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

**Electronic Meeting, 19th – 28th May, 2021**

**Agenda item:** 8.2.1, 8.2.6

**Source:** Hisashi Onozawa (Nokia)

**Title:** Email discussion summary for [99-e][112] NR\_47GHz\_Band

**Document for:** Information

# Introduction

UE RF core requirement for NR band n262 is discussed in this email discussion thread.

• Topic #1: EIRP/EIS requirements for UE power class 1, 2, and 4

• Topic #2: MBR, Beam correspondence side conditions and CR draft to introduce n262 to 38.101-2

# Topic #1: EIRP/EIS requirements for UE power class 1, 2, and 4

## Companies’ contributions summary

Contributions on EIRP aspects.

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2108813**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108813.zip) | Qualcomm Incorporated | **Proposal 1: In n262 FR2 PC1 shall have a min. peak EIRP requirement of 35.9 dBm (consistency with assumptions in other bands) and a min. peak EIRP requirement of 41.9 dBm (if no alignment is required).**  **Proposal 2: In n262 FR2, PC4 shall have a min. peak EIRP requirement of 30.8 dBm**  **Proposal 3: In n262 FR2 PC1 shall have a REFSENS requirement for a 50M channel with -1 dB target SNR of -95.5 dBm (consistency with assumptions in other bands) and a REFSENS requirement of -98.5 dBm (if no alignment is required).**  **Proposal 4: In n262 FR2, PC4 shall have a REFSENS requirement for a 50M channel with -1 dB target SNR of -92.5 dBm.**  **Proposal 5: In n262 FR2 PC1 shall have 8dB degradation along the 85th %ile direction relative to beam peak direction.**  **Proposal 6: In n262 FR2 PC4 shall have 12dB degradation along the 20th %ile direction relative to beam peak direction**  **Observation 1: Arithmetic sum and arithmetic mean of dB values yields nonsensical results.**  **Proposal 7: Proponents must technically justify addition in the dB domain before dB averaging can be accepted as an acceptable technique to average across proposals.**  **Proposal 8: If addition in the dB domain cannot be technically justified, power averaging shall be performed in the mW domain, not in the dB domain.** |
| [**R4-2109007**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109007.zip) | Sony | **Observation 1 It is beneficial for the standard to maintain consistency between different frequency bands, within FR2, for Minimum Peak EIRP and EIRP spherical coverage.**  **Observation 2 MBR for PC1, PC2 and PC4 should not be more than for PC3.**  **Observation 3 The spherical coverage performance (delta between peak and specified percentile of EIRP) depends on many factors, and it cannot be concluded that the n262 band must be worse than, e.g., n260 in terms of spherical coverage.**  **Observation 4 For consistency with the work already done it is a good option to reuse the gain drop (delta between peak and specified percentile of EIRP) of an existing band (e.g., n260).**  **Proposal 1 Companies shall provide the reference RF architecture assumed when deriving the peak EIRP link budget.**  **Proposal 2 Consistency between different FR2 frequency bands shall be maintained when deriving Minimum Peak EIRP and EIRP spherical coverage.**  **Proposal 3 According to our estimate minimum peak EIRP, n262, shall be: PC1 35.5 dBm,  PC2 23dBm, PC4 28dBm.**  **Proposal 4 Gain drop (delta between peak and specified percentile of EIRP) for n262 shall be:  PC1 8 dB,  PC2 11dB, PC4 12dB.** |
| [**R4-2109547**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109547.zip) | MediaTek Beijing Inc. | ***Proposal1:***  *min peak EIRP of PC1 n259 is 33.4 dBm*  *min peak EIRP of PC2 n259 is 22.6 dBm*  *min peak EIRP of PC4 n259 is 26.4 dBm*  ***Proposal2:***  *Spherical EIRP of PC1 n262 is 24.9 dBm@85%-tile*  *Spherical EIRP of PC2 n262 is 9.4 dBm@60%-tile*  *Spherical EIRP of PC4 n262 is 13.9 dBm@20%-tile* |
