**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-2105684**

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

**Agenda item:** 7.25.5/7.27.3/7.39.2

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [98-bis-e][214] Spectrum\_RRM

**Document for:** Information

# Introduction

The document contains discussion related to the RRM core and performance requirements for spectrum related WIs:

The document contains the following three main topics:

* Topic #1: RRM for NR\_FR1\_35MHz\_45MHz\_BW (Agenda item: 7.25.5)
* Topic #2: RRM for NR\_47GHz\_band (band n262) (Agenda items: 7.27.3, 7.27.4.4)
* Topic #3: RRM for NR\_FR2\_FWA\_Bn259 (Agenda item: 7.39.2)

# Topic #1: RRM for NR\_FR1\_35MHz\_45MHz\_BW

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2104602**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104602.zip) | CMCC | ***Observation 1: n1, n2, n3, n7, n8, n25, n66 and n71 all support 10MHz channel bandwidth.***  ***Observation 2: All NR band n1, n2, n3, n7, n8, n25, n66 and n71 can be tested in existing RRM tests.***  ***Proposal 1: No need to specify the RRM test cases for introducing 35MHz and 45MHz.*** |
| [**R4-2106940**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106940.zip) | Huawei, HiSilicon | **Proposal: There is no RRM core and performance impact on 35 MHz and 45 MHz NR FR1 channel bandwidths.** |
| [**R4-2107156**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107156.zip) | Ericsson | * **Observation 1:** In FR1 the RRM core requirements are agnostic to the channel bandwidth rather mainly depends on measured signals e.g. SSB, CSI-RS, PRS, SRS etc. * **Observation 2:** In FR1 the RRM performance requirements including RRM test configurations and test cases are defined for 10 MHz channel bandwidth for FDD and TDD bands and for 40 MHz channel bandwidth for TDD bands. * **Proposal 1:** Introduction of 35 MHz and 45 MHz channel bandwidths does not have any impact on RRM core requirements. * **Proposal 2:** Introduction of 35 MHz and 45 MHz channel bandwidths does not have any impact on RRM performance requirements including RRM test cases. |

## Open issues summary

### Sub-topic 1-1: RRM core requirements for 35MHz and 45MHz

New channel BWs 35MHz and 45MHz are being defined for several FR1 bands under WI on NR\_FR1\_35MHz\_45MHz\_BW. Impact on RRM core is discussed.

**Issue 1-1: RRM core requirements for 35MHz and 45MHz**

* Proposals
  + Option 1: CMCC, Huawei, Ericsson
    - Introduction of 35 MHz and 45 MHz channel bandwidths does not have any impact on RRM core requirements.
  + Option 2: None
* Recommended WF
  + Further discuss if option 1 can be agreeable?

### Sub-topic 1-2: RRM performance requirements for 35MHz and 45MHz

New channel BWs 35MHz and 45MHz are being defined for several FR1 bands under WI on NR\_FR1\_35MHz\_45MHz\_BW. Impact on RRM performance is discussed.

**Issue 1-2: RRM performance requirements for 35MHz and 45MHz**

* Proposals
  + Option 1: CMCC, Huawei, Ericsson
    - Introduction of 35 MHz and 45 MHz channel bandwidths does not have any impact on RRM performance requirements including RRM test cases.
  + Option 2: None
* Recommended WF
  + Further discuss if option 1 can be agreeable?

## Companies views’ collection for 1st round

### Open issues

**Sub-topic 1-1: Issue 1-1: RRM core requirements for 35MHz and 45MHz**

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| **Company** | **Comments** |
| CMCC | Option 1 |
| Huawei | Based on the analysis in our paper, we support option 1. |
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**Sub-topic 1-2: Issue 1-2: RRM performance requirements for 35MHz and 45MHz**

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| **Company** | **Comments** |
| CMCC | Option 1 |
| Huawei | Based on the analysis in our paper, we support option 1. |
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### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| XXX | Company A |
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| YYY | Company A |
| Company B |
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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic 1-1** | **Issue 1-1: RRM core requirements for 35MHz and 45MHz**  *Tentative agreements:*  Introduction of 35 MHz and 45 MHz channel bandwidths does not have any impact on RRM core requirements.  *Recommendations for 2nd round:* No further discussion. |
| **Sub-topic 1-2** | **Issue 1-2: RRM performance requirements for 35MHz and 45MHz**  *Tentative agreements:*  Introduction of 35 MHz and 45 MHz channel bandwidths does not have any impact on RRM performance requirements including RRM test cases.  *Recommendations for 2nd round:* No further discussion. |

### CRs/TPs

*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** |
| 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: RRM for NR\_47GHz\_band (band n262)

