# **[100b-e-NR-5G\_V2X\_NRSL-SL\_PHY\_Procedure-04] CSI reporting latency bound and association with CSI trigger**

[100b-e-NR-5G\_V2X\_NRSL-PHY-Procedure-04] Email discussion/approval regarding CSI reporting latency bound and association with CSI trigger

* Introduction and time/frequency location of SL CSI reference resource
* How to determine the latency bound of SL CSI reporting
* Whether/how to associate the reported CSI with the CSI trigger

till 4/24, with potential TPs by 4/29 (Hanbyul, LGE)

Q1: Do you agree the following proposals for the definition of SL CSI reference resource in the time and frequency domain?

* Proposal
  + For a given CSI trigger, CSI reference resource in time domain is the slot where the CSI trigger is received
  + For a given CSI trigger, CSI reference resource in frequency domain is the PRBs scheduled for the PSSCH in the CSI reference resource slot

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| Company | Answer |
| NTT DOCOMO | Support, if the following is correct understanding:  If it is allowed that CSI report is triggered multiple times, and when RX-UE receives multiple CSI triggers, the above proposal implies that CSI is calculated based on the CSI-RS in the PSCCH/PSSCH with **the LAST** CSI report. |
| Huawei, HiSilicon | Basically agree.  In the time domain, we think better to restrict the reference resource to the slot which carries the “latest” CSI trigger. This is because multiple CSI triggers might be received over a time. This simplification allows a one-to-one correspondence between CSI trigger and CSI report. |
| Apple | Agree |
| ZTE,Sanechips | agree |
| Intel | Agree, this is in line with the prior agreements on SL CSI supporting |
| Futurewei | Agree |
| OPPO | Agree |
| CATT | This issue should discuss together with Q3. Otherwise UE can not know the associated CSI trigger and the related PSSCH resource. |
| Lenovo&MM | Agree |
| vivo | Agree |
| Panasonic | We support above proposal. |

Q2: How can the UE reporting SL CSI know the latency bound? What is the signaling mechanism of the latency bound for sidelink CSI reporting MAC CE?

- Option 1: (Pre)configuration in a resource pool

- Option 2: PC5-RRC signaling from CSI triggering UE to CSI reporting UE

- Option 3: Explicit SCI indication from CSI triggering UE to CSI reporting UE

- Option 4: Others (please specify it)

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| Company | Preferred option | Comments |
| NTT DOCOMO | Option 2 | Required bound is dependent on each PDB. When multiple services are considered, PDB would be different among services and/or UEs. Fixed and/or common value is not desirable solution for the latency bound.  CSI-RS configuration is delivered on PC5-RRC message. The same solution is reasonable. |
| Huawei, HiSilicon | Option 2 + Option 3 | We think one latency bound or a list of latency bounds can be configured. When only one bound is configured, option 2 is utilized. When a list of latency bounds is used, it provides better flexibility at the TX UE side. It may decide the latency bound dynamically based on the service type or whether the last CSI report is successfully received or not. The list will be configured by PC5-RRC, and SCI (option 3) is used to explicitly indicate the used latency bound. |
| Apple | Option 2 | The resource pool (pre)configuration does not fit for channel condition of every pair of UEs and does not fit for every data QoS. The explicit SCI indication increases the L1 signaling overhead. |
| ZTE, Sanechips | Option 1 | FFS whether it is a per resource pool configuration |
| Intel | Option 2 | Per resource pool and/or per QoS configuration may not make much sense since the channel quality is not dependent on QoS or resource partitioning in general. Option 2 can allow UEs to tune the latency bound according to channel coherence times. |
| Futurewei | Option 1 or 2 | Either option is fine for us |
| OPPO | Option 3 | The latency boundary of CSI reporting can be based on the priority in SCI. |
| CATT | Option 2 | SL-CSI feedback is only supported in unicast, there is an available PC5-RRC connection between the unicast peers. And the latency bound could be changed due to the variation of service type and channel environment (e.g. variation of UE speed). |
| Lenovo&MM | Option 2 | At least, option 2 should be supported. In addition, option 1 can also be supported. |
| vivo | Option 1 | If SCI/PC5-RRC is used for configuration, UE may always use 3ms latency bound, i.e., the greedy implementation. Whether it is per pool or per BWP can be FFS. |
| Panasonic | Option 2 | For Unicast transmission, CSI-RS configuring is delivered on PC5-RRC. The same solution seems reasonable |

Q2-1: In case where UE determines the SL CSI latency bound, how is the determination done?