| [**R4-2109669**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109669.zip) | vivo | **Observation 1:** The average approach is not the “share risk” principle but a data processing approach to get a compromised value at middle place to reach consensus. There is no physical meaning on how to average all the input values.  **Observation 2:** For PC4 and PC3 the gain drop is different at different frequency, there is an increase in the drop from peak as we move up in frequency.  **Proposal 1: Average all the input Directly (with dBm) to derive the final requirement. Extreme values should not be removed.**  **Proposal 2: For PC1 and PC4, select n260 gain drop as the reference and consider 0.5dB relaxation for n262, i.e. the gain drop is 8.5dB and 12.5dB, for PC1 and PC4, respectively.**  **Proposal 3: For PC2, select n261 gain drop as the reference and consider 0.5dB relaxation for n262, i.e. 11.5dB.** |
| [**R4-2109789**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109789.zip) | Nokia, Nokia Shanghai Bell | ***Proposal 1: Minimum peak EIRP and EIRP spherical coverage requirements for n262 UE power class 1, 2, and 4 are derived assuming 6 dB degradation from n257.***  ***Observation 1: mW should be used when we take an average of the power.***  ***Observation 2: The PC1 requirement was decided higher than the average of all proposals.***  ***Proposal 2: The process already used to derive the existing requirements shall be respected in order to have the consistent requirement among bands and power classes so that the industrial margin shall not vary significantly among bands and power classes.*** |
| [**R4-2110839**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110839.zip) | OPPO | **Proposal 1: the proposed EIRP requirements for n262 PC1/2/4 are shown below.**    **Proposal 2: it is suggested to use mW averaging method on the proposed values.** |
| [**R4-2111063**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111063.zip) | Intel Corporation | ***PC1 requirements***  **Observation 1:**  In the first PC1 discussions, most companies used a 16-element array. As the discussion progressed, the compromise reached ensured better performance while still allowing for some design flexibility.  **Observation 2:**  Pending further discussion including potential new proposals, a value around 33 to 34 dBm is reasonable and can allow for design flexibility.  **Proposal 1:** For the PC1 minimum peak EIRP requirement of band n262, a value ranging from 33 to 34 dBm is a reasonable option we support.  ***PC2 requirements***  **Proposal 2:** Define the PC2 minimum peak EIRP requirement of band n262 as 23.3 dBm. This value also happens to be the proposal average captured in the WF during RAN4 #98Bis-e.  ***PC4 requirements***  **Observation 3:** The derived requirement for PC4 is very close to the proposal average included in the approved WF (28.7dBm). Therefore, either option is reasonable.  **Proposal 3:** Define the PC4 minimum peak EIRP requirement of band n262 as 28.7 dBm. |
| [**R4-2111163**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111163.zip) | Ericsson | **Observation 1 It is beneficial for the standard to maintain consistency between different frequency bands, within FR2, for Minimum Peak EIRP and EIRP spherical coverage.**  **Observation 2 MBR for PC1, PC2 and PC4 should not be more than for PC3.**  **Observation 3 The spherical coverage performance (delta between peak and specified percentile of EIRP) depends on many factors, and it cannot be concluded that the n262 band must be worse than, e.g., n260 in terms of spherical coverage.**  **Observation 4 For consistency with the work already done it is a good option to reuse the gain drop (delta between peak and specified percentile of EIRP) of an existing band (e.g., n260).**  **Proposal 1 Companies shall provide the reference RF architecture assumed when deriving the peak EIRP link budget.**  **Proposal 2 Consistency between different FR2 frequency bands shall be maintained when deriving Minimum Peak EIRP and EIRP spherical coverage.**  **Proposal 3 According to our estimate minimum peak EIRP, n262, shall be: PC1 35.5 dBm,  PC2 23dBm, PC4 28dBm.**  **Proposal 4 Gain drop (delta between peak and specified percentile of EIRP) for n262 shall be:  PC1 8 dB,  PC2 11dB, PC4 12dB** |

Contributions on EIS aspects.

