**3GPP TSG-RAN WG4 Meeting # 97-e R4-201xxxx**

**Electronic Meeting, 02nd – 13th November, 2020**

**Agenda item:** 12.10.1, 12.10.2

**Source:** Moderator (LG Electronics)

**Title:** Email discussion summary for [97e][139] NRSL\_enh

**Document for:** Information

# Introduction

In this paper, RAN4 discuss work plan and RAN4 RF scope of NR SL enhancement in Rel-17.

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 the work plan for NR SL enhancement and RF scope in Rel-17
	+ Topic #1: NR SL enhancement
	+ Sub-Topic #1-1: Scope for SL enhancements
		- Left over issues from Rel-16
		- New RF requirements in Rel-17
	+ Sub-Topic #1-2: Frequency range for SL enhancements at FR1/FR2
	+ Sub-Topic #1-3: work plan
* 2nd round: FFS

# Topic #1: NR SL enhancements

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

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014326 | LG Electronics | Work plan for NR SL enhancement WI.**Proposal 1: Approve the proposed work plan in RF session for NR SL enhancement service to complete Core requirements in Rel-17 timeline (Sept. 2021 can be extended to March 2022).**- Focus on partial used NR SL operation in n79 and other interested bands- Specify Tx requirements for PC2 (SL-MIMO, Tx diversity and single Tx) UE RF requirements - FR2 operating band will be requested until RAN4 #98 (Jan. 2021) for coexistence evaluation in FR2.- Other RF requirements enhancement can be discussed in Rel-17 timeline |
| R4-2014973 | vivo | General views on NR sidelink enhancements in R17**Proposal 1: Prioritize the scenario licensed bands partially used for sidelink transmission in R17 sidelink enhancements.****Proposal 2: Introduce at least one FR2 frequency band and specify corresponding requirements for R17 enhancements.**The frequency range 63-64GHz is in the scope of SI B52. 6GHz. The frequency range from 76 to 81 GHz is out of any agreed SI/WI. RAN4 can discuss how to introduce the potential ITS bands in mmWave based on regional regulations.**Proposal 3: RAN4 can focus the study on the frequency range 63-64GHz for ITS dedicated spectrum in R17 sidelink enhancements.****Proposal 4: Introduce PC2 for at least one of these operations in R17, single ITS band, SL-MIMO, inter-band con-current band combinations.****Proposal 5: The Tx diversity requirements for SL transmission can be captured after the requirements for NR TX diversity has been finalized in the main forum.****Proposal 6: To study SL over PC5 on multiple carriers in R17 sidelink enhancements.*** + SL over PC5 on multiple carriers;
	+ SL over PC5 and Uu both on the same single carrier
	+ SL over PC5 and Uu, each on a separate carrier
 |
| R4-2015256 | Xiaomi | Discuss on the scope in SL enhancements in Rel-17**Rel-16 Left overs:**1, UE operations for licensed bands partially used for SL transmission: It is agreed to defer the scenario to Rel-17 as captured in the email thread summary [1] of RAN4#96-e. 2, PC2 UE. It is agreed that “Only allow PC3 in rel-16 regardless of 2 Tx (SL-MIMO/TxDiversity) or 1 Tx V2X operation” as captured in [2] of RAN4#96-e. **Rel-17 WID:**Frequency bands that will be used for sidelink considering both licensed and ITS-dedicated spectrum will be gathered first from operator request. For the new features introduced in the Rel-17 WID, it is based mostly on **power saving at this stage of RAN1 discussion and this will lead to RRM core requirement work.** |
| R4-2016280 | Ericsson | Spectrum aspect on public safety UC support Public safety is one of new UC to be supported in Rel-17 SL and apart from the ongoing SA work to support this, RAN will focus on Power saving and Enhanced reliability and reduced latency.So, RAN4 focus on the define harmonized frequency spectrum for above use case.**Observation#1: ITU encourage the regional administrators to use harmonized frequency range of 694-894MHz for the BB PPDR.****Proposal-1: Considering the global and regional harmonization regulatory in the NR SL frequency support****Proposal-2: For the FDD band to be added, the NR UE will support the uplink frequency part of FDD band.** |
| R4-2016281 | Ericsson | General aspects on RAN4 work for public safety UC supportThe amount of spectrum in the range of 2x10 MHz (10MHz uplink and 10MHz downlink) is needed for future European broadband PPDR Wide Area Networks (WAN) in ECC report 199[2]. 2x 10MHz is used as basic spectrum requirement for BB PPDR service in the harmonized condition and spectrum bands in ECC decision [3].**Observation#1: The bandwidth needed for the PPDR service is 2 x 10MHz for 400MHz and 700MHz spectrum.****Proposal#1: Minimum bandwidth for the NR SL based public safety shall be 10 MHz.** |
| R4-2016484 | Huawei | On Rel-17 sidelink enhancement The WID that the main tasks for RAN4 include two parts1. RF requirements for new proposed bands in Rel-17
2. RF requirements for the new features introduced by other working groups

