**3GPP TSG-RAN Meeting #92-e RP-21XXXX**

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

**Agenda item:** 9.1.4, 9.13

**Source:** Moderator (RAN4 Chair)

**Title:** Email discussion summary for [92-e-05-Spectrum-WIs]

**Document for:** Information

# Introduction

In this document, we capture comments and responses in the email thread of [92-e-05-Spectrum-WIs] for new RAN4-led spectrum related WI proposals. Based on the discussions the recommendations will be provided. The following documents under the agenda 9.1.4 and 9.13 will be covered in this email thread.

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| --- | --- | --- | --- | --- |
| **TDoc** | **Title** | **Source** | **Type** | **AI** |
| RP-211202 | New WID: High-power UE operation for fixed-wireless/vehicle-mounted use cases in LTE bands 5 and 12 and NR band n71 | Nokia, Nokia Shanghai Bell | WID new | 9.1.4 |
| RP-211283 | New WID on LTE/NR spectrum sharing in Band 34/n34 | CMCC | WID new | 9.1.4 |
| RP-211284 | New WID on LTE/NR spectrum sharing in Band 39/n39 | CMCC | WID new | 9.1.4 |
| RP-211393 | New WID on DC of x bands (x=1,2,3) LTE inter-band CA (xDL/1UL) and 4 bands NR inter-band CA (4DL/1UL) | Huawei, HiSilicon | WID new | 9.1.4 |
| RP-211445 | Motivation for Introduction of the 6GHz unlicensed band in other countries/regions | Apple Inc. | discussion | 9.1.4 |
| RP-211446 | New WID for Introduction of the 6GHz unlicensed band in other countries/regions | Apple Inc. | WID new | 9.1.4 |
| RP-211305 | Improved MSD for CA and DC | Qualcomm Incorporated | other | 9.13 |

# Topic #1: New WI for HPUE on B5, B12 and n71

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Sourcing company** |
| RP-211202 | New WID: High-power UE operation for fixed-wireless/vehicle-mounted use cases in LTE bands 5 and 12 and NR band n71 | Nokia, Nokia Shanghai Bell |

## Initial round

### Comments & responses

In this section, we collect the comments and responses for the proposed work item. Based on the comments, we will decide how to move forward in the next step.

**Sub-topic 1-1: Any question or comment on the justification or any other general comment?**

Companies are invited to provide the general comments, including comments on justification part, whether the WI is needed, how to handle the work, in the follow table.

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**Sub-topic 1-2: Comments and responses on proposed objectives**

The following objectives are proposed.

Core part:

*As stated in the conclusion of TR 37.880, the following topics should be further discussed and agreed during the WI phase:*

*1. Coexistence studies between HPUE in Band 5 and adjacent channel public safety operation in the same geographical area.*

*2. UE REFSENS exception due to self-dense.*

*3. UE MOP, MPR, A-MPR, and ACLR, considering the interactions between them (e.g. MRP and ACLR) and other related parameters (e.g. larger NR spectrum utilization for band n71).*

*The corresponding HPUE requirements for each band can be included in the RAN4 specifications independently when the work on this band is complete, i.e. no need to wait for the completion of other bands.*

Performance part:

*Specify, if necessary, the performance requirements such as release independence in TS 36.307 and TS 38.307.*

Companies are invited to provide comments and responses in the following table.

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**Sub-topic 1-3: Comments and responses on impacted/new specifications and target completion date**

The proposed impacted specifications as well as target completion date are as follows:

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| 36.101 | Introduce core requirements for high-power UE operation for fixed-wireless/vehicle-mounted use cases in Band 12 and Band 5. | RAN#95 | Core part |
| 38.101-1 | Introduce core requirements for high-power UE operation for fixed-wireless/vehicle-mounted use cases in Band n71. | RAN#95 | Core part |
| 36.307 | Define high-power UE operation for fixed-wireless/vehicle-mounted use cases in Band 12 and Band 5 as release independent feature, if necessary. | RAN#96 | Perf. Part |
| 38.307 | Define high-power UE operation for fixed-wireless/vehicle-mounted use cases in Band n71 as release independent feature, if necessary. | RAN#96 | Perf. Part |

Companies are invited to provide comments and responses in the following table.