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2109008**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109008.zip) | Sony | **Observation 1 It is beneficial for the standard to maintain consistency between different frequency bands, within FR2, for REFSENS and EIS spherical coverage.**  **Observation 2 MBR for PC1, PC2 and PC4 should not be more than for PC3**.  **Observation 3 The spherical coverage performance (delta between REFSENS and specified percentile of EIS) depends on many factors, and it cannot be concluded that the n262 band must be worse than, e.g., n260 in terms of spherical coverage.**  **Observation 4 For consistency it is a good option to reuse the gain drop as specified for EIRP.**  **Proposal 1 Companies shall provide the reference RF architecture assumed when deriving REFSENS and EIS spherical coverage.**  **Proposal 2 Consistency between different FR2 frequency bands shall be maintained when deriving REFSENS and EIS spherical coverage.**  **Proposal 3 According to our estimate REFSENS for n262, shall be: PC1 -94.5 dBm,  PC2 -87.9 dBm, PC4 -90 dBm.**  **Proposal 4 Gain drop (delta between REFSENS and specified percentile of EIS) for n262 shall be:  PC1 8 dB,  PC2 11dB, PC4 12dB.** |
| [**R4-2109557**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109557.zip) | MediaTek Beijing Inc. | ***Proposal1:***  *REFSENS of PC1 n259 is -91.6 dBm (CBW=50MHz, -1 dB SNR)*  *REFSENS of PC2 n259 is -86.5 dBm (CBW=50MHz, -1 dB SNR)*  *REFSENS of PC4 n259 is -92.1 dBm (CBW=50MHz, -1 dB SNR)*  ***Proposal2:***  *Spherical EIS of PC1 n262 is -83.1 dBm@85%-tile (CBW=50MHz, -1 dB SNR)*  *Spherical EIS of PC2 n262 is -73.3 dBm@60%-tile (CBW=50MHz, -1 dB SNR)*  *Spherical EIS of PC4 n262 is -79.6 dBm@20%-tile (CBW=50MHz, -1 dB SNR)* |
| [**R4-2109670**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109670.zip) | vivo | **Proposal 1: Average all the input directly (with dBm) to specify the final requirement. Extreme values should not be removed.**  **Proposal 2: For n262, the same gain drop as EIRP spherical coverage should be specified for EIS spherical coverage.** |
| [**R4-2109791**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109791.zip) | Nokia, Nokia Shanghai Bell | ***Proposal 1: REFSENS and EIS spherical coverage requirements for n262 UE power class 1, 2, and 4 are derived assuming 6 dB degradation from n257.*** |
| [**R4-2110840**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110840.zip) | OPPO | **Proposal: the proposed EIS requirements for n262 PC1/2/4 are shown below.** |
| [**R4-2111064**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111064.zip) | Intel Corporation | ***PC1 requirements***  **Observation 1:** Pending further discussion including potential new proposals, a value around -92 to -91.5 dBm is reasonable for PC1 and allows for design flexibility.  **Proposal 1:** For the PC1 minimum peak EIS requirement of band n262, a value in the -92 to -91.5 dBm range is a reasonable option we support.  ***PC2 requirements***  **Observation 2:** The derived PC2 value is very close to the proposal average captured in the WF (-86.8 dBm). Therefore, either option is acceptable.  **Proposal 2:** Define the PC2 minimum peak EIS requirement of band n262 as -86.8 dBm.  ***PC4 requirements***  **Observation 3:** The derived PC4 value is close to the proposal average included in the WF (-90.6 dBm).  **Proposal 3:** Define the PC4 minimum peak EIS requirement of band n262 as –90.1 dBm. |
| [**R4-2111164**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111164.zip) | Ericsson | **Observation 1 It is beneficial for the standard to maintain consistency between different frequency bands, within FR2, for REFSENS and EIS spherical coverage.**  **Observation 2 MBR for PC1, PC2 and PC4 should not be more than for PC3**.  **Observation 3 The spherical coverage performance (delta between REFSENS and specified percentile of EIS) depends on many factors, and it cannot be concluded that the n262 band must be worse than, e.g., n260 in terms of spherical coverage.**  **Observation 4 For consistency it is a good option to reuse the gain drop as specified for EIRP.**  **Proposal 1 Companies shall provide the reference RF architecture assumed when deriving REFSENS and EIS spherical coverage.**  **Proposal 2 Consistency between different FR2 frequency bands shall be maintained when deriving REFSENS and EIS spherical coverage.**  **Proposal 3 According to our estimate REFSENS for n262, shall be: PC1 -94.5 dBm,  PC2 -87.9 dBm, PC4 -90 dBm.**  **Proposal 4 Gain drop (delta between REFSENS and specified percentile of EIS) for n262 shall be:  PC1 8 dB,  PC2 11dB, PC4 12dB.** |

## Open issues summary

In RAN4#98-bis-e, it was agreed to take average of the inputs in RAN4#99e to conclude the requirement for PC1/2/4. Open issue was how to take average (either mW or dBm average) or if extreme values are excluded in average.

