFRaster  (kHz) | Uplink  Range of NREF  (First – <Step size> – Last) | Downlink  Range of NREF  (First – <Step size> – Last) | | n10x | 15 | 828334 – <1> – 875000 | 828334 – <1> – 875000 | | 30 | 828334 – <2> – 875000 | 828334 – <2> – 875000 |   Proposal 2: To introduce the applicable SS raster entries in table 2-2 for 6425-7125MHz.  Table 2-2: Applicable SS raster entries   |  |  |  |  | | --- | --- | --- | --- | | NR operating band | SS Block SCS | SS Block pattern1 | Range of GSCN  (First – <Step size> – Last) | | n10x | 30 kHz | Case C | 9881 – <1> – 10360 | |
| [**R4-2204565**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204565.zip) | CMCC | Proposal 1: for 6GHz channel raster, it is suggested to reuse the legacy approach with 15KHz and 30KHz.  Proposal 2: 30KHz is suggested for 6GHz SSB SCS. |
| [**R4-2205120**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205120.zip) | Xiaomi | Proposal 1: adopt option 1 follow the legacy approach: 15kHz and 30kHz define the channel raster as below.   * Channel raster  |  |  |  |  | | --- | --- | --- | --- | | NR *operating band* | ΔFRaster  (kHz) | Uplink  range of NREF  (First – <Step size> – Last) | Downlink  range of NREF  (First – <Step size> – Last) | | [nX] | 15 | 828334 – <1> –875000 | 828334 – <1> –875000 | |  | 30 | 828334 – <2> –875000 | 828334 – <2> –875000 |   Proposal 2: define the synchronization raster as below.   * Synchronization raster  |  |  |  |  | | --- | --- | --- | --- | | NR *operating band* | SS Block SCS | SS Block pattern (NOTE 1) | Range of GSCN  (First – <Step size> – Last) | | [nX] | 30 kHz | Case C | 9881 – <1> – 10360 | |
| [**R4-2205145**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205145.zip) | Huawei, HiSilicon, China Unicom | Proposal 1: It is proposed to follow the legacy approach to define channel raster.  Proposal 2: It is proposed to adopt the Sync raster in Table 2-2for 6GHz NR licensed band   |  |  |  |  | | --- | --- | --- | --- | | NR *operating band* | SS Block SCS | SS Block pattern (NOTE 1) | Range of GSCN  (First – <Step size> – Last) | | nxxx | 30 kHz | Case C | 9881 – <1> – 10360 | |
| [**R4-2205453**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205453.zip) | ZTE Corporation | Proposal 1: to use band number n104 for 6425-7125MHz.  Proposal 2: to use the following CBW/SCS configurations for 6425-7125MHz.  Proposal 3: to reuse the existing FR1 spectral utilization for 6425-7125MHz.  Proposal 4: to define channel raster 15KHz and 30KHz (step size is equal to 2) for 6425-7125MHz.  Proposal 5: to have the step size 4 of sync raster for 6425-7125MHz; |
| [**R4-2206102**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206102.zip) | Qualcomm Incorporated | The channel raster should be specified at 5 MHz resolution to accommodate frequency blocks of 10, 20, and 30 MHz which may be aggregated together for wider channels.   |  |  |  |  | | --- | --- | --- | --- | | NR operating band | ΔFRaster  (kHz) | Uplink  Range of NREF  (First – <Step size> – Last) | Downlink  Range of NREF  (First – <Step size> – Last) | | nXYZ | 15 | 828667 – <333, 334> – 874667 | 828667 – <333, 334> – 874667 |   The ARFCN available for this band as follows  ARFCN0 = 828667  ARFCNn+1 = ARFCNn + 333 if n mod 3 ≠ 0  ARFCNn+1 = ARFCNn + 334 if n mod 3 = 0  ARFCN138 = 8874667  Where n = {0, 1, 2, … 138}.  The sync raster should also be compatible with this channelization, especially considering the extent of this band and the impact on UE cell search. |
| [**R4-2206127**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206127.zip) | MediaTek (Chengdu) Inc. | Channel raster minimum requirements from RCC   * Channel raster: 5MHz is required (closest is: 4995kHz for 15kHz SCS, 4980kHz for 30kHz SCS) * However it needs to be considered as to whether more flexibility is required.   Sync raster minimum requirements from RCC   * GSCN raster based on 5MHz channel raster:   + SCS = 30kHz or 15kHz   + Spectrum utilization: 51 RB (30kHz), 106 RB (15kHz)   + SSB = 20 RBs   + CORESET#0 of 48 RBs with offset values defined in TS38.213 for 10MHz bandwidth (4320kHz from edge)   + GSCN spacing: 7.5MHz (30kHz SCS) ideal     - As multiples of current 1.44MHz raster => 7.2MHz (30kHz SCS).   Reduction in cell search effort: 1 – (97/486 GSCNs) = 0.8 => ~80% reduction compared to 1.44MHz sync raster with step size of 1.  Other considerations for sync raster  If more flexibility in the channel raster is required, this may lead to a more granular sync raster. Also if in future more flexibility was required in other regions, this may lead to more flexibility being needed too.  Proposal: Consider the sync and channel raster aspects in this document for further discussion. |

## Open issues summary

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

### Sub-topic 2-1 – Channel bandwidth

**Issue 2-1-1: channel bandwidth/SCS**

* Proposal:

It is proposed to use the following CBW/SCS configurations for 6425-7125MHz band.

* Table 5.3.5-1 Channel bandwidths for each NR band

| **NR Band** | **SCS (kHz)** | ***channel bandwidth* (MHz)** | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **5** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** |
|  | 15 |  |  |  | 20 |  | 30 |  | 40 |  | 50 |  |  |  |  |  |
| n104 | 30 |  |  |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 60 |  |  |  | 20 |  | 30 |  | 40 |  | 50 | 60 | 70 | 80 | 90 | 100 |

* Recommended WF
  + Discuss whether the proposal is agreeable

**Issue 2-1-2: Spectral utilization**

* Proposals:

It is proposed to reuse the existing FR1 spectral utilization for 6425-7125MHz.

* Recommended WF
  + Discuss whether the proposal is agreeable

### Sub-topic 2-2 – Channel arrangment

**Issue 2-2-1: Channel raster**

* Proposals:
  + **Option 1:** follow the legacy approach: 15kHz and 30kHz

|  |  |  |  |
| --- | --- | --- | --- |
| **NR *operating band*** | **ΔFRaster**  **(kHz)** | **Uplink**  **range of NREF**  **(First – <Step size> – Last)** | **Downlink**  **range of NREF**  **(First – <Step size> – Last)** |
| nx | 15 | 828334 – <1> –875000 | 828334 – <1> –875000 |
|  | 30 | 828334 – <2> –875000 | 828334 – <2> –875000 |

* + **Option 2:** the channel raster is specified at ~5 MHz resolution

|  |  |  |  |
| --- | --- | --- | --- |
| NR operating band | ΔFRaster  (kHz) | Uplink  Range of NREF  (First – <Step size> – Last) | Downlink  Range of NREF  (First – <Step size> – Last) |
| nXYZ | 15 | 828667 – <333, 334> – 874667 | 828667 – <333, 334> – 874667 |

The ARFCN available for this band as follows

ARFCN0 = 828667

ARFCNn+1 = ARFCNn + 333 if n mod 3 ≠ 0

ARFCNn+1 = ARFCNn + 334 if n mod 3 = 0

ARFCN138 = 8874667

Where n = {0, 1, 2, … 138}.

* Recommended WF
  + TBA based on 1st round discussion

**Issue 2-2-2: Synchronization raster**

The sync raster entries is related to the discussion of channel raster in Issue 2-2-1.

