**3GPP TSG-RAN WG4 Meeting # 98-bis-e draft R4-2115790**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 8.4.3, 8.5.3

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [100-e][317] RAIL\_900\_1900MHz\_BSRF

**Document for:** Information

# Introduction

This summary covers 8.4.3 and 8.5.3 agenda items for BS RF aspects of the RMR work items.

Please note proposals from R4-2113752 are considered both in [111] and [317] topics, which require coordination.

List of candidate target of email discussion for 1st round and 2nd round

* 1st round: Collect comments and check if any of the proposals is agreeable. Where needed, continue discussion also during second round.

2nd round: the following objectives were identified for the 2nd round discussion:

1. Continue discussion on the following items:
	* Sub topic 1-1: EIRP requirements conversion to conducted requirements
	* Sub topic 1-2: BS rated output power
	* Sub topic 1-3: OBUE category B option 2 requirement
	* Sub topic 1-4: Additional spurious limit requirements
	* Sub topic 2-1: additional BS blocking requirement
	* Sub-topic 3-2: BS rated output power
	* Sub-topic 3-3: additional spurious limit requirements
2. Approve the WF capturing all the agreements for RMR900 and RMR1900.

# Topic #1: BS Tx requirements for RMR900

In this topic we focus on the BS Tx requirements for RMR900 WI.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2113749 | Ericsson | Proposal 1: Convert CEPT EIRP limits in RAN4 conducted ones considering one antenna with 15 dBi antenna gain.Moderator’s note: there is mismatch in R4-2113749, as the same Proposal 1 once states 17 dBi, while conclusion section of R4-2113749 states 15 dBi. Proponents are asked to clarify this ambiguity. Proposal 2: Capture in TS 38.104 that for BS operating in [900MHz RMR band], for uncoordinated deployment, the BS rated output power Prated,c,AC shall not exceed: 47.5dBm/5MHz + (fDL-922.1) x 40/3 dB (considering a 17 dBi antenna gain, and with fDL being the centre frequency in MHz).Proposal 3: Capture the following OBUE category B option 2 requirement for band [900MHz RMR] in TS 38.104:

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 0.2 MHz | 0.1 MHz ≤ f\_offset < 0.3 MHz | 15.5 dBm | 200 kHz  |
| 0.2 MHz ≤ Δf <1 MHz | 0.6MHz ≤ f\_offset <1.4 MHz | -3 dBm | 800 kHz  |
| 1 MHz ≤ Δf ≤ 10 MHz | 1.5 MHz ≤ f\_offset < 10.5 | -12 dBm  | 1 MHz  |
| NOTE 1: Assuming a 17 dBi antenna gain |

Proposal4: Capture the following additional requirement (most likely as an additional spurious limit) for band [900 MHz RMR] in TS 38.104:

|  |  |  |
| --- | --- | --- |
| Spurious frequency range | *Basic limit* | *Measurement bandwidth* |
| 880 MHz – 918 MHz | -66 dBm (NOTE) | 5 MHz |
| NOTE: considering a 17 dBi antenna gain |

 |
| R4-2114368 | Nokia, Nokia Shanghai Bell | Proposal 1: Since additional ECC BS transmitter requirements are not conducted, it is proposed to define them as 3GPP BS declarations. |

## Open issues summary

### Sub-topic 1-1: EIRP requirements conversion to conducted requirements

* Proposals
	+ Option 1: Convert CEPT EIRP limits in RAN4 conducted ones considering one antenna with [17] dBi antenna gain (R4-2113749, Ericsson)

Moderator’s note: there is mismatch in R4-2113749, as the same Proposal 1 once states 17 dBi, while conclusion section of R4-2113749 states 15 dBi. Proponents are asked to clarify this ambiguity.

* + Option 2: Since additional ECC BS transmitter requirements are not conducted, it is proposed to define them as 3GPP BS declarations (R4-2114368, Nokia, Nokia Shanghai Bell).
	+ Option 3: Other
* Recommended WF
	+ Considering the ETSI TFES rules, it is suggested to take Option 1 as the baseline for further discussion, with the antenna gain value to be further studied.

### Sub-topic 1-2: BS rated output power

* Proposals
	+ Option 1: For BS operating in [900MHz RMR band], for uncoordinated deployment, the BS rated output power Prated,c,AC shall not exceed: 47.5dBm/5MHz + (fDL-922.1) x 40/3 dB (considering a 17 dBi antenna gain, and with fDL being the centre frequency in MHz) (R4-2113749, Ericsson)
	+ Option 2: Other
* Recommended WF: before proceeding with the requirements, refer to the Issue 5-2 (Consideration of coordnated/uncoordianted deployments).

### Sub-topic 1-3: OBUE category B option 2 requirement

Referring to the WF in R4-2108609, the following was agreed:

|  |
| --- |
| *Clarify that for RMR900 and RMR1900 operation in Europe, OBUE Cat B Option 2 regulatory emission requirements defined for WA BS shall be considered as the baseline.* |

* Proposals
	+ Option 1:

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits* (Note 1) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 0.2 MHz | 0.1 MHz ≤ f\_offset < 0.3 MHz | 15.5 dBm | 200 kHz  |
| 0.2 MHz ≤ Δf <1 MHz | 0.6MHz ≤ f\_offset <1.4 MHz | -3 dBm | 800 kHz  |
| 1 MHz ≤ Δf ≤ 10 MHz | 1.5 MHz ≤ f\_offset < 10.5 | -12 dBm  | 1 MHz  |
| NOTE 1: Assuming a 17 dBi antenna gain |

* + Option 2: Other
* Recommended WF: before proceeding with the requirements, sub-topic 1-1 to be concluded first. Any agreeable requirements motivation to be captured in the TR.