### Sub-topic 1-1 Min peak EIRP

Proposed minimum peak EIRP is listed in the following table. The medium value is used before taking the average of all companies, if multiple values or range is proposed by one company.

The number in red is extreme values selected by Moderator. They are more than a few dB away from the simple average.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **Option 1** | **Option 2** | **Option 3** | **Option 4** |
| **power class** | **Qualcomm** | **Vivo** | **Sony** | **Ericsson** | **Nokia** | **Intel** | **MediaTek** | **OPPO** | **Average made over mW [dBm]** | **Average made over dBm [dBm]** | **Average made over mW [dBm] excluding extremes** | **Average made over dBm [dBm] excluding extremes** |
|  | R4-2108813 | R4-2109669 | R4-2109007 | R4-2111163 | R4-2109789 | R4-2111063 | R4-2109547 | R4-2110839 |  |  |  |  |
| **PC1** | 35.9 - 41.9 | 33.6 | 35.5 | 35.5 | 34 | 33 - 34 | 33.4 | 33.6 | **35.2** | **34.8** | **34.5** | **34.4** |
| **PC2** | - | 22.6 | 23 | 23 | 23 | 23.3 | 22.6 | 33.6 | **26.9** | **24.4** | **22.9** | **22.9** |
| **PC4** | 30.8 | 27.6 | 28 | 28 | 28 | 28.7 | 26.4 | 33.6 | **29.5** | **28.9** | **28.4** | **28.2** |

Updated table for GTW; OPPO’s proposal is updated.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **Option 1** | **Option 2** | **Option 3** | **Option 4** |
| **power class** | **Qualcomm** | **Vivo** | **Sony** | **Ericsson** | **Nokia** | **Intel** | **MediaTek** | **OPPO** | **Average made over mW [dBm]** | **Average made over dBm [dBm]** | **Average made over mW [dBm] excluding extremes** | **Average made over dBm [dBm] excluding extremes** |
|  | R4-2108813 | R4-2109669 | R4-2109007 | R4-2111163 | R4-2109789 | R4-2111063 | R4-2109547 | R4-2110839 |  |  |  |  |
| **PC1** | 35.9 - 41.9 | 33.6 | 35.5 | 35.5 | 34 | 33 - 34 | 33.4 | 33.6 | **35.2** | **34.8** | **34.5** | **34.4** |
| **PC2** | - | 22.6 | 23 | 23 | 23 | 23.3 | 22.6 | 22.6 | **22.9** | **22.9** | **22.9** | **22.9** |
| **PC4** | 30.8 | 27.6 | 28 | 28 | 28 | 28.7 | 26.4 | 27.6 | **28.3** | **28.1** | **28.3** | **28.1** |

**Issue 1-1: Minimum peak EIRP**

* Proposals
  + Option 1: Average over mW
  + Option 2: Average over dBm
  + Option 3: Average over mW excluding extreme values
  + Option 4: Average over dBm excluding extreme values
  + Option 5: Other averaging schemes
* Recommended WF
  + Option 3
* Agreement:
  + For PC2, 22.9dBm
  + For PC4, 28.3dBm
  + For PC1, further check the value on minimum peak EIRP
    - Alt 1: 34.5dBm (Qualcomm, DISH, T-Mobile, Sony, Ericsson)
    - Alt 2: Value in the range of 33.8~34dBm (Intel, Mediatek, Huawei, Vivo)

Intel: for PC1, we would like to consider the value in the range of 33.8~34dBm.

### Sub-topic 1-2 REFSENS

Proposed REFSENS is listed in the following table for 50 MHz channel bandwidth with SINR=-1 dB. The medium value is used before taking the average of all companies if multiple values or range is proposed by one company.

