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

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

**Agenda item:** 9.14.1, 9.14.2, 9.14.3, 9.14.4, 9.14.7

**Source:** Moderator (LG Electronics)

**Title:** Email discussion summary for [99-e][142] NRSL\_enh\_Part\_1

**Document for:** Information

# Introduction

In this paper, RAN4 treat the SL enhancement in Rel-17 for operating bands, system parameters and UE transmitter/Receiver requirements for SL enhancement including 5G V2X enhancement and Public safety using PC5 operation.

The provided technical docs list of email discussion are shown in Reference in the end of the paper.

Candidate target of email discussion for 1st round are listed as following

* 1st round: RAN4 discuss SL enh. operating scenarios in n14, operating bands and the related system parameters and SL UE Tx/Rx requirements for SL enhancement.
* Topic #1: UE system parameters and RF requirements for SL enhancement
  + Topic #1-1: General & System parameters
  + Sub-Topic #1-1-1: Operating bands & CBW for SL enhancement
  + Sub-Topic #1-1-2: Baseline TP for Operating bands & CBW for SL enhancement
  + Sub-Topic #1-1-3: Channel raster & sync. raster
  + Sub-Topic #1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission
  + Topic #1-2: SL enhancement UE Rx requirements
  + Sub-Topic #1-2-1: REFSENS for SL enhancement
  + Sub-Topic #1-2-2: Maximum input level for SL enhancement
  + Sub-Topic #1-2-3: ACS and other Rx requirements for SL enhancement
* Topic #2: Coexistence evaluation
  + Topic #2-1: Necessity of coexistence evaluation to protect B13 by n14 PC1/PC3 operation
  + Sub-Topic #2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14
  + Topic #2-2: Comparison between LTE Prose and NR SL enh. in n14 operating band.
  + Sub-Topic #2-2-1: Different point for the operating scenarios between LTE Prose and NR SL enh.
  + Sub-Topic #2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation
  + Sub-Topic #2-2-3: What is next step for n14 coexistence evaluation?
* 2nd round: The following issues will further discussed and treat the 6 Todcs for SL enh\_Part1
  + Issue 1-1-1: Operating bands & CBW for SL enhancement
  + Issue 1-1-3: Channel raster & sync. Raster in licensed band
  + Issue 1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission
  + Issue 2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14
  + Issue 2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation

|  |  |  |
| --- | --- | --- |
| **Tdoc number** | **Title** | **Source** |
| R4-2107863 | WF on coexistence evaluation necessity in n14 | LGE |
| R4-2107864 | WF on Feasibility of DL frequency range in FDD band used for SL operation | vivo |
| R4-2107865  (Rev. of R4-2109032) | TP on UE Rx RF requirement for NR SL enhancement | CATT |
| R4-2109921 | TR38.785 v0.2.0 TR Update for SL enhancement in Rel-17 | LG Electronics France |
| R4-2107866  (Rev. of R4-2110175) | TP on channel bandwidth for newly introduced SL bands | CATT |
| R4-2107867  (Rev. of R4-2111535) | NR Sidelink in NR Band n14 and Coexistence Studies | AT&T |

