**3GPP TSG RAN WG2 #118-e R2-220xxxx**

**Online, 9th – 20th May, 2022**

**Agenda Item: 7.2.4**

**Source: InterDigital, Inc.**

**Title: [draft] Report of [AT118-e][049][IoTNTN] User Plane (Interdigital)**

**Document for: Discussion**

# Introduction

This document is the report from the following offline discussion:

[AT118-e][049][IoTNTN] User Plane (Interdigital)

Scope: Treat R2-2205161, R2-2205328, R2-2205724, R2-2205959, R2-2205996

Ph1 Determine agreeable parts, for Agreeable parts endorse TP/Draft CR.

Intended outcome: Report, Endorsed TP(s).

Deadline: Schedule 1 (CB online W2 if needed)

# Contact

Delegates are encouraged to provide their contact information in the following table:

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email** |
| InterDigital | Brian Martin | [Brian.martin@interdigital.com](mailto:Brian.martin@interdigital.com) |
| Ericsson |  | robert.s.karlsson AT ericsson.com |
| Huawei, HiSilicon | Odile Rollinger | odile.rollinger@huawei.com |
| MediaTek | Abhishek Roy | Abhishek.Roy@mediatek.com |
| Lenovo | Min Xu | xumin13@lenovo.com |
| Transsion Holdings | Wen wu | wen.wu5@transsion.com |
| OPPO | Haitao Li | lihaitao@oppo.com |
| TTP(Omnispace) | Manook Soghomonian | Manook.soghomonian@ttp.com |
| Nokia | Ping Yuan | [Ping.1.Yuan@nokia-sbell.com](mailto:Ping.1.Yuan@nokia-sbell.com) |
| GateHouse | René Brandborg Sørensen | rbs@gatehouse.com |
| Xiaomi | Xiaowei jiang | jiangxiaowei@xiaomi.com |
| Spreadtrum | Xu Liu | xu.liu1@unisoc.com |
| ZTE | Lu Ting | lu.ting@zte.com.cn |

# Discussion

## Value range for sr-ProhibitTimerExt

In [1] it is proposed to udpdate the value ranges for sr-ProhobitTimerExt for eMTC and NB-IoT. Specifically, 3 proposals are made:

**Proposal 1: The 0ms offset for *sr-ProhibitTimerExt* should be allowed and it can be the default value.**

**Proposal 2: Some small values, e.g., several milliseconds, are also needed for *sr-ProhibitTimerExt*, in eMTC over NTN.**

**Proposal 3: Larger minimum value for *sr-ProhibitTimerExt* can be set in NB-IoT over NTN. Accordingly, finer granularity or more spare bits can be provided within this range.**

Question 1.1: Do you agree that 0ms offset should be the default value for sr-ProhibitTimerExt ?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | Not needed. If zero is wanted, then *sr-ProhibitTimerExt* is not configured. |
| Huawei, HiSilicon | No | the same is achieved by not configuring *sr-ProhibitTimerExt* |
| MediaTek | No | Not needed, as mentioned by Ericsson and Huawei |
| Qualcomm | No | We think now the name has changed to sr-ProhibitTimerOffset. Agree with Ericsson. |
| Lenovo | No | Not needed. |
| Transsion Holdings | No | Not needed. |
| OPPO | No | Not needed. |
| TTP | No |  |
| Nokia | No |  |
| GateHouse | No |  |
| Xiaomi | No | Agree with Ericsson |
| Spreadtrum | No |  |
| ZTE | No | In previous CR, the Need Code for *sr-ProhibitTimerExt* is OPTIONAL -- Need OP. And the UE behaviour on absence of this parameter is missing. We cannot assume that 0ms would be applied when *sr-ProhibitTimerExt* is not configured (it’s also possible that UE continue to use the existing value). So in the contribution, we suggest to add “If *sr-ProhibitTimerExt* is absent, the UE uses the (default) value of 0.”  In the latest CR, *sr-ProhibitTimerOffset-r17* is defined with SetupRelease {} format. We think this can resolve our concern, e.g., if *sr-ProhibitTimerOffset-r17* is set to “*Release*”, no *sr-ProhibitTimerOffset-r17* would be applied. |

Question 1.2: Do you agree that some additional smaller values, e.g., several milliseconds, are needed for sr-ProhibitTimerExt, in eMTC over NTN?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | We do not see the use case. |
| Huawei, HiSilicon | No | Same as Ericsson, we do not understand the purpose |
| MediaTek | No | Agree with Ericsson and Huawei |
| Qualcomm | No |  |
| Lenovo | No | Not needed. |
| Transsion Holdings | No |  |
| OPPO | No | Not needed. |
| TTP | No |  |
| Nokia | No |  |
| GateHouse | No |  |
| Xiaomi | No | Not needed |
| Spreadtrum | No |  |
| ZTE | Yes | We give analysis in the contribution. But it seems companies have no interests to read and give no technical reason to object.  In LEO case, the RTT is 4ms. If SR period is configured with 1ms, and the legacy *sr-ProhibitTimer* is also configured with small value, e.g., 2 (that means NW don’t want too much prohibit time between two consecutive SRs), we don’t know which value can be configured for *sr-ProhibitTimerOffset?* The minimum value of 90ms? Then:  The actual value of *sr-ProhibitTimer* = CEIL (*sr-ProhibitTimerOffset*/ SR period) + signalled value of *sr-ProhibitTimer =* 92. The final timer length is 92\* SR period =92ms  Do companies really think such large *sr-ProhibitTimer* reasonable for eMTC over LEO? We think it’s unnecessary too large. But now we have no way to configure smaller value. |

