**3GPP TSG RAN WG1 Meeting #101-e R1-200XXXX**

**eMeeting, May 25-June 5, 2020**

**Agenda Item: 7.2.4.7**

**Source: Moderator (FUTUREWEI)**

**Title: Email summary of [101-e-NR-5G\_V2X\_NRSL-NRUuSchedulingLTESL-02]**

**Document for: Discussion and decision**

# Introduction

At RAN1#101-e, it was agreed to have the following email discussion:

[101-e-NR-5G\_V2X\_NRSL-NRUuSchedulingLTESL-02] Email discussion by 5/28 regarding the following:

* *From RAN1 perspective, discuss whether DL pathloss based OLPC is supported and which of following cases are addressed:*
  + *NR Uu scheduling LTE sidelink with NR Uu and LTE SL carriers overlapping in frequency to compensate for the gNB-UE pathloss*
  + *(as a secondary priority) LTE V2X mode-4 resource allocation on a carrier overlapping with NR Uu to compensate for the gNB-UE pathloss*
* *Note: This does not imply that RAN4 supports one of these scenarios in Rel-16*
* *Note: For the shared carrier case, in Rel-16, RAN1 will not address any aspect other than power control*

*If consensus can be reached, potential TP till 6/2 – Phillippe (Futurewei)*

The views for each company are listed and summarized in this document.

# Issues to discuss

**Q1: Should DL-based OLPC be supported for NR Uu scheduling LTE sidelink with NR Uu and LTE SL carriers overlapping in frequency to compensate for the gNB-UE pathloss?**

|  |  |
| --- | --- |
| Company | View |
| Futurewei | Yes |
| Huawei, HiSilicon | Can be considered but not indispensable at this stage. |
| vivo | Yes. |
| Ericsson | Yes |
| CATT | Yes. |
| NTT DOCOMO | Yes |
| OPPO | No in Rel-16 |
| ZTE, Sanechips | Yes |
| Qualcomm | We prefer to not introduce this feature in Rel-16 at this point. |
| Nokia, NSB | Prefer not to introduce this now, but don’t feel very strongly either way. |

**Q2: in Q1, the wording ‘overlapping in frequency is used.’ It was pointed out that a different language might be needed (e.g., in the same band, as used at last meeting). What is your view on this?**

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| --- | --- |
| Company | View |
| Futurewei | We do not have strong view either way |
| Huawei, HiSilicon | Same band may be more generic which can include possible the case of harmonic interference. |
| vivo | Same band is more generic. |
| Ericsson | Same band is OK |
| CATT | “same band” is used instead of “frequency”. |
| NTT DOCOMO | Same band. |
| OPPO | Either wording / terminology is confusing and the exact scenario needs to be clarified. Same band could be different carriers and not necessary co-channel. In this case, existing RAN4 RF requirement such as ACLR and spectrum emission masks could limit the interference from the SL carrier to Uu carrier. If two carriers are overlapping in frequency, then it needs to clarify are they partial overlap or fully overlap, because power control to limit the interference is only needed for the overlapped portion.  Overall, to make it clear, the commonly used wording “co-channel” or “shared carrier” should be used. |
| ZTE, Sanechips | Prefer the original wording, i.e. “frequency”, because   * The intended cases that are handled by power control here include both the partially-overlapped frequency resource and fully-overlapped frequency resource. * “overlapping frequency resource” is one of terminologies used in 38.213. |
| Qualcomm | We share OPPO’s understanding that we’re discussing the shared/same carrier case here. |
| Nokia, NSB | Agree with OPPO and Qualcomm. |

**Q3: if ‘yes’ to Q1, how to specify DL-based OLPC?**

|  |  |
| --- | --- |
| Company | View |
| Futurewei | Reuse the LTE formula with DL pathloss between gNB and UE instead of eNB and UE |
| Huawei, HiSilicon | Can reuse the LTE formula and the DL pathloss is derived from NR Uu. |
| vivo | Same view as Futurewei and Huawei |
| Ericsson | Reuse the LTE formula with DL pathloss between gNB and UE instead of eNB and UE |
| CATT | Reuse the LTE formula with DL pathloss between gNB and UE instead of eNB and UE. |
| NTT DOCOMO | Same view as FW |
| ZTE, Sanechips | Same view as FW. |

**Q4: if ‘no’ to Q1, please indicate the reason for ‘no’, and if any limitation (e.g., optionality) would make the proposal agreeable**

