3GPP TSG RAN WG2 Meeting #119-e R2-2208757

**Electronic, 17th – 26th Aug. 2022**

**Agenda item:** 7.2.2

**Source:** MediaTek

**Title:** Report of [AT119-e][106][IoT-NTN]MAC corrections (Mediatek)

**Document for:**  Discussion and decision

# Introduction

This report summarizes the email discussion below that took place during RAN2#119-e meeting:

* [AT119-e][106][IoT-NTN] MAC corrections (Mediatek)

Initial scope: Discuss remaining MAC corrections

Initial intended outcome: Summary of the offline discussion with e.g.:

* List of proposals for agreement (if any)
* List of proposals that require online discussions
* List of proposals that should not be pursued (if any)

Initial deadline (for companies' feedback): Monday 2022-08-22 1200 UTC

Initial deadline (for rapporteur's summary in R2-2208757): Monday 2022-08-22 2000 UTC

Proposals marked "for agreement" in R2-2208757 not challenged until Tuesday 2022-08-23 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue offline).

# Reference

The following documents are treated in this email discussion:

Contention resolution timer

[1] [R2-2207824](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2207824%20Discussion%20on%20contention%20resolution%20timer%20in%20IoT%20NTN.docx) Discussion on contention resolution timer in IoT NTN ZTE Corporation, Sanechips discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN-Core

* Discussed in offline 104

[2] [R2-2208563](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2208563%20Issue%20on%20false%20claiming%20of%20contention%20resolution%20failure.docx) Issue on false claiming of contention resolution failure for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN

[3] [R2-2208754](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2208754.zip) [offline-104] CR timer ZTE Corporation discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN

deltaPDCCH

[4] [R2-2207064](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2207064%20Correction%20on%20the%20definition%20of%20deltaPDCCH%20in%20%28UL%29%20HARQ%20RTT%20Timer%20for%20NB-IoT%20NTN.docx) Correction on the definition of deltaPDCCH in (UL) HARQ RTT Timer for NB-IoT NTN OPPO CR Rel-17 36.321 17.1.0 1542 - F LTE\_NBIOT\_eMTC\_NTN

[5] [R2-2207817](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2207817%2036321CR_Correction%20for%20RTToffset%20in%20HARQ%20RTT%20timers.docx) 36321CR\_Corrections for RTToffset in HARQ RTT timers ZTE Corporation, Sanechips CR Rel-17 36.321 17.1.0 1545 - F LTE\_NBIOT\_eMTC\_NTN-Core

Triggering of TA reporting

[6] [R2-2207599](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2207599%20Discussion%20on%20the%20triggering%20of%20TA%20reporting.doc) Discussion on the triggering of TA reporting Huawei, HiSilicon discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN

[7] [R2-2208387](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2208387%20Correction%20on%20TA%20Reporting%20Triggering%20Condition%20for%20IoT%20NTN%20in%20TS%2036.321%20final%20clean.docx) Correction on TA Reporting Triggering Condition for IoT NTN in TS 36.321 CATT CR Rel-17 36.321 17.1.0 1546 - F LTE\_NBIOT\_eMTC\_NTN

PDCCH-based HARQ feedback

[8] [R2-2207349](file:///C%3A%5CData%5C3GPP%5CExtracts%5C36321_CR1543_%28Rel-17%29_R2-2207349%20PDCCH%20based%20HQ%20FB.docx) Clarification on PDCCH-based HARQ feedback Qualcomm Incorporated CR Rel-17 36.321 17.1.0 1543 - F LTE\_NBIOT\_eMTC\_NTN

Misc issues

[9] [R2-2208664](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2208664%20-%20R17%20IoT%20NTN%20User%20Plane%20issues.docx) R17 IoT NTN User Plane issues Ericsson discussion Rel-17

# Contact information

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# Discussion

## Contention resolution timer

In the first week of RAN2 #119-e, the following agreement was achieved regarding to the offline discussion report [3], in this offline discussion, we continue to discuss the exact details of expiration of mac-ContentionResolutionTimer.

Agreements:

1. RAN2 needs to address the issue of unintended declaration of Contention Resolution failure after MSG3 is retransmitted.
2. RAN2 confirms that blind Msg3 retransmission is supported in IoT NTN.
3. RAN2 specifies that expiration of mac-ContentionResolutionTimer is not considered as contention resolution failure (or UE ignores expiration of mac-ContentionResolutionTimer) when a Msg3 retransmission is scheduled. Continue the discussion on the exact details
4. The option that UE stops mac-ContentionResolutionTimer when a Msg3 retransmission is scheduled is not pursued.

