[103-e-NR-Rel-16-V2X-01] Email discussion/approval for remaining issues for PT-RS design

* Issue PS-1-1: For PT-RS sequence generation, when r(m) is defined, which DM-RS symbol is used for reference is not clear.
* Issue PS-1-2: Removal of duplication for PT-RS mapping

till 10/29, with a potential CR by 11/4 – Jeongho (Samsung)

# **Issue PS-1-1. For PT-RS sequence generation, when r(m) is defined, which DM-RS symbol is used for reference is not clear**

Four contributions [Huawei, HiSilicon], [LG], [Sharp], [Apple] discuss on this topic, which is related to the yellow-highlighted part below in TS38.211.

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| 8.4.1.2 Phase-tracking reference signals for PSSCH8.4.1.2.1 Sequence generation The precoded sidelink phase-tracking reference signal for subcarrier $k$ on layer $j$ is given by$$r^{(\tilde{p}\_{j})}\left(m\right)=\left\{\begin{matrix}r\left(m\right)&if j=j^{'} or j=j"\\0&otherwise\end{matrix}\right.$$where- antenna ports $\tilde{p}\_{j^{'}}$ or $\left\{\tilde{p}\_{j^{'}},\tilde{p}\_{j^{''}}\right\}$ associated with PT-RS transmission are given by clause 8.2.3 of [6, TS 38.214];- $r\left(m\right)$ is given by clause 8.4.1.1.1 at the position of a DM-RS symbol. |

The proposed ways are that, r(m) is given at

* Alt 1. the position of the DM-RS symbol transmitted in the **first symbol of the 2nd-stage SCI** [Huawei, HiSilicon]
* Alt 2. the **last** position on a DM-RS symbol [LG]
* Alt 3. The position of the **first actual** transmitted DM-RS symbol [Sharp], [Apple]
* Alt 4. Other(s)

Please provide your views and reason.

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| **Company** | **Views** |
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# **Issue PS-1-2: Removal of duplication for PT-RS mapping**

One contribution discusses on PT-RS mapping with the following TP.

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| 8.4.1.2.2 Mapping to physical resourcesThe UE shall transmit phase-tracking reference signals only in the resource blocks used for the PSSCH, and only if the procedure in [6, TS 38.214] indicates that phase-tracking reference signals are being used.The PSSCH PT-RS shall be mapped to resource elements according to $\left[\begin{matrix}a\_{k,l}^{\left(p\_{o},μ\right)}\\\vdots \\a\_{k,l}^{\left(p\_{ρ-1},μ\right)}\end{matrix}\right]=β\_{DMRS}^{PSSCH}W\left[\begin{matrix}r^{(\tilde{p}\_{0})}(2n+k')\\\vdots \\r^{(\tilde{p}\_{υ-1})}(2n+k')\end{matrix}\right]$$$k=4n+2k^{'}+Δ$$when all the following conditions are fulfilled- $l$ is within the OFDM symbols allocated for the PSSCH transmission;- resource element $\left(k,l\right)$ is not used for sidelink ~~CSI-RS,~~ PSCCH, nor DM-RS associated with PSSCH;- $k'$ and $Δ$ correspond to $\tilde{p}\_{0}, …, \tilde{p}\_{υ-1}$The precoding matrix $W$ is given by clause 8.3.1.4*.*=====omitted=====~~PSSCH PT-RS shall not be mapped to resource elements containing PSCCH or PSCCH DMRS by puncturing PSSCH PT-RS.~~A UE is not expected to receive sidelink CSI-RS and PSSCH PT-RS on the same resource elements.=====omitted===== |

The contribution refers the following agreements in RAN1#101-e.

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| Agreements:-  SL-PT-RS is not mapped to the resources for PSCCH by puncturing SL-PT-RS (i.e., sequence & resource mapping).Agreements:* A TX UE is not expected to transmit a SL CSI-RS in a same symbol with the 2nd SCI or PSSCH DMRS
	+ Note: this implies that it’s an error case if there is such a collision

Working assumption:* The 2nd SCI is rate-matched around SL-PT-RS

Working assumption:* The frequency-domain OCC length for PSCCH is {~~2,~~ 3~~, 4~~}
	+ The same LTE requirement and procedure for UE blind decoding (w.r.t. to OCC vs. LTE’s cyclic shifts) for PSCCH applies

Agreements: A TX UE is not expected to transmit a SL CSI-RS and a SL PT-RS which overlap* Note: this implies that it’s an error case if there is such a collision (no puncturing, and the collision is avoided by the Tx UE)

This imples a Rx UE is not expected to receive a SL CSI-RS and a SL PT-RS which overlap |

Please share your views including whether this change is needed or not.

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| **Company** | **Views** |
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Reference

1. R1-2007610 Correction on sidelink PT-RS sequence generation Huawei, HiSilicon
2. R1-2007772 Discussion on essential corrections in physical layer structure LG Electronics
3. R1-2007809 Remaining issues on physical layer structure for NR sidelink CATT
4. R1-2007921 Remaining issues of NR sidelink physical layer structure ZTE, Sanechips
5. R1-2007934 Remaining opens of sidelink physical structure for NR V2X design Intel Corporation
6. R1-2008129 Text Proposals on Physical Layer Structures for NR Sidelink Samsung
7. R1-2008230 Draft TP on physical structure for NR sidelink OPPO
8. R1-2008381 Remaining issue on physical layer structure and procedure for sidelink in NR V2X Panasonic Corporation
9. R1-2008387 Remaining issues on physical layer structure for NR sidelink Sharp
10. R1-2008429 Remaining Issue of Sidelink Physical Layer Structure Apple
11. R1-2008496 Maintenance for PSFCH and PSCCH symbol on NR sidelink ASUSTeK
12. R1-2008529 Maintenance for sidelink physical layer structure NTT DOCOMO, INC.
13. R1-2008604 Remaining Issues in Physical Layer Structure Qualcomm Incorporated
14. R1-2008665 Remaining issues on physical layer structure for NR sidelink vivo
15. R1-2008750 Discussion paper on the remaining issues in Rel. 16 for NR V2X Ericsson