3GPP TSG RAN WG1 #108-e R1-220xxxx

e-Meeting, February 21st - March 3rd, 2022

**Source: Moderator (Nokia)**

**Title:** **Summary of [108-e-R16-V2X-07] Corrections on SL timing (R1-2202357)**

**Agenda item: 7.2.4**

**Document for: Discussion and Decision**

# Introduction

The document is to collect companies’ views and provide a summary for the email discussion thread:

[108-e-R16-V2X-07] Corrections on SL timing; considering R1-2202357.

# Round#1 discussion

## Editorial changes

In R1-2202357 it is proposed to add to the clause 2 of 38.211 the following references:

[12] 3GPP TS 38.133: "NR; Requirements for support of radio resource management”

[13] 3GPP TS 38.304: “NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state”

Also, it is proposed the add serial numbers to the references in the text i.e.

 [12, TS 38.133] and [13, TS 38.304]

**Question 1: Do you agree that the changes should be adopted? If no, please provide the reasons and suggestions, if any.**

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| --- | --- |
| **Company** | **Views** |
| Intel | Agree, subject to resolution of Q2 and Q3 which use these references. |
| Qualcomm | Yes |
| Samsung | Agree with the changes. |
| OPPO | Agree  |
| LG Electronics | See our comments in Q 2/3 (i.e., no changes are preferred). |
| Sharp | Agree |
| Ericsson | OK |
| ZTE, Sanechips | Agree |
| CATT, GOHIGH | Agree |
| Huawei, HiSilicon | Agree. |
| NEC | Agree |
| Nokia, Nokia Shanghai Bell | Agree |

## Timing offset in the serving cell

The draft CR proposes the following changes:

In a serving cell fulfilling the S criterion according to clause 8.2 of [13, TS 38.304]

- The timing of reference radio frame $i$ equals that of downlink radio frame $i$ in the cell with the same uplink carrier frequency as the sidelink and

- $N\_{TA,offset}$ is given by clause 7.1.2 of [12, TS 38.133] ,

The first change (In a serving cell fulfilling the S criterion …) is intended to clarify that the *NTA,offset* value specified for UL transmissions is only applicable in the case when SL transmission takes place in the UL carrier. If UE has a serving cell fulfilling S criterion but SL transmissions take place in the dedicated SL carrier, then *NTA,offset* = 0 as specified in “Otherwise” section.

The second change proposes to refer to UL timing clause of 38.133 instead of 38.211 to obtain *NTA,offset* values. (In LTE, 36.211 included *NTA,offset* values but in NR specifications values are given in 38.133).

**Question 2: Do you agree that the changes should be adopted? If no, please provide the reasons and suggestions, if any.**

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| --- | --- |
| **Company** | **Views** |
| Intel | Agree. In our understanding, there are cases when a UE has a serving cell, but uses ITS spectrum, which are not covered by current spec version. |
| Qualcomm | We agree with the first change “In a serving cell fulfilling the S criterion according to clause 8.2 of [13, TS 38.304]” We don’t think the second change is necessary. Existing specification was clear in that it referred to 38.211 🡪 38.213 (where the RRC parameter was noted) 🡪 38.133 (when RRC parameter is not configured). With the change, the reference becomes 38.133 then based on the note in the table (when RRC parameter is configured) 🡪 38.213 (where the RRC parameter was noted). |
| Samsung | First change is not strictly needed. It should be clear when we say “If the UE has a serving cell …” the description applies to the serving cell.The second change is fine. |
| OPPO | Generally we agree with the intention of the change in the main bullet. The case of SL in dedicated carrier ($N\_{TA,offset}=0) $should belong to otherwise branch. While the wording “in a serving cell” may be also confusing. We suggest the wording below which follows the same description method as in 12.3.1.1 in 38.133.“If the UE is in-coverage with a serving cell on a NR sidelink carrier ”For the change in the second sub-bullet, we agree with QC that it is not necessary.  |
| LG Electronics | **1st change**: Our understanding is that the current specification supports a case where the reference timing of SL Tx/Rx in ITS dedicated carrier is the timing of UE’s serving cell fulfilling S criterion in Licensed carrier. For this case, applying NTA,offset value of UL Tx in Licensed carrier to SL Tx/Rx in ITS dedicated carrier could be reasonable in terms of ensuring the frame (or slot) boundary alignment between UL Tx and SL Tx from the point of view of a single UE. By dosing, the serving cell can efficiently control/decide the overlap between UL Tx and SL Tx for the UE. Note that when UL Tx and SL Tx overlap in time, the transmit power of the UE is split between them. So, we have a concern on the intention of 1st change, and prefer not to do it**2nd change**: We tend to agree with Qualcomm’s comment, and 2nd change is not needed. |
| Sharp | Agree with both changes and reasoning from Moderator. |
| NTT DOCOMO | Same view with QC. |
| Ericsson | We agree with the changes |
| Vivo | **1st change**: We don’t think this change is needed. Please note that in the sub bullet the spec says “… in the cell with the same uplink carrier frequency as the sidelink”. Here it clearly refers to ***the cell*** in the mail bullet that the UE has and fulfilling the S criterion. Thus, there should not be any confusion here.**2nd change**: We tend to agree with Qualcomm and others that the 2nd change is not needed either. |
| ZTE, Sanechips | Same view as QC, the 2nd change is not necessary. |
| CATT, GOHIGH | For the 1st change, we share similar views as vivo, the 1st sub-bullet has said that this is only for the case when sidelink is the same as UL carrier frequency. Therefore, we think it is not necessary.For 2nd change, we are ok to directly refer to 38.133. |
| Huawei, HiSilicon | On the first change, the point is how to interpret the wording “if the UE has a serving cell…”. It can be understood as the UE has SL transmission in the UL carrier, then the reference timing is determined as …. However, if it is changed to “In a serving cell… ” , there would be an ambiguous case that “Although the UE camps in a serving cell fulfilling S criterion, its SL transmissions take place in the dedicated SL carrier, then the downlink timing is used”. So we prefer not to have such a change.On the second change, we share with others that it is not needed. The reference logic in the spec is clear. |
| NEC | For the first change, we’re fine with the intention.For the second change, we can both OK with change or not. |
| Nokia, Nokia Shanghai Bell | 1st change: We think that the clarification is needed. The interpretation presented by LG (*NTA,offset* ≠ 0 supported in the dedicated SL carrier) may be possible based on the current text. However, we think that it is not the intention of the specification. The wording used in 38.133 and proposed by OPPO is also fine for us.2nd change: We think that default values of *NTA,offset* and possibility to use parameter n-TimingAdvanceOffset can be found 38.133. It is not necessary to look at 38.211 and then 38.213. |

## Timing in the dedicated SL carrier

The draft CR proposes the following changes:

Otherwise

- The timing of reference radio frame *i* and $\_{}$ are given by clause 12.2.2, 12.2.3, 12.2.4 or 12.2.5 of [12, TS 38.133]

$\_{}$

The implicit obtaining of timing of reference radio frame from 38.213 is ambiguous because clause 4.2 of 38.213 defines UL timing w.r.t DL timing but e.g., in the case of GNSS as the timing reference, it is not clear if clause 4.2 of 38.213 is relevant. In addition, because *NTA,offset* values for UL are not specified in 38.211 but in 38.133 it is proposed that the same practice is applied to SL as well.

**Question 3: Do you agree that the changes should be adopted? If no, please provide the reasons and suggestions, if any.**

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| --- | --- |
| **Company** | **Views** |
| Intel | Agree. We also suggest to simply refer to parent 12.2 clause which contains all the referred subclauses. |
| Qualcomm | We don’t think the change is necessary. Existing specification text was clear and directly stated that NTA,offset = 0. |
| Samsung | OK with the changes. |
| OPPO | Agree  |
| LG Electronics | Since there is no critical problem on interpreting the correction operation even with the current specification, we prefer not to do it. |
| Sharp | Agree with the changes. |
| NTT DOCOMO | Agree |
| Ericsson | OK |
| vivo | We agree with the changes of the references fixing part.However, we don’t agree with the change of NTA,offset. The current spec is clear regarding NTA,offset = 0.  |
| ZTE, Sanechips | Same view as vivo, it is a more straight way to set NTA,offset = 0. |
| CATT, GOHIGH | Similar views as vivo, OK to directly refer to 38.133, and prefer to keep NTA,offset = 0 |
| Huawei, HiSilicon | We do not think the change on reference is very crucial, even without changes, the UE does not implement wrongly. The deleting of NTA,offset is not needed. It would be more straightforward and not misleading to directly define $N\_{TA,offset}=0$ here. |
| NEC | Ok |
| Nokia, Nokia Shanghai Bell | We prefer to add reference to 38.133. Current text was intended to be just a placeholder until better formulation is agreed. We agree that NTA,offset = 0 is correct statement but the point is that NTA,offset values are specified in RAN4 documents.  |

# Round#2 discussion

## NTA,offset value definition

Clause 8.5 of 38.211 refers to 38.133 and 38.211 to obtain NTA,offset value and also explicitly defines the value as highlighted below.

8.5 Timing

Transmission of a sidelink radio frame number $i$ from the UE shall start $(N\_{TA,SL}+N\_{TA,offset})∙T\_{c}$ seconds before the start of the corresponding timing reference frame at the UE. The UE is not required to receive sidelink or downlink transmissions earlier than the value of $N\_{TA,offset}$, which is given in [TS 38.133], after the end of a sidelink transmission.

For sidelink transmissions:

If the UE has a serving cell fulfilling the S criterion according to clause 8.2 of [TS 38.304]

- The timing of reference radio frame $i$ equals that of downlink radio frame $i$ in the cell with the same uplink carrier frequency as the sidelink and

- $N\_{TA,offset}$ is given by clause 4.3.1 of [TS 38.211],

Otherwise

- The timing of reference radio frame *i* is implicitly obtained from clause 4.2 of [TS 38.213] and

- $N\_{TA,offset}=0$.

It seems that for UL NTA,offset values are specified in 38.133, so in the draft CR it was proposed to keep the reference to 38.133 and further specify which clauses of 38.133 are relevant in different cases. Another option could be to delete reference to 38.133. The 3rd option could be not to change anything.

**Question 1: Do you think that NTA,offset value definition/reference should be clarified in the clause 8.5 of 38.211?**

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| --- | --- |
| **Company** | **Views** |
| OPPO | Yes.  |
| vivo | No.The 1st highlighted part is correct, which is defined for reception perspective.For the 2nd highlighted part, we tend to agree with Qualcomm’s analysis that the current reference is correct.For the 3rd highlighted part, the current spec is clear regarding NTA,offset = 0, no need to change. |
| NTT DOCOMO | Same view with vivo. |
| ZTE, Sanechips | Same view with vivo. |

## NTA,offset determination when UE has a serving cell fulfilling the S criterion

There seems to be different views if the change in the draft CR should be agreed:

In a serving cell fulfilling the S criterion according

The following options could be considered:

* Option 1: Adopt the change proposed in the draft CR
* Option 2: The wording of the change is improved e.g. as proposed by OPPO
* Option 3: No change to 38.211.
	+ If 38.211 is not changed do you agree with the interpretation/comment from LG so that *NTA,offset* ≠ 0 is supported in the dedicated SL carrier

**Question 2: Which of the options above should be selected?**

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| --- | --- |
| **Company** | **Views** |
| OPPO | Option 2 is preferred. It uses the same description as 38.133 which is more clear and not controversial. BTW, for option 3, we have different understanding with LGE. According to the description in 12.1 and 12.2.3 in 38.133 (copied below), in case of SL and UL on different carriers and UE has a serving cell,  = 0. 12.1 IntroductionThis clause contains the requirements for the UE capable of V2X sidelink communication when the UE is out of coverage on the carrier used for V2X sidelink operation, as defined in TS 38.304 [1]. The requirements apply when the UE is:- in any cell selection state, or,- configured for V2X SL operation on a V2X carrier which is dedicated to only V2X SL operation and configured with only a PCell on WAN carrier.12.2.3 NR Cell as synchronization reference sourceThe requirements in this subclause are applicable when the reference timing used for sidelink transmissions is a NR serving cell on a non-V2X sidelink carrier.The sidelink transmissions takes place  before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell, where  = 0 and=0. |
| vivo | Option 3, while in our view, in the dedicated SL carrier  = 0.Note that Option 2 has a problem as “in-coverage” is something not defined in 211. |
| NTT DOCOMO | Either Option 1 or Option 2. |
| ZTE, Sanechips | Prefer Option 1 and accept Option 2. |

## Reference radio frame definition

The wording: “The timing of reference radio frame i is implicitly obtained from 36.213” was originally included in the LTE specification as placeholder until better formulation is agreed. RAN4 has now defined timing definitions for different SL cases (GNSS, eNB, gNB, SyncRef UE) so in the draft CR it was proposed to change the reference to 38.133 which seems to be more relevant than 38.213:

Otherwise

- The timing of reference radio frame *i* is given by clause 12.2.2, 12.2.3, 12.2.4 or 12.2.5 of [12, TS 38.133]

**Question 1: Do you think that reference should be changed from 38.213 to 38.133?**

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| --- | --- |
| **Company** | **Views** |
| OPPO | Agree. Prefer to clarify that.  |
| vivo | OK. |
| NTT DOCOMO | OK |
| ZTE, Sanechips | OK. |

# Conclusion

# References

1. R1-2202357 Draft CR on corrections on SL timing Nokia, Nokia Shanghai Bell