# Topic #1: UE system parameters and RF requirements for SL enhancement

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109032 | CATT | TP on Rx RF requirements  The REFSENS requirements for NR SL enhancement are specified in Table 8.2.1-1.  Table 8.2.1-1: Reference sensitivity for NR SL enhancement (PC5)   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **NR Operating band / SCS / Channel bandwidth / Duplex-mode** | | | | | | | | | **V2X Band** | **SCS**  **kHz** | **5MHz**  **(dBm)** | **10MHz**  **(dBm)** | **20MHz**  **(dBm)** | **30MHz**  **(dBm)** | **40MHz**  **(dBm)** | **Duplex Mode** | | n14 | 15 | -99.9 | -99.9 |  |  |  | FDD | | 30 |  | -96.9 |  |  |  | | 60 |  |  |  |  |  |   Max input level  Table 8.2.2-1: Maximum input level for NR SL enhancement   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Rx Parameter | Units | Channel bandwidth | | | | | |  |  | 5 MHz | 10 MHz | 20 MHz | 30 MHz | 40 MHz | | Power in Transmission Bandwidth Configuration | dBm | -251 | -251 |  |  |  | |  |  | -272 | -272 |  |  |  | | NOTE 1: Reference measurement channel is A.x for 64QAM.  NOTE 2: Reference measurement channel is A.x for 256QAM. | | | | | | |   Refer ACS, blocking requirements, spurious response and Intermodulation in the TP. |
| R4-2109691 | Vivo | TP on operating bands and channel arrangement.  In section 7.1, vivo added all new operating bands as follow  NR V2X is designed to operate in the operating bands in FR1 defined in Table 7.1.1-1.  **Table 7.1.1-1 V2X operating bands in FR1**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **V2X Operating Band** | **Sidelink (SL) Transmission operating band** | | | **Sidelink (SL) Reception operating band** | | | **Duplex Mode** | **Interface** | |  | **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |  |  | | n381 | 2570 MHz | - | 2620 MHz | 2570 MHz | - | 2620 MHz | HD | PC5 | | n47 | 5855 MHz | - | 5925 MHz | 5855 MHz | - | 5925 MHz | HD | PC5 | | n142 | 788 MHz | - | 798 MHz | 758 MHz | - | 768 MHz | HD | PC5 | | n79 | 4400 MHz | - | 5000 MHz | 4400 MHz | - | 5000 MHz | HD | PC5 | | Note 1: When this band is used for V2X SL service, the band is exclusively used for NR V2X in particular regions.  Note 2: This band is only used for SL transmission for public safety services when UE is out of coverage of LTE/NR. | | | | | | | | |   **Table 7.1.3-1 Intra-band con-current operating bands**   |  |  |  | | --- | --- | --- | | **V2X con-current operating Band** | **NR or V2X Operating Band** | **Interface** | | V2X\_n38 | n38 | Uu | |  | n38 | PC5 | | V2X\_n79 | n79 | Uu | |  | n38 | PC5 |   CBW  Table 7.2.1-1 V2X Communication channel bandwidth   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  | V2X band / V2X channel bandwidth | | | | | | | | | | | V2X Operating Band | SCS kHz | 5 MHz | 10 MHz | 20 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz | | n38 | 15 |  | Yes | Yes | Yes | Yes |  |  |  |  |  | | 30 |  | Yes | Yes | Yes | Yes |  |  |  |  |  | | 60 |  | Yes | Yes | Yes | Yes |  |  |  |  |  | | n47 | 15 |  | Yes | Yes | Yes | Yes |  |  |  |  |  | | 30 |  | Yes | Yes | Yes | Yes |  |  |  |  |  | | 60 |  | Yes | Yes | Yes | Yes |  |  |  |  |  | | n14 | 15 | Yes | Yes |  |  |  |  |  |  |  |  | | 30 |  | Yes |  |  |  |  |  |  |  |  | | 60 |  |  |  |  |  |  |  |  |  |  | | n79 | 15 |  |  |  |  | Yes |  |  |  |  |  | | 30 |  |  |  |  | Yes |  |  |  |  |  | | 60 |  |  |  |  | Yes |  |  |  |  |  |   Channel bandwidth for intra-band V2X operation   | V2X configuration | Operating band | Channel bandwidths for NR Uu carrier (MHz) | Channel bandwidths for NR SL carrier (MHz) | | --- | --- | --- | --- | | V2X\_n38 | n38 for Uu/SL | 10,20,30,40 | 10,20,30,40 | | V2X\_n79 | n79 for Uu/SL | 40,50,60,80,100 | 40 |   In 7.3.1.1, vivo added NR V2X reference frequency as same in n47  For NR V2X UE, the reference frequency can be shifted by configuration.  FREF\_V2X = FREF + Δshift + N \* 5 kHz  where  Δshift = 0 kHz or 7.5 kHz indicated in IE (frequencyShift7p5khz), and  N can be set as one of following values {-1, 0, 1}, which are signalled by the network in higher layer parameters or configured by pre-configuration parameters. |
| R4-2109692 | Vivo | System parameters discussion paper  **Proposal 1: To reuse the general channel raster and sync raster for NR V2X in Rel-16, instead of NR Uu in Rel-16, for SL enhancement in Rel-17.**  **Proposal 2: The downlink part of band n14 can be used for SL transmission when UE is out of coverage of LTE/NR Uu.**  **Proposal 3: Channel raster of 15kHz is preferred for n14 and the frequency raster shift can be configured.**   |  |  |  |  | | --- | --- | --- | --- | | **NR Operating Band** | **ΔFRaster**  **(kHz)** | **Uplink**  **Range of NREF**  **(First – <Step size> – Last)** | **Downlink**  **Range of NREF**  **(First – <Step size> – Last)** | | n14 | 15kHz | 157600 – <3> – 159598 | 151600 – <3> – 153598 | |
| R4-2110175 | CATT | TP on channel bandwidth for newly introduced SL bands  NR SL enhancement is designed to operate in the operating bands in FR1 defined in Table 7.1.1-1.  Table 7.1.1-1 operating bands in FR1 for NR SL enhancement   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | V2X Operating Band | Sidelink (SL) Transmission operating band | | | Sidelink (SL) Reception operating band | | | Duplex Mode | Interface | | FUL\_low – FUL\_high | | | FDL\_low – FDL\_high | | | | n141 | 788 MHz | - | 798 MHz | 758 MHz | - | 768 MHz | FDD | PC5 | | n792 | 4400 MHz | - | 5000 MHz | 4400 MHz | - | 5000 MHz | TDD | PC5 | | Note 1: When this band is used for public safety service, the band is exclusively used for NR V2X in out-of-coverage scenario.  Note 2: NR V2X service is partially operated in this band with NR Uu. | | | | | | | | |   Table 7.2.1-1 V2X channel bandwidth   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | V2X band / SCS/ V2X channel bandwidth | | | | | | | | | | | | | V2X Operating Band | SCS kHz | 5 MHz | 10 MHz | 20 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 80 MHz | 90 MHz | 100 MHz | | n14 | 15 | Yes | Yes |  |  |  |  |  |  |  |  | | 30 |  | Yes |  |  |  |  |  |  |  |  | | 60 |  |  |  |  |  |  |  |  |  |  | | n79 | 15 |  |  |  |  | Yes |  |  |  |  |  | | 30 |  |  |  |  | Yes |  |  |  |  |  | | 60 |  |  |  |  | Yes |  |  |  |  |  |   Added inter-band con-current operating band and CBW in TP. But there was no request the inter-band con-current operation from operator for SL enh operation in Rel-17. |
| R4-2111428 | Huawei | TP on CBW for NR V2X in licensed band  In 7.2.1 CBW, Huawei added as follow  “The maximum channel bandwidth for SL service for NR V2X in licensed band is 40MHz.” |

## 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 mainly treat the following UE general parameters (operating bands, system parameters) and RF requirements for SL enhancement WI to support public safety and other SL operation.*

* Topic #1: UE system parameters and RF requirements for SL enhancement
  + Topic #1-1: General & System parameters
  + Sub-Topic #1-1-1: Operating bands & CBW for SL enhancement
  + Sub-Topic #1-1-2: Baseline TP for Operating bands & CBW for SL enhancement
  + Sub-Topic #1-1-3: Channel raster & sync. raster
  + Sub-Topic #1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission
  + Topic #1-2: SL enhancement UE Rx requirements
  + Sub-Topic #1-2-1: REFSENS for SL enhancement
  + Sub-Topic #1-2-2: Maximum input level for SL enhancement
  + Sub-Topic #1-2-3: ACS and other Rx requirements for SL enhancement

### Sub-topic 1-1

*Sub-topic description:* **General & System parameters**

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

As Rapporteur and moderator for SL enh. WI in Rel-17, the related specification works for left over issues and new SL operating scenarios and use cases shall be distinguished in TR38.785 as follow,

1. High power(PC2) V2X operating band (e.g. n38) and RF requirements will be captured in section 5.1
2. Partial usage for intra-band con-current V2X operating band (e.g. n79) and RF requirements will be captured in section 5.2
3. Section 6,7,8 in TR38.785 are for new SL enh. operation for advanced V2X service, public safety (e.g. n14) and other commercial use cases in Rel-17.

