**[104-e-NR-5G\_V2X-06]: PP-4: Interpretation of resource reservation period field in a SCI format 1-A (the same issue in M2-2: Clarification on UE procedure for determining the number of logical slots for a reservation period), till 1/28, with potential CRs till 2/2 – Hanbyul (LGE)**

**PP-4: Interpretation of resource reservation period field in a SCI format 1-A**

Q1: When a UE transmits a SCI format 1-A in slot n in a resource pool and “Resource reservation period” in the SCI format 1-A indicates P, what is UE’s understanding?

* Option 1: The resource reservation period P’ is calculated following 8.1.7 of 38.214, and P’ is counted in (i.e. the number of slots in the resource pool between slot n and slot n+P’ is always the same as P’ (including slot n+P’ itself)).
  + Option 1’: Option 1 + updated equation in 8.1.7 (N is the number of slots belonging to the resource pool)
* Option 2: The resource reservation period P’ is calculated following 8.1.7 of 38.214 and P’ is counted in (i.e. the number of slots in the resource pool between slot n and slot n+P’ can be less than P’).
  + Option 2-1: No further spec change
  + Option 2-2: Add “UE expects belongs to the set of slots assigned to the resource pool.”
  + Option 2-3: Add “If slot  is not in the resource pool, the next slot in the resource pool should be used instead.”
* Option 3: The resource reservation period P’ is calculated following 8.1.7 of 38.214 and P’ indicates the period in terms of ms.
  + If the physical slot after P ms is not in the resource pool, the next slot in the resource pool should be used instead.
* Option 4: The resource reservation period P’ is calculated following 8.1.7 of 38.214 and P’ is counted in the slots that can be used for SL transmission (i.e. the gap between the slots indicated in SCI within two periods is P).
  + Add “UE expects belong to the set of slots assigned to the resource pool.”
* Option 5: Others (please specify)