RAN2 understanding:

1. RAN2 common understanding is that UE doesn’t monitor PDCCH if CR timer is not running (no specification impact)

Text proposals in R2-2207824 [1] or R2-2208563 [2] make not many differences. Furthermore, both the proponents have agreed to converge on the text proposals made in R2-2207824 [1]. Therefore, the rapporteur is using the text proposal in R2-2207824 [1] as the discussion baseline:

**Corresponding Changes in 36.321**

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| - if *mac-ContentionResolutionTimer* expires:- for BL UEs or UEs in CE or NB-IoT UEs:- if notification of a reception of a PDCCH transmission has been received from lower layers before *mac-ContentionResolutionTimer* expired; and- if the MAC PDU received until the subframe that contains the last repetition of the corresponding PDSCH transmission is successfully decoded; and- if the MAC PDU contains a UE Contention Resolution Identity MAC control element; and- if the UE Contention Resolution Identity included in the MAC control element matches the 48 first bits of the CCCH SDU transmitted in Msg3: consider this Contention Resolution successful and finish the disassembly and demultiplexing of the MAC PDU;- set the C-RNTI to the value of the Temporary C-RNTI;- discard the Temporary C-RNTI;- consider this Random Access procedure successfully completed.- else:- if Msg3 is transmitted on a non-terrestrial network:- if no PDCCH transmission addressed to its Temporary C-RNTI indicating uplink grant corresponding to a Msg3 retransmission is received before *mac-ContentionResolutionTimer* expired:- discard the Temporary C-RNTI;- consider this Contention Resolution not successful.- else:- discard the Temporary C-RNTI;- consider this Contention Resolution not successful.- except for BL UEs or UEs in CE or NB-IoT UEs:- discard the Temporary C-RNTI;- consider the Contention Resolution not successful. |

**Question 1:** Do companies agree on the proposed change in TS 36.321 R17?

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| **Company** | **Yes/No** | **Additional comments** |
|  OPPO | Yes |  |
| Qualcomm | No | Keep legacy “else” but add new “else if Msg3 is transmitted on a non-terrestrial network”. |
| CATT | Yes |  |
|  Huawei, HiSilicon |  See comments | We agree with the intention but have some concern on the exact wording. The mac-contentionResolutionTimer is started or restarted after MSG3 transmission/retransmission instead of PDCCH reception. So it is not precise to mention only PDCCH reception which is not equal to MSG3 retransmission in this case. Specifically, it would be more accurate to specify as follows:- else:- if Msg3 is transmitted on a non-terrestrial network:- if no Msg3 retransmission is performed on the uplink grant indicated by PDCCH addressed to its Temporary C-RNTI received before *mac-ContentionResolutionTimer* expired:- discard the Temporary C-RNTI;- consider this Contention Resolution not successful.- else:- discard the Temporary C-RNTI;- consider this Contention Resolution not successful. |
| ZTE | Yes | For QC’s comment, we think the logic is not clear if there will be one set if(s) with two parallel else(s).For HW’s comment, seems ok. But a small issue may be that, it may not cover the case that CR timer expires after reception of Msg3 retransmission grant and before start of Msg3 retransmission.But I assume the gap between reception of Msg3 retransmission grant and start of Msg3 retransmission may be tiny and I also assume the wording proposed by Huawei, e.g., “perform” just means Msg3 retransmission is ongoing but not means “finish”, then the wording suggested by Huawei is acceptable to me. |
| Nokia | Yes | The text is aligned with NR NTN.To Huawei: it was discussed in NR NTN on whether the time should refer to Msg3 retransmission or PDCCH reception. It was agreed that “PDCCH reception” should be referred, since the point of “PDCCH reception” can cover the case where the CR timer expired between PDCCH reception and Msg3 retransmission (in which CR failure should not be declared because the timer will be restarted later). |
| Lenovo | Yes |  |
| Ericsson | No | We slightly prefer the R2-2208563 version, but it has a small issue, we propose:- if *mac-ContentionResolutionTimer* expires:- for BL UEs or UEs in CE or NB-IoT UEs:- if notification of a reception of a PDCCH transmission has been received from lower layers before *mac-ContentionResolutionTimer* expired; and- if the MAC PDU received until the subframe that contains the last repetition of the corresponding PDSCH transmission is successfully decoded; and- if the MAC PDU contains a UE Contention Resolution Identity MAC control element; and- if the UE Contention Resolution Identity included in the MAC control element matches the 48 first bits of the CCCH SDU transmitted in Msg3:- consider this Contention Resolution successful and finish the disassembly and demultiplexing of the MAC PDU;- set the C-RNTI to the value of the Temporary C-RNTI;- discard the Temporary C-RNTI;- consider this Random Access procedure successfully completed.- else if Msg3 was transmitted on a non-terrestrial network - if no notification of a reception of a PDCCH transmission addressed to the Temporary C-RNTI indicating an uplink grant for a Msg3 retransmission was received before mac-ContentionResolutionTimer expired:- discard the Temporary C-RNTI;- consider the Contention Resolution not successful.- else:- discard the Temporary C-RNTI;- consider this Contention Resolution not successful.- except for BL UEs or UEs in CE or NB-IoT UEs:- discard the Temporary C-RNTI;- consider the Contention Resolution not successful.If based on R2-2207824, we think something like this is needed:- if *mac-ContentionResolutionTimer* expires:- for BL UEs or UEs in CE or NB-IoT UEs:- if notification of a reception of a PDCCH transmission has been received from lower layers before *mac-ContentionResolutionTimer* expired; and- if the MAC PDU received until the subframe that contains the last repetition of the corresponding PDSCH transmission is successfully decoded; and- if the MAC PDU contains a UE Contention Resolution Identity MAC control element; and- if the UE Contention Resolution Identity included in the MAC control element matches the 48 first bits of the CCCH SDU transmitted in Msg3: consider this Contention Resolution successful and finish the disassembly and demultiplexing of the MAC PDU;- set the C-RNTI to the value of the Temporary C-RNTI;- discard the Temporary C-RNTI;- consider this Random Access procedure successfully completed.- else:- if Msg3 was transmitted on a non-terrestrial network:- if no notification of a reception of a PDCCH transmission addressed to the Temporary C-RNTI indicating an uplink grant for a Msg3 retransmission was received before *mac-ContentionResolutionTimer* expired:- discard the Temporary C-RNTI;- consider this Contention Resolution not successful.- else:- discard the Temporary C-RNTI;- consider this Contention Resolution not successful.- except for BL UEs or UEs in CE or NB-IoT UEs:- discard the Temporary C-RNTI;- consider the Contention Resolution not successful. |