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2107147**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107147.zip) | Ericsson | * **Observation 1:** RF group is expected to analyze the UE RF requirements including UE REFSENS for the remaining UE power classes (PC1, PC2 and PC4) at RAN4#98bis-e. * **Proposal 1:** Agreement on RRM band grouping for the remaining UE power classes (PC1, PC2 and PC4) for band n262 is based on RF group agreements on their REFSENS requirements. |
| [**R4-2107148**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107148.zip) | Ericsson | Big CR on RRM core requirements for band n262 |
| [**R4-2107149**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107149.zip) | Ericsson | **Table 3:** **Min SSB\_RP/CSI-RS\_RP for conditions for measurements at RX beam peak direction**   |  |  |  |  | | --- | --- | --- | --- | | **No.** | **Condition for requirements** | **Minimum SSB\_RP [dBm] (SCS=120 kHz)** | **Minimum CSI-RS\_RP [dBm] (SCS=60 kHz)** | | 1 | Intra-frequency/inter-freqyuency measurements for cell re-selection | -103.6 | N/A | | 2 | Intra-frequency measurements in RRC connected state | -106.6 | N/A | | 3 | Inter-freqyuency measurements in RRC connected state | -104.6 | N/A | | 4 | SSB based L1-RSRP | -103.6 | N/A | | 5 | CSI-RS based L1-RSRP | N/A | -106.6 | | 6 | RRC connection release with redirection | -104.6 | N/A |   **Table 4: Min SSB\_RP/CSI-RS\_RP for conditions for measurements for spherical coverage direction**   |  |  |  |  | | --- | --- | --- | --- | | **No.** | **Condition for requirements** | **Minimum SSB\_RP [dBm] (SCS=120 kHz)** | **Minimum CSI-RS\_RP [dBm] (SCS=60 kHz)** | | 1 | Intra-frequency/inter-freqyuency measurements for cell re-selection | -90.5 | N/A | | 2 | Intra-frequency measurements in RRC connected state | -93.5 | N/A | | 3 | Inter-freqyuency measurements in RRC connected state | -91.5 | N/A | | 4 | SSB based L1-RSRP | -90.5 | N/A | | 5 | CSI-RS based L1-RSRP | N/A | -93.5 | | 6 | RRC connection release with redirection | -91.5 | N/A | |
| [**R4-2107150**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107150.zip) | Ericsson | Draft CR on RRM performance requirements for band n262 |

## Open issues summary

### Sub-topic 2-1: RRM core requirements for band n262

RRM band grouping for the UE power class 3 was agreed (R4-2103666). RRM band grouping for the remaining UE power classes (PC1, PC2 and PC4) need to be defined as part of the WID (NR\_47GHz\_band).

**Issue 2-1: RRM core requirements for band n262 for power classes 1, 2 and 4.**

* Proposals
  + Option 1: Ericsson
    - Agreement on RRM band grouping for the remaining UE power classes (PC1, PC2 and PC4) for band n262 is based on RF group agreements on their REFSENS requirements.
  + Option 2: None
* Recommended WF
  + Further discuss proposal in option 1

### Sub-topic 2-2: RRM performance requirements for band n262

RRM performance requirements for the UE power classes 1, 2, 3 and 4 need to be defined as part of the WID (NR\_47GHz\_band).

RRM performance requirements consist of min SSB\_RP/CSI-RS\_RP at RX beam peak direction and for spherical coverage direction.

**Issue 2-2: RRM performance requirements for band n262 for power class 3**

* Proposals
  + Option 1: Ericsson

**Table 3: Min SSB\_RP/CSI-RS\_RP for conditions for measurements at RX beam peak direction for UE power class 3 for band n262**

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| **No.** | **Condition for requirements** | **Minimum SSB\_RP [dBm] (SCS=120 kHz)** | **Minimum CSI-RS\_RP [dBm] (SCS=60 kHz)** |
| 1 | Intra-frequency/inter-freqyuency measurements for cell re-selection | -103.6 | N/A |
| 2 | Intra-frequency measurements in RRC connected state | -106.6 | N/A |
| 3 | Inter-freqyuency measurements in RRC connected state | -104.6 | N/A |
| 4 | SSB based L1-RSRP | -103.6 | N/A |
| 5 | CSI-RS based L1-RSRP | N/A | -106.6 |
| 6 | RRC connection release with redirection | -104.6 | N/A |

**Table 4: Min SSB\_RP/CSI-RS\_RP for conditions for measurements for spherical coverage direction for UE power class 3 for band n262**

