3GPP TSG-RAN WG2 Meeting #115e R2-2108897

Online, 16th - 27th August, 2021

**Agenda item: 8.10.2.1**

**Source: CATT**

**Title: [draft] Report of [AT115-e][106][NTN] RACH aspects (CATT)**

**Document for: Discussion and Decision**

# 1 Introduction

This document will continue to discuss companies’ views regarding the RACH aspects in 2nd round:

* [AT115-e][106][NTN] RACH aspects (CATT)

Updated scope: Continue the discussion on p1, p2 and (updated) p6 from R2-2108882, as well as on remaining FFSs in the agreements.

Intended outcome: Summary of the offline discussion with e.g.:

* + -  List of proposals for agreement (if any)
    -  List of proposals for further discussion
    -  List of proposals that should not be pursued (if any)

Updated deadline (for companies' feedback): Monday 2021-08-23 1400 UTC

Updated deadline (for rapporteur's summary in R2-2108897): Monday 2021-08-23 1600 UTC

Proposals marked "for agreement" in R2-2108897 not challenged until Tuesday 2021-08-24 0800 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online during the CB session).

Status: Ongoing

# Summary

## What content of information about UE specific TA in connected mode

**Question 1: Which option of content of UE specific TA in connected mode do you prefer, under the Work assumption?**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 1:**

|  |  |  |
| --- | --- | --- |
| **Which option of content of UE specific TA in connected mode do you prefer, under the Work assumption?**  **Option 1. UE specific TA pre-compensation; Option 2. UE position ; Option 3. Other** | | |
| Option 1 | Option 2 | Other |
| 13 | 3 | 1 |

**Option 1 (13/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Qualcomm, LG, vivo, OPPO, ZTE, InterDigital, ETRI, NEC

**Option 2 (3/17)**: Nokia, Ericsson, Intel

**Other (1/17)**: Apple

It seems option 1- UE specific TA pre-compensation can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 1: The content of** **UE specific TA reported in connected mode is UE specific TA pre-compensation (13/17), FFS the UE position (3/17).**

## 2.2 How to report the information about UE specific TA in connected mode

**Question 2: Which option do you prefer to report UE specific TA pre-compensation in connected mode, under the work assumption?**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 2:**

|  |  |  |
| --- | --- | --- |
| **Which option do you prefer to report UE specific TA pre-compensation in connected mode, under the work assumption?**  **Option 1. RRC signalling; Option 2. MAC CE** | | |
| Option 1 | Option 2 | Other |
| 3 | 13 | 1 |

**Option 1 (3/17)**: Nokia, OPPO, Ericsson

**Option 2 (13/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Qualcomm, LG, vivo, ,ZTE, InterDigital, ETRI, Intel, NEC

**Other (1/17)**: Apple

It seems option 2 can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 2: The UE reports information about UE specific TA in connected mode using a MAC CE (13/17).**

## 2.3 The trigger conditions of UE specific TA reporting in connected mode

### Network control method

**Question 3: which option(s) do you prefer to report the information about UE specific TA, under the work assumption?**

**Option 1: UE specific TA report can be requested by network;**

**Option 2: Periodical reporting of the information about UE-specific TA report;**

**Or none?**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 3:**

|  |  |  |
| --- | --- | --- |
| **which option(s) do you prefer to report the information about UE specific TA, under the work assumption?**  **Option 1: UE specific TA report can be requested by network;**  **Option 2: Periodical reporting of the information about UE-specific TA report;**  **Or none?** | | |
| Option 1 | Option 2 | None |
| 11 | 5 | 5 |

**Option 1 (11/17)**: MediaTek, Lenovo, CATT, Xiaomi, LG, vivo, OPPO, InterDigital, Ericsson, ZTE, Intel, Qualcomm

**Option 2 (5/17)**: CATT, LG, vivo, OPPO, ZTE

**Other (5/17)**: Huawei, HiSilicon, Apple, Nokia, ETRI, NEC

It seems there is no majority in the table. Based on company feedback, the following is proposed:

**Proposal 3: FFS UE specific TA report can be requested by network (11/17).**

### Event triggered method

* **TA values aspect**

**Question 4: Do you agree that the event-triggers for reporting information about UE specific TA are based on TA value?**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 4:**

|  |  |
| --- | --- |
| **Do you agree that the event-triggers for reporting information about UE specific TA are based on TA value?** | |
| Yes | No |
| 15 | 0 |

**Yes (17/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Nokia, Qualcomm, LG, vivo, OPPO, ZTE, InterDigital, ETRI, Ericsson, Intel, NEC

**No(0/17)**

It seems Yes can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 4: The event-triggers for reporting information about UE specific TA are based on TA values (17/17).**

**Question 5: if you agree with Q4, do you agree an offset threshold can be used based on between current TA and the last reported TA?**

**Out of 15 responding companies, the following table presents a summary of responses regarding Question 5:**

|  |  |  |
| --- | --- | --- |
| **If you agree with Q4, do you agree an offset threshold can be used based on between current TA and the last reported TA** | | |
| Yes | No | other |
| 13 | 3 | 1 |

**Yes (13/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Intel, NEC

**No(3/17)**: Nokia, OPPO, Ericsson

**Other (1/17)**: ZTE

It seems Yes can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 5: An TA offset threshold can be used for event-triggered reporting, at least the offset threshold can be between current information about UE specific TA and the last successfully reported information about UE specific TA (13/17).**

**Proposal 5a: Threshold used between Koffset configured by NW and UE’s current TA can be FFS for the next meeting.**

**Question 6: if you agree with Q4, do you agree that the offset threshold also can be**

**Option 1: an offset when going towards lower TA values;**

**Option 2: an offset when going towards higher TA values;**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 6:**

|  |  |  |
| --- | --- | --- |
| **If you agree with Q4, do you agree that the offset threshold also can be**  **Option 1: an offset when going towards lower TA values;**  **Option 2: an offset when going towards higher TA values** | | |
| Both | Neither | Other |
| 5 | 8 | 4 |

**Both (5/17)**:MediaTek, Lenovo, vivo, Ericsson, NEC

**No(8/17)**: Huawei, HiSilicon, Xiaomi, Apple, Nokia, LG, OPPO, InterDigital, ETRI

**Other (4/17)**: CATT, Qualcomm, ZTE, Intel

It seems there is no majority in the table. Based on company feedback, the following is proposed:

**Proposal 6: Further discuss the two proposals:**

* **The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards lower TA values. [2]**
* **The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards higher TA values. [2]**
* **Time threshold aspect**

**Question 7: Do you agree that event-triggers for reporting information about UE specific TA also can be based a time threshold?**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 7:**

|  |  |  |
| --- | --- | --- |
| **Do you agree that event-triggers for reporting information about UE specific TA also can be based a time threshold?** | | |
| Yes | No | Other |
| 1 | 15 | 1 |

**Yes(1/17):** Ericsson

**No (15/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Nokia, OPPO, ZTE, NEC

**Other(1/17) :**Intel

It seems “No” can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 7: The event-triggers for reporting information about UE specific TA based on time threshold is not supported in NTN (15/17).**

* **event-trigger configuration**

**Question 11: Do you agree that the network may configure more than one event-triggers for reporting the information about UE specific TA?**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 11:**

|  |  |
| --- | --- |
| Do you agree that the network may configure more than one event-triggers for reporting the information about UE specific TA? | |
| No | Other |
| 15 | 2 |

**No(14/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Nokia, OPPO, NEC

**Other(3/17):** Ericsson, Intel, ZTE

It seems the question 11 is not what proponent proposed. So the candidate proposal should be clarified and discussed again.

