**3GPP TSG-RAN WG4 Meeting # 96-e R4-2012210**

**Electronic Meeting, 17-28 Aug., 2020**

**Agenda item: 7.3.5 & 7.3.6**

**Source:** Moderator (LG Electronics)

**Title:** Email discussion summary for [96e][210] 5G\_V2X\_NRSL\_RRM

**Document for:** Information

# Introduction

In this e-mail discussion the core maintenance and test cases will be discussed for 5G V2X RRM.

* 7.3.5 RRM core requirements maintenance(38.133) [5G\_V2X\_NRSL-Core]
* 7.3.6 RRM perf. Requirements(38.133) [5G\_V2X\_NRSL-Perf]
  + 7.3.6.1 General
  + 7.3.6.2 Test cases

List of candidate target of email discussion for 1st round and 2nd round

* 1st round: Makes agreements for RRM core maintenance issues and RRM test cases if possible
  + Topic #1: Interruption requirements
    - 1-1: Interruption to WAN due to V2X Sidelink Communication(Sync.vs Async)
    - 1-2: Interruption to WAN for switching between LTE SL and NR SL
    - 1-3: Whether to differentiate the different type of NR communication in interruption requirement due to synchronization reference source change
    - 1-4: Whether to define interruption requirement on LTE SL due to NR SL sync source is changed.
    - 1-5: Scheduling availability for V2X sidelink due to switching between LTE SL and NR SL
    - CRs/draft CRs(R4-2010084, R4-2010085, R4-2011380)
  + Topic #2: Measurement accuracy and side condition
    - 2-1: Absolute accuracy of L1 SL-RSRP measurement
    - 2-2: RRM requirements related to REFSENS
    - CRs (R4-2011053)
  + Topic #3: Test Cases
    - 3-1: Work plan for test cases
    - 3-2: Baseline of test cases
    - 3-3: Test for UE transmit timing
    - 3-4: Test for Initiation/Cease of SLSS Transmissions
    - 3-5: Test for Selection / Reselection of V2X Synchronization Reference Source
    - 3-6: Test for L1 SL-RSRP measurements
    - 3-7: Test for Congestion Control measurements
    - 3-8: Test for Interruption
    - 3-9: Test for Scheduling availability of UE switching between E-UTRA sidelink and NR sidelink
    - 3-10: Work split for draft CRs of test cases
    - Draft CR(R4-2011382)
* 2nd round: TBA

# Topic #1: Interruption requirements

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2010037 | MediaTek | Proposal 2: Synchronization between Uu link and PC5 link can be defined based on whether the misalignment between the interruption start point in the V2X sidelink and the slot start point of Uu link is less than CP length  Proposal 3: When sidelink is synced to Uu link, the interruption to WAN will re-use the NR RRC reconfiguration interruption requirement in synchronization scenario. On the other hand, when sidelink isn’t synced to Uu link, the interruption will re-use the NR RRC reconfiguration interruption requirement in asynchronization scenario.  Proposal 4: The interruption to WAN due to sidelink communication setup/release can be defined as follow.   |  |  |  |  | | --- | --- | --- | --- | |  | NR Slot length (ms) | Interruption length  (number of slots) | | | WAN is the sync. source | Others | | 0 | 1 | 1 | 2 | | 1 | 0.5 | 2 | 3 | | 2 | 0.25 | 5 | | | 3 | 0.125 | 9 | |   Proposal 5: When two synchronization sources that UE switches between are not synchronized, RAN4 shall differentiate the different type of communication in interruption requirement.   * For broadcast communication, define the sidelink communication dropping requirement as 1ms; * For group-cast and unicast communication, the sidelink communication can be dropped at least 1ms due to sync. source change.   Proposal 6: When two synchronization sources that UE switches between are not synchronized in NR sidelink, define the interruption to LTE SL due to NR SL sync. source change in TS36.133  Proposal 7: To define interruption to WAN due to switching between LTE and NR SL, it shall differentiate sync. and async. scenarios when sidelink is synced to BS because of the propagation delay difference between the Uu downlink and V2X sidelink.  Proposal 8: Define the interruption to NR Uu link due to switching between LTE SL and NR SL as follow.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Slot length (ms) | Interruption length (slot) | | | | **WAN is the sync. source** | | **Others** | | **Synced** | **Asynced** | | 0 | 1 | 1 | 2 | 2 | | 1 | 0.5 | 1 | 2 | 2 | | 2 | 0.25 | 1 | 2 | 2 | | 3 | 0.125 | 2 | 3 | 3 | |
| R4-2010083 | LG Electronics | Proposal 1: Add notes to clarify synchronization/asynchronization between NR Uu and SL in Table 12.7.1-1 in TS38.133(Interruption length at V2X RRC reconfiguration).  Table 12.7.1-1: Interruption length at V2X RRC reconfiguration   |  |  |  |  | | --- | --- | --- | --- | |  | NR Slot length (ms) | Interruption length  (number of slots) | | | Sync | Async | | 0 | 1 | 1 | 2 | | 1 | 0.5 | 2 | 3 | | 2 | 0.25 | 5 | | | 3 | 0.125 | 9 | | | Note1: It is assumed to be synchronized between NR Uu and V2X SL when gNB or SyncRef UE directly/indirectly synchronized to gNB is applied as synchronization reference source. | | | |   Proposal 2: Not to differentiate the different type of NR communication in interruption requirement due to synchronization reference source change.  Proposal 3: Specify interruption requirement on NR WAN due to switching between NR SL and LTE SL for synchronization case and asynchronization case between NR Uu and SL with Table2.1-1.  Table 2.1-1 : Interruption length on NR WAN due to switching between NR SL and LTE SL   |  |  |  |  | | --- | --- | --- | --- | |  | NR Slot length (ms) | Interruption length (number of slots) | | | Sync | Async | | 0 | 1 | 1 | 2 | | 1 | 0.5 | 1 | 2 | | 2 | 0.25 | 1 | 2 | | 3 | 0.125 | 2 | 2 | | Note1: It is assumed to be synchronized between NR Uu and V2X SL when gNB or SyncRef UE directly/indirectly synchronized to gNB is applied as synchronization reference source. | | | |   Proposal 4: Do not define interruption requirement on LTE SL due to NR SL sync source is changed in Rel-16. |
| R4-2011054 | Huawei, HiSilicon | Proposal 1: The synchronous conditions for inter-band CA/DC can be reused between NR Uu and SL in interruption requirements.  Proposal 2: It is suggested not to differentiate the different type of NR communication in interruption requirements due to synchronization reference source change.  Proposal 3: It is suggested not to define interruption requirements on NR WAN due to switching between LTE SL and NR SL.  Proposal 4: It is suggested that the scheduling restrictions due to UE switching between LTE SL and NR SL are limited sidelink transmissions. |
| R4-2011379 | Qualcomm | Proposal 1: Interruption requirement on NR Uu from NR SL RRC reconfiguration set as shown in Table 2-1.  Table 1‑1 Interruption requirement on NR Uu from NR SL RRC reconfiguration   |  |  |  | | --- | --- | --- | | µ | NR Slot length (ms) | Interruption length  (number of slots) | | 0 | 1 | 2 | | 1 | 0.5 | 3 | | 2 | 0.25 | 5 | | 3 | 0.125 | 9 |   Proposal 2: No change for agreed sync source change interruption requirement, applies to sync source change between gNB and eNB.  Proposal 3: Interruption requirement on NR Uu from SL Tx cross-RAT set as shown in Table 2-2.  Table 1‑2 Interruption to Uu communication by SL Tx cross-RAT switching   |  |  |  | | --- | --- | --- | |  | Slot length (ms) | Interruption length (slot) | | 0 | 1 | 2 | | 1 | 0.5 | 2 | | 2 | 0.25 | 2 | | 3 | 0.125 | 3 |   Proposal 4: Text revision for 38.133 clause 12.9:  “This clause contains the restrictions on the scheduling availability for V2X sidelink due to switching between E-UTRA V2X sidelink and NR V2X sidelink transmission on a dedicated carrier. For the NR V2X sidelink, the assumed number of configured symbols in a slot is 14.” |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1

*Sub-topic description:* Interruption to WAN due to V2X Sidelink Communication(Sync.vs Async)

*Open issues and candidate options before e-meeting:*

**Issue 1-1: Interruption to WAN due to V2X Sidelink Communication(Sync.vs Async)**

* Proposals
  + Option 1:
    - When sidelink is synced to Uu link, the interruption to WAN will re-use the NR RRC reconfiguration interruption requirement in synchronization scenario.
    - When sidelink isn’t synced to Uu link, the interruption will re-use the NR RRC reconfiguration interruption requirement in asynchronization scenario.

|  |  |  |  |
| --- | --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (number of slots) | |
| WAN is the sync. source | Others |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2 | 0.25 | 5 | |
| 3 | 0.125 | 9 | |

* + Option 2 :
    - When sidelink is synced to gNB or SyncRef UE directly/indirectly synchronized to gNB, it is assumed to be synchronized between NR Uu and V2X SL.

|  |  |  |  |
| --- | --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (number of slots) | |
| Sync | Async |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 2 | 3 |
| 2 | 0.25 | 5 | |
| 3 | 0.125 | 9 | |
| Note1: It is assumed to be synchronized between NR Uu and V2X SL when gNB or SyncRef UE directly/indirectly synchronized to gNB is applied as synchronization reference source. | | | |

* + Option 3: The synchronous conditions for inter-band CA/DC can be reused between NR Uu and SL in interruption requirements
  + Option 4: Due to lack of synchronization mechanism between Uu and SL interface, apply asynchronized requirement.

|  |  |  |
| --- | --- | --- |
|  | NR Slot length (ms) | Interruption length  (number of slots) |
| 0 | 1 | 2 |
| 1 | 0.5 | 3 |
| 2 | 0.25 | 5 |
| 3 | 0.125 | 9 |

* Recommended WF
  + Decide one option in 1st round

### Sub-topic 1-2

*Sub-topic description:* Interruption to WAN for switching between LTE SL and NR SL

*Open issues and candidate options before e-meeting:*

**Issue 1-2: Interruption to WAN for switching between LTE SL and NR SL**

* Proposals
  + Option 1A: Define the interruption requirement for following scenarios
    - Sync. and async. scenarios when sidelink is synced to BS
    - Others

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Slot length (ms) | Interruption length (slot) | | |
| **WAN is the sync. source** | | **Others** |
| **Synced** | **Asynced** |
| 0 | 1 | 1 | 2 | 2 |
| 1 | 0.5 | 1 | 2 | 2 |
| 2 | 0.25 | 1 | 2 | 2 |
| 3 | 0.125 | 2 | 3 | 3 |

* + Option 1B: Define the interruption requirement for following scenarios
    - Sync. and async. scenarios

|  |  |  |  |
| --- | --- | --- | --- |
|  | NR Slot length (ms) | Interruption length (number of slots) | |
| Sync | Async |
| 0 | 1 | 1 | 2 |
| 1 | 0.5 | 1 | 2 |
| 2 | 0.25 | 1 | 2 |
| 3 | 0.125 | 2 | 2 |
| Note1: It is assumed to be synchronized between NR Uu and V2X SL when gNB or SyncRef UE directly/indirectly synchronized to gNB is applied as synchronization reference source. | | | |

* + Option 1C: Define the interruption requirement based on async scenario
    - Based on async. scenario

|  |  |  |
| --- | --- | --- |
|  | Slot length (ms) | Interruption length (slot) |
| 0 | 1 | 2 |
| 1 | 0.5 | 2 |
| 2 | 0.25 | 2 |
| 3 | 0.125 | 3 |

* + Option 2: Not define regarding that UE is assumed to have separate Rx/Tx chains for Uu operation and SL operation
* Recommended WF
  + Decide one option in 1st round

### Sub-topic 1-3

*Sub-topic description:* Whether to differentiate the different type of NR communication in interruption requirement due to synchronization reference source change

*Open issues and candidate options before e-meeting:*

**Issue 1-3: Whether to differentiate the different type of NR communication in interruption requirement due to synchronization reference source change**

* Proposals
  + Option 1: Not differentiate
  + Option 2 : Differentiate as below
    - For broadcast communication, define the sidelink communication dropping requirement as 1ms;
    - For group-cast and unicast communication, the sidelink communication can be dropped at least 1ms due to sync. source change
* Recommended WF
  + Decide one option in 1st round

### Sub-topic 1-4

*Sub-topic description:* Whether to define interruption requirement on LTE SL due to NR SL sync source is changed

*Open issues and candidate options before e-meeting:*

**Issue 1-4: Whether to define interruption requirement on LTE SL due to NR SL sync source is changed**

* Proposals
  + Option 1: Not define in Rel-16
  + Option 2: Define the interruption to LTE SL due to NR SL sync. source change in TS36.133
* Recommended WF
  + Decide one option in 1st round

### Sub-topic 1-5

*Sub-topic description:*: Scheduling availability for V2X sidelink due to switching between LTE SL and NR SL

*Open issues and candidate options before e-meeting:*

**Issue 1-5: Scheduling availability for V2X sidelink due to switching between LTE SL and NR SL**

* Proposals
  + Option 1: Scheduling restrictions due to UE switching between LTE SL and NR SL are limited sidelink transmissions
* Recommended WF
  + Make agreement and related CR change with highlighted yellow colour as below

“This clause contains the restrictions on the scheduling availability for V2X sidelink due to switching between E-UTRA V2X sidelink and NR V2X sidelink transmission on a dedicated carrier. For the NR V2X sidelink, the assumed number of configured symbols in a slot is 14.”