Focus on the left over issues from Rel-16 at this moments***Proposal: Besides the objectives listed in the WI, RAN4 should also continue the study of remaining issues left over in Rel-16, which include at least the following issues:**** ***RF requirements for power class 2***
* ***UE operations for licensed bands partially used for SL transmission, including band n79***
* ***Synchronization issues for simultaneous SL and Uu transmission***
 |
| R4-2016464 | AT&T | NR Sidelink Operating BandsNR Band n14 is dedicated for first responder communications in the United States, the inclusion of NR Band n14 as one of the NR sidelink operating bands is requested to be considered as one of the licensed operating bands to be defined as part of the objective above. RAN4 input is solicited concerning the way forward to add NR Band n14 as an NR sidelink operating band. |

## 1.2 Open issues summary

*Based on provided contributions, RAN4 mainly treat the work plan for NR SL enhancements and scopes of RF enhancements in Rel-17.*

* Sub-Topic #1-1: Scope for SL enhancements
	+ Left over issues from Rel-16
	+ New RF requirements in Rel-17
* Sub-Topic #1-2: Frequency range for SL enhancements at FR1/FR2
* Sub-Topic #1-3: Work plan

### 1.2.1 Sub-topic #1-1

*Sub-topic description:* **Scope for SL enhancements**

**Issue 1-1-1: *Left over issues from Rel-16***

* Proposals
	+ Option 1: RAN4 will include the left over issues in Rel-17 SL enhancements WI scope.
		- Left over issue:
			* Supporting PC2 NR SL UE RF requirements
			* Partial used SL operation in a carrier including n79 and other interesting bands
	+ Option 2: Other proposal are not precluded
* Recommended WF
	+ RAN4 choose option 1.

**Issue 1-1-2: *New SL enhanced RF requirements***

* Proposals
	+ Option 1: RAN4 specify new operating bands and additional RF requirements for SL enhancement operation if identify.
	+ Option 2: Other proposal are not precluded.
* Recommended WF
	+ RAN4 choose option 1.

### 1.2.2 Sub-topic #1-2

*Sub-topic description:* **Frequency ranges at FR1 and FR2**

*There are two candidate options based on discussion papers*

**Issue 1-2-1: *Frequency ranges at FR1***

* Proposals
	+ Option 1: Based on Operator input, RAN4 specify the operating bands for SL operation in licensed bands including candidate public safety spectrum.
* Recommended WF
	+ RAN4 choose option1.

**Issue 1-2-2: *Frequency ranges at FR2***

* Proposals
	+ Option 1: Based on Operator input, RAN4 decide the frequency ranges in licensed bands only. The 63-64GHz ITS dedicated spectrum is not scope in the WID.
	+ Option 2: Based on Operator input, RAN4 decide the frequency ranges in licensed bands. Also RAN4 can study the coexistence evaluation in ITS dedicated spectrum (63-64GHz).
* Recommended WF
	+ RAN4 will decide one option in 1st round.

