**3GPP TSG RAN WG1 #104-e R1-210xxxx**

**e-Meeting, January 26th – February 5th, 2021**

**Source: Moderator (Intel Corporation)**

**Title: Discussion on [104-e-NR-5G\_V2X-04]**

**Agenda item: 7.2.4**

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

Introduction

This document provides discussion on the identified thread related to Mode-2 resource allocation in RAN1#104-e:

[104-e-NR-5G\_V2X-04]: UE behaviour regarding non-monitored slots in mode 2, till 1/28, with potential CRs till 2/2 – Sergey (Intel)

* M2-17: Clarify that hypothetical SCI in step 5) assumes N=1 num of repetitions
* Changes for the uncaptured agreement (M2-3: Capture RAN1#103-e agreement on pre-emption) can be discussed during the CR preparation

Outcome Summary

TBD

Discussion

## Clarification on hypothetical SCI content during exclusion of slots related to non-monitored slots

In [15] (R1-2101533, Sharp) it is analysed that current implementation of step 5) in section 8.1.4 of TS 38.214 may be ambiguous. The issue is that this step invokes step 6)-c) for an assumption of hypothetical SCI to determine excluded slots and resource blocks. In the same time step 6)-c) refers to section 8.1.5 for determination of slots, but since a hypothetical SCI does not have a content it is impossible to derive the number of reserved slots N = 1 or 2 or 3.

To fix that, it is proposed to clarify in step 5) that the hypothetical SCI is assumed with N = 1.

**Q1-1: Do you agree to clarify in step 5) of section 8.1.4 of TS 38.214, that the hypothetical SCI is assumed with N = 1?**

|  |  |  |
| --- | --- | --- |
| **Source** | **Answer** | **Comment, if any** |
| NEC | Agree/Prefer | * N=1 seems reasonable for a hypothetical SCI with no TRIV. * The 2nd option may be to assume all the slots within the 32 slots from the are reserved. But this option sounds a bit excessive, we'd like to follow majority's view. |
| Huawei, HiSilicon | Agree | Clarification is needed, N=1 seems straightforward. |
| Sharp | Agree |  |
| Samsung | Agree |  |
| QC | Agree |  |
| Apple | Agree |  |
| CATT, GOHIGH | Not necessary | We think the current spec is clear, “all subchannels of the resource in this slot” only refers to the resource in one slot. It is unnecessary to further clarify N=1. |
| ZTE | No | Regarding the current spec, the hypothetical SCI received in slot and indicates all subchannels of the resource pool in this slot, that means only one transmission is indicated in the slot, i.e. N=1. We agree with the intention, but we don’t think spec change is necessary. |
| OPPO | Not necessary | Same understanding as CATT and ZTE in that the hypothetical SCI only indicating all subchannels in this slot. There is no other slots indicated by this hypothetical SCI. So N must be 1. |
| Ericsson | Not necessary | As stated by others it is quite clear from the procedure text that N=1. |
| NTT DOCOMO | Agree | Clarification is needed.  Regarding ‘in this slot’, the hypothetical SCI may indicate other slots additionally. Clarifying N=1 would be better. |
| Vivo | Not necessary | In step 5, it is clear to say ‘the hypothetical SCI indicates all subchannels of the resource pool in this slot’. Thus, no further clarification. |
| Nokia, NSB | Not needed | The intention of the existing text seems clear and no interpretation other than N=1 seems reasonable. While one can come up with interpretations which are not precluded by the text, these interpretations would clearly be unreasonable. |

**Q1-2: If the answer in Q1-1 is positive, do you agree to implement the following change in step 5) of section 8.1.4 of TS 38.214 (TP#8 from R1-2101533)?**

|  |
| --- |
| <<< unchanged parts omitted >>>  5) The UE shall exclude any candidate single-slot resource from the set if it meets all the following conditions:  - the UE has not monitored slot in Step 2.  - for any periodicity value allowed by the higher layer parameter *sl-ResourceReservePeriodList* and a hypothetical SCI format 1-A received in slot with '*Resource reservation period*' field set to that periodicity value, indicating all subchannels of the resource pool in this slot and *N*=1 actual resource, condition c in step 6 would be met.  <<< unchanged parts omitted >>> |

|  |  |  |
| --- | --- | --- |
| **Source** | **Answer** | **Comment, if any** |
| NEC | Agree |  |
| Huawei, HiSilicon | Ok with some revision | Suggest to add the following red part to be clearer:   * “and *N*=1 actual resource as defined in Clause 8.1.5” |
| Sharp | Agree | Agree with HW’s revision. |
| Samsung | Agree |  |
| Apple | Agree |  |
| CATT, GOHIGH | Not necessary | See comment in Q1-1 |
| ZTE | No | Refer to comment in Q1-1 |
| NTT DOCOMO | Agree |  |

Based on the discussion, it seems the change is not required since no other interpretations than N=1 is possible.