## Companies views’ collection for 1st round

### Open issues

**Issue 1-1: Interruption to WAN due to V2X Sidelink Communication(Sync.vs Async)**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | We support option 4, also note that even Uu DL and SL are synced, TA in Uu UL still results in timing difference between SL and Uu UL, therefore option 4 is the only option to cover this case |
| LG | We think option1 and option2 are similar. Option 2 includes SyncRef UE directly/indirectly sync.to gNB additionally for synchronization assumption compared to Option1. Our preference is Option2( add note for synchronization assumption in the current specification). |
| MTK | Support option 4 or option 1.  Since no coordinate between Uu and SL, and it’s hard to define a sync. definition for Uu and SL.  Option 4 is also our proposal in last meeting. If we can’t conclude how to define sync. between Uu and SL, we support option 4 firstly.  Option 1 if sync. can be defined based on CP offset between Uu and SL.  To option 2, since the sync. timing error propagation from SyncRef UEs, we don’t think Uu and SL can be believed as sync. in this scenario. |
| Huawei | We prefer option 3, but option 4 is acceptable for us.  For option 2, UE with NR Uu link will not select a SyncRef UE directly/indirectly sync to gNB as sync reference source, since gNB always has higher priority than SyncRef UE directly/indirectly sync to gNB. |
| Ericsson | We support option 1, i.e. the interruption requirements can be similar to the legacy sync and asyn requirements. |
| Xiaomi | Support option4. As there is no specific definition of synchronization between Uu and SL, we prefer to support define the requirements based on asynchronous assumption. |
| MTK | If we want to choose option 1, we had to discuss the sync. definition firstly.  We have nearly agreed to define a test case for this requirement. Since there is only 2 meeting left for V2X performance part, we don’t think it’s possible to have a consensus on sync. definition and finish the test case discussion on time.  Thus, to make the progress in Core part and not delay the discussion in performance part, we suggest to use option 4 in the groups.  We’re also fine with option 1 and RAN4 have to start the discussion on sync. definition. |

**Issue 1-2: Interruption to WAN for switching between LTE SL and NR SL**

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| --- | --- |
| **Company** | **Comments** |
| QC | Support 1C. Note that although Uu and SL may have separate chains, there are some of the RF components like LO can be shared between them, therefore interruption is unavoidable. For sync vs async, same reasoning as 1-1 can apply here. |
| LG | It needs to keep consistency with Issue 1-1 for synchronization and asynchronization. For interruption length, main different value between Option1A and Option1B is in case of =3.  To MTK, could do explain how to get 2 slots for synced to WAN when =3.  General comment, the case of =3 can be removed because FR2 NR Uu is not considered in Rel-16 NR V2X as timing reference source or concurrent operating band. |
| MTK | Support option 1c or 1a.  If we don’t have a common understanding on defining sync. definition, we support option 1c.  Otherwise, we support option 1a with sync. defined based on CP length.  We’re fine to remove all u=3 case in the spec. For u=3, one slot length is 125us. If we use 150us for switching delay, it shall be 2 slots interruption. |
| Huawei | We support option 2.  As we point out that UE is assumed to have separate Rx/Tx chains for Uu and SL, which is clarified in section 12.1.  *Note: When a UE in RRC\_CONNECTED state is performing transmissions and/or reception for V2X sidelink communication, the UE shall meet all the requirements specified in Section 9 assuming that UE has a dedicated RX/TX chain for V2X sidelink communication. Otherwise, the UE may interrup the V2X sidelink communication in order to meet the measurement requirements specified in Section 9.*  For the note, it can be observed that no interruption on V2X sidelink communication when UE perform Uu link switching between intra-frequency carrier and inter-frequency carrier for measurements. So, when UE perform SL switching between NR and LTE in unlicensed band, there should be also no interruption on Uu link in licensed band. |
| Ericsson | We also support option 2 since UE is expected to have a separate RX/TX chain for Uu and SL respectively. Therefore there is no need to define interruption for this case. |
| Xiaomi | We tend to think that this requirement has been contained in section 12.9 and there's no need to discussion. If RAN4 deemed it necessary, we prefer to option1C. |
| MTK | To Huawei, Ericsson,  We don’t think current spec. forces UE to have a separate RX/TX chain. In current spec., it also capture some wordings as follow. It implies a shared RX/TX chain is possible.   |  | | --- | | *Otherwise, the UE may interrup the V2X sidelink communication in order to meet the measurement requirements specified in Section 9.* | |
| Huawei | To MTK  Since LTE V2X, it is common understanding that the UE has separate Rx/Tx chain for Uu and SL.  Besides, , the followings are defined in TS38.101-3  C:\Users\l00212937.CHINA\AppData\Roaming\eSpace_Desktop\UserData\l00559541\imagefiles\4D941C63-8AF6-489B-84A0-042199FFD4F6.png  V2X sidelink and Uu uplink have independent maximum output powers, which implies independent Rx/Tx chains for Uu and SL. |
| QC | Our understanding is separate chain doesn’t guarantee no interruption. For example, BWP switching can interrupt inter-band carriers, when LO is shared between two chains. |

**Issue 1-3: Whether to differentiate the different type of NR communication in interruption requirement due to synchronization reference source change**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Support option 1, Tx and Rx both keep transmitting until RLF happens because none of them is aware of whether this is asynchronous or synchronous communication, and RAN4 doesn’t have any requirement for asynchronous transmission/reception. |
| LG | Preference is option 1(not differentiate). |
| MTK | We agree on QC’s observation.  If the two sync sources are not synced, since Rx UE doesn’t know any information of sync source change in Tx UE, the communication link may be not only interrupted 1ms but go to radio link failure procedure.  Thus, we want to emphasize that the sidelink communication can be dropped at least 1ms due to sync. source change for unicast and group-cast communication. |
| Huawei | We support option 1  V2X UE is assumed to have sidelink communication with other V2X UEs which have synchronous reference timing. When the sync reference timing is changed, then the target UEs for sidelink communication shall be also changed. The interruption time due to sync source change refers to the time period in which UE cannot communicate with any other V2X UE. |
| Xiaomi | Support option1. |
| MTK | To make progress, we can compromise to option 1. |

**Issue 1-4: Whether to define interruption requirement on LTE SL due to NR SL sync source is changed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Option 1 |
| LG | In last RAN4#95e meeting, we agreed below in WF[R4-2008587]   * Whether to define interruption requirement on LTE SL due to NR SL sync source is changed   + If RAN1 makes agreement related to this issue until this RAN4#95e meeting, RAN4 will further discuss it in maintenance part in next RAN4#96e meeting.   + Otherwise, RAN4 does not define this requirement in Rel-16   In our understanding, RAN1 did not make agreement on this issue until this RAN4#95e meeting. Therefore, RAN4 does not need to define the related interruption requirement in Rel-16.  We support Option1. |
| MTK | Send LS to RAN1.  RAN1 had already defined the spec. for concurrent NR SL and LTE SL. But if NR V2X UE switch the sync. source to gNB, RAN1 still hadn’t captured UE’s behavior on how to guarantee the sync. between NR SL and LTE SL.  From our understanding, RAN1 didn’t capture this scenario because they didn’t realize this interruption scenario which is RAN4’s discussion scope.  Thus, we suggest to send LS to RAN1 on this scenario for further clarification. |
| Huawei | We support option 1.  The UE supports LTE SL and NR SL in TDM pattern based on the assumption that LTE SL reference timing and NR SL reference timing are synchronous. If NR SL sync source is changed between two synchronized sync sources, then the UE still could support LTE SL and NR SL in TDM pattern. If NR SL sync source is changed between two asynchronized sync sources, then the UE needs to change the LTE SL sync source accordingly in order to support LTE SL and NR SL in TDM pattern. In current TS36.133, the interruption requirements due to sync source change have been specified. |
| Xiaomi | Support option 1 |
| MTK | To HW,  If NR SL sync source is changed from GNSS to gNB, what about the possible UE’s behavior?   1. Follow RAN1’s spec, to always sync. between NR SL and LTE SL means LTE SL has to change its sync. source too. But no additional interruption is allowed in current 36.133. 2. Follow RAN4’s spec, to keep the sync. source of LTE SL chain unchanged. But after NR SL changes its sync. source, NR SL and LTE SL will be asynced which violates with RAN1’s spec. 3. UE keeps current GNSS sync. source unchanged. But it still violates with RAN1/RAN4 spec. when gNB has higher priority than GNSS.   To LG,  RAN1 updated the spec. based on their agreed UE behavior. It implies RAN1 didn’t see any issue from their sides. Thus, our new suggestion is to send a LS to RAN1 to clarify the UE’s behavior in this situation. |

**Issue 1-5: Scheduling availability for V2X sidelink due to switching between LTE SL and NR SL**

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| --- | --- |
| **Company** | **Comments** |
| QC | Support recommended WF |
| LG | Support recommended WF. |
| MTK | Support recommended WF. |
| Huawei | We support option 1, the recommended WF is acceptable for us. |
| Xiaomi | Support recommended WF. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2010084 | Title : CR of missed requirements based on the agreed CRs in RAN4#95-e |
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|  |
| R4-2010085 | Title : CR of interruption requirements |
|  |
|  |
| R4-2011380 | Title : CR- Addition and correction of NR V2X RRM core requirement |
| QC: this can be merged into R4-2010084 or R4-2010085 |
| LG : It can be merged in the related another CR(R4-2010085) after reaching agreement. |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Issue 1-1** | **Interruption to WAN due to V2X Sidelink Communication(Sync.vs Async)**  *Tentative agreements:*  *Candidate options:*   * Option 1: (Ericsson, MTK)   + When sidelink is synced to Uu link, the interruption to WAN will re-use the NR RRC reconfiguration interruption requirement in synchronization scenario.   + When sidelink isn’t synced to Uu link, the interruption will re-use the NR RRC reconfiguration interruption requirement in asynchronization scenario.  |  |  |  |  | | --- | --- | --- | --- | |  | NR Slot length (ms) | Interruption length  (number of slots) | | | WAN is the sync. source | Others | | 0 | 1 | 1 | 2 | | 1 | 0.5 | 2 | 3 | | 2 | 0.25 | 5 | | | 3 | 0.125 | 9 | |  * Option 4: Due to lack of synchronization mechanism between Uu and SL interface, apply asynchronized requirement. (QC, Huawei, Xiaomi, LG, MTK)  |  |  |  | | --- | --- | --- | |  | NR Slot length (ms) | Interruption length  (number of slots) | | 0 | 1 | 2 | | 1 | 0.5 | 3 | | 2 | 0.25 | 5 | | 3 | 0.125 | 9 |   *Recommendations for 2nd round:*   * Decide one option based on technical discussion about synchronization mechanism between Uu and SL. |
| **Issue 1-2** | **Interruption to WAN for switching between LTE SL and NR SL**  *Tentative agreements:*  *Candidate options:*   * Option 1C: Define the interruption requirement based on async scenario (QC, MTK, Xiaomi, LG)   + - Based on async. scenario  |  |  |  | | --- | --- | --- | |  | Slot length (ms) | Interruption length (slot) | | 0 | 1 | 2 | | 1 | 0.5 | 2 | | 2 | 0.25 | 2 | | 3 | 0.125 | 3 |  * Option 2: Not define regarding that UE is assumed to have separate Rx/Tx chains for Uu operation and SL operation (Huawei, Ericsson)   *Recommendations for 2nd round:*   * Decide one option regarding whether interruption can occur or not in a separated RX/TX chain for Uu and SL. |
| **Issue 1-3** | **Whether to differentiate the different type of NR communication in interruption requirement due to synchronization reference source change**  *Tentative agreements:*   * Not differentiate the different type of NR communication in interruption requirement due to synchronization reference source change   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 1-4** | **Whether to define interruption requirement on LTE SL due to NR SL sync source is changed**  *Tentative agreements:*  *Candidate options:*   * Option 1 : Not define in Rel-16 (QC, LG, Huawei, Xiaomi) * Option 2a : Send LS to RAN1 on this scenario for further clarification (MTK)   *Recommendations for 2nd round:*   * Discuss whether or not to send LS to RAN1 on this scenario for further clarification. |
| **Issue 1-5** | **Scheduling availability for V2X sidelink due to switching between LTE SL and NR SL**  *Tentative agreements:*   * Make agreement and related CR change with highlighted yellow colour as below   “This clause contains the restrictions on the scheduling availability for V2X sidelink due to switching between E-UTRA V2X sidelink and NR V2X sidelink transmission on a dedicated carrier. For the NR V2X sidelink, the assumed number of configured symbols in a slot is 14.”   * Capture it in revision of CR R4-2010084.   *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| WF(R4-2012104) | WF on NR V2X RRM requirements | LG Electronics |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2010084 | To be revised to capture agreement of Issue 1-5. |
| R4-2010085 | To be revised |
| R4-2011380 | To be noted |

## Discussion on 2nd round (if applicable)

### Open issues

**Issue 1-1: Interruption to WAN due to V2X Sidelink Communication(Sync.vs Async)**

* For Option1 and Option4, technical discussion about synchronization mechanism between Uu and SL.

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| **Company** | **Comments** |
| LG | We should consider whether or not there is a way how NW can know which synchronization source is used as reference timing in UE side. If there is way or not ambiguity, Option1 can be considered. However, if not, option 4 is preferable. |
| MTK | Option 4.  We still want to emphasize currently no consensus on how to define sync. between Uu link and sidelink. If so, the minimum requirement(option 4) will be used. |
| Huawei | We support option 4  The UE even has not select a synchronization source before initiating V2X sidelink communication. So, the UE could not distinguish whether sidelink reference timing is synchronized to Uu timing. |
| QC | Option 4.  We raise TA issue in first round comment: with TA, DL and UL can’t be synchronized with non-zero TA, and the interruption we defined here applies to both UL and DL on Uu, and SL can only synchronize to one of them, then for the other it is asynchronized. Since supports for option 1 didn’t provide any technical justification and address our concern, we recommend to agree on option 4 to close this issue. |
| Xiaomi | We prefer Option 4. |
| Ericsson | We support option 1. In our understanding, UE should know the list of synchronization sources it is configured to use and which source it is currently using. Based on this information, at least for the case when the UE uses gNB/eNB as synchronization source the interruption requirements for the synchronous case should apply. When the UE is using any source other than gNB/eNB as synchronization source then the interruption requirements for the asynchronous case should apply. If there is no consensus how to define the sync between SL and Uu link, it does not mean that we should assume the worst case. Also, please note that the WI is already closed, and we should not introduce any new interruption requirements at this stage. We should only focus on making essential corrections. In summary, we support option 1. |
| LG | As moderator, I think most of companies have same view, there is no synchronization mechanism between Uu and SL. And as QC mentioned, even though gNB is used as synchronization source, UL case is not synchronized to SL due to TA. Because, there is different timing offset between UL Tx and SL Tx.   * UL transmission is based on Nta\_offset(13Ts) + Nta(non-zero). * SL transmission is based on Nta\_offset(0Ts) + Nta(0).   Therefore, I think Option 4 is acceptable.  And, I think it is not new requirement but essential for clarification. |

**Issue 1-2: Interruption to WAN for switching between LTE SL and NR SL**

* For Option1C and Option2, whether interruption can occur or not in a separated RX/TX chain for Uu and SL

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| **Company** | **Comments** |
| LG | Regarding that interruption requirements are defined in case of inter-band CA(assuming a separated RX/TX chain), we think the interruption can occur in this case. |
| MTK | Option 1c.  We agree with LG. We think the interruption can occur also.  We think the rule on Issue 1-2 can follow Issue 1-1’s conclusion. |
| Huawei | We support option 2.  The interruptions for inter-band CA in licensed bands are allowed in considering that the two licensed bands may be close in frequency domain. However, ITS band will not be close to a licensed band in frequency domain. Based on TS38.101-1, only V2X\_n71-n47 is introduced for inter-band con-current V2X operating band combination. At least in Rel-16, there is no interruption.  For issue 1-1, the interruption is allowed for sidelink dedicated RF chain power on/off.  For issue 1-2, according to our understanding, there is no interruption to Uu due to sidelink dedicated RF chain re-tuning. |
| QC | We would like to first clarify the scope we discuss here: do we assume LTE SL and NR SL switch can happen only on n47, and exclude all the other possible bands to have such switch in the future, like n38? Considering general band combination is preferred from our perspective, but open to further discussion. |
| LG | In Rel-16, LTE SL and NR SL switch can happen only on n47(ITS). For LTE SL, licensed band has not been specified. So, for that LTE SL and NR SL switch can be possible in licensed band, at first corresponding band should be specified.  For inter-band CA in licensed band, legacy LTE CA 5-46 is also not close in frequency domain as V2X\_n71-n47. So, we need to keep consistency. |
| Xiaomi | We prefer Option 1C. |
| Ericsson | We have similar understanding as Huawei, and therefore support option 2. If there are different understandings, we could solicit feedback from other groups/RF groups about their assumption. |

**Issue 1-4: Whether to define interruption requirement on LTE SL due to NR SL sync source is changed**

* For further clarification this scenario.