### 1.2.3 Sub-topic #1-3

*Sub-topic description:* **Work plan**

*Based on the rapporteur proposed work plan, RAN4 will discuss the high level work plan*

**Issue 1-3-1: *Deadline for requesting of FR2 frequency band.***

* Proposals
	+ Option 1: Decide the deadline for requesting of FR2 frequency band as RAN4 #98-e meeting.
* Recommended WF
	+ RAN4 choose option1.

**Issue 1-3-2: *Scope of SL enhancement***

* Proposals
	+ Option 1: Leftover issues, new SL enhanced RF requirements will be treated in the WI. Based on RAN4 consensus, RAN4 can specify additional SL enhancement requirements.
* Recommended WF
	+ RAN4 choose option1.

## 1.3 Companies views’ collection for 1st round

### 1.3.1 Open issues

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| **Company** | **Comments** |
| Xiaomi | Sub topic 1-1: Scope for SL enhancements**Issue 1-1-1: *Left over issues from Rel-16*** Agree with the two main points as PC2 UE and UE operation for licensed bands partially used for SL. However, as pointed out in Xiaomi’s paper R4-2015256, we would like to go for some more detail as for UE operation for licensed bands partially used for SL:* Timing alignment mechanism
* TDM/FDM solutions
* RF requirements
* Frequency separation for intra-band FDM solutions
	+ Simulation might be needed to assess the separation.
* LGE: n79 partial used operation will cover the Frequency separation issues and timing alignment issue.

**Issue 1-1-2: *New SL enhanced RF requirements***Agree with the WF since it is listed in the WID. However considering the features discussed in RAN1 currently as power saving and URLLC for SL enhancement, we would like to also include them by clarifying the “additional RF requirements for SL enhancement operation” is not only applied to new frequency bands but also other features introduced.* LGE: agree with your comment, RAN4 can specify additional RF requirements when the necessity of some RF requirements are identified from other WG.

Sub topic 1-2: Frequency ranges at FR1 and FR2**Issue 1-2-1: *Frequency ranges at FR1***OK with option 1 but the demand of public safety spectrum might need some confirmation of operator or regulatory**Issue 1-2-2: *Frequency ranges at FR2***OK with option 2 and still the input from operator should be confirmed first.* LGE: 63-64GHz SL operation is not scope of SL enhancement in Rel-17 based on objective as follow

*The exact frequency bands are to be determined based on company input during the WI, considering both licensed and ITS-dedicated spectrum in both FR1 and FR2.*Sub topic 1-3: Work plan**Issue 1-3-1: *Deadline for requesting of FR2 frequency range for coexistence evaluations***Considering the time needed for simulation work, ok with option 1.**Issue 1-3-2: *Scope of SL enhancement in Work plan***OK with option 1. |
| LGE | Sub topic 1-1: Scope for SL enhancements**Issue 1-1-1: *Left over issues from Rel-16*** LGE prefer option1 as leftover issues. Two main part will be included timing alignment issue and Frequency separation for intra-band FDM solutions in n79.**Issue 1-1-2: *New SL enhanced RF requirements***LGE prefer option1. For power saving issue, we expected there is no RF additional requirements. If some new RF requirements are identified, then RAN4 would specify the new additional RF requirements for SL enhancement operation.Sub topic 1-2: Frequency ranges at FR1 and FR2**Issue 1-2-1: *Frequency ranges at FR1***LGE prefer option1, the operating band for SL enhancement will be requested by operator or proponent for public safety spectrum.**Issue 1-2-2: *Frequency ranges at FR2***LGE prefer option1 since the spectrum discussion should be follow approved WID for SL enhancement in Rel-17. In here, the target spectrum is belong to FR1 and FR2 (until 52.6GHz).Sub topic 1-3: Work plan**Issue 1-3-1: *Deadline for requesting of FR2 frequency range for coexistence evaluations***LGE prefer option1. The request deadline of FR2 frequency band is restricted until RAN4 #98-e meeting for coexistence evaluation.**Issue 1-3-2: *Scope of SL enhancement in Work plan***LGE prefer option1. |
| vivo | Issue 1-1-1: Left over issues from Rel-16For the left-over issues from Rel-16, we need further clarify what kind of operation should be considered for PC2. Are these following aspects considered for Rel-17 sidelink enhancements or other aspects not included?*  PC2 for single ITS band
*  PC2 for SL-MIMO
*  PC2 for inter-band con-current band combinations