Question 1.3: Do you agree that a larger minimum value for sr-ProhibitTimerExt can be used in NB-IoT over NTN?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | We do not see the use case. |
| Huawei, HiSilicon | No | Same as Ericsson, we do not understand the purpose |
| MediaTek | No | Not needed. |
| Qualcomm | No |  |
| Lenovo | No | Not needed. |
| Transsion Holdings | No |  |
| OPPO | No | Not needed. |
| TTP | No |  |
| Nokia | No |  |
| GateHouse | No | Same as Ericsson |
| Xiaomi | No | Not needed |
| Spreadtrum | No |  |
| ZTE | No | We have the observation that, in legacy network, since RTT is negligible, the total length of waiting time for SR prohibit is mainly determined by the configured *sr-ProhibitTimer* value and length of SR period. But in IoT NTN, it’s obviously that the impact of RTT cannot be ignored or even dominates over other factors. It’s easy to further understand, if RTT is less than the configured SR period, RTT would cause no new impacts on the time length of several SR transmissions. But if RTT is larger than the SR period, the total time length of several SR transmissions would be mainly determined by RTT. For NB-IoT over LEO, no need of *sr-ProhibitTimerOffset.*  Furthermore, per our understanding, in the large RTT cases, network cannot configure too large value for legacy *sr-ProhibitTimer* (the times for skipping interim SR transmissions). We think at most 2 for *sr-ProhibitTimer* would be enough (7 would be impractical).  But for NB-IoT, in GEO case (RTT is 540ms), even *sr-ProhibitTimer* is configured with small value 2 and if SR period is configured with small value, e.g., 40ms, if 90ms is configured, the result would be:  The actual value of *sr-ProhibitTimer* = CEIL (*sr-ProhibitTimerOffset*/ SR period) + signalled value of *sr-ProhibitTimer =* 5. The final timer length is 5\* SR period =200ms. Such value is much smaller than a RTT.  We think such timer would take no any effect as expectation. And the larger the SR period, the less need for a small value for *sr-ProhibitTimerOffset.* And if SR period is larger than RTT, there is no need of *sr-ProhibitTimerOffset* anymore.  In a summary, for NB-IoT over GEO, we think the small value, e.g., 90ms, 180ms, would never be used. Then why we need them? |

## TA Reporting

A TP including all of the proposed changes to 5.4.9 is in appendix A.

In [2] it is proposed to add the cancelling of the TA reporting procedure in the MAC reset and correct the reference number of TS 36.213.

Question 2.1: Do you agree with the changes in [R2-2205328](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205328.zip) (cancelling of the TA reporting procedure in the MAC reset and correct the reference number of TS 36.213.)?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | The reference shall be to “TS 36.211 clause 8.1”.  We agree to adding the TAR cancelling at MAC reset. |
| Huawei, HiSilicon | yes |  |
| MediaTek | Yes, but | MAC reset needs to be included, but the reference needs to be fixed. |
| Qualcomm | Yes |  |
| Lenovo | Yes | Cancelling TA reporting procedure when MAC reset is necessary. |
| Transsion Holdings | Yes |  |
| OPPO | Yes |  |
| TTP | Yes |  |
| Nokia | Yes with comment | Fine to the modification for MAC reset part. |
| GateHouse | Yes |  |
| Xiaomi | Yes | Also agree with Ericsson comment |
| Spreadtrum | Yes |  |
| ZTE | Yes | Agree with Ericsson. |

In [3] the second and third changes are related to TA reporting, and propose to remove “which the MAC entity is configured to transmit” in section 5.4.9 and an editorial change. NOTE: Since the first change relates to UE-eNB RTT and this is also covered in [5] we have a separate question for this.

Question 2.2: Do you agree with changes 2 and 3 in [R2-2205724](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205724.zip) (remove “which the MAC entity is configured to transmit” in section 5.4.9 and an editorial change)?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | First change: “provided in *SystemInformationBlockType31*” shall be removed. In MAC we normally do not refer to where a RRC parameter is provided.  We are fine with the other changes.  Further “higher layers” is NR speak, it shall be “upper layers” in LTE… |
| Huawei, HiSilicon | yes |  |
| MediaTek | yes |  |
| Qualcomm | Yes | Reference for Kmac is also needed whether to SIB31 or to RAN1 spec. |
| Lenovo | Yes |  |
| Transsion Holdings | Yes |  |
| OPPO | Yes |  |
| TTP | Yes |  |
| Nokia | Yes |  |
| GateHouse | Yes | Agree with Ericsson’s comments |
| Xiaomi | Yes | Also agree with Ericsson comment |
| Spreadtrum | Yes |  |
| ZTE | Yes | Agree with Ericsson. |

In [4] it is proposed that the TAR triggering conditions in TS 36.321 are updated to reference specific RRC procedures (as in TS 38.321).