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| **Company** | **Comments** |
| LG | For requirement, we think RAN4 needs to specify requirements based on RAN1’s agreement and RAN1/2 specification. In our understanding, in last RAN1 meeting, there was no discussion on this scenario in RAN1. Again, we agreed not to define the requirements in Rel-16 if RAN1 does not makes agreement until RAN4#95e meeting.  For LS, we’re open to send it for common understanding. However, we do not believe it means to continue discussing for Ran4 interruption requirement. |
| MTK | We hope all the interested companies on the same page about this issue. UE’s behavior is unclear in this scenario when NR SL sync. source change from/to gNB. |
| Huawei | We support option 1.  It is more like RAN1 mechanism issue rather than RAN4 interruption issue. We suggest not to discuss it in RAN4. |
| QC | Same as Huawei, this is a RAN1 issue, and if RAN1 doesn’t define it, it’s up to UE implementation. We don’t see significant issue/concern for leaving this up to UE implementation from RAN4 perspective, therefore LS may not be needed in our opinion. |
| MTK | To HW, QC,  We don’t agree this is only a RAN1 issue.  If RAN1 doesn’t have a clear UE behavior on this scenario(currently we can say yes), and RAN4 also doesn’t define the interruption requirement. It means there is no interruption and UE shall still guarantee LTE SL timing aligning with NR SL. Could any company further explain how to handle this without interruption? |
| Xiaomi | We prefer Option 1. |
| Ericsson | Our understanding is that this scenario is not covered by RAN4 requirements in R16. RAN4 requirement are based on assumption that the UE has only one SL at a time. This should be discussed in R17. |

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2012105(🡨R4-2010084) | LG : It was uploaded in draft sub-folder(CR folder). Comments are welcome. |
| QC: 12.7 is pending agreement on subtopic 1-1 |
| LG : Subtopic 1-1 is recommended to be captured in other CR revision(R4-2012106), because other things is already agreeable. |
| R4-2012106(🡨R4-2010085) | LG : It is subject to Issue1-1 and I-2. So, it is going to be provided based on the agreements on the issues. |
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## Summary on 2nd round (if applicable)

### Open issues

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|  | **Status summary** |
| **Issue 1-1** | **Interruption to WAN due to V2X Sidelink Communication(Sync.vs Async)**  *Tentative agreements:*   * Apply asynchronized requirement due to lack of synchronization mechanism between Uu and SL interface |
| **Issue 1-2** | **Interruption to WAN for switching between LTE SL and NR SL**  *Tentative agreements:*   * Further discuss whether or not define this requirement by taking RF chain retuning and common local oscillator into account with a separated RX/TX chain. |
| **Issue 1-4** | **Whether to define interruption requirement on LTE SL due to NR SL sync source is changed**  *Tentative agreements:*   * Further discussion whether to send LS to RAN1 * Further discussion whether to define RAN4 interruption requirement |

### CRs/TPs/LSs/WFs

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| R4-2012105 (CR) | To be agreeable |
| R4-2012106 (CR) | To be agreeable |
| R4-2012104 (WF) | To be agreeable (all agreements in both 1st & 2nd round are captured) |

# Topic #2: Measurement accuracy and side condition

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2010037 | MediaTek | Proposal 1: The absolute accuracy of L1 SL-RSRP can be ±4.5dB at SNR=0dB. |
| R4-2010083 | LG Electronics | Proposal 5: Define ±4.5dB as measurement accuracy of L1 SL-RSRP.  Proposal 6: Remove square brackets or update NR V2X operating band group and minimum received power in side condition in RAN4 next meeting(’20.Oct.) based on agreed REFSENS in RF session. |
| R4-2011054 | Huawei, HiSilicon | Proposal 5: It is suggested to define the L1 SL-RSRP absolute accuracy as ±4.5dB under the condition of PSCCH/PSSCH SINR≥0dB. |
| R4-2011379 | Qualcomm | Proposal 5: Decide RSRP measurement accuracy requirement after RF session concluded on how to account for cable loss in Tx and Rx requirement. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1

*Sub-topic description:* Absolute accuracy of L1 SL-RSRP measurement

*Open issues and candidate options before e-meeting:*

**Issue 2-1: Absolute accuracy of L1 SL-RSRP measurement**

* Proposals
  + Option 1: Define ±4.5dB as measurement accuracy of L1 SL-RSRP
  + Option 2 : Decide RSRP measurement accuracy requirement after RF session concluded on how to account for cable loss in Tx and Rx requirement
* Recommended WF
  + Decide one option in 1st round

### Sub-topic 2-2

*Sub-topic description:* RRM requirements related to REFSENS

*Open issues and candidate options before e-meeting:*

**Issue 2-2: RRM requirements related to REFSENS**

* Proposals
  + Option 1: Remove square brackets or update NR V2X operating band group and minimum received power in side condition in RAN4 next meeting(’20.Oct.) based on agreed REFSENS in RF session.
* Recommended WF
  + Make agreement in 1st round

## Companies views’ collection for 1st round

### Open issues

**Issue 2-1: Absolute accuracy of L1 SL-RSRP measurement**

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| **Company** | **Comments** |
| QC | Option 2, cable loss need to be taken into consideration for RSRP measurement accuracy. |
| LG | Support Option 1(±4.5dB). For Option2, we would like to understand what is the additional considering point by cable loss for measurement accuracy. To QC, could do you explain it? |
| MTK | Option 1.  We agree on the observation from QC. Cable loss may introduce additional performance loss to V2X UE.  To QC, we want to further check:   1. Whether LTE V2X has the same issue? 2. Do we need to consider it in RSRP accuracy since this cable from V2X modem to vehicle antenna won’t be connected to V2X test TE? |
| Huawei | We support option 1.  The cable loss for vehicle UE is a new issue only raised in last RAN4 meeting. The following aspects are still not clear:  - Whether to consider the cable loss for both Uu link and sidelink or only for sidelink.  - Whether to consider the cable loss for all the V2X UEs or only for some V2X UEs.  - Whether to consider the cable loss in Rel-16  So, our suggestion is to define measurement accuracy requirements based on the previous agreements on RF margins. When RF session has conclusions on cable loss, then we can study the related RRM impacts. |
| QC | To LG  For vehicular application, additional cable connecting UE to antenna mounted on the car can introduce signal power loss. Impact on REFSENSE is discussed in RAN4#95e. Similar effect exists for RSRP measurement accuracy. If this cable loss is taken into consideration, it introduces an unknown negative bias to the RSRP measurement accuracy.  To MTK  We believe LTE has this issue, too, and this issue eaten into other margin reserve for accuracy requirement. For NR we expect this issue to be worse, since cable loss depends on the length of the cable, given that NR V2X will be more widely deployed than LTE V2X, we expect wider range of cable loss magnitude. Second question is exactly what RF session is discussing, whether the connecting point to TE is on vehicle antenna or UE antenna. If it’s UE antenna, we don’t have this cable loss issue, but if it turns out to be vehicle antenna, we need to take cable loss into consideration.  To Huawei  REFSENSE is core requirement, and RSRP measurement accuracy is performance requirement. Hence REFSENSE is expected to be finalized first, we don’t see an issue for keep this pending, given that there is known correlation between REFSENSE decision and margin in RSRP measurement accuracy. |

**Issue 2-2: RRM requirements related to REFSENS**

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| **Company** | **Comments** |
| QC | We agree that the square brackets should be removed with necessary corrections after REFSENSE is decided, however, we don’t know whether that can be finalized this meeting, not sure what is this agreement for. What if REFSENSE is still pending after this meeting? |
| LG | Option 1. It is not late to specify the requirements related to REFSENS in RAN4 next meeting because these are not core requirement. |
| MTK | We’re fine with option 1. |
| Huawei | We can agree with option 1 |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| **CR/TP number** | **Comments collection** |
| R4-2011053 | Title : CR on PSBCH-RSRP measurement accuracy requirements |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary** |
| **Issue 2-1** | **Absolute accuracy of L1 SL-RSRP measurement**  *Tentative agreements:*  *Candidate options:*   * Option 1: Define ±4.5dB as measurement accuracy of L1 SL-RSRP (LG, MTK, Huawei) * Option 2 : Decide RSRP measurement accuracy requirement after RF session concluded on how to account for cable loss in Tx and Rx requirement (QC)   *Recommendations for 2nd round:*   * Decide one option regarding whether or not to consider cable loss in addition to the previous agreements on RF margins. |
| **Issue 2-2** | **RRM requirements related to REFSENS**  *Tentative agreements:*   * Remove square brackets or update NR V2X operating band group and minimum received power in side condition based on agreed REFSENS in RF session.   *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2011053 | To be postponed. |

## Discussion on 2nd round (if applicable)

### Open issues

**Issue 2-1: Absolute accuracy of L1 SL-RSRP measurement**

* For Option1 and Option2, whether or not to consider cable loss in addition to the previous agreements on RF margins.

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| **Company** | **Comments** |
| LG | We think it is not necessary to consider cable loss additionally for measurement accuracy. In legacy LTE-V2X, there was no consideration of cable loss. This impact can be covered RF margin. |
| MTK | Based on QC’s last comments in 1st round, we think at least we shall wait RF’s discussion on how to handle this loss. |
| QC | To LG: the problem is V2X has the same RF margin as Uu for measurement accuracy, e.g., PSBCH-RSRP accuracy is the same as S-RSRP accuracy in Uu. However, Uu doesn’t have this cable loss issue. Therefore, the RF margin doesn’t take cable loss issue into consideration, therefore, we can only finalize measurement accuracy requirement once RF session concludes on cable loss issue. |
| LG | In RF session, LS to RAN5 on UE antenna connector interpretation is discussing and almost reach agreement as following sentence.   * RAN4 would like to inform RAN5 that for V2X applications, the transmitter and receiver characteristics are specified at the UE antenna connector, as illustrated in Figure 1, excluding any external components.   We think cable loss is not necessary to be considered as additional RF margin regarding excluding any external components. |

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
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## Summary on 2nd round (if applicable)

### Open issues

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|  | **Status summary** |
| **Issue 2-1** | **Absolute accuracy of L1 SL-RSRP measurement**  *Tentative agreements:*   * Option 1: Define ±4.5dB as measurement accuracy of L1 SL-RSRP * Option 2: Finalize measurement accuracy requirement once RF session concludes on cable loss issue |

### CRs/TPs/LSs/WFs

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
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# Topic #3: Test Cases

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2009768 | Xiaomi | Provide list of test cases and basic test setup |
| R4-2010038 | Media Tek | Proposal 1: LTE V2X RRM test cases can be the baseline to define NR V2X RRM test case.  Proposal 2: Define test case with SCS=30kHz as baseline.  Proposal 1: RAN4 shall focus on the RRM test cases related to UE baseline features as 1st priority  **Synchronization related**  Proposal 4: Define the test cases for GNSS and SyncRef UE as sync. source.  **Interruption related**  Proposal 5: Not to define the test cases for interruption to WAN.  Proposal 6: Not to define the test cases for interruption due to sync. source change.  Proposal 7: RAN4 shall discuss the way to control UE’s behavior once RAN4 decides to define the test case of UE switching between LTE SL and NR SL.  **Measurement related**  Observation 1: Both re-evaluation and pre-emption are critical to support aperiodic higher-priority traffic in NR V2X.  Proposal 8: RAN4 shall reuse the resource reselection with RSRP test case in LTE V2X to verify the RSRP accuracy at the same time.  Proposal 9: RAN4 shall discuss the feasibility to define the test cases related to re-evaluation and pre-emption and whether they can be merged into one test case.  Proposal 10: list of the potential RRM test cases with the priority |
| R4-2010086 | LG Electronics | Proposal 1: Time plan for NR V2X RRM test cases   * **RAN4#96-e meeting (’20.August)**   + Agree the list of RRM test cases   + Do work-split of test cases for draft CRs * **RAN4#96-ebis & RAN4#97-e meeting (’20.October)**   + Discuss the draft CRs with the detailed test configurations and related parameter * **RAN4#98 meeting (’21.March)**   + Endorse the final draft CRs.   + Agree the one Big CR for RRM tests based on the endorsed draft CRs.   Proposal 2: Introduce RRM test cases for NR V2X in Table2-1.  Proposal 3: Do work spilt on test cases based on Table2-1 for draft CRs. |
| R4-2010087 | LG Electronics | *Proposal 1:* Consider test cases in LTE-V2X as baseline for introducing test cases in NR V2X RRM.  *Proposal 2:* Introduce the following test cases in NR V2X RRM.   * UE Transmit Timing   + Test for GNSS as synchronization reference source   + Test for FR1 NR Cell as synchronization reference source   + Test for E-UTRAN Cell as synchronization reference source   + Test for SyncRef UE as synchronization reference source * Initiation/Cease of SLSS Transmissions   + Test for FR1 NR Cell as synchronization reference source without gap under non-DRX   + Test for E-UTRAN Cell as synchronization reference source * Selection / Reselection of V2X Synchronization Reference Source   + Test for GNSS configured as the highest priority   + Test for FR1 NR Cell configured as the highest priority * L1 SL-RSRP measurements   + Test for V2X UE Autonomous Resource   + Test for V2X UE Resource Pre-emption   + Test for V2X UE Resource Re-evaluation * Congestion Control measurements   + Test for Congestion Control Measurement * Interruption   + Test for interruptions to WAN due to V2X Sidelink Communication   *Proposal 3:* Define supported test configuration and test parameters in each test as Rel-15 NR test case.  *Proposal 4:* Define test related configurations in new sub-section of A.3 RRM test configurations.  *Proposal 5:* Consider examples in 2.1 and 2.2 as starting point of discussion for RRM test configuration. |
| R4-2011055 | Huawei, HiSilicon | Provide list of test cases and basic test setup |
| R4-2011056 | Huawei, HiSilicon | **Tests for UE transmit timing**  Proposal 1: In NR V2X UE transmit timing accuracy tests, it is suggested to verify the requirements by using the transmission timing of PSSCH transmissions.  **Tests for Initiation/Cease SLSS Transmission**  Proposal 2: For V2X UE initiate/cease SLSS transmissions, it is suggested not to define the RRM tests for GNSS as timing reference.  Proposal 3: For V2X UE initiate/cease SLSS transmissions tests, the test setups provided in section 2.2 are suggested to be used.  **Tests for SyncRef UE Selection/Reselection**  Proposal 4: For selection/reselection of V2X synchronization reference, two separate RRM tests shall be defined for GNSS configured as the highest priority and eNB configured as the highest priority respectively  Proposal 5: For selection/reselection of V2X synchronization reference, the test setups provided in section 2.3 are suggested to be used  **Tests for L1 SL-RSRP Measurements**  Proposal 6: It is suggested to define one RRM test for L1 SL-RSRP measurement, and one of PSSCH-RSRP or PSCCH-RSRP could be configured as L1 SL-RSRP.  **Tests for Congestion Control Measurements**  Proposal 7: For congestion control measurements test in NR V2X, the test methodology for LTE V2X can be utilized to verify S-RSSI measurements accuracy.  **Tests for Interruption requirements**  Proposal 8: For interruption test in NR V2X, it is suggested not to define the RRM test which is to verify the requirements on V2X sidelink communication dropping due to synchronization source change. |
| R4-2011383 | Qualcomm | Proposal 1: Use the following parameters for common resource pool configuration, the rest follows LTE:   |  |  | | --- | --- | | Configuration | Value | | Number of resource pools configured | One Rx resource pool and one normal Tx resource pool | | Subchannel size | 10 RB | | Sensing window | 100ms |   Proposal 2: Set SCS = 30kHz and BW = 40MHz for SL UE in all the RRM test.  Proposal 3: No synchronization source is available is used as initial condition for SyncRefUE search test with GNSS configured as high priority synchronization source.  Proposal 4: S-RSSI threshold and test configuration should be adjusted according to SCS, as listed below:  (1) S-RSSI threshold: -64dBm  (2) S-RSSI in the test: 66.5dBm/38.1MHz and -61.5dBm/38.1MHz  Proposal 5: Since S-RSSI is removed from resource selection criterion, we propose the following changes in resource selection test:   * Active UE and subchannel allocation: there are 50 active UEs in the system, first 10 UEs occupies subchannel 0, the next 10 occupies subchannel 1, the next 10 occupies subchannel 2, following the allocation until all the 50 active UEs are allocated. Now the 5 subchannels configured for UE to be tested are each occupied by 10 UEs. * The 10 UEs in the same subchannel take turns to access the channel, same as LTE but LTE has 20 UEs in one subchannel. * UEs on subchannel 0/1/3/4 always transmit in high RSRP above the threshold (corresponding to 20dB SNR). UEs on subchannel 2 transmit with high RSRP in T1 and low RSRP in T2 (corresponding to 5dB SNR as PSCCH SNR in LTE). * Reuse RSRP threshold in LTE, with the SNR in the previous bullet, to derive SL-RSRP and S-RSSI.   Proposal 6: Add resource pre-emption test, configuration follows the guidelines provided in section 2.5. |

