**3GPP TSG RAN WG1 #107-e R1-21xxxxx**

**e-Meeting, November 11th – 19th, 2021**

**Agenda item:** 7.2.4

**Source:** Moderator (Sharp)

**Title:** Summary of[107-e-NR-5G\_V2X-06]

**Document for:** Discussion and Decision

# Introduction

The document is to collect companies’ views and provide a summary for the email discussion thread:

[107-e-NR-5G\_V2X-06] Discussion on the alignment of priority values in the specifications (R1-2111298, R1-2112010) by Nov 16.

# Discussion

## 1st change in R1-2111298

In the power control procedure for PSFCH transmission, i.e. 16.2.3 in TS38.213, it was specified that “UE autonomously determines PSFCH transmissions with ascending priority order…”. The intention is to select PSFCH transmission(s) with higher priority(s) and it is noted that priority with value ‘1’ is the highest priority. As pointed out in [1], the UE should select PSFCH transmission(s) based on the decreasing priority order instead, i.e. ascending order of corresponding priority field values. Hence, the following change was proposed,

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| 16.2.3 PSFCH  A UE with scheduled PSFCH transmissions, and capable of transmitting a maximum of PSFCHs, determines a number of simultaneous PSFCH transmissions and a power for a PSFCH transmission , , on a resource pool in PSFCH transmission occasion on active SL BWP of carrier as   * if *dl-P0-PSFCH* is provided,   [dBm]  where  - is a value of *dl-P0-PSFCH*  - is a value of *dl-Alpha-PSFCH*, if provided; else,  - when the active SL BWP is on a serving cell , as described in clause 7.1.1 except that  - the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - if  - if , where is determined for PSFCH transmissions according to [8-1, TS 38.101-1]  - and [dBm]  - else  - UE autonomously determines PSFCH transmissions with ascending order of corresponding priority field values as described in clause 16.2.4.2 such that where  is a number of PSFCHs with priority value and is defined as  - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 1, 2, …, , if any  - zero, otherwise  and  [dBm]  where is defined in [8-1, TS 38.101-1] and is determined for the PSFCH transmissions  - else  - the UE autonomously selects PSFCH transmissions with ascending order of corresponding priority field values as described in clause 16.2.4.2  - if , where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1]  - and [dBm]  - else  - the UE autonomously selects PSFCH transmissions in ascending order of corresponding priority field values as described in clause 16.2.4.2 such that where is a number of PSFCHs with priority value and is defined as  - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 1, 2, …, , if any  - zero, otherwise  and  [dBm]  where is determined for the simultaneous PSFCH transmissions according to [8-1, TS 38.101-1]   * else   [dBm]  where the UE autonomously determines PSFCH transmissions with ascending order of corresponding priority field values as described in clause 16.2.4.2 such that and where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1] |

### Round#1 discussion

Please provide your views on the change in the table below.

**Question 1-1: Do you agree that the change should be adopted? If no, please provide the reasons and suggestions, if any.**

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| **Company** | **Views** |
| Intel | Agree |
| NTT DOCOMO | OK |
| LGE | OK |
| CATT,GOHIGH | Agree |
| OPPO | Agree |
| vivo | Fine with the intention, but please note that the meaning of “priority field value” and “priority” is also confusing and being discussed in the next section. We prefer not to use the “priority filed value”.  Instead, considering that “priority value” is already used for sidelink, such as 16.2.4, we propose to modify as below (one example):  PSFCH transmissions with ascending ~~priority~~ order of priority value as described in clause 16.2.4.2 |

### Round#2 discussion

[*TBD*]

## 2nd change in R1-2111298, change in R1-2112010

As discussed in [1] and [2], the value of “*Priority*” field with 3bits in SCI format 1-A ranges from 0 to 7, while they hold different opinions on the range of the priority value, which is widely used throughout TS38.213 and TS38.214 for NR V2X.

It is noted that a clear mapping between “*Priority*” field and priority value is specified for LTE V2X in 14.2.1 of TS36.213. The related specs are hereby copied as follows,

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| 14.2.1 UE procedure for transmitting the PSCCH […]  - The UE shall set the contents of the SCI format 1 as follows:  - the UE shall set the Modulation and coding scheme as indicated by higher layers.  - the UE shall set the "Priority" field according to the highest priority among those priority(s) indicated by higher layerscorresponding to the transport block. Priority field ‘000’ corresponds to priority ‘1’, priority field ‘001’ corresponds to priority ‘2’, and so on.  […] |

Specifically, in [1], it is stated that priority value in physical layer, as indicated in SCI format 1-A, starts from 0. When UE determines for power control of PSFCH transmission, the priority value starting from 1 is used in current TS38.213. Thus, the following change was proposed,

