**3GPP TSG RAN WG1 Meeting #103-E R1-** **200xxxx**

**e-Meeting, October 26th – November 13th, 2020**

**Source: Moderator (Intel Corporation)**

**Title: Discussion on [103-e-NR-Rel-16-V2X-04]**

**Agenda item: 7.2.4**

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

Introduction

This contribution provides discussion on critical issues for the thread [103-e-NR-Rel-16-V2X-04].

[103-e-NR-Rel-16-V2X-04] Email discussion/approval regarding e-evaluation procedure for periodic resource reservations

* Issue M2-1: Fix undefined UE behaviour for the case of re-evaluation performed during periodic reservation process
* Issue M2-7: Fix the issue of unreachable pre-emption event condition due to prior exclusion of slots related to non-monitored slots in the sensing window

till 10/30, with a potential CR by 11/4 – Sergey (Intel)

Outcome summary

Text proposal

1st round discussion

## Issue M2-1: Fix undefined UE behaviour for the case of re-evaluation performed during periodic reservation process

It is currently uncertain in specification whether a UE should perform re-evaluation procedure only before SCIs of the first period after the re-selection, or before ant SCI regardless of the periodic occasion.

In the last meeting the issue was discussed but no final decision was made. The following was one of the latest proposals:

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| **Updated Proposal**   * If periodic reservation is in use by a UE selecting resources, the UE performs re-evaluation procedure at least for resource(s) in the first period after the initial resource re-selection trigger or for resources in non-initial resource re-selection triggered by pre-emption   + Allow discussion in the next meeting whether re-evaluation in other than the first period is feasible and can be allowed for the UE implementation   + Note, this is intended to be captured in MAC specification   + Note, the initial resource re-selection trigger refers to the initial (re-)selection triggered according to clause 5.22.1.2 of TS 38.321, except resource re-selection triggered by re-evaluation and pre-emption |

This option was not supported by a few sources since it precludes re-evaluation every period. However, it was argued that if ‘sl-ReselectAfter’ is configured to 0 or a smaller value, then it may be already possible to do re-evaluation/re-selection when there is no packet transmission in a period.

Another issue found with re-evaluation every period is self-blocking due to step 5) execution. Similar to Issue M2-7, the resource being re-evaluated overlaps with the slot which should be excluded in step 5). In this case, after execution of steps 1)-7), the resource will not be in S\_A, even if there was no collision.

In order to facilitate decision in this meeting, the following set of questions is presented, based on the following two options:

**Option 1:**

* If periodic reservation is in use by a UE selecting resources, the UE performs re-evaluation procedure only for resource(s) in the first period after the initial resource re-selection trigger or for resources in non-initial resource re-selection triggered by pre-emption
  + Note, this is intended to be captured in MAC specification as a restriction when and which resource for re-evaluation can be passed to PHY
  + Note, the initial resource re-selection trigger refers to the initial (re-)selection triggered according to clause 5.22.1.2 of TS 38.321, except resource re-selection triggered by re-evaluation and pre-emption

**Option 2:**

* If periodic reservation is in use by a UE selecting resources, the UE performs re-evaluation procedure for resource(s) in every period by the following procedure
  + During re-evaluation check for resources indicated by a prior SCI with a period, step 5) in 8.1.4 of 38.214 is omitted during re-evaluation check
  + During re-evaluation check for resources indicated by a prior SCI with a period, in step 6)-c) in 8.1.4 of 38.214, j is let to be ‘1 to Cresel-1’ for re-evaluation, i.e. collision checking is skipped for the nearest period
  + If the resource is not in the identified resource set, then re-evaluation is indicated to MAC layer
  + MAC layer resets SL\_RESOURCE\_RESELECTION\_COUNTER following agreed procedures
  + In SCI, which was supposed to reserve the re-evaluated resource with a period, the reservation period is set to 0

**Q1-1: Does the above description of Option 1 capture the intention of performing re-evaluation only for resource in the first period? Please answer even if you don’t support Option 1.**

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| **Source** | **Short answer** | **Comments** |
| LG Electronics | Yes |  |
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**Q1-2: Does the above description of Option 2 capture the intention of performing re-evaluation in every period? Please answer even if you don’t support Option 2.**

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| **Source** | **Short answer** | **Comments** |
| LG Electronics | Difficult to understand the exact behaviour of Option 2 with the current description. | At least the following comments should be clarified:   * What does the sentence of “collision checking is skipped for the nearest period” mean? Is this correct understanding that even though the re-evaluation check for the resources within the current period is performed assuming these resource are periodically reserved “Cresel-1” times, but the resource re-selection can be triggered by this check is limited to the resources within the current period? * What’s the target behaviour/technical motivation with the sentence of “MAC layer resets SL\_RESOURCE\_RESELECTION\_COUNTER following agreed procedures”? |
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**Q1-3: Based on essentiality, spec impact, and backward compatibility which option (or any other alternative) should be implemented?**

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| **Source** | **Short answer** | **Comments** |
| LG Electronics | Option 1 |  |
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**Q1-4: Any other compromise proposals / comments helping to resolve the outstanding issue?**

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| **Source** | **Comments** |
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## Issue M2-7: Fix the issue of unreachable pre-emption event condition due to prior exclusion of slots related to non-monitored slots in the sensing window

In NR SL Mode-2, when pre-emption enabled a UE performs pre-emption checking with both aperiodic and periodic traffic. In case of periodic reservation is enabled in the pool, a UE checks for pre-emption event by comparing RSRP and priority. However, the procedure of resource identification performed by the UE also includes step 5) which excludes slots in the selection window related to slots not monitored in the sensing window, with the set of periodicities configured in the resource pool.

Even if only one period is configured, a UE can face the issue that pre-emption condition is never reached even if there are collisions. This is illustrated in Figure 1 from [1].



Figure 1. Reserved resource with period P during pre-emption

In order to avoid the issue, step 5) may need to be modified for the case when executed during pre-emption checking it does not exclude the reserved resource subject to pre-emption.

**Q2-1: Do you agree that the issue is valid and need to be resolved?**

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| **Source** | **Short answer** | **Comments** |
| LG Electronics | Not critical (i.e., further agreement is not necessary) | Even in Figure 1, according to the current specification, there could be a case that a UE performing the pre-emption checking triggers the resource re-selection of periodically reserved resource if such resource is overlapped with other UE’s resource (e.g., aperiodic resource selection) with a priority satisfying the pre-emption condition, which is identified in a slot different from the location of its periodically reserved resource. |
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**Q2-2: If you think the issue is valid, what solution can be applied?**

* **Examples:**
  + **Skip step 5) during pre-emption check**
  + **Do not include TX period when executing step 5)**
  + **Swap step 5) and step 6)**
  + **Etc.**

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| **Source** | **Comments** |
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References

**Contributions identified by FL to contain Mode-2 related issues:**

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**Other Rel.16 NR V2X contributions**

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53. [R1-2008751](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_103\Docs\R1-2008751.zip) Draft\_CR\_TS38.211 Ericsson
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