**3GPP TSG RAN WG1 #101 R1-200xxxx**

**e-Meeting, May 25th – June 5th, 2020**

**Source: Ad-Hoc Chair (AT&T)**

**Title: Session Notes of AI 7.2.11.4**

**Agenda Item:** **7.2.11.4**

**Document for:** **Endorsement**



#### 7.2.11.4 UE features for 5G V2X (5)

[R1-2004284](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004284.zip) Summary of UE features for 5G V2X Moderator (AT&T)

[101-e-NR-5G\_V2X\_NRSL-UEFeatures-01] Email discussion/approval till 5/29 – Ralf (AT&T)

* Whether FG 15-24 is specified and if so, how to finalize FG 15-24 as in x4282

Proposal:

**Alt. 1: Delete FG 15-24** (2 companies)

**Alt. 2:** (2 companies)

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| 15-24 | Support of multiple synchronization references | 1) UE can support sidelink reception using up to A synchronziaion references in a carrier/BWP | At least one of 15-1, 15-2, 15-3 | Yes | No | UE supports only a single synchronization reference in a carrier/BWP. | Per band | N.A. | N.A. | N.A. | Component-1 candidate value set: {~~1,~~ 2, 3, 4} | Optional with capability signalling |

**Alt. 3:** (2 companies)

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| 15-24 | ~~Support of multiple synchronization references~~  Number of tx and rx timings | 1. ~~UE can support sidelink reception using up to A synchronziaion references in a carrier/BWP~~ 2. This parameter indicates the number of multiple reference TX/RX timings in a BWP/carrier for V2X sidelink communication | At least one of 15-1, 15-2, 15-3 | Yes | No | UE supports only a single synchronization reference in a carrier/BWP. | Per band | N.A. | N.A. | N.A. | Component-1 candidate value set: {1, 2, 3, 4} | Optional with capability signalling |

[101-e-NR-5G\_V2X\_NRSL-UEFeatures-02] Email discussion/approval till 5/29 – Ralf (AT&T)

* How to finalize all NR V2X FGs except FG 15-24 focusing on components, component descriptions, and associated notes as in x4282

Proposal:

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| 15-4 | Synchronization sources for NR sidelink | 1) UE can receive S-SSB in NR sidelink if it supports 15-1.  2) UE can transmit S-SSB in NR sidelink if it supports 15-2 or 15-3.  3) UE supports GNSS and SyncRef UE as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to GNSS and sl-NbAsSync set to false.  4) UE can transmit or receive NR sidelink based on the synchronization to an gNB  5) UE additionally supports gNB, GNSS and SyncRef UE as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to gnbEnb.  6) UE additionally supports gNB, GNSS and SyncRef UE as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to GNSS and sl-NbAsSync set to true. | At least one of 15-1, 15-2, 15-3 | Yes | No |  | Per band | N.A. | N.A. | N.A. | This is the basic FG for sidelink.  Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E-1  Note: Component 4 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E-1  Note: Component 5 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E-1  Note: Component 6 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E-1 | Optional with capability signalling  For UE supports NR sidelink, UE must indicate this FG is supported. |
| 15-15 | eNB type synchronization source for NR sidelink | 1) UE can transmit or receive NR sidelink based on the synchronization to an eNB.  2) If UE supports 15-4, UE additionally supports eNB, GNSS and SyncRef UE as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to gnbEnb.  3) If UE supports 15-4, UE additionally supports eNB, GNSS and SyncRef UE as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to GNSS and sl-NbAsSync set to true. | At least one of 15-1, 15-2, 15-3 | Yes | No |  | Per band | N.A. | N.A. | N.A. |  | Optional with capability signalling. |

Notes:

* Two companies prefer to delete FG 15-5 and merge with FG 15-4

Proposal:

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| 15-6 | Short-term time-scale TDM for in-device coexistence | Support prioritization between LTE sidelink transmission/reception and NR sidelink transmission/reception | At least one of 15-1, 15-2, 15-3 | Yes | No |  | Per band | N.A. | N.A. | N.A. | FFS whether a set of candidate values need to be defined for the time required for the inter-RAT conflict resolution | Optional with capability signalling |

Notes:

* Four companies support confirming FFS, one company supports removing FFS
* OPPO: change type to “per BC”

Proposal:

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| 15-7 | Transmitting LTE sidelink mode 3 scheduled by NR Uu | 1) UE can be scheduled over NR Uu for LTE sidelink mode 3 transmission..  2) UE reports a value ‘X’ for the minimum value it supports for the additional time indicated in the NR DCI scheduling LTE sidelink mode 3.  3) UE can monitor DCI format 3\_1 for LTE sidelink SPS grant. |  | Yes | No |  | Per band | N.A. | N.A. | N.A. | Component-2 candidate value set:  {0ms, 0.25ms, 0.5ms, 0.625ms, 0.75ms, 1ms, 1.25ms, 1.5ms,1.75ms, 2ms, 2.5ms, 3ms, 4ms, 5ms, 6ms, 8ms, 10ms, 20 ms } | Optional with capability signalling |

Note (OPPO): Component 1 is redundant given there is component 3

Proposal:

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| 15-9 | Transmitting LTE sidelink mode 4 configured by NR Uu | 1) UE can be configured over NR Uu for LTE sidelink mode 4 operation |  | Yes | No |  | Per band | N.A. | N.A. | N.A. |  | Optional with capability signalling |

Proposal:

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| 15-10 | 256QAM sidelink transmission | 1) UE can transmit PSSCH ~~with~~ according to the 256QAM MCS table ~~in NR sidelink~~ | At least one of 15-2, 15-3 | Yes | Yes | ~~UE supports QPSK, 16QAM, and 64 QAM for transmission only.~~  UE does not support transmission according to the 256QAM MCS table | Per band | N.A. | N.A. | N.A. |  | Optional with capability signalling |

Proposal:

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| 15-12 | Low-spectral efficiency 64QAM MCS table | 1) UE can transmit or receive PSSCH with low-spectral efficiency 64QAM MCS table. | At least one of 15-1, 15-2, 15-3 | Yes | Yes | ~~UE supports normal 64QAM MCS table~~  UE does not support transmission according to the low spectral-efficiency 64QAM MCS table | Per band | N.A. | N.A. | N.A. |  | Optional with capability signalling |

Proposal:

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| 15-16 | Simultaneous transmission of uplink and sidelink | 1) UE supports simultaneous transmission of NR uplink and NR sidelink (in different bands) in a band combination for which the UE indicated simultaneous sidelink and uplink support in a band combination. | At least one of 15-2 and 15-3 | Yes | No |  | Per band combination | N.A. | N.A. | N.A. |  | Optional with capability signalling. |

Discuss:

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| 15-5 | Sidelink congestion control | 1) UE can report CBR measurement to gNB [when operating in Mode 1] [and mode 2] (FFS: delete component 1)  2) UE can adjust its radio parameters based on CBR measurement and CRlimit. [in mode 2].  3) UE can process CBR and CR within the time it indicates [in mode 2] | 15-1 and at least one of 15-2 and 15-3 | Yes | FFS |  | Per band | N.A. | N.A. | N.A. | FFS: This is the basic FG for NR sidelink  FFS: details of components (1)  [Note: component 1 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E-1]  Component-3 candidate value set  {Congestion process time 1, Congestion process time 2} where  Congestion process time 1: 2, 2, 4, 8 slots for 15, 30, 60, 120 kHz subcarrier spacing.  Congestion process time 2: 2, 4, 8, 16 slots for 15, 30, 60, 120 kHz subcarrier spacing | Optional with capability signalling |

Discuss:

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| 15-11 | PSFCH format 0 | 1) UE can transmit and receive NR PSFCH format 0  2) UE can receive [N] PSFCH(s) resources in a slot.  3) UE can transmit [M] PSFCH(s) resources in a slot.  [4) UE can report sidelink HARQ-ACK to gNB via PUCCH and PUSCH when it is operating in NR sidelink mode 1.] [FFS: move to 15-2 or new FG 15-11a] | At least one of 15-1, 15-2, 15-3 | FFS | FFS |  | Per band | N.A. | N.A. | N.A. | This is the basic FG for sidelink.  Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E-1  Note: Component 4 is not required to be supported in a band indicated with the PC5 interface in 38.101-1 Table 5.2E-1 | Optional with capability signalling  FFS: For UE supports NR sidelink, UE must indicate this FG is supported.  ALT 1) Candidate values for N are {5, [10,] 15, [20,] 25, [30,] 35, [40,] 45, 50 }  ALT 2) Candidate values for N are {32, 64}  Candidate values for M are {[1], 4, [5,] 8, 16} |

Notes:

* Keep component (4): 4 companies
* Delete component (4): 1 company
* Make component (4) new FG 15-11a: 1 company
* Move component (4) to FG 15-2: 4 companies

Notes:

* ALT 1): 1 company
* ALT 2): 1 company

Discuss:

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| 15-14 | Sidelink CSI report | 1) UE can transmit and receive sidelink CSI-RS with 1 [or 2 antenna] port(s).  2) UE supports RI and CQI feedback on sidelink. | 15-1 and at least one of 15-2 and 15-3 | No | FFS |  | [Per band] | N.A. | N.A. | N.A. | FFS: This is the basic FG for NR sidelink | Optional with capability signalling.  FFS: For UE supports NR sidelink, UE must indicate this FG is supported. |

Question: can “[or 2 antenna]” be discussed without addressing other FFS points?