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| 16.2.3 PSFCH  A UE with scheduled PSFCH transmissions, and capable of transmitting a maximum of PSFCHs, determines a number of simultaneous PSFCH transmissions and a power for a PSFCH transmission , , on a resource pool in PSFCH transmission occasion on active SL BWP of carrier as   * if *dl-P0-PSFCH* is provided,   [dBm]  where  - is a value of *dl-P0-PSFCH*  - is a value of *dl-Alpha-PSFCH*, if provided; else,  - when the active SL BWP is on a serving cell , as described in clause 7.1.1 except that  - the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - if  - if , where is determined for PSFCH transmissions according to [8-1, TS 38.101-1]  - and [dBm]  - else  - UE autonomously determines PSFCH transmissions with ascending priority order as described in clause 16.2.4.2 such that where is a number of PSFCHs with priority value and is defined as  - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 0, 1, …, , if any  - zero, otherwise  and  [dBm]  where is defined in [8-1, TS 38.101-1] and is determined for the PSFCH transmissions  - else  - the UE autonomously selects PSFCH transmissions with ascending priority order as described in clause 16.2.4.2  - if , where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1]  - and [dBm]  - else  - the UE autonomously selects PSFCH transmissions in ascending order of corresponding priority field values as described in clause 16.2.4.2 such that where is a number of PSFCHs with priority value and is defined as  - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 0, 1, …, , if any  - zero, otherwise  and  [dBm]  where is determined for the simultaneous PSFCH transmissions according to [8-1, TS 38.101-1]   * else   [dBm]  where the UE autonomously determines PSFCH transmissions with ascending priority order as described in clause 16.2.4.2 such that and where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1] |

In [2], the priority value is treated as ranging from 1 to 8. In congestion control for mode 2, is the CR evaluated with ‘*Priority*’ field in the SCI set to . Thus, range of is [0,7]. For the parameter , it corresponds to the higher layer parameter *sl-CR-Limit* that is associated with the priority value and the CBR range. Thus, range of is [1,8]. The parameters and are directly compared in the item “”. Thus, the following change was proposed,

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| 8.1.6 Sidelink congestion control in sidelink resource allocation mode 2  If a UE is configured with higher layer parameter *sl-CR-Limit* and transmits PSSCH in slot *n*, the UE shall ensure the following limits for any priority value k;    where is the CR evaluated in slot *n*-*N* for the PSSCH transmissions with '*Priority*' field in the SCI set to (*i-*1), and corresponds to the high layer parameter *sl-CR-Limit* that is associated with the priority value *k* and the CBR range which includes the CBR measured in slot *n*-*N*, where *N* is the congestion control processing time.  The congestion control processing time *N* is based on µ of Table 8.1.6-1 and Table 8.1.6-2 for UE processing capability 1 and 2 respectively, where µ corresponds to the subcarrier spacing of the sidelink channel with which the PSSCH is to be transmitted. A UE shall only apply a single processing time capability in sidelink congestion control.  **<unchanged part omitted>** |

### Round#1 discussion

Please provide your views regarding the following questions in the table below.

**Question 2-1: Is the range of priority value as [0, 7] or [1, 8] used in physical layer specs and why? For the range of priority value as [0, 7], do you agree that 2nd change in R1-2111298 should be adopted? For the range as [1, 8], do you agree that the change in R1-2112010 should be adopted?**

