**3GPP TSG RAN WG1 #106-e R1- 210xxxxx**

**e-Meeting, August 16th – 27th, 2021**

**Source: Moderator (vivo)**

**Title: Summary of [106-e-NR-5G\_V2X-06] Discussion on R1-2107980: Clarification on UE behaviour in out of coverage case**

**Agenda Item: 7.2.4**

**Document for: Discussion and Decision**

**Introduction**

The document is to collect companies’ inputs and provide a summary for the email discussion thread [106-e-NR-5G\_V2X-06] Discussion on [R1-2107980](file:///C%3A%5CUsers%5CDocs%5CR1-2107980.zip): Clarification on UE behaviour in out of coverage case by August 18.

The 1st point is planned as following, companies are highly appreciated to provide their inputs before this check point:

* **1st check point: 8.17 (UTC 03:59 AM, August 17)**

The 2nd check point: [TBD]

**Discussion**

## Issue 1#: Correction on Power control

The power control procedures in clauses 16.2.0, 16.2.1, and 16.2.3 were originally intended for the power control of S-SSB/PSSCH/PSFCH on the SL BWP in both IC and OOC cases. However, the current spec specifies that these clauses are used for SL transmission on a SL BWP of ‘**of a serving cell** ’, which means **they apply to IC case only**, and how to determine the transmission power of S-SSB/PSSCH/PSFCH for the case without serving cell is not clear.

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| 16.2.0 S-SS/PSBCH blocksA UE determines a power for an S-SS/PSBCH block transmission occasion in slot on active SL BWP of carrier of serving cell as16.2.1 PSSCHA UE determines a power for a PSSCH transmission on a resource pool in symbols where a corresponding PSCCH is not transmitted in PSCCH-PSSCH transmission occasion on active SL BWP of carrier of serving cell as:16.2.3 PSFCHA UE with scheduled PSFCH transmissions, and capable of transmitting a maximum of PSFCHs, determines a number of simultaneous PSFCH transmissions and a power for a PSFCH transmission , , on a resource pool in PSFCH transmission occasion on active SL BWP of carrier of serving cell as |

‘of serving cell ’ was introduced in [104b-e-NR-5G\_V2X-01] to clarify which serving cell’s DL RS is used to calculate the SL TX power if the gNB configures a UE with more than one serving cell to use DL PL for SL power control. Thus, there is a need to change the conditions on which these procedures in clauses 16.2.0, 16.2.1, and 16.2.3 can be applied. As proposed in [1], one way to modify the spec is to remove ‘of serving cell ’ in the first paragraph of these clauses and provide an explanation of ‘serving cell ’ in the context involving how the DL RS was determined.

***================proposed changes for S-SSB power control in [1] ===================***

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| 16.2.0 S-SS/PSBCH blocksA UE determines a power for an S-SS/PSBCH block transmission occasion in slot on active SL BWP of carrier ~~of serving cell~~ as [dBm]where- is defined in [8-1, TS 38.101-1] - is a value of *dl-P0-PSBCH* if provided; else, - is a value of *dl-Alpha-PSBCH*, if provided; else, - as described in clause 7.1.1 except that- the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell - the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell where serving cell is the serving cell on which the active SL BWP is located- is a number of resource blocks for a S-SS/PSBCH block transmission with SCS configuration  |

***================proposed changes for S-SSB power control in [1] ===================***

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| 16.2.1 PSSCHA UE determines a power for a PSSCH transmission on a resource pool in symbols where a corresponding PSCCH is not transmitted in PSCCH-PSSCH transmission occasion on active SL BWP of carrier ~~of serving cell~~ as: [dBm]where- is defined in [8-1, TS 38.101-1]- is determined by a value of *sl-MaxTransPower* based on a priority level of the PSSCH transmission and a CBR range that includes a CBR measured in slot [6, TS 38.214]; if *sl-MaxTransPower-r16* is not provided, then ;- if *dl-P0-PSSCH-PSCCH* is provided- [dBm]- else - [dBm]where- is a value of *dl-P0-PSSCH-PSCCH* if provided- is a value of *dl-Alpha-PSSCH-PSCCH*, if provided; else, - as described in clause 7.1.1 except that- the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell - the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell where serving cell is the serving cell on which the active SL BWP is located- is a number of resource blocks for the PSSCH transmission occasion and is a SCS configuration- if *sl-P0-PSSCH-PSCCH* is provided and if a SCI format scheduling the PSSCH transmission includes a cast type indicator field indicating unicast- [dBm]- else- [dBm]where- is a value of *sl-P0-PSSCH-PSCCH*, if provided - is a value of *sl-Alpha-PSSCH-PSCCH*, if provided; else, - , where- is obtained from a PSSCH transmit power per RE summed over the antenna ports of the UE, higher layer filtered across PSSCH transmission occasions using a filter configuration provided by *sl-filterCoefficient*, and- is a RSRP, as defined in [7, TS 38.215], that is reported to the UE from a UE receiving the PSCCH-PSSCH transmission and is obtained from a PSSCH DM-RS using a filter configuration provided by *sl-filterCoefficient*- is a number of resource blocks for PSCCH-PSSCH transmission occasion and is a SCS configuration The UE splits the power equally across the antenna ports on which the UE transmits the PSSCH with non-zero power.A UE determines a power for a PSSCH transmission on a resource pool in the symbols where a corresponding PSCCH is transmitted in PSCCH-PSSCH transmission occasion on active SL BWP of carrier ~~of serving cell~~  as [dBm]where is a number of resource blocks for the corresponding PSCCH transmission in PSCCH-PSSCH transmission occasion .The UE splits the power equally across the antenna ports on which the UE transmits the PSSCH with non-zero power. |

