**3GPP TSG-RAN WG4 Meeting #102-e R4-22xxxxx**

**E-meeting, February 21 – March 3, 2022**

**Title: WF on NR SL enhancements RRM requirements**

**Source: LG Electronics**

**Agenda item: 10.15.5/10.15.6**

**Document for:** **Approval**

# WF – 1.1.1 Scheduling availability when switching TDMbased intra-band con-current SL operation

* Scheduling availability requirement apply regardless of NTA

Following table is for temporally record only and will be moved to summary document:

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# WF – 1.1.2 Timeline applicability when switching TDM based intra-band con-current SL operation

* Not consider Tx preparation time for defining scheduling availability

Option 1: When switch from uplink transmission to V2X sidelink transmission (or vice versa) occurs in sidelink (or Uu) slot ‘x’, UE is not expected to transmit or receive on V2X sidelink and Uu DL/UL on the sidelink (or Uu) slot ‘n’ since SL and Uu are on the same band.

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| Company | Comment |
| LG Electronics | It is not necessary to consider option 1 additionally besides the endorsed requirements. Because, Uu Rx/Tx is not considered in slot ‘x’ when V2X SL transmission is in slot ‘x’. |
| MTK | In our understanding, the scheduling restriction is due to retuning. If the switch occurs on slot ‘x’, it means the retuning occurs on slot ‘x’. So there is scheduling restriction on slot ‘x’. We haven’t understood the logic why scheduling restriction is allowed on a different slot. |
| Huawei | The current scheduling availability requirements are sufficient to cover all the case. Option 1 is not needed. We also have the same concern whether slot ‘n’ is a different slot with slot ‘x’, or is it just a typo? |
| QC | Sorry for the typo, we main both slot ‘x’, here is the corrected option:  Option 1: When switch from uplink transmission to V2X sidelink transmission (or vice versa) occurs in sidelink (or Uu) slot ‘x’, UE is not expected to transmit or receive on V2X sidelink and Uu DL/UL on the sidelink (or Uu) slot ‘x’ since SL and Uu are on the same band.  Comparing to the currently endorsed draft, the scheduling restriction is on Uu or SL only, instead of both:  When switch from uplink transmission to V2X sidelink transmission occurs in sidelink slot ‘n’,   * UE is not expected to transmit or receive on V2X sidelink on the sidelink slot ‘n’.   When switch from V2X sidelink transmission to uplink transmission occurs in sidelink slot ‘n-1’,   * UE is not expected to transmit or receive on V2X sidelink on the sidelink slot ‘n-1’.   When switch from V2X sidelink transmission to uplink transmission occurs in Uu slot ‘n’,   * UE is not expected to transmit uplink or receive downlink on the Uu slot ‘n’.   When switch from uplink transmission to V2X sidelink transmission occurs in Uu slot ‘n-1’,   * UE is not expected to transmit uplink or receive downlink on the Uu slot ‘n-1’. |
| Xiaomi | We prefer not to change the current scheduling availability requirements |
| vivo | It can be FFS. Further improvement, if necessary, can be made during maintenance phase. |

# WF – 2.1.1 UE Rx(Data) drop rate requirements for Asynchronized SLSS measurement & search

* UE is allowed to drop up to 2 slots of its V2X data reception per PSBCH monitoring occasion and UE is allowed to drop at most an aggregated window of 24ms of its V2X data reception during Tdetect,SyncRef UE\_V2X for the purpose of selection / reselection to the SyncRef UE when SL-DRX is used.

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# WF – 2.1.2 Conditional SyncRef UE detection requirements for Asynchronized SLSS measurement & search

* GTW agreement
  + Relax asynchronized SyncRef UE search requirement for R17 UE supporting DRX when the conditions are satisfied for an evaluation period, e.g. Tevaluate,SLSS  in initial/cease of SLSS Tx:
    - UE can extend the detection time to max(X\*50 DRX cycle length, 8s) when a set of conditions are satisfied over an evaluation period
      * DRX cycle length is the [longest] DRX cycle
      * X is FFS: 1 ≤ X < ∞
      * Set of conditions is FFS
* Moderator’s recommendation: discuss the followings and decide.
  + - 1. DRX cycle length is the [longest] DRX cycle
    - 2. X value
    - 3. Set of conditions

From 1st round, at least option 1 is reasonable. Focus other options.