R4-2009768(Xiaomi)

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| **No** | **Requirements to be verified** | **Type of Test** | **No of tests** | **Basic test setup** | **Comments** |
| 1 | UE transmit timing (Section 12.2) | V2X UE transmit timing accuracy test when GNSS as the synchronization reference source | 1 | One GNSS based synchronization source is configured during the test. The test system emulates and sends the GNSS signal to the UE under test.  The transmit timing accuracy is verified by the UE transmitting PSSCH and PSCCH. | *Proposed section:*  *A.9.1 V2X UE transmit timing accuracy test*  *A.9.1.1 V2X UE transmit timing accuracy test when GNSS as the synchronization reference source* |
| 2 | V2X UE transmit timing accuracy test when gNB as the synchronization reference source | 1 | One active cell (PCell) is configured during the test. The UE under test is synchronized to the configured active cell (PCell).  The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions. | *Proposed section:*  *A.9.1.1 V2X UE transmit timing accuracy test when gNB as the synchronization reference source* |
| 3 | V2X UE transmit timing accuracy test when eNB as the synchronization reference source | 1 | One active cell (PCell) is configured during the test. The UE under test is synchronized to the configured active cell (PCell).  The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions. | *Proposed section:*  *A.9.1.3 V2X UE transmit timing accuracy test when eNB as the synchronization reference source* |
| 4 | V2X UE transmit timing accuracy test when SyncRef UE as the synchronization reference source | 1 | One active SyncRef UE is configured during the test without either serving cell and or GNSS signals. The UE under test is synchronized to the configured active SyncRef UE.  The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions. | *Proposed section:*  *A.9.1.4 V2X UE transmit timing accuracy test when SyncRef UE as the synchronization reference source* |
| 5 | Initiation/Cease of SLSS transmissions (Section 12.3) | Initiation/Cease of SLSS transmission test when gNB as the synchronization reference source | 1 | One active cell in this test.  T1: the RSRP of the PCell is above syncTxThreshIC and the UE is not expected to be transmitting SLSS.  T2: the RSRP of the PCell is lowered below syncTxThreshIC and the UE is expected to initiate SLSS transmissions.  T3: the RSRP of the PCell is increased back to be above syncTxThreshIC and the UE is expected to cease SLSS transmissions. | *Proposed section:*  *A.9.2 Initiation/Cease of SLSS Transmission Test*  *A.9.2.1 Initiation/Cease of SLSS transmission test when gNB as the synchronization reference source* |
| 6 | Initiation/Cease of SLSS transmission test when eNB as the synchronization reference source | 1 | One active cell in this test.  T1: the RSRP of the LTE PCell is above syncTxThreshIC and the UE is not expected to be transmitting SLSS.  T2: the RSRP of the LTE PCell is lowered below syncTxThreshIC and the UE is expected to initiate SLSS transmissions.  T3: the RSRP of the LTE PCell is increased back to be above syncTxThreshIC and the UE is expected to cease SLSS transmissions. | *Proposed section:*  *A.9.2.2 Initiation/Cease of SLSS transmission test when eNB as the synchronization reference source* |
| 7 | Initiation/Cease of SLSS transmission test when SyncRef UE as the synchronization reference source | 1 | One active SyncRef UE in this test without either serving cell and or GNSS signals.  T1: the S-RSRP of SyncRef UE is above syncTxThreshOOC and the UE is not expected to be transmitting SLSS.  T2: the S-RSRP of SyncRef UE is lowered below syncTxThreshOOC and the UE is expected to initiate SLSS transmissions.  T3: the S-RSRP of SyncRef UE is increased back to be above syncTxThreshOOC and the UE is expected to cease SLSS transmissions. | *A.9.2.3 Initiation/Cease of SLSS transmission test when SyncRef UE as the synchronization reference source* |
| 8 | Selection/Reselection of V2X synchronization reference source  (Section 12.4) | V2X synchronization reference source selection/reselection test when GNSS is configured as the highest priority | 1 | No GNSS signals in this test, one active cell (PCell) and two active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test.  T1: both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select PCell as synchronization source.  T2, SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source.  T3, a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source. | *Proposed section:*  *A.9.3 V2X synchronization reference source Selection/Reselection Test*  *A.9.3.1 V2X synchronization reference source selection/reselection test when GNSS is configured as the highest priority* |
| 9 | V2X synchronization reference source selection/reselection test when serving cell/PCell is configured as the highest priority | 1 | No active cell in this test, GNSS signal is reliable and two active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test.  T1: both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select GNSS as synchronization source.  T2: SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source.  T3: a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source. | *Proposed section:*  *A.9.3.2 V2X synchronization reference source selection/reselection test when serving cell/PCel is configured as the highest priority* |
| 10 | L1 SL-RSRP measurement  (Section 12.5) | V2X UE L1 SL-RSRP measurement accuracy test for resource reselection and pre-emption | 1 | 20 active V2X sidelink UEs are configured in this test. Both the UE under test and active V2X sidelink UEs select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink UEs.  T1: the signal from Test Equipement are configured such that the measured PSSCH-RSRP is above the measurement threshold, and the resource occupied by the active V2X sidelink UEs is expected to be excluded in the resource selection procedure.  T2: the signal from Test Equipement are configured such that the measured PSSCH-RSRP is below the measurement threshold, and the resource occupied by the active V2X sidelink UEs is expected to included in the resource selection procedure. | *Proposed section:*  *A.9.4 L1 SL-RSRP measurement Accuracy Test*  *A.9.4.1 V2X UE L1 SL-RSRP measurement accuracy test for resource reselection and pre-emption* |
| 11 | Congestion control measurements  (Section 12.6) | V2X UE Congestion control measurements test | 1 | Event-triggered reporting with Event V1 is used for V2X UE  4 active sidelink UEs in this test.  T1: all of active sidelink UEs are powered off.  T2: all of active sidelink UEs are powered on and transmit PSCCH/PSSCH every 100ms. | *Proposed section:*  *A.9.5 Congestion Control Measurements Test*  *A.9.5.1 V2X UE Congestion Control Measurements Test* |
| 12 | Interruption  (Section 12.7) | Interruption to WAN due to V2X sidelink communication | 1 | the UE under test is scheduled with PDSCH traffic on PCell downlink during the whole test.  T1: the UE monitoring the V2X sidelink communication transmission from other activeSidelink UEs on the V2X sidelink communication resoruces.  T2: the test system shall send RRC reconfiguration message to the UE and wait for the UE to repond with RRC reconfiguration complete message before transitioning to T3.  T3: The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during V2X sidelink communication. | *Proposed section:*  *A.9.6 Interruption Test*  *A.9.5.1 Interruption to WAN due to V2X sidelink communication* |

R4-2010038 (Media Tek)

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| **No** | **Feature/requirements** | **Type of Test** | **No of tests** | **Priority** | **Company** |
| 1 | UE Transmit Timing (Section 12.2) | V2X UE Transmit Timing Accuracy Test for GNSS as timing reference | 1 | 1 |  |
| 2 | V2X UE Transmit Timing Accuracy Test for SyncRef UE as timing reference | 1 | 1 |
| 3 | V2X UE Transmit Timing Accuracy Test for gNB UE as timing reference | 1 | 2 |
| 3 | Initiation/Cease of SLSS (Section 12.3) | Initiation/Cease of SLSS Transmission with V2X Sidelink Communication for SyncRef UE as timing reference | 1 | 1 |  |
| 4 | Initiation/Cease of SLSS Transmission with V2X Sidelink Communication for gNB as timing reference | 1 | 2 |
| 5 | Selection/Reselection of V2X Synchronization Reference (Section 12.4) | V2X Synchronization Reference Selection / Reselection Test when GNSS is configured as the highest priority | 1 | 1 |  |
| 6 | V2X Synchronization Reference Selection / Reselection Test when gNB is configured as the highest priority | 1 | 2 |
| 7 | Autonomous Resource Selection/Reselection Measurements (Section 12.5) | Autonomous Resource Selection/Reselection Test for PSSCH-RSRP measurements | 1 | 1 |  |
| 8 | Autonomous Resource Selection/Reselection Test for re-evaluation and pre-emption | 1 | 1 |  |
| 9 | Congestion Control measurements (Section 12.6) | Congestion Control measurements test | 1 | 1 |  |
| 10 | Interruptions (Section 12.7) | Interruptions due to V2X Sidelink Communication | 1 | 2 |  |
| 11 | Scheduling availability  (Section 12.9) | Scheduling availability of UE switching between E-UTRA sidelink and NR sidelink | 1 | 1 |  |

R4-2010086(LG Electronics)

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| --- | --- | --- | --- | --- | --- |
| **No** | **Feature/requirements** | **Type of Test** | **No of tests** | **Proposed section** | **Company** |
| 1 | UE Transmit Timing (Section 12.2) | V2X UE Transmit Timing Accuracy Test for GNSS as timing reference | 1 | *A.9 V2X Tests*  *A.9.1 V2X Tests in FR1*  *A.9.1.1 V2X UE transmit timing*  *A.9.1.1.1 Test for GNSS as synchronization reference source* |  |
| 2 | V2X UE Transmit Timing Accuracy Test for gNB as timing reference | 1 | *A.9.1.1.2 Test for FR1 NR Cell as synchronization reference source* |
| 3 | V2X UE Transmit Timing Accuracy Test for eNB as timing reference | 1 | *A.9.1.1.3 Test for E-UTRAN Cell as synchronization reference source* |
| 4 | V2X UE Transmit Timing Accuracy Test for SyncRef UE as timing reference | 1 | *A.9.1.1.4 Test for SyncRef UE as synchronization reference source* |
| 5 | Initiation/Cease of SLSS Transmissions (Section 12.3) | Initiation/Cease of SLSS Transmission for gNB as timing reference | 1 | *A.9.1.2 Initiation/Cease of SLSS Transmission with V2X Sidelink Communication*  *A.9.1.2.1 Test for FR1 NR Cell as synchronization reference source without gap under non-DRX* |  |
| 6 | Initiation/Cease of SLSS Transmission for eNB as timing reference | 1 | *A.9.1.2.2 Test for E-UTRAN Cell as synchronization reference source* |  |
| 7 | Initiation/Cease of SLSS Transmission for SyncRef UE as timing reference | 1 | *A.9.1.2.3 Test for SyncRef UE as synchronization reference source* |  |
| 8 | Selection / Reselection of V2X Synchronization Reference Source(Section 12.4) | V2X Synchronization Reference Selection / Reselection Test when GNSS is configured as the highest priority | 1 | *A.9.1.3 V2X Synchronization Reference Selection/Reselection*  *A.9.1.3.1 Test for GNSS configured as the highest priority* |  |
| 9 | V2X Synchronization Reference Selection / Reselection Test when gNB is configured as the highest priority | 1 | *A.9.1.3.2 Test for FR1 NR Cell configured as the highest priority* |  |
| 10 | L1 SL-RSRP measurements (Section 12.5) | V2X UE Autonomous Resource Selection/Reselection Test for L1 SL-RSRP measurements | 1 | *A.9.1.4 L1 SL-RSRP Measurement Test*  *A.9.1.4.1 Test for V2X UE Autonomous Resource Selection/Reselection* |  |
| 11 | V2X UE Resource Pre-emption Test for L1 SL-RSRP measurements | 1 | *A.9.1.4.2 Test for V2X UE Resource Pre-emption* |  |
| 12 | V2X UE Resource Re-evaluation Test for L1 SL-RSRP measurements | 1 | *A.9.1.4.3 Test for V2X UE Resource Re-evaluation* |  |
| 13 | Congestion Control measurements (Section 12.6) | Congestion Control measurements test | 1 | *A.9.1.5 Congestion Control Measurement Test* |  |
| 14 | Interruption (Section 12.7) | Interruptions due to V2X Sidelink Communication | 1 | *A.9.1.6 Interruption Test*  *A.9.1.6.1 Interruptions to WAN due to V2X Sidelink Communication* |  |

R4-2011055(Huawei)