### Sub-topic 1-4: additional spurious limit requirements

* Proposals
	+ Option 1: Capture the following additional requirement (most likely as an additional spurious limit) for band [900 MHz RMR] in TS 38.104 (R4-2113749, Ericsson):

|  |  |  |
| --- | --- | --- |
| Spurious frequency range | *Basic limit* | *Measurement bandwidth* |
| 880 MHz – 918 MHz | -66 dBm (NOTE) | 5 MHz |
| NOTE: considering a 17 dBi antenna gain |

Moderator’s note: the above note should probably say “assuming”, as in issue 1-3.

* + Option 2: Other
* Recommended WF:
	+ Before proceeding with this requirement, it is suggested to clarify that on the RMR-specific requirements consideration in the specification (e.g. whether those shall be considered as regional requirements, etc.). In relation to the antenna gain assumption, Issue 1-1 to be concluded first.

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1: EIRP requirements conversion to conducted requirements

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Option 2. Since ECC requirements are radiated, the best option is to introduce relevant 3GPP declarations. Defining conducted requirements on certain assumptions (e.g. specific antenna gain) would limit the number of deployment flexibility. 3GPP declarations are widely used in 3GPP specification which allow operator to accommodate deployment plans while fulfilling relevant required requirements at the same time. |
| Ericsson | Option 1: RAN4 used to convert CEPT EIRP requirement in manufacturer declaration requirement and refer to an Annex to explain how CEPT limit should checked with such declaration. But, in the scope of RE-D and writing Harmonized Standards, the European Commission doesn’t accept anymore any requirement based on manufacturer declaration, all requirements shall be fixed limit (concrete number). Considering this band is an European band, using declarations would be acceptable in 3GPP, but in the scope of ETSI Harmonized Standard drafting. So, instead of moving the resolution of this issue to ETSI, we propose to solve it directly in 3GPP. Also, the antenna gain which is assumed to set the limit will be clearly mentioned in the note (the proposed wording could be improved). With this, BS manufacturer could still certify a BS supporting a higher conducted output power (than this limit), claiming it shall be used with a lower antenna gain. Operator will still have full flexibility to deploy any (BS + antenna) compliant with CEPT limit. |
| Huawei | The declaration-based approach would be fine if we talk about the RAN4 alone. However this has been identified as serious problem when it comes to the ETSI Harmonized Standard creation in ETSI TFES. EC does not allow declaration-based requirements. Therefore, we would create a risk of blocking the whole NR BS specification ETSI EN 301 908-24 NR BS. Considering that we have two competing approaches on the table, it is suggested to further analyze pros and cons of both of them. For the RMR deployment flexibility: we may look into the range of antenna gain values that is envisioned for this band, to assess practical impact of following option 1. Additionally, we shall clarify somehow, that for option 1, internal antenna losses for the conducted/OTA conversion are assumed to be 0 dB. |

Sub topic 1-2: BS rated output power

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | See sub-topic 1-1 |
| Ericsson | Option 1, see sub-topic 1-1 |
| Huawei | As there is dependency to the subtopic 1-1, maybe we can proceed with the following being the maximum rated power for RMR BS, based on the ECC limit: (64.5 – [antenna\_gain]) dBm / 5MHz + (fDL-922.1) x 40/3 dB, where [antenna\_gain] is to be decided as per subtopic 1-1, e.g.- manufacturer declared in the test spec, or- fixed value.More analysis on the spec impact of the WA BS upper output power limit is needed, e.g. it seems that the above requirement shall be captured in TS 38.104 clause 6.2.4 (Additional requirements (regional)). |

 Sub topic 1-3: OBUE category B option 2 requirement

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | See sub-topic 1-1 |
| Ericsson | Option 1, see sub-topic 1-1 |
| Huawei | As there is dependency to the subtopic 1-1, maybe we can proceed with the following this meeting:

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits*(dBm) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 0.2 MHz | 0.1 MHz ≤ f\_offset < 0.3 MHz | 32.5 - [antenna\_gain] | 200 kHz  |
| 0.2 MHz ≤ Δf <1 MHz | 0.6MHz ≤ f\_offset <1.4 MHz | 14 -[antenna\_gain] | 800 kHz  |
| 1 MHz ≤ Δf ≤ 10 MHz | 1.5 MHz ≤ f\_offset < 10.5 | 5 - [antenna\_gain] | 1 MHz  |
|  |

, where [antenna\_gain] is to be decided as per subtopic 1-1, e.g.- manufacturer declared in the test spec, or- fixed value.Requirement derivation to be captured in the TR, for future reference. |

Sub topic 1-4: Additional spurious limit requirements

|  |  |
| --- | --- |
| **Company** | **Comments** |
| UIC | RMR 900 allocation is limited to ITU region 1. Hence context to region is already given. No need to add this again. The understanding is that ECC Decision (20)02 defines RMR 900 band specific spurious limits which is the target of R4-2113749. |
| Nokia | See sub-topic 1-1 |
| Ericsson | Option 1, see sub-topic 1-1Regarding moderator’s WF, this band is for Europe (CEPT countries) so it could already be considered as a “regional” band. We don’t think we need so to mention that any requirement related to that band is a regional requirement. |
| Huawei | RMR900 is going to be introduced into global standard – the regional requirements approach is typical approach in RAN4, when it comes to the Region-specific requirements. In order not to block the progress, we suggest to provide analyses of the spec impact for that topic (regional requirements considered, additional spur limits, etc).As there is dependency to the subtopic 1-1, maybe we can proceed with the following for the basic limit derivation :

|  |  |  |
| --- | --- | --- |
|  | *Basic limit**(dBm)* | *Measurement bandwidth* |
| 880 MHz – 918 MHz | -49 – [antenna\_gain] | 5 MHz |
|  |

