**3GPP TSG-RAN WG2 #113bis-e *R2-21xxxxx***

**E-meeting, April 2020**

Agenda Item: 6.4.3

Source: OPPO (rapporteur)

Title: Summary of email [POST113-e][707][V2XSL] Spec update to level 3 logical slots (OPPO)

Document for: Discussion, Decision

# Introduction

This is to kick off following email discussion:

* [POST113-e][707][V2X/SL] Spec update to level 3 logical slots (OPPO)

 **Scope:** Discuss the update of CG equation and other spec changes according to level 3 logical slots (i.e. logical slots within a resource pool).

 **Intended outcome:** Discussion summary and the corresponding CRs

# Discussion

During RAN2#113e meeting RAN2 agreed one recommendation from [1]:

Proposal1: The equation to define CG resource slot should be defined based on Level\_3 logical slots i.e. logical slots within one resource pool

* Agreed.

The relevant proposals i.e. proposal5 and proposal6 in [1] were also discussed and quite aligned among companies. Proposal7 was added a bit later. So to double check with companies view, these 3 proposals will be confirmed again to complete the CRs, one for 38.321 and one for 38.331. The proposal6 in [2] is left out during the email discussion [1] since it is decoupled from the discussion. Since now RAN2 made decision, this issue should be resolved also.

As indicated above, RAN2 agreed CG resource slot should be defined based on logical slots within one resource pool, it is obvious the periodicity of sidelink configured grant should go the same way. The original proposal on the periodicity parameter is scaled as following in [1]:

$sl\\_periodCG\\_RP=\left⌈\frac{N}{20 ms}×sl\\_periodCG\*K/L\right⌉$ (1)

Where:

* K is the total number of slots within the bitmap marked with 1
* L is the bitmap length

During the same meeting RAN2 received a RAN1 LS [3] which indicates two interpretation of the resource reservation period field in a SCI format 1-A. Based on the online discussion our understanding is that RAN2 will go for option1’ and one short post email discussion [701] is arranged to send response LS back to the RAN1 based on the agreement made in the discussion of R2-2102190. While in RAN1 one CR for option1’ is endorsed. The latest version is in [4] where the resource reservation period is defined as following:



It should be desirable that equation and key parameter could be aligned between sidelink CG (mode 1) and mode 2. In addition technically equation (2) is more accurate than (1). In light of this, it is proposed the scaled periodicity parameter as following:

$PeriodicitySL=\left⌈\frac{T'\_{max} }{10240 ms}×sl\\_periodCG\right⌉$ (2)

whereT’max is the number of slots that belongs to a resource pool as defined in clause 8 of TS 38.214.

**Question1: Do you agree the scaling equation(2) ?**

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| --- | --- | --- |
| Company | Position (yes or no) | Comments |
| Sharp | Yes |  |
| Ericsson (Min) | Yes |  |
| OPPO | Yes |  |
| Samsung | Yes |  |
| vivo | Yes |  |
| Huawei | Yes |  |
| ZTE | Yes |  |
| Intel | Yes |  |
| Qualcomm | See comment | In our view this is a decision should be made by RAN1 |

Then from the answers to question 2.2-1 in [1] companies in general fine with equations to allocate resource for configured grant type1 and type2. To align the parameter names of the MAC spec, some adjustment on the parameter name seems necessary including the introduction of parameter T’max. By keeping the same principle, here is new form of the equation for companies to confirm:

Equation for sidelink configured grant type1:

*CURRENT\_slot=(sl-ReferenceSlotCG-Type1+ sl-OffsetSlotCG-Type1+ S × PeriodicitySL) modulo T’max* (3)

Where:

CURRENT\_slot refers to current logical slot in the resource pool

*sl-ReferenceSlotCG-Type1* refers to logical slot which is used for determination of the offset of a resource in a resource pool. The UE uses the closest logical slot with the indicated number preceding the reception of the sidelink configured grant configuration Type 1

*sl-OffsetSlotCG-Type1* refers to Offset of a resource with respect to logical slot = *sl-ReferenceSlotCG-Type1* in time domain, referring to the number of logical slots in a resource pool that can be used for SL transmission

Equation for sidelink configured grant type2:

*CURRENT\_slot=(sl-StartSlotCG-Type2+* S × *PeriodicitySL)* modulo *T’max (4)*

Where:

*sl-StartSlotCG-Type2* refers to the logical slot of the first transmission opportunity of PSSCH where the configured sidelink grant was (re)initialised

