**3GPP TSG-RAN WG4 Meeting # 102-e R4-22xxxx**

**Electronic Meeting, Feb. 21st – Mar. 3rd, 2022**

**Agenda item:** 9.1

**Source:** Moderator (Nokia)

**Title:** Email discussion summary for [102-e][105] NR\_6GHz\_unlic\_EU

**Document for:** Information

# Introduction

During RAN#90 a WID on introduction of lower 6GHz NR unlicensed operation for Europe (RP-202592) was agreed. The WID was updated in RAN#94 (RP-213604).

The objectives of the core part work item are:

* Define a new band as well as a band plan for unlicensed operation in the range 5925-6425 MHz.
	+ This new band shall support the EU/CEPT requirements in the 5945-6425MHz frequency range.
* Define or update (if needed) system parameters such as channel bandwidths and channel arrangements
* Define or update (if needed) transmitter and receiver characteristics requirements for the UE
* Define or update (if needed) transmitter and receiver characteristics requirements for the BS

The objective of the performance part work item is:

* Define or update (if needed) conformance requirements for BS testing.

According the work plan and original WI TU planning the WI should have been finalized. However, this has not been possible, and the WI is was extended to March 2022.

The WI objectives as well as the tasks requested by RAN is treated in this discussion.

## Rapporteur input

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2205559 | Nokia | draft TR 38.849 v0.7.0 – the document is reserved and proposed for email approval to capture agreements during RAN4#102-e |

It is proposed to have draft TR 38.849 v0.7.0 for email approval after the meeting. At RAN4#102 the TR will be updated and suggested endorsed such that it can be submitted for approval at RAN#95.

**Collection of comments:**

|  |  |
| --- | --- |
| **Company** | **Comments**  |
| Company A |  |
|  |  |
|  |  |

# Topic #1: Band plan

The contributions and proposals/observations related to the band plan for the introduction of lower 6GHz NR unlicensed operation for Europe is discussed under this topic and the contributions and relevant proposals/observations have been included in the Table 1.1.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| **[R4-2205560](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205560.zip)** | Nokia, Nokia Shanghai Bell | **Observation 1:** The frequency range for n102 is agreed as 5925 MHz – 6425 MHz. **Observation 2:** There seems to be no reason for NOTE 8 in 38.104 and NOTE 17 in 38.101-1 in Table 5.2-1. **Proposal 1:** Align NOTE 8 in 38.104 and NOTE 17 in 38.101-1 in Table 5.2-1 to “This band is only applicable subject to regional and/or country specific restrictions” |

## Open issues summary

### Sub-topic 1-2 – Note for Band n102

As per RAN agreement a new band, n102, shall be defined for the frequency range 5925MHz to 6425 MHz. During the latest RAN4 meeting discussion related to NOTE 8 in 38.104 and NOTE 17 in 38.101-1 in Table 5.2-1 have been ongoing.

* Recommended WF
	+ At RAN4#101bis it was agreed to align the wording for the Notes related to n96 and n102. Therefore, to avoid parallel discussion this issue is discussed in [102-e][106] NR\_6GHz\_unlic\_full.
	+ The agreement for wording of the Notes will be adopted for n102 during the CR drafting.

## Companies views’ collection for 1st round

### Open issues

**Collection of comments:**

|  |  |
| --- | --- |
| **Company** | **Comments**  |
| Company A | *Comment* |
| Ericsson | While we are fine with discussing the note in thread #106, Ericsson has proposed an updated note in a CR R4-2204602 for Rel-16 under AI 5.1.1.1 (NR-U maintenance thread #102). This updated note is general contains information about designation of the bands for shared spectrum access in different countries/regions subject to country-specific conditions for use similar to the existing note for n96.  |
| Skyworks | Whatever note (or none) is finally chosen, it should be aligned and consistent for R16 and R17 and for n46/96/102 and for UE/BS specs. In our view it is sufficient to clarify that these are shared spectrum access as it is already the case with Note 13 in 38.101-1. That a band applicability is subject to local/regional regulation is true for any band so we do not see the added value with a Note on top of Note 13. If it is helpful the Note 13 may be placed in the “band” column rather than the “mode” column. |
| Nokia | We are fine to discuss the note in thread #106 but as mentioned by others it should be consistent between n46, n96 and now n102. The CRs introducing n102 to 38.101-1 and 38.104 should be updated based on the outcome of this parallel discussion.  |
| Qualcomm | Agree with the comment from Skyworks. Applicability of country-specific rules applies to any band. Maybe it would be better to have country applicability as a more general note not just for a subset of bands if it is truly needed? |
| Apple | We share the view expressed by Skyworks and Qualcomm. It is already the case that country-specific rules apply to any band, so there is no point in repeating it again. And we already have NOTE13 saying that it is the shared access band. So, we do not mind having a simple NOTE, if so wished by companies, but let’s keep it simple.  |