, where [antenna\_gain] is to be decided as per subtopic 1-1, e.g.- manufacturer declared in the test spec, or- fixed value.It needs to be further clarified, whether it is common understanding that the above limit is the “BS spurious emissions *basic limits* for BS for co-existence with RMR”. More analysis of the impact on the co-existing BS may be needed next meeting. Based on Ericsson proposal, analysis of the validity of -66 dBm limit (much lower than other co-ex spur limits) is needed.  |

### CRs/TPs comments collection

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic 1-1**: EIRP requirements conversion to conducted requirements | *Candidate options:*There were two options identified: 1. Manufacturer declaration based approach
2. Fixed antenna gain approach

*Recommendations for 2nd round:*As similar comments were provided as last meeting with limited progress, it is recommended to agree on the following WF during the 2nd round discussion: For the next meeting, provided pros and cons analyses for the following options for the EIRP‑based ECC requirements conversion to conducted requirements (applies to both RMR900 **and RMR1900**): 1. Manufacturer declaration based approach,
2. Fixed antenna gain approach.

Other options are not precluded for the analysis next meeting. |
| **Sub-topic 1-2**: BS rated output power | *Candidate options:* There is dependency on sub-topic 1-1.*Recommendations for 2nd round*In order to progress the work on requirements derivation, the following approach is proposed to be discussed during the 2nd round (transparent to the decision on option 1 or 2 in sub-topic 1-1):RMR900 BS rated power to be defined based on the following ECC limits translation: (64.5 – [RMR900\_antenna\_gain]) dBm / 5MHz + (fDL-922.1) x 40/3 dB, where [RMR900\_antenna\_gain] is to be decided as per subtopic 1-1. |
| **Sub-topic 1-3**: OBUE category B option 2 requirement | *Candidate options:* There is dependency on sub-topic 1-1.*Recommendations for 2nd round:*In order to progress the work on requirements derivation, the following approach is proposed to be discussed during the 2nd round (transparent to the decision on option 1 or 2 in sub-topic 1-1):OBUE category B option 2 requirement for RMR900 BS to be defined based on the following ECC limits translation:

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits*(dBm) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 0.2 MHz | 0.1 MHz ≤ f\_offset < 0.3 MHz | 32.5 - [RMR900\_antenna\_gain] | 200 kHz  |
| 0.2 MHz ≤ Δf <1 MHz | 0.6MHz ≤ f\_offset <1.4 MHz | 14 -[RMR900\_antenna\_gain] | 800 kHz  |
| 1 MHz ≤ Δf ≤ 10 MHz | 1.5 MHz ≤ f\_offset < 10.5 | 5 - [RMR900\_antenna\_gain] | 1 MHz  |
|  |

, where [RMR900\_antenna\_gain] is to be decided as per subtopic 1-1. |
| **Sub-topic 1-4**: additional spurious limit requirements | *Candidate options:* There is dependency on sub-topic 1-1.*Recommendations for 2nd round:*In order to progress the work on requirements derivation, the following approach is proposed to be discussed during the 2nd round (transparent to the decision on option 1 or 2 in sub-topic 1-1):Additional spurious limit requirements for RMR900 BS to be defined based on the following ECC limits translation:

|  |  |  |
| --- | --- | --- |
|  | *Basic limit**(dBm)* | *Measurement bandwidth* |
| 880 MHz – 918 MHz | -49 – [RMR900\_antenna\_gain] | 5 MHz |

, where [RMR900\_antenna\_gain] is to be decided as per subtopic 1-1.For the next meeting: companies are encouraged to provide more analysis on the validity of ECC limit of -66 dBm limit (as much lower than other co-ex spur limits).No more discussion on the “regional requirements” during the 2nd round. This topic to be addressed during requirements implementation in future meetings. |

### CRs/TPs

## Discussion on 2nd round (if applicable)

**Sub topic 1-1: EIRP requirements conversion to conducted requirements**

To agree on the following WF during the 2nd round discussion:

For the next meeting, provided pros and cons analyses for the following options for the EIRP‑based ECC requirements conversion to conducted requirements (applies to both RMR900 and RMR1900):

1. Manufacturer declaration based approach,
2. Fixed antenna gain approach.

Other options are not precluded for the analysis next meeting.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Ok with WF.Both options are similar, providing same flexibility (BS could still support a different limit assuming a different antenna again). The goal with option 2 is to align 3GPP TS and ETSI EN, that’s always preferrable. |
| Huawei  | We would suggest to proceed with this WF in order to progress the work on RF requirements. The WF is structured in a way NOT to block any of the two options discussed in the first round. OK with the WF. |

**Sub topic 1-2: BS rated output power**

RMR900 BS rated power limit to be defined based on the following ECC limits translation:

(64.5 – [RMR900\_antenna\_gain]) dBm / 5MHz + (fDL-922.1) x 40/3 dB

, where [RMR900\_antenna\_gain] is to be decided as per subtopic 1-1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Rated power can be defined on the basis of declaration, it is too early to agree on specific formula since this depends on subtopic 1-1 outcome. |
| Ericsson | Agree with Nokia, better to conclude first on 1-1. |
| Huawei | We have noticed that there is need to clarify one issue: the formula above defines the rated power LIMIT, not the BS product capability that the manufacturer will declare. So same as for other BS so far, manufacturer will declare BS capability of the rated power, BUT it will have to be within the ECC regulatory limit. This is slightly different than issue 1-1: what EC does not like is the declaration-based requirement (i.e. EC does not want to allow to have requirements which declared by manufacturers) – this is NOT the same as the declarations on the product capabilities (BS rated power).All in all: irrespective of 1-1, we will have to translate the ECC rated power limit on table 3 of EC20(02), |