Question 2.3: Do you agree that the TAR triggering conditions in TS 36.321 are updated to reference specific RRC procedures (as in TS 38.321)?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | No | MAC is not aware of RRC procedures.  Better to let the RRC procedure trigger TA report, and in MAC list that a TA report is triggered on indication from upper layers… |
| Huawei, HiSilicon | No | MAC is not aware and should not be aware of RRC procedures.  We also think no indication from RRC is needed, as we cannot think of any other procedures than RRCConnectionRequest , RRCConnectionResumeRequest , RRCConnectionReestablishmentRequest and Handover triggering a RACH procedure |
| MediaTek | No | Agree with Ericsson and Huawei |
| Qualcomm | No | Agree with Ericsson. |
| Lenovo | No | Agree with Ericsson |
| Transsion Holdings | No | Agree with Ericsson. |
| OPPO | No | Agree with Ericssion |
| TTP | No | Agree with Ericsson |
| Nokia | No | Agree with Huawei, it seems no indication from RRC is needed for IoT NTN. |
| GateHouse | No | Agree with Ericsson. |
| Xiaomi | Yes | The list of triggers in MAC can be kept for reference for readability, and also RRC sends indication to MAC to trigger TA report. |
| Spreadtrum | No | Agree with Ericsson |
| ZTE | No | Agree with Ericsson and Huawei. |

In [5] proposals 6 and 7 impact the TA reporting procedure in 5.4.9

1. In MAC 5.4.9 first sentence, remove the word “also” as it does not add anything and only makes the sentence less readable.
2. In MAC 5.4.9 second sentence, change to “The Timing Advance reporting procedure is used in a non-terrestrial network to provide the eNB with an estimate of the UEs Timing Advance ~~(i.e., T\_TA as defined in the UE’s TA formula)~~, see TS 36.~~213~~211 [~~6~~7] clause 8.1.

The resulting TP would be as follows:

|  |
| --- |
| The 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 Ues Timing Advance ’, see TS 36.211 [7] clause 8.1. |

Question 2.4: Do you agree with the TP above (i.e. proposals 6 and 7 in [R2-2205996](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205996.zip))?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes | Maybe can add TTA as in “see TTA TS 36.211 [7] clause 8.1.” to make it super clear what is reported… TTA may also be added in 6.1.3.20. |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes |  |
| Qualcomm | Yes |  |
| Lenovo | Yes |  |
| Transsion Holdings | Yes |  |
| OPPO | Yes for proposal 6,  No for proposal 7 | proposal 7 is unacceptable.  Based on UE’s TA formula (i.e. ) defined in RAN1 spec, UE’s TA consists of multiple components. There may be different understandings for “an estimate of the UE’s Timing Advance”, e.g. it can be interpreted as UE’s full TA (i.e. 𝑇TA) or estimate of the service link’s TA (i.e. 𝑁TA). It would be not clear what “an estimate of the UE’s Timing Advance” refers to if we remove “*T\_TA as defined in the UE’s TA formula*”. So we suggest to keep the description as it is, and only correct the reference. |
| TTP | Yes |  |
| Nokia | Yes with comment | Agree with the rewording from Ericsson. |
| GateHouse | Yes |  |
| Xiaomi | Yes | Agree with other companies that should be kept to make it clear. |
| Spreadtrum | Yes |  |
| ZTE | Yes | Fine with the rewording from Ericsson.  Moreover, we think “UEs” is typo in this change “with an estimate of the UEs Timing Advance”. It should be “the UE’s”. |

## Maintenance of UL Synchronization

In [5] the first 3 proposals are related to RRC-MAC interaction for UL synchronisation timer maintenance. The same issue is covered in offline#050 and therefore please refer to offline #050 for discussion on proposals 1-3.

## UE-eNB RTT

The first change in [3] and proposal 4 of [5] intend to update the definition of UE-eNB RTT. As a baseline, the proposal from [5] is used as a basis for the question. Please provide views and potential alternative wording if necessary.

Question 3.1: Do you agree to change the definition of UE-eNB RTT to “For non-terrestrial networks, the sum of the UE~~’~~s Timing Advance value, see TS 36.211 [7] clause 8.1, and ~~K\_mac~~*k-Mac*~~, see TS 36.213 [6] clause X.X~~.”.

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes |  |
| Qualcomm | Yes |  |
| Lenovo | Yes |  |
| Transsion Holdings | Yes |  |
| OPPO | Yes with comment | As we state in Q2.4, there may be different understandings for “the UE’s Timing Advance value”, e.g. it can be interpreted as UE’s full TA (i.e. 𝑇TA) or estimate of the service link’s TA (i.e. 𝑁TA). So we suggest to add “(i.e., T\_TA as defined in the UE’s TA formula)” in order to make it clear. |
| TTP | Yes |  |
| Nokia | Yes |  |
| GateHouse | Yes | Fine with OPPO’s comment |
| Xiaomi | Yes | But keep |
| Spreadtrum | Yes |  |
| ZTE | Yes | To use such change “the sum of the UE~~’~~s Timing Advance value, see TTA in TS 36.211 [7] clause 8.1.” |

In [5] it is further proposed to update/clarify/correct the specification in places which refer to the UE-eNB RTT.

Question 3.2: Do you agree that, when referring to the UE-eNB RTT, do not use “UEs estimate of the UE-eNB RTT” nor “UE-eNB RTT subframes, as specified in TS 36.213 [6] clause X.X”, instead use “UE-eNB RTT” ?

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Ericsson | Yes |  |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes |  |
| Qualcomm | Ok |  |
| Lenovo | Yes |  |
| Transsion Holdings | Yes |  |
| OPPO | Yes |  |
| TTP | Yes |  |
| Nokia | Yes |  |
| GateHouse | Yes |  |
| Xiaomi | Yes |  |
| Spreadtrum | Yes |  |
| ZTE | Maybe No? | We see the suggestions in the original Tdoc R2-2205996 is to use “UE-eNB RTT subframes”, not “UE-eNB RTT”.  We notice that [rapporteur](https://dict.cn/rapporteur) incorrectly copy the text from TS 38.321 (not TS 36.321) in the below Appendix A. And we further notice that in NR NTN, they generally use “UE-eNB RTT”, not “UE-eNB RTT subframes”.  Maybe one thing we need to discuss is whether to further remove “subframes” from “UE-eNB RTT subframes” in TS 36.321. We learn from RAN1 that, the result of UE-eNB RTT calculation may not be an integer millisecond value. But in LTE MAC, “subframes” is generally used as it may be the smallest unit we can use. So we tend to think we’d better to use “UE-eNB RTT subframes” in TS 36.321. |

# Conclusion

TBD, TP for CR to be updated based on replies. TPs in Appendix A and B are currently based on all proposals being agreeable.