**Issue 1-1-1: Operating bands & CBW for SL enhancement**

* Proposals
  + Option 1: The operating band & CBW for SL enh. operation in Rel-17 will be captured in section 7.
  + Option 2: All operating bands & CBW for PC2 V2X operation, partial usage operation and SL enhancement operation will be captured in section 7.
* Recommended WF
  + TBA

**Issue 1-1-2: Baseline TP for Operating bands & CBW for SL enhancement**

* Proposals
  + Option 1: vivo TP (R4-2109691) is baseline to capture the detail operating bands & CBW for SL enhancement.
  + Option 2: CATT TP (R4-2110175) is baseline to capture the detail operating bands & CBW for SL enhancement.
* Recommended WF
  + TBA

**Issue 1-1-3: Channel raster & sync. raster**

* Proposals
  + Option 1: Keep the previous RAN4 agreement to follow the Channel raster & synch. Raster of NR Uu for SL enhancement in Rel-17.
  + Option 2: Reuse the general channel raster and sync raster for NR V2X in Rel-16 for SL enhancement in Rel-17.
* Recommended WF
  + TBA

**Issue 1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission.**

* Proposals
  + Option 1: This operation is out of scope for NR SL enh. WI in Rel-17. Also it is related regulatory issues in each country.
  + Option 2: Based on vivo proposal, RAN4 can add the scope in SL enhancement WI in Rel-17.
  + Option 3: RAN4 can allow the DL frequency range in FDD band used for SL transmission when the UE is operated in out-of coverage of LTE/NR Uu.
* Recommended WF
  + TBA

### Sub-topic 1-2

*Sub-topic description:* **SL enhancement UE Rx requirements**

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

**Issue 1-2-1: REFSENS for SL enhancement**

* Proposals
  + Option 1: RAN4 can define the REFSENS requirements for n14 based on CATT proposal (in R4-2109032)
  + Option 2: Based on TP feedback in 1st round, it can be updated.
  + Option 3: Other option is not precluded
* Recommended WF
  + TBA

**Issue 1-2-2: Maximum input level for SL enhancement**

* Proposals
  + Option 1: RAN4 can define the Maximum input level requirements for n14 based on CATT proposal (in R4-2109032)
  + Option 2: Based on TP feedback in 1st round, it can be updated.
  + Option 3: Other option is not precluded
* Recommended WF
  + TBA

**Issue 1-2-3: ACS and other Rx requirements for SL enhancement**

* Proposals
  + Option 1: RAN4 can define these requirements for n14 based on CATT proposal (in R4-2109032)
  + Option 2: Based on TP feedback in 1st round, it can be updated.
  + Option 3: Other option is not precluded
* Recommended WF
  + TBA

## 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: **General & System parameters**

**Issue 1-1-1: Operating bands & CBW for SL enhancement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | Option 2. All operating bands and CBWs involved can be introduced in section 7. For the specific band, specific note can be added in tables. |
| Xiaomi | Option 2. As the release independent rule as well as the list of features for Rel-16 and Rel-17 is specified in general parts, it is ok to capture the band information in one chapter. |
| Vivo | Option 2. We have a TP on operating band & CHW for SL enhancement in this meeting. We should make clear that which specific bands and CBWs should be introduced in the TR. |
| Huawei | Option 2. |
| LGE | Option 1. Left over issue and SL en. Issue should be distinguished in TR. If option 2 is allowed, then it is quite difficult to distinguish which operating band is support for which service? |
| Qualcomm | Option 2 |

**Issue 1-1-2: Baseline TP for Operating bands & CBW for SL enhancement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | For option 1, we have some comments as below   1. No need to capture band n47 and n38 in TR 38.785. 2. For intra-band V2X\_n38, I am not sure if we have the request for this scenario. 3. For channel raster, the added part for frequency shift is also captured in 38.101-1. Seems no need to cope it here and just indicate the frequency shifts specified apply here. |
| Xiaomi | Ok with option 2. |
| Vivo: | To CATT’s comment:  1. Since we decide to introduce HPUE for n47 and concurrent operation in band n38, we think it is better to capture the bands in Rel-17 TR.  2. In RAN4, the co-existence evaluation for Uu and SL in n38 was performed in the last meeting. We think the scenario is valid.  3.We agree with CATT the frequency shift part is not needed in the TS. However, we should make clear in the TR. |
| Huawei | Similar view as CATT. Prefer to capture only the necessary information as in R4-2110175. In addition, the proposed change of CBW in R4-2111428 shall be included in the revised TP for bands and CBW. |
| LGE | Prefer option 2. Need more modification is needed for Vivo TP compare to CATT TP. |
| Qualcomm | Option 2. Also we noticed that in Table 7.1.1-1 of both R4-2110175 & R4-2109691 for n14 the SL TX and RX frequencies are different. We were under the impression that when n14 is used for SL only UL will be used for both TX and RX. |
| AT&T | We are OK with Option 2 and agree with the comment from CATT on Option 1 that the frequency shifts specified apply. We share the same view as QC that UL will be used for both TX and RX for SL operation in Band n14. We also prefer to remove Note 1 in the table 7.1.1-1 concerning SL operation for n14 for now or consider revising based on our discussion paper in R4-2111535. |

**Issue 1-1-3: Channel raster & sync. raster**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | Support previous agreements. Option 1 needs to be updated based on RAN4 previous common understanding as below.   1. Channel raster for SL enhancement follows that for NR Uu. 2. Sync raster for SL enhancement follows that for NR V2X   🡪Comment from LGE: what do you mean to follow NR V2X sync raster for V2X in licensed band? In my understanding, the n14 PS operation can reused the n14 NR Uu synch raster. |
| Xiaomi | Option 1. |
| vivo | In the last meeting, we agreed to reuse the general channel/sync raster in Uu for SL. However, in the agreed TP on channel/sync raster, it says no need to define sync raster for SL, which is not consistent with the sync raster definition with Uu, however agrees with the general channel/sync raster in NR V2X. We need to make clear of whether to reuse the general principle in Uu or V2X. |
| Huawei | Option 1. |
| LGE | Option 1. |
| Qualcomm | Option 1 |
| AT&T | Option 1 |

