**3GPP TSG-RAN WG2 Meeting #117e R2-220xxxx**

**Electronic, February, 2022**

**Agenda Item: 9.2.3.1**

**Source: OPPO**

**Title: Report of [AT117-e][011][IoT-NTN] User Plane (OPPO) – round 1**

**Document for: Discussion and Decision**

# Introduction

This document is to collect companies’ views for the following offline discussion.

* [AT117-e][011][IoT-NTN] User Plane (OPPO)

Scope: Based on R2-2203160 and related on-line discussion + based on R2-2203721 issue on cfg of event triggered TA report and issue Whether SR is triggered if no available/sufficient UL-SCH resources for the triggered TA reporting.

- For items that are dependent on NR NTN, kick off the relevant discussion points once NR NTN decision has been taken. For items with no dependency, discussion can be kicked off immediately, and result should be ready for first CB occasion.

- Determine agreeable parts, Aim to agree less controversial points offline (with no CB). Identify CB points. Controversial points and/or very late points (with no time for offline decision) can CB on-line.

Intended outcome: Report

Deadline: In time for first on-line CB W2 Tuesday, later CB TBD.

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# Round-1 Discussion

For companies’ easy track, RAN2 agreements related to IoT NTN’s UP impact are copied below.

RAN2#115e:

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| * Start of ra-ResponseWindow is delayed by an offset. Postpone discussion on the offset value until further agreements regarding RACH are made in RAN1. * If the start of the RA Response window is accurately compensated by UE-eNB RTT and no extension of repetition is required, there is no need to extend the ra-ResponseWindowSize for IoT NTN. * Start of mac-ContentionResolutionTimer is delayed by an offset, (assumed equal to UE-eNB RTT). This can be revisited if RAN1 decides something that requires to change this. * If the start of mac-ContentionResolutionTimer is accurately compensated by UE-eNB RTT and no extension of repetition is required, there is no need to extend the mac-ContentionResolutionTimer for IoT NTN. * From RAN2 perspective, for UE with UE-specific pre-compensation as a baseline it is up to eNB implementation to ensure sufficient time on UE side for the Msg3 transmission for IoT NTN. * RAN2 assumes that TA information (FFS what) reporting by the UE on network enabling will be needed in IoT NTN. Expect RAN1 need to progress on this, and can maybe reuse NR NTN progress. FFS in which message this is provided. * UE-eNB RTT is taken into account when calculating the (UL) HARQ RTT timer. * RAN2 assumes that sr-ProhibitTimer need to be extended. Postpone treatment of sr-ProhibitTimer values until the NR NTN details have been decided. * From RAN2’s perspective, delayed start of pur-ResponseWindowTimer with UE-eNB RTT can be supported. This can be revised if RAN1 finds issues to support PUR that are not small. * pur-ResponseWindowSize is not extended for IoT NTN. * SPS is supported without modification for IoT NTN. * RAN2 confirm the SI agreement that the value range of the RLC t-Reordering timer will be extended to support IoT NTN. * Do not extend the PDCP discardTimer for NB-IoT over NTN. * FFS whether to extend the PDCP discardTimer for eMTC over NTN. * Do not extend PDCP t-Reordering for IoT NTN. |

RAN2#116e:

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| * The estimate of UE-eNB RTT is equal to the sum of UE’s TA and K\_mac, where the UE’s TA is given by , and K\_mac value is broadcasted by network. * RAN2 confirm that the start of mac-ContentionResolutionTimer is delayed by UE-eNB RTT in IoT NTN. * Any enhancements on (N)PRACH resource selection in IoT NTN will not be pursued in Rel-17. * An offset equal to UE-eNB RTT is added to the formula used for calculating the (UL) HARQ RTT timer in IoT NTN. * Support UE-specific TA reporting using MAC CE in Msg3/Msg5 for IoT NTN. * For IoT NTN, UE specific TA reporting during RACH procedure (MSG3/MSG5) in RRC IDLE is enabled/disabled by SI, similar with NR NTN. * Support TA reporting in RRC connected mode in IoT NTN. * UE-specific TA report uses MAC CE. * Support event-triggered for TA reporting in connected mode. Wait for NR NTN agreements for other triggers. * On how to extend RLC t-Reordering in IoT NTN, wait for NR NTN agreements and see if they can be reused. * Don’t change the L2 buffer requirement for IoT NTN (assume the network may need to limit the bit rate in order to not exceed L2 buffer). * The PDCP discardTimer should be extended to support eMTC over NTN. * If PDCP discardTimer is agreed to be extended to support eMTC over NTN, how to extend the timer value can wait for the conclusion for RLC t-reordering timer. * The ra window start offset is defined as sum (current offset, UE-eNB RTT) and current offset is defined in TS36.321 (FFS if applicable to NB-IoT 41ms offset) |

RAN2#116bis-e:

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| * Do not mandate Msg3 or Msg5 to include TA report MAC CE, and whether it can be included depends on the TB size of Msg3 or Msg5. * Reuse NR NTN’s TA reporting trigger event in IoT NTN, i.e., a TA offset threshold between current TA and the last successfully reported TA is used for event-triggered TA reporting. FFS for location used for TA reporting purpose. * Introduce a new MAC CE for provision of UE specific K\_offset and the size is fixed to 1 byte. FFS on the MAC CE’s name. * (Following NR NTN) Neither of the following options are supported “TA information requested by network”, “Periodical reporting of TA information” * (Following NR NTN) Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA before, the UE triggers a TA reporting. FFS whether we need different behaviour for different re-configurations e.g. Handover. * On the RAR window’s start offset for the case of NB-IoT 41ms offset: The RA window start offset defined as sum (current offset, UE-eNB RTT) is applied to the case of NB-IoT 41ms offset. |

These are the recommended proposals based on pre-discussions.