***================proposed changes for S-SSB power control in [1] ===================***

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| 16.2.3 PSFCHA UE with scheduled PSFCH transmissions, and capable of transmitting a maximum of PSFCHs, determines a number of simultaneous PSFCH transmissions and a power for a PSFCH transmission , , on a resource pool in PSFCH transmission occasion on active SL BWP of carrier ~~of serving cell~~ as- if *dl-P0-PSFCH* is provided, [dBm]where- is a value of *dl-P0-PSFCH* - is a value of *dl-Alpha-PSFCH*, if provided; else, - as described in clause 7.1.1 except that- the RS resource is the one the UE uses for determining a power of a PUSCH transmission scheduled by a DCI format 0\_0 in serving cell when the UE is configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell - the RS resource is the one corresponding to the SS/PBCH block the UE uses to obtain MIB when the UE is not configured to monitor PDCCH for detection of DCI format 0\_0 in serving cell where serving cell is the serving cell on which the active SL BWP is located- if - if , where is determined for PSFCH transmissions according to [8-1, TS 38.101-1]- and [dBm] - else- UE autonomously determines PSFCH transmissions with ascending priority order as described in clause 16.2.4.2 such that where  is a number of PSFCHs with priority value and is defined as - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 1, 2, …, , if any- zero, otherwiseand [dBm]where is defined in [8-1, TS 38.101-1] and is determined for the PSFCH transmissions- else- the UE autonomously selects PSFCH transmissions with ascending priority order as described in clause 16.2.4.2- if , where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1]- and [dBm] - else- the UE autonomously selects PSFCH transmissions in ascending order of corresponding priority field values as described in clause 16.2.4.2 such that where is a number of PSFCHs with priority value and is defined as - the largest value satisfying where is determined according to [8-1, TS 38.101-1] for transmission of all PSFCHs assigned with priority values 1, 2, …, , if any- zero, otherwise and [dBm] where is determined for the simultaneous PSFCH transmissions according to [8-1, TS 38.101-1] - else [dBm] where the UE autonomously determines PSFCH transmissions with ascending priority order as described in clause 16.2.4.2 such that and where is determined for the PSFCH transmissions according to [8-1, TS 38.101-1] |

## Company views on issue#1

Please kindly provide your views in the table below.

**Question 1-1: Do you agree that Issue#1 should be fixed?**

* **If no, please provide the reasons and your suggestions, if any.**

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| Company | Agree or not |  Comment |
| vivo | Agree | These procedures are intended to be applied to both IC and OoC cases, and the current specification limits them to IC only, so this issue should be corrected. |
| ZTE,Sanechips | Yes |  |
| OPPO | Agree | In previous version of TS38.213 (v16.5.0), the description of sidelink power saving is defined for both IC and OoC without differentiation. The current version (v16.6.0) excludes OoC case. The spec. should be corrected. |
| Intel | Agree |  |
| NTT DOCOMO | Agree |  |
| Huawei, HiSilicon | Agree | Yes, but this is not how it can be fixed. See Q1-2. |
| Ericsson | Agree |  |
| Nokia, NSB | Agree |  |
| Samsung | Agree |  |
| Sharp | Agree |  |
| LG | Agree |  |
| Qualcomm | Agree |  |
| CATT, GOHIGH | Agree |  |
| NEC | Yes |  |