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| **No.** | **Condition for requirements** | **Minimum SSB\_RP [dBm] (SCS=120 kHz)** | **Minimum CSI-RS\_RP [dBm] (SCS=60 kHz)** |
| 1 | Intra-frequency/inter-freqyuency measurements for cell re-selection | -90.5 | N/A |
| 2 | Intra-frequency measurements in RRC connected state | -93.5 | N/A |
| 3 | Inter-freqyuency measurements in RRC connected state | -91.5 | N/A |
| 4 | SSB based L1-RSRP | -90.5 | N/A |
| 5 | CSI-RS based L1-RSRP | N/A | -93.5 |
| 6 | RRC connection release with redirection | -91.5 | N/A |

* + Option 2: None
* Recommended WF
  + Further discuss proposal in option 1

## Companies views’ collection for 1st round

### Open issues

**Sub-topic 2-1: Issue 2-1: RRM core requirements for band n262 for power classes 1, 2 and 4.**

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| **Company** | **Comments** |
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**Sub-topic 2-2: Issue 2-2: RRM performance requirements for band n262 for power class 3**

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

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| **CR/TP number** | **Comments collection** |
| [**R4-2107148**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107148.zip) (Ericsson)  Note: Big CR based on endorsed CR in R4-2103666 | Huawei: This version is same as the endorsed version in last meeting. It needs to be updated if RF session has achieved the conclusion on UE REFSENS requirements for Band n262 PC1/2/4. |
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| [**R4-2107150**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107150.zip)  (Ericsson) | Huawei: Need to be updated if RF session has achieved the conclusion on UE REFSENS and EIS spherical coverage requirements for Band n262 PC1/2/4. |
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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic 2-1** | **Issue 2-1: RRM core requirements for band n262 for power classes 1, 2 and 4.**  *Tentative agreements:*  Agreement on RRM band grouping for the remaining UE power classes (PC1, PC2 and PC4) for band n262 is based on RF group agreements on their REFSENS requirements.  *Recommendations for 2nd round:* Follow up progress of RF group on REFSENS requirements for PC1/2/4 for band n262 during the 2nd round. |
| **Sub-topic 2-2** | **Issue 2-2: RRM performance requirements for band n262 for power class 3**  *Tentative agreements:*  **Table 3: Min SSB\_RP/CSI-RS\_RP for conditions for measurements at RX beam peak direction for UE power class 3 for band n262**   |  |  |  |  | | --- | --- | --- | --- | | **No.** | **Condition for requirements** | **Minimum SSB\_RP [dBm] (SCS=120 kHz)** | **Minimum CSI-RS\_RP [dBm] (SCS=60 kHz)** | | 1 | Intra-frequency/inter-freqyuency measurements for cell re-selection | -103.6 | N/A | | 2 | Intra-frequency measurements in RRC connected state | -106.6 | N/A | | 3 | Inter-freqyuency measurements in RRC connected state | -104.6 | N/A | | 4 | SSB based L1-RSRP | -103.6 | N/A | | 5 | CSI-RS based L1-RSRP | N/A | -106.6 | | 6 | RRC connection release with redirection | -104.6 | N/A |   **Table 4: Min SSB\_RP/CSI-RS\_RP for conditions for measurements for spherical coverage direction for UE power class 3 for band n262**   |  |  |  |  | | --- | --- | --- | --- | | **No.** | **Condition for requirements** | **Minimum SSB\_RP [dBm] (SCS=120 kHz)** | **Minimum CSI-RS\_RP [dBm] (SCS=60 kHz)** | | 1 | Intra-frequency/inter-freqyuency measurements for cell re-selection | -90.5 | N/A | | 2 | Intra-frequency measurements in RRC connected state | -93.5 | N/A | | 3 | Inter-freqyuency measurements in RRC connected state | -91.5 | N/A | | 4 | SSB based L1-RSRP | -90.5 | N/A | | 5 | CSI-RS based L1-RSRP | N/A | -93.5 | | 6 | RRC connection release with redirection | -91.5 | N/A |   *Recommendations for 2nd round:* Follow up progress of RF group on REFSENS and EIS spherical coverage requirements for PC1/2/4 for band n262 during the 2nd round. |

### CRs/TPs

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| **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”.*