* Proposals:
  + **Option 1:**

To define SS raster based on SCS based channel raster

* Further decision on step size: 1 or 4 or other value<=7

Example: step size =1

|  |  |  |  |
| --- | --- | --- | --- |
| NR operating band | SS Block SCS | SS Block pattern1 | Range of GSCN  (First – <Step size> – Last) |
| nx | 30 kHz | Case C | 9881 – <1> – 10360 |

Example: step size =4

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | SS Block SCS | SS Block pattern (NOTE 1) | Range of GSCN  (First – <Step size> – Last) |
| nx | 30 kHz | Case C | 9884 – <4> – 10360 |

* + **Option 2:** To define SS raster based on ~ 5MHz channel raster and the raster entries are FFS.
* Recommended WF
  + TBA based on 1st round discussion

## Companies views’ collection for 1st round

### Open issues

**Collection of comments:**

**To Sub-topic 2-1 – channel bandwidth**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | **Issue 2-1-1:** *Comment*  **Issue 2-1-2:** *Comment* |
| CATT | **Issue 2-1-1:** Support the proposal.  **Issue 2-1-2:** Support the proposal. |
| Huawei | **Issue 2-1-1:** *the proposal is ok*  **Issue 2-1-2:** *the proposal is ok* |
| Vodafone | **Issue 2-1-1:** Support the proposal.  **Issue 2-1-2:** Support the proposal. |
| Qualcomm | Issue 2-1-1: Ok with the channel bandwidths table, but the band number should be decided later.  Issue 2-1-2: Ok |
| Ericsson | **Issue 2-1-1:** agree with the proposal  **Issue 2-1-2:** agree with the proposal |
| China Unicom | **Issue 2-1-1:** Support the proposal.  **Issue 2-1-2:** Support the proposal. |
| Xiaomi | **Issue 2-1-1:** Support the proposal.  **Issue 2-1-2:** Support the proposal. |
| Skyworks | **Issue 2-1-1:** OK with channel table  **Issue 2-1-2:** fine will WF |
| ZTE | **Issue 2-1-1:** support the proposal.  **Issue 2-1-2:** Support the proposal. |
| Nokia | **Issue 2-1-1:** Support the proposal.  **Issue 2-1-2:** Support the proposal. |
| MediaTek | **Issue 2-1-1:** ok with this. |
| Spark NZ | Issue 2-1-1: agree with the proposal  Issue 2-1-2: agree with the proposal |
| CHTTL | The proposals are ok |

**To Sub-topic 2-2 –Channel arrangement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | **Issue 2-2-1:** *Comment*  **Issue 2-2-2:** *Comment* |
| CATT | **Issue 2-2-1:** Support option 2 to follow the legacy approach based on SCS. Compare to 5MHz channel raster, SCS based channel raster enables more flexibility. That would be more straightforward and helpful to a licensed band that will be possibly used by other countries or regions beyond RCC countries.  **Issue 2-2-2:** Support option 1. As discussed in our paper, the step size from 1 to 7 is workable for sync raster entries. A tradeoff between flexibility and search time can be considered to determine the step size. |
| Huawei | **Issue 2-2-1:** *Option 1, follow the legacy approach. We do not see the reason to not to follow the legacy approach.*  **Issue 2-2-2:** *Option 1, to define the SS raster based on SCS based channel raster and we are open on the step size. If the concern on option 1 is searching time, we can choose step size =6/7.* |
| Qualcomm | Issue 2-2-1: Option 2. If we follow the RCC rules, only 5 MHz raster is allowed. So defining raster outside of this would be in violation of the RCC rules.  Issue 2-2-2: Option 2. The 5 MHz raster is the only one that is allowed by RCC rules. UE cell search time is also a consideration as pointed out by most companies. |
| Ericsson | **Issue 2-2-1 / 2-2-2:** Instead of introducing additional complexity with the modulo approach, it’s better to use a smaller step size that would easily solve this, offering more flexibility for the future. Looking at other licensed FR1 bands with similar width (e.g. n79) the step size was still 16 (not >300) while the minimum channel BW was 40 MHz…Also, n77 (900Mhz wide and 10 MHz minimum channel BW) has step size of 1…  To Qualcomm: Why any of the proposed raster would violate RCC rules? RCC doesn’t specify any rules for the raster but a band plan. As long as the raster specified by RAN4 could accommodate that band plan, this is perfectly aligned with RCC Recommendation. |
| China Unicom | **Issue 2-2-1:** *Option 1, to follow the legacy approach.*  **Issue 2-2-2:** *Option 1, to define SS raster based on SCS based channel raster.* |
| Xiaomi | **Issue 2-2-1:** *Option 1, following the legacy approach.*  **Issue 2-2-2:** *Option 1* |
| Skyworks | Issue 2-2-1: Option 2. We concur with Qualcomm that based on the reference 20 MHz blocks and 10MHz extension, only 5MHz raster is needed  Issue 2-2-2: Option 2. |
| ZTE | **Issue 2-2-1:** support Option 1, to follow the legacy approach to give enough flexibility for practical deployment. In addition, this band is only limited to RCC countries only and it could be applied to other regions.  **Issue 2-2-2:** Option 1 with step size 4 instead of 1 since the minimum channel bandwidth has been increased from 10MHz to 20MHz, just similar as n79 with minimum channel bandwidth 40MHz at the beginning |
| MediaTek | **Issue 2-2-2:** In our paper we showed that a step size of 5 x 1.44 would be suitable to cover a 20MHz minimum channel bandwidth with a 5MHz spacing, 30kHz SCS and 48 RB CORESET#0 RBW.This would lead to a 7.2MHz GSCN raster spacing. Not clear why a step size of 1 would be needed. |
| Spark NZ | Issue 2-2-1: Option 1, follow the legacy approach. |
| Qualcomm | To Ericsson: The RCC rules identify the frequency blocks and where they can be located. Our understanding of the rules is these frequency blocks can only be placed at 5 MHz intervals. Therefore, defining raster points outside of these 5 MHz intervals would enable a deployment that violates the RCC rules. |
| Apple | Issue 2-2-1 and issue 2-2-2: Option 2 (or a similar approach). If we follow what the RCC rules state, then frequency blocks outside 5MHz are not needed. However, we can double check it by asking explicitly this question in the LS to RCC. |
| Ericsson | To Qualcomm: We agree that RCC has specified 5 MHz blocks and that the raster shall support this allocation, but it doesn’t have to stricly support it, it could be more flexible. All licensed bands support today a raster which is much more flexible compared to what Regulators have specified (latest example is n79 for which Korean regulator allocated blocks of 10MHz), and that has never caused any problem, why should it be one now for this specific band?  From our point of view, the right question is which raster should be specified to support RCC Recommendation and still give some flexibility for other potential deployement elsewhere. This is the usual RAN4’s approach when specifying any new band. |
| CHTTL | Issue 2-2-1: Support option 1, to follow the legacy approach.  Issue 2-2-2: Option 1 |

## 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 2-1 – channel bandwidth** | **Issue 2-1-1: channel bandwidth/SCS**  *Recommendations for 2nd round:*  *Based the comments received on 1st round discussion, the proposal is agreeable with the band number to be decided later. No further discussion is needed on 2nd round.*  **Issue 2-1-2: Spectral utilization**  *Recommendations for 2nd round:*  *Based the comments received on 1st round discussion, the proposal is agreeable. No further discussion is needed on 2nd round.* |
| **To Sub-topic 2-2 –Channel arrangement** | **Issue 2-2-1: Channel raster**  **Proposals:**   * + **Option 1: （**CATT, Huawei,Ericsson, China Unicom, Xiaomi, ZTE, Spark NZ, CHTTL**）**   follow the legacy approach: 15kHz and 30kHz   * + **Option 2: (**Qualcomm, Skyworks, Apple)   the channel raster is specified at ~5 MHz resolution  **Issue 2-2-2: Synchronization raster**  **Proposals:**   * + **Option 1: (**CATT, Huawei,Ericsson, China Unicom, Xiaomi, ZTE, CHTTL**)**   To define SS raster based on SCS based channel raster   * Further decision on step size: 1 or 4 or other value<=7   + **Option 2: (**Qualcomm, Skyworks, Apple)   To define SS raster based on ~ 5MHz channel raster and the raster entries are FFS.  *Recommendations for 2nd round:*  The two issues should be discussed together. Based on 1st round discussion, 8 companies support to follow the legacy approach and 3 companies support to use ~ 5MHz resolution, which is strictly limited to the central frequencies from RCC rules while it is not the usual way for RAN4 to define a new band. It is proposed to have a further discussion on 2nd round. |
|  |  |