## deltaPDCCH

In the CRs R2-2207064 [4] and R2-2207817 [5], the following changes to TS 36.321 for R17 are proposed. It was discussed in the first week of RAN2 119e, and it was agreed with principle.

Companies are invited to confirm the wording.

**Corresponding Changes in 36.321**

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| 7.7 HARQ RTT TimersFor each serving cell, in case of FDD configuration not configured with *subframeAssignment-r15* and in case of Frame Structure Type 3 configuration on the serving cell which carries the HARQ feedback for this serving cell the HARQ RTT Timer is set to 8 subframes. For each serving cell, in case of TDD configuration or FDD with *subframeAssignment-r15* configured on the serving cell which carries the HARQ feedback for this serving cell the HARQ RTT Timer is set to k + 4 subframes, where k is the interval between the downlink transmission and the transmission of associated HARQ feedback, as indicated in clauses 10.1 and 10.2 of TS 36.213 [2], and for an RN configured with *rn-SubframeConfig*, as specified in TS 36.331 [8] and not suspended, as indicated in Table 7.5.1-1 of TS 36.216 [11].For each serving cell, for HARQ processes scheduled using Short Processing Time (TS 36.331 [8]) the HARQ RTT Timer is set to 6 subframes for FDD and Frame Structure Type 3 and set to k + 3 subframes for TDD, where k is the interval between the downlink transmission and the transmission of associated HARQ feedback, as indicated in clauses 10.1 and 10.2 of TS 36.213 [2].For each serving cell, for HARQ processes scheduled using short TTI (TS 36.331 [8]) the HARQ RTT Timer is set to 8 TTIs if the TTI length is one slot or if *proc-Timeline* is set to n+4 set1, to 12 TTIs if *proc-Timeline* is set to n+6 set1 or n+6 set2 and to 16 TTIs if *proc-Timeline* is set to n+8 set2 for FDD and Frame Structure Type 3.For TDD short TTI the HARQ RTT Timer is set to k + 4 TTIs, where k is the interval between the downlink transmission and the transmission of associated HARQ feedback, as indicated in clauses 10.1 and 10.2 of TS 36.213 [2].For BL UEs and UEs in enhanced coverage, when single TB is scheduled by PDCCH the HARQ RTT Timer corresponds to 7 + N + RTToffset, where N is the used PUCCH repetition factor, where only valid (configured) UL subframes as configured by upper layers in *fdd-UplinkSubframeBitmapBR* are counted. In case of TDD, HARQ RTT Timer corresponds to 3 + k + N + RTToffset, where k is the interval between the last repetition of downlink transmission and the first repetition of the transmission of associated HARQ feedback, and N is the used PUCCH repetition factor, where only valid UL subframes are counted as indicated in clauses 10.1 and 10.2 of TS 36.213 [2].For BL UEs and UEs in enhanced coverage, when multiple TBs are scheduled by PDCCH and HARQ-ACK bundling is not configured, the HARQ RTT Timer corresponds to 7 + m \* N + RTToffset, where N is the used PUCCH repetition factor and m is the number of scheduled TBs as indicated in PDCCH, where only valid (configured) UL subframes as configured by upper layers in *fdd-UplinkSubframeBitmapBR* are counted.For BL UEs and UEs in enhanced coverage, when multiple TBs are scheduled by PDCCH and HARQ-ACK bundling is configured the HARQ RTT Timer corresponds to 7 + M \* N + RTToffset, where N is the used PUCCH repetition factor