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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #1-1 General part** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #1-2 Objectives** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #1-3 Specs & timeline** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |

## Intermediate round

### Comments & responses

*Based on the status of the intermedaite round, the issues will be provided by moderator and further comments will be collected.*

Companies are invited to provide comments and responses in the following table.

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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #1-X XXX** | Tentative agreements:  Candidate options:  Recommendations for final round: |
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## Final round

### Comments & responses

*Based on the status of the final round, recommendations will be provided.*

Companies are invited to provide comments and responses in the following table.

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### Summary

Moderator summarizes discussion status and provide the recommendation.

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|  | **Status summary** |
| **Sub-topic #1-X XXX** | Recommendations: |
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# Topic #2: LTE/NR spectrum sharing for B34/n34, B39/n39

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Sourcing company** |
| RP-211283 | New WID on LTE/NR spectrum sharing in Band 34/n34 | CMCC |
| RP-211284 | New WID on LTE/NR spectrum sharing in Band 39/n39 | CMCC |

## Initial round

### Comments & responses

In this section, we collect the comments and responses for the proposed work item. Based on the comments, we will decide how to move forward in the next step.

**Sub-topic 2-1: Any question or comment on the justification or any other general comment for two WIDs?**

Companies are invited to provide the general comments, including comments on justification part, whether the WI is needed, how to handle the work, in the follow table.

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**Sub-topic 2-2: Comments and responses on objectives for WI on LTE/NR spectrum sharing in B34/n34**

The following objectives are proposed.

Core part:

*The work item aims to specify spectrum sharing requirements for n34.*

* *Introduce UL 7.5kHz frequency shift for 15kHz SCS operation from Rel-15 [RAN4]*
  + - *Study for backward compatibility*
    - *Study for which release UL shift can be made mandatory*

Performance part:

*None*

Companies are invited to provide comments and responses in the following table.

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**Sub-topic 2-3: Comments and responses on objectives for WI on LTE/NR spectrum sharing in B39/n39**

The following objectives are proposed.

Core part:

*The work item aims to specify spectrum sharing requirements for n39.*

* *Introduce UL 7.5kHz frequency shift for 15kHz SCS operation from Rel-15 [RAN4]*
  + - *Study for backward compatibility*
    - *Study for which release UL shift can be made mandatory*

Performance part:

*None*

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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**Sub-topic 2-4: Comments and responses on impacted/new specifications and target completion date**

The proposed impacted specifications as well as target completion date are as follows:

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| 38.101-1 | NR; User Equipment (UE) radio transmission and reception | RAN#92e | Core Part |
| 38.104 | NR; Base Station (BS) radio transmission and reception | RAN#92e | Core Part |
| 38.307 | NR; Requirements on User Equipments (UEs) supporting a release-independent frequency band | RAN#92e | Core Part |

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #2-1 General part** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #2-2 Objectives for B34/n34** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #2-3 Objectives for B39/n39** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #2-4 Specs & timeline** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |

## Intermediate round

### Comments & responses

Companies are invited to provide comments and responses in the following table.

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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #2-X XXX** | Tentative agreements:  Candidate options:  Recommendations for final round: |
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## Final round

### Comments & responses

Companies are invited to provide comments and responses in the following table.

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### Summary

Moderator summarizes discussion status and provide the recommendation.

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|  | **Status summary** |
| **Sub-topic #2-X XXX** | Recommendations: |
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# Topic #3: DC of x-band LTE CA + 4 bands NR CA

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Sourcing company** |
| RP-211393 | New WID on DC of x bands (x=1,2,3) LTE inter-band CA (xDL/1UL) and 4 bands NR inter-band CA (4DL/1UL) | Huawei, HiSilicon |

## Initial round

### Comments & responses

In this section, we collect the comments and responses for the proposed work item. Based on the comments, we will decide how to move forward in the next step.