# References

1. [R2-2205161](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205161.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205161.zip) "Correction on sr-ProhibitTimerExt for IoT NTN, ZTE Corporation, Sanechips

1. [R2-2205328](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205328.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205328.zip) “Correction on 36.321, Huawei, HiSilicon

1. [R2-2205724](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205724.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205724.zip) “36.321 corrections for IoT NTN, Nokia, Nokia Shanghai Bell

1. [R2-2205959](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205959.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205959.zip) “TA Reporting during Random Access, InterDigital

1. [R2-2205996](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205996.zip" \o "https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_118-e/Docs/R2-2205996.zip) “IoT NTN Uplink synchronisation and UE-eNB RTT modelling, Ericsson

# Appendix A: TP for 36.321

Start Change

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

------------------------------------Skip the unchanged text----------------------------------------------------------------

**Transmission using PUR:** Allows one uplink data transmission using preconfigured uplink resource from RRC\_IDLE mode as specified in TS 36.300 [9]. Transmission using PUR refers to both CP transmission using PUR and UP transmission using PUR.

**UE-eNB RTT:** For non-terrestrial networks, the sum of the UE's Timing Advance value (see TS 36.211[7] clause 8.1) and *k-Mac*

Next Change

5.1.4 Random Access Response reception

Once the Random Access Preamble is transmitted and regardless of the possible occurrence of a measurement gap or a Sidelink Discovery Gap for Transmission or a Sidelink Discovery Gap for Reception, and regardless of the prioritization of V2X sidelink communication described in clause 5.14.1.2.2, the MAC entity shall monitor the PDCCH of the SpCell for Random Access Response(s) identified by the RA-RNTI defined below, in the RA Response window which starts at the subframe that contains the end of the preamble transmission,as specified in TS 36.211 [7], plus three subframes and has length *ra-ResponseWindowSize*.

If the UE is a BL UE or a UE in enhanced coverage:

- if the random access preamble was transmitted in a non-terrestrial network:

- RA Response window starts at the subframe that contains the end of the last preamble repetition plus 3 + UE-eNB RTT subframes, and has length *ra-ResponseWindowSize* for the corresponding enhanced coverage level;

- else:

- RA Response window starts at the subframe that contains the end of the last preamble repetition plus three subframes and has length *ra-ResponseWindowSize* for the corresponding enhanced coverage level.

If the UE is an NB-IoT UE:

- if the random access preamble was transmitted in a non-terrestrial network:

- RA Response window starts at the subframe that contains the end of the last preamble repetition plus X + UE-eNB RTT subframes, and has length *ra-ResponseWindowSize* for the corresponding enhanced coverage level, where value X is determined from Table 5.1.4-1 based on the used preamble format and the number of NPRACH repetitions;

- else:

- RA Response window starts at the subframe that contains the end of the last preamble repetition plus X subframes and has length *ra-ResponseWindowSize* for the corresponding enhanced coverage level, where value X is determined from Table 5.1.4-1 based on the used preamble format and the number of NPRACH repetitions.

Next Change

5.1.5 Contention Resolution

Once Msg3 is transmitted the MAC entity shall:

* 1> if Msg3 is transmitted on a non-terrestrial network:

2> start the *ra-ContentionResolutionTimer* and restart the *ra-ContentionResolutionTimer* at each HARQ retransmission in the first symbol after the end of the Msg3 transmission plus the UE-gNB RTT.

* 1> else if the Msg3 transmission (i.e. initial transmission or HARQ retransmission) is scheduled with Type A PUSCH repetition:

2> start or restart the *ra-ContentionResolutionTimer* in the first symbol after the end of all repetitions of the Msg3 transmission.

* 1> else:

2> start or restart the *ra-ContentionResolutionTimer* in the first symbol after the end of the Msg3 transmission.

* 1> monitor the PDCCH while the *ra-ContentionResolutionTimer* is running regardless of the possible occurrence of a measurement gap;
* 1> if notification of a reception of a PDCCH transmission of the SpCell is received from lower layers:

2> if the C-RNTI MAC CE was included in Msg3:

3> if the Random Access procedure was initiated for SpCell beam failure recovery or for beam failure recovery of both BFD-RS sets of SpCell (as specified in clause 5.17) and the PDCCH transmission is addressed to the C-RNTI; or

3> if the Random Access procedure was initiated by a PDCCH order and the PDCCH transmission is addressed to the C-RNTI; or

3> if the Random Access procedure was initiated by the MAC sublayer itself or by the RRC sublayer and the PDCCH transmission is addressed to the C-RNTI and contains a UL grant for a new transmission:

4> consider this Contention Resolution successful;

4> stop *ra-ContentionResolutionTimer*;

4> discard the *TEMPORARY\_C-RNTI*;

4> consider this Random Access procedure successfully completed.

2> else if the CCCH SDU was included in Msg3 and the PDCCH transmission is addressed to its *TEMPORARY\_C-RNTI*:

3> if the MAC PDU is successfully decoded:

4> stop *ra-ContentionResolutionTimer*;

4> if the MAC PDU contains a UE Contention Resolution Identity MAC CE; and

4> if the UE Contention Resolution Identity in the MAC CE matches the CCCH SDU transmitted in Msg3:

5> consider this Contention Resolution successful and finish the disassembly and demultiplexing of the MAC PDU;

5> if this Random Access procedure was initiated for SI request:

6> indicate the reception of an acknowledgement for SI request to upper layers.

