**[101-e--NR-5G\_V2X\_NRSL-SYNC-02]**

**Email discussion regarding**

* **Issue 8: Start symbol of S-SSB**
* **Issue 17: In-device coexistence between LTE-V2X and NR-V2X**
* **Issue 5: Sidelink timing definition**

**Till 5/28. If consensus can be reached, any follow-up TP by 6/3 – Teng (CATT)**

**Issue 8 Start symbol of S-SSB**

***FL Proposal: The first OFDM symbol in an S-SS/PSBCH block is mapped to the first OFDM symbol in the slot.***

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| **Company** | **Views** |
| Huawei, HiSilicon | Ok with it. |
| Intel | Agree. Clarification is needed. |
| MediaTek | Fine with it. |
| OPPO | Agree |
| Nokia, Nokia Shanghai Bell | Agree |
| vivo | Agree. |
| ITRI | We are fine with the proposal. |
| ZTE/Sanechips | Agreed |
| LGE | Supported. |

**Issue 17 In-device coexistence LTE-V2X and NR-V2X**

***FL Proposal: When a UE is configured to operate the in-device coexistence between LTE-V2X and NR-V2X, the SL transmission timing and DFN of NR-V2X are derived from those of LTE-V2X***

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| **Company** | **Views** |
| Huawei, HiSilicon | Disagree.  As discussed during the preparing stage, we think the only issue left is to capture the subframe alignment between LTE-V and NR-V sidelinks. The related agreements as following:   * Agreements on TDM solutions   + For TDM solutions for in-device coexistence between LTE and NR V2X:     - Time Alignment       * Subframe boundary alignment is required between LTE and NR V2X sidelinks       * Both LTE and NR V2X sidelinks are aware of the time resource index (e.g., DFN for LTE) in both carriers * Agreements on FDM solutions   + For intra-band and inter-band FDM dynamic power sharing solutions, the following additional conditions apply:     - Subframe boundary alignment is required between LTE and NR V2X sidelinks     - Both LTE and NR V2X sidelinks are aware of the time resource index (e.g., DFN for LTE) in both carriers   If a UE cannot detect the NR-V S-SSB in coexistence scenarios, then the UE can derive its sidelink timing by implementation according to the timing in LTE-V module inside or by its local timing. |
| Intel | Disagree. We only need subframe aligned timing. Regarding DFN, we think it should be supported by configuration but not mandated |
| MediaTek | No need of the proposal. Maybe the early agreement on the subframe alignment is enough. How to secure the alignment is up to UE implementation. |
| OPPO | Disagree  According to the agreement copied above, the subframe boundary of NR SL and LTE SL should be aligned. how to promise that is up to UE implementation since both modules are within a UE. No specification is needed. |
| Nokia, Nokia Shanghai Bell | Disagree.  According to the WID, FDM-based in-device coexistence solutions with static power allocation should be supported when LTE SL and NR SL are in the different frequency bands. According to the NR V2X TR 38.885 when inter-band FDM-based in-device coexistence with static power assignment of Pc,max for each carrier is configured, synchronization between the SLs is not assumed. Therefore, statements that imply that synchronization is always required for in-device coexistence cannot be agreed.  Regarding the intra-band case when synchronization is needed, we think that it would be better if NR V2X is synchronized to SSBs from other NR V2X UEs. There will likely be UEs that are not operating in the in-device coexistence mode and those NR V2X UEs will anyway use SSBs from other NR V2X UEs. |
| vivo | Disagree.  The agreement made in-device coexistent just specifies that the subframe level boundary between LTE and NR are aligned, but it does not impose any restriction on the DFN mis-alignment. |
| ITRI | Disagree.  The coexistence between LTE-V2X and NR-V2X will cause the time alignment issue. |
| ZTE/Sanechips | We disagree. If the UE derives SL Tx timing and DFN of NR V2X from LTE V2X, other NR V2X UEs nearby may be unable to communicate with this UE. Because LTE V2X can not provide valid TDD-UL-DL config information and SLSSID for S-SSB. The other UEs could not derive the valid timing information from this UE.  In our view, NR V2X module should determine SL Tx timing and DFN of NR V2X based on NR V2X sync procedure. If NR V2X and LTE V2X are misaligned in subframe boundary, the coordination for in-device coexistence is not applicable. |
| LGE | FL proposal needs to be divided into the following two proposals.  ***Proposal 1:***  *The following agreements are captured in the specification.*  *Agreements:*   * *NR V2X sidelink operation includes the following cases:*   + *NR V2X sidelink is synchronized with LTE V2X sidelink*   *Agreements****:***   * *For TDM solutions for in-device coexistence between LTE and NR V2X:*   + *Time Alignment*     - *Subframe boundary alignment is required between LTE and NR V2X sidelinks*     - *Both LTE and NR V2X sidelinks are aware of the time resource index (e.g., DFN for LTE) in both carriers*   *Agreements****:***   * *For intra-band and inter-band FDM dynamic power sharing solutions, the following additional conditions apply:*   + *Subframe boundary alignment is required between LTE and NR V2X sidelinks*   + *Both LTE and NR V2X sidelinks are aware of the time resource index (e.g., DFN for LTE) in both carriers*   We need to discuss how and where to capture the above agreements, which are missing in the current specification.  For the first agreement, we need a conclusion that triggers RAN2 work to capture it in RAN2 spec. An LS may be sent to RAN2 for further specification work, if necessary.  For the second and the third agreement, our preference is to capture them in RAN1 specification as UE should align subframe boundary between LTE SL and NR SL for in-device coexistence operation.  ***Proposal 2:***  *When a UE is configured to operate the in-device coexistence between LTE-V2X and NR-V2X, the SL transmission timing and DFN of NR-V2X are derived from those of LTE-V2X*  The FL proposal is only related to the case when the in-device coexistence is used. It does not mean that in-device coexistence is always required.  In the in-device coexistence scenario, if NR-V2X-only UE coexists with in-device coexistence (COEX) UE in NR SL carrier, there will be severe interference between NR-V2X-only UE and COEX UE because of their independent sync operations. Therefore, in the in-device coexistence scenario, it’s assumed that every UE is COEX UE.  When the in-device coexistence mode is used, if we only capture the subframe boundary alignment and no rule for DFN value derivation, there will be ambiguity in NR SL DFN among UEs. For example, if NR SL DFN is not derived from LTE SL DFN, there will be a problem in interpreting the resource pool configuration, which makes SL communication impossible. In this sense, it cannot be UE implementation issue. Considering agreement that NR V2X is synchronized to LTE V2X, it’s reasonable to derive NR SL DFN from LTE SL DFN.  In the in-device coexistence scenario, regardless of NR S-SSB detection, NR V2X should be synchronized to LTE V2X in any case. |