**Intermediate conclusion:**

* Current specification in section 8.1.4 of TS 38.214 is clear enough to interpret that in step 5) the hypothetical SCI 1-A is assumed with N=1

## Capturing RAN1#103-e agreement on pre-emption

At the last meeting, the following late agreement was made which needs to be implemented in specifications:

|  |
| --- |
| Agreements:   * When a UE checks pre-emption for a resource, the UE identifies a candidate resource set based on steps 1-7 in clause 8.1.4 TS 38.214   + After the candidate set is identified, the UE checks SL-RSRP measurement and priority condition as per agreements, for resource(s) {r’} subject to pre-emption overlapping with received SCI 1-A and not included in the candidate set, where the RSRP threshold is the final threshold after executing steps 1-7 i.e. includes all necessary increments for reaching X%. |

It was already discussed in RAN1#103-e that the agreement may be implemented by letting UE to check the RSRP threshold for a resource which is even not in the identified resource set. Two sources propose TPs for the agreement:

R1-2100204, Huawei, HiSilicon:

|  |
| --- |
| **--------------------------- Start of Text Proposal for TS 38.214 ------------------------**  **<Unchanged parts omitted>**  **8.1.4 UE procedure for determining the subset of resources to be reported to higher layers in PSSCH resource selection in sidelink resource allocation mode 2**  **<Unchanged parts omitted>**  The UE shall report set to higher layers.  If a resource from the set is not a member of , then the UE shall report re-evaluation of the resource to higher layers.  If a resource from the set is not a member of , checks whether the RSRP measurement is higher than for the received SCI format 1-A which overlaps with according to step 6) with an associated priority where satisfies one of the following conditions, and is the final threshold after executing steps 1)-7), i.e. includes all necessary increments for reaching X%.  - *sl-PreemptionEnable* is provided and is equal to 'enabled' and  - *sl-PreemptionEnable* is provided and is not equal to 'enabled', and and  If the RSRP measurement is higher than , then the UE shall report pre-emption of the resource to higher layers.  **<Unchanged parts omitted>**  **------------------------------------End of Text Proposal -------------------------------** |

R1-2100630, Intel Corporation:

|  |
| --- |
| 8.1.4 UE procedure for determining the subset of resources to be reported to higher layers in PSSCH resource selection in sidelink resource allocation mode 2  **<<< Unchanged parts omitted >>>**  If a resource from the set  - is not a member of , and  - if the RSRP measurement performed according to clause 8.4.2.1 for a received SCI format 1-A overlapped with the resource is higher than including all increments after execution of steps 1-7 above, and  - if an associated priority satisfies one of the following conditions, then the UE shall report pre-emption of the resource to higher layers.  - *sl-PreemptionEnable* is provided and is equal to 'enabled' and  - *sl-PreemptionEnable* is provided and is not equal to 'enabled', and and  **<<< Unchanged parts omitted >>>** |

**Q2-1: Which of the above text proposal could be a starting point for implementing RAN1#103-e agreement? Do you have any other suggestions?**