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| --- | --- |
| Company | View |
| OPPO | * This kind of frequency usage scenario has not been discussed and agreed to be supported before. Nor it has been listed in the WID. * Based on existing frequency band support for LTE V2X, this operating scenario is not possible. * It has been already ruled out by us in RAN1 to NOT spend time to work on this in Rel-16 and clearly communicated to other WGs. * To support this scenario, other core technical work in addition to power control are also needed in RAN1. It is necessary to jointly consider all relevant technical aspects before deciding a final power control solution. * To support this scenario, other core part of work is also needed in RAN2/4, and they have no plan to work on this as we have also received LS communication from them. * In the maintenance phase of this WI, this feature is non-essential/critical in Rel-16. |
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**Q5: Should DL-based OLPC be supported for LTE V2X mode-4 resource allocation on a carrier overlapping with NR Uu to compensate for the gNB-UE pathloss?**

|  |  |
| --- | --- |
| Company | View |
| Futurewei | Yes |
| Huawei, HiSilicon | Can be considered but not indispensable at this stage. |
| vivo | yes |
| Ericsson | Yes |
| CATT | Yes. |
| NTT DOCOMO | Yes |
| OPPO | No in Rel-16. |
| ZTE, Sanechips | Yes. |
| Qualcomm | No |
| Nokia, NSB | Same as Q1. If, however, DL pathloss-based OLPC is introduced then it shall apply to both modes. |

**Q6: if ‘yes’ to Q5, how to specify DL-based OLPC?**

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| --- | --- |
| Company | View |
| Futurewei | Reuse the LTE formula with DL pathloss between gNB and UE instead of eNB and UE |
| Huawei, HiSilicon | Can reuse the LTE formula and the DL pathloss is derived from NR Uu. |
| vivo | Reuse the mechanism for inter-RAT mode3 |
| Ericsson | Reuse the LTE formula with DL pathloss between gNB and UE instead of eNB and UE |
| CATT | Same view with Furturewei.  Reuse the LTE formula with DL pathloss between gNB and UE instead of eNB and UE. |
| NTT DOCOMO | Same view with FW. |
| ZTE, Sanechips | Same view with FW. |

**Q7: if ‘no’ to Q5, please indicate the reason for ‘no’, and if any limitation (e.g., optionality) would make the proposal agreeable**

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| --- | --- |
| Company | View |
| OPPO | Same reasons as in Q4 |
| Qualcomm | We don’t see the need to introduce this feature for Mode 4. |
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# Decisions at previous meetings

## RAN1#96

*Agreements:*

* *Scheduling by gNB using RRC for LTE sidelink scheduled mode is supported from RAN1 perspective under the premise that there is sufficient time for coordination between the NR and LTE modules. No DCI to activate/release*
  + *RRC message delivers the SPS grant configuration and releases the SPS configuration.*
  + *Support of this scheduling mode is subject to UE capability (may or may not have capability for both LTE & NR)*
  + *Note: some specification LTE change is needed to support the reception of a grant through RRC*
    - *RRC message contains mode 3 grant content and timing*
    - *Up to the Editor to capture it as mode 3 or new LTE sidelink mode*
  + *No intention to have additional NR & LTE specification change (other than those described above) for this function in Rel-16*
* *RAN1 studied the feasibility of SPS scheduling by gNB for LTE sidelink with DCI activation/release, but there is no consensus to support it*

## RAN1#96bis

*Agreements:*

*Regarding RRC-based versus DCI-based activation/release of LTE sidelink SPS, RAN1 agrees to make the choice on the basis of at least:*

* *Spec impact*
* *Flexibility*
* *Performance, including latency*
* *Implementation complexity*
* *Timing of the activation/deactivation*

## RAN2#105bis

*Agreements:*

* *For scheduling LTE SL UEs, the gNB uses RRC messages to deliver the SPS grant configuration.*
* *Separate system information block should be designed to support LTE resource pool configuration via NR Uu. It will be defined as a container (OCTET STRING) and actual information follows what defined in LTE RRC.*
* *gNB should be able to configure the LTE V2X mode 4 sidelink resource pool via dedicated signalling. In addition, gNB should be able to configure mode3 SL resources via dedicated signaling. It will be defined as a container (OCTET STRING) and actual information follows what defined in LTE RRC.*

