**3GPP TSG-RAN WG4 Meeting # 100-e R4-210XXXX**

**Electronic Meeting, August 2021**

**Agenda item:** 8.40.1

**Source:** Moderator (Qualcomm Incorporated)

**Title:** Email discussion summary for [100-e][126] NR\_FR2\_FWA\_Bn259\_Bn257\_Bn258

**Document for:** Information

# Introduction

*This document is intended to capture discussions towards completing UE RF requirements for FR2 PC5 in n259.*

# Topic #1: Title

## Companies’ contributions summary

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| **T-doc number** | **T-doc title** | **Company** | **Proposals / Observations** |
| [**R4-2111905**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2111905.zip) | dCR to 38.101-2: PC5 requirements in n259 | Qualcomm Incorporated | CR proposal with the following choices:  1. Min peak EIRP: 27.7 dBm  2. REFSENS: -89.7 dBm for 50 MHz CBW, -1 dB SNR |
| [**R4-2112871**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112871.zip) | Remaining core part requirement for FWA | Sony, Ericsson | **Observation 1 Due to the maximum allowed TRP of 23 dBm it is reasonable to use 16 antenna elements as the baseline for min Peak EIRP estimation.**  **Observation 2 It is possible to fulfill maximum TRP 23 dBm even with a minimum peak EIRP of 33.5 dBm.**  **Observation 3 The SNR condition for FWA devices is likely to be good and stable, and thus an FWA device should obtain a good RSRP estimation.**  **Observation 4 The degradation due to the phase shifter errors have been included in the peak EIRP and spherical coverage requirement.**  **Observation 5 The beam correspondence depends on the SNR condition. Therefore, it is questionable whether it is useful for the network to know a UE BC capability with bit-1 or bit-0.**  **Proposal 1 According to our estimate minimum peak EIRP for PC5, n262, shall be no less than 28.5 dBm.**  **Proposal 2 According to our estimate REFSENS for PC5, n259, shall be -90.5 dBm.**  **Proposal 3 Define only BC bit 1 requirement for new FWA UE.**  **Proposal 4 Adopt the same beam correspondence requirement (only bit 1) for n259 as for n257 and n258 for PC5.** |
| [**R4-2112970**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112970.zip) | FR2 PC5 requirements for n259 | Samsung | **Proposal 1: For n259 requirements of PC5, it is reasonable to take the alternative scaling from existing requirements, Alt-1, for the peak EIRP and REFSENS.**  **Proposal 2: PC5 minimum peak EIRP requirement of n259 should be 26.7 dBm.**  **Proposal 3: PC5 REFSENS requirement of n259 should be -89.2 dBm.** |
| [**R4-2112974**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112974.zip) | Proposal on n259 PC5 min Peak EIRP, REFSENS, and beam correspondence | MediaTek Beijing Inc. | ***Observation1:*** *Based on scaling concept, min peak EIRP of PC5 n259 shall be 26.3 dBm.*  ***Proposal1:*** *min peak EIRP of PC5 n259 is 26.7 dBm.*  ***Observation2:*** *Based on scaling concept, REFSENS of PC5 n259 shall be -89 dBm (CBW=50MHz, -1 dB SNR).*  ***Proposal2:*** *REFSENS of PC5 n259 shall be -89.2 dBm (CBW=50MHz, -1 dB SNR).*  ***Proposal3:*** *Introduce n259 PC5 beam correspondence Bit-0.* |
| [**R4-2113897**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113897.zip) | R17 n259 FWA | OPPO | ***Proposal 1: The min peak EIRP is 25.8dBm.***  ***Proposal 2: The max peak EIS is -88dBm @ 50MHz.***  ***Proposal 3: Consider averaging all the inputs to derive the values if doesn’t have big difference.*** |
| [**R4-2114248**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114248.zip) | Power class 5 requirements for band n259 | Intel Corporation | ***Minimum peak EIRP***  **Observation 1:** The scaling-based option has the advantage of leveraging previous discussions. The 26.7 to 27.5 dBm range captured in option 1 represents a significant increase of *at least* **8.0 dB** from PC3 value (18.7 dBm).  **Proposal 1:** Use option 1 (scaling from existing requirements) to define the PC5 minimum peak EIRP requirement of band n259. From this range, 27 dBm is reasonable and preferred.  **Observation 2:** A minimum peak EIRP value of 27.5 dBm may be considered as a compromise between the two options.  ***Minimum peak EIS***  **Proposal 2:** Use option 1 (scaling from existing requirements) to define the PC5 minimum peak EIS requirement of band n259. Considering the narrow range, -89.5 dBm is our preferred value.  **Observation 3:** The two value options for minimum peak EIS are very close, and both include -89.7 dBm. This value can be used as a compromise to define the requirement. |

