**3GPP TSG-RAN WG4 Meeting # 102-e R4-220xxxx**

**Electronic Meeting, 21st Feb. – 03rd March, 2022**

**Agenda item:** 10.15.1, 10.15.2

**Source:** Moderator (LG Electronics)

**Title:** Email discussion summary for [102-e][130] NRSL\_enh\_Part1

**Document for:** Information

# Introduction

In this paper, RAN4 treats the SL\_enh\_part1 in Rel-17 for operating bands, system parameters, and UE transmitter/Receiver requirements for SL enhancement including advanced 5G V2X, Public safety usage and other commercial use cases with PC5 operation.

The provided technical docs list of email discussion are shown in the existing Tdocs in recommenations for Tdocs Part.

Candidate target of email discussion for 1st round is listed as follows.

* 1st round: Discuss NR SL enhancement UE RF requirements to support PS service and other SL operation.
  + Topic #1: SL enhancement UE RF requirements
  + Sub-Topic #1-1: TxD RF requirements
    - Sub-Topic #1-1-1: Frequency error for TxD
    - Sub-Topic #1-1-2: Revision of MPR for PC2 TxD in TS38.101-1
  + Sub-Topic #1-2: n14 PS UE RF requirements
    - Sub-Topic #1-2-1: 5MHz CBW FRC Tables for PS UE in Annex 7
    - Sub-Topic #1-2-2: Merged big CR for Part1
  + Sub-Topic #1-3: Other RF requirements
    - Sub-Topic #1-3-1: Updated TR 38.785 v1.0.0
  + Sub-Topic #1-4: Configured Tx power for SL in Rel-16 (Maintenance issue)
    - Sub-Topic #1-4-1: PEMAX,c IE parameters (*sl-maxTxPower, sl-MaxTransPower, SL-TxPower*)
    - Sub-Topic #1-4-2: Serving cell associated issues in licensed band
* 2nd round: TBA with Table Format

# Topic #1: SL enhancements UE RF requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-1104017 | Qualcomm | **Frequency error merasurement period for NR SL MIMO and NR V2X TxD UE**  Observation 1: The frequency error observation period for NR SL MIMO and NR V2X TxD is 0.5 ms  Observation 2: The frequency error observation period for NR Uu UL MIMO and NR Uu TxD is 1.0ms  **Proposal 1: The frequency error observation period for NR SL MIMO and NR V2X TxD should be revised to 1.0 ms to align with the Uu specifications** |
| [R4-2204154](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-e/Docs/R4-2117402.zip) | LG Electronics | **Draft CR for TS 38.101-1, Include FRC Tables for 5MHz CBW for PS UE in Annex 7**   * **See the detail proposals in R4-2204154** |
| R4-2204156 | LG Electronics | **Draft Big CR TS38.101-1: Merged the endorsed CRs for SL enhancements for PS UE in Part1**  Endorsed Draft CRs   * Add contents from R4-2202408 and R4-2204154 |
| R4-2204157 | LG Electronics | **Big CR: CR to introduce SL enhancements UE RF requirements in Rel-17**  Formal big CR to merge these endorsed big CRs in NRSL\_enh Part1/2/3. It will be reserved to capture the all draft CRs in TS38.101-1. |
| [R4-2](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_101-e/Docs/R4-2119536.zip)205583 | Huawei | **Draft CR for TS 38.101-1, update MOP and MPR requirements of PC2 TxD for SL UE**  Table 6.2E.1.1-1: NR V2X UE Power Class for SL-MIMO   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | NR band | Class 1 (dBm) | Tolerance (dB) | Class 2 (dBm) | Tolerance (dB) | Class 3 (dBm) | Tolerance (dB) | Class 4 (dBm) | Tolerance (dB) | | n38 |  |  |  |  | 23 | +2/-3 |  |  | | n47 |  |  | 26 | +2/-2 | 23 | +2/-3 |  |  |   Table 6.2E.2.2-2: Maximum Power Reduction (MPR) for power class 2 V2X (Contiguous PSCCH and PSSCH transmission)   |  |  |  |  | | --- | --- | --- | --- | | **Modulation** | | **Channel bandwidth/MPR (dB)** | | | **Outer RB allocations** | **Inner RB allocations** | | CP-OFDM | QPSK | ≤ 5.5 | ≤ 2.5 | | 16QAM | | 64 QAM | ≤ 6.0 | ≤ 4.5 | | 256 QAM | ≤ 7.0 | |   Reuse MPR for PSFCH transmission of PC3 V2X TxD UE for PC2 V2X TxD UE.  Reuse MPR for S-SSB transmission of PC3 V2X TxD UE for PC2 V2X TxD UE. |
| R4-2204929 | vivo | **Draft CR for TS38.101-1 in Rel-16: Update configured Tx power in clause 6.2E.4 in TS38.101-1**  - PCMAX,f,*c* is configured for PSSCH\PSCCH and PSFCH, respectively;  - For the total transmitted power PCMAX,PSSCH/PSCCH/PSFCH , PEMAX,c is the value given by IE *sl-MaxTransPower*, defined by TS 38.331.  - For the total transmitted power PCMAX,S-SSB , PEMAX,c is not defined by TS 38.331. Thus, PCMAX\_L,f, *c* is still applicable for the lower bound of PCMAX,S-SSB; for the upper bound of PCMAX,S-SSB, it should be MIN {PPowerClass, PRegulatory}. |
| R4-2204152 | LG Electronics | TR38.785 v1.0.0 TR Update for SL enhancement in Rel-17  It will be reserved to capture the all approved TPS and WF in this meeting |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

