**3GPP TSG-RAN WG4 Meeting # 104-e R4-22**

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

**Agenda item:** 8.1.3

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

**Title:** Email discussion summary for [104-e][104] NR\_6 GHz\_licensed

**Document for:** Information

# Introduction

This email thread discuss the band definition for 6GHz licensed band. The contributions are in agenda 8.1, which includes:

* Topic #1: Core requirement maintenance
* Topic #2: BS conformance testing

# Topic #1: Core requirement maintenance

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2212489 | Huawei, HiSilicon | draft CR to 38.104: applicability note for n104 |
| R4-2212490 | Huawei, HiSilicon | draft CR to 38.101-1: applicability note for n104 |
| R4-2213704 | ZTE Corporation | Discussion on Introduction of 6GHz NR licensed bands |
| R4-2213705 | ZTE Corporation | Draft CR to TS38.104: further clarity on the applicability of band n104 |
| R4-2213706 | ZTE Corporation | Draft CR to TS38.101-1: further clarity on the applicability of band n104 |
| R4-2213707 | ZTE Corporation | Draft maintenance CR to TS38.104: the introduction of 6425-7125MHz |

## Open issues summary

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

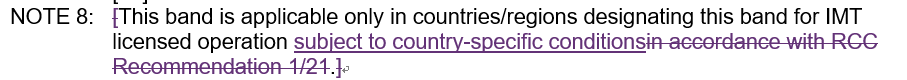
### Sub-topic 1 –Core requirement maintenance

**Issue 1-1: Applicability note for n104**

* Proposals:

It is proposed to update the NOTE to keep aligned with last wording for the band n96 and n102.

For TS 38.104:



For TS 38.101-1:



* Recommended WF
  + Discuss whether the proposal is agreeable

**Issue 1-2: Maintenance CR to TS38.104**

* Proposals:

To update the typos in the notes in Table 6.6.4.2.2.1-2a, Table 6.6.4.2.3-1a, Table 6.6.4.2.3-2a and Table 6.6.4.2.4-1a and 6.6.4.2.4-1b (R4-2213707)

* Recommended WF
  + Discuss whether the draft CR R4-2213707 is agreeable

## Companies views’ collection for 1st round

### Open issues

**Collection of comments:**

**Issue 1-1: Applicability note for n104**

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | Ok with the proposal. |
| Skyworks | The change of Note text for n96 from FCC specific to more general was done when it happened that more countries issued regulation and new NS were specified. At this point there is no new regulation available for n104 and we don’t know if n104 general requirement would apply as is or need NS. In our view the Note present in the spec is accurate and there is not yet evidence that the same change that occurred in n96 is valid for n104 (ie more regulation from more countries made available) |
| Spark NZ | This band is of interest to many jurisdictions outside RCC countries. We support the following note in both 38-104 and 38-101:  This band is applicable only in countries/regions designating this band for IMT licensed operation subject to country-specific conditions.  We also observe that in some jurisdictions, for the band to be allocated nationally, the only mandatory requirement is that a band must be allocated to mobile . On the other hand in some jurisdictions both mobile allocation and IMT identification are required. |
| Charter Comm Inc. | We agree with Skyworks comments, i.e., the note present in the spec is accurate and there is not yet evidence that the same change that occurred in n96 is valid for n104 (ie more regulation from more countries made available) |
| Huawei | Support the proposal to make the band number more inclusive. |
| CHTTL | Support the proposal. |
| ZTE | In our contribution R4-2213704, we propose to update UE spec with BS note, however we are also fine with proposal as listed above |
| Qualcomm | We don’t agree with the proposal. Until other countries make this spectrum available for usage, the specifications were only done according to RCC. It is the same way Band n96 was treated specifically limited to US only when it was first defined with only US FCC making it available. However, we do understand that other companies have a different view, we have the situation with square brackets around the notes and inconsistent notes between 38.101-1 and 38.104. We will likely have to live with that situation until other countries regulators make this spectrum available and release technical rules for which 3GPP will need to assess technical compatibility. |
| Meta | It can be acceptable to cover the same regulatory limits in other countries. However, the regulatory limits are different with RCC, then RAN4 need to define new NS\_xx for n104. |