**Proposal 8: Further discuss the network may configure a number of TA levels that triggers reporting of information about UE specific TA pre-compensation.**

## 2.4 UE specific TA reporting in RA procedure

**Question 12: Is a new indication in RRC reconfiguration needed with sync to configure the UE to report information about UE specific TA in handover procedure (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell)?**

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 12:**

|  |  |  |
| --- | --- | --- |
| **Is a new indication in RRC reconfiguration needed with sync to configure the UE to report information about UE specific TA in handover procedure (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell)?** | | |
| Yes | No | FFS |
| 1 | 15 | 1 |

**Yes(1/17):** Ericsson

**No(15/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Nokia, OPPO, ZTE,NEC

**FFS(1/17)**: Intel

It seems “No” can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 9: No new indication in RRC reconfiguration with sync is needed to configure the UE to report information about UE specific TA in handover procedure (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell) (15/17).**

# 3 Discussion

At RAN2#113bis-e the reporting of TA was discussed with the following agreements

1. At least for uplink scheduling adaptations, the UE may report information about the UE specific TA pre-compensation. The exact information and frequency of reports depend on RAN1 outcome. FFS on when/how to report.

* [Post113bis-e][000] “It is FFS whether the UE reports the UE specific TA pre-compensation at the RACH procedure (MSG3 or MSG5) using a MAC CE. Actual content is FFS and also depends on further RAN1 input. Configurability is FFS”

Further at RAN2#114 the following was agreed

Agreement:

1. If enabled by the network, the UE reports information about UE specific TA pre-compensation at the random access procedure (MSGA/MSG3 or MSG5) using a MAC CE. Actual content is FFS and also depends on further RAN1 input (we can revise this whole agreement if RAN1 come to a different conclusion in terms of what needs to be conveyed to the NW)

From the online discussion of RAN2 #115-e meeting, the agreement regarding UE specific TA reporting was achieved as following:

Agreements:

1. UE specific TA reporting during RACH procedure is enabled/disabled by SI (FFS for RACH in connected mode)

The agreements via email at RAN2#115-e are listed as following

|  |
| --- |
| **Agreements via email - from offline 106:**  1.     The content of UE specific TA pre-compensation reported in RA procedure using MAC CE is UE specific TA (this can be revisited after receiving RAN1 response).  2.     Reporting on the information about UE specific pre-compensation in connected mode is supported, FFS via RRC signalling or MAC CE  3.     Event-triggers for reporting on the information about UE specific TA in connected mode is supported. FFS on the details. Confirmation by RAN1 is also needed  4.     If configured, the UE shall report information of the UE specific TA pre-compensation to the target cell during the random access. FFS if a new indication in RRC reconfiguration with sync is needed or not (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell).  5.    Information about UE specific TA pre-compensation is not reported in RA procedures triggered due to “Request for Other SI” |

## 3.1 What content of information about UE specific TA in connected mode

**Work assumption: It is agreed to support reporting on the information about UE specific TA in connected mode.**

Based on the work assumption above, RAN2 will further discuss the content of UE specific TA, e.g. UE specific TA pre-compensation or UE position.

We list the main views of two methods provided by companies in first round for your information to take into consideration.

**Views of reporting UE specific TA:**

* UE specific TA is straightforward;
* UE specific TA is more useful for NW’s scheduling adaption;
* If network has UE location, there is no need to report TA. But TA report should belong to TA associated with UL scheduling, Network may need this fast information via MAC CE.

**Views of reporting UE position:**

* The UE position will facilitate the NW to predict TA change, thus minimize the Uu signalling
* UE position shall be reported by RRC signalling.
* With UE position, network can calculate UE-specific TA and UE position is quite amenable to event trigger.

Rapporteur’s comments:

The UE position discussed in LCS aspect offline #102 may also applies to UE specific TA because the coarse UE location is just ~2km. Any UE specific TA (from UE to reference/satellite) within 2km radius already works smoothly for gNB scheduling.

Therefore, the rapporteur suggests discussing the following question

|  |  |  |
| --- | --- | --- |
| **Question 1: Which option of content of UE specific TA in connected mode do you prefer, under the Work assumption?**  **Option 1. UE specific TA pre-compensation; Option 2. UE position ; Option 3. Other** | | |
| **Company** | **Option1/2/3** | **Comment** |
| Huawei, HiSilicon | Option 1 | Reporting UE position may have security concerns and is dependent on SA3 reply. Besides, the motivation for this reporting is to facilitate scheduling, and UE specific TA can serve this purpose well. |
| MediaTek | Option 1 | UE specific TA pre-compensation is simple and has no potential security issues. |
| Lenovo | Option 1 | TA reporting could be of less size and can be directly used for scheduling. |
| CATT | Option 1 |  |
| Xiaomi | Option 1 |  |
| Apple | Option 3 | Reporting TA has the same security concerns as directly reporting UE position. We do not understand what advantage the network will have when 100s of UEs RACHing will start reporting their TA for network to process. We should wait for RAN1 decision on this before continuing. Additionally, this should strictly be limited to at most 1 depending on if the UE wants to report it or not. |
| Nokia | Option 2 | Agree with Rapporteur’s comments in the description. In the email discussion *“[AT115-e][102][NTN] LCS aspects (Qualcomm)”,* RAN2 agreed a working assumption: “*Event triggered-based UE location reporting are configured by gNB to obtain UE location update of mobile UEs in RRC\_CONNECTED*” . This means, for a UE in RRC Connected, NW can achieve UE’s location based on event. With UE’s location and satellite ephemeris data, NW can estimate the UE’s UE-gNB RTT (i.e. UE-specific TA). This is same as what UE can do before UE’s initial access to decide offset (i.e. UE-gNB RTT) for RAR timer start.  If the NW predicted UE-specific TA can be used for gNB scheduling, we don’t see the reason why UE should report the UE estimated TA again with the cost of Uu interface. |
| Qualcomm | Option 1 | We agree with Nokia that one network has UE location, it can accurately determine the scheduling offset for the UE.  However, UE location may not be updated as fast and at the right time when needed (i.e., network wants to schedule data) network may not have updated UE location. For this fast action, we are OK to keep the option of UE specific TA MAC CE as another possibility. |
| LG | Option 1 |  |
| vivo | Option 1 | Same view as Huawei and MediaTek. No need to further introduce extra impacts on UE location reporting specifically for the TA reporting purpose. |
| OPPO | Option 1 |  |
| ZTE | Option 1 | TA is more straightforward. |
| InterDigital | Option 1 | Same view with Qualcomm. Furthermore, it would not require the additional calculation to derive TA and if MAC CE is already introduced for UE TA reporting in RA procedure it can simply be re-used in connected mode with minimal additional specification effort.  We consider TA/location reporting as complimentary mechanisms, where both can be supported and selected based on scenario. |
| ETRI | Option 1 |  |
| Ericsson | Option 2 | We agree with Nokia.  In connected mode, all reporting shall be using RRC to not allow unwanted observers to see the reported TA/reported position.  The UE must measure its position anyway in-order to do the autonomous UE specific TA pre-compensation, thus there is no saving of extra GNSS reception or complicated calculations needed for the UE to know the position. The position the UE uses to estimate the UE specific TA pre-compensation is more than sufficient accurate to include in the report to the NW.  There is no point in trying to “hide” the UE position, as the NW can anyway get the UE position. And reporting the position has the advantage that in most cases no more report of information about the UE specific TA pre-compensation is necessary.  Comment on the summary of opiniions   * “UE specific TA is straightforward;”   That is not true, UE must know its position to calculate the UE specific TA pre-compensation (as time stamp method was not selected in RAN1).   * UE specific TA is more useful for NW’s scheduling adaption;   Not true as reported TA may need to be reported during the connection as it changes greatly in some scenarios, while UE position in most cases is sufficient for the whole connection time, and it is useful also after a handover to a new satellite. |
| Intel | Option 2 | TA change due to satellite movement can be tracked by the gNB but UE positioning cannot and with UE positioning, network can also calculate UE TA |
| NEC | Option 1 | TA reporting achieves synchronisation efficiently with small signalling overhead. |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 1:**