*Proposal for agreements:*

Proposal 1: (16/17) Align with NR NTN and use the name of “Differential UE-Specific K\_Offset MAC CE”. (IoT NTN/NR NTN common)

Proposal 2: (15/16) Align with NR NTN and capture the contents of Differential UE-Specific K\_Offset MAC CE as “Differential UE-Specific K\_Offset: This field contains the differential UE-specific K\_Offset. The length of the field is 8 bits”. FFS on whether to change “8 bits” to “6 bits” for both 36.321 and 38.321. (IoT NTN/NR NTN common)

Proposal 3: (15/17) A reserved LCID is used for the Differential UE-Specific K\_Offset MAC CE.

Proposal 4: (14/16) Align with NR NTN and use the name of “UE-specific TA MAC CE”. (IoT NTN/NR NTN common)

Proposal 5: (15/16) Align with NR NTN and capture the contents of UE-specific TA MAC CE as “UE-specific TA: This field contains the UE estimate of the full UE-specific TA (i.e., T\_TA as defined in the UE’s TA formula). The length of the field is 16 bits”. (IoT NTN/NR NTN common)

Proposal 6: (15/17) A reserved LCID is used for the UE-specific TA MAC CE.

Proposal 7: (17/17) On logical channel priority, put the UE-specific TA report MAC CE between “MAC control element for AUL confirmation” and “MAC control element for BSR, with exception of BSR included for padding”.

Proposal 8: (17/17) During RA procedure for RRC re-establishment procedure, the UE should trigger TA report if an indication is broadcasted by the target cell’s SI. (IoT NTN/NR NTN common)

Proposal 9: (17/17) During RA procedure for handover, the UE should trigger TA report if the target cell indicates this in the handover command. (IoT NTN/NR NTN common)

Proposal 10: (16/17) Other than re-establishment and handover procedure, TA reporting in connected mode is not controlled by enabling/disabling indication in SI. (IoT NTN/NR NTN common)

Proposal 11a: RAN2 to clarify the previous agreement as: Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA to current serving cell before, the UE triggers a TA reporting. (IoT NTN/NR NTN common)

Proposal 12: (17/17) Threshold-based TA-Trigger will align with NR-NTN.

*Proposal for discussion:*

Proposal 11b: RAN2 to further discuss below open issues. (IoT NTN/NR NTN common)

1. Whether the TA reporting event configuration in reconfiguration message uses NEED OR or NEED ON?
2. Whether target cell can use delta configuration for the TA reporting event configuration in handover command?
3. If TA reporting event configuration is absent in handover command which supports delta configuration and if target cell’s SI disables TA reporting during RACH, how should the UE trigger TA reporting after handover?

Proposal 13: (13/17) Regarding how to extend sr-ProhibitTimer in IoT NTN, follow NR NTN and add more extended values (in number of SR periods).

Proposal 14: RAN2 to further discuss whether the offset is fixed or configured by the network, if RAN2 agrees to add an offset to the legacy value of sr-ProhibitTimer.

Proposal 15: (9/17) On extending RLC t-Reordering timer for IoT NTN, RAN2 to add values ms2200 and ms3200. RAN2 can further discuss if to add any other values between ms200 and ms1600.

Proposal 16: (13/17) RAN2 to introduce a new discardTimer value ms2000 for eMTC over NTN.

For proposal 1/2/4/5, it was agreed in Monday’s session to align naming and field description with NR NTN. Discussion points will be kicked off once NR NTN decision has been taken.

## 2.1 MAC

### 2.1.1 K\_Offset MAC CE

*MAC CE’s LCID:*

Regarding the LCID for the MAC CE corresponding K\_Offset, 15 out of 17 companies supported using a reserved LCID during pre-discussion. Ericsson commented that eLCID can be used.

For company’s easy check, below is the copy of TS 36.321 on LCIDs for DL-SCH.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Table 6.2.1-1 Values of LCID for DL-SCH   |  |  | | --- | --- | | Codepoint/Index | LCID values | | 00000 | CCCH | | 00001-01010 | Identity of the logical channel | | 01011-01111 | Reserved | | 10000 | Extended logical channel ID field | | 10001 | DCQR Command | | 10010 | Activation/Deactivation of PDCP Duplication | | 10011 | Hibernation (1 octet) | | 10100 | Hibernation (4 octets) | | 10101 | Activation/Deactivation of CSI-RS | | 10110 | Recommended bit rate | | 10111 | SC-PTM Stop Indication | | 11000 | Activation/Deactivation (4 octets) | | 11001 | SC-MCCH, SC-MTCH (see note) | | 11010 | Long DRX Command | | 11011 | Activation/Deactivation (1 octet) | | 11100 | UE Contention Resolution Identity | | 11101 | Timing Advance Command | | 11110 | DRX Command | | 11111 | Padding | | NOTE: Both SC-MCCH and SC-MTCH cannot be multiplexed with other logical channels in the same MAC PDU except for Padding and SC-PTM Stop Indication | |   Table 6.2.1-1a Values of eLCID for DL-SCH   |  |  |  | | --- | --- | --- | | Codepoint | Index | LCID values | | 000000-000110 | 32-38 | Identity of the logical channel | | 000111-111111 | 39-95 | Reserved |   For NB-IoT only the following LCID values for DL-SCH are applicable: CCCH, Identity of the logical channel, DCQR Command, SC-PTM Stop Indication, SC-MCCH/SC-MTCH, UE Contention Resolution Identity, Timing Advance Command, DRX Command and Padding. |

**Question 1: Which option do companies prefer for the LCID used** **for the MAC CE corresponding K\_Offset?**

* **Option 1: use a reserved LCID**
* **Option 2: repurpose an existing LCID (and which one?)**
* **Option 3: eLCID??**