**Sub-topic 3-1: Any question or comment on the justification or any other general comment?**

Companies are invited to provide the general comments, including comments on justification part, whether the WI is needed, how to handle the work, in the follow table.

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| **Company** | **Comments** |
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**Sub-topic 3-2: Comments and responses on objectives**

The following objectives are proposed.

Core part:

* *.* *Specify the DC configurations listed in the tables below, including at least*
  + *Applicable frequencies if necessary*
  + *Applicable bandwidths and bandwidth sets if necessary*
* *Specify the band-combination specific RF requirements for these DC configurations, i.e.*
  + *Analyse combinations that have self-desensitization due to following reasons:*
    - *TX Harmonic and/or intermodulation overlap of receive band*
    - *TX signal overlap of receiver harmonic frequency*
    - *TX frequency being in close proximity of one of the receive bands*
    - *Any other identified reasons such that insufficient cross band isolation, harmonic mixing*
  + *For the combination where self-desensitization exists, specify at least needed*
    - *∆TIB, c and ∆RIB, c*
    - *Reference sensitivity exceptions including MSD test cases*

*of all REL-17 DC including EN-DC and NE-DC of LTE CA for up to 3 different bands DL with 1 band UL + NR CA for 4 different bands DL with 1 band UL that fall into the category is defined by the WI title.*

*An overview table of these EN-DC and NE-DC configurations are provided in the EXCEL file zipped together with WORD file WID.*

*Unless stated otherwise, the release independent for EN-DC and NE-DC configurations are from Rel-15.*

Performance part:

*This Perf. Part WI has to standardize the Perf. Part requirements:*

* *Required changes to be added to release independence TS 38.307.*

*of all REL-17 DC combinations including EN-DC and NE-DC that fall into the category is defined by the WI title.*

The band combinations are included:

Refer to attached excel file of RP-211393.

Companies are invited to provide comments and responses in the following table.

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**Sub-topic 3-3: Comments and responses on impacted/new specifications and target completion date**

The proposed impacted specifications as well as target completion date are as follows:

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| **New specifications** *{One line per specification. Create/delete lines as needed}* | | | | | |
| Type | TS/TR number | Title | For info  at TSG# | For approval at TSG# | Remarks |
| Internal TR | 37.717-11-41 | DC of x bands (x=1,2,3) LTE inter-band CA (xDL/1UL) and 4 bands NR inter-band CA (4DL/1UL) | *TSG#94* | *TSG#95* | *WANG, Zhou,*  *Huawei,*  *research.wangzhou@huawei.com* |

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| 38.101-3 | Add new DC band combinations and related RF core requirements | *TSG#95* | Core part |
| 38.307 | Release independent manner will be applied to all new DC band combinations according to each DC band combination | *TSG#95* | Perf. part |

Companies are invited to provide comments and responses in the following table.

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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #3-1 General part** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #3-2 Objectives** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #3-3 Specs & timeline** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |

## Intermediate round

### Comments & responses

Companies are invited to provide comments and responses in the following table.

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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #3-X XXX** | Tentative agreements:  Candidate options:  Recommendations for final round: |
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## Final round

### Comments & responses

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status and provide the recommendation.

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|  | **Status summary** |
| **Sub-topic #3-X XXX** | Recommendations: |
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# Topic #4: 6GHz unlicensed band in other countries/regions

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Sourcing company** |
| RP-211445 | Motivation for Introduction of the 6GHz unlicensed band in other countries/regions | Apple Inc. |
| RP-211446 | New WID for Introduction of the 6GHz unlicensed band in other countries/regions | Apple Inc. |

## Initial round

### Comments & responses

In this section, we collect the comments and responses for the proposed work item. Based on the comments, we will decide how to move forward in the next step.