*Suggestion on WF/LS assignment*

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

## Discussion on 2nd round

|  |  |
| --- | --- |
| **Issues** | **Company Comments** |
| WF on system parameters | Huawei: Option 1, we do not see any issue for Option 1. It is the normal case that more entries are defined in 3GPP than that in one regional regulator, otherwise it will need large number of bands for different countries/regions. So option 2 only put restrictions on future usage of the band by other countries and complication on the specifications. We support Option 1 and for the step size, we are open for 1~7. If we consider the example case for n79 for Korean regulator. Step size =1 can provide more flexibility.  Company B: |
|  | Qualcomm: Option 2 for the reasons we provided in the first round. When Band n96 was defined, there was only one country where regulations allowed its usage. At the time the 3GPP requirements were specified, there was an agreement to include a note to restrict the usage of the band to US only subject to specific FCC rules. In other words, the band was not generalized to be able to operate in other countries. On the other hand, with this band there is a proposal to define the requirements in a flexible manner so that it can be used in other countries in the future. Fundamentally, 3GPP needs to agree whether this is a band defined for RCC according to its rules, or a general band that can potentially be used in other countries as well. |
|  | MediaTek: We would not like the UE to have to do unnecessary cell search if we could have easily avoided unnecessary GSCN location flexibility for a device operating in the RCC region. The 5MHz channel raster granularity does not guarantee a natural alignment of everybody’s sync channel locations.  In our contribution **[R4-2206127](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206127.zip)**, we provide some analysis that suggests that a step size of 5 x 1.55MHz for sync raster could be ok assuming a 5MHz channel raster shift, 20MHz min channel BW, 48 RB CORESET#0, and 30kHz SCS for SSB and CORESET#0. This could apply to Option 2 channel raster, but can also apply to Option 1 sync raster.  So we don’t really see why the WF draft has combined the sync raster and the channel raster options, as a step size of <5> from Option 1 sync raster also seems to cater for Option 2 channel raster.  Answer to Ericsson below: Yes, given that the Option 1 step size for sync raster is very loosely defined at the moment (i.e. the step size is not specified yet), we feel that this can be used with the Option 2 channel raster with the step size of <5>. |
|  | Ericsson: Option 1: It has been commented in the 1st round there is interest for that bands in other Regions/countries. RAN4 should anticipate such needs by allowing more flexible raster definition, there is no good technical reason to strictly stick to band plan defined by RCC.  To Mediatek: If I understood well your above comment, you would like a 3rd option using channel raster from option 2 and sync raster from option 1, is that correct? |
|  | Huawei: to Mediatek, if the concern is time for cell search, we are ok to take step size of <5> or even larger number 6. |
|  | CATT: Option 1. We share the similar view with Ericsson since it is not precluded to use the band in other countries and regions. For the step size, it is acceptable for us to adopt a larger number within 1~7, such as 4/5/6. |
|  | ZTE: Similar comments as Ericsson that, this band is not limited to RCC countries only which could also been used by other regions, to have floating sync raster would give sufficient flexibility. Step size could be increased since minimum channel bandwidth has also increased from 10MHz to 20MHz. |
|  | Qualcomm: We aren’t sure that this band not being limited to RCC countries is a common agreement. The WID states  The work on 6425-7125 MHz frequency range according to RCC Recommendation 1/21 starts from RAN#94e.  NOTE: the RCC Recommendation 1/21 is intended to apply in the RCC countries.  So the work should be done according to RCC recommendations which is 5 MHz raster as applicable in RCC countries. |
|  |  |

## 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** |
|  |  |

# Topic #3: UE RF requirements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2203653](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203653.zip) | Skyworks Solutions Inc. | REFSENS for 6GHz licensed band  Proposal: 11.5dB NF figure is assumed for 6GHz licensed band (-91.2dBm REFSENS at 20MHz and 15kHz SCS). |
| [R4-2203654](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203654.zip) | Skyworks Solutions Inc. | MPR versus ACLR and SEM for 6GHz licensed band  Proposal:   * If MPR is not re-evaluated, NR ACLR and SEM from 38.101 should be reused for 6GHz licensed band. * If relaxed ACLR and SEM from 38.921 is adopted for 6GHz licensed band, PC3 MPR is re-evaluated and PC2 ACLR target confirmed for MPR re-evaluation   + Our preference is to re-evaluate MPR based on 38.921 ACLR and SEM to enable better UL performance at frequencies >6.425MHz which is a challenge. |
| [R4-2203920](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203920.zip) | CATT | UE RF requirements for 6GHz licensed band  Proposal 1: To keep the current MPR requirements as a starting point.  Proposal 2: To adopt the SEM requirement defined in TR 38.921 for 6425-7125MHz.  Proposal 3: To adopt 26 dB ACLR for 6425-7125MHz. (PC3 UE).  Proposal 4: To introduce 32dBc ACS for 6425-7125MHz. |
| [R4-2204073](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204073.zip) | Mediatek India Technology Pvt. | Discussion on UE RX REFSENS for 6GHz licensed band  Proposal 1: From observations, to assume 20MHz REFSENS provided in Table 2 as baseline for discussion on decision of 6GHz licensed band REFSENS.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Operating band / SCS / Channel bandwidth / REFSENS | | | | | | Operating band | SCS  kHz | Channel bandwidth (MHz) | REFSENS (dBm) | Duplex Mode | | nX | 15 | 20 | [-90.7 ~ -89.2] | TDD | |  | 30 | 20 | [-90.9 ~ -89.4] |  | |  | 60 | 20 | [-91.1 ~ -89.6] |  | |
| [R4-2204566](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204566.zip) | CMCC | Discussion on UE requirements for 6GHz licensed spectrum  Proposal 1: it’s better to reuse the same value as in TR 38.921 for ACLR and SEM requirements.  Proposal 2: it’s better to reuse the same value as in TR 38.921 for ACS requirements.  Proposal 3: it’s better to reuse the same REFSENSE as n78 and n79 for 6GHz license spectrum. |
| [R4-2205121](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205121.zip) | Xiaomi | Discussion on UE Rx requirements for 6G license band  Proposal 1: Adopt 10.5 dB NF for for 6GHz NR band.  Proposal 2: the REFSENS value can be derived as shown in Table 2-2  Table 2-2: REFSENS for 6GHz NR band   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Operating band / SCS / Channel bandwidth / REFSENS | | | | | | Operating band | SCS  kHz | Channel bandwidth (MHz) | REFSENS (dBm)8 | Duplex Mode | | nX | 15 | 20, 30, 40, 50 | [-92.2] + 10log10(NRB/106) | TDD | |  | 30 | 20, 30, 40, 50, 60, 70, 80, 90, 100 | [-92.4] + 10log10(NRB/51) |  | |  | 60 | 20, 30, 40, 50, 60, 70, 80, 90, 100 | [-92.6] + 10log10(NRB/24) |  |   ACS  Proposal 3: Adopt 32dB ACS for 6GHz NR band. |
| [R4-2205146](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205146.zip) | Huawei, HiSilicon | UE TX RF requirements  **Proposal 1:** to adopt Option1 limits for 6GHz licensed band.  SEM: Option 1: Adopt the SEM requirement defined in TR 38.921 for 6425-7125MHz assuming UE PC3 is specified.  ACLR: Option 1: Adopt 26 dB ACLR for 6.425 - 7.125 GHz band (PC3 UE).  **Proposal 2:** the current MPR should be maintained and whether to increase the transmit power is left to the UE implementation. |
| [R4-2205147](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205147.zip) | Huawei, HiSilicon, China Unicom | UE RX RF requirements  **Proposal 1**: it is proposed to define the same REFSENS as n78 and n79 for the new band.  **Proposal 2**: it is proposed to adopt 32 dB or 33 dB adjacent channel selectivity (ACS) for 6.425 - 7.125 GHz band |
| [R4-2205454](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205454.zip) | ZTE Corporation | Discussion on UE RF requirements for 6425-7125MHz  Proposal 1: to specify PC3 1 Tx (with both 1Tx and 2Tx) as first priority and default power class.  Additionally specify PC2 (1Tx) if time allows (2Tx is FFS)  Proposal 2: Current MPR requirement for NR PC3 and PC2 can apply to 6425-7125MHz PC3.  Proposal 3: to use the existing SEM requirement defined in TR 38.921 for 6425-7125MHz;  Proposal 4: to use the existing ACLR 26dBc requirement defined in TR 38.921 for 6425-7125MHz for PC3 and 27dBc for PC2.  Observation 1: If noise figure 10dB is agreeable, then UE REFSENS for n78 or n79 could be reused for 6425-7125MHz except for channel bandwidth not supported for 6425-7125MHz.  Proposal 5: to use the existing ACS requirement in TR 38.921 for 6425-7125MHz.  Proposal 6: to use the existing blocking requirement above 3300MHz in TS 38.101-1 for 6425-7125MHz.  Proposal 7 to use the existing spurious response requirement above 3300MHz in TS 38.101-1 for 6425-7125MHz. |
| [R4-2206103](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206103.zip) | Qualcomm Incorporated | UE RF requirements for the 6 GHz licensed band  Proposal: Since 3GPP specifications are written to serve a wide variety of conditions and use cases, it may be more prudent to retain the UE emission requirements (ACLR, SEM, and spurious emissions) as they are for all other NR bands, rather than to relax them for this band.  Proposal: From a UE implementation perspective, the conventional requirements of ACLR, SEM, power class, and MPR can be met at 7 GHz without undue relaxation.  Proposal: So long as the ACLR, SEM, and other relevant requirements are not relaxed, the general MPR can be applied to the 6 GHz band.  Proposal: Send an LS to RCC to clarify what (if any) additional spurious emission requirements are needed to ensure compatibility with adjacent services in the band. Further clarify whether emission requirements or other necessary restrictions will be forthcoming from individual administrations.  Proposal: It is assumed that the RF filter will not provide rejection for additional spurious emission requirements (if any). Instead, A-MPR will be specified as needed.  Proposal: For reference sensitivity, further discussion on UE front-end architecture to include the effect of losses at 7 GHz as well as the possibility to share the front-end among multiple bands within a similar frequency range.  Proposal: ACS is specified as 33 dB consistent with all other NR bands with frequency greater than 3300 MHz. |
| R4-2206104 | Qualcomm Incorporated | Introduction of NR licensed band 6425 – 7125 MHz |