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| **Company** | **Option for eMTC,**  **Option for NB-IoT** | **Additional comments**  **(suggest an existing LCID if you prefer option 2)** |
| MediaTek | Option 1 | Option 1 is simple. |
| OPPO | Option 1 |  |
| Intel | option 1 | If in IoT NTN we follow the general agreement made in NR session, and considering IoT NTN is a coverage limited case, we should use LCID.   * Confirm that coverage limited cases shall use LCID, other cases use eLCID. |
| Apple | Option 1 |  |
| Lenovo | Option 1 |  |
| Huawei, HiSilicon | Option 1 |  |
| Nokia | Option 3 but | Since there are only 4 reserved LCID left for DL-SCH, it is better leave it for common usage feature/function.  For DL, the coverage limitation is not as critical as UL, hence eLCID is agreed to be used for the MAC CE for differential UE-specific K\_offset in NR NTN. IoT NTN can follow NR NTN solution. However, we are also fine to go with majority for NB-IoT. |
| Xiaomi | Option 1 |  |
| NEC | Option1 and option 3 | No strong opinion among option1 and option 3 |
| ZTE | Option 1 |  |
| Qualcomm | Option 1 |  |
| Sequans | Option 1 |  |
| Ericsson | Option 3 | The DL is not critical for coverage, so fine to use eLCID. As there is 5 LCIDs left, we can maybe consider using an LCID too. |

**[Rapporteur summary]:**

Option 1: 13 (all companies including Nokia, NEC and Ericsson)

Option 3: 3

Given all companies’ support for option 1, following is proposed.

**Proposal 1: (13/13) Use a reserved LCID for the MAC CE corresponding K\_Offset.**

### 2.1.2 TA reporting MAC CE

*MAC CE’s LCID:*

Regarding the LCID for the TA reporting MAC CE, 15 out of 17 companies supported using a reserved LCID during pre-discussion.

For company’s easy check, below is the copy of TS 36.321 on LCIDs for UL-SCH.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Table 6.2.1-2 Values of LCID for UL-SCH   |  |  | | --- | --- | | Codepoint/Index | LCID values | | 00000 | CCCH | | 00001-01010 | Identity of the logical channel | | 01011 | CCCH | | 01100 | CCCH | | 01101 | CCCH and Extended Power Headroom Report | | 01110-01111 | Reserved | | 10000 | Extended logical channel ID field | | 10001 | DCQR and AS RAI | | 10010 | AUL confirmation (4 octets) | | 10011 | AUL confirmation (1 octet) | | 10100 | Recommended bit rate query | | 10101 | SPS confirmation | | 10110 | Truncated Sidelink BSR | | 10111 | Sidelink BSR | | 11000 | Dual Connectivity Power Headroom Report | | 11001 | Extended Power Headroom Report | | 11010 | Power Headroom Report | | 11011 | C-RNTI | | 11100 | Truncated BSR | | 11101 | Short BSR | | 11110 | Long BSR | | 11111 | Padding |   Table 6.2.1-2a Values of eLCID for UL-SCH   |  |  |  | | --- | --- | --- | | Codepoint | Index | LCID values | | 000000-000110 | 32-38 | Identity of the logical channel | | 000111-111111 | 39-95 | Reserved |   For NB-IoT only the following LCID values for UL-SCH are applicable: CCCH (LCID “00000”), Identity of the logical channel, CCCH and Extended Power Headroom Report, DCQR and AS RAI, SPS confirmation, C-RNTI, Short BSR and Padding. |

**Question 2: Which option do companies prefer for the LCID used for the TA reporting MAC CE?**

* **Option 1: use a reserved LCID**
* **Option 2: repurpose an existing LCID (and which one?)**
* **Option 3: eLCID??**

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| **Company** | **Option for eMTC,**  **Option for NB-IoT** | **Additional comments**  **(suggest an existing LCID if you prefer option 2)** |
| MediaTek | Option 1 for NB-IoT  Option 3: eMTC |  |
| OPPO | Option 1 for NB-IoT  Option 3: eMTC |  |
| Intel | Option 1 for NB-IoT  Option 3: eMTC |  |
| Apple | Option 1 for NB-IoT  Option 3: eMTC |  |
| Lenovo | Option 1 for NB-IoT  Option 3: eMTC |  |
| Huawei, HiSilicon | Option 1 or 2 | For option 2: we can use Dual Connectivity Power Headroom Report |
| Nokia | Option 1 for NB-IoT  Option 3: eMTC |  |
| Xiaomi | Option 1 for NB-IoT  Option 3: eMTC |  |
| ZTE | Option 1 for NB-IoT  Option 3: eMTC |  |
| Qualcomm | Option 1 or option 2 | We can use codepoint for Dual Connectivity Power Headroom Report.  eLCID should not be used to send one byte of uplink payload data. For both eMTC in enhanced coverage and NB-IoT, this is huge issue due to a number of repetitions.  We do not want different solutions for eMTC and NB-IoT.   |  |  | | --- | --- | | 10111 | Sidelink BSR | | 11000 | Dual Connectivity Power Headroom Report  For non-terrestrial network: TA reporting MAC CE | | 11001 | Extended Power Headroom Report | |
| Sequans | Option 1 or 2 | For option 2, fine to repurpose DC power headroom |
| Ericsson | Option 1 (also maybe 2 if 1 is not agreeable) | This is supposed to go in Msg3 which is critical for coverage, we think we shall use one of the two reserved LCIDs left.  We think eMTC and NB-IoT shall use the same solution. |

**[Rapporteur summary]:**

For NB-IoT:

Option 1: 12

Option 2: 4

Option 3: 0

For eMTC:

Option 1: 4

Option 2: 4

Option 3: 8

Given majority views, following are proposed.

**Proposal 2a: (12/12) For NB-IoT, use a reserved LCID for the TA Report MAC CE.**

**Proposal 2b: (8/12) For eMTC, use a reserved eLCID for the TA Report MAC CE.**

*MAC CE’s logical channel priority:*

For the logical channel priority of the UE-Specific TA Report MAC CE, all companies during pre-discussion agreed to the below order.

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| **Proposal 7: (17/17) On logical channel priority, put the UE-specific TA report MAC CE between “MAC control element for AUL confirmation” and “MAC control element for BSR, with exception of BSR included for padding”.** |

Example for MAC spec is shown here.

