**3GPP TSG RAN WG1 Meeting #101-E R1-** **200xxxx**

**e-Meeting, May 25th – June 5th, 2020**

**Source: Moderator (Intel Corporation)**

**Title: Discussion #4 [101-e-NR-5G\_V2X\_NRSL-Mode-2-04]**

**Agenda item: 7.2.4.2.2**

**Document for:** **Discussion and Decision**

Introduction

This contribution provides discussion on critical issues for the fourth thread [101-e-NR-5G\_V2X\_NRSL-Mode-2-04].

[101-e-NR-5G\_V2X\_NRSL-Mode-2-04] Email discussion/approval with respect to periodic reservation:

5a – Conversion of periodicity to logical slots of a resource pool, handling of UL-DL configurations, Tscal

New – How to capture L1 procedure of periodicity signalling in SCI

By 6/1, with potential TPs till 6/4 – Sergey (Intel)

Discussion

## Conversion of periodicity to logical slots of a resource pool, handling of UL-DL configurations, Tscal

It may be uncertain in specification, how the period value in ms for both TX and RX is converted to logical slots, taking also into account the UL-DL configurations. Note, in PHY structure AI, currently it is a working assumption, that slots with insufficient number of UL symbols in semi-static UL-DL configuration are excluded.

There are a few proposals leaning towards reusing procedures similar to LTE [3][16][14]. However, there may be opinions that there is no need for additional conversions.

**Q1: How** $P\_{rsvp\\_TX}$ **and** $P\_{rsvp\\_RX}$ **measured in ms are converted to logical slot periods** $P^{'}\_{rsvp\\_TX}$ **and** $P^{'}\_{rsvp\\_RX}$ **respectively? E.g. is it required to introduce** $P^{'}\_{rsvp\\_TX}$ **and** $P^{'}\_{rsvp\\_RX}$ **as a function of** $P\_{step}$ **which is determined from a semi-static UL-DL configuration?**

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| **Source** | **Comments / Motivation** |
| Intel | Main principle is to do all operations in physical domain i.e. in ms or physical slots and then convert to logical indexing using the floor function to find the nearest logical slot for transmission. Specific implementation of this is a matter of TP preparation. In anyway, we assume that LTE-V2X principle will be reused here. |
| Qualcomm | LTE principle is used, details can be discussed in TP.  |
| Sharp | Reuse the function of $P\_{step}$ as in LTE V2X. |
| Huawei/HiSilicon | LTE-V mechanism should be reused to avoid any confusion about the conversion.The conversion of periodicity to logical slots can be formulated as $P\_{rsvp\\_TX}^{'}=\left⌈S×P\_{rsvp\_{TX}}/P\right⌉$, where $P$denotes the periodicity of DL-UL pattern in section 11.1 of TS 38.213, provided by higher layer parameter *dl-UL-TransmissionPeriodicity*, $S$ denotes the number of configured slots for sidelink in the pattern, and $P\_{rsvp\_{TX}}/P$ is equal to the number of DL-UL pattern occurrences within the physical interval $P\_{rsvp\_{TX}}$. |
| OPPO | Similar to Intel, to reuse the LTE mechanism is fine, but to use the ceil function instead of floor function, in order to avoid $P^{'}\_{rsvp\\_TX}$or$P^{'}\_{rsvp\\_RX}$ equal zero. |

Currently $T\_{scal}$ is FFS in 214. Assuming the main purpose of this value is to increase the interval of the TX UE selection window to check for periodic collision in case of small reservation periods, what is the value of Tscal that can be adopted in NR?