|  |  |  |
| --- | --- | --- |
| **Which option of content of UE specific TA in connected mode do you prefer, under the Work assumption?**  **Option 1. UE specific TA pre-compensation; Option 2. UE position ; Option 3. Other** | | |
| Option 1 | Option 2 | Other |
| 13 | 3 | 1 |

**Option 1 (13/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Qualcomm, LG, vivo, OPPO, ZTE, InterDigital, ETRI, NEC

**Option 2 (3/17)**: Nokia, Ericsson, Intel

**Other (1/17)**: Apple

Additionally, the following key comments were noted:

**Views of option 1:**

* the motivation for this reporting is to facilitate scheduling, and UE specific TA can serve this purpose well;
* UE specific TA pre-compensation is simple and has no potential security issues;
* TA reporting could be of less size and can be directly used for scheduling;
* UE location may not be updated as fast and at the right time when needed (i.e., network wants to schedule data) network may not have updated UE location.

**Reason of option 2:**

* NW can achieve UE’s location based on event. With UE’s location and satellite ephemeris data, NW can estimate the UE’s UE-gNB RTT (i.e. UE-specific TA).
* The UE must measure its position anyway in-order to do the autonomous UE specific TA pre-compensation, thus there is no saving of extra GNSS reception or complicated calculations needed for the UE to know the position.
* Reporting the position has the advantage that in most cases no more report of information about the UE specific TA pre-compensation is necessary

**Reason of other:**

* We should wait for RAN1 decision on this before continuing. Additionally, this should strictly be limited to at most 1 depending on if the UE wants to report it or not.

Rapporteur’s comments:

As Qualcomm mentioned that if one network has UE location, it can accurately determine the scheduling offset for the UE. However, UE location may not be updated as fast and at the right time when needed (i.e., network wants to schedule data) network may not have updated UE location. The trigger condition of report UE specific TA is different from reporting UE location which was discussed in LCS aspect. For this fast action, it’s better to keep the option of UE specific TA pre-compensation as another possibility, following majority’s view.

It seems option 1- UE specific TA pre-compensation can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 1: The content of** **UE specific TA reported in connected mode is UE specific TA pre-compensation (13/17), FFS the UE position (3/17).**

## 3.2 How to report the information about UE specific TA in connected mode

**Work assumption: It is agreed to support reporting on the information about UE specific TA in connected mode.**

Based on the first round discussion of RACH Aspect, it is agreed to support reporting **on the information about UE specific TA** in connected mode, FFS via RRC signalling or MAC CE.

We list the main views of two methods provided by companies in first round for your information to take into consideration.

**Views of report via RRC:**

* Considering the security of UEs, option1 in connected mode is more suitable.
* The TA/position information shall be protected as much as possible;
* Using MAC CEs will enable unwanted parties to detect it, using multiple MAC CE reports from the same user (potentially after a handover, or satellite must have moved substantially or using other information)

**Views of report via MAC CE:**

* Reporting TA does not require high resolution of the UE position and can be made via MAC CE without using RRC security
* The UE position can be quantized (like discussed in the Control Plane discussion), or UE specific TA pre-compensation can be quantized;
* MAC Ces would be more efficient way to go

Therefore, the rapporteur suggests discussing the following question

|  |  |  |
| --- | --- | --- |
| **Question 2: Which option do you prefer to report UE specific TA pre-compensation in connected mode, under the work assumption?**  **Option 1. RRC signalling; Option 2. MAC CE** | | |
| **Company** | **Option 1/2** | **Comment** |
| Huawei, HiSilicon | Option 2 | It’s better to be aligned with the TA report for initial access. |
| MediaTek | Option 2 | No need to have two signalling options for the same information. |
| Lenovo | Option 2 | Aligned with reporting in initial access. |
| CATT | Option 2 | A single reporting mechanism should be applied in NTN. |
| Xiaomi | Option 2 |  |
| Apple | Option 1 (Maybe) | We do not see why this TA needs to be reported more than once when the TA provided by the network is applied by the UE anyway once the UE provided value is corrected by the network!! As mentioned in earlier question, we do not agree that the UE TA should be reported pre connection as we do not see any benefit to it. |
| Nokia | Option 1 | To report UE’s location (as indicated in Q1), RRC should be used since using RRC will have integrity protection and encryption on UE location information. |
| Qualcomm | Option 2 | It is for fast response and also very coarse TA report. |
| LG | Option 2 |  |
| vivo | Option 2 | Agree with Huawei and MediaTek |
| OPPO | Option 1 | We prefer TA reporting via RRC signalling since RRC signaling is secured. |
| ZTE | Option 2, but | Different from initial access where the report is only one-shot, for connected mode, as raised in companies’ contribution, consecutively report TA might be possible to derive UE’s position as well. Since there is no security check for MAC CE, it is also required confirmation from SA3 that whether frequent TA report will have privacy concerns. |
| InterDigital | Option 2 | For TA should be MAC CE. |
| ETRI | Option 2 |  |
| Ericsson | Option 1 | MAC CEs are never encrypted nor integrity protected, thus they can be read by unwanted parties.  Repeated TA reports from a UE will enable any observer to know the UE position (for example when the direction of TA changes from decreasing to increasing, when removing part associated to feeder link which can be calculated from GW and satellite position, the UE is known to be one of two possible locations, and if reported TA has low resolution, it just mean the observer have to observe for longer time with multiple satellite handovers). |
| Intel | Option 2 | For UE positioning, we preferred RRC, however for TA, we are ok with MAC CE |
| NEC | Option 2 |  |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 2:**

|  |  |  |
| --- | --- | --- |
| **Which option do you prefer to report UE specific TA pre-compensation in connected mode, under the work assumption?**  **Option 1. RRC signalling; Option 2. MAC CE** | | |
| Option 1 | Option 2 | Other |
| 3 | 13 | 1 |