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| - MAC control element for C-RNTI or data from UL-CCCH;  - MAC control element for DPR;  - MAC control element for SPS confirmation;  - MAC control element for AUL confirmation;  - MAC CE for UE-Specific TA Report;  - MAC control element for BSR, with exception of BSR included for padding;  - MAC control element for PHR, Extended PHR, or Dual Connectivity PHR;  - MAC control element for Sidelink BSR, with exception of Sidelink BSR included for padding;  - MAC control element for DCQR and AS RAI, with exception of when DCQR is to be included in Msg3;  - data from any Logical Channel, except data from UL-CCCH;  - MAC control element for DCQR and AS RAI, when DCQR is to be included in Msg3;  - MAC control element for Recommended bit rate query;  - MAC control element for BSR included for padding;  - MAC control element for Sidelink BSR included for padding. |

**Question 3: Do companies agree to P7 above?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree |  |
| Intel | Agree |  |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Agree |  |
| Nokia | Agree |  |
| Xiaomi | Agree |  |
| NEC | Agree |  |
| ZTE | Agree |  |
| Qualcomm | Agree |  |
| Sequans | Agree |  |
| Ericsson | Agree |  |

**[Rapporteur summary]:**

All companies agree.

**Proposal 3: (13/13) On logical channel priority, put the UE-specific TA report MAC CE between “MAC control element for AUL confirmation” and “MAC control element for BSR, with exception of BSR included for padding”.**

### 2.1.3 Enable/disable indication applied for TA reporting in connected mode?

Regarding TA reporting during RACH for RRC re-establishment or handover, all companies during pre-discussions agreed to the below proposals.

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| **Proposal 8: (17/17) During RA procedure for RRC re-establishment procedure, the UE should trigger TA report if an indication is broadcasted by the target cell’s SI. (IoT NTN/NR NTN common)**  **Proposal 9: (17/17) During RA procedure for handover, the UE should trigger TA report if the target cell indicates this in the handover command. (IoT NTN/NR NTN common)** |

This is to check whether companies have changed their mind.

**Question 4: Do companies agree to p8 and p9 above?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree | These have been agreed in NR NTN. We could follow NR conclusion. |
| Intel | Agree |  |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Agree |  |
| Nokia | Agree |  |
| Xiaomi | Agree |  |
| NEC | agree |  |
| ZTE | Agree |  |
| Qualcomm | Agree |  |
| Sequans | Agree |  |
| Ericsson | Agree |  |

**[Rapporteur summary]:**

All companies agree.

**Proposal 4a: (13/13) During RA procedure for RRC re-establishment procedure, the UE should trigger TA report if an indication is broadcasted by the target cell’s SI. (aligned with NR NTN)**

**Proposal 4b: (13/13) During RA procedure for handover, the UE should trigger TA report if the target cell indicates this in the handover command. (aligned with NR NTN)**

Other than re-establishment and handover procedure, there seems no value to have extra control of TA reporting by checking enable/disable indication since network can have UE-specific TA reporting event configuration to control TA reporting in connected mode. 16 out of 17 companies supported this views during pre-discussions.

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| **Proposal 10: (16/17) Other than re-establishment and handover procedure, TA reporting in connected mode is not controlled by enabling/disabling indication in SI. (IoT NTN/NR NTN common)** |

**Question 5: Do companies agree to P10 above?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree | We suggest to reword the proposal as following to align with NR agreement.  Proposal 10: Other than re-establishment (TA reporting controlled by target cell’s SI) and handover procedure (TA reporting controlled by HO command), TA reporting in connected mode is not controlled by enabling/disabling indication in SI. |
| Intel | Agree |  |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Agree | Fine with rewording suggestion from OPPO |
| Nokia | Agree |  |
| Xiaomi | Agree |  |
| NEC | Agree |  |
| ZTE | Agree | TA reporting in connected mode should be controlled by dedicated configuration about event trigger. |
| Qualcomm | Agree |  |
| Sequans | Agree |  |
| Ericsson | Agree | We are fine with OPPOs clarification |

**[Rapporteur summary]:**

All companies agree and NR NTN’s agreement will be reused.

**Proposal 5: (13/13) Other than re-establishment (TA reporting controlled by target cell’s SI) and handover procedure (TA reporting controlled by HO command), TA reporting in connected mode is not controlled by enabling/disabling indication in SI. (aligned with NR NTN)**

### 2.1.4 TA reporting upon configuration/reconfiguration

RAN2#116bis-e made the following agreement.

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| * (Following NR NTN) Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA before, the UE triggers a TA reporting. FFS whether we need different behaviour for different re-configurations e.g. Handover. |

The issue is that UE may change cell during handover. Even if UE has reported TA to the source cell, the source cell TA may not be suitable to be compared to when evaluating the triggering condition in the target cell as it may lead to too late TA reporting. Before that late reporting, the target cell cannot know UE’s TA and thus cannot configure UE-specific K\_Offset properly.

The above issue also applies to re-establishment as for cell change case, the source cell TA is not suitable to be used as reference value for later comparison. It is worth clarifying the previous agreement means that if UE has not reported TA to the current serving cell, upon configuration/reconfiguration of TA reporting trigger event, UE triggers a TA reporting.

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| **Proposal 11a: RAN2 to clarify the previous agreement as: Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA to current serving cell before, the UE triggers a TA reporting.** |

**Question 6: Do companies agree to P11a above?**

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| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree | We suggest to reword the proposal as following to align with NR agreement.  Proposal 11a: RAN2 to clarify the previous agreement as: Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA to current serving cell before (during this connection), the UE triggers a TA reporting. (can further check this during the implementation in the MAC CR) |
| Intel | Agree | We can follow NR NTN’s agreement, i.e., “, if connected mode UE has not reported TA to current serving cell before” |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | - | Fine in principle although we do not really see the benefit. Would like to see how this translates in the specification |
| Nokia | Agree | OK for the rewording from OPPO. |
| Xiaomi | Agree |  |
| NEC | Agree | Wording can align with NR NTN |
| ZTE | Agree | Fine to align with NR NTN. |
| Qualcomm | Agree |  |
| Sequans | Agree |  |
| Ericsson | Disagree | It must be clear that if the reconfig leads to the triggering condition for being fulfilled (for example when the offset is decreased), then a report SHALL be triggered even the UE has reported the TA to the current serving cell. A small rewording is needed. |

**[Rapporteur summary]:**

12 out of 13 companies agree.