**Issue 1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | Option 3. If no LTE/NR Uu are deployed and the band is inclusively used for SL, both UL and DL band should be used for SL transmission. |
| Xiaomi | More study is needed before concluding that the DL spectrum can be used for SL.. |
| vivo | Our intention is to clarify that how to handle the DL part of FDD band for SL enhancement. Whether we can use the DL part for SL transmission or restrict the DL part only to Uu transmission. We think this can be clarified in RAN4. |
| Huawei | Some clarification from operator is needed. Based on the previous discussion, the feedback from operator is that the application scenario is similar to that of LTE-V. |
| LGE | Option 1. In SL operation, the SL UE only allowed to use UL resource for both FDD,TDD band. This is general principle for all RAN WG1,2,4.  To change the general principle for the SL operation, it will be discussed in RAN1, firstly. It is not scope of RAN4. |
| Qualcomm | Option 4 : The implications of using the DL for SL has to be further studied |
| AT&T | We agree with Qualcomm that the use of the DL for SL has to be further studied. In either case, for NR Band n14 SL operation, the UL will be used for SL as noted in our earlier comment. |

Sub topic 1-2: **SL enhancement UE Rx requirements**

**Issue 1-2-1: REFSENS for SL enhancement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | Support option 1 and option 2. |
| Xiaomi | For REFSENS, 13dB NF is used for band n47 as from LAA. For band n14, we believe separate NF as 9dB for NR might be used.  🡪 LGE comment: This is already considered for the REFSENS equation in TR38.886. For n14, RAN4 consider 9dB noise figure.  CATT reply to LGE: For band n38, it was agreed to not define sync raster like n47 inRel-16. 5.4E.3 Synchronization raster for V2X There is no synchronization raster definition for NR V2X for both licensed bands and unlicensed bands.  For licensed band n14, it can follow this principle especially when no Uu is deployed in this band. If for intra-band V2X con-current operation, how to define sync raster can be further discussed. |
| Huawei | OK with option 1 and option 2. |
| LGE | Option 2. Need revised the number of RB size in SL tx configuration and further check the detail values. |
| Qualcomm | Option 3: The SL REFSENSE numbers in R4-2109032 for n14 are more stringent than those for n14 in Uu as can be seen from the tables below. The basic understanding is that SL has similar performance as Uu. It is not practical to expect the RF circuitry to have better performance for SL compared to Uu. The REFSENSE numbers in R4-2109032 have to be updated to align with the REFSENSE values for n14 Uu.  REFSENSE values for Uu n14 from 38.101-1 (section 7.3.2)    REFSENSE values proposed for NR SL enhancements in R4-2109032    Also, it is unclear whether the RB allocations given in Table 8.2.1-2 were used to calculate the REFSENSE numbers given in R4-2109032. If so, we do not think that these values are correct. For 5MHz nRB should be 25 (15 kHz SCS) and for 10MHz it should be 50 &24 (15 kHz & 30 kHz SCS).  We believe that the NF for n14 in the SL REFSENSE equation has to be increased. |
| CATT | To LGE and QC:  The previous REFSENS values are calculated based on UL Tx configuration for NR Uu, in which NF is 9dB based on previous agreements.  I update SL Tx configuration and REFSENS values as below, where 9dB NF is still used. The requirements are still more stringent than NR Uu.  Table 8.2.1-1: Reference sensitivity for NR SL enhancement (PC5)   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **NR Operating band / SCS / Channel bandwidth / Duplex-mode** | | | | | | | | | **V2X Band** | **SCS**  **kHz** | **5MHz**  **(dBm)** | **10MHz**  **(dBm)** | **20MHz**  **(dBm)** | **30MHz**  **(dBm)** | **40MHz**  **(dBm)** | **Duplex Mode** | | n14 | 15 | -99.0 | -96.0 |  |  |  | FDD | | 30 |  | -96.1 |  |  |  | | 60 |  |  |  |  |  |   Table 8.2.1-2: Sidelink TX configuration for reference sensitivity for NR SL enhancement (PC5)   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | NR operating Band / SCS/ Channel bandwidth / NRB / Duplex mode | | | | | | | | | V2X Band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 20 MHz (dBm) | 30 MHz (dBm) | 40 MHz (dBm) | Duplex Mode | | n14 | 15 | 25 | 50 |  |  |  | FDD | | 30 |  | 24 |  |  |  | | 60 |  |  |  |  |  | |

**Issue 1-2-2: Maximum input level for SL enhancement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | Support option 1 and option 2. |
| Xiaomi |  |
| Huawei | OK with option 1 and option 2. |
| LGE | Support option 1 |
| Qualcomm | Option 1: RAN4 can define the Maximum input level requirements for n14 based on CATT proposal (in R4-2109032) |

**Issue 1-2-3: ACS and other Rx requirements for SL enhancement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | Support option 1 and option 2. |
| Xiaomi | As most of the requirements are reusing NR Uu requirements, we prefer simply refer to current TS 38.101-1 so that we don’t need to list them here.  Further, as discussed in issue 2, if the co-existence issue exist, we might need to further analyze the RX requirements. |
| Huawei | OK with option 1 and option 2. |
| LGE | For the coexistence issue, the impact will be reached to both Tx/Rx part. Maybe, RAN4 define tight ACLR requirements or A-MPR requirements to consider in-coverage NW scenarios. Also need to relax the REFSENS requirements or ACS relaxation based on interference analysis. Currently we can capture the Rx requirements based on CATT proposal. |
| Qualcomm | We are OK with the Max input level, ACS, inband blocking, out-of band blocking, spurious response and intermodulation characteristics given in R4-2109032. As mentioned in Issue 1-2-1 we do not agree with the REFSENSE values given in R4-2109032. |