Based on provided contributions, RAN4 discusses the detailed NR UE RF Tx/Rx requirements for SL enhancement service.

* + Topic #1: SL enhancement UE RF requirements
  + Sub-Topic #1-1: TxD RF requirements
    - Sub-Topic #1-1-1: Frequency error for TxD
    - Sub-Topic #1-1-2: Revision of MPR for PC2 TxD in TS38.101-1
  + Sub-Topic #1-2: n14 PS UE RF requirements
    - Sub-Topic #1-2-1: 5MHz CBW FRC Tables for PS UE in Annex 7
    - Sub-Topic #1-2-2: Merged big CR for Part1
  + Sub-Topic #1-3: Other RF requirements
    - Sub-Topic #1-3-1: Updated TR 38.785 v1.0.0
  + Sub-Topic #1-4: Configured Tx power for SL in Rel-16 (Maintenance issue)
    - Sub-Topic #1-4-1: PEMAX,c IE parameters (*sl-maxTxPower, sl-MaxTransPower, SL-TxPower*)
    - Sub-Topic #1-4-2: Serving cell associated issues in licensed band

### Sub-topic #1-1

*Sub-topic description:* **TxD RF requirements**

*Open issues and candidate options before e-meeting:*

**Issue 1-1-1: Frequency error for TxD**

* Proposals
  + Option 1: The frequency error observation period for NR SL MIMO and NR V2X TxD should be revised to 1.0 ms to align with the Uu specifications.
  + Option 2: Keep the current 0.5ms for NR SL MIMO and V2X TxD UE.
* Recommended WF
  + Option 1 is acceptable

Discussion:

Qualcomm: Support Option 1 which is aligned with NR Uu spec.

Huawei: we need consider Cat F CR to correct the value for LTE-V. We only consider the revision for NR.

Xiaomi: for LTE-V, 0.5ms corresponds to LTE Uu.

Agreement: for frequency error for TxD, agree with Option 1.

**Issue 1-1-2: Revision of MPR for PC2 TxD in TS38.101-1**

* Proposals
  + Option 1: Based on Huawei CR (R4-2205583), RAN4 can update the MOP and MPR requirements for PC3/PC2 V2X TxD UE.
  + Option 2: In Table 6.2E.1.1-1, the PC2 tolerance should be aligned with NR UL-MIMO UE with +2/-3dB.
  + Option 3: Need further clarification for the proposed contents in Huawei CR (R4-2205583)
* Recommended WF
  + TBD

Huawei: We would like to check if the separate tables for TxD are needed.

LGE: Not to define the separate table for TxD.

Agreement: Do not have separate tables for TxD requirements for NR V2X PC2 UE.