and M is the number of TB bundles as specified in clause 7.3 of TS 36.213 [2], where only valid (configured) UL subframes as configured by upper layers in *fdd-UplinkSubframeBitmapBR* are counted.For NB-IoT, when single TB is scheduled by PDCCH or when multiple TBs are scheduled for the interleaved case when HARQ-ACK bundling is configured the HARQ RTT Timer is set to k+3+N + RTToffset +deltaPDCCH subframes, where k is the interval between the last subframe of the downlink transmission and the first subframe of the associated HARQ feedback transmission and N is the transmission duration in subframes of the associated HARQ feedback, and deltaPDCCH is the interval starting from the subframe following the last subframe of the associated HARQ feedback transmission plus 3 + RTToffset subframes to the first subframe of the next PDCCH occasion.For NB-IoT, when multiple TBs are scheduled by PDCCH for the non-interleaved case or for the interleaved case when HARQ-ACK bundling is not configured, the HARQ RTT Timer is set to k+2\*N+1 + RTToffset +deltaPDCCH subframes where k is the interval between the last subframe of the downlink transmission and the first subframe of the first HARQ feedback transmission and N is the transmission duration in subframes of the associated HARQ feedback, and deltaPDCCH is the interval starting from the subframe following the last subframe of the last HARQ feedback transmission plus 1 + RTToffset subframes to the first subframe of the next PDCCH occasion.Except for NB-IoT and for HARQ processes scheduled using Short Processing Time and for short TTI, UL HARQ RTT Timer length is set to 4 subframes for FDD and Frame Structure Type 3, and set to kULHARQRTT subframes for TDD, where kULHARQRTT equals to the kPHICH value indicated in Table 9.1.2-1 of TS 36.213 [2] if the UE is not configured with upper layer parameter *symPUSCH-UpPts* for the serving cell, otherwise the kPHICH value is indicated in Table 9.1.2-3.For NB-IoT, when single TB is scheduled by PDCCH the UL HARQ RTT timer length is set to 4 + RTToffset +deltaPDCCH subframes, where deltaPDCCH is the interval starting from the subframe following the last subframe of the PUSCH transmission plus 3 + RTToffset subframes to the first subframe of the next PDCCH occasion.For NB-IoT, when multiple TBs are scheduled by PDCCH the UL HARQ RTT timer length is set to 1 + RTToffset +deltaPDCCH subframes, where deltaPDCCH is the interval starting from the subframe following the last subframe of the PUSCH transmission plus 1 + RTToffset subframes to the first subframe of the next PDCCH occasion.For HARQ processes scheduled using Short Processing Time (TS 36.331 [8]), the UL HARQ RTT Timer length is set to 3 subframes for FDD and for Frame Structure Type 3, and set to kULHARQRTT subframes for TDD, where kULHARQRTT equals the value indicated in Table 7.7-1 and Table 7.7-2.For HARQ processes scheduled using short TTI (TS 36.331 [8]), the UL HARQ RTT Timer length is set to 8 TTIs if the TTI length is one slot or if *proc-Timeline* is set to n+4 set1, to 12 TTIs if *proc-Timeline* is set to n+6 set1 or n+6 set2 and to 16 TTIs if *proc-Timeline* is set to n+8 set2 for FDD and Frame Structure Type 3. For TDD short TTI the UL HARQ RTT Timer is set to kULHARQRTT TTIs, where kULHARQRTT equals the value indicated in Table 7.7-3, Table 7.7-4 and Table 7.7-5. |