### 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** |
| R4-2109032 | LGE: we can further check the detail REFSENS requirements for 5MHz, 10MHz for 15kHz SCS and 30kHz SCS. The 50RBs and 24RBs for CBW 10MHz are used for SL Tx configuration in table 8.2.1-2.  ACS and Other Rx requirements can be reused the related Rx requirements for NR Uu operation |
| Qualcomm : cannot accept this TP. The REFSENSE numbers are not aligned with the n14 Uu REFSENSE values as discussed in issue 1-2-1 |
| CATT: Thanks for all comments. We copy our comments on Issue 1-2-1 here.  To LGE and QC:  The previous REFSENS values proposed in R4-2109032 are calculated based on UL Tx configuration for NR Uu, in which NF is 9dB based on previous agreements.  I update SL Tx configuration and REFSENS values as below, where 9dB NF is still used.  Table 8.2.1-1: Reference sensitivity for NR SL enhancement (PC5)   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **NR Operating band / SCS / Channel bandwidth / Duplex-mode** | | | | | | | | | **V2X Band** | **SCS**  **kHz** | **5MHz**  **(dBm)** | **10MHz**  **(dBm)** | **20MHz**  **(dBm)** | **30MHz**  **(dBm)** | **40MHz**  **(dBm)** | **Duplex Mode** | | n14 | 15 | -99.0 | -96.0 |  |  |  | FDD | | 30 |  | -96.1 |  |  |  | | 60 |  |  |  |  |  |   Table 8.2.1-2: Sidelink TX configuration for reference sensitivity for NR SL enhancement (PC5)   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | NR operating Band / SCS/ Channel bandwidth / NRB / Duplex mode | | | | | | | | | V2X Band | SCS (kHz) | 5 MHz (dBm) | 10 MHz (dBm) | 20 MHz (dBm) | 30 MHz (dBm) | 40 MHz (dBm) | Duplex Mode | | n14 | 15 | 25 | 50 |  |  |  | FDD | | 30 |  | 24 |  |  |  | | 60 |  |  |  |  |  | |
| R4-2109691 | CATT: We have some comments as below:   1. No need to capture band n47 and n38 in TR 38.785. 2. For intra-band V2X\_n38, I am not sure if we have the request for this scenario. 3. For channel raster, the added part for frequency shift is also captured in 38.101-1. Seems no need to cope it here and just indicate the frequency shifts specified apply here. |
| To CATT’s comment:  1. Since we decide to introduce HPUE for n47 and concurrent operation in band n38, we think it is better to capture the bands in Rel-17 TR.  2. In RAN4, the co-existence evaluation for Uu and SL in n38 was performed in the last meeting. We think the scenario is valid.  3.We agree with CATT the frequency shift part is not needed in the TS. However, we should make clear in the TR. |
| LGE: several comment are provided asfollow  - n47, n38 is not needed. NR band n14 for SL enh. Service only can specified in section 7.  - n79 will be specified in section 5.2 for partial usage part for left over issues.  - n38/n47 can be specified in section 5.1 for PC2 V2X UE for left over sissues.  - Also currently n79 is only requested to support intra-band con-current operation. It will be captured in section 5.2 for left over issue. N38 will be removed in here.  - Same comment for CBW. Should be distinguished.  - For channel raster, removed the proposed contents. |
| Qualcomm: In table 7.1.1-1 doesn’t the TX/RX frequencies of n14 have to be the same (i.e. only UL band is used for TX & RX) |
| R4-2110175 | LGE: n79 and related CBWs will be moved to section 5.2 for partial usage part for left over issues. |
| Qualcomm: In table 7.1.1-1 doesn’t the TX/RX frequencies of n14 have to be the same (i.e. only UL band is used for TX & RX) |
|  |
|  |
| R4-2111428 | LGE: The contents are fine to us. But the contents will be added in CATT TP(R4-2110175) to merge same issue. |
| CATT: It is OK with us. It can be added in our TP (R4-2110175). |
|  |
|  |