**Sub topic 1-3: OBUE category B option 2 requirement**

OBUE category B option 2 requirement for RMR900 BS to be defined based on the following ECC limits translation:

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency offset of measurement filter ‑3dB point, Δf | Frequency offset of measurement filter centre frequency, f\_offset | *Basic limits*(dBm) | *Measurement bandwidth* |
| 0 MHz ≤ Δf < 0.2 MHz | 0.1 MHz ≤ f\_offset < 0.3 MHz | 32.5 - [RMR900\_antenna\_gain] | 200 kHz  |
| 0.2 MHz ≤ Δf <1 MHz | 0.6MHz ≤ f\_offset <1.4 MHz | 14 -[ RMR900\_antenna\_gain] | 800 kHz  |
| 1 MHz ≤ Δf ≤ 10 MHz | 1.5 MHz ≤ f\_offset < 10.5 | 5 - [RMR900\_antenna\_gain] | 1 MHz  |
|  |

, where [RMR900\_antenna\_gain] is to be decided as per subtopic 1-1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Proposal is not clear. Generic OBUE category B requirements are defined already in 3GPP specifications. Further requirements can be defined on the basis of declaration, it is too early to agree on specific formula since this depends on subtopic 1-1 outcome. |
| Ericsson | Agree with Nokia, better to conclude first on 1-1. |
| Huawei | EC20(02) captures OoB requirement in table 5. Therefore we see that RMR900 will require that mask to be respected, despite the Generic OBUE requirements. It seems that we need to compare both masks (existing General, and the RMR900 specific) first to conclude on this.  |

**Sub topic 1-4: Additional spurious limit requirements**

Additional spurious limit requirements for RMR900 BS to be defined based on the following ECC limits translation:

|  |  |  |
| --- | --- | --- |
|  | *Basic limit**(dBm)* | *Measurement bandwidth* |
| 880 MHz – 918 MHz | -49 – [RMR900\_antenna\_gain] | 5 MHz |

, where [RMR900\_antenna\_gain] is to be decided as per subtopic 1-1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Additional spurious emissions can be defined on the basis of declaration, it is too early to agree on specific formula since this depends on subtopic 1-1 outcome. |
| Ericsson | We would like to come back on that one in next meeting. |
| Huawei | This is based on EC20(02) table 6. Ok to study for next meeting, including investigation on the resulting/expected levels and their validity. |

# Topic #2: BS Rx requirements for RMR900

In this topic we focus on the BS Rx requirements for RMR900 WI.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2113749 | Ericsson | Proposal 5: Capture the following additional BS blocking requirement for band [900 MHz RMR] in TS 38.104 and further study the interferer’s characteristics:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Wanted signal mean power (dBm)(Note 1) | Interfering signal mean power (dBm) | Center Frequency of Interfering Signal (MHz)(Note 2) | Type of interfering signal |
| 5 | PREFSENS + 3 dB | Wide Area BS: -34 | TBD | TBD |
| NOTE 1: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in tables 7.2.2-1, 7.2.2-2 and 7.2.2-3. NOTE 2: Considering a 200kHz interferer. |

 |
| R4-2114368 | Nokia, Nokia Shanghai Bell | Proposal 2: It is proposed to consider new blocking requirement (conducted) for 900MHz RMR band. |

## Open issues summary

### Sub-topic 2-1: additional BS blocking requirement

Referring to the WF in R4-2108609, the following was agreed:

|  |
| --- |
| *Consider option 1 as baseline:* *Option 1: consider new blocking requirement for RMR band, as per EC 20(02) requirements.* |

* Proposals
	+ Option 1: Capture the following additional BS blocking requirement for band [900 MHz RMR] in TS 38.104 and further study the interferer’s characteristics (R4-2113749, Ericsson):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Wanted signal mean power (dBm)(Note 1) | Interfering signal mean power (dBm) | Center Frequency of Interfering Signal (MHz)(Note 2) | Type of interfering signal |
| 5 | PREFSENS + 3 dB | Wide Area BS: -34 | TBD | TBD |
| NOTE 1: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in tables 7.2.2-1, 7.2.2-2 and 7.2.2-3. NOTE 2: Considering a 200kHz interferer. |

* + Option 2: Other
* Recommended WF
	+ Consider Option 1 as baseline for further discussion on conducted requirement.

## Companies views’ collection for 1st round

### Open issues

Sub topic 2-1: additional BS blocking requirement

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 1 |
| Huawei | It may be a little premature to just to the definition of the additional blocking requirement. Referring to the ECC20(02), the level of the interfering signal is specified as the max, while the RAN4 spec defines it as the mean power. This requires some more analysis before proceeding. For the interferer bandwidth, the Note 2 in Option 1 say “Considering a 200kHz interferer” – this comes from ECC20(02), but its meaning is confusing. We prefer to have more time for the analysis of the interferer signal characteristics. Level of the wanted signal seems to be straightforward, based on ECC20(02): |

### CRs/TPs comments collection

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #2-1: additional BS blocking requirement** | *Candidate options:*One company provided a pre-filled template for the additional BS blocking requirement for RMR900, while another company provided number of comments. The value of the wanted signal for the additional BS blocking requirement seems agreeable. *Recommendations for 2nd round:*Agree on the wanted signal level for the additional BS blocking requirement, based on the ECC 20(02): PREFSENS + 3 dBFor the next meeting: companies are encouraged to provide more analysis on the interferer signal specifics. |