The number in red is extreme values selected by Moderator. They are more than a few dB away from the simple average.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **Option 1** | **Option 2** | **Option 3** | **Option 4** |
| **power class** | **Qualcomm** | **Vivo** | **Sony** | **Ericsson** | **Nokia** | **Intel** | **MediaTek** | **OPPO** | **Average made over mW [dBm]** | **Average made over dBm [dBm]** | **Average made over mW [dBm] excluding extremes** | **Average made over dBm [dBm] excluding extremes** |
|  | **R4-2108813** | **R4-2109670** | **R4-2109008** | **R4-2111164** | **R4-2109791** | **R4-2111064** | **R4-2109557** | **R4-2110840** |  |  |  |  |
| **PC1** | **-95.5 / -98.5** | **-92** | **-94.5** | **-94.5** | **-91.5** | **-92 - -91.5** | **-91.6** | **-92** | **-92.8** | **-93.1** | **-92.3** | **-92.5** |
| **PC2** |  | **-86.5** | **-87.9** | **-87.9** | **-86** | **-86.8** | **-86.5** | **-86.5** | **-86.8** | **-86.9** | **-86.8** | **-86.9** |
| **PC4** | **-92.5** | **-91.5** | **-90** | **-90** | **-91** | **-90.1** | **-92.1** | **-91.5** | **-91.0** | **-91.1** | **-91.0** | **-91.1** |

Updated table for GTW; miscalculation is corrected.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **Option 1** | **Option 2** | **Option 3** | **Option 4** |
| **power class** | **Qualcomm** | **Vivo** | **Sony** | **Ericsson** | **Nokia** | **Intel** | **MediaTek** | **OPPO** | **Average made over mW [dBm]** | **Average made over dBm [dBm]** | **Average made over mW [dBm] excluding extremes** | **Average made over dBm [dBm] excluding extremes** |
|  | **R4-2108813** | **R4-2109670** | **R4-2109008** | **R4-2111164** | **R4-2109791** | **R4-2111064** | **R4-2109557** | **R4-2110840** |  |  |  |  |
| **PC1** | **-95.5 / -98.5** | **-92** | **-94.5** | **-94.5** | **-91.5** | **-92 - -91.5** | **-91.6** | **-92** | **-92.8** | **-93.1** | **-92.7** | **-92.9** |
| **PC2** |  | **-86.5** | **-87.9** | **-87.9** | **-86** | **-86.8** | **-86.5** | **-86.5** | **-86.8** | **-86.9** | **-86.8** | **-86.9** |
| **PC4** | **-92.5** | **-91.5** | **-90** | **-90** | **-91** | **-90.1** | **-92.1** | **-91.5** | **-91.0** | **-91.1** | **-91.0** | **-91.1** |

**Issue 1-2: REFSENS**

* Proposals
  + Option 1: Average over mW
  + Option 2: Average over dBm
  + Option 3: Average over mW excluding extreme values
  + Option 4: Average over dBm excluding extreme values
  + Option 5: Other averaging schemes
* Recommended WF
  + Option 3
* Agreement
  + PC2: -86.8dBm
  + PC4: -91.0dBm

### Sub-topic 1-3 Gain drop from peak to spherical

Proposed gain drop (or Delta from peak to spherical EIRP) is listed in the following table.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **Option 1** | **Option 2** | **Option 3** | **Option 4** |
| **power class** | **Qualcomm** | **Vivo** | **Sony** | **Ericsson** | **Nokia** | **Intel** | **MediaTek** | **OPPO** | **Average (linear)** | **Average over dBm** | **Average (linear) excluding extremes** | **Average made over dB excluding extremes** |
|  | R4-2108813 | R4-2109669 | R4-2109007 | R4-2111163 | R4-2109789 | R4-2111063 | R4-2109547 | R4-2110839 |  |  |  |  |
| **PC1** | 8 | 8.5 | 8 | 8 | 8 |  | 8.5 | 10.2 | **8.5** | **8.5** | **8.2** | **8.2** |
| **PC2** | - | 11.5 | 11 | 11 | 11 |  | 13.2 | 24.2 | **17.5** | **13.7** | **11.6** | **11.5** |
| **PC4** | 12 | 12.5 | 12 | 12 | 9 |  | 12.5 | 17.2 | **13.1** | **12.5** | **12.2** | **12.2** |