### CRs/TPs comments collection

N/A

## 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**  |
| Issue 1-1 | *Candidate options:*TBD*Recommendations for 2nd round:*TBD |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

### Open issues

TBD

## Summary for 2nd round

TBD

# Topic #2: UE related

Discussions related to how the introduction of unlicensed operation in the range 5945-6425 MHz for the UE specification shall be treated.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2203658**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203658.zip) | Apple | Proposal 1a: Re-use 3GPP band n102 for Morocco and UAE.Proposal 1b: Existing NS\_01 can be re-used for LPI in Morocco and UAE.Proposal 2: : Include the summary of the required NS values for Morocco and UAE into TR 38.849. |
| [**R4-2204606**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204606.zip) | Ericsson | Proposal 1: for operations in the EU, unwanted emissions requirements for n102 is specified in accordance with EN 303 687 including at least the limits for LPI (Low Power Indoor) devices. |

## Open issues summary

### Sub-topic 2-1 – NS definition

Different input/contributions have been provided on the NS definition for n102.

**Issue 2-1: NS for Morocco and UAE**

* Proposals
	+ **Option 1:** Use NS\_01 for Morocco and UAE.
	+ **Option 2:** NS for Morocco and UAE is FFS.
* Recommended WF
	+ Option 1 – This seems to be the normal procedure to use the general requirements (i.e. NS\_01) if no specific requirements mandates a NS to be defined.

**Issue 2-2: Unwanted emissions requirements for n102**

* Proposals
	+ **Option 1:** For operations in the EU, unwanted emissions requirements for n102 is specified in accordance with EN 303 687 including at least the limits for LPI (Low Power Indoor) devices.
	+ **Option 2:** Unwanted emissions requirements for n102 is FFS.
* Recommended WF
	+ Option 1 – Aligning with regulations is recommended.

## Companies views’ collection for 1st round

### Open issues

Sub-topic 3-1 - Out-of-band blocking

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | **Issue 2-1:** *Comment***Issue 2-2:** *Comment* |
| Ericsson | Issue 2-1:Option 2. The unwanted emissions requirements outside the band 5925-6425 MHz for UAE and Morocco are still not provided. If Cat-A applies outside the band, then NS\_01 can be used, whereas if Cat-B applies (ECC Rec. 74-01 for EMEA countries following Europe) then NS\_01 cannot be used (-30 dBm/MHz applies below 5925 MHz for WAS/RLAN).Issue 2-2: Option 1 (for operations in the range 5945-6425 MHz in the EU). |
| Qualcomm | Issue 2-1: If there is still uncertainty as Ericsson comments, then Option 2 FFS would be better.Issue 2-2: Agree that the 3GPP requirements should be at least as tight as regulatory requirements, but we aren’t sure about the proposal in R4-2204607 (see below). |
| Apple | Issue 2-1:Answering the comment from Ericsson, we added references to the corresponding regulatory documents from UAE and Morocco (see our discussion paper), according to which there are no additional/specific emission requirements outside 5925-6425MHz range. Maybe Ericsson can provide references to the corresponding documents if we missed something. Issue 2-2: We do also agree that 3GPP requirements should be at least as tight as the regulations, e.g. EN 303 687, but we are not entirely sure about several proposals in R4-2204607 (CR from Ericsson). We provided our comments and questions below. |
|  |  |