**Option 1 (3/17)**: Nokia, OPPO, Ericsson

**Option 2 (13/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Qualcomm, LG, vivo, ,ZTE, InterDigital, ETRI, Intel, NEC

**Other (1/17)**: Apple

Additionally, the following key comments were noted:

**Views of option 1:**

* To report UE’s location (as indicated in Q1), RRC should be used since using RRC will have integrity protection and encryption on UE location information;
* MAC CEs are never encrypted nor integrity protected, thus they can be read by unwanted parties;
* Repeated TA reports from a UE will enable any observer to know the UE position

**Reason of option 2:**

* It’s better to be aligned with the TA report for initial access;
* It is for fast response and also very coarse TA report.

**Reason of other:**

* We do not see why this TA needs to be reported more than once when the TA provided by the network is applied by the UE anyway once the UE provided value is corrected by the network.

It seems option 2 can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 2: The UE reports information about UE specific TA in connected mode using a MAC CE (13/17).**

## 3.3 The trigger conditions of UE specific TA reporting in connected mode

**Work assumption: It is agreed to support reporting on the information about UE specific TA in connected mode.**

### Network control method

There are two options for network control method:

* Option 1: UE specific TA report can be requested by network;
* Option 2: Periodical reporting of the information about UE-specific TA report.

**For the option 1,** we list the support and challenges provided by companies in first round for your information to take into consideration.

**Views of requested by network:**

* The scenarios where UE specific TA report can be requested by network in connected mode:
  + If NW does not enable TA report during RACH or TA cannot be reported in Msg3/Msg5 due to not enough resource, NW can indicate UE to report UE specific TA in connected mode;
  + The reporting on request can be useful for UEs within long connection time, especially if UE position is reported (fast UEs may have moved far away, say a plane at 1200 km/h);
  + The UE may move in the connected state, causing the change of the TA compensated by the UE. Such change may be invisible to NW and may not be easy for the NW to predict;
  + Network can request and UE shall report TA report as UE TA drift may be different based on satellite and UE movement.
* The benefit of supporting that UE specific TA report can be requested by network in connected mode:
  + If network wants an updated value for scheduling, the network can request the UE to report TA.

**Reasons of No:**

* There is no need to report UE specific TA in connected mode:
  + When UE is in connected mode, the network can use the legacy TA adjustment mechanism, The TA is changing continuously, the network can estimate TA based on UL signals and use consecutive TA commands to make adjustment and keep the TA value credible;
  + If conditions for TA reporting are configured during/following initial access, then one-off TA requests during connected mode will not be necessary.
* Requested by network is unnecessary when other trigger condition is agreed:
  + If the periodical reporting of UE-specific TA report is introduced, there is no reason to request the UE-specific TA report by the network;
  + For UE in connected mode, event-triggered TA update should be supported (as indicated in Q3).

**For the option 2,** we list the support and challenges provided by companies in first round for your information to take into consideration.

**Views of periodical reporting:**

* The scenarios to support periodical reporting of UE-specific TA report:
  + UE-specific TA may constantly change due to the movement of satellite, so periodical reporting is straightforward in connected mode.
* The benefit of supporting that periodical reporting of UE-specific TA report:
  + The network can keep track of the UE specific TA pre-compensation value without additional signalling;
  + Periodical reporting is simpler than event-triggered reporting from UE implementation.

**Reasons of No:**

* There is no need to report UE specific TA in connected mode:
  + When UE is in connected mode, the network can use the legacy TA adjustment mechanism, The TA is changing continuously, the network can estimate TA based on UL signals and use consecutive TA commands to make adjustment and keep the TA value credible.
* The method is unnecessary when other trigger condition is agreed:
  + Event triggered report with network based polling should be enough, it is not reasonable for UE to report the TA periodically even the TA is not changed (or change within the threshold);
  + NW request could be sufficient;
  + If periodical location reporting and event-triggered location reporting are supported for the connected UE. Then any RRC based UE-specific TA reporting is not needed.
* The disadvantage of periodical reporting of UE-specific TA report in connected mode:
  + Signaling overhead is not negligible. There is not much to be gained from periodic reporting;
  + many users will send unnecessary reports using precious radio resources and waste UE energy even they are far from a TA pre-compensation level that will require the gNB to adjust the Koffset.

Since many companies consider the one of the above option is enough for network control, we list the two options together for decision.

|  |  |  |
| --- | --- | --- |
| **Question 3: which option(s) do you prefer to report the information about UE specific TA, under the work assumption?**  **Option 1: UE specific TA report can be requested by network;**  **Option 2: Periodical reporting of the information about UE-specific TA report;**  **Or none?** | | |
| **Company** | **Option1/2/none** | **Comment** |
| Huawei, HiSilicon | None | TA report in connected mode does not look necessary to us. The reason has been listed by the rapporteur: when UE is in connected mode, the network can use the legacy TA adjustment mechanism. The TA is changing continuously, the network can estimate TA based on UL signals and use consecutive TA commands to make adjustment and keep the TA value credible.  With the legacy mechanism workable, adding additional UE reports increases complexity and signalling overhead. Besides, RAN2 needs to figure out how the legacy mechanism and the newly introduced UE report coexist; the two-tier adjustment looks duplicated, and the adjustment results are mutually influenced.  We can live with the majority view to have the event-triggered approach as in phase 1, but do not want more alternatives to add the complexity. |
| MediaTek | Option 1 | Network requested TA report can be useful in some scenarios, but periodic reporting is not necessary. |
| Lenovo | Option 1 | It can be requested by network if necessary. There is no need for periodic reporting. |
| CATT | Option 1 and option 2 | For the option 1, the TA report can be requested by NW when the NW wants to adjust TA.  The option 2 is beneficial for timely TA tracking. Since the option 2 can be configured as OPTIONAL, the network can configure it when there is a need for timely TA tracking. |
| Xiaomi | Option 1 | Option 2 is not necessary as network request & event trigger are enough. |
| Apple | None | Agree with Huawei. |
| Nokia | None | Event-triggered reporting is sufficient. |
| Qualcomm | Either option | Both options are not needed. |
| LG | Option 1 and 2 | Agree with CATT |
| vivo | Option 1 and/or Option 2 | We are open to follow the majority on which way(s) to go with. |
| OPPO | Option 1 and Option 2 | Option 1 and 2 both have scenarios to apply and benefits. |
| ZTE | Both | We see benefits in both, but would like to wait for RAN1’s feedback. Currently RAN1is discussing the same topic and an LS will be send out after this meeting to inform us the latest RAN1 progress. We can better analysis the required signalling based on their feedback. |
| InterDigital | Option 1 | If we need to down-select we think network requested TA would be most important to allow on-demand TA reporting when most needed by network. |
| ETRI | None | Agree with Huawei. We believe the legacy TA adjustment mechanism is sufficient. |
| Ericsson | Option 1 | On request report is beneficial in some scenarios.  There is no need for periodic reporting as it will have higher overhead than event-based reporting. |
| Intel | Option 1 |  |
| NEC | None | We agree with Nokia, we prefer event-triggered as per network configuration. Then No TA request or periodical reporting is needed. |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 3:**