**Question 1-2: Do you agree with the proposed changes of Issue#1?**

* **If no, please provide the reasons and your suggestions, if any.**

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| Company | Agree or not |  Comment |
| vivo | Agree |  |
| ZTE,Sanechips | Ok with the change |  |
| OPPO | Agree in principle | There are two direct ways to the resolve the issue, and either one is okay:1. **Alt 1**: Agree with moderator’s TP.
2. **Alt 2**: Keep the wording in current version of TS38.213, and add another clarification under subsection 16.2.0/16.2.1/16.2.3:

The power control procedures defined for S-SS/PSBCH blocks, PSSCH and PSFCH can be applied for OoC case in sidelink. |
| Intel | Agree |  |
| NTT DOCOMO | Agree |  |
| Huawei, HiSilicon | No. | It seems a problematic CR was agreed in the previous meeting, so we must be careful before making another hasty change to this same text.The issue with the proposed text is the introduction of a new definition of “serving cell c”, as “the serving cell on which the active SL BWP is located”, which seems to anyway try to define DL/UL quantities on a SL BWP which may be e.g. ITS band without the relevant quantities defined.Would it be simpler to split the case of OOC from IC more directly, for S-SSB and PSFCH e.g.:PS-SSB­ = PCMAX unless the active SL BWP is on a serving cell *c*, in which case: [dBm]<followed by the existing definitions, and with deletion of “of serving cell c” as in the original draft CR>And for PSSCH/PSCCH, we likewise delete “of serving cell c” as in the original draft CR, and add: when the active SL BWP is on a serving cell c, as described in clause 7.1.1 except that …Our point is to achieve the same goal, without (re-)defining the serving cell c, or trying to introduce it to SL ITS bands.[moderator-2021/08/17]Thank you for your comments, please check my response in the summary section |
| Ericsson | Agree |  |
| Nokia, NSB | Agree |  |
| Samsung | Agree with comments | In section 16.2.1; “A UE determines a power for a PSSCH transmission on a resource pool” the quantity includes suffix “c” should this this be changed to as we are deleting of “serving cell c” |
| Sharp | Agree |  |
| LG | Agree in principle | Rather than saying “located”, we prefer to use the expression “the active SL BWP is on a serving cell *c*”, as proposed by HW.  |
| Qualcomm | Please see comment | We support the wording proposed by Huawei for SSB and PSFCH. |
| CATT, GOHIGH | Agree | We share similar views as Huawei, it would be better to avoid redefining the serving cell c. |
| NEC | Agree  |  |

## Issue 2#: Correction on SL HARQ-ACK reporting for a SL BWP on ITS band

The current specification implies that type1 SL HARQ-ACK codebook-based reporting is **not allowed** for a SL BWP where the SL BWP is not configured in a particular service cell, which also includes ITS band case since the first sentence in section 16.5.1.1 of TS 38.213 (v.g60) specifies that the procedure and pseudo-code in 16.1.1.1 is applied ‘**For a SL BWP on a serving cell** ’. To be more specific, this statement prevents gNB from scheduling a mode-1 UE on the ITS band to report type1 SL HARQ-ACK codebook, **because the ITS carrier is not considered as ‘serving cell ’**.

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| 16.5.1.1 Type-1 HARQ-ACK codebook in physical uplink control channel**For a SL BWP on a serving cell** and an active UL BWP on the primary cell, as described in clause 12, a UE determines a set of occasions for candidate PSSCH transmissions with corresponding PSFCH reception occasions for which the UE can multiplex corresponding HARQ-ACK information in a PUCCH transmission in slot . The determination is based on: |

However, type1 SL HARQ-ACK codebook-based reporting for a SL BWP on ITS band should be supported for mode-1. There is a need to change the prerequisite conditions where these procedures and pseudocodes described in 16.1.1.1 can be applied. In [1], the following change is proposed to simply replace ‘on a serving cell ’ with ‘on a carrier’, which includes ITS band case.

***========================proposed changes in [1] ========================***

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| For a SL BWP on a carrier, ~~on a serving cell~~ and an active UL BWP on the primary cell, as described in clause 12, a UE determines a set of occasions for candidate PSSCH transmissions with corresponding PSFCH reception occasions for which the UE can multiplex corresponding HARQ-ACK information in a PUCCH transmission in slot . The determination is based on: |

## Company views on issue#2

Please kindly provide your views in the table below.