### Sub-topic #1-2

*Sub-topic description:* **n14 PS UE RF requirements**

*Open issues and candidate options before e-meeting:*

**Issue 1-2-1: 5MHz CBW FRC Tables for PS UE in Annex 7**

* Proposals
  + Option 1: Based on LGE CR (R4-2204154), RAN4 can update the FRC tables for 5MHz CBW for PS UE.
  + Option 2: Need time to further check the FRC Tables.
* Recommended WF
  + TBD.

Discussion:

Qualcomm: there was band combination for 5MHz with 30KHz SCS, which is targeting at public safety. The related part should be removed from document.

LGE: 5MHz can be support with 30KHz SCS.

AT&T: We do not think it is necessary to limit to n14. There is no band to show 5Mhz with 30Khz.

Agreement: remove 5Mhz with 30Khz from the draft CRs.

**Issue 1-2-2: Merged big Draft CR for NRSL\_enh\_Part1**

* Proposals
  + Option 1: Based on LGE CR (R4-2204156), RAN4 can complete SL enh. UE RF requirements for PS UE and other commercial usage with SL operation.
  + Option 2: Need time to further check the contents.
* Recommended WF
  + TBD.

### Sub-topic #1-3

*Sub-topic description:* **Other RF requirements**

*Open issues and candidate options before e-meeting:*

**Issue 1-3-1: Updated TR 38.785 v1.0.0**

* Proposals
  + Option 1: Updated TR will be treated in 2nd round to capture the approved TPs and complete the NRSL\_enh WI in Rel-17.
* Recommended WF
  + Option 1 is acceptable

### Sub-topic #1-4

*Sub-topic description:* **Configured Tx power for SL in Rel-16 (Maintenance issue)**

*Open issues and candidate options before e-meeting:*

**Issue 1-4-1: PEMAX,c IE parameters (*sl-maxTxPower, sl-MaxTransPower, SL-TxPower*)**

* Proposals
  + Option 1: Based on vivo CR (R4-2204929), RAN4 can update the PEMAX,c is updated to use the IE *‘sl-MaxTransPower’* instead of the IE *‘slmaxTxPower’*.
  + Option 2: Need to wait the formal reply LS from RAN1/RAN2.
* Recommended WF
  + TBD

**Issue 1-4-2: Serving cell associated issues in licensed band**

**The following options are provided in the sent LS (R4-2120047)**

* Proposals
  + Option 1: The parameter can be associated either with a serving cell or without a serving cell, and it can be configured separately with p-max for Uu.
  + Option 2: The parameter can be associated either with a serving cell or without a serving cell, when the parameter is associated with a serving cell, PEMAX,c is the smaller value given by this parameter for SL and p-max for Uu of that serving cell.
  + Option 3: When UE is associated with a serving cell on the NR V2X carrier, p-max is used for serving cell c; when the UE is not associated with a serving cell on the NR V2X carrier, the parameter given for SL in RAN2 specification is used.
* Recommended WF
  + TBD

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

Sub topic 1-1: **TxD RF requirements**

**Issue 1-1-1: Frequency error for TxD**

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| **Company** | **Comments** |
| CATT | OK with the recommended WF. |
| Huawei | OK to align the observation period with Uu. |
| Qualcomm | Option 1. OK with the recommended WF |
| LGE | Option 1 |
| Xiaomi | OK with option 1. |
| OPPO | Option 1 |

**Issue 1-1-2: Revision of MPR for PC2 TxD in TS38.101-1**

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| --- | --- |
| **Company** | **Comments** |
| CATT | Support this CR but the tolerance for PC2 should be aligned with NR UL-MIMO UE with +2/-3dB as presented in option 2. |
| Huawei | Ok to have the tolerance with +2/-3dB, the values are cited from the TR, if +2/-3dB is agreeable, the TR should also be updated. |
| Qualcomm | The PC2 MPRs for PSFCH agreed in WF R4-2107873 and the the values proposed for PC2 in WF R4-220583 seem to be different.  Also it seems that in 38.101-1 that UL MIMO is only defined for PC3. Furthermore, PC2 Uu TxD has different MPR tables for 2 Tx and 1 Tx. From reading this document it is not clear if the 1TX V2X PC3 and PC2 MPR tables are being proposed for both PC3 and PC2 SL-MIMO and TxD. We think that if we follow the Uu guidelines we need separate 2TX MPR tables for V2X PC2 TxD and a separate MPR table for PC2 SL MIMO. |
| LGE | Option 2 and option 3. For the separate MPR table for 2Tx and 1Tx V2X UE, RAN4 need to make common understanding for the RF architecture for TxD V2X UE. In our view, the 23+23 dBm 2Tx MPR is baseline to determine the PC2 TxD V2X UE. |
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Sub topic 1-2: **n14 PS UE RF requirements**