**Question 2:** Do companies agree on the proposed change in TS 36.321 R17?

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| **Company** | **Yes/No** | **Additional comments** |
|  OPPO | Yes | Proponent.  |
| Qualcomm | Yes |  |
| CATT | Yes |  |
| Huawei, HiSilicon | Yes |  |
| ZTE | Yes |  |
| Nokia | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

Another change in R2-2207817[5] was proposed for eMTC RTTOffset. It was agreed in the first week of RAN2 119e in principle. Companies are invited to comment on the corresponding TP in 36.321.

**Corresponding Changes in 36.321**

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| 7.7 HARQ RTT TimersFor each serving cell, in case of FDD configuration not configured with *subframeAssignment-r15* and in case of Frame Structure Type 3 configuration on the serving cell which carries the HARQ feedback for this serving cell the HARQ RTT Timer is set to 8 subframes. For each serving cell, in case of TDD configuration or FDD with *subframeAssignment-r15* configured on the serving cell which carries the HARQ feedback for this serving cell the HARQ RTT Timer is set to k + 4 subframes, where k is the interval between the downlink transmission and the transmission of associated HARQ feedback, as indicated in clauses 10.1 and 10.2 of TS 36.213 [2], and for an RN configured with *rn-SubframeConfig*, as specified in TS 36.331 [8] and not suspended, as indicated in Table 7.5.1-1 of TS 36.216 [11].For each serving cell, for HARQ processes scheduled using Short Processing Time (TS 36.331 [8]) the HARQ RTT is set to 6 subframes for FDD and Frame Structure Type 3 and set to k + 3 subframes for TDD, where k is the interval between the downlink transmission and the transmission of associated HARQ feedback, as indicated in clauses 10.1 and 10.2 of TS 36.213 [2].For each serving cell, for HARQ processes scheduled using short TTI (TS 36.331 [8]) the HARQ RTT is set to 8 TTIs if the TTI length is one slot or if *proc-Timeline* is set to n+4 set1, to 12 TTIs if *proc-Timeline* is set to n+6 set1 or n+6 set2 and to 16 TTIs if *proc-Timeline* is set to n+8 set2 for FDD and Frame Structure Type 3.For TDD short TTI the HARQ RTT is set to k + 4 TTIs, where k is the interval between the downlink transmission and the transmission of associated HARQ feedback, as indicated in clauses 10.1 and 10.2 of TS 36.213 [2].For BL UEs and UEs in enhanced coverage, when single TB is scheduled by PDCCH the HARQ RTT Timer corresponds to 7 + N + RTToffset, where N is the used PUCCH repetition factor, where only valid (configured) UL subframes as configured by upper layers in *fdd-UplinkSubframeBitmapBR* are counted for N. In case of TDD, HARQ RTT Timer corresponds to 3 + k + N + RTToffset, where k is the interval between the last repetition of downlink transmission and the first repetition of the transmission of associated HARQ feedback, and N is the used PUCCH repetition factor, where only valid UL subframes are counted for N as indicated in clauses 10.1 and 10.2 of TS 36.213 [2].For BL UEs and UEs in enhanced coverage, when multiple TBs are scheduled by PDCCH and HARQ-ACK bundling is not configured, the HARQ RTT Timer corresponds to 7 + m \* N + RTToffset, where N is the used PUCCH repetition factor and m is the number of scheduled TBs as indicated in PDCCH, where only valid (configured) UL subframes as configured by upper layers in *fdd-UplinkSubframeBitmapBR* are counted for m \* N.For BL UEs and UEs in enhanced coverage, when multiple TBs are scheduled by PDCCH and HARQ-ACK bundling is configured the HARQ RTT Timer corresponds to 7 + M \* N + RTToffset, where N is the used PUCCH repetition factor and M is the number of TB bundles as specified in clause 7.3 of TS 36.213 [2], where only valid (configured) UL subframes as configured by upper layers in *fdd-UplinkSubframeBitmapBR* are counted for M \* N. |