**Issue 1-2: Maintenance CR to TS38.104 (R4-2213707)**

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| **Company** | **Comments** |
| Company A |  |
| Company B |  |
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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** |
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*Suggestion on WF/LS assignment*

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

## Discussion on 2nd round (if applicable)

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| **Issues** | **Company Comments** |
|  | 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** |
|  |  |

# Topic #2: BS conformance testing

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2211748 | CATT | Introducing 6GHz licensed operation into TS 38.141-1 (Rel-17) |
| R4-2212488 | Huawei, HiSilicon | Measurement uncertainty for 6 to 7.125GHz |
| [R4-2212653](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212653.zip) | Ericsson | Band n104: measurement uncertainties for 6.0-7.125GHz frequency range |
| [R4-2212654](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212654.zip) | Ericsson | CR to TS 38.141-2 - Introduction of licensed 6GHz band n104 |

## 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 – Measurements uncertainties

**Issue 2-1: TX requirements MU - conducted and OTA**

* Proposals:
  + **Option 1:** 
    - Reuse n96 MUs for n104 MUs.
  + **Option 2:** 
    - Keep the same MU values for Tx FR1 requirements as the 4.2 to 6GHz frequency range (conducted and OTA)
* Recommended WF
  + Discuss which option is agreeable

**Issue 2-2: RX requirements MU - conducted**

* Proposals:
  + **Option 1:** 
    - Reuse n96 MUs for n104 MUs.
  + **Option 2:** 
    - Adopt conducted Rx requirements MU as proposed in Table 1.
* Table 1: MU for Rx requirements in the 6.0-7.125 GHz frequency range

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| --- | --- | --- | --- | --- | --- |
| Requirement | MU (dB) | | | | |
| Wanted signal level error | Modulated Interferer level error | CW Interferer level error | ACLR effect or Broadband noise effect | Total |
| Adjacent channel selectivity  Narrow band blocking  In-channel selectivity | 1.5 | 1.5 | N/A | 0.4 | 2.5 |
| In-band blocking (General) | 1.5 | 1.67 | N/A | 0.4 | 2.6 |
| Out-of-band blocking (General)  1MHz < finterferer ≤ 3 GHz | 1.5 | N/A | 1 | 0.1 | 1.9 |
| Out-of-band blocking (General)  3.0GHz < finterferer ≤ 4.2 GHz | 1.5 | N/A | 1.2 | 0.1 | 2.0 |
| Out-of-band blocking (General)  4.2GHz < finterferer ≤ 12.75 GHz | 1.5 | N/A | 3 | 0.1 | 3.5 |
| Out-of-band blocking (Co-location) | 1.5 | N/A | 2 | 0.4 | 2.9 |
| Receiver intermodulation | 1.5 | 1.5 | 1 | 0.4 | 3.5 |

* Observation 1: The conducted Rx requirements MU in Table 1 and n46/n96/102 MU have close values, with only 0.1-0.2 dB difference.
* Recommended WF
  + Discuss which option is agreeable

**Issue 2-3: RX requirements MU - OTA**

* Proposals:
  + For OTA FR1 Rx sensitivity use the same value as the n96 bands i.e. 1.9dB, and further decide on the options for other requirements.