5> else:

6> set the C-RNTI to the value of the *TEMPORARY\_C-RNTI*;

5> discard the *TEMPORARY\_C-RNTI*;

5> consider this Random Access procedure successfully completed.

4> else:

5> discard the *TEMPORARY\_C-RNTI*;

5> consider this Contention Resolution not successful and discard the successfully decoded MAC PDU.

* 1> if *ra-ContentionResolutionTimer* expires:

2> if Msg3 is transmitted on a non-terrestrial network and *ra-ContentionResolutionTimer* expires prior to the first symbol after the end of a Msg3 retransmission plus the UE-gNB RTT:

3> do not consider the Contention Resolution unsuccessful.

2> else:

3> discard the *TEMPORARY\_C-RNTI*;

3> consider the Contention Resolution not successful.

* 1> if the Contention Resolution is considered not successful:

2> flush the HARQ buffer used for transmission of the MAC PDU in the Msg3 buffer;

2> increment *PREAMBLE\_TRANSMISSION\_COUNTER* by 1;

2> if *PREAMBLE\_TRANSMISSION\_COUNTER* = *preambleTransMax* + 1:

3> indicate a Random Access problem to upper layers.

3> if this Random Access procedure was triggered for SI request:

4> consider the Random Access procedure unsuccessfully completed.

2> if the Random Access procedure is not completed:

3> if the *RA\_TYPE* is set to *4-stepRA*:

4> select a random backoff time according to a uniform distribution between 0 and the *PREAMBLE\_BACKOFF*;

4> if the criteria (as defined in clause 5.1.2) to select contention-free Random Access Resources is met during the backoff time:

5> perform the Random Access Resource selection procedure (see clause 5.1.2);

4> else:

5> perform the Random Access Resource selection procedure (see clause 5.1.2) after the backoff time.

3> else (i.e. the *RA\_TYPE* is set to *2-stepRA*):

4> if *msgA-TransMax* is applied (see clause 5.1.1a) and *PREAMBLE\_TRANSMISSION\_COUNTER* = *msgA-TransMax* + 1:

5> set the *RA\_TYPE* to *4-stepRA*;

5> perform initialization of variables specific to Random Access type as specified in clause 5.1.1a;

5> flush HARQ buffer used for the transmission of MAC PDU in the MSGA buffer;

5> discard explicitly signalled contention-free 2-step RA type Random Access Resources, if any;

5> perform the Random Access Resource selection as specified in clause 5.1.2.

4> else:

5> select a random backoff time according to a uniform distribution between 0 and the *PREAMBLE\_BACKOFF*;

5> if the criteria (as defined in clause 5.1.2a) to select contention-free Random Access Resources is met during the backoff time:

6> perform the Random Access Resource selection procedure for 2-step RA type as specified in clause 5.1.2a.

5> else:

6> perform the Random Access Resource selection for 2-step RA type procedure (see clause 5.1.2a) after the backoff time.

Next Change

### 5.4.9 Timing Advance Reporting

The 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 UEs Timing Advance , see TS 36.211 [7] clause 8.1.

RRC controls Timing Advance reporting by configuring the following parameters:

- *ta-Report*;

- *offsetThresholdTA*.

If configured, Timing Advance reporting may be triggered if any of the following events occur:

- if *ta-Report* is configured with value enabled, upon initiation of Random Access procedure due to initial access from RRC\_IDLE, RRC Connection Resume procedure from RRC\_INACTIVE, or RRC Connection Re-establishment procedure (see TS 36.331 [8]);

- if *ta-Report* with value enabled is indicated in the handover command, upon initiation of Random Access procedure due to reconfiguration with sync;

- upon configuration or reconfiguration of *offsetThresholdTA* by higher layer, 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 successfully reported information about Timing Advance is equal to or larger than *offsetThresholdTA*, if configured.

If the Timing Advance reporting procedure determines that at least one Timing Advance Report has been triggered and not cancelled:

- if the MAC entity has UL resources allocated for new transmission for this TTI, and;

- if the allocated UL resources can accommodate the Timing Advance Report MAC CE plus its subheader, as a result of logical channel prioritization:

- instruct the Multiplexing and Assembly procedure to generate the Timing Advance report MAC control element as defined in clause 6.1.3.20.

A MAC PDU shall contain at most one Timing Advance Report MAC CE, even when multiple events have triggered a Timing Advance report.

All triggered Timing Advance reports shall be cancelled when a Timing Advance Report MAC CE is included in a MAC PDU for transmission.

Next Change

5.9 MAC Reset

If a reset of the MAC entity is requested by upper layers, the MAC entity shall:

- initialize Bj for each logical channel to zero;

- except for *pur-TimeAlignmentTimer,* if configured*,* stop (if running) all timers;

- except for *pur-TimeAlignmentTimer,* if configured*,* consider all *timeAlignmentTimer*sas expired and perform the corresponding actions in clause 5.2;

- set the NDIs for all uplink HARQ processes to the value 0;

- stop, if any, ongoing RACH procedure;

- discard explicitly signalled *ra-PreambleIndex* and *ra-PRACH-MaskIndex*, if any;

- flush Msg3 buffer;

- cancel, if any, triggered Scheduling Request procedure;

- cancel, if any, triggered Buffer Status Reporting procedure;

- cancel, if any, triggered Power Headroom Reporting procedure;

- cancel, if any, triggered Recommended bit rate query procedure;

- cancel, if any, triggered Timing Advance Reporting procedure;

- flush the soft buffers for all DL HARQ processes;

- for each DL HARQ process, consider the next received transmission for a TB as the very first transmission;

- release, if any, Temporary C-RNTI.

