**3GPP TSG RAN WG1 Meeting #100bis-E R1-200xxxx**

**e-Meeting, April 20th – 30th, 2020**

**Source: Moderator (Intel Corporation)**

**Title: TP Email Discussion #5 [100b-e-NR-5G\_V2X\_NRSL-Mode-2-05]**

**Agenda item: 7.2.4.2.2**

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

Introduction

This document provides discussion on TP as per the fifth email discussion on V2X Mode-2 during RAN1#100bis-e.

[100b-e-NR-5G\_V2X\_NRSL-Mode-2-05] Email approval of TP capturing previous meeting’s agreement regarding Time and frequency resource indication based on the submitted contributions till 4/22 (Intel, Sergey)

The intention of the TP is to implement the following agreements made in RAN1#100e:

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| --- |
| Agreements:* Time resource assignment in SCI uses an extended time domain RIV mechanism as follows:

if $N=1$$TRIV=0$ elseif $N=2$$TRIV=T\_{1} $ elseif $\left(T\_{2}-T\_{1}-1\right)\leq 15$$TRIV=30\left(T\_{2}-T\_{1}-1\right)+T\_{1}+31$ else$TRIV=30\left(31-T\_{2}+T\_{1}\right)+62-T\_{1}$ end ifend ifwhere* N denotes the actual number of resources indicated
* Ti denotes i-th resource time offset
	+ for N=2, $1\leq T\_{1}\leq 31$
	+ for N=3, $1\leq T\_{1}\leq 30$, $T\_{1}<T\_{2}\leq 31$

Agreements:* For frequency resource indication, the following resource index calculation is used
	+ For Nmax = 2,
		- $r=f\_{2}+\sum\_{i=1}^{m-1}\left(N\_{ subchannel}^{ SL}+1-i\right)$
	+ For Nmax = 3,
		- $r=f\_{2}+f\_{3}⋅\left(N\_{ subchannel}^{ SL}+1-m\right)+\sum\_{i=1}^{m-1}\left(N\_{ subchannel}^{ SL}+1-i\right)^{2}$
	+ where
		- f2 denotes lowest sub-channel index for the second resource, if any
		- f3 denotes lowest sub-channel index for the third resource, if any
		- m denotes number of sub-channels in a frequency resource allocation
	+ If time domain allocation indicates N < Nmax, the decoded lowest sub-channel indexes corresponding to Nmax minus N last resources are not used
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The draft TPs were identified in contributions [1] and [13]. In the next section, the TP based on these contributions is provided.

Proposed draft TP to TS 38.214

--------------------------------------------- TP to 38.214, section 8.1.5 starts ---------------------------------------------------

8.1.5 UE procedure for determining slots and resource blocks for PSSCH transmission associated with an SCI format 0-1

The set of slots and resource blocks for PSSCH transmission is determined by the resource used for the PSCCH transmission containing the associated SCI format 0-1, and fields "Frequency resource assignment", "Time resource assignment" of the associated SCI format 1 as described below.

"Time resource assignment" carries logical slot index indication of N = 1 or 2 or 3 actual resources in a form of time RIV (TRIV) field which is determined as follows:

if $N=1$

$$TRIV=0$$

elseif $N=2$

$$TRIV=T\_{1}$$

else

if $\left(T\_{2}-T\_{1}-1\right)\leq 15$

$$TRIV=30\left(T\_{2}-T\_{1}-1\right)+T\_{1}+31$$

else

$$TRIV=30\left(31-T\_{2}+T\_{1}\right)+62-T\_{1}$$

end if

end if

where $T\_{i}$ denotes i-th resource time offset in logical slots of a resource pool with respect to the first resource where N = 2, $1\leq T\_{1}\leq 31$, for N = 3, $1\leq T\_{1}\leq 30$, $T\_{1}<T\_{2}\leq 31$.

The lowest sub-channel index of the first PSSCH associated with the received SCI format 0-1 is determined from the sub-channel index where PSCCH carrying the SCI format 0-1 is received. The number of allocated sub-channels $L\_{subCH}$ and the lowest sub-channel indexes of other PSSCH reserved by the received SCI format 0-1 are determined from "Frequency resource assignment" which is equal to a frequency resource index $r$ where.

If *sl-MaxNumPerReserve* is 2 then $r=f\_{2}+\sum\_{i=1}^{L\_{subCH}-1}\left(N\_{ subchannel}^{ SL}+1-i\right)$,

If *sl-MaxNumPerReserve* is3 then $r=f\_{2}+f\_{3}⋅\left(N\_{ subchannel}^{ SL}+1-L\_{subCH}\right)+\sum\_{i=1}^{L\_{subCH}-1}\left(N\_{ subchannel}^{ SL}+1-i\right)^{2}$*,*

where

- $f\_{2}$ denotes the lowest sub-channel index for the second resource, if any

- $f\_{3}$ denotes the lowest sub-channel index for the third resource, if any

If TRIV indicates *N* < *sl-MaxNumPerReserve*, the decoded lowest sub-channel indexes corresponding to *sl-MaxNumPerReserve* minus N last resources are not used.