## Open issues summary

### Min. Peak EIRP for PC5 in n259:

*WF R4-2107839 from previous meeting had identified the following alternatives:*

* + ***Alt-1:*** *Based on scaling from existing requirements*
    - *[26.7 to 27.5] dBm*
  + ***Alt-2:*** *From averaging UE Tx budget-based proposals.* 
    - *Average power: 28.0 dBm*

*Also, per the last round of email discussion in RAN4#99-e there was general acceptance of a compromise value of 27.7 dBm, which is included as moderator’s proposal.*

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| **Options for Issue 1.2.1, Min. peak EIRP in n259** | **Company Comments** |
| Option 1: WF scaling based, [26.7 to 27.5] | MediaTek: We prefer scaling method, because it leverages prior compromise result. However, as commented in RAN4#99-e, we are okay for moderator’s suggestion “Option3 (27.7 dBm)”  Samsung: We support 26.7dBm using the scaling method based on our proposal  Huawei, HiSilicon: With the data proposed from 25.8dBm to 27.7dBm, we think 26.7dBm is reasonable as the middle one.  Intel: Our preference is to leverage previous discussions and use a value within the specified range (preferably 26.7 or 27 dBm) |
| Option 2: WF averaging based, 28.0 | Nokia: We prefer this option.  Sony: PC5 UE has more connection to PC1 than to PC3 and higher output could be prioritized over other design aspects. 28.0dBm is already a compromise.  Murata: We support this option.  Ericsson: We support this option.  NTT DOCOMO, INC: We support this option. |
| Option 3: 27.7 dBm (compromise proposal, see email discussion in RAN4#99e) | MediaTek: We prefer scaling method, because it leverages prior compromise result. However, as commented in RAN4#99-e, we are okay for moderator’s suggestion “Option3 (27.7 dBm)”  OPPO: Ok with 27.7 although our calculation shows 25.8.  Nokia: Ok if Option 2 cannot be agreed.  Samsung: Acceptable if needed  QC: Will accept. Our proposal was 30.6 dBm, so we appreciate everyone trying to make this compromise work.  SoftBank: Min. peak EIRP value should be agreed in this meeting since September is the target completion date of core part for this WI. Considering the comments above, 27.7dBm is the majority view. We are fine with it.  Murata: Ok if Option 2 cannot be agreed.  NTT DOCOMO, INC: We prefer option 2 but we are OK with option 3 to complete this work.  Intel: Our preference is Option 1, but we can accept Option 3 if needed |
| Option 4: Other |  |

### REFSENS for PC5 in n259:

*WF R4-2107839 from previous meeting had identified the following alternatives for -1 dB SNR and 50 MHz CBW:*

* + ***Alt-1:*** *Based on scaling from existing requirements*
    - *[-89.2 to -89.7] dBm*
  + ***Alt-2:*** *From averaging UE Tx budget-based proposals.* 
    - *Average power: -89.7 dBm*

*Also, per the last round of email discussion in RAN4#99-e there was general acceptance of a compromise value of -89.7 dBm, which is included as moderator’s proposal.*

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| **Options for Issue 1.2.2, REFSENS in n259**  *-1 dB SNR and 50 MHz CBW* | **Company Comments** |
| Option 1: WF scaling based, [-89.2 to -89.7] | MediaTek: We prefer scaling method, because it leverages prior compromise result. However, as commented in RAN4#99-e, we are okay for moderator’s suggestion “Option3 (-89.7 dBm)”  Samsung: We support -89.2dBm using the scaling method based on our proposal  Huawei, HiSilicon: we support -89.2 dBm.  Intel: We support this option and a value within the specified range (preferably -89.5 dBm) |
| Option 2: WF averaging based, -89.7 | Nokia: Support.  Sony: PC5 UE has more connection to PC1 than to PC3 and better RX performance could be prioritized over other design aspects. -89.7dBm is already a compromise.  Ericsson: We support this option. |
| Option 3: -89.7 dBm (compromise proposal, see email discussion in RAN4#99e) | MediaTek: We prefer scaling method, because it leverages prior compromise result. However, as commented in RAN4#99-e, we are okay for moderator’s suggestion “Option3 (-89.7 dBm)”  OPPO: Ok with -89.7 although our calculation shows -88.  Nokia: OK.  Samsung: Acceptable if needed  Qualcomm: Will accept. Our proposal was -93.4 dBm, so we appreciate everyone trying to make this compromise work.  SoftBank: REFSENSE value should be agreed in this meeting since September is the target completion date of core part for this WI. Considering the comments above, -89.7dBm is the majority view. We are fine with it.  Murata: We support this option.  NTT DOCOMO, INC: We support this.  Intel: We can accept this option if necessary |
| Option 4: Other |  |