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| **No** | **Feature/requirements** | **Type of Test** | **Basic test configuration** | **Comments** |
| 1 | UE Transmit Timing (Section 12.2) | V2X UE Transmit Timing Accuracy Test for GNSS as timing reference | During the test, GNSS is available. The PSCCH/PSSCH RMC need to be configured. | *Proposed section:*  *A.9 V2X sidelink tests for NR RRM*  *A.9.1 V2X UE Transmission Timing Accuracy Test*  *A.9.1.1 V2X UE Transmission Timing Accuracy Test for GNSS as timing reference* |
| 2 | V2X UE Transmit Timing Accuracy Test for gNB as timing reference | During the test, there is one active NR cell. The PSCCH/PSSCH RMC need to be configured. | *Proposed section:*  *A.9.1.2 V2X UE Transmission Timing Accuracy Test for gNB as timing reference* |
| 3 | V2X UE Transmit Timing Accuracy Test for eNB as timing reference | During the test, there is one active LTE cell. The PSCCH/PSSCH RMC need to be configured. | *Proposed section:*  *A.9.1.3 V2X UE Transmission Timing Accuracy Test for eNB as timing reference* |
| 4 | V2X UE Transmit Timing Accuracy Test for SyncRef UE as timing reference | During the test, there is one active SyncRef UE. The PSCCH/PSSCH RMC need to be configured. | *Proposed section:*  *A.9.1.4 V2X UE Transmission Timing Accuracy Test for SyncRef UE as timing reference* |
| 5 | Initiation/Cease of SLSS Transmission (Section 12.3) | Initiation/Cease of SLSS Transmission for gNB as timing reference | The test system simulates one active NR cell, and the test consists of three consecutive time periods, T1, T2 and T3.   * During T1, SS-RSRP of NR cell is higher than threshold. No SLSS is transmitted. * During T2, SS-RSRP of NR cell is lower than threshold. The UE under test is triggered to initiate SLSS transmissions * During T3, SS-RSRP of NR cell is higher than threshold. The UE under test is triggered to cease SLSS transmissions. | *Proposed section:*  *A.9.2 Initiation/Cease of SLSS Transmission with V2X Sidelink Communication*  *A.9.2.1 Initiation/Cease of SLSS Transmission Tests for gNB as timing reference* |
| 6 | Initiation/Cease of SLSS Transmission for eNB as timing reference | The test system simulates one active LTE cell, and the test consists of three consecutive time periods, T1, T2 and T3.   * During T1, RSRP of LTE cell is higher than threshold. No SLSS is transmitted. * During T2, RSRP of NR cell is lower than threshold. The UE under test is triggered to initiate SLSS transmissions * During T3, RSRP of NR cell is higher than threshold. The UE under test is triggered to cease SLSS transmissions. | *Proposed section:*  *A.9.2.2 Initiation/Cease of SLSS Transmission Tests for eNB as timing reference* |
| 7 | Initiation/Cease of SLSS Transmission for SyncRef UE as timing reference | The test system simulates one active SyncRef UE, and the test consists of three consecutive time periods, T1, T2 and T3.   * During T1, PSBCH-RSRP of SyncRef UE is higher than threshold. No SLSS is transmitted. * During T2, PSBCH-RSRP of SyncRef UE is lower than threshold. The UE under test is triggered to initiate SLSS transmissions * During T3, PSBCH-RSRP of SyncRef UE is higher than threshold. The UE under test is triggered to cease SLSS transmissions. | *Proposed section:*  *A.9.2.3 Initiation/Cease of SLSS Transmission Tests for SyncRef UE as timing reference* |
| 8 | Selection/Reselection of V2X Synchronization Reference (Section 12.4) | V2X Synchronization Reference Selection / Reselection for GNSS configured as the highest priority | The test system simulates three SyncRef UEs: SyncRef UE1 (sync to gNB directly), SyncRef UE2 (sync to GNSS in-directly) and SyncRef UE3 (sync to GNSS directly).  The test consists of three consecutive time periods, T1, T2 and T3.   * During T1, SyncRef UE 1 is powered on, SyncRef UE 2 and SyncRef UE 3 are powered off, and the UE under test is synchronized to SynchRef UE1. * During T2, SyncRef UE2 becomes detectable, SyncRef UE 3 is still powered off, and the UE under test is expected to change its reference synchronization from SyncRef UE1 to SyncRef UE2. * During T3, SyncRef UE3 becomes detectable, SyncRef UE 1 is powered off, and the UE under test is expected to change its reference synchronization from SyncRef UE2 to SyncRef UE3. | *Proposed section:*  *A.9.3 V2X Synchronization Reference Selection / Reselection Tests*  *A.9.3.1 V2X Synchronization Reference Selection / Reselection Test for GNSS configured as the highest priority* |
| 9 | V2X Synchronization Reference Selection / Reselection Test for gNB/eNB is configured as the highest priority | The test system simulates two SyncRef UEs: SyncRef UE1 (sync to gNB in-directly) and SyncRef UE2 (sync to gNB directly), and GNSS signals that is switched on during the whole test.  The test consists of three consecutive time periods, T1, T2 and T3.   * During T1, both SyncRef UE 1 and SyncRef UE 2 are powered off, the UE under test has been synchronized to GNSS. * During T2, SyncRef UE1 is ON, SyncRef UE2 is OFF, and the UE under test is expected to change its reference synchronization from GNSS to SyncRef UE1. * During T3, SyncRef UE2 becomes detectable, the UE under test is expected to change its reference synchronization from SyncRef UE1 to SyncRef UE2. | *Proposed section:*  *A.9.3.2 V2X Synchronization Reference Selection / Reselection Test for gNB/eNB configured as the highest priority* |
| 10 | L1 SL-RSRP Measurements (Section 12.5) | L1 SL-RSRP measurements Tests | FFS | *Proposed section:*  *A.9.4 V2X UE L1 SL-RSRP measurements Test* |
| 11 | Congestion Control measurements (Section 12.6) | Congestion Control measurements test | Developed based on the existing congestion control tests for LTE V2X in TS36.133 | *Proposed section:*  *A.9.5 V2X UE Congest Control measurements Test* |
| 12 | Interruptions (Section 12.7) | Interruptions due to V2X Sidelink Communication | FFS | *Proposed section:*  *A.9.6 Interruption Tests due to V2X Sidelink Communication* |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1

*Sub-topic description:* Work plan for test cases

*Open issues and candidate options before e-meeting:*

**Issue 3-1: Work plan for test cases**

* Proposals
  + RAN4#96-e meeting (’20.August)
    - Agree the list of RRM test cases
    - Do work-split of test cases for draft CRs
  + RAN4#96-ebis & RAN4#97-e meeting (’20.October)
    - Discuss the draft CRs with the detailed test configurations and related parameter
  + RAN4#98 meeting (’21.March)
    - Endorse the final draft CRs.
    - Agree the one Big CR for RRM tests based on the endorsed draft CRs.
* Recommended WF
  + Agree work plan in 1st round

### Sub-topic 3-2

*Sub-topic description:* General rule of test cases

*Open issues and candidate options before e-meeting:*

**Issue 3-2: Baseline of test cases**

* Proposals
  + P1 : LTE V2X RRM test cases can be the baseline to define NR V2X RRM test case
  + P2: Consider V2X SL SCS & CBW in all the RRM test
    - Option 1: {SCS=30kHz & CBW = 40MHz}
    - Option 2 : { SCS=15kHz & CBW = 10MHz} and { SCS=30kHz & CBW = 40MHz}
  + P3: Consider the following synchronization reference sources in the related RRM test cases
    - Option 1: All synchronization reference source(GNSS, gNB, eNB, SyncRef UE)
    - Option 2: UE baseline features as 1st priority (GNSS, SyncRef UE)
      * 1st priority : GNSS, SyncRef UE
      * 2nd priority : gNB, eNB
  + P4: Consider gNB(FR1 NR Cell) configurations in all the related RRM test
    - Option 1

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| --- | --- |
| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

* + - Option 2

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| **Configuration** | **Description** |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations. | |

* + P5: Define the number of tests in each test as 1.
* Recommended WF
  + Agree baseline of test cases in 1st round

### Sub-topic 3-3

*Sub-topic description:* Test for UE transmit timing

*Open issues and candidate options before e-meeting:*

**Issue 3-3: Test for UE transmit timing**

* Proposals
  + Option 1: Introduce Tests for GNSS, gNB, eNB and SyncRef UE as timing reference
  + Option 2: Introduce Tests for GNSS, SyncRef UE as timing reference with 1st priority, for gNB with 2nd priority
  + Option 3: Introduce Tests for gNB and SyncRefUE as timing reference
* Recommended WF
  + Agree test cases in 1st round

**Issue 3-3-1: Test Set-up for GNSS as timing reference if agreed**

* Proposals
  + Option 1
    - One GNSS based synchronization source is configured during the test. The test system emulates and sends the GNSS signal to the UE under test.
    - The transmit timing accuracy is verified by the UE transmitting PSSCH.
* Recommended WF
  + Agree option in 1st round

**Issue 3-3-2: Test Set-up for gNB as timing reference if agreed**

* Proposals
  + Option 1
    - One active cell (PCell) is configured during the test. The UE under test is synchronized to the configured active cell (PCell).
    - The transmit timing accuracy is verified by the UE transmitting PSSCH.
* Recommended WF
  + Agree option in 1st round

**Issue 3-3-3: Test Set-up for eNB as timing reference if agreed**

* Proposals
  + Option 1
    - One active cell (PCell) is configured during the test. The UE under test is synchronized to the configured active cell (PCell).
    - The transmit timing accuracy is verified by the UE transmitting PSSCH.
* Recommended WF
  + Agree option in 1st round

**Issue 3-3-4: Test Set-up for SyncRef UE as timing reference if agreed**

* Proposals
  + Option 1
    - One active SyncRef UE is configured during the test without either serving cell and or GNSS signals. The UE under test is synchronized to the configured active SyncRef UE.
    - The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions.
* Recommended WF
  + Agree option in 1st round

### Sub-topic 3-4

*Sub-topic description:* Test for Initiation/Cease of SLSS Transmissions

*Open issues and candidate options before e-meeting:*

**Issue 3-4: Test for Initiation/Cease of SLSS Transmissions**

* Proposals
  + Option 1: Introduce Tests for gNB, eNB and SyncRef UE as timing reference
  + Option 2: Introduce Test for SyncRef UE as timing reference with 1st priority, and Test for gNB with 2nd priority
  + Option 3: Introduce Tests for gNB and SyncRefUE as timing reference
* Recommended WF
  + Agree test cases in 1st round

**Issue 3-4-1: Test Set-up for gNB as timing reference if agreed**

* Proposals
  + Option 1
    - There is one active cell in this test.
    - T1: the RSRP of the PCell is above syncTxThreshIC and the UE is not expected to be transmitting SLSS.
    - T2: the RSRP of the PCell is lowered below syncTxThreshIC and the UE is expected to initiate SLSS transmissions.
    - T3: the RSRP of the PCell is increased back to be above syncTxThreshIC and the UE is expected to cease SLSS transmissions.
* Recommended WF
  + Agree option in 1st round

**Issue 3-4-2: Test Set-up for eNB as timing reference if agreed**

* Proposals
  + Option 1
    - There is one active cell in this test.
    - T1: the RSRP of the LTE PCell is above syncTxThreshIC and the UE is not expected to be transmitting SLSS.
    - T2: the RSRP of the LTE PCell is lowered below syncTxThreshIC and the UE is expected to initiate SLSS transmissions.
    - T3: the RSRP of the LTE PCell is increased back to be above syncTxThreshIC and the UE is expected to cease SLSS transmissions.
* Recommended WF
  + Agree option in 1st round

**Issue 3-4-3: Test Set-up for SyncRef UE as timing reference if agreed**

* Proposals
  + Option 1
    - There is one active SyncRef UE in this test without either serving cell and or GNSS signals.
    - T1: the PSBCH-RSRP of SyncRef UE is above syncTxThreshOOC and the UE is not expected to be transmitting SLSS.
    - T2: the PSBCH -RSRP of SyncRef UE is lowered below syncTxThreshOOC and the UE is expected to initiate SLSS transmissions.
    - T3: the PSBCH -RSRP of SyncRef UE is increased back to be above syncTxThreshOOC and the UE is expected to cease SLSS transmissions.
* Recommended WF
  + Agree option in 1st round

### Sub-topic 3-5

*Sub-topic description:* Test for Selection / Reselection of V2X Synchronization Reference Source

*Open issues and candidate options before e-meeting:*

**Issue 3-5: Test for Selection / Reselection of V2X Synchronization Reference Source**

* Proposals
  + Option 1: Introduce Tests when GNSS/gNB is configured as the highest priority
  + Option 2: Introduce Test when GNSS is configured as the highest priority with 1st priority(gNB with 2nd priority)
  + Option 3: Introduce Tests when GNSS/gNB/eNB is configured as the highest priority
* Recommended WF
  + Agree test cases in 1st round

**Issue 3-5-1: Test Set-up when GNSS is configured as the highest priority if agreed**

* Proposals
  + Option 1 (same as LTE-V2X)
    - No GNSS signals in this test, one active cell (PCell) and 2 active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test.
    - T1: both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select PCell as synchronization source.
    - T2, SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source.
    - T3, a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.
  + Option 2
    - The test system simulates 3 SyncRef UEs: SyncRef UE1 (sync to gNB directly), SyncRef UE2 (sync to GNSS in-directly) and SyncRef UE3 (sync to GNSS directly).
    - The test consists of three consecutive time periods, T1, T2 and T3.
    - During T1, SyncRef UE 1 is powered on, SyncRef UE 2 and SyncRef UE 3 are powered off, and the UE under test is synchronized to SynchRef UE1.
    - During T2, SyncRef UE2 becomes detectable, SyncRef UE 3 is still powered off, and the UE under test is expected to change its reference synchronization from SyncRef UE1 to SyncRef UE2.
    - During T3, SyncRef UE3 becomes detectable, SyncRef UE 1 is powered off, and the UE under test is expected to change its reference synchronization from SyncRef UE2 to SyncRef UE3.
  + Option 3
    - No GNSS signals in this test, 2 active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test.
    - During T1, both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE does not synchronize to any source.
    - During T2, SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source.
    - During T3, a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.
* Recommended WF
  + Decide one option in 1st round

**Issue 3-5-2: Test Set-up when gNB is configured as the highest priority if agreed**

* Proposals
  + Option 1
    - No active cell in this test, GNSS signal is reliable and 2 active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test.
    - T1: both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select GNSS as synchronization source.
    - T2: SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source.
    - T3: a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source.
* Recommended WF
  + Agree option in 1st round

**Issue 3-5-3: Test Set-up when eNB is configured as the highest priority if agreed**

* Proposals
  + Option 1
    - No active cell in this test, GNSS signal is reliable and 2 active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test.
    - T1: both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select GNSS as synchronization source.
    - T2: SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source.
    - T3: a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source
* Recommended WF
  + Agree option in 1st round

### Sub-topic 3-6

*Sub-topic description:* Test for L1 SL-RSRP measurements

*Open issues and candidate options before e-meeting:*

**Issue 3-6: Test for L1 SL-RSRP measurements**

* Proposals
  + P1: Define Test for V2X UE Autonomous Resource Selection/Reselection
  + P2: Define Test(s) for V2X UE Resource Re-evaluation and Resource Pre-emption
    - Option 1 : Introduce Test for V2X UE Resource Pre-emption
    - Option 2 : Introduce Each Test for V2X UE Resource Re-evaluation and Resource Pre-emption
    - Option 3 : Introduce Merged Test for V2X UE Resource Re-evaluation and Resource Pre-emption
* Recommended WF
  + Agree test cases in 1st round

**Issue 3-6-1: Test Set-up for V2X UE Autonomous Resource Selection/Reselection if agreed**

* Proposals
  + Option 1
    - 20 active V2X sidelink UEs are configured in this test. Both the UE under test and active V2X sidelink UEs select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink UEs.
    - The test system shall emulate the active V2X sidelink UEs to transmit PSCCH/PSSCH every 20ms (or 20slot).
    - T1: the signal from Test Equipment are configured such that the measured L1 SL-RSRP is above the measurement threshold, and the resource occupied by the active V2X sidelink UEs is expected to be excluded in the resource selection procedure.
    - T2: the signal from Test Equipment are configured such that the measured L1 SL-RSRP is below the measurement threshold, and the resource occupied by the active V2X sidelink UEs is expected to be included in the resource selection procedure.
* Recommended WF
  + Agree option in 1st round

**Issue 3-6-2: Test Set-up for V2X UE Resource Pre-emption if agreed**

* Proposals
  + Option 1
    - There is 1 active V2X sidelink UE in this test. Both the UE under test and the active V2X sidelink UE select GNSS as synchronization reference source. The test system can emulate and send the GNSS signal to the test UE and active V2X sidelink UEs.
    - T1 : the signal from Test Equipment are configured such that the active SL UE is not transmitting. The UE under test shall transmit SL data and reserve future resources. The resource reservation is decoded by the active SL UE. The point in time at which resource reservation from the UE under test is decoded by the active SL UE defines the start of time period T2.
    - T2 : the active SL UE reserves the same resource as the UE under test with high priority data no later than slot n- Tpre-empt.
    - The test time T1 and T2 should be long enough. The UE under test is required to trigger resource reselection and not to transmit on the reserved resource at slot n when the high priority reservation is transmitted by the active sidelink UE before n-Tpre-empt, where
    - Tpre-empt = T3+Tproc,0
    - T3 = 2ms and Tproc,0= 1 slot for FR1.
    - The rate of PSSCH transmissions on the resources at slot n shall be less than 10% during repeated tests
* Recommended WF
  + Agree option in 1st round