**Question2: Do you agree with equation (3) and (4) as well as interpretation of the parameters in principle?**

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| --- | --- | --- |
| Company | Position (yes or no) | Comments |
| Sharp | Partially yes | Regarding *sl-OffsetSlotCG-Type1*, we suppose “that can be used for SL transmission” in the interpretation is not necessary, since “can be” is for Level 2 logical slots description. For *sl-ReferenceSlotCG-Type1*, please also see our comments in Question 4.Rapporteur: it is clarified that it is counted within resource pool, the ambiguity is not there. But I have no strong opinion to remove the wording either. |
| Ericsson (Min) | Yes |  |
| OPPO | Yes |  |
| Samsung | Yes |  |
| vivo | Yes | For *sl-OffsetSlotCG-Type1*, as it is already clarified this is referring to the number of logical slots **in a resource pool**, we don’t have strong view whether the text ‘can be’ as mentioned by Sharp should be deleted or not, we can follow majority’s view. |
| Huawei | Yes, except for the definition of *sl-ReferenceSlotCG-Type1* | We think the interpretation of the parameter *sl-ReferenceSlotCG-Type1* is not accurate/clear enough. A more appropriate definition of this parameter can be as follows:*“... The UE uses the 1st logical slot included in the closest SFN with the indicated number by* ***sl-TimeReferenceSFN-Type1*** *preceding the reception of the sidelink configured grant configuration Type 1*.”This means that we still first calculate an SFN by the **existing** offset *sl-TimeReferenceSFN-Type1* as in Uu, and finally determine the *logical slot for SL* in the SFN calculated above. By this way, we don’t need to make any change of the existing ASN.1 parameter *sl-TimeReferenceSFN-Type1*, and can also overcome the problem raised by Sharp led by using the variable T’max/2. |
| ZTE | Yes with comments | We agree the interpretation of the parameters. But, for the wording of the interpretation, instead of using “current slot” here, we think it’s better to align with the specification as shown in following, , After a sidelink grant is configured for a configured grant Type 1, the MAC entity shall consider sequentially that the first slot of the Sth sidelink grant occurs in the logical slot for which:[Logical slot number in the resource pool]=*(sl-ReferenceSlotCG-Type1+ sl-OffsetSlotCG-Type1+ S × PeriodicitySL) modulo T’max* We delete “current slot” here,because it is used to calculate the HARQ process ID only. |
| Intel | Yes |  |
| Qualcomm | See comment | See answer to Q1. In our view this is a decision should be made by RAN1 |

The value range of offset prameter could be the same. The difference between *sl-TimeOffsetCG-Type1* and *sl-OffsetSlotCG-Type1* will be reserved slots and S-SSB slots in one sidelink configured grant period assuming the bitmap is filled with value “1”. And *sl-ReferenceSlotCG-Type1* could be still be a ENUMERATED parameter because only two value is possible i.e. 0 or ceiling(T’max/2).

**Question3:Do you agree the value range of *sl-OffsetSlotCG-Type1* is the same as *sl-TimeOffsetCG-Type1 i.e.* *INTEGER (0..7999)* and *sl-ReferenceSlotCG-Type1* is a ENUMERATED parameter with only one value?**

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| Company | Position (yes or no) | Comments |
| Sharp | Partially yes | In our understanding, T’max is not a constant, thus, if the parameter is kept an ENUMERATED one, we suppose to keep as it is. Otherwise, the parameter is better to be an INTEGER with a range. Please also see our comments in Question 4.Rapporteur: for one specific resource pool there are only two value it is fixed and only two values are possible. So what is the problem for ENUMERATED? |
| Ericsson (Min) | Yes |  |
| OPPO | Yes |  |
| Samsung | Yes |  |
| vivo | Yes | For *sl-OffsetSlotCG-Type1*, we agree that it can be the same value range as *sl-TimeOffsetCG-*Type1.For *sl-ReferenceSlotCG-*Type1, although different resource pool configuration may end up with different T’max, an ENUMERATED parameter would be OK for the UE to know the reference slot based on related resource pool e.g. when the parameter is present the reference slot should be ceiling(T’max/2) otherwise 0. |
| Huawei | Yes for *sl-TimeOffsetCG-Type1*;No for *sl-ReferenceSlotCG-Type1* | As per our suggested way for above Q2, it is not needed to change the **existing parameter** *sl-TimeReferenceSFN-Type1* to *sl-ReferenceSlotCG-Type1.* Instead, we only need to illustrate how to calculate *sl-ReferenceSlotCG-Type1* via the **existing RRC parameter** *sl-TimeReferenceSFN-Type1*, e.g. either in MAC or in field description of *sl-TimeReferenceSFN-Type1*. No need to have a new ASN.1 parameter for this parameter *sl-ReferenceSlotCG-Type1* itself. |
| ZTE | Yes |  |
| Intel | Yes |  |
| Qualcomm | See comment | See answer to Q1. In our view this is a decision should be made by RAN1 |