|  |  |  |
| --- | --- | --- |
| **which option(s) do you prefer to report the information about UE specific TA, under the work assumption?**  **Option 1: UE specific TA report can be requested by network;**  **Option 2: Periodical reporting of the information about UE-specific TA report;**  **Or none?** | | |
| Option 1 | Option 2 | None |
| 11 | 5 | 5 |

**Option 1 (11/17)**: MediaTek, Lenovo, CATT, Xiaomi, LG, vivo, OPPO, InterDigital, Ericsson, ZTE, Intel, Qualcomm

**Option 2 (5/17)**: CATT, LG, vivo, OPPO, ZTE

**Other (5/17)**: Huawei, HiSilicon, Apple, Nokia, ETRI, NEC

Additionally, the following key comments were noted:

**Views of option 1:**

* The TA report can be requested by NW when the NW wants to adjust TA;
* Network requested TA report can be useful in some scenarios, but periodic reporting is not necessary;
* If we need to down-select we think network requested TA would be most important to allow on-demand TA reporting when most needed by network

**Reason of option 2:**

* The option 2 is beneficial for timely TA tracking. Since the option 2 can be configured as OPTIONAL, the network can configure it when there is a need for timely TA tracking.

**Reason of none:**

* With the legacy mechanism workable, adding additional UE reports increases complexity and signalling overhead. Besides, RAN2 needs to figure out how the legacy mechanism and the newly introduced UE report coexist; the two-tier adjustment looks duplicated, and the adjustment results are mutually influenced.

It seems there is no majority in the table. Based on company feedback, the following is proposed:

**Proposal 3: FFS UE specific TA report can be requested by network (11/17).**

### Event triggered method

Based on the first round discussion of RACH Aspect, it is agreed that event-triggers for reporting UE specific TA in connected mode is supported, FFS detail information.

The detail information of event-triggers is provided in [1] and [2], we list as following:

|  |
| --- |
| The proposal in [1]:  **Proposal 2 For the UE-specific TA reporting under UE control, event triggered method should be supported in NTN, e.g. a threshold between current TA and the last reported TA.**  The proposals in [2]:  **Proposal 8 The network may configure a number of TA levels that triggers reporting of information about UE specific TA pre-compensation.**  **Proposal 9 The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards lower TA values.**  **Proposal 10 The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards higher TA values.**  **Proposal 11 The network may configure a time threshold when going towards lower TA values where a report with information about UE specific TA pre-compensation is triggered if time since passing the TA threshold is above the time threshold.**  **Proposal 12 The network may configure a time threshold when going towards higher TA values where a report with information about UE specific TA pre-compensation is triggered if time until passing the TA threshold is below the time threshold.**  **Proposal 13 The network may configure the time thresholds and offsets separately or combine them together.**  **Proposal 14 The network may configure the UEs to report the times (or time until) it will cross each TA level with an indication if it will pass from lower to higher TA or from higher to lower TA.**  **Proposal 15 The network may configure the UE to only consider the TA levels closest to the TA when last successfully reported information about UE specific TA pre-compensation was triggered.** |

There are two methods provided in the above table: one is TA values related, the other is time threshold related. We will further discuss the detail information in two methods.

* **TA values aspect**

Work assumption:

|  |  |  |
| --- | --- | --- |
| **Question 4: Do you agree that the event-triggers for reporting information about UE specific TA are based on TA value?** | | |
| **Company** | **Yes/No** | **Comment** |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Xiaomi | Yes |  |
| Apple | Yes |  |
| Nokia | Yes with modification | We agree it should base on UE estimated Timing Advance. However, it is ambiguous to say the trigger is based on TA value because actually it should base on the change of TA value estimated by UE instead of TA value itself. So, we suggest modifying as below:  **The event-triggers for reporting information about UE specific TA are based on the change of TA value estimated by UE.** |
| Qualcomm | Yes |  |
| LG | Yes |  |
| vivo | Yes |  |
| OPPO | Yes with comment | Regarding to the trigger condition based on TA value, in our understanding, UE should report TA when Koffset – UE’s TA < Threshold since the purpose of TA report is for the NW configuration of Koffset. For example, if NW configures Koffset with a very large value, UE does not even need to report TA until the difference between Koffset and UE’s TA is less than a threshold, so that UE can avoid unnecessary TA reporting. |
| ZTE | Yes | For event-triggered, TA threshold seems simpler and more straightforward. But again, this shall be confirmed by RAN1. |
| InterDigital | Yes |  |
| ETRI | Yes |  |
| Ericsson | Yes | The absolute TA value is much better to use as NW may use the same values for all UEs, and it does not require adaptation depending on what the UE specific TA pre-compensation is.  A“TA value change” will need to be configured different for a UE that is far from an “iso-delay curve corresponding to a needed change in UE specific Koffset” compare to a UE close to an “iso-delay curve corresponding to a needed change in UE specific Koffset”. |
| Intel | Yes |  |
| NEC | Yes |  |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 4:**

|  |  |
| --- | --- |
| **Do you agree that the event-triggers for reporting information about UE specific TA are based on TA value?** | |
| Yes | No |
| 15 | 0 |

**Yes (17/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Nokia, Qualcomm, LG, vivo, OPPO, ZTE, InterDigital, ETRI, Ericsson, Intel, NEC

**No(0/17)**

It seems Yes can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 4: The event-triggers for reporting information about UE specific TA are based on TA values.**

Last successful reported TA is proposed as a benchmark in both [1] and [2]. The proposals are as following:

|  |
| --- |
| **Proposal 2 For the UE-specific TA reporting under UE control, event triggered method should be supported in NTN, e.g. a threshold between current TA and the last reported TA. [1]**  **Proposal 15 The network may configure the UE to only consider the TA levels closest to the TA when last successfully reported information about UE specific TA pre-compensation was triggered. [2]** |