## Open issues summary

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

### Sub-topic 3-1 – TX requirements

**Issue 3-1-1: Maximum output power**

* Proposals:
  + **Proposal 1:** to specify PC3 1 Tx (with both 1Tx and 2Tx) as first priority and default power class. Additionally specify PC2 (1Tx) if time allows (2Tx is FFS)
* Recommended WF
  + Discuss whether the proposal is acceptable

**Issue 3-1-2: MPR, ACLR and SEM**

* Proposals:
  + Option1: ACLR, SEM, and other relevant requirements are not relaxed, and current MPR can be applied to the 6 GHz band
  + Option 2: Relaxed ACLR for PC3 and SEM from 38.921 is adopted, and further evaluate if current PC3 MPR should be improved or maintained. PC2 ACLR and PC2 MPR are FFS.
* Recommended WF
  + Discuss which option is agreeable

### Sub-topic 3-2 – RX requirements

**Issue 3-2-1: Reference sensitivity**

According to the SI TR clause 7.2.1, a noise figure in the [9, 13] dB interval was agreed for reporting to ITU WP5D sharing studies. In the meeting companies provide evaluations and proposal for reference sensitivity.

* Proposals: the REFSENS for 6GHz licensed band is defined based on the following NF,
  + **Option 1:** 11.5 dB NF
  + **Option 2:** 10.5 dB NF
  + **Option 3:** 10 dB NF
  + **Option 3:** 12 dB~13.5 dB NF
  + **Option 4:** FFS
* Recommended WF
  + TBA based on 1st round discussion

**Issue 3-2-2: ACS**

* Proposals:
  + **Option 1:** Adopt 32 dBc adjacent channel selectivity (ACS) for 6.425 - 7.125 GHz band.
  + **Option 2:** Adopt 33 dBc adjacent channel selectivity (ACS) for 6.425 - 7.125 GHz band
* Recommended WF
  + Discuss whether the proposal is agreeable

**Issue 3-2-3: blocking**

* Proposals:
  + Adopt the existing blocking requirement above 3300MHz in TS 38.101-1 for 6425-7125MHz.
* Recommended WF
  + Discuss whether the proposal is agreeable

### Sub-topic 3-3 – draft CR

* Recommended WF
  + Comments collection on the draft CR

## Companies views’ collection for 1st round

### Open issues

**Collection of comments:**

**To Sub-topic 3-1 – TX requirements**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | **Issue 3-1-1:** *Proposal is acceptable*  **Issue 3-1-2:** *Basically ok with both, what is not ok is to relax requirements AND keep current MPR. From workload pov option 1 maybe best.* |
| CATT | **Issue 3-1-1:**Support the proposal.  **Issue 3-1-2:**OK with both options. |
| Huawei | **Issue 3-1-1:** *ok with the proposal*  **Issue 3-1-2:** *Option 2, we prefer to take the relaxed requirement based on the co-existence study in the SI. From our observation, for some of outer regions, the MPR can be improved by 0.5~1 dB, but we think two sets of MPR table will increase the development workload. Hence we propose to reuse the MPR and the benefit to increase the transmit power can be left to implementation.* |
| Qualcomm | Issue 3-1-1: We are ok with PC3 1 Tx as first priority and default, but we don’t see the need for 2Tx PC3.  Issue 3-1-2: Option 1. If workload reduction is important as commented by Huawei, then surely keeping the same ACLR, SEM, and MPR is the least amount of work. Keeping ACLR and SEM will also meet (and exceed) the coexistence study outcome from 38.921 for a greater number of scenarios enabling greater flexibility. |
| Ericsson | **Issue 3-1-1:**proposal 1 is acceptable.  **Issue 3-1-2:**Both options are ok with a preference foroption 2 (which was also requested by UE vendors during the SI on 6 GHz…). |
| China Unicom | **Issue 3-1-1:**Support the proposal. |
| Xiaomi | **Issue 3-1-1:** Support the proposal.  Issue 3-1-2: Option 2 |
| Skyworks | **Issue 3-1-1:**If the same ACLR and SEM than NR are adopted the current PC3 and PC2 MPRs are directly applicable so we do not see the need for priority in that case. PC3 2TX mat be covered together with PC3 2TX for NR-U to enable reuse of the TX between n96 and licensed 6GHz band.  **Issue 3-1-2:**If the group priority is to minimise the work, the easiest is to apply current PC3 and PC2  MPR and keep the NR ACLR and SEM requirements. but for us it is a package as we do not agree to  use the current MPR if relaxed ACLR/SEM are adopted) |
| ZTE | **Issue 3-1-1:**fine with proposal 1.  **Issue 3-1-2:**both options are fine for us. Slightly prefer to option 2. |
| Apple | **Issue 3-1-1:** PC3 is the first prioritywhereupon we can check further whether 1TX or 2TX, or both, are considered.  **Issue 3-1-2:** Keeping current requirements is the easiest approach from the viewpoint of the workload. However, MPR with ACLR/SEM still need to be checked as a package. |
| CHTTL | **Issue 3-1-1:** Support the proposal. |