**Issue 1-2-1: 5MHz CBW FRC Tables for PS UE in Annex 7**

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| **Company** | **Comments** |
| CATT | Option 1. |
| Qualcomm | The values for all modulations for SCS=30kHz, CBW=5MHz should be removed as this CBW does not support SCS=30kHz |
| LGE | Support option 1.  To QC, the 5MHz CBW for SCS =30kHz in NR Uu shall supported in Table 5.3.2-1 in TS38.101-1 as follow    What does mean not support the 5MHz CBW for SCS=30kHz ? |
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**Issue 1-2-2: Merged big Draft CR for NRSL\_enh\_Part1**

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| **Company** | **Comments** |
| Qualcomm | In R4-2204156 the values for all modulations for SCS=30kHz, CBW=5MHz should be removed as this CBW does not support SCS=30kHz |
| LGE | We need to QC view the clarification question in issue 1-2-1. |
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Sub topic 1-3: **Other RF requirements**

**Issue 1-3-1: Updated TR 38.785 v1.0.0**

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| **Company** | **Comments** |
| LGE | OK with option 1 |
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Sub topic 1-4: **Configured Tx power for SL in Rel-16**

**Issue 1-4-1: PEMAX,c IE parameters (*sl-maxTxPower, sl-MaxTransPower, SL-TxPower*)**

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| --- | --- |
| **Company** | **Comments** |
| CATT | Prefer option 2 although we also think option 1 is technically correct. This issue should be discussed based on RAN1/RAN2 reply LS. As far as I know, both RAN1 and RAN2 are going to handle this issue in this meeting. |
| LGE | We are fine with option1 and also acceptable with option2 to wait the reply LS from RAN1/2 WG. Based on the feedback, RAN4 can revise the configured Tx power in TS38.101-1 for maintenance in Rel-16/17. |
| Huawei | Draft CR by vivo is ok for us. |
| Qualcomm | Prefer option 2. Though we think that option 1 is correct we believe that we should wait for the RAN1/RAN2 response to the LS that was sent. |
| Xiaomi | Currently both RAN1 and RAN2 is drafting the reply LS for this issue. So we should wait for the reply LS first and then make conclusion. |
| OPPO | Option 1 is ok, but the CR itself has more changes than changing Pemax,c IE from SL-maxTxPower, it also removes S-SSB from Pcmax,f,c definition but in the below it further mention the PCMAX,S-SSB requirements which seems contradicting each other (*below red line*).  If PEMAX,c is not defined by TS 38.331 and not applied to S-SSB, then the clarification of lower bound and upper bound should be same (*current CR change use different language to handle lower bound and upper bound as below green line*). Easier changes could be just one clarification sentence saying the PEMAX,c is not defined by TS 38.331 and not applied to S-SSB. |

**Issue 1-4-2: Serving cell associated issues in licensed band**

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| **Company** | **Comments** |
| CATT | This issue should be discussed based on RAN1/RAN2 reply LS. As far as I know, both RAN1 and RAN2 are going to handle this issue in this meeting. |
| Huawei | Our preference is option 1. If no timely response from RAN1/2, either agree the draft CR by vivo or keep the existing spec unchanged is ok for us. Later on, based on inputs from other WGs, we can correct the spec with maintenance CR. |
| Qualcomm | We think that we should wait for the RAN1/RAN2 LS reply before making a decision. However, our preference is option 3. |
| LGE | Support option 1 and acceptable to wait the reply LS from RAN1/2 WG. |
| Xiaomi | Currently both RAN1 and RAN2 is drafting the reply LS for this issue. So we should wait for the reply LS first and then make conclusion. |
| OPPO | RAN1 and RAN2 dependent. |