**Issue 5 Sidelink timing definition**

***FL Proposal: For sidelink transmissions, uplink timing is used on shared carrier, and downlink timing is used on dedicated carrier.***

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| **Company** | **Views** |
| Huawei, HiSilicon | Agree.  To handle SL-UL interference in shared carriers in NR-V, we have to use UL timing alignment.  For dedicated carriers, DL timing is used to avoid the need for UE to perform PRACH to acquire TAC from gNB, and hence allow UE to operate SL in idle/inactive modes. |
| Intel | Disagree. Mode-2 UE may not have uplink timing. |
| MediaTek | We can just reuse the definition for LTE SL time relations in section 9.10 of TS36.211. |
| OPPO | Agree in principle.  Further clarification is needed for shard carrier: the uplink timing without TA is applied, follows the same mechanism as LTE-V2X. |
| Nokia, Nokia Shanghai Bell | Ok to use UL timing at least for mode 1 in shared carrier |
| vivo | Not sure if this proposal is applicable to both mode-1 and mode-2, or is just used for mode-1?  For mode-2, there may be no Uu timing. |
| ITRI | We agree the uplink timing is used on shared carrier. But, downlink timing is used on dedicated carrier need to be FFS. |
| ZTE/Sanechips | We disagree. We support reusing timing mechanism in LTE V2X. |
| LGE | Not supported.  RAN4 already made a relevant agreement and captured in TS 38.133 that DL timing is used as a SL timing reference. This is also in-line with LTE-V2X operation, and we see no issue with NR-V2X.  We can also reuse LTE-V2X rule regarding N\_TA,offset. In LTE-V2X, N\_TA,offset for SL is same as that for Uu link for in-coverage UE, while N\_TA,offset is zero for out-of-coverage UE.  So we suggest the following modification on the FL proposal.  ***FL Proposal:***  *For sidelink transmissions, downlink timing is used as a reference timing. N\_TA,offset for SL is same as that for Uu link for in-coverage UE, while N\_TA,offset is zero for out-of-coverage UE.* |