**To Sub-topic 3-2 – RX requirements**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | **Issue 3-2-1:** *Comment*  **Issue 3-2-2:** *Comment*  **Issue 3-2-3:** *Comment* |
| Nokia | Issue 3-2-1: *NF should not be higher than 11.5 dB. Hence, we can accept options 1,2 and 3.*  Issue 3-2-2: Option 2.  Issue 3-2-3: Proposal is ok. |
| CATT | **Issue 3-2-1:** option 2 and option 3 are acceptable to us.  **Issue 3-2-2:** Support option 1. It would be appropriate to reuse the agreement captured in TR 38.921 if no technical issue is identified.  **Issue 3-2-3:** Support the Proposal. |
| Huawei | Issue 3-2-1: *Option 3, as evaluated in our paper, with the using a front-end LNA, the NF can be much better than n96.*  Issue 3-2-2: either option 1 or option 2 is ok  Issue 3-2-3: ok with the proposal |
| Qualcomm | Issue 3-2-1: Option 4 FFS. This topic needs further discussion.  Issue 3-2-2: Option 2. There is no reason to deviate from the ACS that is specified for other bands. The UE will not be able to relax filtering with a 1 dB relaxed ACS since the blocking requirements are not also relaxed.  Issue 3-2-2: Ok |
| Ericsson | Issue 3-2-1: Based on the rationale given in 3653, option 1.  Issue 3-2-2: both options are acceptable.  Issue 3-2-3: proposal is acceptable. |
| China Unicom | Issue 3-2-1: *Option 3.*  Issue 3-2-2: both options are acceptable.  Issue 3-2-3: ok with the proposal. |
| Xiaomi | Issue 3-2-1: *Option 2 and Option 3.*  Issue 3-2-2: both options are acceptable.  Issue 3-2-3: support the proposal. |

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| MediaTek | Issue 3-2-1: We support option 4 and Option 5(FFS) since other options mainly use 4GHz-bands REFSENS to derive NF. From technical perspective, NF from 4GHz bands cannot fully represent 6GHz licensed band’ NF. We think proposal of “*further discussion on UE front-end architecture to include the effect of losses at 7 GHz as well as the possibility to share the front-end among multiple bands within a similar frequency range*” from Qcom is quite reasonable.  Issue 3-2-2: Option 2.  Issue 3-2-3: We are okay with the proposal |

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| Skyworks | Issue 3-2-1: Option 1 is in our view a good compromise and supported by analysis of the current NR and NR-U REFSENS  Issue 3-2-3: proposal is OK |
| ZTE | Issue 3-2-1:fine with option 2.  Issue 3-2-2: both options are acceptable.  Issue 3-2-3: ok with the proposal. |
| Apple | Issue 3-2-1: Option 4 (FFS)  Issue 3-2-2: Since the proposed frequency range overlaps with band n96 and some HW components may be re-used, it would be premature to agree 32/33dBc. That should be checked further.  Issue 3-2-3: Firstly, which blocking requirements we are talking about, in-band or out-band or both? Secondly, which “*existing requirements above 3300*” we are referring to, is it band n96? |
| CHTTL | Issue 3-2-1: fine with option 2 or 3. |

**To Sub-topic 3-3 – draft CR**

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| **CR/TP number** | **Comments collection** |
| R4-2206104 CR to 38.101-1 |  |
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## 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.*

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|  | **Status summary** |
| Sub-topic 3-1 – TX requirements | **Issue 3-1-1: Maximum output power**   * Proposal:   + To specify PC3 1 Tx (with both 1Tx and 2Tx) as first priority and default power class. Additionally specify PC2 (1Tx) if time allows (2Tx is FFS)   *Recommendations for 2nd round:*  Based on 1st round discussion, companies are ok with the proposal, except for further check on the need for 2Tx PC3 on 2nd round.  **Issue 3-1-2: MPR, ACLR and SEM**   * Proposals:   + Option1: (Nokia, CATT, Qualcomm, Ericsson, Skyworks, ZTE)   ACLR, SEM, and other relevant requirements are not relaxed, and current MPR can be applied to the 6 GHz band   * + Option 2: (Nokia, CATT, Huawei, Ericsson, Xiaomi, Skyworks, ZTE)   Relaxed ACLR for PC3 and SEM from 38.921 is adopted, and further evaluate if current PC3 MPR should be improved or maintained. PC2 ACLR and PC2 MPR are FFS.  *Recommendations for 2nd round:*  Based on 1st round discussion, some companies are ok with both options while a few companies have strong preference. It is proposed to further discuss on 2nd round. |
| Sub-topic 3-2 – RX requirements | **Issue 3-2-1: Reference sensitivity**  **Proposals:**   * + **Option 1:** 11.5 dB NF (Nokia, Ericsson, Skyworks)   + **Option 2:** 10.5 dB NF (Nokia, CATT, Xiaomi, ZTE, CHTTL)   + **Option 3:** 10 dB NF (Nokia, CATT, Huawei, China Unicom, Xiaomi, CHTTL)   + **Option 3:** 12 dB~13.5 dB NF   + **Option 4:** FFS (Qualcomm, MediaTek, Apple)   *Recommendations for 2nd round:*  *Based on 1st round discussion, companies’ views are still diverse. Moderator suggest to further discuss the WF for the requirements on 2nd round.*  **Issue 3-2-2: ACS**   * Proposals:   + **Option 1:** (CATT, Huawei, Ericsson, China Unicom, Xiaomi, ZTE)   Adopt 32 dBc adjacent channel selectivity (ACS) for 6.425 - 7.125 GHz band.   * + **Option 2:** (Nokia, Huawei, Qualcomm, Ericsson, China Unicom, Xiaomi, ZTE)   Adopt 33 dBc adjacent channel selectivity (ACS) for 6.425 - 7.125 GHz band  *Recommendations for 2nd round:*  *Based on 1st round discussion, most companies are ok with both options. Moderator suggest to further discuss on whether one of the options is agreeable on 2nd round.*  **Issue 3-2-3: blocking**   * Proposals:   + Adopt the existing blocking requirement above 3300MHz in TS 38.101-1 for 6425-7125MHz. * Recommended WF   + Discuss whether the proposal is agreeable   *Recommendations for 2nd round:*  *Based on 1st round discussion, the majority is ok with the proposal. Apple has some clarification questions which can be further discussed on 2nd round.* |
| R4-2206104 CR to 38.101-1 | *Recommendations for 2nd round:*  There is no comments received on 1st round, it is proposed to continue the discussion for 2nd round. |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on UE RF requirements | Qualcomm |