Discuss:

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| 15-22 | Support of fewer than 14 consecutive sidelink symbols in a slot | 1) UE additionally supports transmission/reception of SL slot configured with 7, 8, 9, 10, 11, 12, 13 consecutive symbols [and the corresponding DMRS patterns it reports.]  [2) UE supports [some/all] applicable DMRS patterns for the number of consecutive Sl symbols it reports] | At least one of 15-1, 15-2, 15-3 | Yes | No | UE supports SL only in a SL slot configured with 14 consecutive symbols. | Per band | N.A. | N/A | N.A. | FFS: This is the basic FG for NR sidelink  [Note: For Component (1) the support of 12 symbols is mandatory for ECP]  [The component-1 candidate value set can be DRMS patterns corresponding to {#PSSCH symbols, #DMRS symbols} = {[{12,2}, {12,1},] {11,4}, {11,3}, {11,2}, {10,4}, {10,3}, {10,2}, {9,2}, [{9,3},] {8,3}, {8,2}, {7,2}, {6,2}, {5,2}}] | Optional with capability signalling |

Discuss:

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| 15-23 | Support of open loop SL power control and RSRP report | 1) Support sidelink pathloss based open loop power control and RSRP report in case of unicast  [2) downlink pathloss based OLPC] | FFS | FFS | Yes |  | Per band | N.A. | N/A | N.A. | Working assumption: This FG is a basic UE FG [at least] for UEs supporting mode 1  FFS: all details for component (2)  FFS: whether this is a basic FG also for UEs not supporting mode 1 | Optional with capability signalling |

[101-e-NR-5G\_V2X\_NRSL-UEFeatures-03] Email discussion/approval till 5/29 – Ralf (AT&T)

* Which NR V2X feature groups are basic feature groups as in x4282

[101-e-NR-5G\_V2X\_NRSL-UEFeatures-04] Email discussion/approval till 5/29 – Ralf (AT&T)

* How to finalize type, need for the gNB to know if the feature is supported, and applicability to the capability signalling exchange between UEs focusing on, but not limited to (as in x4282)
  + Type: FG 15-14
  + Need for gNB to know: FG 15-1, FG 15-3, FG 15-11, FG 15-18, FG 15-19, FG 15-23
  + Applicability to the capability signalling exchange between UEs: FG 15-5, FG 15-11, FG 15-14, FG 15-18, FG 15-19, FG 15-23

[101-e-NR-5G\_V2X\_NRSL-UEFeatures-05] Email discussion/approval till 5/29 – Ralf (AT&T)

* How to finalize prerequisites of FGs focusing on, but not limited to, FG 15-18 and FG 15-19 as in x4282

[R1-2003417](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003417.zip) Discussion on 5G V2X UE features vivo

[R1-2003570](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003570.zip) Discussion on Rel-16 NR UE features for 5G V2X LG Electronics

[R1-2003576](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003576.zip) Views on UE features for 5G V2X ZTE, Sanechips

[R1-2003605](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003605.zip) Discussion of UE features for NR V2X CATT

[R1-2003696](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003696.zip) Views on Rel-16 UE features for NR V2X MediaTek Inc.

[R1-2003754](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003754.zip) On UE features for NR V2X Intel Corporation

[R1-2003809](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003809.zip) Remaining details of features for Rel-16 V2X Futurewei

[R1-2003896](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003896.zip) UE features for NR V2X Samsung

[R1-2004080](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004080.zip) Discussion on UE feature list for Release16 5G-V2X OPPO

[R1-2004143](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004143.zip) Rel-16 UE features for 5G V2X Huawei, HiSilicon

[R1-2004242](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004242.zip) Discussions on UE Features on V2X Apple

[R1-2004404](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004404.zip) UE features for 5G V2X NTT DOCOMO, INC.

[R1-2004479](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004479.zip) Discussion on V2X UE features Qualcomm Incorporated

R1-2004553 UE features for 5G V2X Ericsson

Withdrawn

[R1-2004562](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004562.zip) On UE features for 5G V2X Nokia, Nokia Shanghai Bell

[R1-2004576](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004576.zip) UE features for 5G V2X Ericsson