## 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 #1-1: General & system parameters** | **Issue 1-1-1: Operating bands & CBW for SL enhancement**  **In 1st round, 5 companies support to capture all operating bands in section 7. But as a rapporteur for the SL enh WI, the operating bands should be distinguished according to feature such as PC2 V2X operation, intra-band con-current V2X operation and SL enh public safety service. Also, the operating bands and the related RF requirements are matched in same section. So it is problem when RAN4 consider with option 2.**  **So following issue will further discussed in 2nd round.**  *Candidate options:*   * Option 1: All operating band & CBW can be captured in section 7. But the related RF requirements and coexistence evaluation is described in the different sections in TR38.785. * Option 2: same section will be used according to SL enh. operation   + In section 5.1, PC2 V2X UE, the operating band and the related RF requirements will be captured.   + In section 5.2, Intra-band con-current operating band and the related RF requirements will be captured   + In section 7, SL enh operating band will be captured. Section 8 and section 9 will be captured the Tx and Rx requirements for SL enhancement.   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 will further discuss how to specify the operating band & CBW for SL enhancement.** |
| **Issue 1-1-2: Baseline TP for Operating bands & CBW for SL enhancement**  **In 1st round, almost companies support to use the CATT TP as baseline to define the operating band and CBW.**  *Tentative agreements:*   * Option 2: CATT TP (R4-2110175) is baseline to capture the operating bands & CBW for SL enhancement.   *Recommendations for 2nd round:*  **Based on above tentative agreement, the revised TP will treat to capture the operating band & CBW for SL enhancement in TR38.785.** |
| **Issue 1-1-3: Channel raster & sync. Raster in licensed band**  **In 1st round, almost companies support to option 1 to keep the previous RAN4 agreements to reuse NR Uu system parameters. But one discussion point is raised by CATT as following two options in 2nd round.**  *Tentative agreements:*   * Option 1: Keep the previous RAN4 agreement to follow the Channel raster & synch. Raster of NR Uu for SL enhancement in Rel-17.   *Candidate options:*   * Option 1: Channel raster for SL enhancement follows that for NR Uu. But, sync raster for SL enhancement follows that for NR V2X * Option 2: Both Channel raster & synch raster for SL enhancement follows that for NR Uu.   *Recommendations for 2nd round:*  **Based on above 2 candidate options, the revised TP can be updated for SL enhancement in TR38.785.** |
| **Issue 1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission**  **In 1st round, the interested company’s preference is diverse. But SL for SSB transmission is restricted in UL carrier in FDD band as defined in section 16.1 in TS38.213 as follow**  For paired spectrum, an S-SS/PSBCH block can be transmitted/received only in a slot of an UL carrier. For unpaired spectrum, an S-SS/PSBCH block can be transmitted/received only in a slot of which all OFDM symbols are semi-statically configured as UL as per the higher layer parameter *tdd-UL-DL-ConfigurationCommon* of the serving cell…  **So, as moderator we propose as following 2 candidate options in 2nd round.**  *Candidate options:*   * Option 1: Based on RAN1 specification aspect, the DL freq. range is not allow for SL operation in out-of overage in LTE/NR licensed band. * Option 2: Need further discussion with other RAN WGs to allow the DL frequency range in FDD band used for SL transmission in out-of coverage in LTE/NR licensed band.   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 need further discussion in 2nd round.** |
| **Sub-topic #1-2: SL enhancement UE Rx requirements** | **Issue 1-2-1: REFSENS for SL enhancement**  **In 1st round, some companies provided their view for TP. So the TP will be updated based on companies input. So option 2 was chosen as tentative agreements for REFSENS requirements.**  *Tentative agreements:*   * Option 2: Based on TP feedback in 1st round, it can be updated.   *Recommendations for 2nd round:*  **Based on above tentative agreement, the revised TP will treat to capture the REFSENS requirements for SL enhancement in TR38.785.** |
| **Issue 1-2-2: Maximum input level for SL enhancement**  **In 1st round, some companies provided their view for TP. So the TP will be updated based on companies input. So option 1 was chosen as tentative agreements for max. input levels.**  *Tentative agreements:*   * Option 1: RAN4 can define the Maximum input level requirements for n14 based on CATT proposal (in R4-2109032)   *Recommendations for 2nd round:*  **Based on above tentative agreement, the revised TP will treat to capture the max. input levels requirements for SL enhancement in TR38.785.** |
| **Issue 1-2-3: ACS and other Rx requirements for SL enhancement**  **In 1st round, some companies provided their view for TP. So the TP will be updated based on companies input. So option 1 was chosen as tentative agreements for other Rx requirements.**  *Tentative agreements:*   * Option 1: RAN4 can define the ACS and other Rx requirements for n14 based on CATT proposal (in R4-2109032)   *Recommendations for 2nd round:*  **Based on above tentative agreement, the revised TP will treat to capture the ACS and other Rx requirements for SL enhancement in TR38.785.** |

### 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** |
| R4-2109032 | *Based on 1st round of comments collection, moderator can recommend as*  ***“To be revised” to capture RX requirements for SL enhancement.*** |
| R4-2109691 | *Based on 1st round of comments collection, moderator can recommend as*  ***“Noted”*** |
| [R4-2110175](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110175.zip) | *Based on 1st round of comments collection, moderator can recommend as*  ***“To be revised” to capture CBWs for SL enhancement.*** |
| [R4-2111428](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111428.zip) | *Based on 1st round of comments collection, moderator can recommend as*  ***“Noted”. The content will be merged in CATT TP.*** |

## Discussion on 2nd round (if applicable)

### Open issues (if applicable)

**Issue 1-1-1: Operating bands & CBW for SL enhancement**

* Proposals
  + Option 1: All operating band & CBW can be captured in section 7. But the related RF requirements and coexistence evaluation is described in the different sections in TR38.785.
  + Option 2: same section will be used according to SL enh. operation
  + In section 5.1, PC2 V2X UE, the operating band and the related RF requirements will be captured.
  + In section 5.2, Intra-band con-current operating band and the related RF requirements will be captured
  + In section 7, SL enh operating band will be captured. Section 8 and section 9 will be captured the Tx and Rx requirements for SL enhancement.
* Recommended WF
  + FFS

**Issue 1-1-3: Channel raster & sync. Raster in licensed band**

In 1st round, almost companies support to option 1 to keep the previous RAN4 agreements to reuse NR Uu system parameters. But one discussion point is raised by CATT as following two options in 2nd round.

*Tentative agreements:* **RAN4 agreed as following tentative agreement based on 1st round**

* Option 1: Keep the previous RAN4 agreement to follow the Channel raster & synch. Raster of NR Uu for SL enhancement in Rel-17.
* Proposals
  + Option 1: Channel raster for SL enhancement follows that for NR Uu. But, sync raster for SL enhancement follows that for NR V2X
  + Option 2: Both Channel raster & synch raster for SL enhancement follows that for NR Uu.
* Recommended WF
  + FFS

**Issue 1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission**

In 1st round, the interested company’s preference is diverse. But SL for SSB transmission is restricted in UL carrier in FDD band as defined in section 16.1 in TS38.213 as follow

For paired spectrum, an S-SS/PSBCH block can be transmitted/received only in a slot of an UL carrier. For unpaired spectrum, an S-SS/PSBCH block can be transmitted/received only in a slot of which all OFDM symbols are semi-statically configured as UL as per the higher layer parameter *tdd-UL-DL-ConfigurationCommon* of the serving cell…

So, as moderator we propose as following 2 candidate options in 2nd round.