**Sub-topic 4-1: Can we agree to introduce the support of the 6GHz band in countries/regions that are not covered by the scope of the existing WIs?**

Proposals in RP-211445:

“*…there are a number that either have recently announced support for the 6GHz band or are in the process of public consultations to open the 6GHz band for the license-exempt operation…. As can be seen, quite many countries have somewhat different regulatory requirements for the maximum mean EIRP density and out of band emissions. And since those parameters have direct impact on e.g. A-MPR values, 3GPP RAN WG4 will have to perform analysis on how much A-MPR each country/region will have and how it can be supported with existing or new NS values. Furthermore, since other Administrations have been working on the 6GHz band, even more countries will start publishing the corresponding regulatory requirements. Based on that we anticipate that non-trivial technical discussions will be needed to understand how to support 6GHz in all countries/regions*.”

***Proposal: Introduce support for the 6GHz band in countries/regions that are not covered by the scope of the existing WIs.***

Companies are invited to provide the general comments on the above proposal.

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| **Company** | **Comments** |
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**Sub-topic 4-2: Any question or comment on justification or any other general comment on the proposed WI RP-211446?**

Companies are invited to provide the general comments, including comments on justification part, how to handle the work, in the follow table.

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**Sub-topic 4-3: Comments and responses on objectives of the proposed work item in RP-211446**

The following objectives are proposed.

Core part:

*The objectives of the core part work item are:*

*- Analyse regulatory requirements for new countries/regions that have adopted the 6GHz band for the license-exempt operation:*

*NOTE: The list of new countries/regions with the corresponding parameters can be taken from TR 37.890;*

*- Depending on the regulatory requirements, determine whether they can be handled by existing NS values or whether new NS values are needed.*

*- Define or update (if needed) system parameters such as channel bandwidths and channel arrangements.*

*- Define or update (if needed) transmitter and receiver characteristics requirements for the UE.*

*- Define or update (if needed) transmitter and receiver characteristics requirements for the BS*.

Performance part:

*The objective of the performance part work item is to define or update (if needed) conformance requirements for BS testing.*

*Changes are to be made in a release-independent manner.*

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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**Sub-topic 4-4: Comments and responses on impacted/new specifications and target completion date**

The proposed impacted specifications as well as target completion date are as follows:

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| **New specifications** *{One line per specification. Create/delete lines as needed}* | | | | | |
| Type | TS/TR number | Title | For info  at TSG# | For approval at TSG# | Remarks |
| *Internal TR* | *TR 38.xxx* | *Introduction of the 6GHz unlicensed band in other countries/regions* |  | *RAN#95* | *Core part* |

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| **Impacted existing TS/TR** *{One line per specification. Create/delete lines as needed}* | | | |
| TS/TR No. | Description of change | Target completion plenary# | Remarks |
| 38.101-1 | NR; UE Radio transmission and reception | RAN#95 | Core UE part |
| 38.104 | NR; BS Radio transmission and reception | RAN#95 | Core BS part |
| 37.104 | E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception | RAN#95 | Core BS part |
| 37.105 | Active Antenna System (AAS) Base Station (BS) transmission and reception | RAN#95 | Core BS part |
| 38.141-1 | NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing | RAN#96 | Perf. BS part |
| 38.141-2 | NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing | RAN#96 | Perf. BS part |
| 37.141 | E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing | RAN#96 | Perf. BS part |
| 37.145-1 | Active Antenna System (AAS) Base Station (BS) conformance testing; Part 1: conducted conformance testing | RAN#96 | Perf. BS part |
| 37.145-2 | Active Antenna System (AAS) Base Station (BS) conformance testing; Part 2: radiated conformance testing | RAN#96 | Perf. BS part |

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #4-1 Proposal in RP-211445** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #4-2 General part** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #4-3 Objectives** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #4-4 Specs & timeline** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |

## Intermediate round

### Comments & responses

*Based on the status of the initial round, the issues will be provided by moderator and further comments will be collected.*

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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|  | **Status summary** |
| **Sub-topic #4-X XXX** | Tentative agreements:  Candidate options:  Recommendations for final round: |
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## Final round

### Comments & responses

*Based on the status of the intermediatel round, the issues will be provided by moderator and further comments will be collected.*

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status and provide the recommendation.