# Topic #3: RRM for NR\_FR2\_FWA\_Bn259

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2107157**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107157.zip) | Ericsson | * **Observation 1:** The RRM core requirements comprise defining the NR frequency bands group for the UE PC5 for band 259. * **Observation 2:** The performance RRM requirements consists of specifying the minimum received signal level (SSB\_RP or CSI-RS levels) for RX for beam peak direction and for spherical coverage direction as part of the side conditions (sections B.1 and B.2, TS 38.133). * **Proposal 1:** The FR2 band group for PC5 for n259 will be defined in Table 3.5.3-1 of TS 38.133 after the RF group has agreed on the UE RF requirements (UE REFSENS) for FR2 FWA power class 5 with maximum TRP of 23 dBm for band n259. * **Proposal 2:** The minimum received signal level (SSB\_RP or CSI-RS levels) for RX for beam peak direction and for spherical coverage direction as part of the side conditions will be defined in sections B.1 and B.2 of TS 38.133 after the RF group has agreed on the UE RF requirements (UE REFSENS and EIS spherical coverage) for FR2 FWA power class 5 with maximum TRP of 23 dBm for band n259. |

## Open issues summary

### Sub-topic 2-1: RRM core requirements for FR2 FWA UE for band n259

RRM band grouping for the FWA FR2 UE power class 5 for band n259 needs to be defined as part of the WID (NR\_FR2\_FWA\_Bn259).

**Issue 3-1: RRM core requirements for FR2 FWA UE power class 5 for band n259**

* Proposals
  + Option 1: Ericsson
    - The FR2 band group for PC5 for n259 will be defined in Table 3.5.3-1 of TS 38.133 after the RF group has agreed on the UE RF requirements (UE REFSENS) for FR2 FWA power class 5 with maximum TRP of 23 dBm for band n259.
  + Option 2: None
* Recommended WF
  + Further discuss proposal in option 1

### Sub-topic 3-2: RRM performance requirements for FR2 FWA for band n259

RRM performance requirements for the FWA FR2 UE power class 5 for band n259 need to be defined as part of the WID (NR\_FR2\_FWA\_Bn259).

RRM performance requirements consist of min SSB\_RP/CSI-RS\_RP at RX beam peak direction and for spherical coverage direction.

**Issue 3-2: RRM performance requirements for FR2 FWA UE power class 5 for band n259**

* Proposals
  + Option 1: Ericsson
    - The minimum received signal level (SSB\_RP or CSI-RS levels) for RX for beam peak direction and for spherical coverage direction as part of the side conditions will be defined in sections B.1 and B.2 of TS 38.133 after the RF group has agreed on the UE RF requirements (UE REFSENS and EIS spherical coverage) for FR2 FWA power class 5 with maximum TRP of 23 dBm for band n259.
  + Option 2: None
* Recommended WF
  + Further discuss proposal in option 1

## Companies views’ collection for 1st round

### Open issues

**Sub-topic 3-1: Issue 3-1: RRM core requirements for FR2 FWA UE power class 5 for band n259.**

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| **Company** | **Comments** |
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**Sub-topic 3-2: Issue 3-2: RRM performance requirements for FR2 FWA UE power class 5 for band n259**

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

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## Summary for 1st round

### Open issues

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|  | **Status summary** |
| **Sub-topic 3-1** | **Issue 3-1: RRM core requirements for FR2 FWA UE power class 5 for band n259**  *Tentative agreements:*  The FR2 band group for PC5 for n259 will be defined in Table 3.5.3-1 of TS 38.133 after the RF group has agreed on the UE RF requirements (UE REFSENS) for FR2 FWA power class 5 with maximum TRP of 23 dBm for band n259.  *Recommendations for 2nd round:* Follow up progress of RF group on REFSENS requirements for PC5 for band n259 during the 2nd round. |
| **Sub-topic 3-2** | **Issue 3-2: RRM core requirements for FR2 FWA UE power class 5 for band n259**  *Tentative agreements:*  The minimum received signal level (SSB\_RP or CSI-RS levels) for RX for beam peak direction and for spherical coverage direction as part of the side conditions will be defined in sections B.1 and B.2 of TS 38.133 after the RF group has agreed on the UE RF requirements (UE REFSENS and EIS spherical coverage) for FR2 FWA power class 5 with maximum TRP of 23 dBm for band n259.  *Recommendations for 2nd round:* Follow up progress of RF group on REFSENS and EIS spherical coverage requirements for PC5 for band n259 during the 2nd round. |

### CRs/TPs

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| **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**

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| **Title** | **Source** | **Comments** |
| WF on RRM requirements for spectrum WIs | Ericsson | To capture agreements on RRM requirements for all the spectrum related WIs |
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**Existing tdocs**

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| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| **[R4-2107148](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107148.zip)** | RRM core requirements for band n262 in 38.133 | Ericsson | Return to | Following up RF group discussion on PC1/2/4 |
| **[R4-2107150](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107150.zip)** | RRM performance requirements for band n262 in 38.133 | Ericsson | Return to | Following up RF group discussion on PC1/2/4 |
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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

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| **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 |  |
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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