**Question 2-1: Do you agree that Issue#2 should be fixed (i.e., type1 SL HARQ-ACK codebook-based reporting for a SL BWP on ITS band should be supported for mode-1)?**

* **If no, please provide the reasons and your suggestions, if any.**

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| Company | Agree or not |  Comment |
| vivo | Agree | Mode-1 scheduling is supported for SL on ITS band, thus, type-1 SL HARQ-ACK reporting for SL transmission on ITS band should be allowed. |
| ZTE,Sanechips | Yes |  |
| OPPO | Agree | Similar view with Issue#1 that the latest update on the spec excludes ITS band. |
| Intel | Agree |  |
| NTT DOCOMO | Agree |  |
| Huawei, HiSilicon | Yes |  |
| Ericsson | Agree |  |
| Nokia, NSB | Agree |  |
| Samsung | Agree |  |
| Sharp | Agree |  |
| LG | Agree |  |
| Qualcomm | Yes |  |
| CATT, GOHIGH | Yes |  |
| NEC | Yes  |  |

**Question 2-2: Do you agree with the proposed changes of Issue#2?**

* **If no, please provide the reasons and your suggestions, if any.**

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| Company | Agree or not |  Comment |
| vivo | Agree | Since there is only one SL BWP on a carrier, ‘For a SL BWP on a carrier’ is sufficient to cover all relevant cases for SL HARQ-ACK reporting in mode-1. |
| ZTE,Sanechips | Ok with the change |  |
| OPPO | Agree in principle | Either alt is okay:1. **Alt 1**: Agree with moderator’s TP.
2. **Alt 2**: Another suggested TP for subsection 16.5.1.1 in TS38.213:

\*\*\*\*\*\*\*\*\*\*\*\*\*\*16.5.1.1 Type-1 HARQ-ACK codebook in physical uplink control channelFor a SL BWP on a serving cell and an active UL BWP on the primary cell or on a dedicated band, as described in clause 12, a UE determines a set of occasions for candidate PSSCH transmissions with corresponding PSFCH reception occasions for which the UE can multiplex corresponding HARQ-ACK information in a PUCCH transmission in slot . The determination is based on:\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* |
| Intel | Agree |  |
| NTT DOCOMO | Agree |  |
| Huawei, HiSilicon | Agree | We prefer not to introduce the “on a dedicated band” text. |
| Ericsson | Agree |  |
| Nokia, NSB | Agree |  |
| Samsung | Agree |  |
| Sharp | Agree |  |
| LG | Agree | In our understanding, RAN1 spec is described transparently for band(s).  |
| Qualcomm | Yes |  |
| CATT, GOHIGH | Agree |  |
| NEC  | Agree  |  |

**Summary**

Based on the first round of comments, 14 companies have provided feedback, all agreeing that issue#1 and issue#2 are valid and should be addressed.

* For the changes on issue#1:
	+ 10 companies are fine with the changes in [1] and one company pointed out that suffix “c” should be removed
	+ 3 companies would like to avoid redefining the serving cell c by using ‘when the active SL BWP is on a serving cell c’
	+ 2 companies support different changes to introduce DL PL-based power control part to ITS band case.
		- For PSSCH

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|  when the active SL BWP is on a serving cell c, as described in clause 7.1.1 except that … |

* + - For S-SSB and PSFCH

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| PS-SSB­ = PCMAX unless the active SL BWP is on a serving cell *c*, in which case: [dBm]<followed by the existing definitions, and with deletion of “of serving cell c” as in the original draft CR> |

Regarding the concerns on re-definition of serving cell c, the proposed change ‘when the active SL BWP is on a serving cell c’ is fine from the moderator’s perspective and has been incorporated into the draft CR. suffix “c” have been removed.

While regarding the comments of introducing DL pathloss-based power control part to ITS band case, moderator recalled a similar discussion in [104b-e-NR-5G\_V2X-01] and it was confirmed during the discussion that there is no need to consider DL RS for DL pathloss for SL power control on the ITS band since the main purpose of DL pathloss-based SL power control is to control the interference from SL to the Uu side on the licensed carrier. Moreover, even with the proposed changes, the term ‘serving cell c’ still excludes the ITS band case since the ITS carrier **is not a serving cell**.

Considering that the deadline is approaching (August 18), the problems of power control for PSSCH and S-SSB/PSFCH in the current spec are similar, and the majority are fine with proposed changes in [1], moderator suggests applying the refined wording ‘when the active SL BWP is on a serving cell c’ to PSSCH, S-SSB and PSFCH to have a consistent spec with limited and simple changes.

* For the changes on issue#2:
	+ All companies agreed that the changes proposed in [1] were acceptable and on top of that a draft CR was prepared and uploaded by the moderator to the folder for final check.

**Reference**

1. R1-2107980, Clarification on UE behaviour in out of coverage case, vivo