Thus, the rapporteur suggests discussing the following question:

|  |  |  |
| --- | --- | --- |
| **Question 5: if you agree with Q4, do you agree an offset threshold can be used based on between current TA and the last reported TA?** | | |
| **Company** | **Yes/No** | **Comment** |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes |  |
| Lenovo | Yes |  |
| CATT | Yes |  |
| Xiaomi | Yes |  |
| Apple | Yes |  |
| Nokia | No | **The content of the reported information is not decided yet (as discussed in Q1), we agree an offset threshold can be used but whether it is based on the *last reported TA* is FFS. If UE’s location is reported, the threshold is not based on last reported TA. To make progress, we suggest proposal as below:**  **An TA offset threshold can be used for event-triggered reporting, how to define the threshold is FFS.** |
| Qualcomm | Yes | **However, we agree it may also depend on how RAN1 defines the TA report.** |
| LG | Yes |  |
| vivo | Yes |  |
| OPPO | No | As stated in Q4, we prefer a threshold used between Koffset configured by NW and UE’s current TA. |
| ZTE | Clarification is required. | **We’d like to first clarify what’s TAs will be used for comparison. If the current TA is the TA UE just estimated or the current used TA, which also relates to whether UE will use this estimated TA immediately (i.e., autonumous adjustment) ?**  **If UE will adjust the TA autonomously, than it make sense to compare the current TA(i.e., the TA UE just adjusted) with the last reported TA (shall be full TA in this case).**  **If only close-loop adjustment is adopted, which means UE continuously adjust it’s TA based on NW’s command, then event its current used TA is quite different from its last reported one, it is still no need to trigger the TA report since NW knows the TA updated. The condition requires TA report is when UE estimated TA is greatly different from the one adjusted by NW (i.e., the current used TA), which implies a wrong TA adjustment.**  **Based on above analysis, which TAs values to be used in the comparison still depends on RAN1’s progress on TA adjustment, no urgent conclusion is needed at this stage.** |
| InterDigital | Yes |  |
| ETRI | Yes |  |
| Ericsson | No | **Agree with OPPO. This may be further refined so that a different threshold is used when crossing a iso-delay curve towards lower TA values and a different threshold when crossing towards longer TA values.** |
| Intel | Yes |  |
| NEC | Yes |  |

[Summary]

**Out of 15 responding companies, the following table presents a summary of responses regarding Question 5:**

|  |  |  |
| --- | --- | --- |
| **If you agree with Q4, do you agree an offset threshold can be used based on between current TA and the last reported TA** | | |
| Yes | No | other |
| 13 | 3 | 1 |

**Yes (13/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Intel, NEC

**No(3/17)**: Nokia, OPPO, Ericsson

**Other (1/17)**: ZTE

Additionally, the following key comments were noted:

**OPPO** propose a threshold used between Koffset configured by NW and UE’s current TA.

Ericsson propose **a different threshold is used when crossing a iso-delay curve towards lower TA values and a different threshold when crossing towards longer TA values.**

**As for ZTE’s comments, rapporteur think there is no close-loop adjustment (as well as no adjustment frequency) pre-condition in RAN2 so far, so here it is assumed that UE adjusts the TA autonomously.**

It seems Yes can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 5: An TA offset threshold can be used for event-triggered reporting, at least the offset threshold can be between current information about UE specific TA and the last successfully reported information about UE specific TA.**

**Proposal 5a: Threshold used between Koffset configured by NW and UE’s current TA can be FFS for the next meeting.**

**Proposal 9 The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards lower TA values. [2]**

**Proposal 10 The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards higher TA values. [2]**

|  |  |  |
| --- | --- | --- |
| **Question 6: if you agree with Q4, do you agree that the offset threshold also can be**  **Option 1: an offset when going towards lower TA values;**  **Option 2: an offset when going towards higher TA values;** | | |
| **Company** | **Option1/2/neither** | **Comment** |
| Huawei, HiSilicon | neither | We are wondering why Option 1 and Option 2 are separate options. In our understanding, as long as the absolute value exceeds a certain threshold, the report can be triggered. It does not matter whether it is a positive value or negative value. |
| MediaTek | Option 1 and 2 | A hysteresis around the previous reported value (TA\_old +/- hys) should be fine. |
| Lenovo | Both | For flexibility both can be supported. |
| CATT | See comments | The same offset should be applied to when going towards lower TA values and when going towards higher TA values, i.e. the solution in Q5.  We agree with Q6 if the offset in option 1 and option 2 are same. |
| Xiaomi | Neither | A single offset can be applied for both increase and decrease case. |
| Apple | Neither |  |
| Nokia | Neither |  |
| Qualcomm | See comments | Probably an absolute change can be considered. |
| LG | Neither | Agree with Huawei |
| vivo | Option 1 and 2 | We also wonder whether there is a need to specifically distinguish the “going lower” case and the “going higher” case. Isn’t it enough to just say “the variation of the TA value exceeds a threshold”? |
| OPPO | Neither |  |
| ZTE |  | No need to further differentiate the direction. As long as the difference exceeding the configured threshold, it will trigger a report for TA-based event trigger. |
| InterDigital | Neither | Agree to absolute threshold as mentioned by other companies |
| ETRI | Neither | Agree with Huawei. |
| Ericsson | Both |  |
| Intel | See comment | We support having checking for an offset or delta, however we assume a single value is sufficient to reflect an increase or decrease. It might be easier to discuss this with some exemplary stage-3 TP. |
| NEC | Option 1 and 2 | We do not see benefit in separating the two cases. |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 6:**

|  |  |  |
| --- | --- | --- |
| **If you agree with Q4, do you agree that the offset threshold also can be**  **Option 1: an offset when going towards lower TA values;**  **Option 2: an offset when going towards higher TA values** | | |
| Both | Neither | Other |
| 5 | 8 | 4 |

**Both (5/17)**:MediaTek, Lenovo, vivo, Ericsson, NEC

**No(8/17)**: Huawei, HiSilicon, Xiaomi, Apple, Nokia, LG, OPPO, InterDigital, ETRI

**Other (4/17)**: CATT, Qualcomm, ZTE, Intel

Companies wonder why the “going lower” case and the “going higher” case is distinguished. More explanation should be shown from the proponent on the two separate options.