|  |  |  |
| --- | --- | --- |
| Company | Option | Comment |
| ZTE,Sanechips | Option 4 first preference  Option 2-1 compromise | None of the above listed options could deliver a perfect way out as to the conflict between resource pool based jittering and always ensuring the reserved resource is actually in the resource pool. We believe technical perspective could be summarized as follows,  In current NR SL structure, in our view, four levels of slot sets have been defined in the spec:   * L0: physical slots. * L1: slots can be used for SL communication.   + i.e., excluding any slot from L0 if at least one of Y-th, (Y+1)-th, …, (Y+X-1)-th OFDM symbols in this slot are semi-statically configured as DL or F as per *tdd-UL-DL-ConfigurationCommon* or *sl-TDD-Configuration* * L2: slots can belong to a SL resource pool.   + i.e., further excluding slots and the reserved slots from L1, where the reserved slots are determined according to , the length of bitmap configured for this resource pool.   + L2 is denoted as in current specification. * L3: slots belong to a SL resource pool,   + L3 is denoted as .   We can have the following observation as to applying different levels of slots under the leftover case c) or d) :   1. 1. L0 and L1 SL slot sets are periodic in the physical duration sense, and are independent from resource pool configuration thus free from resource pool jittering    2. L2 and L3 SL slot sets are closely related to resource pool configuration including e.g. S-SSB and bitmap setting, due to which the following issues may arise   - In case the Rx pool where SCI is detected should be different from Tx pool where mode 2 transmission takes place, ambiguity and potential collision could take place given the reservation period should be resource pool specific  -The logical resource reservation period is highly likely to be deviated from the physical resource reservation period if L2 and L3 slots are used due to resource pool jittering  In addition, from spec. change perspective, if we further examine the impact considering LTE V2X as well, we could obtain the following table.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Case a) | Case b) | Case c) | Case d) | | Option 1’ | L3 | L3 | L3 | L3 | | Option 2  (current specification) | L3 | L3 | L2 | L1 | | Option 3 | L3 | L3 | L0 | L0 | | Option 4 | L3 | L3 | L1 | L1 | | LTE V2X | L2 | L2 | L2 | L1 |   Accordingly, Option1’ and Option 3 have larger impact than Option 2 and Option 4.(Both 8.1.4 and 8.1.7 in TS 38.214 should be updated) from both NR and LTE specification perspective  Option 4 should be an ideal solution considering the technical perspective and spec. impact tradeoff. Alternatively, 2-1 is OK due to least spec. impact and alignment with LTE. |
| NTT DOCOMO | Option 1 is OK;  option 2-3 or option 3 is conditional OK | There is no perfect solution to solve the current discussed issue.  In this case, we slightly prefer option 1 so that any resource collision does not occur.  We are OK with option 2-3 or option 3 as second preference if collision issue can be solved. |
| LGE | Option 1 | According to the clause 8.1.4 in TS 38.214, a UE will derive the 2nd and 3rd PSSCH resources in each reservation period from the first PSSCH resource in each reservation period by using TRIV.  In this case, if Option 1 is not agreed, in this case, the resource reservation period value in the SCIs in 2nd and 3rd PSSCH resource would be no longer P since the TRIV will be interpreted as the slot offset in t’ domain.  In other words, the TX UE may need to use different value of resource reservation period for 2nd and 3rd PSSCH to ensure the same resources are reserved that can be derived by the SCI in the 1st PSSCH resource. Meanwhile, it would not be ensured that these period values are supported in the resource pool. |
| Huawei, HiSilicon | Option 1’ | For Option 1 and Option 1’, *P’* is counted in , i.e., slots belonging to the sidelink resource pool. So in Option 1 and Option 1’, the whole procedure of determining the sidelink resource pool in Clause 8 in TS 38.214 is considered, including considering slots which are not semi-statically configured as UL by the UL-DL configuration, S-SSB slots, reserved slots, and the unavailable slots determined by bitmap.  Since the periods of S-SSB slots/ reserved slots/ unavailable slots as determined by bitmap may not be multiple of 20 ms, the number of slots belonging to a sidelink resource pool in different 20 ms window may be different. Thus, Option 1 does not work since different UEs may consider different 20 ms windows, resulting in misalignment among UEs.  According to Option 1’, 20 ms in the existing formula of Clause 8.1.7 in TS 38.214 can be changed to 10240 ms, so that there is no misalignment among UEs. And Option 1’ further considers changing N to represent the number of slots belonging to the resource pool to be more accurate since *P’* is counted in . In general, Option 1’ works well and is proposed to be supported. The following TP is proposed for Option 1’  **<Unchanged parts omitted>**  8.1.7 UE procedure for determining the number of logical slots for a reservation period  A given resource reservation period in milliseconds is converted to a period in logical slots as:  where N is the number of slots belonging to the resource pool within 10240 msec according to Clause 8.  **<Unchanged parts omitted>**  Since the bitmap is not considered in Option 2 and Option 4, it is possible that may not belong to the sidelink resource pool.  Option 2-3 proposes the next slot after slot  belonging to the sidelink resource pool should be used. This works as a technical solution, and writing the specification is straightforward.  Option 2-2 and Option 4 add a limitation that “UE expects belong to the set of slots assigned to the resource pool”. However, considering PSSCH/PSCCH transmission can happen at any logical slot, i.e., can be any logical slot, it may impose too strict or even impractical limitations on configurations. |
|  |  |  |

**Others**

Q2: Other aspects with respect to the above issues.

|  |  |
| --- | --- |
| Company | Comment |
| LGE | If Option 1 in Q2 is not agreed, it is necessary to further clarify how a UE interprets a combination of TRIV and resource reservation period in the received SCI to determine reserved resource in the next reservation period.  For instance, if Option 2-2 is agreed, and if the UE applies resource reservation first, then applies TRIV with respect to each initial transmission resource, the number of slots in t\_i between two resources across different periods will not be constant as shown in Figure-(a). On the other hand, if Option 2-2 is agreed, and if the UE applies TRIV first, then applies resource reservation for each retransmission resource, the number of slots in t\_i between two resources across different periods will be constant as shown in Figure-(b). |
| Huawei, HiSilicon | In RAN1#103-e discussion, companies took a long time to align on the understanding of each option. So we illustrate each option in the following figure for convenience. |
|  |  |
|  |  |