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

**Electronic Meeting, May. 19-27, 2021**

**Agenda item:** 8.26

**Source:** Moderator (CATT)

**Title:** Email discussion summary for [99-e][119] NR\_LTE\_V2X\_PC5\_combos

**Document for:** Information

# Introduction

This email discussion summary will discuss the newly introduced band combinations of V2X con-current operation and associated open issues.

The candidate targets of this email discussion for 1st round and 2nd round:

* 1st round
  + Companies to provide comments on open issues involved.
  + Companies to provide comments on TPs and CRs involved.
* 2nd round
  + Further check the revised TPs and CRs if any.
  + Recommend the final status of TPs and CRs.

# Topic #1: Introduce new band combinations

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109043 | CATT | Title: TR 37.875, Band combinations for V2X con-current operation  **For email approval after meeting** |
| [R4-2111427](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111427.zip) | Huawei, HiSilicon | Title: TP for 37.875: Scope of NR V2X R17 combinations |
| [R4-2109038](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109038.zip) | CATT | Title: TP on V2X\_n78A-n47A and V2X\_n78A-47A coexistence study |
| [R4-2109039](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109039.zip) | CATT | Title: CR for TS 38.101-1, Introduce new band combination of V2X\_n78A-n47A |
| [R4-2109041](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109041.zip) | CATT | Title: CR for TS 38.101-1, Introduce new band combination of V2X\_n79A-n47A  **Resubmission of draft CR R4-2105367 endorsed in RAN4#98-bis-e meeting.** |
| [R4-2109370](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109370.zip) | Qualcomm Incorporated | Title: Calculation of delta RIB,V2X for V2X\_n79A-n47A and V2X\_n79A-47A  **Proposal 1: The ΔRIB,V2X given in table 2 be adopted for V2X\_n79A-47A**  Table 2 ΔRIB,V2X for V2X\_n79A-47A   |  |  |  | | --- | --- | --- | | V2X inter-band con-current band Combination | E-UTRA or NR Band | ΔRIB,V2X [dB] | | V2X\_n79-47 | n79 | 3.3 | | 47 | 2.3 |   Proposal 2: The ΔRIB,V2X given in table 3 be adopted for V2X\_n79A-n47A  Table 3 ΔRIB,V2X for V2X\_n79A-n47A   |  |  |  | | --- | --- | --- | | V2X inter-band con-current band Combination | E-UTRA or NR Band | ΔRIB,V2X [dB] | | V2X\_n79-n47 | n79 | 3.3 | | n47 | 3.3 |   **Proposal 3: Support of all V2X band combinations is optional**  **Proposal 4: Support of all V2X band combinations that are made release independent to an earlier release is optional in the earlier release** |
| [R4-2110403](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110403.zip) | Huawei, HiSilicon | Title: Draft CR for 38.101-1 to simplify the configuration and REFSENS for V2X band combinations |
| [R4-2110404](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110404.zip) | Huawei, HiSilicon | Title: Discussion and TP for TR 37.875 on MSD for V2X\_n79A-n47A and V2X\_n79A\_47A |
| [R4-2109040](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109040.zip) | CATT | Title: CR for TS 38.101-3, Introduce new band combination of V2X\_n78A-47A |
| [R4-2109042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109042.zip) | CATT | CR for TS 38.101-3, Introduce new band combination of V2X\_n79A-47A  **Resubmission of draft CR R4-2105368 endorsed in RAN4#98-bis-e meeting.** |

## Open issues summary

Based on above contributions, the following sub-topics and issues are summarized.

### Sub-topic 1-1: Sensitivity degradation for V2X\_n79A-n47A and V2X\_n79A-47A

**Issue 1-1-1: MSD/ΔRIB,V2X for V2X\_n79A-n47A and V2X\_n79A-47A**

* Proposals
  + Option 1: Adopt the following ΔRIB,V2X for V2X\_n79A-n47A and V2X\_n79A-47A proposed in paper [R4-2109370](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109370.zip).
* Table 1: ΔRIB,V2X for V2X\_n79A-47A

|  |  |  |
| --- | --- | --- |
| V2X inter-band con-current band Combination | E-UTRA or NR Band | ΔRIB,V2X [dB] |
| V2X\_n79-47 | n79 | 3.3 |
| 47 | 2.3 |

* Table 2: ΔRIB,V2X for V2X\_n79A-n47A

|  |  |  |
| --- | --- | --- |
| V2X inter-band con-current band Combination | E-UTRA or NR Band | ΔRIB,V2X [dB] |
| V2X\_n79-n47 | n79 | 3.3 |
| n47 | 3.3 |

* + Option 2: Adopt the following MSD for V2X\_n79A-n47A and V2X\_n79A-47A proposed in paper [R4-2110404](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110404.zip).