**Proposal 6: (12/13) RAN2 to clarify the previous agreement as: Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA to current serving cell before (during this connection), the UE triggers a TA reporting. (can further check this during the implementation in the MAC CR). (aligned with NR NTN)**

The next question is: how should the UE trigger TA during handover, when handover command uses delta configuration. Some open issues are like:

1. Whether the event configuration in reconfiguration message uses NEED OR or NEED ON?
2. Whether target cell can use delta configuration for the event configuration in handover command?
3. If event configuration is absent in handover command which supports delta configuration and if target cell’s SI disables TA reporting during RACH, how should the UE trigger TA reporting after handover? Should it directly triggered TA reporting?

**Question 7: companies can provide input for the following open issues.**

1. **Whether the event configuration in reconfiguration message uses NEED OR or NEED ON?**
2. **Whether target cell can use delta configuration for the event configuration in handover command?**
3. **If event configuration is absent in handover command which supports delta configuration and if target cell’s SI disables TA reporting during RACH, should the UE trigger TA reporting after handover?**

|  |  |  |
| --- | --- | --- |
| **Company** | 1. **NEED OR or NEED ON?** 2. **Yes or No?** 3. **Yes or No? if no, how should UE trigger TA reporting?** | **Additional comments** |
| MediaTek | 1. OR 2. No 3. Yes | We think Question (3) should be the baseline. |
| OPPO | 1. NEED ON 2. Yes 3. Yes | We think it is reasonable to define the TA event configuration as Need ON to support delta configuration. In this way, if a UE is configured with a TA reporting event in the source cell, and if the TA reporting event configuration is absent in the handover command, it means the UE is configured with the same TA reporting event in the target cell as that in the source cell. In this case, UE should trigger TA report. Otherwise, we may have the issue of TA report initiation, if the target cell sets the indication in SI as “disabled” |
| Intel | (1) NEED ON  (2) Yes  (3) Yes |  |
| Apple | 1. Need OR 2. Yes 3. Yes | On (1), ON would also work |
| Lenovo | 1. Need OR 2. Yes 3. Yes |  |
| Huawei, HiSilicon | (1) Need ON  (2) Yes  (3) No | We don’t understand either the issue or the question.   1. (2) By default, delta configuration should be the baseline whether in the same cell or in a different cell.   For (3), we think it is up to the eNB to trigger the TA report either by setting the ta-report in MobilityControlInfo (note that the eNB can set the ta-report in the HO command differently from System information) or by including again the ta-EventConfiguration in the reconfiguration message. |
| Nokia | 1. Need ON 2. Yes 3. Yes | For (1), Need ON is needed to support delta configuration in RRC Reconfiguration.  For (2), we would assume target node can decide to release previous reporting configuration or modify it as delta configuration.  For (3), OK to support it to trigger the first TA report in new cell. |
| Xiaomi | (1) Need OR or Need OM  (2) Slightly No  (3) Yes | To support delta configuration, it requires explicit release indication of the configuration. It seems unnecessary for this small field.  But if people still want to support delta configuration. Need code should be Need M instead of Need N. Need N is only for one-shot configuration. Given the trigger event will be used all the time, Need M is required.  [Rapp]: I assume Xiaomi meant NEED ON when referring to NEED M, because NEED M is only applied for NR. |
| NEC | NEED ON  Yes  Yes |  |
| ZTE | (1) Need ON  (2) Yes  (3) No | We also think it is up to the eNB to trigger the TA report, e.g., by including again the ta-EventConfiguration in the reconfiguration message. |
| Qualcomm | 1. Need ON 2. Yes 3. No | We don’t get the option 3, that dedicated configuration is not for initial RACH to a cell. |
| Sequans | (1) Need ON  (2) Yes  (3) ?? | We don't understand the (3)  Even if delta configuration is used, it should be considered as a reconfiguration (if configured in the source cell) and initial TA report in target should be sent. |
| Ericsson | (1) NEED OR  (2) No  (3) no |  |

**[Rapporteur summary]:**

Firstly, NEED ON is the pre-condition for delta configuration. During reply:

NEED ON: 10

NEED OR: 5

Whether target cell can use delta configuration for the event configuration in handover command?

Yes: 10

No: 3

If event configuration is absent in handover command which supports delta configuration and if target cell’s SI disables TA reporting during RACH, should the UE trigger TA reporting after handover?

Yes: 9

No: 4

Given majority companies’ views, following are proposed.

**Proposal 7a: (10/13) Use NEED ON for the event configuration in reconfiguration message.**

**Proposal 7b: (10/13) Target cell can use delta configuration for the event configuration in handover command.**

**Proposal 7c: (9/13) If event configuration is absent in handover command which supports delta configuration and if target cell’s SI disables TA reporting during RACH, the UE triggers TA reporting after handover.**

### 2.1.5 TA reporting aligned with NR NTN?

In pre-discussions, all companies agree that threshold-based TA-Trigger will align with NR-NTN. In Monday’s session, some company wanted to clarify this only applies to TA value reporting.

|  |
| --- |
| **Proposal 12: (17/17)** **Threshold-based TA-Trigger for TA value reporting will align with NR-NTN.** |

**Question 8: Do companies agree to P12 above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree |  |
| Intel | Agree |  |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Agree |  |
| Nokia | Agree |  |
| Xiaomi | Agree |  |
| NEC | Agree |  |
| ZTE | Agree |  |
| Qualcomm | Agree |  |
| Sequans | Agree |  |
| Ericsson | Agree |  |

**[Rapporteur summary]:**

All companies agree.