### Beam correspondence:

*Whether Bit 0 UE shall be defined for PC5*

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| **Options for Issue 1.2.3,**  **Bit 0 beam correspondence UE shall be defined for PC5** | **Company Comments** |
| Agree | MediaTek: Beam correspondence requirement framework shall be power class agnostic. Hence, PC5 shall introduce beam correspondence Bit-0 as PC3, which is the starting point to discuss beam correspondence requirement framework.  OPPO: Ok to introduce for PC5.  Huawei, HiSilicon: PC5 is not high related to mobility, bit-0 requirement could benefit from UL beam sweeping. We can see SRS sweeping is helpful to network performance, cause the FR2 UL and DL is not rigidly correspondence, UL beam sweeping can accurately measure on the UL channel status. We cannot understand why bit 0 is taken as degraded UE capability. |
| Disagree | Nokia: Not needed for PC5. This is only for PC3.  Samsung: we would keep disagree with bit-0 for PC5 as commented in the past meetings. The requirement was developed for PC3.  Sony: We don’t see it meaningful to define bit-0 for an FWA device.  Qualcomm: We do not see the need for bit 0 for a basically immobile UE that puts performance first. It is not precluded for a bit 1 UE to also support UL beam sweeping.  Ericsson: It’s not needed to define bit 0 for PC5.  NTT DOCOMO, INC: We support this. |

## Companies’ views collection for 1st round

### Open issues

*Views are collected in section 1.2*

### CRs/TPs comments collection

*CR contains assumptions on peak EIRP, REFSENS and beam correspondence assumptions that are not yet resolved as of RAN4#99e. CR can be revised to incorporate any agreements on these parameters. Comments pertaining to details other than those listed will be useful.*

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| **CR/TP number** | **Comments collection** |
| [**R4-2111905**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2111905.zip) | Huawei, HiSilicon: wait for the conclusion on open issues. |
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## Summary for 1st round

### Open issues

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

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|  | **Status summary** |
| **Options for Issue 1.2.1, Min. peak EIRP in n259** | *Tentative agreements:None*  *Candidate options:*   * *27.7 dBm (supported by 9/11 commenting companies)* * *26.7 dBm (preferred by 1/11 companies)* * *28.0 dBm (preferred by 1/11 companies)*   *Recommendations for 2nd round: Can Huawei and Ericsson please consider the compromise value of 27.7 dBm? For Huawei, it seems to be just 0.1 dB outside the range that was acceptable in 99-e: ‘*So we think the power between 26.7~27.6dBm for n259 need to be considered.*’* |
| **Options for Issue 1.2.2, REFSENS in n259**  *-1 dB SNR and 50 MHz CBW* | *Tentative agreements:None*  *Candidate options:*   * *-89.7 dBm (supported by 10/11 commenting companies)* * *-89.2 dBm (preferred by 1/11 companies)*   *Recommendations for 2nd round: Can Huawei please consider the -89.7 dBm?* |
| **Bit 0 beam correspondence UE shall be defined for PC5** | *Tentative agreements:None*  *Recommendations for 2nd round: No further discussion necessary. One company pointed out that ‘*It is not precluded for a bit 1 UE to also support UL beam sweeping.*’* |

### 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.*

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| [**R4-2111905**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2111905.zip) | *Return to* |

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

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

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [**R4-2111905**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2111905.zip) | dCR to 38.101-2: PC5 requirements in n259 | Qualcomm Incorporated | Return to | Draft CR to capture agreements |
| [**R4-2112871**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112871.zip) | Remaining core part requirement for FWA | Sony, Ericsson | noted | Discussion paper |
| [**R4-2112970**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112970.zip) | FR2 PC5 requirements for n259 | Samsung | noted | Discussion paper |
| [**R4-2112974**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112974.zip) | Proposal on n259 PC5 min Peak EIRP, REFSENS, and beam correspondence | MediaTek Beijing Inc. | noted | Discussion paper |
| [**R4-2113897**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113897.zip) | R17 n259 FWA | OPPO | noted | Discussion paper |
| [**R4-2114248**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114248.zip) | Power class 5 requirements for band n259 | Intel Corporation | noted | Discussion paper |

## 2nd round

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| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
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# Annex

Contact information

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Note:

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