**3GPP TSG-RAN WG4 Meeting # 99-e R4-210XXXX**

**Electronic Meeting, 19th – 27th May 2021**

**Agenda item: 8.5, 8.6**

**Source: Ingo Wendler (UIC)**

**Title:** Email discussion summary for [99-e][114]NR\_RAIL\_EU\_900MHz\_NR\_RAIL\_EU\_1900MHz

**Document for:** Information

# Introduction

**Subject 1 WI updates (AI 8.5.1)**

R4-2109842[6] Update WI NR\_RAIL\_EU\_900MHz,

R4-2109726[7] Update WI NR\_RAIL\_EU\_1900MHz

In RAN4#98-e-bis the objectives of the work items NR\_RAIL\_EU\_900MHz/NR\_RAIL\_EU\_1900MHz have been further discussed. Several suggestions were made during the discussion, which have now been recorded in this WI update for endorsement. The endorsed WI will be submitted for approval in the RAN#92-e.

**Subject 2 (AI 8.5.1)**

R4-2111051[4] Discussion on general aspects of the RMR 900 WI

**Relations to other RATs**: ECC Decision 20(02) [x] allocates the spectrum part 874.4-880/819.4-925 MHz for technology neutral use. In this context the spectrum portion can be used for GSM-R, FRMCS (broadband use) and NB-IoT. For the use by GSM-R 3GPP TS 45.005. The WI [x] addresses the use of the allocated spectrum by 5G NR encompassing. Furthermore, NB IoT can be operated in this spectrum range. It need be clarified whether this is done under the proposed WI or by a subsequent WI.

Further clarifications are required in the context with HST support.

**Subject 3 (AI 8.6.1)**

R4-2111055[5] Discussion on general aspects of the RMR 1900 WI

The affected 3GPP technical specification for the use of the spectrum range RMR 1900 need to be adapted and aligned with RMR 900.

Relation to other RATs: ECC Decision 20(02) [x] does not foresee the use of NB IoT in the context with RMR 1900MHz in Annex 3. It is proposed to further clarify the use of NB IoT, uncoordinated deployment aspects (multicarrier and single carrier usage) and the use of HST.

**Subject 4 UE requirements RMR 900 (AI 8.5.2)**

The inclusion of RMR\_900MHz in 5G NR requires various consideration in the context of spurious emissions to adjacent bands. Apart from the band number allocation various parameters need to be agreed for the use 5G NR. Actually, the WI considers only the use PCL-3 which will be complemented in a later stage by PCL-1 in accordance with ECC Decision 20(02).

The contribution R4-2110956 [8] considers various interference scenarios to adjacent bands B8/n8 and proposes major UE parameters applicable for the RMR 900MHz. The allocated spectrum block of 2x 5.6MHz in accordance to ECC Decision 20(02) [1] and the required CBW of 5MHz will not occupy the entire spectrum of 5.6MHz.

**Subject 5 UE requirements RMR 1900 (AI 8.6.2)**

The inclusion of RMR\_1900MHz in 5G NR requires various consideration in the context of spurious emissions, blocking characteristics etc. Apart from the band number allocation various parameters are proposed and requires further alignment for the use of 5G NR. Actually, the WI considers only the use PCL-3 which will be complemented in a later stage by PCL-1 in accordance with ECC Decision 20(02).

The contribution R4-2110958 [9] considers the operating bands around RMR 1900MHz which are bands B1/n1 and B3/n3.and proposes the necessary parameters for the UE part.

**Summary**

The use of RMR 900/RMR 1900 have to fulfil ECC Decision 20(02) [1] in an uncoordinated approach. The proposed UE parameters for RMR 900 and RMR 1900 are for discussion and agreement.

In this context the updated WIs for RMR\_900 and RMR\_1900 requires endorsement to be submitted for next RAN plenary meeting.

# Topic #1: Rail Mobile Radio 900MHz spectrum block

## Companies’ contributions summary - subject relation to other RATs

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111051[4] | Huawei | **Observation 1**: NB-IoT operation shall be considered during the discussion on the RF requirements, as NB-IoT is included in the NR BS specification. **Proposal 1:** When implementing RMR900 band into the NR specifications, account for the NB-IoT guard-band and NB-IoT in-band operation. **Observation 2**: further analysis is needed to identify the way to implement power boosting restrictions for NB-IoT when operating in RMR bands.  |

## Companies’ contributions summary - subject HST requirements

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111051[4] | Huawei | **Proposal 2:** It is proposed to clarify in the WID and/or in the related BS specification (TS 38.104) that the HST base station requirements are independent of the RMR 900 discussion. |

## Companies’ contributions summary - subject WID update

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109842[6] | UIC | **Proposal 1:** Endorse the proposed changes in WI NR\_RAIL\_EU\_900MHz |