* Proposals
  + Option 1: Based on RAN1 specification aspect, the DL freq. range is not allow for SL operation in out-of overage in LTE/NR licensed band.
  + Option 2: Need further discussion with other RAN WGs to allow the DL frequency range in FDD band used for SL transmission in out-of coverage in LTE/NR licensed band.
* Recommended WF
  + FFS

### Companies views’ collection for 2nd round (if applicable)

**Issue 1-1-1: Operating bands & CBW for SL enhancement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | We still prefer option 2 to define operating bands and CBW will be captured in separate sessions as mentioned in option 2. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Issue 1-1-3: Channel raster & sync. Raster in licensed band**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | The Meaning of tentative agreement is aligned with option 2. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Issue 1-1-4: Feasibility of DL frequency range in FDD band used for SL transmission**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Based on RAN1 specification, only UL carrier is used to transmit S-SSB in FDD band. So option 1 is acceptable to us. The specific operating scenario will be further discussed in RAN Plenary to allow the specific operation in out-of coverage NW. |
| Qualcomm | Option 1 |
| Huawei | Option 1 to align with RAN1 spec. |
|  |  |
|  |  |
|  |  |

### Summary for 2nd round (if applicable)

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

# Topic #2: Coexistence evaluation

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111535 | AT&T | NR SL in n14 and coexistence study  AT&T proposed new operating scenarios and coexistence evaluation for adjacent carrier protection in n14 for SL enhancement.  1. Con-current operation NR SL and LTE Uu in n14 to support the additional public safety use cases.  2. Concern was raised during a previous meeting on coexistence with adjacent bands (in particular, Band 13) for NR sidelink operation in NR Band n14.  3. Based on Ericsson paper (R4-2102334), RAN4 need study coexistence evaluation in n14 to address above concerning points |

## 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 mainly treat the SL coexistence evaluation in n14 to support public safety and other SL operation.*

* Topic #2: Coexistence evaluation
  + Topic #2-1: Necessity of coexistence evaluation to protect B13 by n14 PC1/PC3 operation
  + Sub-Topic #2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14
  + Topic #2-2: Comparison between LTE Prose and NR SL enh. in n14 operating band.
  + Sub-Topic #2-2-1: Different point for the operating scenarios between LTE Prose and NR SL enh.
  + Sub-Topic #2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation
  + Sub-Topic #2-2-3: What is next step for n14 coexistence evaluation?

### Sub-topic 2-1

*Sub-topic description:* **Necessity of coexistence evaluation to protect B13 by n14 PC1/PC3 operation**

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

**Issue 2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14**

* Proposals
  + Option 1: The LTE prose UE (both PC1 and PC3) in Band 14 can coexisted with Band 13 UE in real field. So, RAN4 do not need the additional coexistence evaluation to protect band 13 UE.
  + Option 2: Other option is not precluded
* Recommended WF
  + TBA

### Sub-topic 2-2

*Sub-topic description:* **Comparison between LTE Prose and NR SL enhancement in n14 operating band**

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

**Issue 2-2-1: Different point for the operating scenarios between LTE Prose and NR SL enhancement**

* Proposals
  + Option 1: Con-current operation is only different point for the operating scenarios between LTE prose and NR SL enh. But it is self-interference issues in intra-device. It is not possible to support con-current operation in small frequency operating range with 10MHz for both UL/DL frequency in FDD band.
  + Option 2: Other option is not precluded.
* Recommended WF
  + TBA

**Issue 2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation**

* Proposals
  + Option 1: RNA4 can allow NR PS operation in in-coverage NW with legacy LTE/NR Uu operation. Since LTE PS already studied the coexistence evaluation to protect legacy LTE system.
  + Option 2: RAN4 need further coexistence evaluation to protect legacy LTE/NR system in n14
* Recommended WF
  + TBA

**Issue 2-2-3: What is next step for n14 coexistence evaluation?**

* Proposals
  + Option 1: Capture the detail reason for the unnecessary coexistence evaluation n14 SL operation in n14 to protect Band 13 or legacy LTE/NR system in n14. And RAN4 do not allow the con-current operation in n14 with small frequency range in FDD band.
  + Option 2: Further discussion the detail coexistence scenarios and parameters for SL enhancement operation in n14
* Recommended WF
  + TBA

## 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 2-1: **Necessity of coexistence evaluation to protect B13 by n14 PC1, PC3 operation**

**Issue 2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Support Option1. LTE PS UE already protect band 13 for both PC1 and PC3 UE. |
| Ericsson | Option 2. Some detail aspects need to revisit before draw ingconclusion of no coexisting study . e.g Power control , coexisting simulation parameter in general. |
| AT&T | We support Option 1 if RAN4 concludes that the LTE coexistence evaluation can be re-used. We can also support Option 2 as proposed by Ericsson if an updated coexistence evaluation is needed. |

Sub topic 2-2: **Comparison between LTE Prose and NR SL enhancement in n14 operating band**

**Issue 2-2-1: Different point for the operating scenarios between LTE Prose and NR SL enhancement**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Support Option1. The different point tis con-current operation based in AT &T paper. But it is not possible in small operating freq. band. |
| Ericsson | Option 2, needs discuss the coexisting simulation assumption in detail. |
| AT&T | Option 2.  There is some clarification required for the co-existence studies requested for NR Sidelink in NR Band n14 in our paper. We would like to request a revision to our discussion paper to provide further clarification.  The intent is not for the UE to support con-current Uu and Sidelink operation in small frequency operating range with 10MHz for both UL/DL frequency in FDD band. NR sidelink operation will use UL for TX/RX. |

**Issue 2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Support Option 1. RAN4 do not need to study additional coexistence evaluation for NR PS UE to protect NR legacy UE in n14. |
| Ericsson | Option2. |
| AT&T | We support Option 1 if RAN4 concludes that the LTE coexistence evaluation can be re-used. We can also support Option 2 as proposed by Ericsson if an updated coexistence evaluation is needed. |

**Issue 2-2-3: What is next step for n14 coexistence evaluation?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Support Option 1 or option 2. |
| Ericsson | Option 2. Not quite sure about the con-current operation relation to the coexisting study. I suppose in this issue (coexistence evaluation), only adjacent carrier operation between NR SL and LTE/NR Uu will be concern. We have another thread discussion the co-channel existence. |
| Qualcomm | Option 2: Further discussion the detail coexistence scenarios and parameters for SL enhancement operation in n14 |
| AT&T | Option 2. |