**Q2: How to define** $T\_{scal}$ **in 38.214, section 8.1.4?**

* **Option 1:** $T\_{scal}=PDB$
* **Option 2:** $T\_{scal}=100 ms$
* **Other options, please specify**

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| **Source** | **Short answer** | **Comments** |
| Intel | Option 2 | In order to comply with LTE V2X procedure |
| Qualcomm | Other | PDB if packet is aperiodic, 100ms otherwise. |
| Sharp | Option 2 | Share same thought with Intel. |
| Huawei/HiSilicon | Option 1 | Since the T\_scal corresponds the upper bound of resource selection window, which is 100 in LTE-V2X and PDB in NR-V2X, so T\_scal should be equal to PDB. |
| OPPO | Other | $T\_{scal}=T\_{2}$, since it is not necessary to take into consideration of reserved resources that are outside the selection window and anyway T2 can equal to remaining PDB based on UE selection. Furthermore, if $T\_{scal}=PDB$ all the time, then this may cause the Q value to be large and the selecting UE will exclude excessive resources, especially when $P\_{rsvp\\_RX}$ is small. |

Finally, it is worth confirming whether $C\_{resel}=10\*SL\\_RESOURCE\\_RESELECTION\\_COUNTER$ which is provided by higher layers, or it needs modification comparing to LTE.

**Q3: Is it agreeable to reuse LTE rule and let** $C\_{resel}=10\*SL\\_RESOURCE\\_RESELECTION\\_COUNTER$**?**

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| **Source** | **Short answer** | **Comments** |
| Intel | Agree | In order to comply with LTE V2X procedure. Only for semi-persistent processes in Mode-2 |
| Sharp | Agree | Share same thought with Intel. |
| Huawei/HiSilicon | Agree | Reuse LTE-V rule |
| OPPO | Agree | Reuse the LTE mechanism. BTW, isn’t this a RAN2 topic? |

## How to capture L1 procedure of periodicity signalling in SCI

There are a few places in 38.212 and 38.214 referring to the procedure how a UE sets/determines a period in SCI 0\_1. However, there is no such clause currently in specification. In FL understanding, it can be implemented in 38.213, section 16.4.

There are two main aspects:

* How to ensure / capture that for periodic reservation enabled case, a UE can still set the period to 0, i.e. no periodic reservation
* If such a code-point in SCI always available, in which cases the period can be set to 0

**Q4: Please indicate your preference how to ensure that a period value 0 corresponding to no periodic reservation is always present in SCI:**

* **Option 1: A fixed codepoint in the “Resource reservation period” field of SCI 1-A, e.g. corresponding to 0. Other configured periods are provided by RRC and are indexed starting from 1.**
* **Option 2: A UE does not expect to be (pre-)configured with a set *sl-MultiReserveResource* not containing value of 0 ms**

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| **Source** | **Short answer** | **Comments** |
| Intel | Option 2 is preferred | Straight forward approach.  |
| Qualcomm | Option 2 |  |
| Panasonic | Option 2 |  |
| Sharp | Option 1 | We propose to reuse the LTE V2X method which uses a code point ‘0000’ to indicate no periodical reservation. |
| Huawei/HiSilicon | Option 2 | Option 2 is simple and straightforward |
| ASUSTeK | Option 2 |  |
| NTT DOCOMO | Option 2 |  |
| OPPO | Option 2 |  |

**Q5: Is it agreeable to capture two different cases for setting “Resource reservation period” to 0 ms?**

* **The higher layer decides not to keep the resource for the transmission in the next period**
* **The higher layer does not provide a period value**

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| **Source** | **Short answer** | **Comments** |
| Intel | Agree | We assume that “The higher layer decides not to keep the resource for the transmission in the next period”also covers the case when in a given period UE reserves dynamic resources for the same or another TB transmission |
| Qualcomm | Agree |  |
| Panasonic | Agree |  |
| Sharp | Not support | It seems in LTE V2X, there is always ‘*X*’ indicated by higher layers and does not include the 2nd case. The interpretation of ‘0000’ in TS36.213 is for the 1st case. |
| Huawei/HiSilicon | Agree | We think the first bullet is also related to the discussion in Mode2-02 Q5/Q6.For example, if “reselected resources should not be periodically reserved” is chosen for Q5/Q6 in Mode2-02, we assume this belongs to the 1st bullet, i.e., “The higher layer decides not to keep the resource for the transmission in the next period”. |
| ASUSTeK | Agree |  |
| NTT DOCOMO | Agree  |  |
| OPPO | Agree |  |

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