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2203659**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203659.zip) | Source: Apple, Skyworks Solutions Inc., MediaTek Inc Type: CRTitle: Introduction of the lower 6GHz unlicensed band |
| Company – Comment |
| Ericsson - is this the same as the running CR from last meeting? Not agreed, the unwanted emissions requirement for EU is still incorrect. |
| Nokia – We are fine to use this CR as baseline for introducing n102 to 38.101-1. Meaning it shall be revised to capture the agreements at this meeting. |
| Qualcomm: Generally ok |
|  |
| [**R4-2204607**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204607.zip) | Source: Ericsson Type: draftCRTitle: Unwanted emissions requirements for Band n102 |
| Company – Comment |
| Qualcomm: Needs further discussion. We understand the motivation, but we aren’t clear that the proposed change is needed. The requirements are already specified as SEM, additional spurious emissions and general spurious. Where there is overlap between two requirements, the 3GPP specifications dictate that the tighter requirement applies. |
| Apple: This should be further discussed because some changes are not clear. Referring to ETSI EN 303 687, we understand the motivation for the following change.

|  |  |  |
| --- | --- | --- |
| **Frequency band****(MHz)** | **Spectrum emission limit****(dBm)** | **Measurement bandwidth** |
|  5945 – FOOB ≤ f ≤ 5935 | -22 | 1 MHz |

However, remaining changes are not clear because, as also mentioned by Qualcomm, they effectively repeat existing SEM and spurious emission requirements. It would be also good to understand why we apply spurious emission requirements from NS\_28. ETSI EN 303 687 defines spurious emission requirements as follows below, which is still different comparing to NS\_28.

| Frequency range | Maximum power  | Measurement bandwidth |
| --- | --- | --- |
| 30 MHz ≤ f < 87,5 MHz | −36 dBm | 100 kHz |
| 87,5 MHz ≤ f ≤ 118 MHz | −54 dBm | 100 kHz |
| 118 MHz < f < 174 MHz | −36 dBm | 100 kHz |
| 174 MHz ≤ f ≤ 230 MHz | −54 dBm | 100 kHz |
| 230 MHz < f < 470 MHz | −36 dBm | 100 kHz |
| 470 MHz ≤ f ≤ 694 MHz | −54 dBm | 100 kHz |
| 694 MHz < f ≤ 1 GHz | −36 dBm | 100 kHz |
| 1 GHz < f ≤ 26 GHz | −30 dBm | 1 MHz |
| NOTE: Information in this table is based on ERC Recommendation 74-01 Annex 2, Table 6 [i.11]. |

 |
| [**R4-2203660**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203660.zip) | Source: Apple Type: TPTitle: TP for TR 38.849 |
| Company – Comment |
| Ericsson – not agreed, see comment to Issue 2-1 above. |
| Apple: If the concern is about NS\_01 for UAE and Morocco, that can be discussed further; but hopefully we have provided our explanations above under issue 2-1. And we believe that there is nothing controversial in specifying NS\_58 for EU/CEPT.  |

## 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**  |
|  |  |
|  |  |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

### Open issues

TBD

## Summary for 2nd round

TBD

# Topic #4: BS related

Discussions related to how the introduction of unlicensed operation in the range 5945-6425 MHz for the BS specification shall be treated.

## Companies’ contributions summary

See CR Section

## Open issues summary

Agree CRs to be approved to introduce n102 to specification.