* + - * Option 1: SLSS RSRP is larger than a threshold, e.g., syncTxThreshOoC
      * Option 2-a: SLSS RSRP variation, (instantaneous RSRP – current filtered RSRP)^2 , is lower than a threshold
      * Option 2-b: FFS on conditions to ensure UE is aware of high priority async SyncRef UE sources.
      * Option 3-a: Data connection is maintained with the current SyncRef UE source
      * Option 3-b: FFS on conditions data connection is reliable with current SyncRef UE sources.

Following table is for temporally record only and will be moved to summary document:

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| Company | Comment |
| LG Electronics | 1. We’re fine with the longest SL-DRX cycle when multiple SL-DRXs are configured.  2. We’re fine with X = [4] in R4-22-3718 as starting point. The value can be confirmed in maintenance.  3. Fine with Option 1 and Option 3-a. Other options can be discussed as maintenance. |
| MTK | 1. Fine with using the longest SL-DRX cycle.  2. Fine with using X=[4] as starting point and confirm in maintenance.  3. Option 1 and Option 3-a are acceptable to us.  Regarding Option 2-b, we have not quite followed how to ensure UE to be aware of high priority async SyncRef UE sources. But what UE does know is the priority of the current SyncRef UE source. If UE is synchronized to a P6 SyncRef UE source, it is more important to find a SyncRef UE source of higher priority than power saving. Therefore, we propose **Option 2-c:** **The current SyncRef UE source is not of Priority 6**. |
| Huawei | 1. OK with the longest SL-DRX cycle  2. X= [2 or 4] are fine for us.  3. Option 1 and option 3a are fine for us. Option 2-c proposed by MTK is also fine for us.  When the conditions are met, the UE is allowed but not mandatory to apply the relaxed SyncRef identification requirements. |
| QC | 1. OK with the longest SL-DRX cycle  2. X= [2 or 4] are fine for us.  3. Option 1 and 3a are fine for us. Could MTK check option 2a and the explanation in our contribution? If we want to address option 2b, option 2a is a better alternative than 2c because it implicitly detects the presence of higher priority SyncRefUE. But we are fine with keep only 1 and 3a. |
| Xiaomi | 1. OK with the longest SL-DRX cycle  2. X= [2 or 4] are fine for us.  3. We are generally fine with Option 1, 2a and 3a. But the specific threshold of option 2a need further discuss. For option 2-c, the condition here cannot guarantee the UE could be aware of higher priority async SyncRef UE sources from our understanding. |
| vivo | 1. We are fine with longest SL-DRX cycle 2. X = [2 or 4[ is fine. 3. We think option 1 would be enough for now. if any other options are needed can be FFS. Option 3a is not so clear about how data connection is maintained and how it is relevant to syncRef sources searching. |

# WF – 2.2.1 Avoidance of Interruption to WAN due to SL-DRX

* GTW agreement
  + Define the following applicability rules for interruptions to WAN due to SL DRX

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| WAN operation | Applicability of WAN interruptions due to SL DRX transition between active/non-active states | |
| SL resource  allocation mode 1 | SL resource  allocation mode 2 |
| Reception of paging | Applicable | Not applicable |
| Reception of system information | Applicable | Not applicable |
| While RLF timer is running | Applicable | Not applicable for DRX cycle length < X ms  Applicable for other cases |
| While UE is performing CBD | Applicable |

* + - FFS on UE behavior for the case when WAN interruption shall be avoided (e.g., postpone SL-DRX transition)
* Moderator’s recommendation: decide the followings in the agreed table
  + 1. X value
  + 2. UE behaviour for the case when WAN interruption shall be avoided (e.g., postpone SL-DRX transition)

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| Company | Comment |
| LG Electronics | 1.Consider X=640ms, which is used as reference for missed Ack/Nack probability of 1%  2. Fine with 2nd bullet. However, it is not necessary to specify it. It is rather implementation. |
| MTK | Regarding the second bullet, it is up to UE implementation and it is not necessary to specify in our understanding. |
| Huawei | 1. We suggest X =320ms.  2. It is left to UE implementation on how to avoid the interruption. |
| QC | 1. We suggest X = 80ms. Since the transition is once per DRx cycle, and once per 80ms is roughly 1%. To LGE, the 640ms is the threshold, and deriving the DRx cycle length based on the target percentage is a better approach than use the threshold directly.  2. Up to UE implementation. |
| vivo | 1. X=160ms 2. Up to UE implementation. |
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# WF – 2.2.1.1 The conclusion from 2-2-1 is applicable to SL UE active to inactive transition only or all the transitions