Table 3: Reference sensitivity exceptions (MSD) due to cross band isolation for V2X

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| UL band | DL band | SCS of UL/DL band (kHz) | LCRB of UL band | UL band BW(MHz) | LCRB of DL band | DL band BW (MHz) | MSD value of DL band (dB) |
| n79 | n47 | 15 | 216 | 40 | 50 | 10 | 3 |

Table 4: Reference sensitivity exceptions (MSD) due to cross band isolation for NR V2X

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| UL band | DL band | SCS of UL/DL band (kHz) | LCRB of UL band | UL band BW(MHz) | LCRB of DL band | DL band BW (MHz) | MSD value of DL band (dB) |
| n79 | 47 | 15 | 216 | 40 | 50 | 10 | 3 |

* Recommended WF
  + Need more discussion.

### Sub-topic 1-2: Clarification on V2X con-current operation

**Issue 1-2-1: V2X band combination in Rel-17**

* Proposals
  + Option 1: Support of all V2X band combinations is optional.
* Recommended WF
  + Need more discussion.

**Issue 1-2-2: V2X band combination in Rel-16**

* Proposals
  + Option 1: Support of all V2X band combinations that are made release independent to an earlier release is optional in the earlier release
* Recommended WF
  + Need more discussion.

## Companies views’ collection for 1st round

### Open issues

**Issue 1-1-1: MSD/ΔRIB,V2X for V2X\_n79A-n47A and V2X\_n79A-47A**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | Option 2, it’s reasonable to specify MSD for this band combination. Delta R is just used for insertion loss. |
| Qualcomm | Option 1: We see option 1 and 2 having a common goal of trying to achieve sensitivity relaxation for n47/B47. However, R4-2019370 also details sensitivity relaxations for n79 which must be considered as there is interference from n79 to n47/B47. We suggest using the max values from both these proposals i.e. MSD for n47=3.3 dB, MSD for B47=3.0 dB and MSD for n79=3.3dB  The MSD values for n47 should apply to all BW’s 10MHz, 20MHz,30MHz and 40 MHz  The MSD values for B47 should apply to all BW’s 10MHz, 20MHz  The MSD values for n79 should apply to all BW’s 40MHz, 50MHz,60MHz, 80MHz and 100 MHz |
| CATT | Share the similar view as Huawei. If UL Tx leakage falls into SL Rx, MSD for SL band should be specified. If no insertion loss introduced such as harmonic trap filter, no need to specify delta R. We generally agree QC’s proposal to use the maximum value from both sides, i.e. MSD=3.3 for both n47/47. |
| LGE | We are same view with HW. Option 2 is common approach. Additional IL terms shall be derived additional RF component compare to V2X\_n79-n47 or V2X\_n79\_47. |

**Issue 1-2-1: V2X band combination in Rel-17**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Support option 1 |
| CATT | Con-current operation for V2X UE is an optional feature. Con-current operation should be declared per band combination. The band combinations introduced in Rel-17 are expected to be release independent from Rel-16. |
| LGE | Option 1. V2X WI is completed in Rel-16. So the inter-band V2X con-current band combination can support from Rel-16 even though the inter band V2X con-current band combinations was specified in later release. |

**Issue 1-2-2: V2X band combination in Rel-16**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Support option 1 |
| CATT | Con-current operation for V2X UE is an optional feature. Con-current operation should be declared per band combination. The band combinations introduced in Rel-17 are expected to be release independent from Rel-16. |
| LGE | Option 1. V2X WI is completed in Rel-16. So the inter-band V2X con-current band combination can support from Rel-16 even though the inter band V2X con-current band combinations was specified in later release. |