If a partial reset of the MAC entity is requested by upper layers, for a serving cell, the MAC entity shall for the serving cell:

- set the NDIs for all uplink HARQ processes to the value 0;

- flush all UL HARQ buffers;

- stop all running *drx-ULRetransmissionTimers*;

- stop all running UL HARQ RTT timers;

- stop, if any, ongoing RACH procedure;

- discard explicitly signalled *ra-PreambleIndex* and *ra-PRACH-MaskIndex*, if any;

- flush Msg3 buffer;

- release, if any, Temporary C-RNTI.

# Appendix B: TP for 36.331

Start Change

– *MAC-MainConfig*

The IE *MAC-MainConfig* is used to specify the MAC main configuration for signalling and data radio bearers. All MAC main configuration parameters can be configured independently per Cell Group (i.e. MCG or SCG), unless explicitly specified otherwise.

***MAC-MainConfig* information element**

-- ASN1START

MAC-MainConfig ::= SEQUENCE {

ul-SCH-Config SEQUENCE {

maxHARQ-Tx ENUMERATED {

n1, n2, n3, n4, n5, n6, n7, n8,

n10, n12, n16, n20, n24, n28,

spare2, spare1} OPTIONAL, -- Need ON

periodicBSR-Timer PeriodicBSR-Timer-r12 OPTIONAL, -- Need ON

retxBSR-Timer RetxBSR-Timer-r12,

ttiBundling BOOLEAN

} OPTIONAL, -- Need ON

drx-Config DRX-Config OPTIONAL, -- Need ON

timeAlignmentTimerDedicated TimeAlignmentTimer,

phr-Config CHOICE {

release NULL,

setup SEQUENCE {

periodicPHR-Timer ENUMERATED {sf10, sf20, sf50, sf100, sf200,

sf500, sf1000, infinity},

prohibitPHR-Timer ENUMERATED {sf0, sf10, sf20, sf50, sf100,

sf200, sf500, sf1000},

dl-PathlossChange ENUMERATED {dB1, dB3, dB6, infinity}

}

} OPTIONAL, -- Need ON

...,

[[ sr-ProhibitTimer-r9 INTEGER (0..7) OPTIONAL -- Need ON

]],

[[ mac-MainConfig-v1020 SEQUENCE {

sCellDeactivationTimer-r10 ENUMERATED {

rf2, rf4, rf8, rf16, rf32, rf64, rf128,

spare} OPTIONAL, -- Need OP

extendedBSR-Sizes-r10 ENUMERATED {setup} OPTIONAL, -- Need OR

extendedPHR-r10 ENUMERATED {setup} OPTIONAL -- Need OR

} OPTIONAL -- Need ON

]],

[[ stag-ToReleaseList-r11 STAG-ToReleaseList-r11 OPTIONAL, -- Need ON

stag-ToAddModList-r11 STAG-ToAddModList-r11 OPTIONAL, -- Need ON

drx-Config-v1130 DRX-Config-v1130 OPTIONAL -- Need ON

]],

[[ e-HARQ-Pattern-r12 BOOLEAN OPTIONAL, -- Need ON

dualConnectivityPHR CHOICE {

release NULL,

setup SEQUENCE {

phr-ModeOtherCG-r12 ENUMERATED {real, virtual}

}

} OPTIONAL, -- Need ON

logicalChannelSR-Config-r12 CHOICE {

release NULL,

setup SEQUENCE {

logicalChannelSR-ProhibitTimer-r12 ENUMERATED {sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}

}

} OPTIONAL -- Need ON

]],

[[ drx-Config-v1310 DRX-Config-v1310 OPTIONAL, -- Need ON

extendedPHR2-r13 BOOLEAN OPTIONAL, -- Need ON

eDRX-Config-CycleStartOffset-r13 CHOICE {

release NULL,

setup

CHOICE {

sf5120 INTEGER(0..1),

sf10240 INTEGER(0..3)