**Proposal 8: (13/13) Threshold-based TA-Trigger for TA value reporting will align with NR-NTN.**

*Configuration of TA report triggering event*

It is summarized in R2-2203721 that all the 4 contributions (R2-2203002, R2-2203052, R2-2203080 and R2-2203483) on configuration of event triggered TA report have suggested using of an offset threshold for event triggered TA report configuration.

This is also discussed in NR-NTN offline: “**[****Pre117-e][NTN][101] RRC open issues**”, with report available in R2-2203154.Based on all the Tdoc contributions and progress in NR-NTN, following proposal is suggested by the AI summary’s rapporteur.

|  |
| --- |
| **Proposal 4a: Configuration of event triggered TA report will include TA offset threshold between current TA and the last successfully reported TA (similar to NR-NTN). FFS: The value of the TA offset threshold (consider possible to align with NR-NTN values).** |

**Question 9: Do companies agree to P4a above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree |  |
| Intel | Agree |  |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Agree |  |
| Nokia | Disagree | RAN2 already agreed below in RAN2#116bis. There is no need to repeat the agreement.  **=> Reuse NR NTN’s TA reporting trigger event in IoT NTN, i.e., a TA offset threshold between current TA and the last successfully reported TA is used for event-triggered TA reporting. FFS for location used for TA reporting purpose** |
| Xiaomi | Agree |  |
| NEC | Agree |  |
| ZTE | Agree |  |
| Qualcomm | Agree |  |
| Sequans | Agree |  |
| Ericsson | Agree |  |

**[Rapporteur summary]:**

12 companies agree. One company don’t think we need to repeat the agreement. Rapporteur thinks anyway it is not exactly the same as the previous agreement and there is no harm to agree to this.

**Proposal 9: (12/13) Configuration of event triggered TA report will include TA offset threshold between current TA and the last successfully reported TA (similar to NR-NTN). FFS: The value of the TA offset threshold (consider possible to align with NR-NTN values).**

*Triggering SR?*

There is a left open issue in User Plane on “***whether SR can be triggered if there is no available or sufficient UL-SCH resources for the triggered TA reporting***”. It is common with NR NTN and also under discussion in “[Pre117-e][NTN][103] MAC open issues (InterDigital). Discussion points will be kicked off once NR NTN decision has been taken.

### 2.1.6 Extension of *sr-ProhibitTimer*

How to extend *sr-ProhibitTimer* was discussed in [6]. It states that in NR, sr-ProhibitTimer is signalled as a value in the unit of ms so it is straightforward to extend the value range to take into account the RTT in NTN. In NB-IoT and eMTC, sr-ProhibitTimer is signalled as a value in number of SR period(s). The length of a SR period can take very different values depending on the configuration, i.e. 1ms, 2ms, 5ms, 10ms, 20ms, 40ms and 80ms for eMTC and 40ms, 80ms, 160ms, 240ms, 320ms, 640ms, 1280ms, 2560 ms, 5120 ms for NB-IoT. Thus it seems better to add an offset to the signalled value of the timer length.

During pre-discussions, 13 out of 17 companies preferred to follow NR NTN and add more extended values (in number of SR periods).

|  |
| --- |
| **Proposal 13: (13/17)** **Regarding how to extend sr-ProhibitTimer in IoT NTN, follow NR NTN and add more extended values (in number of SR periods).** |

**Question 10: Do companies agree to P13 above? If you agree, please suggest the added values.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Disagree | Unlike NR NTN, the sr-ProhibitTimer in LTE in unit of SR periods. If we extend sr-ProhibitTimer by adding more values, we may need to define many values to accommodate to different SR periods. We think it is more straightforward to extend the timer by UE-eNB RTT, where UE-eNB RTT should be rounded up to [integer](javascript:;) [multiples](javascript:;) of SR periods |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Disagree | 1) There are many differences between IOT-NTN and NR NTN which makes NR approach not suitable:  1. IOT NTN signalling uses Integer not Enumerated, which does not allow gaps in the range  2. in IOT NTN, the SR period is not fixed and can vary widely based on the SR resource configuration.  In NR, they have added 8 values. One of the value corresponds to the max legacy value + the max RTT (542 ms)  if we extend the timer value in eMTC, then we need a value equal to 549 for the case SR period =1ms which means extending the range to INTEGER (8…550) which requires 7 additional bits.  Even if we add the new values as enumerated (which is not really a straightforward extension), we will need to add extended values for the different periodicities, which will lead to many additional values.  2) on the other hand, it is straightforward to add a delay/offset, (independent of the SR period) to the existing timer. The offset can be signalled by the network to provide the same flexibility as in NR. The offset can be in ms and rounded by the UE to an multiple of SR periods  By analogy with NR, the offset could have the range { ms80, ms240, ms400, ms560} or { ms40, ms80, ms160, ms240, ms320, ms400 ms480, ms560} if finer granularity is needed. |
| Nokia | Agree, but | Fine to go NW signalled offset as indicated by Huawei if it is majority view. |
| Xiaomi | Agree |  |
| NEC | Agree with comment | As same as for NR NTN. First it should be possible to configure value less than RTT.  With this principle, either 1) follow NR NTN to define a new IE once it is configured, UE ignore the existing IE or 2) value in new IE is added on top of the value of existing IE, |
| ZTE | Agree | It seems NR NTN still allow smaller value than RTT to be configured, then maybe the option of “adding an offset” is not so flexible.  With unit of SR period, when determine the value range of *sr-ProhibitTimer*, we need to do some conversion. We think we need to ensure the required maximum SR prohibit time can be achieved in the case of minimum SR period (1ms for eMTC and 40ms for NB-IoT). So the value range is calculated as follows:   * For eMTC:   + For LEO NTN, the maximum required SR prohibit time can be 32 (i.e., 4ms\*7/1ms=28, and ceiling to a value with 2^n=32) and minimum is 4ms. For GEO NTN, the maximum required SR prohibit time can be 4096 (i.e., 541ms\*7/1ms=3787, and ceiling to a value with 2^n=4096) and minimum is 541ms. After merge, we propose the value of *sr-ProhibitTimer* is extended to INTEGER (1…4096) * For NB-IoT:   + Mainly considering GEO NTN case, the maximum required SR prohibit time can be 128 (i.e., 541ms\*7/40ms=94.675, and ceiling a value with 2^n =128). We propose the value of *sr-ProhibitTimer* is extended to INTEGER (1…128)   With Option 2, we think the legacy configure rules which may take into account the network scheduling flexibility and tolerable UL/DL transmission loss can be kept as much as possible. |
| Qualcomm | Agree but | Just calculate the new values in terms of periodicity.  But also we agree with Huawei, we could just add delay offset for IoT case. |
| Sequans | Agree | But fine to reconsider if there is an issue |
| Ericsson | Agree |  |

**[Rapporteur summary]:**

Agree: 10, but many companies didn’t explain what are the suggested values.