### 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** |
| [R4-2111427](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111427.zip)  (TP for 37.875: Scope of NR V2X R17 combinations) | Qualcomm: cannot agree with this CR. Cannot have rel-17 combinations release independent to an earlier release and be mandatory in the earlier release. Also, cannot agree to having V2X\_n79A-n47A and V2X\_n79A\_47A in this list as the MSDs for these combinations are still being discussed. |
| CATT: After addressing MSD issues for V2X\_n79A-n47A and V2X\_n79A\_47A, this TP is acceptable.  The band combinations introduced in Rel-17 are expected to be release independent from Rel-16. But for the specific band combination, whether V2X UE can support this band combination should be optional based on capability signalling. |
|  |
| [R4-2109038](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109038.zip)  (TP on V2X\_n78A-n47A and V2X\_n78A-47A coexistence study) |  |
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| [R4-2109039](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109039.zip)  (CR for TS 38.101-1, Introduce new band combination of V2X\_n78A-n47A) |  |
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| [R4-2110403](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110403.zip)  (Draft CR for 38.101-1 to simplify the configuration and REFSENS for V2X band combinations) |  |
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| [R4-2110404](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110404.zip)  (Discussion and TP for TR 37.875 on MSD for V2X\_n79A-n47A and V2X\_n79A\_47A) | Qualcomm : We think that the MSD for n79 is missing from this analysis and should be added |
| CATT: The table for MSD could be revised as below:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | UL band | SL band | SCS of UL/SL band (kHz) | LCRB of UL band | UL band BW(MHz) | LCRB of SL band | SL band BW (MHz) | MSD value of SL band (dB) | | n79 | n47 | 15 | 216 | 40 | 50 | 10 | 3.3 | |
| Qualcomm:  The MSD values in the tables should apply to the following BWs  The MSD values for n47 should apply to all BW’s 10MHz, 20MHz,30MHz and 40 MHz  The MSD values for B47 should apply to all BW’s 10MHz, 20MHz  The MSD values for n79 should apply to all BW’s 40MHz, 50MHz,60MHz, 80MHz and 100 MHz |
|  |
| [R4-2109040](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109040.zip)  (CR for TS 38.101-3, Introduce new band combination of V2X\_n78A-47A) |  |
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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.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 1-1-1: MSD/ΔRIB,V2X for V2X\_n79A-n47A and V2X\_n79A-47A** | *Tentative agreements:*  Specified MSD for SL band for V2X\_n79A-n47A and V2X\_n79A-47A. The MSD value is FFS.  *Candidate options:*   * Option 1: MSD=3dB for SL band * Option 2: MSD=3.3dB for SL band   *Recommendations for 2nd round:*  Further discuss the MSD value for SL band. |
| **Issue 1-2-1: V2X band combination in Rel-17** | *Tentative agreements:* Support of all V2X band combinations in Rel-17 is optional.  *Candidate options:* NONE  *Recommendations for 2nd round:* No more discussion needed in 2nd round. |
| **Issue 1-2-2: V2X band combination in Rel-16** | *Tentative agreements:* Support of all V2X band combinations that are release independent from Rel-16 is optional in Rel-16.  *Candidate options:* NONE  *Recommendations for 2nd round:* No more discussion needed in 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”* |
| [R4-2111427](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111427.zip) | Revised |
| [R4-2109038](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109038.zip) | Approved |
| [R4-2109039](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109039.zip) | Endorsed.  This formal CR can be endorsed as it has overlaps with another endorsed CR (R4-2110403). To avoid CR implementation problem, a big CR will be used. |
| [R4-2109041](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109041.zip) | Endorsed.  This formal CR can be endorsed as it has overlaps with another endorsed CR (R4-2110403). To avoid CR implementation problem, a big CR will be used. |
| [R4-2110403](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110403.zip) | Endorsed |
| [R4-2110404](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110404.zip) | Revised |
| [R4-2109040](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109040.zip) | Agreed |
| [R4-2109042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109042.zip) | Agreed |

## Discussion on 2nd round (if applicable)

## Open issues summary

**Issue 1: MSD for V2X\_n79A-n47A and V2X\_n79A-47A**

* Proposals
  + Option 1: MSD=3dB for SL band
  + Option 2: MSD=3.3dB for SL band
* Recommended WF
  + Need more discussion.

**Issue 2: Whether to specify MSD for Uu band**

* Proposals
  + Option 1: YES
  + Option 2: NO
* Recommended WF
  + Need more discussion.

**Issue 3: Whether MSD value applies to all supported CBWs for one single band**

* Proposals
  + Option 1: YES
  + Option 2: NO
* Recommended WF
  + Need more discussion.

## Companies views’ collection for 2st round

### Open issues

**Issue 1: MSD for V2X\_n79A-n47A and V2X\_n79A-47A**

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| --- | --- |
| **Company** | **Comments** |
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|  |  |

**Issue 2: Whether to specify MSD for Uu band**

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |

**Issue 3: Whether MSD value applies to all supported CBWs for one single band**

|  |  |
| --- | --- |
| **Company** | **Comments** |
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### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
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## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
|  |  |
|  |  |
|  |  |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
| Big CR for 38.101, Introduce new band combinations for V2X con-current operation | CATT |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| [R4-2111427](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111427.zip) | TP for 37.875: Scope of NR V2X R17 combinations | Huawei, HiSilicon | Revised |  |
| [R4-2109038](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109038.zip) | TP on V2X\_n78A-n47A and V2X\_n78A-47A coexistence study | CATT | Approved |  |
| [R4-2109039](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109039.zip) | CR for TS 38.101-1, Introduce new band combination of V2X\_n78A-n47A | CATT | Endorsed | This formal CR can be endorsed as it has overlaps with another endorsed CR (R4-2110403). To avoid CR implementation problem, a big CR will be used. |
| [R4-2109041](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109041.zip) | CR for TS 38.101-1, Introduce new band combination of V2X\_n79A-n47A | CATT | Endorsed | This formal CR can be endorsed as it has overlaps with another endorsed CR (R4-2110403). To avoid CR implementation problem, a big CR will be used. |
| [R4-2110403](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110403.zip) | Draft CR for 38.101-1 to simplify the configuration and REFSENS for V2X band combinations | Huawei, HiSilicon | Endorsed |  |
| [R4-2110404](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110404.zip) | Discussion and TP for TR 37.875 on MSD for V2X\_n79A-n47A and V2X\_n79A\_47A | Huawei, HiSilicon | Revised |  |
| [R4-2109040](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109040.zip) | CR for TS 38.101-3, Introduce new band combination of V2X\_n78A-47A | CATT | Agreed |  |
| [R4-2109042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109042.zip) | CR for TS 38.101-3, Introduce new band combination of V2X\_n79A-47A | CATT | Agreed |  |

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 |  |
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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