Updated table for GTW; OPPO’s proposal is updated.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  | **Option 1** | **Option 2** | **Option 3** | **Option 4** |
| **power class** | **Qualcomm** | **Vivo** | **Sony** | **Ericsson** | **Nokia** | **Intel** | **MediaTek** | **OPPO** | **Average (linear)** | **Average over dBm** | **Average (linear) excluding extremes** | **Average made over dB excluding extremes** |
|  | R4-2108813 | R4-2109669 | R4-2109007 | R4-2111163 | R4-2109789 | R4-2111063 | R4-2109547 | R4-2110839 |  |  |  |  |
| **PC1** | 8 | 8.5 | 8 | 8 | 8 |  | 8.5 | 10.2 | **8.5** | **8.5** | **8.2** | **8.2** |
| **PC2** | - | 11.5 | 11 | 11 | 11 |  | 13.2 | 13.2 | **11.9** | **11.8** | **11.9** | **11.8** |
| **PC4** | 12 | 12.5 | 12 | 12 | 9 |  | 12.5 | 11.2 | **11.7** | **11.6** | **12.1** | **12.0** |

**Issue 1-3-1: Gain drop from minimum peak EIRP to EIRP spherical coverage**

* Proposals
  + Option 1: Average over linear scale
  + Option 2: Average over dB
  + Option 3: Average over linear scale excluding extreme values
  + Option 4: Average over dB excluding extreme values
  + Option 5: Other averaging schemes
* Recommended WF
  + Option 3

**Issue 1-3-2: Gain drop from REFSENS to EIS spherical coverage**

* Proposals
  + Option 1: The gain drop for EIS is the same as EIRP (Issue 1-3)
  + Option 2: Other values
* Recommended WF
  + Option 1
* Agreement
  + PC2: 11.9dBm
  + PC4: 12.1dBm

## Companies views’ collection for 1st round

### Open issues

Sub topic 1-1 Min peak EIRP

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MediaTek | Support “Option 4: Average over dBm excluding extreme values” |
| OPPO | Sorry for inconvenience of the extreme values in our proposal R4-2110839 that copy the P2 & P4 proposed values using P1 value by mistake. As the methodology presented in R4-2110839, the proposed values are listed below. |
| Sony | Option 5: We think it is fair that all inputs are counted (i.e. option 1). However, there are inputs based on reading TS 38.101-2 incorrectly (or maybe just a typo). The fairest would be to let companies update their calculation to be based on agreed assumptions (e.g. TS 38.101-2). When it comes to averaging, we think mW is the straightforward and mathematics correct method in this case. |
| Ericsson | As adding two dBm values is not correct mathematically, the averaging should be done over mW values. Regarding the extreme values, it’s good to have a discussion before excluding them. |
| Huawei, HiSilicon | We prefer Option 3. With modified values provided by OPPO, the average value need to be revised.  For PC1, aligned assumption should be used, that 41.9dBm comes from 64 elements could be just removed from the table. However larger antenna array is always allowed to use to get a higher EIRP value. |

Sub topic 1-2 REFSENS

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MediaTek | Support “Option 4: Average over dBm excluding extreme values” |
| Sony | Option 1: When it comes to averaging, we think mW is the straightforward and mathematics correct method in this case. |
| Ericsson | As adding two dBm values is not correct mathematically, the averaging should be done over mW values. Regarding the extreme values, it’s good to have a discussion before excluding them. |
| Huawei, HiSilicon | For PC1, 4dB difference between the higher and lowest value from companies, which means larger than 3 times Refsens comes from the same assumption. That seems unreasonable, because for receiver almost the same parameters in the budget are assumed, e.g. SNR and NF. So, for PC1 we would like to see clarification who raise the extreme value.  For PC2/4, Option 1 would be more straightforward. |