### 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** |
| **R4-2204154** | Qualcomm : see our comments for issue 1-2-1 |
| Company B |
| … |
| **R4-2204156** | Qualcomm : see our comments for issue 1-2-2 |
| Company B |
| … |
| **R4-2205583** | Qualcomm : see our comments for issue 1-1-2 |
| Company B |
| … |
| **R4-2204152** | Company A |
| Company B |
| … |
| **R4-2204157** | Company A |
| Company B |
| … |
| **R4-2204929 & R4-2204930 (Maintenance)** | Qualcomm: see our comments to issue 1-4-1 |
| OPPO: See comment in Issue 1-4-1 |
| … |

## 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** |
| **Sub-topic#1-1:**  **TxD RF requirements** | **Issue 1-1-1: Frequency error for TxD**  *- Candidate options*  *- Tentative agreements*  *- Recommendations for 2nd round:* |
| **Issue 1-1-2: Revision of MPR for PC2 TxD in TS38.101-1**  *- Candidate options*  *- Tentative agreements*  *- Recommendations for 2nd round:* |
| **Sub-Topic#1-2:**  **n14 PS UE RF requirements** | **Issue 1-2-1: 5MHz CBW FRC Tables for PS UE in Annex 7**  *- Candidate options*  *- Tentative agreements*  *- Recommendations for 2nd round:* |
| **Issue 1-2-2: Merged big Draft CR for NRSL\_enh\_Part1**  *- Candidate options*  *- Tentative agreements*  *- Recommendations for 2nd round:* |
| **Sub-topic#1-3:**  **Other RF requirements** | **Issue 1-3-1: Updated TR38.785 v1.0.0**  *- Candidate options*  *- Tentative agreements*  *- Recommendations for 2nd round:* |
| **Sub-topic#1-4:**  **Configured Tx power for SL in Rel-16 (Maintenance issue)** | **Issue 1-4-1: PEMAX,c IE parameters (*sl-maxTxPower, sl-MaxTransPower, SL-TxPower*)**  *- Candidate options*  *- Tentative agreements*  *- Recommendations for 2nd round:* |
| **Issue 1-4-2: Serving cell associated issues in licensed band**  *- Candidate options*  *- Tentative agreements*  *- 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** |
| **R4-2204154** |  |
| **R4-2204156** |  |
| **R4-2205583** |  |
| **R4-2204152** | TR38.785 v1.0.0. It will be treated in 2nd round |
| **R4-2204157** | Formal big CR It will be treated as e-mail approval after 2nd round |
| **R4-2204929 (Maintenance)** | Maintenance Draft CR to update PEmax,c IE in TS38.101-1 Rel-16 |
| **R4-2204930** | Mirror CR of R4-2204929 in TS38.101-1 Rel-17 |
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## Discussion on 2nd round (if applicable)

### Open issues (if applicable)

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
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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*

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| **Tdoc number** | **Title** | **Source** | **Reccomandation** |
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# 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** |
| [**R4-2204017**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204017.zip) | Frequency error measurement period for NR SL MIMO and NR V2X TxD | Qualcomm Incorporated |  |  |
| R4-2204152 | TR38.785 v1.0.0 TR Update for SL enhancement in Rel-17 | LG Electronics France |  |  |
| [**R4-2204154**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204154.zip) | Draft CR on FRC for 5MHz CBW for SL enhancement for public safety service in n14 | LG Electronics France |  |  |
| [**R4-2204156**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204156.zip) | Draft big CR to merge the endorsed CRs for SL enhancement PS UE in Part1 | LG Electronics France |  |  |
| R4-2204157 | Formal big CR to introduce SL enhancements UE RF requirements in Rel-17 | LG Electronics France |  |  |
| [**R4-2204929**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204929.zip) | Draft CR for TS 38.101-1, Correction on configured transmitted power for SL (Rel-16) | vivo |  |  |
| R4-2204930 | Draft CR for TS 38.101-1, Correction on configured transmitted power for SL (Rel-17) | vivo |  |  |
| [**R4-2205583**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205583.zip) | draft CR for TS 38.101-1: introduction of PC2 TxD for SL | Huawei, HiSilicon |  |  |
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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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
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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

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| LG Electronics | Suhwan Lim | Suhwan.lim@lge.com |
| CATT | Yuan Gao | gaoyuan@catt.cn |
| vivo | Shuai Zhou | shuai.zhou@vivo.com |
| AT&T | Ron Borsato | ronald.borsato@att.com |

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)