### 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** |
| R4-210xxxx |  |
|  |
|  |

## 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 #2-1: Necessity of coexistence evaluation to protect B13 by n14 PC1, PC3 operation** | **Issue 2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14**  **In 1st round, the interested company’s preference is diverse.**  **So, as moderator propose as following 2 candidate options in 2nd round.**  *Candidate options:*   * Option 1: The LTE prose UE (both PC1 and PC3) in Band 14 can coexisted with Band 13 UE in real field. So, RAN4 do not need the additional coexistence evaluation to protect band 13 UE. * Option 2: Need coexistence evaluation to protect B13 UE   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 will further discuss whether coexistence evaluation is needed to protect B13 or not.** |
| **Sub-topic #2-2: Comparison between LTE Prose and NR SL enhancement in n14 operating band** | **Issue 2-2-1: Different point for the operating scenarios between LTE Prose and NR SL enhancement**  **In 1st round, AT&T request to revise Tdoc for updating operating scenarios for n14. Based on the revised Tdoc, RAN4 can further discuss the different point between LTE Prose and NR SL enhancement.**  **So, as moderator propose as following 2 candidate options in 2nd round.**  *Candidate options:*   * Option 1: the different point will be further studied based on the revised AT&T paper. * Option 2: other option is not precluded.   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 will further discuss whether coexistence evaluation is needed to support new operating scenarios or not.** |
| **Issue 2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation**  **In 1st round, the interested company’s preference is diverse.**  **So, as moderator propose as following 2 candidate options in 2nd round.**  *Candidate options:*   * Option 1: RNA4 can allow NR PS operation in in-coverage NW with legacy LTE/NR Uu operation. Since LTE PS already studied the coexistence evaluation to protect legacy LTE system. * Option 2: RAN4 need further coexistence evaluation to protect legacy LTE/NR system in n14   *Recommendations for 2nd round:*  **Based on above 2 candidate options, RAN4 will further discuss whether the coexistence evaluation is needed to protect legacy LTE/NR system or not.** |
| **Issue 2-2-3: What is next step for n14 coexistence evaluation?**  **In 1st round, almost companies preferred to need further study for detail coexistence scenarios and parameters as option 2**  **So, tentative agreements are follow**  *Tentative agreements:*   * Option 2: Further discussion the detail coexistence scenarios and parameters for SL enhancement operation in n14   *Recommendations for 2nd round:*  **Based on above tentative agreement, RAN4 will further discuss whether the coexistence evaluation to support the detail operating scenarios and parameters in next RAN4 meeting.** |

### 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** |
| R4-2111535 | *Based on 1st round of comments collection, moderator can recommend*  ***“to be revised” to introduce additional scenarios for SL enhancement in n14.*** |
|  |  |
|  |  |
|  |  |

## Discussion on 2nd round (if applicable)

### Open issues (if applicable)

**Issue 2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14**

In 1st round, the interested company’s preference is diverse. So, as moderator propose as following 2 candidate options in 2nd round.

* Proposals
  + Option 1: The LTE prose UE (both PC1 and PC3) in Band 14 can coexisted with Band 13 UE in real field. So, RAN4 do not need the additional coexistence evaluation to protect band 13 UE.
  + Option 2: Need coexistence evaluation to protect B13 UE
* Recommended WF
  + FFS

**Issue 2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation**

In 1st round, the interested company’s preference is diverse. So, as moderator propose as following 2 candidate options in 2nd round.

* Proposals
  + Option 1: RNA4 can allow NR PS operation in in-coverage NW with legacy LTE/NR Uu operation. Since LTE PS already studied the coexistence evaluation to protect legacy LTE system.
  + Option 2: RAN4 need further coexistence evaluation to protect legacy LTE/NR system in n14
* Recommended WF
  + FFS

Based on revision of R4-2111535 from AT&T, con-current operation was removed. So moderator removed issue 2-2-1 in 2nd round discussion.

### Companies views’ collection for 2nd round (if applicable)

**Issue 2-1-1: Review the protection of Band 13 UE for LTE prose UE (both PC1and PC3) in Band 14**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | Based on proposed WF, the protection band 13 issue will be concluded in next RAN4 meeting based on the different points between LTE Prose and NR PS to protect Band 13. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Issue 2-2-2: Coexistence evaluation for NR SL UE in in-coverage NW with legacy LTE/ NR Uu operation**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LGE | RAN4 need to study the different points between LTE Prose and NR PS to protect legacy LTE/NR system in n14. Based on interested companies discussion paper, RAN4 conclude this issue in next RAN4 meeting. |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

### Summary for 2nd round (if applicable)

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

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on coexistence evaluation necessity in n14 | LGE | In 2nd round discussion, the coexistence evaluation in n14 will be discussed in the WF. |
| WF on Feasibility of DL frequency range in FDD band used for SL operation | vivo | In 2nd round discussion, the feasibility of DL freq. In FDD band used for SL operation will be discussed in the WF. |
|  |  |  |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2109032](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109032.zip) | TP on UE Rx RF requirement for NR SL enhancement | CATT | Revised to |  |
| [R4-2109691](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109691.zip) | TP on operating bands and channel arrangement for SL enhancement | vivo | Noted |  |
| [R4-2109692](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109692.zip) | Discussion on system parameters for SL enhancement | vivo | Noted |  |
| [R4-2109704](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109704.zip) | Work Plan of RRM requirements for Rel-17 SL enhancement | LG Electronics Polska |  | It will be treated RRM session |
| R4-2109921 | TR38.785 v0.2.0 TR Update for SL enhancement in Rel-17 | LG Electronics France | It will be updated in 2nd round to capture the approved TPs |  |
| [R4-2110175](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110175.zip) | TP on channel bandwidth for newly introduced SL bands | CATT | Revised to |  |
| [R4-2111428](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111428.zip) | TP for 38.785: CBW for licensed band supporting NR V2X | Huawei,HiSilicon | Contents are fine. It will be captured in CATT TP.  Noted. |  |
| R4-2111535 | NR Sidelink in NR Band n14 and Coexistence Studies | AT&T | Revised to |  |

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** |
| R4-2107863 | WF on coexistence evaluation necessity in n14 | LGE |  |  |
| R4-2107864 | WF on Feasibility of DL frequency range in FDD band used for SL operation | vivo |  |  |
|  |  |  |  |  |

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