### CRs/TPs

|  |  |
| --- | --- |
|  |  |

## Discussion on 2nd round (if applicable)

**Sub topic 2-1: additional BS blocking requirement**

Agree on the wanted signal level for the additional BS blocking requirement for RMR900 **and RMR1900** as:

PREFSENS + 3 dB

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | 3GPP usually define the requirement as a package. Without details on interfering signal level, it is difficult to agree on the wanted signal level only. |
| Ericsson | To be further discussed |
| Huawei | @Nokia: referring to progress in other WIs, requirement may be agreed as package, but to get there, there are intermediate agreements (on specifics of wanted or interfering signal). This is based on e.g. EC20(02) table 7, which defines wanted and max interfering signal levels.  |

# Topic #3: BS Tx requirements for RMR1900

In this topic we focus on the BS Tx requirements for RMR1900 WI.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2113752 | Ericsson | Proposal 1: Convert CEPT EIRP limits in RAN4 conducted ones considering one antenna with 18 dBi antenna gain.Proposal 3: Capture in TS 38.104 that for BS operating in [1900MHz RMR band], for uncoordinated deployment, the BS rated output power Prated,c,AC shall not exceed 47 dBm/10MHz (considering a 18 dBi antenna gain).Proposal 4: Capture the following additional requirement (most likely as an additional spurious limit)for band [1900 MHz RMR] in TS 38.104:

|  |  |  |
| --- | --- | --- |
| Spurious frequency range | *Basic limit* | *Measurement bandwidth* |
| 1920 MHz – 1980 MHz | -61 dBm (NOTE) | 5 MHz |
| NOTE: considering a 18 dBi antenna gain |

 |
| R4-2114371 | Nokia, Nokia Shanghai Bell | Proposal 1: Since additional ECC BS transmitter requirements are not conducted, it is proposed to define them as 3GPP BS declarations. |

## Open issues summary

### Sub-topic 3-1: EIRP requirements conversion to conducted requirements

* Proposals
	+ Option 1: Convert CEPT EIRP limits in RAN4 conducted ones considering one antenna with [17] dBi antenna gain (R4-2113752, Ericsson)
	+ Option 2: Since additional ECC BS transmitter requirements are not conducted, it is proposed to define them as 3GPP BS declarations (R4-2114371, Nokia, Nokia Shanghai Bell).
	+ Option 3: Other
* Recommended WF
	+ Considering the ETSI TFES rules, it is suggested to take Option 1 as the baseline for further discussion, with the antenna gain value to be further studied.

### Sub-topic 3-2: BS rated output power

* Proposals
	+ Option 1: Capture in TS 38.104 that for BS operating in [1900MHz RMR band], for uncoordinated deployment, the BS rated output power Prated,c,AC shall not exceed 47 dBm/10MHz (considering a 18 dBi antenna gain) (R4-2113752, Ericsson)
	+ Option 2: Other
* Recommended WF: before proceeding with the requirements, refer to the Issue 5-2 (Consideration of coordnated/uncoordianted deployments).

### Sub-topic 3-3: additional spurious limit requirements

* Proposals
	+ Option 1: Capture the following additional requirement (most likely as an additional spurious limit)for band [1900 MHz RMR] in TS 38.104 (R4-2113752, Ericsson):

|  |  |  |
| --- | --- | --- |
| Spurious frequency range | *Basic limit* | *Measurement bandwidth* |
| 1920 MHz – 1980 MHz | -61 dBm (NOTE) | 5 MHz |
| NOTE: considering a 18 dBi antenna gain |

Moderator’s note: the above note should probably say “assuming”, as in issue 1-3.

* + Option 2: Other
* Recommended WF:
	+ Before proceeding with this requirement, it is suggested to clarify that on the RMR-specific requirements consideration in the specification (e.g. whether those shall be considered as regional requirements, etc.). In relation to the antenna gain assumption, Issue 3-1 to be concluded first.

## Companies views’ collection for 1st round

### Open issues

Sub topic 3-1: EIRP requirements conversion to conducted requirements

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Option 2. Since ECC requirements are radiated, the best option is to introduce relevant 3GPP declarations. Defining conducted requirements on certain assumptions (e.g. specific antenna gain) would limit the number of deployment flexibility. 3GPP declarations are widely used in 3GPP specification which allow operator to accommodate deployment plans while fulfilling relevant required requirements at the same time. |
| Ericsson | Option 1: RAN4 used to convert CEPT EIRP requirement in manufacturer declaration requirement and refer to an Annex to explain how CEPT limit should checked with such declaration. But, in the scope of RE-D and writing Harmonized Standards, the European Commission doesn’t accept anymore any requirement based on manufacturer declaration, all requirements shall be fixed limit (concrete number). Considering this band is an European band, using declarations would be acceptable in 3GPP, but in the scope of ETSI Harmonized Standard drafting. So, instead of moving the resolution of this issue to ETSI, we propose to solve it directly in 3GPP. Also, the antenna gain which is assumed to set the limit will be clearly mentioned in the note (the proposed wording could be improved). With this, BS manufacturer could still certify a BS supporting a higher conducted output power (than this limit), claiming it shall be used with a lower antenna gain. Operator will still have full flexibility to deploy any (BS + antenna) compliant with CEPT limit. |
| Huawei | The declaration-based approach would be fine if we talk about the RAN4 alone. However this has been identified as serious problem when it comes to the ETSI Harmonized Standard creation in ETSI TFES. EC does not allow declaration-based requirements. Therefore, we would create a risk of blocking the whole NR BS specification ETSI EN 301 908-24 NR BS. Considering that we have two competing approaches on the table, it is suggested to further analyze pros and cons of both of them. For the RMR deployment flexibility: we may look into the range of antenna gain values that is envisioned for this band, to assess practical impact of following option 1. Additionally, we shall clarify somehow, that for option 1, internal antenna losses for the conducted/OTA conversion are assumed to be 0 dB. |