Sub topic 1-3 Gain drop from peak to spherical

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MediaTek | Compared to simply say support which option at this moment, may companies take a few time to check our calculation, especially for PC2, in Table 3 of R4-2109547? Our calculation result on PC1/4 is closed to most companies’ proposals, and we actually use similar logic to calculate PC2. |
| OPPO | According to the updated Minimum Peak EIRP above, our proposed gain drops from peak to spherical are listed below. Sorry for the inconvenience. |
| Sony | Option 5: We think it is fair that all inputs are counted (i.e. option 1). However, there are inputs based on reading TS 38.101-2 incorrectly (or maybe just a typo). The fairest would be to let companies update their calculation to be based on agreed assumptions (e.g. TS 38.101-2). When it comes to averaging, we think mW is the straightforward and mathematics correct method in this case. |
| Ericsson | As adding two dBm values is not correct mathematically, the averaging should be done over mW values. Regarding the extreme values, it’s good to have a discussion before excluding them. |
| Huawei, HiSilicon | Option 3 or 4. OPPO’s modification need to be considered into the average table.  To remove the extreme value for gain droop value is because, gain droop is not only coming from budget calculation, it actually comes from the UE design and form factor consideration, it is not mostly decided by chipset parameters itself. We would like to leave more space for different UE form factors. |

### 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: MBR, Beam correspondence and UE RF CR

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2109131**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109131.zip) | Murata Manufacturing Co Ltd. | **Observation 1: The decreased peak and 50%-tile CDF gain from 28GHz antenna to 28/47GHz antenna are smaller than MBR value, in band n257 and n258**  Observation 2: 28/47GHz dual band antenna could achieve enough performance  Proposal 1: There is no need changing MBR specification (MBP,n=0.7dB, MBS,n=0.7dB) |
| R4-2109007 | Sony | **Observation 2 MBR for PC1, PC2 and PC4 should not be more than for PC3.** |
| R4-2111163 | Ericsson | **Observation 2 MBR for PC1, PC2 and PC4 should not be more than for PC3.** |
| [**R4-2110153**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110153.zip) | Apple | **The side conditions for beam correspondence is proposed for n262.** |
| **R4-2109790** | Nokia, Nokia Shanghai Bell | **CR to introduce n262 all power classes is proposed.** |
| [**R4-2110087**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110087.zip) | Ericsson | **The updated TR draft is provided.** |

## Open issues summary

MBR values were previously agreed in RAN#98e by estimating from the existing MBR values for other bands. The contribution confirms them by simulating dual band antenna performance.

### Sub-topic 2-1 MBR values for n262

**Issue 2-1: MBR values for n262**

* Proposals
  + Option 1: There is no need changing MBR specification (MBP,n=0.7dB, MBS,n=0.7dB)
  + Option 2: Against option 1.
* Recommended WF
  + Option 1

### Sub-topic 2-2 Side conditions for beam correspondence

**Issue 2-2: Side conditions for beam correspondence**

* Proposals
  + Option 1: SSB/CSI-RS signal level is -88.5 dBm for n262 as proposed in R4-2110153.
  + Option 2: Against option 1.
* Recommended WF
  + Option 1

### Sub-topic 2-3 CR to introduce n262 to 38.101-2

**Issue 2-3: CR draft**

* Proposals
  + Option 1: Agree the CR after including all agreements of Topic #1 and #2 (EIRP, REFSENS, Spherical coverage, MBR, side conditions, etc.)
  + Option 2: More changes are needed.
* Recommended WF
  + Option 1

Note: If all core CRs (including BS RF and RRM) can be agreed this meeting, core part of WI may be closed.

### Sub-topic 2-4 TR update

**Issue 2-4: TR 38.847 update**

* Proposals
  + Option 1: Revised TR 38.847 (R4-2110087) is approved.
  + Option 2: Against option 1.
* Recommended WF
  + Option 1

## Companies views’ collection for 1st round

### Open issues

Sub topic 2-1 MBR

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MediaTek | Support “Option 1: There is no need changing MBR specification (MBP,n=0.7dB, MBS,n=0.7dB)” |
| Sony | Option 1: No need to change MBR. |
| Ericsson | Option 1 |
| Huawei, HiSilicon | Could we clarify, this MBR is only for PC3? Or applied for PC1/2/3/4? |

Sub topic 2-2 Side conditions

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| Sony | Option 1: Agree CR on BC side condition |
| Ericsson | Option 1 |

Sub topic 2-3 CR draft

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| Sony | Option 1: Agree with Moderator it would be good to agree on all CR and close the WI in this meeting. CR need to be updated with actual agreements from this meeting (maybe e-mail approval is required). |
| Ericsson | Option 1 |
| Huawei, HiSilicon | CR need to be updated after conclusion on each requirements. |

Sub topic 2-4 TR draft

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

### 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