--------------------------------------------- TP to 38.214, section 8.1.5 ends ---------------------------------------------------

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| --- | --- |
| Source | Comments |
| Qualcomm | To clarify that N is bounded by N\_max:* "Time resource assignment" carries logical slot index indication of N = 1 or 2 or, when *sl-MaxNumPerPreserve* is 3, 3 actual resources in a form of time RIV (TRIV) field which is determined as follows

Editorial comments:* where $T\_{i}$ denotes i-th resource time offset in logical slots of a resource pool with respect to the first resource where for N = 2, $1\leq T\_{1}\leq 31$~~,~~; and for N = 3, $1\leq T\_{1}\leq 30$, $T\_{1}<T\_{2}\leq 31$.
* Could you replace $T\_{1},T\_{2}$ with different variable names to avoid confusion with the selection window limits, which are also used in 38.214? For example, $S\_{1},S\_{2}$ (or $X\_{1},X\_{2}$), …
 |
| Apple | We prefer to denote f2 and f3 as “the **starting** sub-channel index….”, as defined in LTE V2X (TS36.213). Similar to TRIV, we could use the term FRIV, rather than “r”, for the frequency resource index. |
| Sharp | 1. Similar to Qualcomm’s first proposed change, but it would be clearer if we say “N=1 or 2 when sl-MaxNumPerPreserve is 2, and N=1 or 2 or 3 when sl\_MaxNumPerPreserve is 3”.
2. Not sure if it is clear enough to say “other PSSCH”. It could happen that a resource is reserved but eventually not used, in which case there is no “other PSSCH” transmission. It may be better to just use “resource” as already used in other places of the TP.
3. Could we add a reference to the definition of $N\_{ subchannel}^{ SL}$?
4. Agree with Apple that to be consistent, it would be better to use FRIV rather than “r”.
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| CATT | Agree with the first change of Qualcomm, and N is bounded by N\_max.Agree with Apple that FRIV rather than “r” should be used for the frequency resource index. |
|  |  |

References

1. [R1-2001552](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001552.zip) Remaining details of sidelink resource allocation mode 2 Huawei, HiSilicon

1. [R1-2001661](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001661.zip) Remaining issues on mode 2 resource allocation mechanism vivo

1. [R1-2001749](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001749.zip) Discussion on remaining open issue for mode 2 OPPO

1. [R1-2001793](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001793.zip) Remaining Issues on Sidelink Mode 2 Resource Allocation Panasonic Corporation

1. [R1-2001805](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001805.zip) Remaining details of Resource allocation for sidelink - Mode 2 Nokia, Nokia Shanghai Bell

1. [R1-2001877](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001877.zip) Remaining details on mode 2 resource allocation for NR V2X Fujitsu

1. [R1-2001886](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001886.zip) Discussion on resource allocation for Mode 2 LG Electronics

1. [R1-2001896](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001896.zip) Remaining issues of mode 2 operation on sidelink ZTE, Sanechips

1. [R1-2001907](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001907.zip) Sidelink mode-2 resource allocation MediaTek Inc.

1. [R1-2001964](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001964.zip) Resource allocation for NR sidelink Mode 2 TCL Communication Ltd.

1. [R1-2001969](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001969.zip) Discussion on resource allocation for NR sidelink Mode 2 Lenovo, Motorola Mobility

1. [R1-2001978](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001978.zip) Remaining Issues in Resource Allocation for Mode 2 NR V2X Fraunhofer HHI, Fraunhofer IIS

1. [R1-2001994](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2001994.zip) Solutions to remaining opens of resource allocation mode-2 for NR V2X sidelink design Intel Corporation
2. [R1-2002041](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_100b%5CDocs%5CR1-2002041.zip) Remianing details on mode-2 resource allocation Futurewei

1. [R1-2002078](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002078.zip) Remaining issues on Mode 2 resource allocation in NR V2X CATT

1. [R1-2002126](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002126.zip) On Mode 2 for NR Sidelink Samsung

1. [R1-2002234](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002234.zip) Resource allocation Mode 2 for NR SL Ericsson

1. [R1-2002267](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002267.zip) Remaining issues in NR sidelink mode 2 resource allocation Spreadtrum Communications

1. [R1-2002301](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002301.zip) Remaining Issues on NR Sidelink Mode 2 Resource Allocation InterDigital, Inc.

1. [R1-2002325](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002325.zip) On Remaining Details of Mode 2 Resource Allocation Apple

1. [R1-2002362](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002362.zip) Remaining issues on resource allocation Mode 2 NEC

1. [R1-2002388](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002388.zip) Remaining issues on resource allocation mode 2 for NR sidelink Sharp

1. [R1-2002402](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002402.zip) On resource reservation in Mode 2 resource allocation Xiaomi Communications

1. [R1-2002439](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002439.zip) Remaining issues on resource allocation mechanism mode 2 NTT DOCOMO, INC.
2. [R1-2002487](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_100b%5CDocs%5CR1-2002487.zip) Remain details on mode-2 resource allocation for NR V2X ITL

1. [R1-2002489](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002489.zip) Remaining issue for Mode 2 resource allocation in NR V2X ASUSTeK

1. [R1-2002539](file:///C%3A%5C%5CUsers%5C%5Cwanshic%5C%5COneDrive%20-%20Qualcomm%5C%5CDocuments%5C%5CStandards%5C%5C3GPP%20Standards%5C%5CMeeting%20Documents%5C%5CTSGR1_100b%5C%5CDocs%5C%5CR1-2002539.zip) Sidelink Resource Allocation Mechanism for NR V2X Qualcomm Incorporated