**Question 3:** Do companies agree on the proposed change in TS 36.321 R17?

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| **Company** | **Yes/No** | **Additional comments** |
|  OPPO | Yes | For RTToffset, all subframes should be counted. This change makes sense to avoid misunderstanding. |
| Qualcomm |  | Seems already clear the count is talking about N or m\*N. |
| CATT | Yes |  |
| Huawei, HiSilicon |  | Agree with QC. There is clear definition for RTToffset. No strong view.  |
| ZTE | Yes | We worry about the understanding that here “only valid UL subframes…are counted” means “only valid UL subframes…are counted for the whole time length”. So it’s better to clarify. |
| Nokia | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

## Triggering of TA reporting

In the contribution R2-2207599 [6], the company gives the following proposals:

1. **Remove “reconfiguration” from the triggering condition of TA report.**

In the R2-2208387 [7], the company contributes a similar CR :

1. Background of the issue:
* For TA reporting, the following agreement was achieved in RAN2#117-e meeting:
* 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)

But there is not any scenario that TA reporting can be triggered by reconfiguration of offsetThresholdTA with the precondition that the connected mode UE has not reported TA to current serving cell before, because the UE has reported the TA during RACH or when configured with TA reports.

1. Proposed changes in CR [7]:
* to remove “or reconfiguration” from “upon configuration or reconfiguration of offsetThresholdTA by upper layers, if the UE has not previously reported Timing Advance value to current Serving Cell;” in 5.4.9 Timing Advance Reporting.

**Corresponding Changes in 36.321**

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| 5.4.9 Timing Advance ReportingThe UE may be configured to report information about UE specific timing advance during a Random Access procedure and in RRC\_CONNECTED Mode.The Timing Advance reporting procedure is used in a non-terrestrial network to provide the eNB with an estimate of the UE's Timing Advance, see TTA in TS 36.211 [7] clause 8.1.Timing Advance reporting shall be triggered if any of the following events occur:- if triggered by upper layers;- upon configuration of *offsetThresholdTA* by upper layers, if the UE has not previously reported Timing Advance value to current Serving Cell;- if the variation between current information about Timing Advance and the last reported information about Timing Advance is equal to or larger than *offsetThresholdTA*, if configured. |

**Question 4:** Do companies agree on the proposed changes to TS 36.321 R17?

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| **Company** | **Yes/No** | **Additional comments** |
|  OPPO |  Yes |  |
| Qualcomm | Yes |  |
| CATT | Yes | Proponent |
| Huawei, HiSilicon | Yes |  |
| ZTE | Yes |  |
| Nokia | Yes |  |
| Lenovo | Yes |  |
| Ericsson | Yes |  |

## PDCCH-based HARQ feedback

In the CR R2-2207349 [8] the following change to TS 36.321 for R17 is proposed:

1. Background of the issue:
	* Maximum value of the UL DRX retransmission timer is 320 PDCCH subframes and minimum value is zero PDCCH subframe. As shown in figure below, this timer may expire before the UE can receive the PDCCH-based feedback or UL grant for the new transmission:
	* 
2. Proposed changes in CR [8]:
* If *mpdcch-UL-HARQ-ACK-FeedbackConfig* is configured, the *drx-ULRetransmissionTimer* is extended by RTToffset.

**Corresponding Changes in 36.321**

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| 5.7 Discontinuous Reception (DRX)*…**Text omitted**…*- if *mpdcch-UL-HARQ-ACK-FeedbackConfig* is configured and an UL HARQ-ACK feedback has not been received on PDCCH until the last repetition of the corresponding PUSCH transmission:- if connected to non-terrestrial networks, set the value of *drx-ULRetransmissionTimer* to *drx-ULRetransmissionTimer* plus RTToffset;- start or restart the *drx-ULRetransmissionTimer* for the corresponding HARQ process in the subframe containing the last repetition of the corresponding PUSCH transmission plus RTToffset;- if NB-IoT, stop *drx-RetransmissionTimer* for all DL HARQ processes. |