🡪 LGE: All PC2 UE requirements can be considered in PC2 SL UE RF requirements.Besides these two bullets in Option 1, how about the Tx diversity for NR V2X? Should it be in the scope of left over issues from Rel-16?🡪 LGE: In my view, RAN4 can add Tx diversity for 5G V2X UE in TS38.101-1 in Rel-16. I do not consider in rel-17.Issue 1-1-2: New SL enhanced RF requirementsExcept Option 1, we would like to know whether there are any RF requirements for introducing new features power saving and URLLC. 🡪 LGE: RAN4 also consider public safety service using SL operation. So need to dfine SL operating band and others. I also think there is no additional RF requirements for power saving and URLLC. But it is depend on other WG progress for enhanced SL operation.Issue 1-2-1: Frequency ranges at FR1OK with option 1.Issue 1-2-2: Frequency ranges at FR2As per the objective in this WI, both licensed and ITS-dedicated in FR2 are considered. *The exact frequency bands are to be determined based on company input during the WI, considering both licensed and ITS-dedicated spectrum in both FR1 and FR2.*🡪 LGE: Fully agree with your comment. RAN4 shall consider exact operating band in both FR1 and FR2 (up to 52.6GHz)*Issue 1-3-1: Deadline for requesting of FR2 frequency band.**We suggest to defer the deadline to one or two more meetings than RAN4#98, thus more time can be spared for requesting FR2 bands. It is really of good use for R17 sidelink to utilize the benefits of FR2 bands in time.*🡪 LGE: When we consider target completion date of the WI, RAN4 need to start the coexistence evaluation study from March 2021. So we propose to decide the deadline for requesting of FR2 frequency band as RAN4 #98-e meeting.*Issue 1-3-2: Scope of SL enhancement**We need clearer picture than option 1. It is suggested to list the concrete aspects for the scope of sidelink enhancements.* |
| Huawei, HiSilicon | Sub topic 1-1: Scope for SL enhancements**Issue 1-1-1: *Left over issues from Rel-16*** For option 1, focused on n79 first. For other licensed bands, if TDD, using the similar mechanism as n79 or n38; if FDD, further co-existence study is needed as there is no conclusion in Rel-16 that licensed bands except TDD with synchronization or SL only have solved the co-existence issue, only some observations are provided in the TR. Some changes is needed for left over issues relevant to n79:Partial used SL operation in a carrier for n79 1. MPR for n38 is missing in Rel-16 spec, which should be added as a left over issue.
* LGE: we can study the n38 for SL operation in rel-17. It is not leftover issue since we do not study for detail use case and the regulation aspect for deriving A-MPR issue.

As for TxD, as agreed before V2X TxD should be considered together with the general TxD discussion in Rel-16, which should be included in the spec once there is a conclusion on the TxD discussion in RAN4. In that sense, it should not be considered as one aspect in Rel-17 SL enhancement scope but rather a Rel-16 feature.* LGE: Agree. Tx diversity will be added in Rel-16.