|  |  |
| --- | --- |
| **Source** | **Comments** |
| NEC | Either is OK, the one from Intel seems more concise. |
| Huawei, HiSilicon | It’s better to add the following red part to be more accurate, so the TP provided by Huawei/HiSilicon can be considered as a starting point.   * “…higher than for the received SCI format 1-A which overlaps with according to step 6) …” |
| Sharp | Both TPs are OK to us. For the TP from Intel, it seems that “overlapped with …” needs to refer to Step 6) as Huawei’s TP/comment. In our understanding, the condition of “is not a member of ” seems unnecessary , since is excluded in Step 5) already and we believe this is the main reason why we had such an agreement. If companies are OK to this condition, we are fine. |
| Samsung | Intel’s TP looks better |
| QC | Agree with NEC |
| Apple | Either is fine. The second text proposal is a little preferred as a starting point. |
| CATT. GOHIGH | Both are fine, slightly prefer second TP as a starting point. |
| ZTE | Either is ok. |
| OPPO | Intel’s TP is clearer and Huawei’s TP is more concrete. We suggest to use the TP from **Intel** as the start point. We also propose to replace the description of “ including all increments after execution of steps 1-7 above” with “, and is the final threshold after executing steps 1)-7), i.e. includes all necessary increments for reaching X%.” |
| Ericsson | Agree with NEC |
| NTT DOCOMO | Either is fine. |
| vivo | Either is fine |
| Nokia, NSB | Prefer the structure of Intel’s text and hence to use Intel as starting point. Some suggested changes:   * To make it clearer what the text is about move “the UE shall report pre-emption of the resource r\_i^\prime to higher layers” to the first line, e.g.  If a resource r\_i^\prime from the set (r\_0^\prime,r\_1^\prime,r\_2^\prime,\ldots) meets the conditions below then the UE shall report pre-emption of the resource to higher layers * “received SCI format 1-A overlapped with the resource r\_i^\prime” seems somewhat sloppy language and should be replaced by text based on the condition in 6c. |

It seems in terms of structure the second TP can be a starting point as preferred by majority of views. However, adjustments are required as also pointed out by several companies. Considering all the comments, the following TP is proposed:

|  |
| --- |
| 8.1.4 UE procedure for determining the subset of resources to be reported to higher layers in PSSCH resource selection in sidelink resource allocation mode 2  **<<< Unchanged parts omitted >>>**  If a resource from the set meets the conditions below then the UE shall report pre-emption of the resource to higher layers  - is not a member of , and  - the RSRP measurement performed according to clause 8.4.2.1 for a received SCI format 1-A which overlaps with according to step 6) is higher than , and is the final threshold after executing steps 1)-7), i.e. includes all necessary increments for reaching , and  - the associated priority satisfies one of the following conditions  - *sl-PreemptionEnable* is provided and is equal to 'enabled' and  - *sl-PreemptionEnable* is provided and is not equal to 'enabled', and and  **<<< Unchanged parts omitted >>>** |

UPDATED

|  |
| --- |
| 8.1.4 UE procedure for determining the subset of resources to be reported to higher layers in PSSCH resource selection in sidelink resource allocation mode 2  **<<< Unchanged parts omitted >>>**  If a resource from the set meets the conditions below then the UE shall report pre-emption of the resource to higher layers  - is not a member of , and  - meets the conditions for exclusion in step 6, with set to the final threshold after executing steps 1)-7), i.e. including all necessary increments for reaching , and  - the associated priority satisfies one of the following conditions  - *sl-PreemptionEnable* is provided and is equal to 'enabled' and  - *sl-PreemptionEnable* is provided and is not equal to 'enabled', and and  **<<< Unchanged parts omitted >>>** |

Please indicate any further comments and suggestions regarding the above TP:

|  |  |
| --- | --- |
| **Source** | **Comment** |
| Sharp | Support the TP. |
| vivo | If our understanding is correct, the second bullet can cover the first bullet. Thus the first bullet is redundant and can be removed. |
| OPPO | Support the TP. In addition, we think the first bullet is needed. We only need to check the condition of RSRP measurement and priority for the resource not included in . |
| CATT, GOHIGH | Support the TP. |
| NEC | Support |
| MODERATOR | I’ve found the previous version of 2nd sub-bullet reads a bit strange. In this version, I’ve moved part ‘which overlaps with according to step 6)’ to right after ‘SCI format 1-A’. This should also be acceptable. |
| Nokia, NSB | Agree in principle, but I still think that “SCI format 1-A which overlaps with” isn’t proper specification language – an SCI format itself cannot really overlap with a resource, the resources determined by the SCI etc can overlap with a resource. How about text like:  - meets the conditions for exclusion in step 6, with set to the final threshold after executing steps 1)-7), i.e. including all necessary increments for reaching , and  [FL] Adopted your suggestion |
|  |  |