**Question 5:** Do companies agree on the intention of change?

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| **Company** | **Yes/No** | **Additional comments** |
|  OPPO |  No | The earliest UL HARQ-ACK feedback (when eNB has decoded the PUSCH using the first PUSCH repetition) that can reach the UE is after the subframe containing the first PUSCH repetition plus RTToffset. The detailed timing for (re)starting the *drx-ULRetransmissionTimer* may depend on whether RTToffset is larger than the UL\_REPETITION\_NUMBER of PUSCH.If it is larger than UL\_REPETITION\_NUMBER, the *drx-ULRetransmissionTimer* should be started after the subframe containing the first PUSCH repetition plus RTToffset, and it would be more reasonable to set the value of *drx-ULRetransmissionTimer* to *drx-ULRetransmissionTimer* plus UL\_REPETITION\_NUMBER.If RTToffset is smaller than the UL\_REPETITION\_NUMBER of PUSCH, UE should continuously monitor PDCCH by (re)starting the *drx-ULRetransmissionTimer* for the corresponding HARQ process in the subframe containing the last repetition of the corresponding PUSCH transmission without any offset. In this case, we think that the value of *drx-ULRetransmissionTimer* should be increased by RTToffset. |
| Qualcomm | Yes | We think the start of timer should not be changed. Only first change is sufficient. |
| ZTE | No | The main purpose of introducing *mpdcch-UL-HARQ-ACK-FeedbackConfig* is the early termination of PUSCH transmission.* If *mpdcch-UL-HARQ-ACK-FeedbackConfig* is configured and the duration of PUSCH repetition transmission (related to UL\_REPETITION\_NUMBER) is larger than RTT, UE may receive UL HARQ-ACK feedback or UL grant before the end of PUSCH repetition transmission, and stop the PUSCH transmission. That means the early termination feature take effect normally.
* If *mpdcch-UL-HARQ-ACK-FeedbackConfig* is configured and the duration of PUSCH repetition transmission is less than RTT, UE may receive UL HARQ-ACK feedback or UL grant after the end of PUSCH repetition transmission, early termination of PUSCH transmission cannot take effect. Therefore, in such scenario, the *mpdcch-UL-HARQ-ACK-FeedbackConfig* should not be configured. Then the HARQ RTT timer could enable *drx-ULRetransmissionTimer* being started after RTT.

Therefore, we see no issue in both cases. So no need of change. |
| Nokia | No | Since the issue mainly exist in GEO with maximum RTT 541ms where the UL DRX retransmission timer is not big enough, it is not necessary to extend the timer directly with RTToffset in all cases. Instead, the simplest way is to add more value in the range, e.g. {pp480, pp560}.We think above change is sufficient in Rel-17. |
| Lenovo | No | Agree with OPPO |
| Ericsson | No | Extending Retx timer will waste energy.First repetition is ambiguous, and may not be EXACTLY RTToffset earlier. |
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**Question 6:** If companies agree on the intention of the change, do companies agree on the proposed changes to TS 36.321 R17?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Additional comments** |
|  OPPO | No | See our reply to Q5. |
| Qualcomm | Yes with revision | - if connected to non-terrestrial networks, set the value of *drx-ULRetransmissionTimer* to *drx-ULRetransmissionTimer* plus RTToffset;- start or restart the *drx-ULRetransmissionTimer* for the corresponding HARQ process in the subframe containing the last repetition of the corresponding PUSCH transmission. |
| ZTE | No |  |
| Ericsson | No |  |
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In the CR R2-2207349 [8] the another change to TS 36.321 for R17 is proposed:

1. Background of the issue:
	* The PDCCH-based HARQ feedback does not indicate any HARQ process ID. The UE once receives the PDCCH-based HARQ feedback, it will stop all the UL DRX retransmission timers. As shown in figure below, if the PDCCH-based HARQ feedback was received for the first PUSCH and network has not finished the decoding of the second PUSCH transmission yet, then it is wrong for the UE to stop all the UL DRX retransmission timer.
	* 
2. Proposed changes in CR [8]:
* Also, clarify the PDCCH-based HARQ feedback is associated with the PUSCH transmission that started at least RTToffset earlier.

**Corresponding Changes in 36.321**

|  |
| --- |
| 5.7 Discontinuous Reception (DRX)*…**Text omitted**…*- if the PDCCH indicates an UL HARQ-ACK feedback for an asynchronous UL HARQ process for a UE configured with *mpdcch-UL-HARQ-ACK-FeedbackConfig*:- if the lower layer had indicated scheduling of transmission of multiple TBs:- stop *drx-ULRetransmissionTimer* for the corresponding UL HARQ process(es).- else if the PUSCH transmission is completed:- stop *drx-ULRetransmissionTimer* for all UL HARQ processes for which the first repetition occurred RTToffset earlier. |

**Question 7:** Do companies agree on the intention of change?

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| **Company** | **Yes/No** | **Additional comments** |
|  OPPO |  No | In legacy TN, UL HARQ-ACK feedback addresses two cases:1. Early PUSCH termination;
2. Stop PDCCH monitoring.