Sub topic 3-2: BS rated output power

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | See sub-topic 3-1 |
| Ericsson | Option 1, see sub-topic 3-1 |
| Huawei | As there is dependency to the subtopic 3-1, maybe we can proceed with the following being the maximum rated power for RMR BS, based on the ECC limit: (65-[antenna\_gain]) dBm/10MHz, where [antenna\_gain] is to be decided as per subtopic 3-1, e.g.- manufacturer declared in the test spec, or- fixed value.More analysis on the spec impact of the WA BS upper output power limit is needed, e.g. it seems that the above requirement shall be captured in TS 38.104 clause 6.2.4 (Additional requirements (regional)).  |

 Sub topic 3-3: Additional spurious limit requirements

|  |  |
| --- | --- |
| **Company** | **Comments** |
| UIC | RMR 1900 allocation is limited to ITU region 1. Hence context to region is already given. No need to add this again. The understanding is that ECC Decision (20)02 defines RMR 900 band specific spurious limits which is the target of R4-2113752. |
| Nokia | See sub-topic 3-1 |
| Ericsson | Option 1, see sub-topic 3-1Regarding moderator’s WF, this band is for Europe (CEPT countries) so it could already be considered as a “regional” band. We don’t think we need so to mention that any requirement related to that band is a regional requirement. |
| Huawei | RMR1900 is going to be introduced into global standard – the regional requirements approach is typical approach in RAN4, when it comes to the Region-specific requirements. In order not to block the progress, we suggest to provide analyses of the spec impact for that topic (regional requirements considered, additional spur limits, etc).As there is dependency to the subtopic 1-1, maybe we can proceed with the following for the basic limit derivation :

|  |  |  |
| --- | --- | --- |
|  | *Basic limit**(dBm)* | *Measurement bandwidth* |
| 1920 MHz – 1980 MHz | -43 – [antenna\_gain] | 5 MHz |
|  |

, where [antenna\_gain] is to be decided as per subtopic 1-1, e.g.- manufacturer declared in the test spec, or- fixed value.It needs to be further clarified, whether it is common understanding that the above limit is the “BS spurious emissions *basic limits* for BS for co-existence with RMR”. More analysis of the impact on the co-existing BS may be needed next meeting. Based on Ericsson proposal, analysis of the validity of -61 dBm limit (much lower then other co-ex spur limits) is needed.  |

### CRs/TPs comments collection

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic 3-1: EIRP requirements conversion to conducted requirements** | *Recommendations for 2nd round:*Sub-topic 3-1 to be merged into subtopic 1-1. No further discussion in 3-1 during the 2nd round. |
| **Sub-topic 3-2: BS rated output power** | *Candidate options:* There is dependency on sub-topic 1-1.*Recommendations for 2nd round*In order to progress the work on requirements derivation, the following approach is proposed to be discussed during the 2nd round (transparent to the decision on option 1 or 2 in sub-topic 1-1):RMR1900 BS rated power to be defined based on the following ECC limits translation: (65-[RMR1900\_antenna\_gain]) dBm/10MHz, where [RMR1900\_antenna\_gain] is to be decided as per subtopic 1-1. |
| **Sub-topic 3-3: additional spurious limit requirements** | *Candidate options:* There is dependency on sub-topic 1-1.*Recommendations for 2nd round:*In order to progress the work on requirements derivation, the following approach is proposed to be discussed during the 2nd round (transparent to the decision on option 1 or 2 in sub-topic 1-1):Additional spurious limit requirements for RMR1900 BS to be defined based on the following ECC limits translation:

|  |  |  |
| --- | --- | --- |
|  | *Basic limit**(dBm)* | *Measurement bandwidth* |
| 1920 MHz – 1980 MHz | -43 – [RMR1900\_antenna\_gain] | 5 MHz |

, where [RMR1900\_antenna\_gain] is to be decided as per subtopic 1-1. |

### CRs/TPs

## Discussion on 2nd round (if applicable)

**Sub-topic 3-2: BS rated output power**

Agree on the BS rated power limit for RMR1900 BS as:

(65-[RMR1900\_antenna\_gain]) dBm/10MHz

, where [RMR1900\_antenna\_gain] is to be decided as per subtopic 1-1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Rated power can be defined on the basis of declaration, it is too early to agree on specific formula since this depends on subtopic 1-1 outcome. |
| Ericsson | Agree with Nokia, better to conclude first on 1-1. |
| Huawei | Same comment as in topic 1-2. This is based on EC20(02) table 9. |

**Sub-topic 3-3: additional spurious limit requirements**

Agree on the additional spurious limit requirements for RMR1900 BS as:

|  |  |  |
| --- | --- | --- |
|  | *Basic limit**(dBm)* | *Measurement bandwidth* |
| 1920 MHz – 1980 MHz | -43 – [RMR1900\_antenna\_gain] | 5 MHz |

, where [RMR1900\_antenna\_gain] is to be decided as per subtopic 1-1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Additional spurious emissions can be defined on the basis of declaration, it is too early to agree on specific formula since this depends on subtopic 1-1 outcome. |
| Ericsson | We’d like to come back on our proposal in next meeting. |
| Huawei | Same comment as in topic 1-4. This is based on EC20(02) table 10. |