}

} OPTIONAL -- Need ON

]],

[[ drx-Config-r13 CHOICE {

release NULL,

setup DRX-Config-r13

} OPTIONAL -- Need ON

]],

[[ skipUplinkTx-r14 CHOICE {

release NULL,

setup SEQUENCE {

skipUplinkTxSPS-r14 ENUMERATED {true} OPTIONAL, -- Need OR

skipUplinkTxDynamic-r14 ENUMERATED {true} OPTIONAL -- Need OR

}

} OPTIONAL, -- Need ON

dataInactivityTimerConfig-r14 CHOICE {

release NULL,

setup SEQUENCE {

dataInactivityTimer-r14 DataInactivityTimer-r14

}

} OPTIONAL -- Need ON

]],

[[ rai-Activation-r14 ENUMERATED {true} OPTIONAL -- Need OR

]],

[[ shortTTI-AndSPT-r15 CHOICE {

release NULL,

setup SEQUENCE {

drx-Config-r15 DRX-Config-r15 OPTIONAL, -- Need ON

periodicBSR-Timer-r15 ENUMERATED {

sf1, sf5, sf10, sf16, sf20, sf32, sf40,

sf64, sf80, sf128, sf160, sf320, sf640,

sf1280, sf2560, infinity}

OPTIONAL, -- Need ON

proc-Timeline-r15 ENUMERATED {nplus4set1, nplus6set1,

nplus6set2, nplus8set2 } OPTIONAL, -- Need ON

ssr-ProhibitTimer-r15 INTEGER (0..7) OPTIONAL -- Need ON

}

} OPTIONAL, -- Need ON

mpdcch-UL-HARQ-ACK-FeedbackConfig-r15 BOOLEAN OPTIONAL, -- Need ON

dormantStateTimers-r15 CHOICE {

release NULL,

setup SEQUENCE {

sCellHibernationTimer-r15 ENUMERATED {

rf2, rf4, rf8, rf16, rf32, rf64, rf128, spare} OPTIONAL, -- Need OR

dormantSCellDeactivationTimer-r15 ENUMERATED {

rf2, rf4, rf8, rf16, rf32, rf64,

rf128, rf320, rf640, rf1280, rf2560,

rf5120, rf10240, spare3, spare2, spare1} OPTIONAL -- Need OR

}

} OPTIONAL -- Need ON

]],

[[ ce-ETWS-CMAS-RxInConn-r16 ENUMERATED {true} OPTIONAL -- Need OR

]],

[[ offsetThresholdTA-r17 ENUMERATED {

ms05, ms1, ms2, ms3, ms4, ms5, ms6 ,ms7,

ms8, ms9, ms10, ms11, ms12, ms13, ms14, ms15}

OPTIONAL, -- Need OR

sr-ProhibitTimerExt-r17 ENUMERATED {

ms5, ms10, ms40, ms360,

, ms540, ms1080, spare2, spare1}

OPTIONAL -- Need OP

]]

}

//skip unrelated parts//

-- ASN1STOP

| ***MAC-MainConfig* field descriptions** |
| --- |
| ***ce-ETWS-CMAS-RxInConn***  Indicates UE shall monitor for ETWS/CMAS notification on control channels associated with the shared data channel in RRC\_CONNECTED as specified in TS 36.213 [23], clause 7.1. | |
| //skip unrelated parts// |
| ***skipUplinkTxSPS***  If configured, the UE skips UL transmissions for a configured uplink grant if no data is available for transmission in the UE buffer as described in TS 36.321 [6]. E-UTRAN always configures *skipUplinkTxSPS* when there is at least one SPS configuration with *semiPersistSchedIntervalUL* shorter than sf10 or when at least one SPS-ConfigUL-STTI is configured for the cell group. |
| ***sr-ProhibitTimer, sr-ProhibitTimerExt***  Timer for SR transmission on PUCCH in TS 36.321 [6]. Value in number of SR period(s) of shortest SR period of any serving cell with PUCCH. Value 0 means that behaviour as specified in 7.3.2 applies. Value 1 corresponds to one SR period, Value 2 corresponds to 2\*SR periods and so on. SR period is defined in TS 36.213 [23], table 10.1.5-1.  If *sr-ProhibitTimerExt* is present, actual value of *sr-ProhibitTimer* = CEIL (*sr-ProhibitTimerExt*/ SR period) + signalled value of *sr-ProhibitTimer*. If *sr-ProhibitTimerExt* is absent, the UE uses the (default) value of 0. |
| ***ssr-ProhibitTimer***  Timer for prohibiting SR transmission on SPUCCH in TS 36.321 [6]. Value in number of SR period(s) of shortest SR period of any serving cell with SPUCCH. Value 0 means that behaviour as specified in 7.3.2 applies. Value 1 corresponds to one SR period, value 2 corresponds to 2 SR periods and so on. SR period is defined in TS 36.213 [23], table 10.1.5-1. |
| ***stag-Id***  Indicates the TAG of an SCell, see TS 36.321 [6]. Uniquely identifies the TAG within the scope of a Cell Group (i.e. MCG or SCG). If the field is not configured for an SCell (e.g. absent in *MAC-MainConfigSCell*), the SCell is part of the PTAG. |
| ***stag-ToAddModList, stag-ToReleaseList***  Used to configure one or more STAGs. E-UTRAN ensures that a STAG contains at least one SCell with configured uplink. If, due to SCell release a reconfiguration would result in an 'empty' TAG, E-UTRAN includes release of the concerned TAG. |
| ***timeAlignmentTimerSTAG***  Indicates the value of the time alignment timer for an STAG, see TS 36.321 [6]. |
| ***ttiBundling***  TRUE indicates that TTI bundling TS 36.321 [6] is enabled while FALSE indicates that TTI bundling is disabled. TTI bundling can be enabled for FDD and for TDD for configurations 0, 1 and 6 and additionally for configurations 2 and 3 when *symPUSCH-UpPTS-r14* is configured. The functionality is performed independently per Cell Group (i.e. MCG or SCG), but E-UTRAN does not configure TTI bundling for the SCG. For a TDD PCell, E-UTRAN does not simultaneously enable TTI bundling and semi-persistent scheduling in this release of specification. Furthermore, for a Cell Group, E-UTRAN does not simultaneously configure TTI bundling and SCells with configured uplink, and E-UTRAN does not simultaneously configure TTI bundling and eIMTA. |

Next Change

– *SchedulingRequestConfig-NB*

The IE *SchedulingRequestConfig-NB* is used to specify the Scheduling Request related parameters.