This spec text refers to the second case. We think the following correction might be the intention.5.7 Discontinuous Reception (DRX)*…**Text omitted**…*- if the PDCCH indicates an UL HARQ-ACK feedback for an asynchronous UL HARQ process for a UE configured with *mpdcch-UL-HARQ-ACK-FeedbackConfig*:- if the lower layer had indicated scheduling of transmission of multiple TBs:- stop *drx-ULRetransmissionTimer* for the corresponding UL HARQ process(es).- else if the PUSCH transmission is completed and last repetition of all PUSCH occurred RTToffset earlier:- stop *drx-ULRetransmissionTimer* for all UL HARQ processes. |
| Qualcomm | Yes | OPPO’s suggestion does not work as the feedback may be from the nth repetition RTToffset earlier while the last repetition may have occurred just x subframe <RTToffset earlier. |
| ZTE | No | As our comments in Q5, if the duration of PUSCH repetition transmission is less than RTT, *mpdcch-UL-HARQ-ACK-FeedbackConfig* don’t need to be configured. Then no issue needs to be addressed. |
| Ericsson | No |  |
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**Question 8:** If companies agree on the intention of the change, do companies agree on the proposed changes in Section 5.7 of TS 36.321 R17?

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| --- | --- | --- |
| **Company** | **Yes/No** | **Additional comments** |
|  OPPO | No | See our reply to Q7. |
| Qualcomm | Yes |  |
| ZTE | No |  |
| Ericsson | No |  |
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## Misc issues

In the CRs R2-2208664 [9], the following proposals are given:

* **P1**: Define the start of the drx-RetransmissionTimer to take the effect of Koffset parameter into account.
* **P2**: Clarify that in NTNs, the start of drx-RetransmissionTimer must be based on the UL timing for HARQ feedback transmission and the UL HARQ RTT Timer.
* **P3**: Clarify in the MAC spec that the UE-eNB RTT is expressed in subframes and not rounded or truncated toward an integer number of subframes.
* **P4**: Add to the SR active time “If this Serving Cell is part of a non-terrestrial network, the Active Time is started after the Scheduling Request transmission that is performed when the SR\_COUNTER is 0 for all the SR configurations with pending SR(s) plus the UE-eNB RTT”.

**Question 9:** Do companies agree on the above proposed changes (**P1, …, P4**) in TS 36.321 R17?

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| --- | --- | --- | --- | --- | --- |
| **Company** | **P1** | **P2** | **P3** | **P4** | **Any Additional comment** |
|  | **Y / N** | **Y / N** | **Y / N** | **Y / N** |  |
| OPPO | N | N | N |  Y | For P1 and P2, we don’t think something is wrong with the current spec.For P3, we are not sure about the intention. Isn’t “rounding” or “truncating” the way to determine the UE-eNB RTT in subframes? |
| Qualcomm | N | N | Y | Y | For P1 and P2, after applying Koffset and UE's TA, the actual ACK transmission time gap after PDSCH reception should be similar to the TN. The network should have good idea when the drx retransmission starts and when UE is listening to PDCCH, there should be no issue. |
| Huawei, HiSilicon | N | N | N | Y |  |
| ZTE | N | N | Y | Y | For P1, HARQ RTT timer is started in the subframe containing the last repetition of the PDSCH, *Koffset* (between the PDCCH and PUSCH) has already been considered in starting of HARQ RTT timer. Therefore, we think it is unnecessary to add a *Koffset* to the start of the *drx-RetransmissionTimer.*For P3, we have sympathy with the proposal. We assume the possible TP can be like this:*the HARQ RTT Timer corresponds to 7 + N + RTToffset subframes*…. *the HARQ RTT Timer corresponds to 7 + m \* N + RTToffset subframes*…..*the HARQ RTT Timer corresponds to 7 + M \* N + RTToffset subframes* |
| Nokia | FFS | FFS | Y |  Y | For P1/P2, we think further discussion is needed (e.g. whether Koffset should be considered in HARQ RTT timer calculation). |
| Lenovo | N | N |  | Y | For P1 and P2 we see no essential issues.For P3, not quite sure about the description. Does it mean that RTT can be a none-integer number? |
| Ericsson | Y | Y | Y | Y |  |
|  |  |  |  |  |  |

# Conclusion

<To be updated based on inputs from different companies>