Disagree: 4

Based on majority views, following is proposed.

**Proposal 10: (10/13) Regarding how to extend sr-ProhibitTimer in IoT NTN, follow NR NTN and add more extended values (in number of SR periods). FFS which values.**

## RLC t-Reordering timer extension

NR NTN has agreed to extend t-Reassembly timer: {ms210, ms220, ms340, ms350, ms550, ms1100, ms1650, ms2200}. During pre-dicussions, slight majority companies preferred to add ms2200 and ms3200, and there is clear majority view on whether to add any other values between 200 ms and 1600 ms.

|  |
| --- |
| **Proposal 15: (9/17) On extending RLC t-Reordering timer for IoT NTN, RAN2 to add values ms2200 and ms3200. RAN2 can further discuss if to add any other values between ms200 and ms1600.** |

**Question 11: Do companies agree to extend RLC t-Reordering timer by adding values {ms2200, ms3200}?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree |  |
| Intel | Agree |  |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Agree |  |
| Nokia | Agree |  |
| Xiaomi | Agree |  |
| NEC | Agree |  |
| ZTE | Agree |  |
| Qualcomm | Agree |  |
| Sequans | Agree |  |
| Ericsson | Agree |  |

**[Rapporteur summary]:**

All companies agree.

**Proposal 11: (13/13) Extend RLC t-Reordering timer by adding values {ms2200, ms3200}.**

**Question 12: Any other values between ms200 and ms1600 are needed for extending RLC t-Reordering timer?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes or No** | **Additional comments (any suggested values if Yes?)** |
| MediaTek | No |  |
| OPPO |  | Maybe we need a very finer granularity. But we are ok to go with majority. |
| Apple | No | We don’t see the value of adding finer granularity, esp. for IOT scenarios. |
| Lenovo | No |  |
| Huawei, HiSicion | No for NB-IoT | Not needed for NB-IoT.  For eMTC, probably no needed but fine to follow the majority view |
| Nokia | - | IoT NTN service is assumed as delay tolerant, it is no need to support very finer granularity but we are fine to add some values between ms200 and ms1600. |
| Xiaomi | No |  |
| NEC | No | But can go with majority |
| ZTE | No |  |
| Qualcomm | No |  |
| Sequans |  | No strong view |
| Ericsson | No |  |

**[Rapporteur summary]:**

All companies are fine not to add any finer values.

**Proposal 12: (13/13) Do not add values between ms200 and ms1600 for extending RLC t-Reordering timer.**

## PDCP discardTimer extension

NR NTN has agreed to introduce a new discardTimerExt-r17 IE with a new value ms2000. During pre-discussion, 13 out of 17 companies prefer to introduce a new discardTimer value ms2000 for eMTC over NTN. Regarding the concerns on larger value than t-Reordering timer (if ms2200 or ms3200 is configured for t-Reordering timer), rapporteur assumes that network can configure discardTimer as “infinite” in such case.

|  |
| --- |
| **Proposal 16: (13/17) RAN2 to introduce a new discardTimer value ms2000 for eMTC over NTN.** |

**Question 13: Do companies agree to P16 above?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
| MediaTek | Agree |  |
| OPPO | Agree |  |
| Intel | Agree |  |
| Apple | Agree |  |
| Lenovo | Agree |  |
| Huawei, HiSilicon | Agree |  |
| Nokia | Agree |  |
| Xiaomi | Agree |  |
| NEC | Disagree | We prefer to have higher value(s) to match the higher t-reordering timer value, considering anyway new IE is needed (no spare bit for extension). |
| ZTE | Agree | But ms3000 still can be additionally considered for eMTC NTN. |
| Qualcomm | Agree |  |
| Sequans | Agree | We are also ok to have an additional larger value to match higher t-reordering. |
| Ericsson | Agree w comment | Higher values are needed to support new QCI for satellites. We suggest 3000 ms |

**[Rapporteur summary]:**

Agree: 12

Disagree: 1

Two companies suggest to consider adding ms3000.

Based on majority views, following is proposed.

**Proposal 13: (12/13) Introduce a new discardTimer value ms2000 for eMTC over NTN. FFS whether to add ms3000.**

# 3. Round-1 summary

**Proposal 1: (13/13) Use a reserved LCID for the MAC CE corresponding K\_Offset.**

**Proposal 2a: (12/12) For NB-IoT, use a reserved LCID for the TA Report MAC CE.**

**Proposal 2b: (8/12) For eMTC, use a reserved eLCID for the TA Report MAC CE.**

**Proposal 3: (13/13) On logical channel priority, put the UE-specific TA report MAC CE between “MAC control element for AUL confirmation” and “MAC control element for BSR, with exception of BSR included for padding”.**

**Proposal 4a: (13/13) During RA procedure for RRC re-establishment procedure, the UE should trigger TA report if an indication is broadcasted by the target cell’s SI. (aligned with NR NTN)**

**Proposal 4b: (13/13) During RA procedure for handover, the UE should trigger TA report if the target cell indicates this in the handover command. (aligned with NR NTN)**