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| Clause | Maximum OTA Test System uncertainty |
| 7.2 OTA sensitivity | ±1.9 dB, 6.0 GHz < f ≤ 7.125 GHz |
| 7.3 OTA reference sensitivity level | ±1.9 dB, 6.0 GHz < f ≤ 7.125 GHz |
| 7.4 OTA dynamic range | ±0.3 dB |
| 7.5.1 OTA adjacent channel selectivity | Option 1: ±2.7 dB, 6.0 GHz < f ≤ 7.125 GHz  Option 2: ±2.8 dB, 6.0 GHz < f ≤ 7.125 GHz |
| 7.5.2 In-band blocking (General) | Option 1: ±2.8 dB, 6.0 GHz < f ≤ 7.125 GHz  Option 2: ±2.9 dB, 6.0 GHz < f ≤ 7.125 GHz |
| 7.5.2 In-band blocking (Narrowband) | Option 1: ±2.7 dB, 6.0 GHz < f ≤ 7.125 GHz  Option 2: ±2.8 dB, 6.0 GHz < f ≤ 7.125 GHz |
| 7.6 OTA out-of-band blocking (General) | 6.0 GHz < f ≤ 7.125 GHz:  ±2.2 dB, finterferer ≤ 3.0 GHz  ±2.3 dB, 3.0 GHz < finterferer ≤ 6.0 GHz  ±3.6 dB, 6.0 GHz < finterferer ≤ 12.75 GHz |
| 7.6 OTA out-of-band blocking (Co-location)  (NOTE 1) | 6.0 GHz < f ≤ 7.125 GHz:  ±3.6 dB, finterferer ≤ 3.0 GHz  ±3.8 dB, 3.0 GHz < finterferer ≤ 4.2 GHz  ±3.9 dB, 4.2 GHz < finterferer ≤ 6.0 GHz |
| 7.8 OTA receiver intermodulation | ±3.5 dB, 6.0 GHz < f ≤ 7.125 GHz |
| 7.9 OTA in-channel selectivity | Option 1: ±2.7 dB, 6.0 GHz < f ≤ 7.125 GHz  Option 2: ±2.8 dB, 6.0 GHz < f ≤ 7.125 GHz |

* Recommended WF
  + TBA based on 1st round discussion.

### Sub-topic 3– BS big CRs

* Recommended WF
  + Comments collection on the draft CRs

## Companies views’ collection for 1st round

### Open issues

**Collection of comments:**

**To Sub-topic 2 –Measurements uncertainties**

**Issue 2-1: TX requirements MU - conducted and OTA**

**Issue 2-2: RX requirements MU - conducted**

**Issue 2-3: RX requirements MU - OTA**

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| --- | --- |
| **Company** | **Comments** |
| Company A | **Issue 2-1:** *Comment*  **Issue 2-2:** *Comment*  **Issue 2-3:** *Comment* |
| Ericsson | Issue 2-1: Option 2  Issue 2-2: Values are very close, if not the same, we would be fine with both options.  Issue 2-3: Values are very close, with only 0.1 dB difference, we would be fine with both options. |
| Huawei | Issue 2-1: Support Option 2  Issue 2-2: the two options are very close, and we think the difference is maybe that the number of decimal places is different in the calculation. Option 1 takes one decimal place and Option 2 takes 2.  Issue 2-3: Same comments as issue 2-2. |
| ZTE | Issue 2-1: support Option 2  Issue 2-2: both options are fine for us.  Issue 2-3: we are fine with the proposal. |
| CATT | Issue 2-1: Support Option 2  Issue 2-2: We slightly prefer option 1.  Issue 2-3: Fine with both options. |

**To Sub-topic 3 – BS big CRs**

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| **CR/TP number** | **Comments collection** |
| R4-2211748  38.141-1 | Ericsson:   1. MUs should be aligned with the agreement on issues 2-1 and 2-2 2. We don’t need to specify MU for NB blocking as this requirement will not be applicable for n104.   CATT: Thanks Ercisson for the comments. For comment 1, we’ll update after the agreement is reached. For comment 2, we’ll correct it in the revision. |
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| R4-2212654  CR to 38.141-2 |  |
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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** |
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*Suggestion on WF/LS assignment*

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

## Discussion on 2nd round (if applicable)

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| --- | --- |
| **Issues** | **Company Comments** |
|  | 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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# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
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| **Title** | **Source** | **Comments** |
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**Existing tdocs**

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

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
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. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| Ericsson | Dominique Everaere | dominique.everaere@ericsson.com |
| Skyworks | Dominique Brunel | dominique.brunel@skyworksinc.com |
| Huawei | Liehai Liu | liuliehai@huawei.com |
| ZTE | Xuefei | Xue.fei25@zte.com.cn |
| Qualcomm Incorporated | Gene Fong | gfong@qti.qualcomm.com |
| CATT | Huiping Shan | shanhuiping@catt.cn |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)