***SchedulingRequestConfig-NB* information element**

-- ASN1START

SchedulingRequestConfig-NB-r15 ::= SEQUENCE {

sr-WithHARQ-ACK-Config-r15 ENUMERATED {true} OPTIONAL,

sr-WithoutHARQ-ACK-Config-r15 SR-WithoutHARQ-ACK-Config-NB-r15 OPTIONAL, -- Need ON

sr-SPS-BSR-Config-r15 SR-SPS-BSR-Config-NB-r15 OPTIONAL, -- Need ON

...,

[[ sr-WithoutHARQ-ACK-Config-v1700 SR-WithoutHARQ-ACK-Config-NB-v1700 OPTIONAL -- Need ON

]]

}

SR-WithoutHARQ-ACK-Config-NB-r15 ::= CHOICE {

release NULL,

setup SEQUENCE {

sr-ProhibitTimer-r15 INTEGER (0..7) OPTIONAL, -- Need ON

sr-NPRACH-Resource-r15 SR-NPRACH-Resource-NB-r15 OPTIONAL -- Need ON

}

}

SR-WithoutHARQ-ACK-Config-NB-v1700 ::= SEQUENCE {

sr-ProhibitTimerExt-r17 ENUMERATED {

ms180, ms270, ms360, ms450, ms540, ms1080, spare2, spare1}

OPTIONAL -- Need OP

}

SR-NPRACH-Resource-NB-r15 ::= SEQUENCE {

nprach-CarrierIndex-r15 INTEGER (0..maxNonAnchorCarriers-NB-r14),

nprach-ResourceIndex-r15 INTEGER (1..maxNPRACH-Resources-NB-r13),

nprach-SubCarrierIndex-r15 CHOICE {

nprach-Fmt0Fmt1-r15 INTEGER (0..47),

nprach-Fmt2-r15 INTEGER (0..143)

},

p0-SR-r15 INTEGER (-126..24),

alpha-r15 ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1}}

SR-SPS-BSR-Config-NB-r15 ::= CHOICE {

release NULL,

setup SEQUENCE {

semiPersistSchedC-RNTI-r15 C-RNTI,

semiPersistSchedIntervalUL-r15 ENUMERATED {sf128, sf256, sf512, sf1024,

sf1280, sf2048, sf2560, sf5120}

}

}

-- ASN1STOP

| ***SchedulingRequestConfig-NB* field descriptions** |
| --- |
| ***alpha***  Parameter: *αc*. Fractional power control parameter for SR without HARQ-ACK. See TS 36.213 [23], clause 16.2.1.2.1, where value *al0* corresponds to 0, value *al04* corresponds to 0.4, value *al05* to 0.5, value *al06* to 0.6, value *al07* to 0.7, value *al08* to 0.8, value *al09* to 0.9 and value *al1* corresponds to 1. |
| ***nprach-CarrierIndex***  Index of the carrier in the list of UL non anchor carriers in *SystemInformationBlockType22-NB*. The first entry in the list has index '1', the second entry has index '2' and so on. Value '0' indicates the anchor carrier. |
| ***nprach-ResourceIndex***  Index of the NPRACH resource in the list of NPRACH resources in *NPRACH-ParametersList* or *NPRACH-ParametersList-Fmt2* for the UL carrier indicated by *nprach-CarrierIndex*. The first entry in the list has index '1', the second entry has index '2' and so on.  E-UTRAN configures a NPRACH resource in *NPRACH-ParametersList-Fmt2* only to UEs that have reported support of NPRACH resource Format2. |
| ***nprach-SubCarrierIndex***  Index of the subcarrier in the NPRACH resource in *NPRACH-ParametersList* or or *NPRACH-ParametersList-Fmt2* for the indicated UL carrier.  E-UTRAN does not configure *nprach-SubcarrierIndex* to a smaller value than *nprach-SubcarrierOffset* + *nprach-NumCBRA-StartSubcarriers* for the indicated NPRACH resource. |
| ***p0-SR***  Parameter:. Target power for SR without HARQ-ACK. See TS 36.213 [23], clause 16.2.1.2.1, unit dBm. |
| ***semiPersistSchedC-RNTI***  Semi-persistent Scheduling C-RNTI, see TS 36.321 [6]. |
| ***semiPersistSchedIntervalUL***  Semi-persistent scheduling interval in uplink, see TS 36.321 [6]. Value in number of sub-frames. Value *sf128* corresponds to 128 sub-frames, value *sf256* corresponds to 256 sub-frames and so on. |
| ***sr-SPS-BSR-Config***  Activation of SR with SPS BSR, see TS 36.321 [6].  E-UTRAN cannot configure *sr-SPS-BSR* together with *sr-WithoutHARQ-ACK-Config*. |
| ***sr-NPRACH-Resource***  NPRACH resource for physical layer SR without HARQ-ACK, see TS 36.211 [21] and TS 36.213 [23]. |
| ***sr-ProhibitTimer, sr-ProhibitTimerExt***  Timer for SR transmission on the NPRACH resource for SR in TS 36.321 [6]. Value in number of SR period, where the SR period is equal to the field *nprach-Periodicity* of the NPRACH resource. Value 0 means that behaviour as specified in 7.3.2 applies. Value 1 corresponds to one SR period, Value 2 corresponds to 2\*SR period and so on.  If *sr-ProhibitTimerExt* is present, actual value of *sr-ProhibitTimer* = CEIL (*sr-ProhibitTimerExt*/ SR period) + signalled value of *sr-ProhibitTimer*. If *sr-ProhibitTimerExt* is absent, the UE uses the (default) value of 0. |
| ***sr-WithHARQ-ACK-Config***  Activation of physical layer SR with HARQ ACK, see TS 36.213 [23]. |
| ***sr-WithoutHARQ-ACK-Config***  Activation of physical layer SR without HARQ ACK, see TS 36.211 [21] and TS 36.213 [23].  E-UTRAN cannot configure *sr-WithoutHARQ-ACK-Config* together with *sr-SPS-BSR*. |