It seems there is no majority in the table. Based on company feedback, the following is proposed:

**Proposal 6: Further discuss the two proposals:**

* **The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards lower TA values. [2]**
* **The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards higher TA values. [2]**
* **Time threshold aspect**

The time threshold method was suggested by P11/P12/P13/P14 in [2], thus, the rapporteur suggests discussing the following question regarding time threshold one by one:

|  |  |  |
| --- | --- | --- |
| **Question 7: Do you agree that event-triggers for reporting information about UE specific TA also can be based a time threshold?** | | |
| **Company** | **Yes/No** | **Comment** |
| Huawei, HiSilicon | No |  |
| MediaTek | No |  |
| Lenovo | No |  |
| CATT | No |  |
| Xiaomi | No |  |
| Apple | No |  |
| Nokia | No |  |
| Qualcomm | No |  |
| LG | No |  |
| vivo | No | We wonder whether such “time threshold” intends to function as a prohibit timer to control the frequency of TA reporting. If so, why not directly introduce a prohibit timer? |
| OPPO | No |  |
| ZTE | Maybe no | I understand this is similar to TTT for event triggered, and the intention is to avoid some cases where UE’s TA comes back to its lasted reported level within short period,e.g, due to some error case? But I wonder if it will be a normal case in NTN. |
| InterDigital | No |  |
| ETRI | No |  |
| Ericsson | Yes | The intention is that the UE can estimate when in time it will cross an iso-delay curve, and the time threshold for the crossing time gives reports from UEs with the same amount left until the crossing (as compared to using only TA value to trigger the report).  A UE that is moving fast will trigger a TA report at longer distance from the crossing compared to a UE moving slow on the same path, but the network will have the same time to react to the measurement report and update the UE specific Koffset.  Thus, a time threshold will increase knowledge of best timing for Koffset signalling and may avoid signalling for UEs that happen to only pass close by an iso-delay curve. |
| Intel |  | It is unclear how the “time threshold” works e.g. we wonder if this is same as periodic reporting of UE specific TA |
| NEC | No |  |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 7:**

|  |  |  |
| --- | --- | --- |
| **Do you agree that event-triggers for reporting information about UE specific TA also can be based a time threshold?** | | |
| Yes | No | Other |
| 1 | 15 | 1 |

**Yes(1/17):** Ericsson

**No (15/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Nokia, OPPO, ZTE, NEC

**Other(1/17) :**Intel

It seems “No” can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 7: The event-triggers for reporting information about UE specific TA based on time threshold is not supported in NTN(15/17).**

**Proposal 11 The network may configure a time threshold when going towards lower TA values where a report with information about UE specific TA pre-compensation is triggered if time since passing the TA threshold is above the time threshold. [2]**

**Proposal 12 The network may configure a time threshold when going towards higher TA values where a report with information about UE specific TA pre-compensation is triggered if time until passing the TA threshold is below the time threshold. [2]**

|  |  |  |
| --- | --- | --- |
| **Question 8: If you agree with Q7, do you agree that time related method is as following?**   * **The network may configure a time threshold when going towards lower TA values where a report with information about UE specific TA pre-compensation is triggered if time since passing the TA threshold is above the time threshold.** * **The network may configure a time threshold when going towards higher TA values where a report with information about UE specific TA pre-compensation is triggered if time until passing the TA threshold is below the time threshold.** | | |
| **Company** | **Option1/2/other** | **Comment** |
| Ericsson | Both | This will make UE specific Koffset handling much more accurate with low amount of signalling. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

[Summary]

There is no majority supporting candidate solutions on Q8. So there is no more proposals.

**Proposal 13 The network may configure the time thresholds and offsets separately or combine them together. [2]**

|  |  |  |
| --- | --- | --- |
| **Question 9: If you agree with both Q4 and Q7, do you agree that the network may configure the time thresholds and offset threshold separately or combine them together?** | | |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes | This enables even better UE specific Koffset handling in the netwrok. |
| Intel | No | We do not support both events but if there is support of majority of companies, we understand that they should be handled as independent events. |
|  |  |  |
|  |  |  |
|  |  |  |

[Summary]

There is no majority supporting Q9. So there is no more proposal.

**Proposal 14 The network may configure the UEs to report the times (or time until) it will cross each TA level with an indication if it will pass from lower to higher TA or from higher to lower TA. [2]**

|  |  |  |
| --- | --- | --- |
| **Question 10: if you agree with Q9, do you agree that the network may configure the UEs to report the times (or time until) it will cross each event-trigger with an indication if it will pass from lower to higher TA or from higher to lower TA?** | | |
| **Company** | **Yes/No** | **Comment** |
| Ericsson | Yes |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

[Summary]

There is one company agree with the time threshold based solution, one company disagree with Q9, therefore, there is no proposal on the Q8/Q9/Q10.

* **event-trigger configuration**

Some event-triggers configuration was suggested by p8 in [2], thus, the rapporteur suggests discussing the following question:

|  |  |  |
| --- | --- | --- |
| **Question 11: Do you agree that the network may configure more than one event-triggers for reporting the information about UE specific TA?** | | |
| **Company** | **Yes/No** | **Comment** |
| Huawei, HiSilicon | No | Multiple triggering conditions add significant complexity without clear gains. |
| MediaTek | No | A single event based trigger should be enough. |
| Lenovo | No | No need to do so. |
| CATT | No | One event-trigger is enough for triggering the UE specific TA reporting. |
| Xiaomi | No |  |
| Apple | No |  |
| Nokia | No |  |
| Qualcomm | No |  |
| LG | No | A single event based trigger should be enough. |
| vivo | No | Same concerns about complexity. |
| OPPO | No |  |
| ZTE |  | It seems pre-mutual to preclude other event triggers. |
| InterDigital | No |  |
| ETRI | No | Agree with concerns about complexity. |
| Ericsson | This is not what we proposed. | Our proposal was to define multiple absolute TA levels (each can correspond to a certain Koffset value) that can be configured for the UE to report when crossing. This will ease the configuration of all UEs, as they may be configured in system information.  At least two absolute TA levels shall be configured to each UE, one above (when crossing this level the NW must increase the Koffset) the current UE specific TA pre-compensation and one below (when crossing this level the NW may configure a lower Koffset).  This may save signalling, because if we only use one TA level to trigger all event reporting we may need to reconfigure a new TA level after a received report and an updated Koffset is sent to the UE. |
| Intel | Depends | If multiple trigger evets are defined, we agree that network can configure multiple (and independent) ones to a given UE |
| NEC | No | A simple event-trigger is enough. |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 11:**

|  |  |
| --- | --- |
| Do you agree that the network may configure more than one event-triggers for reporting the information about UE specific TA? | |
| No | Other |
| 14 | 3 |

**No(14/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Nokia, OPPO, NEC

**Other(3/17):** Ericsson, Intel, ZTE

It seems the question is not what proponent proposed. So the proposal should be clarified and discussed again.

**Proposal 8 Further discuss the network may configure a number of TA levels that triggers reporting of information about UE specific TA pre-compensation.**

## 3.4 UE specific TA reporting in RA procedure

Based on the first round discussion of RACH Aspect, it is agreed that if configured, the UE shall report information of the UE specific TA pre-compensation to the target cell during the random access. FFS if a new indication in RRC reconfiguration with sync is needed or not (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell).