# Topic #4: BS Rx requirements for RMR1900

In this topic we focus on the BS Rx requirements for RMR1900 WI.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2113752 | Ericsson | Proposal 2: RAN4 will not specify any requirement to capture the BS enhanced selectivity (band n1) assumption. A note should be added in TS 38.104 and/or in 1900MHz band TR to highlight this.Proposal 5: Capture the following additional BS blocking requirement for band [1900 MHz RMR] in TS 38.104:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Centre Frequency of Interfering Signal [MHz] | Type of interfering signal |
| [5], 10 | PREFSENS + 3 dB | Wide Area BS: -20 | 1807.5 MHz to 1877.5 MHz | 5 MHz NR signal |
| NOTE: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in tables 7.2.2-1, 7.2.2-2 and 7.2.2-3.  |

 |
| R4-2114371 | Nokia, Nokia Shanghai Bell | Proposal 2: It is proposed to consider new blocking requirement (conducted) for 1900MHz RMR band. |

|  |  |  |
| --- | --- | --- |
| R4-2114368 | Nokia, Nokia Shanghai Bell | Proposal 2: It is proposed to consider new blocking requirement (conducted) for 900MHz RMR band. |

## Open issues summary

### Sub-topic 4-1: additional BS blocking requirement

Referring to the WF in R4-2108609, the following was agreed:

|  |
| --- |
| *Consider option 1 as baseline:* *Option 1: consider new blocking requirement for RMR band, as per EC 20(02) requirements.* |

* Proposals
	+ Option 1: Capture the following additional BS blocking requirement for band [1900 MHz RMR] in TS 38.104 (R4-2113752, Ericsson):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Centre Frequency of Interfering Signal [MHz] | Type of interfering signal |
| [5], 10 | PREFSENS + 3 dB | Wide Area BS: -20 | 1807.5 MHz to 1877.5 MHz | 5 MHz NR signal |
| NOTE: PREFSENS depends on the RAT. For NR, PREFSENS depends also on the *BS channel bandwidth* as specified in tables 7.2.2-1, 7.2.2-2 and 7.2.2-3.  |

* + Option 2: Other
* Recommended WF
	+ Consider Option 1 as baseline for further discussion on conducted requirement.

### Sub-topic 4-2: consideration of BS enhanced selectivity for band n1

* Proposals
	+ Option 1: RAN4 will not specify any requirement to capture the BS enhanced selectivity (band n1) assumption. A note should be added in TS 38.104 and/or in 1900MHz band TR to highlight this (R4-2113752, Ericsson)
	+ Option 2: Other
* Recommended WF
	+ Consider Option 1 as baseline for further discussion. Further discuss on the envisioned implemented of related Note (and possibly its text) in TS and/or TR.

## Companies views’ collection for 1st round

### Open issues

Sub topic 4-1: additional BS blocking requirement

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Nokia | Not sure why 5MHz NR interfering signal is proposed? |
| Ericsson | To Nokia: CEPT specified requirement using a 5 MHz LTE signal. The proposal to use a 5 MHz NR signal (same characteristics) is aligned with NR in-band blocking, not out of band blocking that’s true. This could be further discussed, considering CEPT requirement as iput. |
| Huawei | It may be a little premature to just to the definition of the additional blocking requirement.Premature to consider 5 MHz wanted signal – see subtopic 5-1.Level of the wanted signal seems to be straightforward, based on ECC20(02).Referring to the ECC20(02), the level of the interfering signal is specified as the max, while the RAN4 spec defines it as the mean power. This requires some more analysis before proceeding. There is need for some clarification on the interfering signal power in ECC. As the antenna connector is considered to be the reference point, it is understood that the -20dBm is the conducted power.  |

Sub topic 4-2: consideration of BS enhanced selectivity for band n1

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 1 |
| Huawei | Option 1 |

### CRs/TPs comments collection

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic 4-1: additional BS blocking requirement** | Sub-topic 4-1 to be merged into subtopic 2-1. No further discussion in 4-1 during the 2nd round. |
| **Sub-topic 4-2: consideration of BS enhanced selectivity for band n1** | *Candidate options:**One option was identified, which was supported by two companies.* *Option 1: RAN4 will not specify any requirement to capture the BS enhanced selectivity (band n1) assumption. A note should be added in TS 38.104 and/or in 1900MHz band TR to highlight this (R4-2113752, Ericsson)**Recommendations for 2nd round: Agree on Option 1. No more discussion in 2nd round.* |

### CRs/TPs

## Discussion on 2nd round (if applicable)

Not applicable for Topic #4.

# Topic #5: Other (to be coordinated with [111])

In this topic we focus on remaining aspects related to the General RMR discussion in [111].

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2113752 | Ericsson | Proposal 6: Further investigate impacts of the introduction of 5 MHz channel BW in 1900 MHz RMR band.Proposal 7: RMR BSs are not expected to be co-located with MFCN BSs. |
| R4-2113749 | Ericsson | Proposal 2: Capture in TS 38.104 that for BS operating in [900MHz RMR band], for uncoordinated deployment, the BS rated output power Prated,c,AC shall not exceed: 47.5dBm/5MHz + (fDL-922.1) x 40/3 dB (considering a 17 dBi antenna gain, and with fDL being the centre frequency in MHz). |

## Open issues summary

### Sub-topic 5-1: consideration of 5 MHz channel BW for RMR 1900

Referring to the WF in R4-2108609, the following was agreed:

|  |
| --- |
| *For RMR1900 and consideration of the 5MHz channel bandwidth: provide further discussion and analyses on the possible implications of the CEPT studies which were made on 10MHz channel BW only.* |

* Proposals
	+ Option 1: Further investigate impacts of the introduction of 5 MHz channel BW in 1900 MHz RMR band.
	+ Option 2: Other
* Recommended WF
	+ Consider Option 1 as baseline during BS RF requirements discussion, with the potential impact of the 10 MHz channel studies in CEPT.