|  |  |
| --- | --- |
| **Company** | **View** |
| Intel | We don’t have strong preference. What matters is the aligned assumption throughout the specs. The interpretation which leads to a smaller number of corrections should be selected. |
| NTT DOCOMO | Either is fine, but it seems that appropriate update is necessary for the selected direction between [0, 7] and [1, 8].  If we go with [1, 8], an update as discussed in 2-2 below would be necessary, and above updates of [1][2] becomes unnecessary.  If we go with [0, 7], the updates of [1][2] would be OK. |
| LGE | We think it is reasonable to consider the priority value range as [1, 8] as the text copied from 14.2.1 of TS 36.213 is defining how the bit field in SCI is set. In this sense we understand that the priority value signaled via SCI having the priority field set to ‘000’ is 1, not 0. So the changes in [1] or [2] are not necessary, and, if necessary, we may consider the following clarification in the congestion control to say that the index i corresponds to the priority value indicated by the SCI, not the field itself:  where is the CR evaluated in slot *n*-*N* for the PSSCH transmissions with '*Priority*' field in the SCI indicating ~~set to~~ priority value *i*,  To make this intention clear, we agree that the text in 14.2.1 of TS 36.213 needs to appear in NR spec as well. |
| CATT,GOHIGH | No strong preference. However, in physical layer, indication value range of priority field in SCI is from '000' to '111'. It is better to treat the value range as [0,7]. |
| OPPO | After double check 38.213 and 38.331, we think the value range [1, 8] is more reasonable.  For 16.2.4.3.1 in 38.213:    For 38.331 in RP configuration    If the SL priority value range is [1, 8], then if the priority thd is set to [2, 8], then SL priority can be higher or lower than UL. If the priority thd is set to 9, SL is always prioritized over UL. If the priority thd is set to 1, UL is always prioritized over SL. That is the logic for the prioritization comparison between SL and UL.  While if the SL priority value range is [0, 7], the value 9 for the priority thd is meaningless. Since if the priority thd is set to 8, SL is always prioritized over UL. There is no necessary to set the value to 9.  Furthermore, following the same logic in LTE, we think it is preferred to clarify the priority range is [1, 8] in SCI. |
| vivo | Either works. But considering the required spec changes and the compatibility/coexistence with LTE, we prefer to use [1, 8] instead of [0, 7]. If we migrate the corresponding text from LTE to NR for clarifying the ‘priority’, the other changes may not be needed (which may actually also due to a copy from LTE …). |

**Question 2-2: For proponents of the range of priority value as [1, 8], do you think a similar part as LTE V2X for mapping between “*Priority*” field and priority value as cited above should be added in NR V2X and why?**

|  |  |
| --- | --- |
| **Company** | **View** |
| NTT DOCOMO | Yes for [1, 8]; otherwise, it seems that correspondence between priority field and priority value is unclear. |
| LGE | Yes |
| OPPO | Yes. |
| vivo | Yes, as explained above. |

### Round#2 discussion

[Depending on outcome of Round#1 discussion].

## 3rd change in R1-2111298

In [1], for power control of PSFCH transmission, it was stated that if *dl-P0-PSFCH* is not provided, the number of PSFCH transmissions determined by the UE should be upper bounded by , since UE is capable of transmitting a maximum of PSFCHs. Hence, the following change is proposed,

|  |
| --- |
| 16.2.3 PSFCH  A UE with scheduled PSFCH transmissions, and capable of transmitting a maximum of PSFCHs, determines a number of simultaneous PSFCH transmissions and a power for a PSFCH transmission , , on a resource pool in PSFCH transmission occasion on active SL BWP of carrier as   * if *dl-P0-PSFCH* is provided,   [dBm]  where  - is a value of *dl-P0-PSFCH*  - is a value of *dl-Alpha-PSFCH*, if provided; else,  - when the active SL BWP is on a serving cell , as described in clause 7.1.1 except that  - the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell  - if  - if , where is determined for PSFCH transmissions according to [8-1, TS 38.101-1]  - and [dBm]  - else  - UE autonomously determines PSFCH transmissions with ascending priority order as described in clause 16.2.4.2 such that where is a number of PSFCHs with priority value and is defined as  - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 1, 2, …, , if any  - zero, otherwise  and  [dBm]  where is defined in [8-1, TS 38.101-1] and is determined for the PSFCH transmissions  - else  - the UE autonomously selects PSFCH transmissions with ascending priority order as described in clause 16.2.4.2  - if , where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1]  - and [dBm]  - else  - the UE autonomously selects PSFCH transmissions in ascending order of corresponding priority field values as described in clause 16.2.4.2 such that where is a number of PSFCHs with priority value and is defined as  - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 1, 2, …, , if any  - zero, otherwise  and  [dBm]  where is determined for the simultaneous PSFCH transmissions according to [8-1, TS 38.101-1]   * else   [dBm]  where the UE autonomously determines PSFCH transmissions with ascending priority order as described in clause 16.2.4.2 such that , and where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1] |

### Round#1 discussion

Please provide your views regarding the question in the table below.

**Question 3-1: Do you agree that the change should be fixed? If no, please provide the reasons and suggestions, if any.**

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| --- | --- |
| **Company** | **View** |
| Intel | Agree |
| LGE | OK |
| CATT,GOHIGH | Agree |
| OPPO | Agree |
| vivo | We don’t think the change is essential: anyway the UE will never autonomously select a value beyond upper bound that exceeds its capabilities. |

### Round#2 discussion

[*TBD*]

# Summary and Conclusion

# Reference

1. R1-2111298, “Corrections for PSFCH power control in TS 38.213”, OPPO, RAN1#107-e.
2. R1-2112010, “Correction on priority field value in congestion control for mode 2”, Sharp, RAN1#107-e.