**Issue 3-6-3: Test Set-up for V2X UE Resource Re-evaluation and Pre-emption if agreed**

* Proposals
  + Option 1
    - During 0-T1, one UE under test and 100 instrumental UEs, and the instrumental UE i (i=0, 1, …, 99) is configured to transmit PSSCH and the corresponding PSCCH by using the slot i (i=0, 1, …, 99) in every 100ms(SCS=15KHz).
    - The original 100 instrumental UE RSRP configuration can be {0, …,19+}, {40+, …, 79} as high power, {80-,…, 99-} as medium power and {20+, …, 39+} as low power.
    - After T1, test UE has already chosen its report candidate set={20+,…,39+}.
    - The equipment can configure test UE to transmit the PSSCH/PSCCH with re-evaluation. The re-evaluation window can be {T1, T1+20} due to the limitation on before the slot - . The equipment will configure the UEs in re-evaluation window with high power and high priority and reserved periodicity as 20+.
    - UE will exclude the already reported set based on the new configuration and re-choose the set as T1+{80-, …, 99-} before T1+20+.
    - UE will finally transmit the initial PSSCH/PSCCH in slot T2 between T1+{80-, …, 99-} with the reservation periodicity.
    - After T2, the equipment can decode the SCI from test UE and configure higher priority UE with high power at the same time-frequency position T3 with test UE’s next transmission. At the same time, the TE sets low power for {T3+1, T3+ 21}.
    - UE will exclude the already reported reservation resource based on the updated pre-emption sensing window and re-choose the re-transmission in new low power occasion.
* Recommended WF
  + Agree option in 1st round

### Sub-topic 3-7

*Sub-topic description:* Test for Congestion Control measurements

*Open issues and candidate options before e-meeting:*

**Issue 3-7: Test for Congestion Control measurements**

* Proposals
  + Introduce Test for Congestion Control Measurement
* Recommended WF
  + Agree test case in 1st round

**Issue 3-7-1: Test Set-up for Congestion Control measurements if agreed**

* Proposals
  + Option 1
    - Event-triggered reporting with Event C1 is used for V2X UE
    - 4 active sidelink UEs in this test.
    - T1: all of active sidelink UEs are powered off.
    - T2: all of active sidelink UEs are powered on and transmit PSCCH/PSSCH every 100ms (or 100 slot).
* Recommended WF
  + Agree option in 1st round

### Sub-topic 3-8

*Sub-topic description:* Test for Interruption

*Open issues and candidate options before e-meeting:*

**Issue 3-8: Test for Interruption**

* Proposals
  + P1: Test for interruptions to WAN due to V2X Sidelink Communication
    - Option 1: Define
    - Option 2: Not define
  + P2: Test for interruptions due to sync. source change
    - Option 1: Not define
  + P3: Test for interruptions to WAN due to UE switching between LTE SL and NR SL
    - Option 1: Not define
    - Option 2: Define
* Recommended WF
  + Agree test cases in 1st round

**Issue 3-8-1: Test Set-up for interruptions to WAN due to V2X Sidelink Communication if agreed**

* Proposals
  + Option 1
    - The test consists of one active cell (PCell) on the serving RF channel 1, and 8 active sidelink UEs transmitting V2X sidelink communication on RF channel 2.
    - T1: the UE monitoring the V2X sidelink communication transmission from other active Sidelink UEs on the V2X sidelink communication resources.
    - T2: the test system shall send RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before transitioning to T3.
    - T3: The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during V2X sidelink communication
* Recommended WF
  + Agree option in 1st round

### Sub-topic 3-9

*Sub-topic description:* Test for Scheduling availability of UE switching between E-UTRA sidelink and NR sidelink

*Open issues and candidate options before e-meeting:*

**Issue 3-9: Test for Scheduling availability of UE switching between E-UTRA sidelink and NR sidelink**

* Proposals
  + Test for Scheduling availability of UE switching between E-UTRA sidelink and NR sidelink
    - Option 1: Define
    - Option 2: Not define
* Recommended WF
  + Agree test case in 1st round

### Sub-topic 3-10

*Sub-topic description:* Work split for draft CRs of test cases

*Open issues and candidate options before e-meeting:*

**Issue 3-10: Work split for draft CRs of test cases**

* Proposals
  + Do work split in 2nd round based on the agreements in 1st round
* Recommended WF
  + Do work split in 2nd round based on the agreements in 1st round

## Companies views’ collection for 1st round

### Open issues

**Issue 3-1: Work plan for test cases**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LG | Support proposed Work plan. |
| MTK | Support proposed Work plan. |
| Huawei | We can agree with the proposed work plan |
| Xiaomi | Support proposed Work plan.  We noticed that there exists different opinions on the test cases, would it be better to focus on the discussion of test case list at first? And the detailed test configuration could be discussed later once we reach consensus on the test cases. |

**Issue 3-2: Baseline of test cases**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | P1: ok  P2: option 1 since 30kHz is mandatory, no reason to test 15kHz but not 30kHz  P3: both are ok  P4: Option 2, should algin to NR Uu  P5: Not sure what this proposal try to address |
| LG | P1 : Support.  P2 : Support Option2. We think that CBW of 10MHz needs to be tested.  P3 : Support Option 1. Regarding LTE V2X RRM test cases, it is not complicated to address the test cases for synchronization reference sources(GNSS, gNB, eNB, SyncRef UE).  P4 : Preference is Option2.  P5 : Support. To QC, this intention is to add note ‘The UE is only required to be tested in one of the supported test configurations.’ |
| MTK | P2: option 1.  P3: option 2.  P4: We don’t see any other band combination with NR SL except n71, but n71 is a FDD band. |
| Huawei | P1: not all the NR V2X RRM tests can been developed from corresponding LTE V2X RRM tests. We can further which LTE V2X tests can be reused.  P2: we agree to use SCS=30kHz as baseline configuration. We suggest to configure the sub-channel size as 10 PRBs for L1 SL-RSRP measurement test, and five sub-channels are included in the CBM. Then, we suggest to use 20MHz as CBW.  P3: we support option 1. We can have some application rules for the UE Tx timing tests, e.g., UE supporting SL only need to be tested for GNSS and SyncRef UE.  P4: support option 2, to align with WAN RRM tests. |

**Issue 3-3: Test for UE transmit timing**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Option 2. In our proposal GNSS is missing, but we support to have it. We don’t think test for eNB as sync source is needed. We believe P1 in issue 3-2 covers issue 3-3-1~4. |
| LG | Support Option 1. However, we’re fine to remove eNB from Option1. |
| MTK | Option 2.  GNSS and syncRef UE as sync. source is mandatory feature. |
| Huawei | We support option 1 with adding application rules |

**Issue 3-3-1: Test Set-up for GNSS as timing reference if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | We believe P1 in issue 3-2 covers issue 3-3-1~4. |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We’re fine with recommended WF. |
| Huawei | Generally we agree with option 1.  The test setup for GNSS signals can be reused from LTE V2V/V2X tests defined in section B.6.1 in TS36.133. |

**Issue 3-3-2: Test Set-up for gNB as timing reference if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | We believe P1 in issue 3-2 covers issue 3-3-1~4. |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We’re fine with recommended WF. If we agree to introduce this test case, an applicable rule shall be defined. |
| Huawei | We agree with option 1 |

**Issue 3-3-3: Test Set-up for eNB as timing reference if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | We believe P1 in issue 3-2 covers issue 3-3-1~4. |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We don’t agree to add this test case. |
| Huawei | We agree with option 1.  We suggest to use “LTE PCell” to distinguish with NR cell. |

**Issue 3-3-4: Test Set-up for SyncRef UE as timing reference if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | We believe P1 in issue 3-2 covers issue 3-3-1~4. |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We’re fine with recommended WF. |
| Huawei | We agree with option 1 |

**Issue 3-4: Test for Initiation/Cease of SLSS Transmissions**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Option 2 and 3 are both fine for us. We don’t think test for eNB as sync source is needed. |
| LG | Option 1 and 3 are fine. |
| MTK | Option 2. |
| Huawei | We agree with option 1 |

**Issue 3-4-1: Test Set-up for gNB as timing reference if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Should follow P1 in issue 3-2 |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We’re fine with recommended WF. If we agree to introduce this test case, an applicable rule shall be defined. |
| Huawei | We agree with option 1  We suggest to use SS-RSRP instead of RSRP. |

**Issue 3-4-2: Test Set-up for eNB as timing reference if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Should follow P1 in issue 3-2 |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We don’t agree to add this test case. |
| Huawei | We agree with option 1 |

**Issue 3-4-3: Test Set-up for SyncRef UE as timing reference if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Should follow P1 in issue 3-2 |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We’re fine with recommended WF. |
|  |  |

**Issue 3-5: Test for Selection / Reselection of V2X Synchronization Reference Source**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Option 1 and 2 are both fine for us. We don’t think test for eNB as sync source is needed. |
| LG | Support Option 1. |
| MTK | Option 1. |
| Huawei | We agree with option 1 |

**Issue 3-5-1: Test Set-up when GNSS is configured as the highest priority if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Option 3, as we explained in our contribution, this test should apply to UEs support or not support gNB as sync source, hence option 1 doesn’t work. In option 2, in T2 and T3 we repeat the same procedure, do not see any additional value for doing it. |
| LG | Option1 and 3 are fine. |
| MTK | Option 3. |
| Huawei | We suggest option 2.  Option 1 is not applicable for UE supporting SL only.  One purpose of this test is to verify that GNSS has a higher priority than gNB/eNB , which cannot be verified by option 3. Considering SL only UE, we suggest to use the SyncRef UE (sync to gNB directly) instead of PCell. |

**Issue 3-5-2: Test Set-up when gNB is configured as the highest priority if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Should follow P1 in issue 3-2 |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We’re fine with recommended WF. If we agree to introduce this test case, an applicable rule shall be defined. |
| Huawei | We can agree with option 1. |

**Issue 3-5-3: Test Set-up when eNB is configured as the highest priority if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Should follow P1 in issue 3-2 |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We don’t agree to add this test case. |
| Huawei | No need to introduce this test. |

**Issue 3-6: Test for L1 SL-RSRP measurements**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | P1: ok  P2: Support option 1. If re-evaluation is proved to be testable, support option 2. |
| LG | P1 : Support  P2 : We’re open with Options. At first, each feasibility for re-evaluation test and pre-emption test needs to be discussed. After that, option 3 can be discussed. |
| MTK | P2: option 3. We agree with LG’s comments, we shall discuss the feasibility for these new test cases firstly. |
| Huawei | P1: we agree to define test for sensing procedure. However, UE is mandatory to support sensing and re-evaluation procedures, and both procedures are performed based on L1 SL-RSRP measurements. Is it feasible to define separate tests for sensing and re-evaluation procedures?  P2: resource pre-emption procedure is similar to resource re-evaluation procedure, we do suggest not to define separate tests. |

**Issue 3-6-1: Test Set-up for V2X UE Autonomous Resource Selection/Reselection if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | As we explained in our contribution, we need more UEs to fill out the slots/subcarriers which was filled by OCNG in LTE set up, which is the underlying assumption in option 1. However, this gets into more details in the test, suggest to have scope agreed in this meeting then come back to details in next meeting. |
| LG | Support Option1. One minor comment is, 20ms needs to be checked whether to be changed to 20 slots or not. |
| MTK | To QC,  Could QC further explain why shall we use 20UEs? |
| Huawei | In LTE V2X, there are total 100 resources and 20 resources are expected to be excluded by Step-1 SL-RSRP measurements. The S-RSSI of other 80 resources is much higher than the S-RSSI of those 20 resources expected to be excluded. Once any of those 20 resources is not excluded due to error SL-RSRP measurements, then it will always be selected by S-RSSI ranking in Step-2.  Since there is no Step-2 S-RSSI ranking for NR V2X sensing procedure, all the resources which are not excluded by step-1 could be the candidates for transmissions. If there are total 100 resources and 20 resources are expected to be excluded by Step-1 SL-RSRP measurements, then the other 80 resources would be expected as the candidates and the UE would randomly select one of them as transmission resource.  For option 1, this test does not need to have two time period. During T2, no resource is expected to be excluded and all the resource can be the candidates. The test is to verify the L1 SL-RSRP measurement performance by the probability of unexpected resources for transmission. RAN4 shall further study the test setup. |

**Issue 3-6-2: Test Set-up for V2X UE Resource Pre-emption if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Support option 1 |
| LG | We have some questions to understand the test set-up further.   1. How to guarantee the time of start of T2? Because it seems to be dependent of active SL UE decoding time for resource reservation. 2. How to set the number ‘n’ for slot n within T2? Is it set based on the resource reservation? |
| MTK | 1. Could you further explain how to guarantee TE can reserve the resources before n- Tpre-empt if test UE chose the reservation resource nearly with UE’s initial transmission? 2. We think the test method shall be carefully considered. How to guarantee the cheat UE which won’t follow the RAN1 spec. cannot pass this test. For example. if the test UE will random select the resource after sending the SCI, it may still pass this test. |
| Huawei | We suggest to further study the test method. |

**Issue 3-6-3: Test Set-up for V2X UE Resource Re-evaluation and Pre-emption if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| LG | This test set-up is for mixed test. Could do we separate re-evaluation test set-up from it? Because we would like to check feasibility for each test. |
| MTK | This is the 1st time to discuss the test case for these two new features in NR V2X.  It’s pleasure to further discuss with other companies on whether and how to define this re-evaluation and pre-emption test case.  We agree to split the discussion on re-evaluation and pre-emption feasibility. If we finally agree to define both test cases, we can continue to discuss how to merge them together. |
| Huawei | We suggest to further study the test method. |
|  |  |

**Issue 3-7: Test for Congestion Control measurements**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | OK to introduce congestion control test |
| LG | Support Proposal |
| MTK | We’re fine with recommended WF. |
| Huawei | We can agree with the recommended WF. |

**Issue 3-7-1: Test Set-up for Congestion Control measurements if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Should follow P1 in issue 3-2 |
| LG | Support Option1. One minor comment is, 100ms needs to be checked whether to be changed to 100 slots or not. |
| MTK | We’re fine with recommended WF. |
| Huawei | We can agree with the recommended WF. |

**Issue 3-8: Test for Interruption**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | P1: Option 1  P2 and P3: option 1, not define |
| LG | P1 : Option1(Define)  P2 : Option1(Not define)  P3 : Option 1(Not define) |
| MTK | Option 1.  Option 1.  Option 1. |
| Huawei | P1: Option 1  P2: Option 1  P3: Option 1 |

**Issue 3-8-1: Test Set-up for interruptions to WAN due to V2X Sidelink Communication if agreed**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Should follow P1 in issue 3-2 |
| LG | Support Option 1. Option1 is based on LTE V2X RRM test cases. |
| MTK | We’re fine with recommended WF. If we agree to introduce this test case, an applicable rule shall be defined. |
| Huawei | We can agree with the recommended WF. |

**Issue 3-9: Test for Scheduling availability of UE switching between E-UTRA sidelink and NR sidelink**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | Do not see proposed test procedure, need to verify testability first. |
| LG | Option2(Not define) |
| MTK | Option 2.  We want to further check with other companies how to define a clear UE’s behavior if we plan to define this test case. |
| Huawei | Support option 2. |