- Option A: By UE implementation

- Option B: Based on UE speed

- Option C: Others (please specify it)

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| Company | Preferred option | Comments |
| NTT DOCOMO | Option A | Bound would be related to PDB, channel busy ratio, etc. We do not understand why only UE speed should be considered. |
| Huawei, HiSilicon | Option A | The latency bound depends more strongly on service priority, link-level factors such as MCS table, and so on, than only on speed. UE may take into account whatever it needs to when setting the latency bound. |
| Apple | Option A | The channel status depends on relative speed of peer UEs, instead of absolute speed. The relative UE speed is hard to obtain. Hence, we do not think it is based on UE speed. |
| ZTE, Sanechips | Option A |  |
| Intel | Option A |  |
| Futurewei | Option A |  |
| OPPO | Option C | Based on priority in SCI. A mapping between priority and latency boundary can be (pre-)configured. |
| Lenovo&MM | Option A |  |
| Panasonic | Option A | Multiple factors including QoS and channel busy ratio are taken into account by UE implementation but not only UE speed. |

Q3: Do you think the specification needs to support an overlap of SL CSI reporting window of different CSI trigger, i.e., first CSI trigger is transmitted and second CSI trigger is transmitted additionally before the latency bound of the first CSI reporting?

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| Company | Answer |
| NTT DOCOMO | Specification should clarify RX UE behavior for re-trigger of CSI report.  CSI triggering could be failed e.g. due to TX collision/half-duplex. In this case, CSI trigger would be transmitted several times. However, let us assume that actually the RX-UE receives both trigger successfully. UE behavior for this case is unclear in the current specification. Which trigger does the UE report CSI based on? When is the correct latency bound? |
| Huawei, HiSilicon | No. We think the TX UE should not trigger another CSI procedure before CSI report is received or the corresponding latency bound is exceeded. Otherwise, the relationship between the CSI triggers and the CSI reports will be rather complicated. |
| Apple | In general, we do not support the overlap of SL CSI reporting window of different CSI triggers. This simplifies the operations at both Tx UE and Rx UE, as well as reducing potential L1 signaling overhead. |
| ZTE, Sanechips | No needs to support this. Non-overlap of reporting window could be assumed for unicast. |
| Intel | We are OK to either leave such cases unexpected to a UE, or to introduce simple handling, w/o enforcing a UE to provide CSI report based on processing of multiple CSI-RS occasions. |
| Futurewei | We are okay to have overlapping supported by the spec as it is hard to avoid |
| OPPO | Whether two CSI reporting window can be overlapped can be supported. while that can be left to UE implementation. No specification work is needed. |
| CATT | No. If more than one SL-CSI RS occasions are transmitted before the corresponding CSI report, there could be some ambiguous to determine the CSI reference. From Rx UE perspective, it may loss some reception opportunity due to prioritization operation. If Rx UE feedback the CSI report in the overlapped CSI report window, Tx UE can’t know which Tx occasion is used for CSI measurement. |
| Lenovo&MM | In general, we do not preclude the case in which overlapping is supported. How to address the problem introduced by this case can be left to UE implementation. |
| vivo | We slightly prefer non-overlapping. Otherwise, the association b/w CSI-RS resource and CSI feedback resource have to be associated by definition some rule. |
| Panasonic | The latest CSI trigger should be used should be clarified in the specification. |

Q3-1: If the answer to Q3 is yes, does the CSI triggering UE need to know which CSI trigger is associated with a received CSI report? If so, how?

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| Company | Answer |
| NTT DOCOMO | Not needed. |
| Futurewei | if the overlapped ones are all reported then it is needed to know. However, as only WB CSI are reported, only reporting the latest triggered CSI should be sufficient. |
| OPPO | Not needed |
| Lenovo&MM | Not needed |
| Panasonic | Not needed as the majority can be the latest CSI trigger. |
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