We provide the discussion via email for your information:

|  |
| --- |
| Proposal 7: RAN2 to agree the UE should report information of the UE specific TA pre-compensation to the target cell during the random access, FFS a new indication in RRC reconfiguration with sync or not.  -     Oppo thinks the FFS part was not suggested by anyone and should be removed  -     Huawei suggests to reword as “RAN2 to agree the UE should report information of the UE specific TA pre-compensation to the target cell during the random access if the enable/disable indication of TA report in SI is also carried in HO command (similar to other IEs in SIB1 that are carried in HO command), FFS a new indication in RRC reconfiguration with sync or not.”. Nokia agrees  -     ZTE wonders if some sort of implicit indication (e.g., presence of NTN parameters) can be used to inform the UE to report TA via HO, therefore the FFS can be kept for the moment  -     Ericsson thinks there are handover cases where the network do not need the reported TA because it can deduct it from known information (for example for HO to a cell in the same satellite without a feeder link switch, the UE shall use the same TA as before the HO and no TA report is needed), therefore proposes a new flag to trigger this report as the SIB indication from the new cell is not sufficient.  -     CATT is ok with Huawei’s formulation with the addition of the FFS: “RAN2 to agree the UE should report information of the UE specific TA pre-compensation to the target cell during the random access if the enable/disable indication of TA report in SI is also carried in HO command (similar to other Ies in SIB1 that are carried in HO command). FFS a new indication in RRC reconfiguration with sync or not.”  **Agreed with the formulation “If configured, the UE shall report information of the UE specific TA pre-compensation to the target cell during the random access. FFS if a new indication in RRC reconfiguration with sync is needed or not (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell)”** |

Thus, the rapporteur suggests discussing the following question:

|  |  |  |
| --- | --- | --- |
| **Question 12: Is a new indication in RRC reconfiguration needed with sync to configure the UE to report information about UE specific TA in handover procedure (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell)?** | | |
| **Company** | **Yes/No** | **Comment** |
| Huawei, HiSilicon | No | We think the case where source node enables the flag whereas target node disables the flag is quite rare.  Most companies supported the UE specific TA report in connected mode in phase 1 discussion, with the understanding that UE shall adjust the TA continuously. Based on this understanding, reporting the latest TA to the target node makes sense. On the other hand, there’s no negative effect if the latest TA to be reported has no drastic change compared with the TA before HO. |
| MediaTek | No, but | We think this is not crucial, however if there is majority support, it can be considered. |
| Lenovo | No |  |
| CATT | No | The SIB indication is enough to trigger the UE specific TA reporting. |
| Xiaomi | No |  |
| Apple | No |  |
| Nokia | No | The SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell is sufficient. |
| Qualcomm | No |  |
| LG | No |  |
| vivo | No | Seems not critical. |
| OPPO | No | Adding a new TA report indication to differentiate handover cases is not an essential enhancement, and to support this, UE has to maintain two variables for the same IEs. |
| ZTE | No | Share similar understanding as Huawei. |
| InterDigital | No |  |
| ETRI | No |  |
| Ericsson | Yes | Sometimes the SIB indication is not sufficient as the gNB do not need the report, for example if target cell is in same satellite and uses the same feeder link. |
| Intel | FFS |  |
| NEC | No, but | Same view as MediaTek. |

[Summary]

**Out of 17 responding companies, the following table presents a summary of responses regarding Question 12:**

|  |  |  |
| --- | --- | --- |
| **Is a new indication in RRC reconfiguration needed with sync to configure the UE to report information about UE specific TA in handover procedure (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell)?** | | |
| Yes | No | FFS |
| 1 | 15 | 1 |

**Yes(1/17):** Ericsson

**No(15/17)**: Huawei, HiSilicon, MediaTek, Lenovo, CATT, Xiaomi, Apple, Qualcomm, LG, vivo, InterDigital, ETRI, Nokia, OPPO, ZTE,NEC

**FFS(1/17)**: Intel

It seems “No” can be taken as majority in the table. Based on company feedback, the following is proposed based on majority:

**Proposal 9: No new indication in RRC reconfiguration with sync is needed to configure the UE to report information about UE specific TA in handover procedure (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell) (15/17).**

# 4 Conclusions

Based on the views expressed in the previous sections, we propose the following:

*Proposals for easy agreements:*

**Proposal 1: The content of** **UE specific TA reported in connected mode is UE specific TA pre-compensation (13/17), FFS the UE position (3/17).**

**Proposal 2: The UE reports information about UE specific TA in connected mode using a MAC CE (13/17).**

**Proposal 4: The event-triggers for reporting information about UE specific TA are based on TA values (17/17).**

**Proposal 5: An TA offset threshold can be used for event-triggered reporting, at least the offset threshold can be between current information about UE specific TA and the last successfully reported information about UE specific TA (13/17).**

**Proposal 7: The event-triggers for reporting information about UE specific TA based on time threshold is not supported in NTN (15/17).**

**Proposal 9: No new indication in RRC reconfiguration with sync is needed to configure the UE to report information about UE specific TA in handover procedure (besides the SIB indication carried in HO command on whether TA report is enabled/disabled in the target cell) (15/17).**

*Proposals for further discussion:*

**Proposal 8: Further discuss the network may configure a number of TA levels that triggers reporting of information about UE specific TA pre-compensation.**

**Proposal 5a: Threshold used between Koffset configured by NW and UE’s current TA can be FFS for the next meeting.**

**Proposal 6: Further discuss the two proposals:**

* **The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards lower TA values. [2]**
* **The network may configure an offset for triggering reporting of information about UE specific TA pre-compensation when going towards higher TA values. [2]**

**Proposal 3: FFS UE specific TA report can be requested by network (11/17).**

# 5 List of referenced documents

[1] [R2-2107314](file:///C:\Data\3GPP\Extracts\R2-2107314.docx) Discussion on UE Specific TA Report CATT discussion

[2] [R2-2108453](file:///C:\Data\3GPP\Extracts\R2-2108453%20-%20Random%20Access%20timers%20and%20reporting%20information%20about%20UE%20specific%20TA%20pre-compensation%20in%20NTNs.docx) Random Access timers and reporting information about UE specific TA pre-compensation in NTNs Ericsson discussion

# Contact information

|  |  |
| --- | --- |
| Company | Delegate contact |
| Huawei, HiSilicon | Lili Zheng (zhenglili4@huawei.com) |
| MediaTek | Abhishek Roy (Abhishek.Roy@mediatek.com) |
| Lenovo | Min Xu (xumin13@lenovo.com) |
| CATT | Jianxiang Li (lijianxiang@datangmobile.cn) |
| Apple | Sarma Vangala (svangala@apple.com) |
| Nokia | Ping Yuan (Ping.1.Yuan@nokia-sbell.com) |
| Qualcomm | Bharat Shrestha (bshresth@qti.qualcomm.com) |
| LG | Geumsan Jo (geumsan.jo@lge.com) |
| OPPO | Haitao Li (lihaitao@oppo.com) |
| ZTE | Zhihong Qiu (qiu.zhihong@zte.com.cn) |
| InterDigital | Dylan Watts (dylan.watts@interdigital.com) |
| ETRI | Mi young Yun (myyun@etri.re.kr) |
| Ericsson | robert.s.karlsson@ericsson.com |
| Intel | [marta.m.tarradell@intel.com](mailto:marta.m.tarradell@intel.com) |
| NEC | Maxime.grau@emea.nec.com |