**Issue 3-10: Work split for draft CRs of test cases**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| QC | We can take the following tests:   1. Selection / Reselection of V2X Synchronization Reference Source 2. V2X UE Autonomous Resource Selection/Reselection 3. V2X UE Resource Pre-emption 4. Congestion Control measurements |
| LG | It would be helpful to decide the work split in 2nd round if companies show the wanted test cases in 1st round.  And, additional configurations related to test cases, such as reference resource pool and measurement reference channel needs to be included in work split. QC’s draft CR (R4-2011382) can be considered as starting point.  We can take the following test:   1. Initiation/Cease of SLSS Transmission   One more, we suggest to discuss the skeleton of specification in 2nd round. |
| MTK | We can take the following tests:   1. Transmit timing accuracy 2. Congestion Control measurements   We also suggest all the interested companies can share the analysis on whether and how to define test cases for pre-emption and re-evaluation. |
| Huawei | We can take the following tests:   1. Transmit timing accuracy 2. Interruptions |
| MTK | We think RMC shall also be defined and related CR shall be submitted in next meeting. |
| Xiaomi | From our perspective, work split based on requirements is quite general while each requirement may related to several test cases. We suggest to make work split based on specific test cases after RAN4 reach consensus.  And we can take the specific test cases of the following requirements:  1. Transmit timing accuracy  2. Interruptions  3. Selection/Reselection of V2X synchronization reference source |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2011382  (draft CR) | QC: we are fine with defer this to next meeting |
| MTK: It’s too early to submit these test cases. We suggest to use this draft version to update the test case in next meeting after we had some consensus. |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Issue 3-1** | **Work plan for test cases**  *Tentative agreements:*   * RAN4#96-e meeting (’20.August)   + Agree the list of RRM test cases   + Do work-split of test cases for draft CRs * RAN4#96-ebis & RAN4#97-e meeting (’20.October)   + Discuss the draft CRs with the detailed test configurations and related parameter * RAN4#98 meeting (’21.March)   + Endorse the final draft CRs.   + Agree the one Big CR for RRM tests based on the endorsed draft CRs.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-2** | **Baseline of test cases**  *Tentative agreements:*   * LTE V2X RRM test cases can be the baseline to define NR V2X RRM test case.   + Further check which LTE V2X RRM test cases can be reused * V2X SL SCS & CBW in all the RRM test   + SCS = 30kHz   + CBW     - Option 1 : 40MHz     - Option 2 : 20MHz     - Option 3 : 20MHz & 40MHz * Synchronization reference sources in the related RRM test cases   + GNSS, SyncRef UE, [gNB], [eNB]   + Apply application rule, * gNB(FR1 NR Cell) configurations in all the related RRM test   + Option 2(QC, LG, Huawei) : align with NR Uu RRM tests  |  |  | | --- | --- | | **Configuration** | **Description** | | 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | | 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | | 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Note: The UE is only required to be tested in one of the supported test configurations. | |  * + Option 3(MTK) : Consider only FDD regarding any other band combination except for n71(FDD) with NR SL is not defined in Rel-16   *Candidate options:*  *Recommendations for 2nd round:*   * Decide one option for each followings ;   + V2X SL CBW in all the RRM test     - CBW       * Option 1 : 40MHz       * Option 2 : 20MHz       * Option 3 : 20MHz & 40MHz   + gNB(FR1 NR Cell) configurations in all the related RRM test     - Option 2     - Option 3 * Decide whether or not to define test cases for gNB/eNB as synchronization reference sources in the related RRM test cases. |
| **Issue 3-3** | **Test for UE transmit timing**  *Tentative agreements:*   * Define test cases for GNSS, SyncRef UE, [gNB], [eNB] as timing reference   *Candidate options:*  *Recommendations for 2nd round:*   * Decide whether to define test cases for gNB/eNB. |
| **Issue 3-3-1** | **Test Set-up for GNSS as timing reference if agreed**  *Tentative agreements:*   * One GNSS based synchronization source is configured during the test. The test system emulates and sends the GNSS signal to the UE under test. * The transmit timing accuracy is verified by the UE transmitting PSSCH   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-3-2** | **Test Set-up for gNB as timing reference if agreed**  *Tentative agreements:*   * If this test case is agreed,   + One active cell (PCell) is configured during the test. The UE under test is synchronized to the configured active cell (PCell).   + The transmit timing accuracy is verified by the UE transmitting PSSCH.   + Add applicable rule     - UE supporting SL and Uu is applied.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-3-3** | **Test Set-up for eNB as timing reference if agreed**  *Tentative agreements:*   * If this test case is agreed   + One active cell (E-UTRAN PCell) is configured during the test. The UE under test is synchronized to the configured active cell (E-UTRAN PCell).   + The transmit timing accuracy is verified by the UE transmitting PSSCH.   + Add applicable rule     - UE supporting SL and Uu is applied.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-3-4** | **Test Set-up for SyncRef UE as timing reference if agreed**  *Tentative agreements:*   * One active SyncRef UE is configured during the test without either serving cell and or GNSS signals. The UE under test is synchronized to the configured active SyncRef UE. * The transmit timing accuracy is verified by using the transmission timing of PSSCH transmissions.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-4** | **Test for Initiation/Cease of SLSS Transmissions**  *Tentative agreements:*   * Define test cases for SyncRef UE, [gNB], [eNB] as timing reference   *Candidate options:*  *Recommendations for 2nd round:*   * Decide whether to define test cases for gNB/eNB. |
| **Issue 3-4-1** | **Test Set-up for gNB as timing reference if agreed**  *Tentative agreements:*   * If this test case is defined   + There is one active cell in this test.   + T1: the SS-RSRP of the PCell is above syncTxThreshIC and the UE is not expected to be transmitting SLSS.   + T2: the SS-RSRP of the PCell is lowered below syncTxThreshIC and the UE is expected to initiate SLSS transmissions.   + T3: the SS-RSRP of the PCell is increased back to be above syncTxThreshIC and the UE is expected to cease SLSS transmissions   + Add applicable rule     - UE supporting SL and Uu is applied.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-4-2** | **Test Set-up for eNB as timing reference if agreed**  *Tentative agreements:*   * If this test case is defined   + There is one active cell in this test.   + T1: the RSRP of the E-UTRAN PCell is above syncTxThreshIC and the UE is not expected to be transmitting SLSS.   + T2: the RSRP of the E-UTRAN PCell is lowered below syncTxThreshIC and the UE is expected to initiate SLSS transmissions.   + T3: the RSRP of the E-UTRAN PCell is increased back to be above syncTxThreshIC and the UE is expected to cease SLSS transmissions   + Add applicable rule     - UE supporting SL and Uu is applied.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-4-3** | **Test Set-up for SyncRef UE as timing reference if agreed**  *Tentative agreements:*   * There is one active SyncRef UE in this test without either serving cell and or GNSS signals. * T1: the PSBCH-RSRP of SyncRef UE is above syncTxThreshOOC and the UE is not expected to be transmitting SLSS. * T2: the PSBCH -RSRP of SyncRef UE is lowered below syncTxThreshOOC and the UE is expected to initiate SLSS transmissions. * T3: the PSBCH -RSRP of SyncRef UE is increased back to be above syncTxThreshOOC and the UE is expected to cease SLSS transmissions.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-5** | **Test for Selection / Reselection of V2X Synchronization Reference Source**  *Tentative agreements:*   * Define test cases for GNSS, gNB as the highest priority   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-5-1** | **Test Set-up when GNSS is configured as the highest priority if agreed**  *Tentative agreements:*  *Candidate options:*   * Option 2 : 3 SyncRef UEs based (Huawei)   + SyncRef UE1 (sync to gNB directly), SyncRef UE2 (sync to GNSS in-directly) and SyncRef UE3 (sync to GNSS directly). * Option 3 : 2 active SyncRef UEs based (QC, LG, MTK )   *Recommendations for 2nd round:*   * Decide one option regarding UE support or not support gNB as sync. Source. |
| **Issue 3-5-2** | **Test Set-up when gNB is configured as the highest priority if agreed**  *Tentative agreements:*   * No active cell in this test, GNSS signal is reliable and 2 active SyncRef UEs (SyncRef UE 1 and SyncRef UE 2) in this test. * T1: both SyncRef UE 1 and SyncRef UE 2 are powered off and the V2X UE will select GNSS as synchronization source. * T2: SyncRef UE 1 is powered ON and the V2X UE will select SyncRef UE 1 as the synchronization source. * T3: a higher priority SyncRef UE 2 is additionally powered ON and the V2X UE will reselect to the higher priority SyncRef UE 2 as the synchronization source. * Add applicable rule   + UE supporting SL and Uu is applied.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-5-3** | **Test Set-up when eNB is configured as the highest priority if agreed**  *Tentative agreements:*   * Not define this test case   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-6** | **Test for L1 SL-RSRP measurements**  *Tentative agreements:*   * Define Test for V2X UE Autonomous Resource Selection/Reselection * Decide whether to define each test case or merged single test case after discussing feasibility of test for Resource Re-evaluation and Resource Pre-emption.   *Candidate options:*  *Recommendations for 2nd round:*   * Discuss feasibility of test for Resource Re-evaluation and Resource Pre-emption. |
| **Issue 3-6-1** | **Test Set-up for V2X UE Autonomous Resource Selection/Reselection if agreed**  *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:*   * As moderator, I found the number of active UEs is wrongly captured. So, 20 active SL UEs need to be changed to 50 active SL UEs based on R4-2011382 and R4-2011383. Following test set up is needed to be considered for discussion.   + Active UE and subchannel allocation: there are 50 active UEs in the system, first 10 UEs occupies subchannel 0, the next 10 occupies subchannel 1, the next 10 occupies subchannel 2, following the allocation until all the 50 active UEs are allocated. Now the 5 subchannels configured for UE to be tested are each occupied by 10 UEs.   + The 10 UEs in the same subchannel take turns to access the channel, same as LTE but LTE has 20 UEs in one subchannel.   + UEs on subchannel 0/1/3/4 always transmit in high RSRP above the threshold (corresponding to 20dB SNR). UEs on subchannel 2 transmit with high RSRP in T1 and low RSRP in T2 (corresponding to 5dB SNR as PSCCH SNR in LTE).   + Reuse RSRP threshold in LTE, with the SNR in the previous bullet, to derive SL-RSRP and S-RSSI. * Continue discuss |
| **Issue 3-6-2** | **Test Set-up for V2X UE Resource Pre-emption if agreed**  *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:*   * Continue discuss |
| **Issue 3-6-3** | **Test Set-up for V2X UE Resource Re-evaluation and Pre-emption if agreed**  *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:*   * Continue discuss |
| **Issue 3-7** | **Test for Congestion Control measurements**  *Tentative agreements:*   * Define Test for Congestion Control Measurement   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-7-1** | **Test Set-up for Congestion Control measurements if agreed**  *Tentative agreements:*   * Event-triggered reporting with Event C1 is used for V2X UE * 4 active sidelink UEs in this test. * T1: all of active sidelink UEs are powered off. * T2: all of active sidelink UEs are powered on and transmit PSCCH/PSSCH every 100ms (or 100 slot).   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-8** | **Test for Interruption**  *Tentative agreements:*   * Define Test for interruptions to WAN due to V2X Sidelink Communication * Not define Test for interruptions due to sync. source change * Not define Test for interruptions to WAN due to UE switching between LTE SL and NR SL   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-8-1** | **Test Set-up for interruptions to WAN due to V2X Sidelink Communication if agreed**  *Tentative agreements:*   * The test consists of one active cell (PCell) on the serving RF channel 1, and 8 active sidelink UEs transmitting V2X sidelink communication on RF channel 2. * T1: the UE monitoring the V2X sidelink communication transmission from other active Sidelink UEs on the V2X sidelink communication resources. * T2: the test system shall send RRC reconfiguration message to the UE and wait for the UE to respond with RRC reconfiguration complete message before transitioning to T3. * T3: The test system will count the missed ACK/NACKs during T3 to verify the allowed interruptions during V2X sidelink communication * Add applicable rule   + UE supporting SL and Uu is applied.   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-9** | **Test for Scheduling availability of UE switching between E-UTRA sidelink and NR sidelink**  *Tentative agreements:*   * Not define this test case   *Candidate options:*  *Recommendations for 2nd round:* |
| **Issue 3-10** | **Work split for draft CRs of test cases**  *Tentative agreements:*  *Candidate options:*   |  |  |  | | --- | --- | --- | | Tests | Volunteers | Comment | | Transmit timing accuracy | Huawei, MTK,Xiaomi |  | | Initiation/Cease of SLSS Transmission | LG |  | | Selection / Reselection of V2X Synchronization Reference Source | Xiaomi,,QC |  | | V2X UE Autonomous Resource Selection/Reselection | QC |  | | V2X UE Resource Pre-emption | QC | If this test case is agreed | | V2X UE Resource Re-evaluation | MTK | If this test case is agreed(maybe merged with pre-emption) | | Congestion Control measurements | MTK, QC |  | | Interruptions | Huawei, Xiaomi |  | | Related Configuration (resource pool, RMC) |  |  |   *Recommendations for 2nd round:*   * Decide work split for draft CRs of test cases based on the comments in 1st round. * Discuss the skeleton of specification based on agreed test cases. |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
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### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2011382  (draft CR) | To be noted. |
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## Discussion on 2nd round (if applicable)

### Open issues

**Issue 3-2: Baseline of test cases**

* P2: V2X SL CBW in all the RRM test
  + CBW
    - Option 1 : 40MHz
    - Option 2 : 20MHz
    - Option 3 : 20MHz & 40MHz
* P3: Synchronization reference sources in the related RRM test cases
  + [gNB], [eNB]
* P4: gNB(FR1 NR Cell) configurations in all the related RRM test
  + Option 2
  + Option 3

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| **Company** | **Comments** |
| LG | P2 : Option3 is supported. Because we think 20MHz is typical in NR V2X. We can add ‘note’: The UE is only required to be tested in one of the supported test configurations.  P3 : gNB is OK. eNB is not strong view.  P4 : Option2, we think note(The UE is only required to be tested in one of the supported test configurations) can cover Option3. In addition, band combinations to be added in future need to be considered. |
| MTK | P2: agree with LG’s proposal.  P3: gNB with applicable rule.  P4: We don’t have strong view. |
| Huawei | P2: We prefer option 2, but option 3 is acceptable for us.  P3: We prefer to define gNB, and no strong view on eNB  P4: We prefer option 2 |
| QC | P2: option 3 is acceptable  P3: gNB with applicability rule, no need to test eNB  P4: Option 2 is preferred |
| Xiaomi | P2: We prefer Option 2. As LG indicated, 20MHz is typical in NR V2X. From our perspective, we should test the worst case as UE is assumed to support both. Also, option 2 would simply test set up.  P3: We prefer to define both gNB and eNB. LTE and NR has different pshysical layer structure and different SCS, followed by V2X different requirements. We think it is better to consider the case eNB as sync reference source for verification of UE supporting such capability. But we can compromise to define gNB only.  P4: We prefer Option 2. |

**Issue 3-3: Test for UE transmit timing**

* [gNB], [eNB] as timing reference

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| **Company** | **Comments** |
| LG | P3 : gNB is OK. eNB is not strong view. |
| MTK | gNB with applicable rule. |
| Huawei | Prefer to define gNB with application rule. No strong view on eNB |
| QC | gNB with applicability rule, no need to test eNB |
| Xiaomi | We prefer to define both gNB and eNB. UE transmit timing is closely related to SCS. For the same reason in issue 3-2, we think it would be appropriate to define both gNB and eNB. |