Another question is that how to treat old parameters i.e. *sl-TimeReferenceSFN-Type1* and *sl-TimeOffsetCG-Type1* and new parameters i.e. *sl-ReferenceSlotCG-Type1* and *sl-OffsetSlotCG-Type1*. Restrictly speaking those two old prameters should be dummied because the updated equation is the only place they are applied and these two new parameters should be introduced to avoid backwards compability issue. But considering there is no deployment in the field of Rel16 sidelink configured grant featuer in the field at all and the value range is not changed if question3 is confirmed by companies, one alternative is to replace old two paramters with new parameters simply with updated parameter name and field description i.e. ASN.1 is reused.

**Question4: which alternative do you agree to treat these two old parameters and two new parameters?**

Alt1: To dummy these two old parameters and introduce these two new parameters in 38.331

Alt2: To simply replace two old parameters with two new parameters i.e. reuse existing ASN.1 with updated parameter name and field description

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| Company | Position (alt1 or alt2) | Comments |
| Sharp | Partially yes | For *sl-ReferenceSlotCG-Type1*, we propose to keep as it is and further add the interpretation for the formula, e.g. if *sl-TimeReferenceSFN-Type1* is configured as sfn512, the parameter *sl-ReferenceSlotCG-Type1* is equal to ceiling(T’max/2).Rapporteur: I am bit confused by the parameter *TimeReferenceSFN-Type1.* Or do you mean when *ReferenceSlotCG-Type1* is configured with “sfn512”, but actually it means ceiling(T’max/2)? |
| Ericsson (Min) | Alt2 | Alt2 is fine as far as we don’t change the meaning of the parameter in the filed descriptionRapporteur: the meaning of the field description will be changed  |
| OPPO | Alt2 |  |
| Samsung | Alt2 |  |
| vivo | Alt 1 | As we can configure *sl-ReferenceSlotCG-Type1* and *sl-OffsetSlotCG-Type1* directly, it seems no need to rely on or relate to the old parameters like *sl-TimeReferenceSFN-Type1.*We can simply dummy these two parameters in a legacy way. |
| Huawei | Alt. 2 for *sl-TimeOffsetCG-Type1*;Comments for *sl-ReferenceSlotCG-Type1.* | See our comment for Q3 above. We don’t need to change the **existing parameter** *sl-TimeReferenceSFN-Type1* to *sl-ReferenceSlotCG-Type1*; instead we only need to explain how to calculate the later via the former in the Spec. |
| ZTE | Alt2 |  |
| Intel | Alt2 | We are fine to reuse the existing parameters |

There are also parameters CURRENT\_slot and periodicity parameter in the equation to calculate sidelink HARQ process ID. During email discussion [2], majority companies agree that these two parameters should be aligned with equations to allocated sidelink CG resources. It means the equation should be updated as following:

HARQ Process ID = [floor(CURRENT\_slot / PeriodicitySL )] modulo sl-NrOfHARQ-Processes + sl-HARQ-ProcID-offset (5)

Where CURRENT\_slot refers to current logical slot in a resource pool.

**Question5: Do you agree with the update of equation and interpretation of CURRENT\_slot (5)?**

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| Company | Position (yes or no) | Comments |
| Sharp | Yes |  |
| Ericsson (Min) | Yes |  |
| OPPO | Yes |  |
| Samsung | Yes |  |
| vivo | Yes |  |
| Huawei | Yes |  |
| ZTE | Yes |  |
| Intel | Yes |  |

**Question6: any other spec impact or issue?**

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| --- | --- | --- |
| Company | Issue description | Comments |
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|  |  |  |

# Conclusion

# Reference

[1] R2-2102190 Summary of email [AT113-e][711][V2X]SL CG related issues OPPO discussion Rel-16

[2] R2-2100098 Summary of email discussion [701][V2X] RAN1 related discussion (OPPO) OPPO discussion Rel-16

[3] R2-2102328 LS on the resource reservation period (R1-2101922; contact: LGE) RAN1 LS in Rel-16 5G\_V2X\_NRSL-Core To:RAN2

[4] Draft R1-200xxxx CR\_38.214\_[104-e-NR-5G\_V2X-06]\_V003\_FL