## RAN1#97

*Agreements:*

* *DCI-based activation/deactivation is supported* 
  + *Support of LTE PC5 scheduling by NR Uu (mode 3-like ) is based on UE capability*
  + *NR DCI provides the fields of DCI 5A in LTE-V that are related to SPS scheduling*
  + *The size of DCI for activation/deactivation is one of the DCI size(s) that will be defined for NR Uu scheduling NR V2V*
    - *FFS whether the DCI format is the same as one of the DCI formats that will be defined for NR Uu scheduling NR V2V*
  + *Activation/deactivation applies to the first LTE subframe after Z+X ms after receiving the DCI*
    - *Z is the same timing offset in current LTE V2X specs*
    - *X>0. FFS value(s) of X, and if one or multiple values of X are possible*

## RAN1#98

*Agreements:*

* *A new RNTI is introduced to scramble the NR DCI used for scheduling LTE PC5.*
* *X is dynamically indicated using a field in the DCI*
  + *FFS whether the DCI field provides an index to a table or the value of X*
  + *The minimum value of X is subject to UE capability*
    - *UE reports a single value subject to UE capability*

## RAN1#98b

*Agreements:*

* *The NR DCI field to indicate X provides an index to a table of values*
  + *The table of values is configurable, and has 8 values*
  + *The size of the DCI field is fixed at 3 bits*

## RAN1#99

*Agreements****:***

* *Use a separate PDCCH monitoring configuration (as configured in Rel-15) for NR DCI scheduling LTE SL*
  + *The per-CC and across-CC blind decoding budget and the maximum number of non-overlapped CCEs for channel estimation are not increased.*
  + *The per-CC and across-CC maximum number of search spaces is not increased.*
  + *The per-CC and across-CC maximum number of CORESETs is not increased*
    - *When in the same slot, there is both PDCCH monitoring for Uu SL and PDCCH monitoring for SL for the same CC, the search space(s) for LTE SL is configured to be the same or a subset of those for Uu for the same CC or vice versa*

*Agreements:*

* *The minimum value of X signalled in the UE capability is one of the values (excluding spare values) that can be signalled in DCI 3\_1*

*Agreements:*

*The supported values of X signaled in the DCI are:*

* *0.75ms, 1ms, [1.25ms], [1.5ms], 2ms, 4ms, 5ms, 8ms, 10ms, 20 ms*
  + *Additional value(s) can be discussed during the Feb. meeting*
* *Spare values are reserved for future deployments*

## RAN1#100

*Agreements*

* *For NR Uu scheduling LTE sidelink, the subframe of the first sidelink transmission is the first SL subframe of the corresponding resource pool that starts not earlier than , where TDCI is the start timing of the slot carrying DCI format 3\_1, NTA and Tc are defined in TS 38.211, X is the value indicated by Timing offset field in DCI format 3\_1, m is the value indicated by SL index in DCI format 3\_1 if SL index is present, otherwise m=0.*

*Agreements*

* *If UE is configured to monitor DCI 3\_0, the sizes of DCI 3\_1 and DCI 3\_0 are aligned by zero padding.*
* *If UE is not configured to monitor DCI 3\_0, the mechanism for size alignment between DCI 3\_0 and Uu DCI is reused for size alignment between DCI 3\_1 and Uu DCI*

*Agreements:*

* *The set of possible values for X is: 0ms, 0.25ms, 0.5ms, 0.625ms, 0.75ms, 1ms, 1.25ms, 1.5ms,1.75ms, 2ms, 2.5ms, 3ms, 4ms, 5ms, 6ms, 8ms, 10ms, 20 ms*

# References

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *No.* | *Tdoc* | *Type* | *Source* | *Title* | *Status* |
| 1 | R1-2003315 | discussion | Nokia, Nokia Shanghai Bell | Remaining details of Support of NR Uu controlling LTE sidelink | present |
| 2 | R1-2003385 | discussion | vivo | Remaining issues on support of NR Uu controlling LTE sidelink | present |
| 3 | R1-2003500 | discussion | Huawei, HiSilicon | Remaining details of NR Uu control for LTE sidelink | present |
| 4 | R1-2003554 | discussion | ZTE, sanechips | Remaining issues on NR Uu control LTE sidelink | present |
| 5 | R1-2003568 | discussion | LGE | Discussion on NR Uu controlling LTE sidelink | present |
| 6 | R1-2003808 | decision | Futurewei | Remaining details of cross-RAT scheduling | present |
| 7 | R1-2004078 | discussion | OPPO | Open loop power control for NR Uu controlling LTE sidelink | present |
| 8 | R1-2004388 | discussion | NTT DoCoMo | Remaining issues on NR Uu controlling LTE SL | present |
| 9 | R1-2004550 | decision | Ericsson | NR UU controlling LTE sidelink transmissions | present |