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|  | **Status summary** |
| **Sub-topic #4-X XXX** | Tentative agreements:  Candidate options:  Recommendations: |
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# Topic #5: Improving MSD for CA and DC

## Companies’ contributions summary

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| **T-doc number** | **Title** | **Sourcing company** |
| RP-211305 | Improved MSD for CA and DC | Qualcomm Incorporated, T-Mobile USA, Verizon, AT&T, DISH Network, TELUS, Deutsche Telekom, CMCC, CHTTL, KT Corp, Vodafone, BT plc., Telecom Italia, Bell Mobility |

## Initial round

### Comments & responses

In this section, we collect the comments and responses for the proposed work item. Based on the comments, we will decide how to move forward in the next step.

Background:

The issue was triggered by the proposal to design a solution to improve MSD for power class 2 EN-DC in RAN4. And then the proponents proposed to apply it for all the power classes. The latest discussions were captured in RAN4 email summaries of R4-2107937 and R4-2107926.

Because there is no clear objective for such generic solution to improve MSD in any existing WID, and it seems not proper to treat it under basket work items for band combinations in a band specific manner, it was suggested to discuss how to handle it in RAN.

**Sub-topic 5-1: Comments and questions on proposal#1, i.e., should we introduce a generic UE capability for improving MSD?**

***Proposal 1: RAN4 to introduce a new UE capability bit to allow a UE indicate support for improved MSD***

Companies are invited to provide comments on ***Proposal 1*** in the follow table.

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| **Company** | **Comments** |
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**Sub-topic 5-2: If we can agree to do the work for improve MSD, then how can we treat it, i.e., in new WI, adding objectives in the existing WI, or TEI?**

Question: How can we handle the work?

* + Option 1: new work item
  + Option 2: adding the new objectives in the existing work item
  + Option 3: TEI17
  + Other option

Companies are invited to provide answers on the above questions in the follow table.

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| **Company** | **Comments** |
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**Sub-topic 5-3: Comments and responses on potential objectives**

The following objectives are proposed.

* + *How to determine the improved MSD value [RAN4]*
  + *The details of the signaling need to be decided [RAN2/RAN4?]*
  + *Should this be limited to new combinations being specified, i.e., PC2 CA, or should this also apply (optionally) to existing combinations even PC3? [RAN4?]*
  + *Under what ~~work item and~~ release should this be carried out? [RAN]*

For the last bullet, please focus on “release” here.

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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**Sub-topic 5-4: Comments and responses on signalling design, i.e., Proposal #2 and #3 in RP-211445.**

***Proposal 2: RAN4 will choose a (preferably low single digit) improved MSD value that a UE could declare support for a given combination with a new capability bit***

* ***RAN4 could either define a single improved MSD value for all the types of MSD, or it could choose one level for harmonics, one level for harmonic mixing, one level for cross-band isolation and one value for Intermods.***

***Proposal 3: The new capability would be signalled per UL/DL band combination***

Companies are invited to provide general comments on the above two proposals in the follow table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic #5-1** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #5-2** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #5-3 potential objectives** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |
| **Sub-topic #5-4 signaling design** | Tentative agreements:  Candidate options:  Recommendations for intermediate round: |

## Intermediate round

### Comments & responses

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status for this round, list all the identified open issues and tentative agreements or candidate options and suggestion for next round.

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| --- | --- |
|  | **Status summary** |
| **Sub-topic #5-X XXX** | Tentative agreements:  Candidate options:  Recommendations for final round: |
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## Final round

### Comments & responses

Companies are invited to provide comments and responses in the following table.

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| **Company** | **Comments** |
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### Summary

Moderator summarizes discussion status and provide the recommendation.

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|  | **Status summary** |
| **Sub-topic #5-X XXX** | Recommendations: |
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# Summary of Recommendations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| RP-21xxxx | New WI on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |