**3GPP TSG RAN WG1 #110 R1-22NNNNN**

**Toulouse, France, August 22nd – 26th, 2022**

**Source: Moderator (Ericsson)**

**Agenda item: 8.5**

**Title: Summary of discussion on LS on timing advance (TADV) report mapping for NR UL E-CID positioning**

**Document for:**  **Discussion and Decision**

# Introduction

This document presents a summary of the LS discussion triggered by the following in the Chair’s notes:

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| [R1-2206348](file:///C%3A%5CUsers%5Cyouns%5COneDrive%5CDocuments%5C3GPP%5CRAN1%20tdocs%5CTSGR1_110%5CDocs%5CR1-2206348.zip) Discussion on timing advance (TADV) report mapping for NR UL E-CID positioning CATT🡺 Check if RAN1 specification need updated and/or response LS is needed. Discuss under agenda item 8.5. Moderator: Florent (Ericsson). |

The following documents are considered in this discussion:

[**R1-2205712**](file:///C%3A%5CUsers%5Cyouns%5COneDrive%5CDocuments%5C3GPP%5CRAN1%20tdocs%5CTSGR1_110%5CDocs%5CR1-2205712.zip) LS on timing advance (TADV) report mapping for NR UL E-CID positioning RAN4, Ericsson

[R1-2206348](file:///C%3A%5CUsers%5Cyouns%5COneDrive%5CDocuments%5C3GPP%5CRAN1%20tdocs%5CTSGR1_110%5CDocs%5CR1-2206348.zip) Discussion on timing advance (TADV) report mapping for NR UL E-CID positioning CATT

[R1-2206367](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206367.zip) Correction on the definition of timing advance (TADV) CATT

[R1-2205807](file:///C%3A%5CUsers%5Cyouns%5COneDrive%5CDocuments%5C3GPP%5CRAN1%20tdocs%5CTSGR1_110%5CDocs%5CR1-2205807.zip) Correction to timing advance [NRTADV] Huawei, HiSilicon

**Contact information**

**To facilitate remote discussions, companies are kindly requested to provide an email address for the delegate handling this discussion.**

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# Discussion

##  LS on Timing advance and correction to timing advance definitions

### Background

In [1], RAN1 received an LS regarding the timing advance measurement report mapping. In this LS, RAN4 says it is up to RAN1 to judge if this has any impact on RAN1 specifications.

in [2], the following changes to the timing advance definition is proposed.

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| **Definition** | Timing advance (TADV) is defined as the time difference TADV = (TgNB-RX –TgNB-TX) + NTA offset,Where:TgNB-RX is the Transmission and Reception Point (TRP) [18] received timing of subframe #*i* containing PRACH transmitted from UE, defined by the first detected path in time. TgNB-TX is the TRP transmit timing of subframe #*j* that is closest in time to the subframe #*i* received from the UE.NTA offset is based on the information *n-TimingAdvanceOffset* as specified in TS 38.331 [8].The detected PRACH is used to determine the start of one subframe containing that PRACH.The reference point for TgNB-RX shall be:- for type 1-C base station TS 38.104 [9]: the Rx antenna connector,- for type 1-O or 2-O base station TS 38.104 [9]: the Rx antenna (i.e. the centre location of the radiating region of the Rx antenna),- for type 1-H base station TS 38.104 [9]: the Rx Transceiver Array Boundary connector.The reference point for TgNB-TX shall be:- for type 1-C base station TS 38.104 [9]: the Tx antenna connector,- for type 1-O or 2-O base station TS 38.104 [9]: the Tx antenna (i.e. the centre location of the radiating region of the Tx antenna),- for type 1-H base station TS 38.104 [9]: the Tx Transceiver Array Boundary connector. |

The first change is to include the TA offset that is present in the definition of timing advance in the LS from RAN4 in [1]. The second change is to make the measurement relative to the closest subframe, instead of the closest downlink subframe.

In [3], it is proposed to, instead of changing the definition of the measurement, add a note reflecting the LS from RAN4:

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| **Proposal 1: The following NOTE in the RAN4’s LS R1-2205712(R4-2211167) should be added into the definition of TADV in TS 38.215:*** **NOTE:For report mapping, the TADV is equal to (gNB Rx – Tx time difference) + NTA\_offset, where NTA\_offset is based on the information n-TimingAdvanceOffset as specified in TS 38.331.**
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The draft CR reflecting the proposal in [3] is available in [4] as follow:

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| **Definition** | Timing advance (TADV) is defined as the time difference TADV = (TgNB-RX –TgNB-TX),Where:TgNB-RX is the Transmission and Reception Point (TRP) [18] received timing of uplink subframe #*i* containing PRACH transmitted from UE, defined by the first detected path in time. TgNB-TX is the TRP transmit timing of downlink subframe #*j* that is closest in time to the subframe #*i* received from the UE.The detected PRACH is used to determine the start of one subframe containing that PRACH.The reference point for TgNB-RX shall be:- for type 1-C base station TS 38.104 [9]: the Rx antenna connector,- for type 1-O or 2-O base station TS 38.104 [9]: the Rx antenna (i.e. the centre location of the radiating region of the Rx antenna),- for type 1-H base station TS 38.104 [9]: the Rx Transceiver Array Boundary connector.The reference point for TgNB-TX shall be:- for type 1-C base station TS 38.104 [9]: the Tx antenna connector,- for type 1-O or 2-O base station TS 38.104 [9]: the Tx antenna (i.e. the centre location of the radiating region of the Tx antenna),- for type 1-H base station TS 38.104 [9]: the Tx Transceiver Array Boundary connector.NOTE: For report mapping, the TADV is equal to (gNB Rx – Tx time difference) + NTA\_offset, where NTA\_offset is based on the information *n-TimingAdvanceOffset* as specified in TS 38.331 [8]. |

### First round Discussion

We should discuss whether the RAN4 decision has an impact on the RAN1 specification, and if so, whether the proposed correction in the CRs in [2] or [4] is the appropriate change.

Companies are encouraged to give their view on

* What should be the reply LS to RAN4, if any
* Whether the CR in [2] should be endorsed, or if the note proposed in [3] is sufficient and CR in [4] should be endorsed.

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| Company | Comment |
|  Huawei, HiSilicon | No need for the LS.We think that the change to TS 38.215 is needed. Proposal [2] can be endorsed. |
| CATT | We also have a related CR in [R1-2206367](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206367.zip), which also changes the definition of Timing advance (TADV) in 38.215.We prefer this CR as the impact on the RAN1 specs from the LS from RAN4.FL: sorry for missing this CR in the list of related documents. I added the CR in the proposal in red text.

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| **Definition** | Timing advance (TADV) is defined as the time difference TADV = (TgNB-RX –TgNB-TX),Where:TgNB-RX is the Transmission and Reception Point (TRP) [18] received timing of uplink subframe #*i* containing PRACH transmitted from UE, defined by the first detected path in time. TgNB-TX is the TRP transmit timing of downlink subframe #*j* that is closest in time to the subframe #*i* received from the UE.The detected PRACH is used to determine the start of one subframe containing that PRACH.The reference point for TgNB-RX shall be:- for type 1-C base station TS 38.104 [9]: the Rx antenna connector,- for type 1-O or 2-O base station TS 38.104 [9]: the Rx antenna (i.e. the centre location of the radiating region of the Rx antenna),- for type 1-H base station TS 38.104 [9]: the Rx Transceiver Array Boundary connector.The reference point for TgNB-TX shall be:- for type 1-C base station TS 38.104 [9]: the Tx antenna connector,- for type 1-O or 2-O base station TS 38.104 [9]: the Tx antenna (i.e. the centre location of the radiating region of the Tx antenna),- for type 1-H base station TS 38.104 [9]: the Tx Transceiver Array Boundary connector.NOTE: For report mapping, the TADV is equal to (gNB Rx – Tx time difference) + NTA\_offset, where NTA\_offset is based on the information *n-TimingAdvanceOffset* as specified in TS 38.331 [8]. |

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| vivo | We are fine with the version in the CATT reply and agree with Huawei that no need for the LS |
|  NTT DOCOMO | Regarding first bullet, we think reply LS is not necessary.Regarding second bullet, in our view, the current description of timing advance definition is clear. However, if the majority of companies need the CR, we can accept the modification. In this case, we believe adding note proposed in [3] is sufficient. |
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Conclusions

TBD

References

1. R1-2205712 LS on timing advance (TADV) report mapping for NR UL E-CID positioning, RAN4, Ericsson
2. R1-2205807 Correction to timing advance [NRTADV], Huawei, HiSilicon
3. R1-2206348 Discussion on timing advance (TADV) report mapping for NR UL E-CID positioning, CATT
4. [R1-2206367](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110/Docs/R1-2206367.zip) Correction on the definition of timing advance (TADV) CATT