### Sub-topic 5-2: consideration of coordinated/uncoordinated deployments

* Proposals
	+ Option 1: Capture in TS 38.104 that for BS operating in [900MHz RMR band], for uncoordinated deployment, the BS rated output power Prated,c,AC shall not exceed: 47.5dBm/5MHz + (fDL-922.1) x 40/3 dB (considering a 17 dBi antenna gain, and with fDL being the centre frequency in MHz) (R4-2113749, Ericsson)
	+ Option 2: Other
* Recommended WF
	+ It is proposed to collect companies’ views on the envisioned approach to consider coordinated and/or uncoordinated RMR deployments in RAN4 specifications. RAN4 understanding is proposed to be captured in both RMR900 and RMR1900 TR (if consensus could be reached this meeting).

### Sub-topic 5-3: consideration of RMR co-location with MFCN BSs

Referring to the WF in R4-2108609, the following was agreed:

|  |
| --- |
| Way forward on Tx spurious emissions For Tx spur co-locations, further discuss and verify if the expected RMR deployments motivate introduction of Tx spur colocation requirements, i.e. It shall be further clarified by the proponents if RMR BS is expected to be co-sited /co-located with MFCN systems. If yes, we need co-location requirements. If not, such requirement is not expected to be required. |

* Proposals
	+ Option 1: RMR BSs are not expected to be co-located with MFCN BSs (R4-2113752, Ericsson).

Moderator’s note: the above “expected” wording may not be clear. More discussion is needed on the expected TS implementation of such potential agreement.

* + Option 2: Other
* Recommended WF
	+ Collect companies’ views before proceeding with Option 1.

## Companies views’ collection for 1st round

### Open issues

Sub topic 5-1: consideration of 5 MHz channel BW for RMR 1900

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | More study needed. |

Sub topic 5-2: Consideration of coordinated/uncoordinated deployments

|  |  |
| --- | --- |
| **Company** | **Comments** |
| UIC | UIC agrees in general with the proposal. A coordinated deployment is a national matter and is subject to national regulation. Furthermore, the RMR900/1900 are only applicable to ITU region 1 and may not require global applicable standardization in 3GPP. |
| Ericsson | Our understanding is that each country could decide to use on th deployment mode, coordinated or not. But the ECC Decision is assuming un-coordinated deployment and the specifed limits specified are assuming such deployment. |
| Huawei | Thank you for UIC clarification. The issue we see is not related to the RMR deployment, but to the impact on the specification. What needs some more discussion is whether RAN4 spec: - provides requirement with for coordinated deployment as default, or  - provides requirement with for uncoordinated deployment as default.For example, we see co-ex and colocation requirements as some sort of coordination, but there is no 1-to-1 mapping. Therefore we see the need to have some more analysis on those aspects in order to properly define RMR requirements and properly translate the RMR assumption of uncoordinated deployments. For the comment “*Furthermore, the RMR900/1900 are only applicable to ITU region 1 and may not require global applicable standardization in 3GPP.*”: of course not – this is why the discussion on reginal requirements was initiated.  |

Sub topic 5-3: consideration of RMR co-location with MFCN BSs

|  |  |
| --- | --- |
| **Company** | **Comments** |
| UIC | UIC understands the WF in RF-2108609 as coordinated approach where ECC Decision (20)02 provides some clarification in clause 3 bullet “m” and bullet “k”. |
| Ericsson | Option 1: Our understanding is that RMR BSs would not be co-located with other IMT BSs.  |
| Huawei | Option 1. There is need to further clarify what is meant by “expected” deployment. We may need to address this in the TR. |

### CRs/TPs comments collection

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic 5-1: consideration of 5 MHz channel BW for RMR 1900** | *Candidate options:*Very little feedback was received and this topic requires more analysis next meeting. *Recommendations for 2nd round:* No more discussion in the 2nd round. Companies are encouraged to provide more technical analyses for the next meeting.  |
| **Sub-topic 5-2: Consideration of coordinated/uncoordinated deployments** | *Candidate options:*Companies provided feedback on their understanding of the coordinated/uncoordinated deployments for RMR. *Recommendations for 2nd round:*No more discussion in 2nd round. This topic to be addressed during requirements implementation in future meetings. |
| **Sub-topic 5-3: consideration of RMR co-location with MFCN BSs** | *Candidate options:*Companies provided feedback, with two companies supporting Option 1: *Option 1: RMR BSs are not expected to be co-located with MFCN BSs (R4-2113752, Ericsson).**Recommendations for 2nd round:* Agree on Option 1. No more discussion in 2nd round. |

### CRs/TPs

## Discussion on 2nd round (if applicable)

Not applicable for Topic #5.

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| Title | Source | Comments |
| WF on BS RF requirements for RMR900 and RMR1900 | Huawei |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation  | Comments |
| R4-2113749 | RMR 900 MHz - BS RF | Ericsson | Noted |  |
| R4-2113752 | RMR 1900 MHz - BS RF | Ericsson | Noted |  |
| R4-2114368 | On 900MHz RMR RAN4 BS RF requirements impact due to ECC Decision (20) | Nokia, Nokia Shanghai Bell | Noted |  |
| R4-2114371 | On 1900MHz RMR RAN4 BS RF requirements impact due to ECC Decision (20) | Nokia, Nokia Shanghai Bell | Noted |  |

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation  | Comments |
| R4-2115637 | WF on BS RF requirements for RMR900 and RMR1900 | Huawei | Agreeable |  |

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| Huawei | Michal Szydelko | Michal.szydelko@huawei.com |
| Ericsson | Dominique Everaere | dominique.everaere@ericsson.com |
| Nokia | Iwo Angelow | Iwajlo.angelow@nokia.com |