## Discussion on 2nd round

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| **Issues** | **Company Comments** |
| WF on UE RF requirements | Huawei: we prefer to adopt the value from SI for the ACLR and SEM, especially for ACLR RAN4 have done a lot of simulations to derive the numbers. We don't need to define over strict requirements.  Qualcomm: As explained in our paper, we don’t see the reason to relax ACLR and SEM compared to other bands, nor to necessarily undergo a study to re-evaluate MPR. We don’t see the requirements as overly tight. We also do not agree with Ericsson’s proposed modification to the WF since the WF only lists the options copied directly from the moderator’s first round summary.  Ericsson: Our preference is also to re-use the ACLR and SEM values from the SI (TR 38.921) for this new band as well, taking benefit of the analysis and the conclusions made in that study. It should also be noted that those limits will be used by ITU-R for their studies, it won’t be consistent to specify more stringent limits now. Also, if Qualcomm doesn’t like our proposed modifications, it would still be very helpful for us to better understand why they have suddenly changed their mind on those limits, as it’s not obvious there is any technical issue with those relaxed limits.  Huawei: we are ok with the WF. Some clarification on the ACLR value, to Qualcomm, the relaxed ACLR is derived from co-existence study in the SI. Qualcomm also provided the simulation results and proposed to adopt relaxed UE ACLR there, e.g. R4-2016601.  CATT: We are ok with the agreement on ACS in the WF.  MediaTek: Regarding existing UE’s licensed TX ACLR and RX ACS specification, whether to tighten or relax them would take time for discussion. If there is no concern from UE implementation perspective to keep the same licensed band UE ACLR and ACS specification, then reusing ACLR and ACS specifications could be one way to alleviate the controversy. We are okay with the WF.  Nokia: Leaning towards Qualcomm view to keep current emission requirements and MPR. If we would agree emission limits from SI then a MPR campaign would be needed and that can easily lead to long debate without any MPR improvement in the end. There is no proposal for REFSENS?  ZTE:we think that we still need to respect the SI outcome which has already been shared by ITU-R study, to update requirement at the current phase, it’s not reasonable to us.  Skyworks:  on ALCR/SEM/MPR: We think that at this point the esasiest is to reconduct NR ACLR/SEM requirements and MPR  the REFSENS based on 11.5dB is justified technically when looking at derating with frequency from n79 in a similar way than than other NR bands. It is also a good compromise give the current range being discussed  Alex: As we asked during the first discussion round, which in- and out-of-band blocking requirements are assumed? There are several bands above 3300MHz so it is not clear what the proposal is about.  Qualcomm: To Apple (Alex): The WF was modified to clarify that it is the NR in-band and out-of-band blocking requirements (not NR-U) that apply. But if there is different wording or something is unclear, please provide a suggestion. |
| R4-2206104 CR to 38.101-1 | Company A:  Company B: |
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## 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*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
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# Topic #4: BS RF requirements

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2203646**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203646.zip) | Nokia, Nokia Shanghai Bell | Proposals on BS RF requirements for introduction of 6GHz licensed band  Proposal 1: To consider changing the step size of the OBUE mask for the new 6GHz licensed band to 40 MHz, at least for MR and LA BS type 1-C and type 1-H, and further consider it for WA BS type 1-C and 1-H.  Proposal 2: To define ΔfOBUE = 40 MHz for the new 6GHz licensed band, at least for MR and LA BS type 1-C and type 1-H, and further consider it for WA BS type 1-C and 1-H.  Proposal 3: To add the new 6GHz licensed band into the operating band list in table 7.5.2-1a of TS 38.104 instead of adding a new NOTE in table 7.5.2-1.  Proposal 4: To define ΔfOOB = 60 MHz for the new 6GHz licensed band, at least for MR and LA BS type 1-C and type 1-H, and further consider it for WA BS type 1-C and 1-H. |
| [**R4-2203961**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203961.zip) | CATT | Remaining issue on RF requirements for BS operating in 6GHz band  Proposal 1: it is proposed to define ΔfOBUE = 100 MHz for BS type 1-C, 1-H and 1-O for all BS classes.  Proposal 2: It is proposed to define ΔfOOB = 100 MHz for BS type 1-C, 1-H and 1-O for all BS classes.  Proposal 3: It is proposed to use the unwanted emission in table 2.3-1/2/3 as the basic limits for MR and LA BS operating in 6425-7125 MHz band.  Proposal 4: It is proposed to define general and additional spurious emission requirements for 6425-7125 MHz as shown in Table 2.4-1 and Table 2.4-2. |
| [**R4-2203962**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203962.zip) | CATT | Introduction of 6GHz licensed band for 37.105 |
| [**R4-2203963**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203963.zip) | CATT | Introduction of 6GHz licensed band for 38.174 |
| [**R4-2204567**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204567.zip) | CMCC | Discussion on BS requirements for 6GHz licensed spectrum  Observation 1: the fOBUE and fOOB requirements are the same for 1-H and 1-O while relax compared with 1-C.  Proposal 1: fOBUE is 100MHz for 1-H and 1-O 6GHz license spectrum while 40MHz for 1-C type.  Proposal 2: fOOB is 100MHz for 1-H and 1-O 6GHz license spectrum while 60MHz for 1-C type. |
| [**R4-2205060**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205060.zip) | Ericsson | Remaining BS RF open issues and MU - n104  *Proposal1: Postpone decision on ΔfOBUE and ΔfOOB values for all BS classes to next RAN4#93-e meeting.* |
| [**R4-2205062**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205062.zip) | Ericsson | CR to TS 38.141-2 - introduction of band n104 |
| [**R4-2205063**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205063.zip) | Ericsson | CR to TS 38.176-2 - introduction of band n104 |
| [**R4-2205148**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205148.zip) | Huawei, HiSilicon, China Unicom | BS RF requirements |
| [**R4-2205455**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205455.zip) | ZTE Corporation | Discussion on BS RF requirements for 6425-7125MHz |
| [**R4-2205456**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205456.zip) | ZTE Corporation | draft CR to TS38.104 the introduction of 6425-7125MHz |
| [**R4-2205457**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205457.zip) | ZTE Corporation | draft CR to TS36.104 the introduction of coexistence requirements of licensed band 6425-7125MHz |
| [**R4-2205458**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205458.zip) | ZTE Corporation | draft CR to TS36.141 the introduction of coexistence requirements of licensed band 6425-7125MHz |
| [**R4-2205954**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205954.zip) | Nokia, Nokia Shanghai Bell | draft CR to 37.104 on introduction of n104 co-existence requirements |
| [**R4-2205955**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205955.zip) | Nokia, Nokia Shanghai Bell | draft CR to 37.141 on introduction of n104 co-existence requirements |

## Open issues summary

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

### Sub-topic 4-1 – RF requirements

**Issue 4-1-1:** ΔfOBUE

* Proposals:
  + **Option 1:** define ΔfOBUE = 100 MHz for BS type 1-C, type 1-H and type 1-O
  + **Option 2:** define ΔfOBUE = 100 MHz for BS type 1-H and type 1-O, and ΔfOBUE = 40 MHz for BS type 1-C
  + **Option 3:** define ΔfOBUE = 40 MHz at least for MR and LA BS type 1-C and type 1-H, and further consider it for WA BS type 1-C and 1-H.
  + **Option 4:** Postpone decision on ΔfOBUE values for all BS classes to next RAN4#103-e meeting*.*
* Recommended WF
  + TBA based on 1st round discussion

**Issue 4-1-2:** ΔfOOB

* Proposals:
  + **Option 1:** define ΔfOOB = 100 MHz for BS type 1-C, type 1-H and type 1-O
  + **Option 2:** define ΔfOOB = 100 MHz for BS type 1-H and type 1-O, and ΔfOOB = 60 MHz for BS type 1-C
  + **Option 3:** define ΔfOOB = 60 MHz at least for MR and LA BS type 1-C and type 1-H, and further consider it for WA BS type 1-C and 1-H.
  + **Option 4**: Postpone decision on ΔfOOB values for all BS classes to next RAN4#103-e meeting.
* Recommended WF
  + TBA based on 1st round discussion

**Issue 4-1-3: Out-of-band blocking**

* Proposals:
  + **Proposal 1:** the blocking level is set to a level of -35 dBm for the frequency range (FUL\_low -500) to (FUL\_low -ΔfOOB) and (FUL\_high +ΔfOOB) to (FUL\_high +500).
  + **Proposal 2:** To add the new 6GHz licensed band into the operating band list in table 7.5.2-1a of TS 38.104 instead of adding a new NOTE (to include text in proposal 1) in table 7.5.2-1.
* Recommended WF
  + TBA based on 1st round discussion.

**Issue 4-1-4: Measurements uncertainties**

* Proposals:
  + **Proposal 1:** Reuse n96 MUs for n104 MUs.
* Recommended WF
  + TBA based on 1st round discussion.