**Issue 1-1-2: *New SL enhanced RF requirements***RAN4 specify new operating bands and additional RF requirements for SL enhancement operation based on updated conclusion of co-existence study.Sub topic 1-2: Frequency ranges at FR1 and FR2**Issue 1-2-1: *Frequency ranges at FR1***Before we dive into specifying the RF requirements for new licensed bands, firstly RAN4 should have a conclusion on co-existence study based on more simulation results.**Issue 1-2-2: *Frequency ranges at FR2***Option 1 with some modification, i.e. the licensed bands for FR2 should also have co-existence study which were not simulated in Rel-16.Sub topic 1-3: Work plan**Issue 1-3-1: *Deadline for requesting of FR2 frequency range for coexistence evaluations***OK with option 1.**Issue 1-3-2: *Scope of SL enhancement in Work plan***Some inputs from RAN1 are needed to identify if any new aspects need to be studied in RAN4 other than the usual RF requirements work for operating bands. |
| CATT | **Issue 1-1-1: *Left over issues from Rel-16*** Support the left over issues listed in Option 1. PC2 should apply to single carrier, con-current operation, SL MIMO and TxD. TxD can be captured in Rel-16 as discussed before.**Issue 1-1-2: New SL enhanced RF requirements**New operating bands should be based on request from operators. Enhanced RF requirements should be based on the progress of RAN1 design.**Issue 1-2-1: *Frequency ranges at FR1***OK with option 1.**Issue 1-2-2: *Frequency ranges at FR2***OK with option 1.**Issue 1-3-1: *Deadline for requesting of FR2 frequency range for coexistence evaluations***OK with option 1.**Issue 1-3-2: *Scope of SL enhancement in Work plan***OK with option 1. |

### 1.3.2 CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| **CR/TP number** | **Comments collection** |
| **R4-201xxxx** | **XXX** |
| **YYY** |
| **ZZZ** |
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## 1.4 Summary for 1st round

### 1.4.1 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**Scope for SL enhancements | **Issue 1-1-1: *Left over issues from Rel-16***  |
| **Issue 1-1-2: *New SL enhanced RF requirements*** |
| **Sub-Topic#1-2**Frequency ranges at FR1 and FR2 | **Issue 1-2-1: *Frequency ranges at FR1*** |
| **Issue 1-2-2: *Frequency ranges at FR2*** |
| **Sub-Topic#1-3**Work plan | **Issue 1-3-1: *Deadline for requesting of FR2 frequency range for coexistence evaluations*** |
| **Issue 1-3-2: *Scope of SL enhancement in Work plan*** |

*Recommendations on WF/LS assignment*

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|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
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### 1.4.2 CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

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| **CR/TP number** | **CRs/TPs Status update recommendation**  |
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## 1.5 Discussion on 2nd round (if applicable)

RAN4 will further discuss based on the WF and revised TPs/CRs in 2nd round.

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| **T-doc number** | **Company** | **Comments** |
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## 1.6 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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| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
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# Reference Tdoc lists

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **# of Tdoc** | **TDoc** | **Title** | **Source** | **Type** | **Agenda item** |
| 1 | [**R4-2014326**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014326.zip) | Work plan for SL enhancement for RF perspectives in Rel-17 | LG Electronics France | Work plan | 12.10.1 🡪 Sub-Topic #1-1 |
| 2 | [**R4-2014973**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014973.zip) | General views on NR sidelink enhancements in R17 | vivo | [Discussion](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014323.zip) | 12.10.1 🡪 Sub-Topic #1-1 |
| 3 | [**R4-2015256**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015256.zip) |  on Rel-17 V2X work | Xiaomi | Discussion | 12.10.1 🡪 Sub-Topic #1-1 |
| 4 | [**R4-2016280**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016280.zip) | spectrum aspect on public saftey UC support | Ericsson | Other | 12.10.2 🡪 Sub-Topic #1-3 |
| 5 | [**R4-2016281**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016281.zip) | General aspects on RAN4 work for public safety UC support | Ericsson | Other | 12.10.1 🡪 Sub-Topic #1-3 |
| 6 | [**R4-2016484**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016484.zip) | On Rel-17 sidelink enhancement | Huawei, HiSilicon | Other | 12.10.1 🡪 Sub-Topic #1-2 |
| 7 | [**R4-2016464**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016464.zip) | NR Sidelink Operating Bands | AT&T, FirstNet | Other | 17.3 🡪 Sub-Topic #1-2 |
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