References

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

1. R1-2100137 Remaining open issues and corrections for mode 1 and mode 2 RA OPPO
2. R1-2100204 Remaining details of sidelink resource allocation mode 2 Huawei, HiSilicon
3. R1-2100334 Discussion and TPs on resource allocation in NR V2X CATT, GOHIGH
4. R1-2100411 Maintenance on resource allocation mechanisms for NR sidelink vivo
5. R1-2100515 Discussion on essential corrections in resource allocation for Mode 1 and 2 LG Electronics
6. R1-2100630 Corrections to Mode-2 resource allocation Intel Corporation
7. R1-2100799 Remaining issues in NR sidelink mode 2 resource allocation Spreadtrum Communications
8. R1-2100938 The slot set for SL resource allocation procedure ZTE, Sanechips
9. R1-2100945 Remaining issues on resource allocation mode 2 NEC
10. R1-2101073 Remaining issues on resource allocation mode 2 for NR V2X ETRI
11. R1-2101175 Draft CR on Sidelink Physical Duration to Logical Slot Conversion Samsung
12. R1-2101176 Maintenance for NR Sidelink Mode 2 Operation Samsung
13. R1-2101346 Remaining Issues of Mode 2 Resource Allocation Apple
14. R1-2101437 Remaining Issues in Mode 2 Resource Allocation Qualcomm Incorporated
15. R1-2101533 Remaining issues on resource allocation for NR sidelink Sharp
16. R1-2101571 Remaining issues on sidelink mode 2 ASUSTeK
17. R1-2101582 Maintenance for sidelink synchronization and mode 2 NTT DOCOMO, INC.
18. R1-2101759 Remaining details for Resource allocation for sidelink - Mode 2 Nokia, Nokia Shanghai Bell

**Other Rel.16 NR V2X contributions**

1. R1-2100135 Draft TP on physical strucutre for NR sidelink OPPO
2. R1-2100136 Remaining open issues and corrections for physical layer procedure OPPO
3. R1-2100333 Discussion and TPs on sidelink synchronization mechanism and physical layer structure in NR V2X CATT, GOHIGH
4. R1-2100335 Discussion and TPs on physical layer procedures in NR V2X CATT, GOHIGH
5. R1-2100410 Maintenance on physical layer structure for NR sidelink vivo
6. R1-2100412 Maintenance on NR sidelink synchronization and procedures vivo
7. R1-2100514 Discussion on essential corrections in physical layer structure LG Electronics
8. R1-2100516 Discussion on essential corrections in physical layer procedure LG Electronics
9. R1-2100629 Correction to FD-OCC for PSCCH Intel Corporation
10. R1-2100631 Corrections to sidelink procedures Intel Corporation
11. R1-2100734 A remaining issue on Mode-1 resource allocation for NR sidelink Fujitsu
12. R1-2100735 Remaining issues on physical layer procedures for NR sidelink Fujitsu
13. R1-2100800 Remaining issues on sidelink physical layer procedure Spreadtrum Communications
14. R1-2100936 Remaining issues on sidelink synchronization ZTE, Sanechips
15. R1-2100937 Remaining issues on mode1 ZTE, Sanechips
16. R1-2101174 Maintenance for NR Sidelink Physical Layer Structure Samsung
17. R1-2101344 Remaining Issues of Sidelink Physical Layer Procedures Apple
18. R1-2101345 Remaining Issue of Mode 1 Resource Allocation Apple
19. R1-2101436 Remaining Issues in Mode 1 Resource Allocation Qualcomm Incorporated
20. R1-2101438 Remaining Issues in Physical Layer Procedure Qualcomm Incorporated
21. R1-2101532 Remaining issues on physical layer structure and procedures for NR sidelink Sharp
22. R1-2101534 Remaining issues on synchronization mechanism for NR sidelink Sharp
23. R1-2101581 Maintenance for resource allocation mechanism mode 1 NTT DOCOMO, INC.
24. R1-2101583 Maintenance for sidelink physical layer procedure NTT DOCOMO, INC.
25. R1-2101649 Remaining issues on type-1 HARQ-ACK codebook considering multiple sidelink reosurce pools ASUSTeK
26. R1-2101650 Remaining issues on sidelink procedure ASUSTeK
27. R1-2101707 Draft\_CR\_TS38.212 Ericsson
28. R1-2101708 Draft\_CR\_TS38.213 Ericsson
29. R1-2101709 Draft\_CR\_TS38.306 Ericsson
30. R1-2101732 Correction on PSBCH payload generation Huawei, HiSilicon
31. R1-2101733 Correction on determination of PSFCH resources based on a set of configured PRBs Huawei, HiSilicon
32. R1-2101760 Remaining details for Physical layer structure for sidelink Nokia, Nokia Shanghai Bell