### Sub-topic 4-2 – draft CRs

* Recommended WF
  + Comments collection on the draft CRs

## Companies views’ collection for 1st round

### Open issues

**Collection of comments:**

**To Sub-topic 4-1 – 38.104 RF requirements**

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| **Company** | **Comments** |
| Company A | **Issue 4-1-1:** *Comment*  **Issue 4-1-2:** *Comment*  **Issue 4-1-3:** *Comment*  **Issue 4-1-4:** *Comment* |
| Nokia | **Issue 4-1-1:** Propose option 3; ok with option 4; for options 1 and 2, they do not address the potential issues with different requirements for licensed and unlicensed bands – this point should be covered in the WF as action for next meeting.  **Issue 4-1-2:** Same comments as issue 4-1-1.  **Issue 4-1-3:** Ok with proposal 1; propose proposal 2.  **Issue 4-1-4:** Proposal 1 seems reasonable but should be decided in performance phase. |
| Huawei | **Issue 4-1-1:** *ok to option 1 and 2, we think the value for AAS should not be changed.*  **Issue 4-1-2:** *ok to option 1 and 2, we think the value for AAS should not be changed.*  **Issue 4-1-3:** *ok to proposal 1, open to proposal 2 which can be considered in the CR drafting*  **Issue 4-1-4:** *ok with the proposal* |
| Ericsson | Issue 4-1-1: option 4, we were not able to finalize our analysis due to the very short time between the 2 RAN4 meetings.  Issue 4-1-2: option 4, we were not able to finalize our analysis due to the very short time between the 2 RAN4 meetings.  Issue 4-1-3: Proposals 1-2 were already discussed during the SI without reaching any agreement, why should we have this relaxation? We don’t agree with this proposal for the time being but we could further evaluate it for next meeting (together with Dfoob and Dfobue).  Issue 4-1-4: ok with the proposal |
| China Unicom | **Issue 4-1-1:** *Both option 1 and option 2 are fine.*  **Issue 4-1-2:** *Both option 1 and option 2 are fine.*  **Issue 4-1-4:**ok with the proposal |
| CATT | **Issue 4-1-1:**Prefer to have aligned ΔfOBUE for different BS class and different BS type. So Option 1  **Issue 4-1-2:**Prefer to have aligned ΔfOOB for different BS class and different BS type. So Option 1  **Issue 4-1-3:**  **Issue 4-1-**4: fine with the proposal. |
| ZTE | **Issue 4-1-1:** *prefer to option 2 and okay to keep it in [] for the coming RAN-P meeting.*  **Issue 4-1-2:** *prefer to option 2 and okay to keep it in [] for the coming RAN-P meeting.*  **Issue 4-1-2**: we don’t agree to further relaxation which has been discussed in SI phase.. |
| Spark NZ | Issue 4-1-1: ok to option 1 and 2.  Issue 4-1-2: ok to option 1 and 2.  Issue 4-1-3: ok to proposal 2.  Issue 4-1-4: ok to proposal 1. |

**To 4.2.2 Sub-topic 4-2 – draft CRs**

**Ericsson:** we have the same comments as Nokia and Huawei below, some additional ones added.

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| **CR/TP number** | **Comments collection** |
| R4-2203962 CR to 37.105 | Nokia: band number should be n104; should be -46dBm for coexistence in Table 9.7.6.3.3-1; in general, should come back to other CRs once CR to 38.104 is stable. |
| Huawei: limit should be -46 dBm |
| CATT: Thanks to Nokia and Huawei for the comments. Will update later. |
| R4-2203963  CR to 38.174 | Nokia: band number should be n104; in general, should come back to other CRs once CR to 38.104 is stable. |
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| R4-2205062  CR to 38.141-2 | Nokia: would better finalize CR to 38.104 first, then align this CR with it. |
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| R4-2205063  CR to 38.176-2 | Nokia: in general, should come back to other CRs once CR to 38.104 is stable. |
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| R4-2205456  CR to 38.104 | Nokia:  - band number should be n104;  - note needed in Table 5.2-1 this band is applicable for Russia only?  - in Table 5.3.5-1, is 25/35/45MHz CHBW needed?  - there are changes to other bands, e.g., CHBW for n40;  - ΔfOBUE and ΔfOOB yet to be agreed;  - 38 dB ACLR would be used also for other bands than n104, so should not define a n104 specific ACLR table;  - table references in clauses 6.6.3.3 and 6.6.3.4 should also be updated;  - statement about measurement bandwidth scaling should also apply for Note 1 in Table 6.6.4.2.2.1-3;  - it should be clarified that Table 6.6.5.2.1-1 does not apply to n104;  - clause 6.6.5.2.2 should also be updated;  - 'could' is not clear wording on 1dB refsens relaxation;  - OOBB requirements should also be specified. |
| Huawei:   * it is not based on the clean version which makes confusions. * We think the Note may not be needed since the general requirements can also apply to other regions. * 35/45 MHz is not needed in our view * “could be ” is recommended hence to be updated to “shall be” |
| Ericsson: same comments than other companies, this is not based on agreed limits but on proposals to be discussed in this meeting. |
| ZTE: thanks for all comments, the CR would be updated and share after 1st round discussions. |
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| R4-2205457  CR to 36.104 | Nokia: seems to be based on older version of 36.104, as band 23 already removed from 36.104; in general, should come back to other CRs once CR to 38.104 is stable. |
| Ericsson: Not based on the latest TS version…  Table 6.6.4.4.1-2: it should be n104, not n96  Table 7.6.2.1-1: "MHz" shall be removed |
|  |
| R4-2205458  CR to 36.141 | Nokia: seems to be based on older version of 36.141, as band 23 already removed from 36.141 in general, should come back to other CRs once CR to 38.104 is stable. |
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| R4-2205954  CR to 37.104 |  |
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| R4-2205955  CR to 37.141 |  |

## 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.*

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|  | **Status summary** |
| Sub-topic 4-1 – RF requirements | **Issue 4-1-1:** ΔfOBUE and **Issue 4-1-2:** ΔfOOB   * **Proposals:**    + **Option 1: (**Huawei, China Unicom, CATT, Spark NZ)   + **Option 2: (**Huawei, China Unicom, ZTE, Spark NZ)   + **Option 3: (**Nokia)   + **Option 4: (**Nokia, Ericsson)   Postpone decision on ΔfOBUE values for all BS classes to next RAN4#103-e meeting*.*  *Recommendations for 2nd round:*  *Based on 1st round discussion, companies’ view are still diverse. Moderator suggest to have a further discussion on 2nd round.*  **Issue 4-1-3: Out-of-band blocking**   * Proposals:   + **Proposal 1: ( yes:** Nokia, Huawei; **no**: ZTE; FFS: Ericsson**)**   the blocking level is set to a level of -35 dBm for the frequency range (FUL\_low -500) to (FUL\_low -ΔfOOB) and (FUL\_high +ΔfOOB) to (FUL\_high +500).   * + **Proposal 2:** **( yes:** Nokia, Huawei, Spark NZ; **no**: ZTE; FFS: Ericsson**)**   To add the new 6GHz licensed band into the operating band list in table 7.5.2-1a of TS 38.104 instead of adding a new NOTE (to include text in proposal 1) in table 7.5.2-1.  *Recommendations for 2nd round:*  *Based on 1st round discussion, companies’ view are still diverse. Moderator suggest to have a further discussion on 2nd round.*  **Issue 4-1-4: Measurements uncertainties**   * Proposals:   + **Proposal 1:** Reuse n96 MUs for n104 MUs. * Recommended WF   *Based on 1st round discussion, companies are ok with the proposal, which can be further confirmed in performance phase. No further discussion is needed for 2nd round.* |
| Sub-topic 4-2 – draft CRs | For BS CRs, it is proposed to focus on the draft CR to 38.104 on 2nd round. For other BS CRs no open issue is identified and it is proposed to come back to other CRs in next meeting. |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on BS RF requirements | Nokia |