## Companies views’ collection for 1st round

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2205561**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205561.zip) | Source: Nokia, Nokia Shanghai Bell Type: CRTitle: CR for 38.104 to introduce n102 |
| Company – Comment |
| Ericsson – to be revised. The (tentative) formulation of the NOTE 8 is not acceptable. NR-ARFCN/GSCN raster points for the lowest 20 MHz channel in 5925-5945 MHz are missing (the raster points for 40 MHz and wider channels should remain unchanged and be aligned with n96 for the range 5945-6425 MHz). |
| Nokia – We have provided a revised version in the CR draft folder aggressing the comments from Ericsson.  |
|  |
| [**R4-2205944**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205944.zip) | Source: Nokia, Nokia Shanghai Bell Type: CRTitle: CR to 37.104 on introduction of n102 co-existence requirements |
| Company – Comment |
| Ericsson - agreeable. |
|  |
| [**R4-2205946**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205946.zip) | Source: Nokia, Nokia Shanghai Bell Type: CRTitle: CR to 37.141 on introduction of n102 co-existence requirements |
| Company – Comment |
| Ericsson - agreeable. |
|  |
| [**R4-2205947**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205947.zip) | Source: Nokia, Nokia Shanghai Bell Type: CRTitle: CR to 36.141 on introduction of n102 co-existence requirements |
| Company – Comment |
| Ericsson - agreeable. |
|  |
| [**R4-2205950**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205950.zip) | Source: Nokia, Nokia Shanghai Bell Type: CRTitle: CR to 38.141-1 on introduction of n102 requirements |
| Company – Comment |
| Ericsson - agreeable. |
|  |
| [**R4-2206041**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206041.zip) | Source: Ericsson GmbH, Eurolab Type: CRTitle: CR for 37.105 on Introduction of lower 6GHz NR unlicensed operation for Europe |
| Company – Comment |
| Nokia – Agreeable  |
|  |
| TBD | Source: ZTE Type: CRTitle: CR to TS36.104 the introduction of EU unlicensed band n102 |
| Nokia – The CR were endorsed as draftCR (R4-2202253) at last meeting and is shared as CR in the CR draft folder for review at this meeting. |
|  |
|  |
| TBD | Source: ZTE Type: CRTitle: CR to TS38.141-2 the introduction of EU unlicensed band n102 |
| Nokia – The CR were endorsed as draftCR (R4-2202254) at last meeting and is shared as CR in the CR draft folder for review at this meeting. |
|  |
|  |
| TBD | Source: [Huawei] Type: CRTitle: CR to 37.145-2 - adding band n102 |
| Nokia – The CR were endorsed as draftCR (R4-2202256) at last meeting. Please provide a draft to the CR draft folder for review at this meeting. |
| Huawei – Draft added to review folder (awaiting T-doc and CR No to be allocated in 2nd round) |
|  |
| TBD | Source: [Huawei] Type: CRTitle: CR to 37.145-1 - adding band n102 |
|  | Huawei - The CR was endorsed as draftCR (R4-2201928) at last meeting. Draft added to review folder (awaiting T-doc and CR No to be allocated in 2nd round) |
|  |  |
|  |  |

## 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**  |
|  |  |
|  |  |
|  |  |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

### Open issues

TBD

## Summary for 2nd round

TBD

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
|  |  |  |
|  |  |  |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| [**R4-2203658**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203658.zip) | Overview of the Region 1 countries implementing lower 6GHz unlicensed band | Apple |  |  |
| R4-2205559 | draft TR 38.849 v0.7.0 | Nokia, Nokia Shanghai Bell |  |  |
| [**R4-2205560**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205560.zip) | On band definition for the lower 6GHz NR unlicensed operation | Nokia, Nokia Shanghai Bell |  |  |
| [**R4-2203659**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203659.zip) | CR for introduction of the lower 6GHz unlicensed band | Apple, Skyworks Solutions Inc., MediaTek Inc. |  |  |
| [**R4-2204606**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204606.zip) | Unwanted emissions requirements for lower 6GHz NR unlicensed operation for Europe | Ericsson |  |  |
| [**R4-2204607**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204607.zip) | Unwanted emissions requirements for Band n102 | Ericsson |  |  |
| [**R4-2205561**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205561.zip) | CR for 38.104 to introduce n102 | Nokia, Nokia Shanghai Bell |  |  |
| [**R4-2205944**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205944.zip) | CR to 37.104 on introduction of n102 co-existence requirements | Nokia, Nokia Shanghai Bell |  |  |
| [**R4-2205946**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205946.zip) | CR to 37.141 on introduction of n102 co-existence requirements | Nokia, Nokia Shanghai Bell |  |  |
| [**R4-2205947**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205947.zip) | CR to 36.141 on introduction of n102 co-existence requirements | Nokia, Nokia Shanghai Bell |  |  |
| [**R4-2205950**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205950.zip) | CR to 38.141-1 on introduction of n102 requirements | Nokia, Nokia Shanghai Bell |  |  |
| [**R4-2206041**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206041.zip) | CR for 37.105 on Introduction of lower 6GHz NR unlicensed operation for Europe | Ericsson GmbH, Eurolab |  |  |
| [**R4-2203660**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203660.zip) | TP for TR 38.849 | Apple |  |  |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

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** |
| Nokia | Johannes Hejselbaek | Johannes.hejselbaek@nokia.com |
| Qualcomm Incorporated | Gene Fong | gfong@qti.qualcomm.com |
| Huawei | Richard Kybett | richard.kybett@huawei.com |
|  |  |  |
|  |  |  |

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)