## Companies’ contributions summary - subject relation to other RATs

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2110965[2] | Huawei | **Proposal 1**: adopt the existing UE requirements for RMR 900MHz with specific details below (see below the table). |

## Companies’ contributions summary - subject relation to other RATs

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111054[10] | Huawei | **Observation 1**: RMR900 downlink allocation from 919.6MHz is not leaving sufficient guardband for NR operation (5MHz channel, 15 kHz and 30 kHz SCS). **Observation 2**: RMR900 downlink channel edge shall be shifted above 919.6 MHz to allow NR operation with 5MHz channel bandwidth. **Observation 3**: RMR900 uplink channel edge arrangement shall incorporate NR guardband to allow NR operation with 5MHz channel bandwidth. |

## Open issues summary

### Sub-topic 1-1

Sub-topic description: relation to other RATs

WI description requires clarification if NB- IoT shall be included or excluded in the objectives of NR\_RMR\_EU\_900MHz. Companies are invited to provide their view if NB-IoT shall be treated in this WI or an subsequent WI for the use of NR\_RMR\_EU\_900MHz.

### Sub-topic 1-2

Sub-topic description: HST requirements

Clarify if the HST support is included or excluded from the WI. Companies are invited their view if HST support should be treated in this WI or in a subsequent WI.

Rail requires the support of speed between 0-500km/h.

### Sub-topic 1-3

Sub-topic description: WID update objectives

Consolidate necessary WI changes and endorse the WI objective update.

### Sub-topic 1-4

Sub-topic description: Proposed RMR 900 parameters

Companies are invited to discuss the proposed parameters applicable for 3GPP TS 3GPP 38.101-1 which are :

- Operating band

- Channel bandwidth

- Channel raster

- Synchronisation raster

- Tx and Rx frequency separation

- UE output power

- Reference sensitivity

- Spurious emission for UE co-existence and the proposed bands

### Sub-topic 1-5

Sub-topic description: Align and propose potential solutions in the channel raster context applicable for RMR 900 to achieve sufficient use of the allocated spectrum for RMR 900.

## Companies views’ collection for 1st round

### Open issues

**Sub-topic 1-1**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | There is a major issue on NB-IoT for this band which is related to power boosting. ECC Decision states that NB-IoT operation is allowed in 900MHz without any power boosting.But, according to 3GPP, +6dB power boosting is a mandatory feature when claiming supporting NB-IoT. From this observation, NB-IoT support in 900MHz is then questionable. |

**Sub-topic 1-2**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | Our understanding is that HST requirements are bands agnostic for FR1, supporting up to 500km/h so this should not be an issue. Is there anything specific in this request? |

**Sub-topic 1-3**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | Should we really introduce 30kHz SCS with 5MHz? This is really spectrum inefficient, it has never specified before for any band. |

**Sub-topic 1-4**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |

**Sub-topic 1-5**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

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

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

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

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

## Discussion on 2nd round (if applicable)

# Topic #2: Rail Mobile Radio 1900MHz spectrum block

## Companies’ contributions summary - subject NR BS specification impact

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111055[5] | Huawei | **Observation 1**: lists of impacted specifications in RMR900 WID and RMR1900 WID shall be aligned. **Proposal 1:** Add TS36.104, 36.141, 37.104, 37.141 to the list of impacted specifications in RMR1900 WID. |

## Companies’ contributions summary - subject relation to other RATs

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111055[5] | Huawei | **Observation 2**: NB-IoT operation shall be considered during the discussion on the RF requirements, as NB-IoT is included in the NR BS specification. **Proposal 2:** When implementing RMR bands into the NR specifications, account for the NB-IoT guard-band and NB-IoT in-band operation. **Observation 3**: further analysis is needed to identify the way to implement power boosting restrictions for NB-IoT when operating in RMR bands.  |

## Companies’ contributions summary - subject deployment aspects

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111055[5] | Huawei | **Proposal 3**: Applicability of coordination procedures or mitigation measures shall be further studied for RMR1900, not only for the multi-carrier operation or EIRP above 65dBm, but also for single carrier and for EIRP below 65 dBm.  |

## Companies’ contributions summary - subject HST requirements

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111055[5] | Huawei | **Proposal 12:** it is proposed to clarify in the WID and/or in the related BS specification (TS 38.104) that the HST base station requirements are independent of the RMR1900 discussion. |

## Companies’ contributions summary - subject WID update

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111055[5] | Huawei | **Proposal 12:** it is proposed to clarify in the WID and/or in the related BS specification (TS 38.104) that the HST base station requirements are independent of the RMR1900 discussion. |

## Companies’ contributions summary – subject general handling of proposed subjects and corresponding solutions

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111055[5] | Huawei | **Proposal 4:** capture the agreeable proposals into a Draft CR to TS 38.104 in [3] to capture agreements on the RMR1900 and related requirements. |

## Companies’ contributions summary – subject WID update

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109726[7] | UIC | **Proposal 1:** Endorse the proposed changes in WI NR\_RAIL\_EU\_1900MHz |

## Companies’ contributions summary - subject NR BS specification impact

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2110958[3] | Huawei | Proposal: Agree with the changes listed in this contribution. |

## Open issues summary

### Sub-topic 2-1

Sub-topic description: NR BS specification impact

It has been identified that some 3GPP TS are not listed although the use of RMR 1900MHz will impact the use. Hence, the impact on various 3GPP Technical Specifications requires further alignment. Companies provides their view on the necessary 3GPP TS alignment.