**Issue 3-4: Test for Initiation/Cease of SLSS Transmissions**

* [gNB], [eNB] as timing reference

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| **Company** | **Comments** |
| LG | P3 : gNB is OK. eNB is not strong view. |
| MTK | gNB with applicable rule. |
| Huawei | Prefer to define gNB with application rule. No strong view on eNB |
| QC | gNB with applicability rule, no need to test eNB |
| Xiaomi | gNB is fine to us. |

**Issue 3-5-1: Test Set-up when GNSS is configured as the highest priority**

* For Option2 and Option3, whether or not to consider UE which supports or not support gNB as sync. source

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| **Company** | **Comments** |
| LG | This test needs to apply for both UEs, supporting SL only, supporting Uu and SL. We think one difference between Option2 and Option3 is initial condition. In initial condition, Test UE is synched to SyncRef UE1(sync to gNB directly) in Option2 and is not synched to any timing reference in Option3. To simply test-set up, Option3 is preferable. |
| MTK | Option 3. |
| Huawei | We support option 2.  This test needs not only to verify the SyncRef identification requirements but also to verify GNSS has higher priority than gNB, which is the same reason to set PCell as initial sync source in LTE V2X test. However, considering of SL only UE in NR, we suggest to use SyncRef UE1(sync to gNB directly) instead of PCell as initial sync source. |
| QC | We support option 3.  Huawei’s concern is addressed in the following:  For a UE which doesn’t support gNB as sync source, priority between gNB and GNSS doesn’t matter. For a UE which supports gNB as sync source, correct selection according to priority between gNB and GNSS is verified by the gNB as the highest priority test (reselect to SyncRefUE indirectly synchronized to gNB from GNSS).  We also want to clarify that in option 3 (based on our propose), SyncRef UE 1 is indirectly synchronized to GNSS and SyncRefUE 2 is directly synchronized to GNSS. |
| Xiaomi | We prefer Option 3. |

**Issue 3-6: Test for L1 SL-RSRP measurements**

* For feasibility of test for Resource Re-evaluation and Resource Pre-emption

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| **Company** | **Comments** |
| MTK | We suggest at least to list the potential issues in WF.  Pre-emption:   1. RAN4 shall further check the timeline to guarantee TE can reserve the resources timely before n- Tpre-empt if test UE chose the reservation resource nearly with UE’s initial transmission? 2. RAN4 shall further check how to guarantee the cheat UE which won’t follow the RAN1 spec. cannot pass the test. For example. if the test UE will random select the resource after sending the SCI, it may still pass this test. |
| QC | We addressed the two issues raised by MTK to be captured in WF in our contribution and in our first round comment. If companies want more time to check it we are ok, given that this is the first meeting. But we would like to list our proposed solutions to these two potential issue as options to address this issue. We suggest the following wording:   1. Timeline to guarantee TE having enough time to send high priority reservation to trigger pre-emption:   Option 1 (QC): configure the slot bitmap as 10000000000000000000 so that each available slot if far part enough to guarantee that the first transmission and the next reservation are not too close to accommodate TE decoding time and pre-emption timeline defined in RAN1   1. How to prevent test UE to randomly select resource after sending SCI   Option 1 (QC): The general resource selection spec violation may not necessary be tested in pre-emption test, if it can not be conveniently embedded in pre-emption test   1. Other UE cheating behavior specific to resource pre-emption can be further discussed if companies come up with any other example.   Our first round comment to address LG and MTK’s concern seems missing in the summary, paste it below:  To LG:  T2 is not a specific timing, and yes it depends on when testing UE reserves the resource and when active SL UE decodes the reservation. Given that this is a full buffer test and decoding time should be short, we don’t see a risk of excessive testing time.  Yes, n is the slot reserved by testing UE, and we can control the location (one time domain) by slot bitmap in resource pool configuration, as we explained in R4-2011382  To MTK:  It’s a designated TE behavior, we program TE to immediately reserve the same resource reserved by testing UE after decodes the testing UE reservation. Hence the issue to be resolved is how to guarantee that n is large enough to accommodate T\_pre-empt. This is done by slot bitmap in resource pool configuration, as we explained in R4-2011382.  If the test procedure can be optimized to catch the example cheating UE, we are welcome for the suggestions. But randomized selection is a general spec violation in a broader resource selection context, not specific to pre-emption. Even without pre-emption, randomize selection defeats the purpose of sensing and increase collision probability. It will be ideal to utilize this test procedure to catch additional non-spec compliance behavior for general resource selection, but even if we can’t catch it through this test, we still should introduce this test to serve the purpose of confirming resource pre-emption behavior. |
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**Issue 3-6-1: Test Set-up for V2X UE Autonomous Resource Selection/Reselection if agreed**

* For Recommendations for 2nd round in 3.4.1

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| **Company** | **Comments** |
| LG | We’re fine with it in general. |
| Huawei | Based to the suggested test setup, sub-channels 0/1/3/4 will be always excluded due to 20dB higher RSRP, sub-channel 2 is expected to be excluded in T1 and to be included in T2. It seems that all the sub-channels will be excluded in T1. However, according to 38.214,  If the number of candidate single-slot resources remaining in the set is smaller than , then is increased by 3 dB for each priority value and the procedure continues with step 4.  At least to be included in set SA, and the value of can be configured as {20%, 35%, 50%}.  We need further to study the test methodology for sensing procedure. |
| QC | We can revise our proposal for next meeting, suggest to capture companies concern in WF. |

**Issue 3-6-2: Test Set-up for V2X UE Resource Pre-emption if agreed**

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| **Company** | **Comments** |
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**Issue 3-6-3: Test Set-up for V2X UE Resource Re-evaluation and Pre-emption if agreed**

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| **Company** | **Comments** |
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**Issue 3-10: Work split for draft CRs of test cases**

* For moderator’s suggestion as below

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| Tests | Volunteers in 1st Round | Moderator’s suggestion | Comment |
| Transmit timing accuracy | Huawei, MTK,Xiaomi | Huawei |  |
| Initiation/Cease of SLSS Transmission | LG | LG |  |
| Selection / Reselection of V2X Synchronization Reference Source | Xiaomi,QC | Xiaomi |  |
| V2X UE Autonomous Resource Selection/Reselection | QC | QC |  |
| V2X UE Resource Pre-emption | QC | QC | If this test case is agreed |
| V2X UE Resource Re-evaluation | MTK | MTK | If this test case is agreed(maybe merged with pre-emption) |
| Congestion Control measurements | MTK, QC | MTK |  |
| Interruptions | Huawei, Xiaomi | Huawei |  |
| Related Configuration (resource pool, RMC) |  | QC |  |
| Big one CR |  | LG | It includes all draft CRs for test cases and related configuration |

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| **Company** | **Comments** |
| Huawei | Moderator’s suggestion is acceptable for us. |
| Xiaomi | Moderator’s suggestion is acceptable for us. |
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**Issue 3-10-1: Skeleton of specification for test cases**

* *A.9 V2X Tests*
* *A.9.1 V2X Tests in FR1*
* *A.9.1.1 V2X UE transmit timing Test*
  + *A.9.1.1.1* Test *for GNSS as synchronization reference source*
  + *A.9.1.1.2* Test for SyncRef UE as synchronization reference source
  + *[A.9.1.1.3 Test for FR1 NR Cell as synchronization reference source]*
  + *[A.9.1.1.4 Test for E-UTRAN Cell as synchronization reference source]*
* *A.9.1.2 Initiation/Cease Test of SLSS Transmission with V2X Sidelink Communication*
  + *A.9.1.2.1 Test for SyncRef UE as synchronization reference source*
  + *[A.9.1.2.2 Test for FR1 NR Cell as synchronization reference source]*
  + *[A.9.1.2.2 Test for E-UTRAN Cell as synchronization reference source]*
* *A.9.1.3 V2X Synchronization Reference Selection/Reselection Test*
  + *A.9.1.3.1 Test for GNSS configured as the highest priority*
  + *A.9.1.3.2 Test for FR1 NR Cell configured as the highest priority*
* *A.9.1.4 L1 SL-RSRP Measurement Test*
  + *A.9.1.4.1 Test for V2X UE Autonomous Resource Selection/Reselection*
  + *[A.9.1.4.2 Test for V2X UE Resource Pre-emption] or*
  + *[A.9.1.4.2 Test for V2X UE Resource Re-evaluation and Resource Pre-emption]*
* *A.9.1.5 Congestion Control Measurement Test*
* *A.9.1.6 Interruption Test*
  + *A.9.1.6.1 Test for Interruptions to WAN due to V2X Sidelink Communication*

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| **Company** | **Comments** |
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**Issue 3-10-2: Skeleton of specification for resource pool, RMC**

* *A.3.19 V2X sidelink communication*
* *A.3.19.1 Introduction*
* *A.3.19.2 Reference resource pool configurations for V2X Sidelink Communication*
* *A.3.19.3 Reference measurement channels for V2X Sidelink Communication*

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| **Company** | **Comments** |
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### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
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## Summary on 2nd round (if applicable)

### Open issues

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|  | **Status summary** |
| **Issue 3-2** | **Baseline of test cases**  *Tentative agreements:*   * V2X SL SCS & CBW in all the RRM test   + {30kHz, 20MHz}, {30kHz, 40MHz}   + Add note:The UE is only required to be tested in one of the supported test configurations * Synchronization reference sources in the related RRM test cases   + GNSS, SyncRef UE, gNB     - Apply application rule for gNB * gNB(FR1 NR Cell) configurations in all the related RRM test  |  |  | | --- | --- | | **Configuration** | **Description** | | 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | | 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | | 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Note: The UE is only required to be tested in one of the supported test configurations. | | |
| **Issue 3-3** | **Test for UE transmit timing**  *Tentative agreements:*   * Define test cases for GNSS, SyncRef UE, gNB as timing reference |
| **Issue 3-4** | **Test for Initiation/Cease of SLSS Transmissions**  *Tentative agreements:*   * Define test cases for SyncRef UE, gNB as timing reference |
| **Issue 3-5-1** | **Test Set-up when GNSS is configured as the highest priority if agreed**  *Tentative agreements:*   * Option 2 : 3 SyncRef UEs   + SyncRef UE1 (sync to gNB directly), SyncRef UE2 (sync to GNSS in-directly) and SyncRef UE3 (sync to GNSS directly). * Option 3 : 2 SyncRef UEs   + SyncRef UE1 (sync to GNSS in-directly) and SyncRef UE2 (sync to GNSS directly). * Decide one option in next meeting. |
| **Issue 3-6** | **Test for L1 SL-RSRP measurements**  *Tentative agreements:*   * Define Test for V2X UE Autonomous Resource Selection/Reselection * Decide whether or not introduce Test for Resource Re-evaluation and Resource Pre-emption after conclusion on feasibility of tests   + Need further check followings for Pre-emption Test     - Timeline to guarantee TE having enough time to send high priority reservation to trigger pre-emption:       * Option 1 : Configure the slot bitmap as 10000000000000000000 so that each available slot if far part enough to guarantee that the first transmission and the next reservation are not too close to accommodate TE decoding time and pre-emption timeline defined in RAN1     - How to prevent test UE to randomly select resource after sending SCI       * Option 1: The general resource selection spec violation may not necessary be tested in pre-emption test, if it can not be conveniently embedded in pre-emption test     - Other UE cheating behavior specific to resource pre-emption can be further discussed if companies come up with any other example   + Need further check for Re-evaluation Test     - How to avoid the test UE to select the resource and send the initial transmission before sensing procedure? |
| **Issue 3-6-1** | **Test Set-up for V2X UE Autonomous Resource Selection/Reselection if agreed**  *Tentative agreements:*   * Revise option 1 regarding RAN1 spec., ‘at least X⋅M\_"total" to be included in set SA, and the value of X can be configured as {20%, 35%, 50%}. * Option 1   + Active UE and subchannel allocation: there are 50 active UEs in the system, first 10 UEs occupies subchannel 0, the next 10 occupies subchannel 1, the next 10 occupies subchannel 2, following the allocation until all the 50 active UEs are allocated. Now the 5 subchannels configured for UE to be tested are each occupied by 10 UEs.   + The 10 UEs in the same subchannel take turns to access the channel, same as LTE but LTE has 20 UEs in one subchannel.   + UEs on subchannel 0/1/3/4 always transmit in high RSRP above the threshold (corresponding to 20dB SNR). UEs on subchannel 2 transmit with high RSRP in T1 and low RSRP in T2 (corresponding to 5dB SNR as PSCCH SNR in LTE).   + Reuse RSRP threshold in LTE, with the SNR in the previous bullet, to derive SL-RSRP and S-RSSI. * Other options are not precluded |
| **Issue 3-10** | **Work split for draft CRs of test cases**  *Tentative agreements:*   * Company are encouraged to provide draft CR for corresponding test case in Table below in next meeting.  |  |  |  | | --- | --- | --- | | Tests | Volunteer Company | Comment | | Transmit timing accuracy | Huawei |  | | Initiation/Cease of SLSS Transmission | LG Electronics |  | | Selection / Reselection of V2X Synchronization Reference Source | Xiaomi |  | | V2X UE Autonomous Resource Selection/Reselection | Qualcomm |  | | V2X UE Resource Pre-emption | Qualcomm | If this test case is agreed | | V2X UE Resource Re-evaluation | Mediatek | If this test case is agreed(maybe merged with pre-emption) | | Congestion Control measurements | Mediatek |  | | Interruptions | Huawei |  | | Related Configuration (resource pool, RMC) | Qualcomm |  | | Big one CR | LG Electronics | It includes all draft CRs for test cases and related configuration | |
| **Issue 3-10-1** | **Skeleton of specification for test cases**  *Tentative agreements:*  *A.9 V2X Tests*  *A.9.1 V2X Tests in FR1*  *A.9.1.1 V2X UE transmit timing Test*  *A.9.1.1.1 Test for GNSS as synchronization reference source*  *A.9.1.1.2 Test for SyncRef UE as synchronization reference source*  *A.9.1.1.3 Test for FR1 NR Cell as synchronization reference source*  *A.9.1.2 Initiation/Cease Test of SLSS Transmission with V2X Sidelink Communication*  *A.9.1.2.1 Test for SyncRef UE as synchronization reference source*  *A.9.1.2.2 Test for FR1 NR Cell as synchronization reference source*  *A.9.1.3 V2X Synchronization Reference Selection/Reselection Test*  *A.9.1.3.1 Test for GNSS configured as the highest priority*  *A.9.1.3.2 Test for FR1 NR Cell configured as the highest priority*  *A.9.1.4 L1 SL-RSRP Measurement Test*  *A.9.1.4.1 Test for V2X UE Autonomous Resource Selection/Reselection*  *[A.9.1.4.2 Test for V2X UE Resource Pre-emption] or*  *[A.9.1.4.2 Test for V2X UE Resource Re-evaluation and Resource Pre-emption]*  *A.9.1.5 Congestion Control Measurement Test*  *A.9.1.6 Interruption Test*  *A.9.1.6.1 Test for Interruptions to WAN due to V2X Sidelink Communication* |
| **Issue 3-10-2** | **Skeleton of specification for resource pool, RMC**  *Tentative agreements:*  *A.3.19 V2X sidelink communication*  *A.3.19.1 Introduction*  *A.3.19.2 Reference resource pool configurations for V2X Sidelink Communication*  *A.3.19.3 Reference measurement channels for V2X Sidelink Communication* |

### CRs/TPs/LSs/WFs

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
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