**Proposal 5: (13/13) Other than re-establishment (TA reporting controlled by target cell’s SI) and handover procedure (TA reporting controlled by HO command), TA reporting in connected mode is not controlled by enabling/disabling indication in SI. (aligned with NR NTN)**

**Proposal 6: (12/13) RAN2 to clarify the previous agreement as: Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA to current serving cell before (during this connection), the UE triggers a TA reporting. (can further check this during the implementation in the MAC CR). (aligned with NR NTN)**

**Proposal 7a: (10/13) Use NEED ON for the event configuration in reconfiguration message.**

**Proposal 7b: (10/13) Target cell can use delta configuration for the event configuration in handover command.**

**Proposal 7c: (9/13) If event configuration is absent in handover command which supports delta configuration and if target cell’s SI disables TA reporting during RACH, the UE triggers TA reporting after handover.**

**Proposal 8: (13/13) Threshold-based TA-Trigger for TA value reporting will align with NR-NTN.**

**Proposal 9: (12/13) Configuration of event triggered TA report will include TA offset threshold between current TA and the last successfully reported TA (similar to NR-NTN). FFS: The value of the TA offset threshold (consider possible to align with NR-NTN values).**

**Proposal 10: (10/13) Regarding how to extend sr-ProhibitTimer in IoT NTN, follow NR NTN and add more extended values (in number of SR periods). FFS which values.**

**Proposal 11: (13/13) Extend RLC t-Reordering timer by adding values {ms2200, ms3200}.**

**Proposal 12: (13/13) Do not add values between ms200 and ms1600 for extending RLC t-Reordering timer.**

**Proposal 13: (12/13) Introduce a new discardTimer value ms2000 for eMTC over NTN. FFS whether to add ms3000.**

# Round-2 Discussion

The left open issues from the first-round discussion includes the naming and field description for the two new MAC CEs and the intention is to align with NR NTN. Below are the NR NTN related agreements made during this meeting.

1. "UE-specific TA MAC CE" consists of only one field with length 14 bits (+ 2 reserved bits), which contains the UE estimate of full UE-specific TA
2. "Differential UE-Specific K\_Offset MAC CE" consists of only one field with length 6 bits (+2 reserved bits), which contains the Differential UE-Specific K\_Offset
3. The name “UE-Specific TA MAC CE” is revised to “Timing Advance Report MAC CE”
4. Revise the field description of “UE-Specific MAC CE” as follows: Timing Advance: In FR1, the Timing Advance field indicates the least integer number of slots greater than or equal to the Timing Advance value (see TS 38.211 section 4.3.1). The length of the field is 14 bits.
5. The name “Differential UE-Specific K\_Offset MAC CE” is revised to “Differential Koffset MAC CE”.

For the two MAC CEs’ names, rapporteur thinks that IoT NTN can directly reuse the ones agreed for NR NTN, i.e. “Timing Advance Report MAC CE” and “Differential Koffset MAC CE”.

For the field description of “Timing Advance Report MAC CE”, some slight update is needed to reflect the difference from NR spec, e.g. we don’t need to mention FR1 and the corresponding RAN1 spec reference needs to be updated. Here is the suggested field description.

Timing Advance: The Timing Advance field indicates the least integer number of slots greater than or equal to the Timing Advance value (see TS 36.211 section 8.1). The length of the field is 14 bits.

For the field description of “Differential Koffset MAC CE”, the current 38.321 running CR used for the following text:

- R: Reserved bit, set to 0;

- Differential Koffset: This field contains the differential Koffset. The length of the field is 6 bits.

IoT NTN can align with NR NTN on this and make corresponding update in future running CR discussion.

In summary, following are the proposals to be aligned with NR NTN.

|  |
| --- |
| **Proposal 1: The two MAC CEs’ names are “Timing Advance Report MAC CE” and “Differential Koffset MAC CE”.**  **Proposal 2: Adopt the following field description for the “Timing Advance Report MAC CE”:**  **- R: Reserved bit, set to 0;**  **- Timing Advance: The Timing Advance field indicates the least integer number of slots greater than or equal to the Timing Advance value (see TS 36.211 [7] section 8.1). The length of the field is 14 bits.**  **Proposal 3: Adopt the following field description for the “Differential Koffset MAC CE”:**  **- R: Reserved bit, set to 0;**  **- Differential Koffset: This field contains the differential Koffset. The length of the field is 6 bits.** |

**Question 1: Do companies agree to the above proposals 1-3?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
|  |  |  |
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|  |  |  |

Another left open issue in User Plane is “***whether SR can be triggered if there is no available or sufficient UL-SCH resources for the triggered TA reporting***”. In Tuesday’s online session, following has been agreed for NR NTN after companies compromised on the part of optionally configurable and UE capability. It would be straightforward and save online discussion if IoT NTN can follow the same agreements as the situation is the same.

1. If a TA report is triggered and there are no available UL-SCH resources, the network may optionally configure UE to trigger an SR. A UE capability is introduced for this.

**Question 2: Do companies agree that “Align with NR NTN. If a TA report is triggered and there are no available UL-SCH resources, the network may optionally configure UE to trigger an SR. A UE capability is introduced for this”?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree/Disagree** | **Additional comments** |
|  |  |  |
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|  |  |  |
|  |  |  |
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|  |  |  |

# 5. Round-2 summary

*TBD…*

# 6. References

1. R2-2200253, Discussion on UP impact for IoT over NTN, OPPO
2. R2-2200692, Discussion on TA information reporting for IoT NTN, CATT
3. R2-2200698, Remaining FFSs on UP in IoT NTN, ZTE Corporation, Sanechips
4. R2-2200878, Remaining issues on UP aspects for IoT-NTN, CMCC
5. R2-2201010, On User Plane left issues for IoT NTN, Nokia, Nokia Shanghai Bell
6. R2-2201454, User plane for IOT NTN, Huawei, HiSilicon
7. R2-2201547, Location Reporting in RRC\_CONNECTED, Interdigital, Inc.
8. R2-2201631, User plane aspects of NB-IoT and LTE-M in NTNs, Ericsson