### Sub-topic 2-2

Sub-topic description: relation to other RATs

The use of NB-IoT is referenced in some clauses of ECC Decision 20(02). In Annex 3 the use of NB-IoT is not explicitly referenced and therefore not required. Companies should provide their view on the use of NB-IoT for RMR 1900MHz.

### Sub-topic 2-3

Sub-topic description: deployment aspects

ECC Decision 20(02) defines to use the spectrum block 1900-1910MHz and their related radio parameters for an uncoordinated approach with the adjacent spectrum blocks. Companies are invited to provide their view if coordination procedures/mitigation measures are a matter of 3GPP or is left to the regional/national frequency regulation authorities.

### Sub-topic 2-4

Sub-topic description: HST requirements

Clarify if the HST support is included or excluded from the WI. Companies are invited their view if HST support should be treated in this WI or in a subsequent WI.

Rail requires the support of speed between 0-500km/h.

### Sub-topic 2-5

Sub-topic description: general handling of proposed subjects and corresponding solutions

Companies are invited to provide their view how to record clarifications, key issue and their corresponding solutions.

### Sub-topic 2-6

Sub-topic description: WID update objectives

Consolidate necessary WI changes and endorse the WI objective update.

### Sub-topic 2-7

Sub-topic description: Proposed RMR 1900 parameters

Companies are invited to discuss the proposed parameters applicable for 3GPP TS 3GPP 38.101-1 which are :

- Operating band

- Channel bandwidth

- Channel raster

- Synchronisation raster

- Reference sensitivity

- Duplex gap (Tx and Rx frequency separation)

- UE output power

- Reference sensitivity

- Spurious emission for UE co-existence and the proposed bands

- In-band blocking characteristics

- Out of band blocking characteristics

- Narrow band blocking characteristics

## Companies views’ collection for 1st round

### Open issues

**Sub-topic 2-1**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | TS 36.104, 36.141, 37.104 and 37.141 shoud be added. |

**Sub-topic 2-2**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | ECC Decision explicitly mentions NB-IoT for the 900MHz but not for the 1900MHz one. Most likely, NB-IoT should not be supported in this 1900MHz band then. It seems also CEPT didn’t make any study on NB-IoT for this band. |

**Sub-topic 2-3**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | If such information are expected, they should be captured in a separate TR. |

**Sub-topic 2-4**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | Our understanding is that HST requirements are bands agnostic for FR1, supporting up to 500km/h so this should not be an issue. Is there anything specific in this request? |

**Sub-topic 2-5**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericsson | As mentioned before, depending on the complexity and numbers of clarifications, a separate TR might be needed. |

**Sub-topic 2-6**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |
| Ericssson | We only have following comments on the 5MHz channel BW for that band: * 30kHz SCS is very inefficient (spectrum utilization) for 5MHz channel BW. Current wording is ambiguous and should be clarified, 30kHz SCS should only be specified for 10MHz
* CEPT only studied 10 MHz channel BW for this band. Some adaptation might then be needed for 5 MHz, to be further studied.

Except from his, the revised WI looks good. |

**Sub-topic 2-7**

|  |  |
| --- | --- |
| Company | Comments |
| XXX |  |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

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

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

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

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

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

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

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** |
| 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

# References

[1] RP-210878 New WID on introduction of 900 MHz spectrum to 5G NR applicable for Rail Mobile Radio, UIC

[2] RP-210879 New WID on introduction of 1900 MHz spectrum to 5G NR applicable for Rail Mobile Radio, UIC

[3] ECC Decision (20)02 Harmonised use of the paired frequency bands 874.4-880.0 MHz and 919.4-925.0 MHz and of the unpaired frequency band 1900-1910 MHz for Railway Mobile Radio (RMR), November 2020

[4] R4-2111051 Discussion on general aspects of the RMR 900 WI

[5] R4-2111055 Discussion on general aspects of the RMR 1900 WI

[6] R4-2109842 Update WI NR\_RAIL\_EU\_900MHz,

[7] R4-2109726 Update WI NR\_RAIL\_EU\_1900MHz

[8] R4-2110956 Introduction of the RMR 900

[9] R4-2110958 Introduction of the RMR 1900

[10] R4-2111054 Discussion on channel raster aspects for RMR 900