* ‘Not applicable’ in issue2-2-1 applies for
  + Option 1: UE active to inactive transition only (QC/LGE/vivo)
  + Option 2: All the transitions (Ericsson/Huawei/ZTE)
* Moderator’s recommendation : Further discuss, and if no consensus,
  + compromise based on majority to complete core requirements or
  + discuss as maintenance

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| Company | Comment |
| LG Electroincs | Preference is Option 1. If no consensus, we can discuss it as maintenance. |
| MTK | Option 1. |
| QC | Option 1. |
| vivo | Option 1 |
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# WF – 2.2.2 Interruption to WAN due to SL-DRX when NR is in DRX and SL is in SL-DRX

* GTW tentative agreement
  + Define interruptions to WAN due to SL-DRX when NR is in DRX
    - Interruptions on WAN are not applicable while *onDurationTimer* is running for the SL resource allocation mode 2
* Moderator’s recommendation : Further discuss tentative agreement and make agreement

Following table is for temporally record only and will be moved to summary document:

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| Company | Comment |
| LG Electronics | Fine with it when WAN operation is same cases as in 2.2.1 while onDurationTimer is running  - reception of paging  - reception of system information  - while RLF timer is running  - while UE is performing CBD |
| QC | We don’t agree with the tentative agreement. The interruption is allowed regardless of whether the *onDurationTimer* and *inactivityTimer* are still running or not. But naturally when both timmer are not running, UE is not communicating and no need to discuss interruption.  We propose the following alternative option:  The SL DRx transition interruption to WAN requirement is allowed when NR Uu is in DRx except the not applicable cases agreed in 2.2.1 (NR Uu in non-DRx). |
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# WF – 2.2.3 Interruption to WAN due to SyncRef UE detection and/or Sensing during SL DRX off duration

* Reuse same requirements of interruption to WAN due to SL-DRX

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# WF – 4.1 Work plan of RRM performance

* RAN4#102-e meeting (’22.February)
  + Agree with list of RRM test cases
  + Do work-split of test cases for draft CRs
* RAN4#103-e meeting (’22.May)
  + Discuss the draft CRs with the detailed test configurations and related parameter
* RAN4#104 meeting (’22.August)
  + Endorse the final draft CRs.
  + Approve a Big CR based on all endorsed draft CRs.

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# WF – 4.2 List of test cases

* Introduce following test cases

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| **No** | **Feature/requirements** | **Comment** | **No of tests** | **Proposed section** | **Company** |
| 1 | 12.3.1.4 Initiation/Cease of SLSS transmissions with SyncRef UE as synchronization reference source | Need test for SL-DRX | 1 | - A.9.1.2.3 Test for SyncRef UE as synchronization reference source under SL-DRX | Huawei |
| 2-1 | 12.4 Selection / Reselection of V2X Synchronization Reference Source | Need test for SL-DRX | 1 | - A.9.1.3.3 Test for GNSS configured as the highest priority under SL-DRX | vivo |
| 2-2 | Need test for SL-DRX | 1 | - A.9.1.3.4 Test for FR1 NR Cell configured as the highest priority under SL-DRX | vivo |
| 3-1 | 12.5.2 SL-RSRP measurements | Need test for Partial sensing(Periodic, Contiguous) | 2 | - A.9.1.4.4 Test for V2X UE Partial Sensing | Qualcomm |
| 3-2 | Need test to verify that Tx UE performs proper sensing and select the resource during Rx UE DRx active time | 1 | - A.9.1.4.5 Test for V2X UE Sensing during Rx UE SL-DRX active time | Qualcomm |
| 4-2 | 12.7.4 Interruptions to WAN at transitions between active and non-active during SL-DRX | Need test for SL-DRX | 1 | - A.9.1.6.3 Test for Interruption to WAN at transitions between active and non-active during SL-DRX for Asynchronized case | LG Electronics |

* Moderator’s recommendation:
  + 1. 2-1 & 2-2 need to be tested based on GTW agreements
  + 2. Encourage companies to volunteer draft CR for interesting test cast.

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| Company | Comment |
| LG Electronics | 1. Support to test 2-1 & 2-2.  2. Volunteer test #4-2. |
| Huawei | 2.Volunteer test #1 |
| QC | We can take 3-1 and 3-2. Need clarification on 2-1 and 2-2: do we want to test the relaxed requirement or normal requirement? Normal requirement is the same as R16. |
| LG Electronics | To QC,  For 2-1 & 2-2, our preference is normal requirement under SL-DRX.  As moderator, I put QC as volunteer for Test3-1 & 3-2 in the above table. |
| vivo | Volunteer to test #2-1, 2-2. If necessary. |
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