## Discussion on 2nd round

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| **Issues** | **Company Comments** |
| WF on BS RF requirements | Huawei: At least we should follow the SI conclusion, i.e. for AAS type BS 100 MHz ΔfOBUE and ΔfOOB should be adopted.  Nokia: SI conclusion was based on the reason that ‘it is foreseen the smaller channel bandwidth such as less than 50 MHz CBW is less attractive’, we would like to see technical justifications (e.g., filter data) for using 100MHz ΔfOBUE and ΔfOOB in this band with the minimum 20 MHz CBW.  Ericsson: we have proposed to come back in next meeting with some more detailed analysis on those aspects.  ZTE: at least, for SI out come should be still respected, for other new case BS type 1-C, we could further discuss it.  Nokia: It looks unlikely we can decide on ΔfOBUE and ΔfOOB in this meeting, so the only option is to postpone decision to next meeting. |
| draft CR to TS38.104 | Nokia: Draft CR need to be aligned with agreements in WF which are being discussed, so it should be further revised accordingly.  Ericsson: the proposed draft CR has not taken into account all comments made during the 1st round. For example, for REFSENS, just adding a note (NOTE 6: For BS operating in band n104, PREFSENS shall be allowed with 1dB relaxation.) is not acceptable, this is too confusing. It’s most likely better to add a column and clearly specified the new values.  ZTE: it’s fine to further update the Rx requirement, maybe dedicate new table are needed instead of just one column? More updated would be provided soon.Nokia: Please also consider the comments made in the 1st round in your revision. |
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## 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*

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| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
|  |  |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on general aspects | Huawei |  |
| WF on system parameters | Ericsson |  |
| WF on UE RF requirements | Qualcomm |  |
| WF on BS RF requirements | Nokia |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| [**R4-2203646**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203646.zip) | Proposals on BS RF requirements for introduction of 6GHz licensed band | Nokia, Nokia Shanghai Bell | Noted |  |
| [**R4-2203647**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203647.zip) | Draft CR to TR 38.176-1 on introduction of 6GHz licensed band | Nokia, Nokia Shanghai Bell | Not Pursued |  |
| [**R4-2203653**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203653.zip) | REFSENS for 6GHz licensed band | Skyworks Solutions Inc. | Noted |  |
| [**R4-2203654**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203654.zip) | MPR versus ACLR and SEM for 6GHz licensed band | Skyworks Solutions Inc. | Noted |  |
| [**R4-2203665**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203665.zip) | Initial considerations on requirements for the licensed operation in the upper 6GHz frequency range | Apple | Noted |  |
| [**R4-2203666**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203666.zip) | [Draft] Further Reply LS on inclusion of the 6425-7125 MHz frequency band in the 3GPP specification for 5G-NR/IMT-2000 systems | Apple | Revised |  |
| [**R4-2203868**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203868.zip) | On RCC recommendation and coexistence in 6GHz licensed band | Skyworks Solutions Inc. | Noted |  |
| [**R4-2203918**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203918.zip) | General issues for 6GHz licensed band | CATT | Noted |  |
| [**R4-2203919**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203919.zip) | System parameters for 6GHz licensed band | CATT | Noted |  |
| [**R4-2203920**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203920.zip) | UE RF requirements for 6GHz licensed band | CATT | Noted |  |
| [**R4-2203961**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203961.zip) | Remaining issue on RF requirements for BS operating in 6GHz band | CATT | Noted |  |
| [**R4-2203962**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203962.zip) | Introduction of 6GHz licensed band for 37.105 | CATT | Not Pursued |  |
| [**R4-2203963**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203963.zip) | Introduction of 6GHz licensed band for 38.174 | CATT | Not Pursued |  |
| [**R4-2204073**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204073.zip) | Discussion on UE RX REFSENS for 6GHz licensed band | Mediatek India Technology Pvt. | Noted |  |
| [**R4-2204564**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204564.zip) | Discussion about the LS to RCC | CMCC | Noted |  |
| [**R4-2204565**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204565.zip) | Discussion on system parameters for 6GHz licensed spectrum | CMCC | Noted |  |
| [**R4-2204566**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204566.zip) | Discussion on UE requirements for 6GHz licensed spectrum | CMCC | Noted |  |
| [**R4-2204567**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204567.zip) | Discussion on BS requirements for 6GHz licensed spectrum | CMCC | Noted |  |
| [**R4-2205059**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205059.zip) | General aspects - n104 | Ericsson | Noted |  |
| [**R4-2205060**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205060.zip) | Remaining BS RF open issues and MU - n104 | Ericsson | Noted |  |
| [**R4-2205061**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205061.zip) | CR to TS 38.133 - introduction of band n104 | Ericsson | Not Pursued |  |
| [**R4-2205062**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205062.zip) | CR to TS 38.141-2 - introduction of band n104 | Ericsson | Not Pursued |  |
| [**R4-2205063**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205063.zip) | CR to TS 38.176-2 - introduction of band n104 | Ericsson | Not Pursued |  |
| [**R4-2205120**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205120.zip) | Discussion the remaining issues on system parameters for 6G license band | Xiaomi | Noted |  |
| [**R4-2205121**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205121.zip) | Discussion on UE Rx requirements for 6G license band | Xiaomi | Noted |  |
| [**R4-2205143**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205143.zip) | Clarification on RCC Recommendation | Huawei, HiSilicon | Noted |  |
| [**R4-2205144**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205144.zip) | Draft LS on futher clarification on RCC Recommendation 1/21 | Huawei, HiSilicon | Merged |  |
| [**R4-2205145**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205145.zip) | System parameters for 6GHz NR licensed band | Huawei, HiSilicon, China Unicom | Noted |  |
| [**R4-2205146**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205146.zip) | UE TX RF requirements | Huawei, HiSilicon | Noted |  |
| [**R4-2205147**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205147.zip) | UE RX RF requirements | Huawei, HiSilicon, China Unicom | Noted |  |
| [**R4-2205148**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205148.zip) | BS RF requirements | Huawei, HiSilicon, China Unicom | Noted |  |
| [**R4-2205452**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205452.zip) | Discussion on general aspects for licensed 6GHz | ZTE Corporation | Noted |  |
| [**R4-2205453**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205453.zip) | Discussion on system parameters for 6425-7125MHz | ZTE Corporation | Noted |  |
| [**R4-2205454**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205454.zip) | Discussion on UE RF requirements for 6425-7125MHz | ZTE Corporation | Noted |  |
| [**R4-2205455**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205455.zip) | Discussion on BS RF requirements for 6425-7125MHz | ZTE Corporation | Noted |  |
| [**R4-2205456**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205456.zip) | draft CR to TS38.104 the introduction of 6425-7125MHz | ZTE Corporation | Revised |  |
| [**R4-2205457**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205457.zip) | draft CR to TS36.104 the introduction of coexistence requirements of licensed band 6425-7125MHz | ZTE Corporation | Not Pursued |  |
| [**R4-2205458**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205458.zip) | draft CR to TS36.141 the introduction of coexistence requirements of licensed band 6425-7125MHz | ZTE Corporation | Not Pursued |  |
| [**R4-2205954**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205954.zip) | draft CR to 37.104 on introduction of n104 co-existence requirements | Nokia, Nokia Shanghai Bell | Not Pursued |  |
| [**R4-2205955**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205955.zip) | draft CR to 37.141 on introduction of n104 co-existence requirements | Nokia, Nokia Shanghai Bell | Not Pursued |  |
| [**R4-2206102**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206102.zip) | Channel raster and sync raster for the 6 GHz licensed band | Qualcomm Incorporated | Noted |  |
| [**R4-2206103**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206103.zip) | UE RF requirements for the 6 GHz licensed band | Qualcomm Incorporated | Noted |  |
| [**R4-2206104**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206104.zip) | Introduction of NR licensed band 6425 – 7125 MHz | Qualcomm Incorporated | Return to |  |
| [**R4-2206127**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206127.zip) | 6GHz licensed band system parameters | MediaTek (Chengdu) Inc. | Noted |  |
| [**R4-2206129**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206129.zip) | 6GHz licensed band coexistence aspects | MediaTek (Chengdu) Inc. | Noted |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

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   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents