3GPP RAN WG2 Meeting #114e R2-2106523

eMeeting May 19th – May 27th, 2021

Agenda Item: 8.10.2.2

Source: InterDigital (summary rapporteur)

Title: [DRAFT] Report of [AT114-e][103][NTN] Other MAC aspects

Document for: Discussion, Decision

# Introduction

This document continues the pre-meeting summary discussion of 8.10.2.2 – Other MAC aspects. The following scope and intended list of outcomes has been provided:

* [AT114-e][103][NTN] Other MAC aspects (Interdigital)

Initial scope: Continue the discussion on proposals from [R2-2106488](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2106488.zip) as well as those on drx-RetransmissionTimerDL, sr-ProhibitTimer and CGT/CGRT

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)

The following deadlines have been provided:

* Initial deadline (for companies' feedback): **Friday 2021-05-21 1000 UTC**
* Initial deadline (for rapporteur's summary in R2-2106523): **Friday 2021-05-21 1800 UTC**

Please also note the following further guidance provided by chair:

* Proposals marked "for agreement" in R2-2106523 not challenged until **Monday 2021-05-24 10:00** UTC will be declared as agreed via email by the session chair.

# UL HARQ Retransmission

From RAN2 perspective it has been agreed that the NW can continuously schedule the UE using one or a combination of scheduling strategies to avoid HARQ stalling in NTN UE:

* HARQ with retransmissions based on the previous PUSCH decoding result
* HARQ with (blind) retransmissions not based on the previous PUSCH decoding result
* HARQ with no retransmission

## drx-HARQ-RTT-TimerUL

In RAN2#112e it was agreed that for dynamic grant, HARQ uplink retransmission may be “disabled” by gNB sending grant with NDI not toggled/toggled without waiting for decoding result of previous PUSCH transmission. However, handling of RTT timers (specifically *drx-HARQ-RTT-TimerUL*) is listed as FFS. In RAN2#113bis-e, it was agreed:

*RAN2 confirms that in NTN if the UE is in DRX Active Time for any reason, the UE should monitor the PDCCH regardless of whether drx-HARQ-RTT-TimerUL or drx-HARQ-RTT-TimerDL is running or not. No specification change is needed.*

*RAN2 confirms that in NTN using the value= “zero” for drx-HARQ-RTT-TimerUL and drx-RetransmissionTimerUL is possible. No specification change is needed.*

*In NTN, The drx-HARQ-RTT-TimerUL is configured per UE DRX group and the behaviour can be configured per HARQ process. FFS the different behaviours and how to indicate the behaviour to the UE and the number of behaviours (e.g., two or more behaviours).*

### Possible configured values

In RAN2#114e, the following was agreed regarding possible values for the *drx-HARQ-RTT-TimerUL*:

*The following options are supported for drx-HARQ-RTT-TimerUL in NTN per HARQ process: 1) Timer length is extended by offset; 2) Timer set to zero and/or 3) Timer disabled (i.e. not started). FFS if this is based on explicit configuration or not. We can also come back to see whether both 2 and 3 are needed.*

In online session it was discussed whether the timer offset should be aligned with agreement for *drx-HARQ-RTT-TimerDL* (i.e. RAN2 working assumption that the offset to UL RTT timer be offset via UE-gNB RTT). As discussion was ultimately inconclusive, companies which would like an alternative solution are encouraged to further explain their position.

**Question 1)** **Do you support the following proposed working assumption?:**

***RAN2 working assumption: Offset for drx-HARQ-RTT-TimerUL is equal to UE-gNB RTT (if RAN1 decides something that requires to change this we can revisit it as in DL).***

**If “No” please explain why not, and provide an alternative wording/solution which would be acceptable.**

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| **Company** | **Yes/No** | **Additional comments** |
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### Selection between values

Considering the multiple options supported for *drx-HARQ-RTT-TimerUL*, configuring different behaviours of *drx-HARQ-RTT-TimerUL* per HARQ process could ensure the UE is monitoring PDCCH at the optimal time for each of the various NW scheduling strategies (i.e. to take increased RTT into account, or to facilitate immediate reception). Considering what strategy the NW uses to avoid HARQ stalling in NTN is up to NW implementation, what behaviour the UE applies to timers for each HARQ process shall also be up to network implementation.

**Question 2)** **Do you agree that which *drx-HARQ-RTT-TimerUL* value is applied for each HARQ process is up to network implementation (e.g. to support NW scheduling strategy to avoid HARQ stalling)?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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For DL case, behaviour of *drx-HARQ-RTT-TimerDL* is defined based on whether HARQ feedback is enabled or disabled. Referring to agreements from RAN2#113e:

*For HARQ processes with DL HARQ feedback disabled, drx-HARQ-RTT-TimerDL is not started.*

*For HARQ processes with DL HARQ feedback enabled, drx-HARQ-RTT-TimerDL length is increased by offset (i.e. existing values within value range increased by offset). RAN2 working assumption: offset is equal to UE-gNB RTT (if RAN1 decides something that requires to change this we can revisit it)*

Adopting the same principal for *drx-HARQ-RTT-TimerUL* would mean that a HARQ retransmission scheme would be associated with a *drx-HARQ-RTT-TimerUL* behaviour. For example, if network indicates that retransmission is enabled for a HARQ process, UE could automatically know to apply offset to timer without explicit configuration. It is noted that actual mapping between timer option/retransmission scheme requires further discussion.

**Question 3) Do you agree the value of drx-HARQ-RTT-TimerUL is connected to an UL HARQ retransmission scheme (e.g. as in DL for HARQ feedback enabled/disabled)?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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## Indication of HARQ retransmission scheme

Depending on which scheduling strategy is employed to avoid HARQ stalling state, UE may expect a retransmission grant after UE-gNB RTT, before UE-gNB RTT, or not at all. This may impact DRX timers or LCP, which is discussed further in Section 3. The possible options have been captured in Pre-meeting summary discussion:

**Indication by RRC:**

Companies which support semi-static indication via RRC note that if UE receives a grant with NDI toggled, it cannot tell whether the gNB wants to perform scheduling with UL retransmission disabled or the gNB just wants a new transmission. UE will need to know the different scheduling strategies of each HARQ process, for example, for LCP restriction to map LCH to HARQ process or to properly configure HARQ RTT timer. It is also mentioned that semi-static indication per HARQ process is already agreed for enabling/disabling DL HARQ feedback.

**Implicit indication**

In pre-meeting summary a compromise was suggested where HARQ retransmission scheme may be determined implicitely by UL HARQ RTT Timer behaviour. Since the configured value of this timer is meant to optimize UE PDCCH monitoring for a particular strategy, this would provide a likely indication of which retransmission scheme is employed per HARQ process. The additional benefit is that an implicit indication does not restrict network to a specific scheduling strategy as retransmission grant can be sent any time the UE is in DRX Active time.

**Indication via DCI**

It is suggested that a DCI-based dynamic enabling/disabling of HARQ feedback could be used in addition to semi-static RRC signaling-based. This would utilize radio resources more efficiently and to adapt to the prevailing radio environment and QoS requirements. It is proposed to send an LS to RAN1 regarding re-purposing DCI PDCCH bits for this purpose.

**No indication**:

It was noted that when the UE receives a new transmission grant/assignment (that is, NDI is toggled), then previous TB cannot be retransmitted by HARQ. Previous TB may have been successfully received or not, and time elapsed since last time a grant/assignment for the same HARQ process was received with toggled NDI may be shorter or longer than the HARQ RTT. Semi-static indication may limit network scheduling flexibility, and in NTN, as in legacy, the UE shall always do what received grants and assignments indicate.

**Question 4)** **Which of the following method(s) for indication of HARQ retransmission scheme do you support:**

**1) Semi-static RRC configuration;**

**2) Determined implicitly, e.g. via current HARQ RTT Timer behaviour;**

**3) Dynamic DCI indication;**

**4) No indication is needed.**

**5) Other**

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| **Company** | **Indication method(s)** | **Additional comments** |
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Regardless of whether indication is configured via RRC or implictly determined, the majority of companies seem to support that an indication of HARQ retransmission scheme (if agreed) should be per HARQ process.

**Question 5)** **Do you agree that indication of HARQ retransmission scheme (if agreed) is per HARQ process?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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# LCP

The following was agreed in RAN2#113bise:

*LCP restrictions should be further considered for an UL HARQ process in NTN. FFS if no further LCP restrictions are needed, or if (R16) existing LCP restrictions can be re-used or if new LCP restriction shall be defined for this purpose.*

This section summarizes proposals addressing LCP, including the whether additional LCP restrictions are necessary and if introduced how the existing procedure can be modified.

## Introduction of new LCP restriction

In legacy specification, RRC controls LCP procedure by configuring mapping restrictions for each logical channel (LCH). The following LCP restrictions are defined, with parameters *configuredGrantType1Allowed* and *allowedCG-List* specific to configured grant, and *allowedPHY-PrioirtyIndex* specific to dynamic grant:

- ***allowedSCS-List*** which sets the allowed Subcarrier Spacing(s) for transmission;

- ***maxPUSCH-Duration*** which sets the maximum PUSCH duration allowed for transmission;

**- *configuredGrantType1Allowed*** which sets whether a configured grant Type 1 can be used for transmission;

- ***allowedServingCells*** which sets the allowed cell(s) for transmission;

**- *allowedCG-List*** which sets the allowed configured grant(s) for transmission;

- ***allowedPHY-PrioirtyIndex*** which sets the allowed PHY priority index(es) of a dynamic grant for transmission.

### CG-specific LCP restriction in NTN

In the pre-meeting summary it was suggest that for configured grant, the current LCP restrictions are sufficient to support enabled/disabled UL retransmission. If allowedCG-List is configured to a logical channel, MAC SDUs from the logical channel can only be mapped to the indicated configured grant configuration, so the network can control the allowed CG type and CG to be used for transmission of certain LCHs. Since the configuration of CG and HARQ process ID is also controlled by NW, current LCP is sufficient to guarantee the mapping between LCHs and HARQ process ID for CG case.

It was further noted that discussion on disabling UL retransmission and various scheduling strategies to avoid HARQ stalling has focused primarily on dynamic grant i.e. referring to agreement from RAN2#112e:

*From RAN2 perspective, for dynamic grant, one possibility for "enabling"/"disabling" HARQ uplink retransmission at UE transmitter is without introducing an additional mechanism (i.e. gNB can send grant with NDI not toggled/toggled without waiting for decoding result of previous PUSCH transmission). FFS on the handling of RTT timers. Other solutions for enabling/disabling HARQ UL reTX are not precluded*

Past discussion has also focused on whether *allowedPHY-PriorityIndex* is sufficient (i.e. a dynamic-grant specific parameter). To reduce scope of discussion, it is suggested to attempt conclusion that at least no additional LCP restrictions *specific to configured grant* are needed.

Note: if a new LCP restriction is agreed for dynamic grant, the following proposal does not preclude future discussion on whether it may also apply to configured grant.

**Question 6)** **Do you agree no new CG-specific LCP restriction is introduced for NTN?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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### LCP restrictions for dynamic grant

As previously mentioned NW can continuously schedule the UE using one or a combination of scheduling strategies to avoid HARQ stalling in NTN UE. As described in the pre-meeting summary, due to the different scheduling strategies for UL HARQ retransmission, HARQ processes with different delay/reliability attributes may coexist. To ensure, for example, a UE does not multiplex data from a LCH requiring high reliability to a HARQ process without retransmission, LCP may require modification.

Past discussion has focused on whether re-purposing existing LCP restrictions (*allowedPHY-PriorityIndex*) can serve this purpose. The parameter *allowedPHY-PriorityIndex* was introduced in R16 IIoT to ensure high priority (i.e. mainly time-sensitive) data is mapped to an appropriate UL grant. gNB may configure LCHs with less important data to use PHY priority index p0 and p1, while important LCHs are configured to only use priority index p1. gNB can distinguish between SR for low priority data and SRs for high priority data via separate PUCCH SR resources, and gNB may dynamically decide which PHY index (p0 or p1) to use for each grant.

According to current specification, the usage of *allowedPHY-PriorityIndex* is given as follows:

* ***allowedPHY-PriorityIndex* is configured and the dynamic grant has a PHY-priority index**: UL MAC SDUs from this LCH can only be mapped to the dynamic grants indicating PHY-priority index equal to the values configured by this field.
* ***allowedPHY-PriorityIndex* is configured and the dynamic grant does not have a PHY-priority index:** UL MAC SDUs from this logical channel can only be mapped to this dynamic grant if the value of the field is p0. Since the presence of PHY-priority index is configured by IE priorityIndicatorDCI-0-1 in RRC signaling, the present or not can not be changed dynamically.
* ***allowedPHY-PriorityIndex* is not configured**: UL MAC SDUs from this logical channel can be mapped to any dynamic grants.

The following is a summary of views provided in contributions regarding introduction of a new LCP restriction for UL HARQ process in NTN.

**Support for new restriction:**

Supporting companies argue that uplink traffic is generally differentiated by mapping QoS flows to logical channels (LCHs). The UE should be able to route certain traffic (e.g. requiring high reliability) using the HARQ processes for which HARQ UL retransmission is enabled, and other traffic (e.g. requiring high throughput) using the HARQ processes for which HARQ UL retransmission is disabled.

Unless a mapping between LCHs and UL HARQ processes is introduced, at the time of initial transmission of PUSCH, UE will have no idea whether network intends to disable HARQ retransmission or not. UE therefore risks multiplexing data from a logical channel that is unsuitable for the UL retransmission scheme (i.e. HARQ enabled/disabled). In case of HARQ transmission loss, RLC retransmission mechanism to recover the data could be too costly in terms of latency impact, UE power consumption and network resources (if RLC retransmission is even configured).

Regarding re-use of *allowedPHY-PriorityIndex*, several companies mention that re-purposing this field from IIoT may not be a good way forward. They note that this may: limit possible adoption of IIoT for NTN in a future release, may impact future standardization work in IoT over NTN, affect intra-UE prioritization (which would have to be evaluated by RAN1), and cannot cover the configured grant case.

**Not introduced**

Companies not in favour of introducing further LCP restrictions note that are already several mechanisms to ensure transmission reliability (e.g. BSR MAC CE have retxBSR-Timer, RRC messages can have RLC retransmissions).

Considering gNB is aware of the decoded data and failed decoding, it can adapt the scheduling and/or link adaptation and/or the gNB estimation algorithm for UE buffer status. For example, the gNB can estimate the UE buffer content from BSRs, SRs, and previously decoded TBs so can schedule accordingly. Furthermore, link adaptation in NTNs will most likely aim at a lower block error rate (i.e. possibly 1% BLER) because the pathloss differences are smaller over a cell and the long RTT has severe drawbacks as retransmissions are delayed for long.

Splitting HARQ processes into groups based on if retransmissions are enabled or disabled will require new management algorithms, and if there are available resources in the gNB at the end of a data burst, the gNB may not be able to schedule a retransmission because the HARQ process was configured with ”disable uplink HARQ retransmissions” leading to added delay at the burst end.

Legacy parameters (e.g. *allowedPHY-PriorityIndex*) allow reserving a certain type of grant for some LCHs and to control the QoS of each LCH. If *allowedPHY-PriorityIndex* is configured for a logical channel and the dynamic grant has a priority index, e.g., high or low, the MAC SDUs from the logical channel is only mapped to the dynamic grant indicating the priority index equal to the values.

### Details of enhancements to LCP

The following options were captured in the pre-meeting summary regarding LCP in NTN:

1. Two mapping relationships shall be indicated to UE. The first performs mapping between LCH and HARQ process type (configured for every LCH via RRC) to indicate whether LCH could be transmitted via HARQ process with or without feedback. The second performs mapping between HARQ process ID and HARQ process type, with mapping indicated via RRC message.
2. An “allowed HARQ process list” provides suitable mapping between an LCH and one or more HARQ processes.
3. Network should indicate whether to allow UL retransmission per logical channel
4. enabled HARQ UL retransmission is further differentiated into retransmission based on PUSCH decoding, or blind retransmission. If two kinds of services are multiplexed into one MAC PDU, one service (e.g,LCH1) requires the blind retransmission while the other service(e.g ,LCH2) requires decoding-result based HARQ retransmission, the gNB should adopt the blind retransmission to meet the QoS of LCH1. LCH2 is not necessary to use this retransmission scheme, which cause the waste of system resources for blind retransmission. It is proposed LCH with different QoS requirement can be mapped to HARQ processes with corresponding retransmission scheme. To let UE know different retrnamission schemes and LCHs preferred retrnamission scheme, NW indicates each LCH's association with one or multiple HARQ processes to UE.
5. A possible mapping strategy is provided to acommodate different service types via possible UL retransmission strategies. It is noted given there are 3 possible retransmission schemes which may each support a different type of services, the 1 bit available by re-purposing the *allowedPHY-PriorityIndex* is possible but may not provide an optimal/expected mapping. Possible alternatives include extending *allowedPHY-PriorityIndex* to 2 bits, or grouping HARQ processes with different priority together to decide which LCHs can be mapped to UL grant linked to HARQ process, however NW can still configure UE with one or more transmission schemes for each HARQ process based on it's implementation. To reduce complexity in NW implementation for some NTN scenarios, this may be optionally configurable.

It is noted that conclusion on a particular method this meeting is unlikely. Companies are therefore invited to select one or more options they would like to further study in an attempt to down-select between possible options.

**Question 7)** **Which of the following options for LCP in NTN do you support for further study:**

1. ***allowedPHY-PriorityIndex* is re-used;**
2. ***allowedPHY-PriorityIndex* is re-used and extended;**
3. **A new LCP restriction is introduced to map LCH to one or more HARQ process(es). HARQ processes can be classified as having retransmission “enabled” or “disabled”;**
4. **A new LCP restriction is introduced to map LCH to one or more HARQ process(es). HARQ processes can be classified as having retransmission “enabled based on PUSCH decoding result”, “enabled based on blind retransmission” or “disabled”.**
5. **A new LCP restriction is introduced to map LCH to one or more HARQ process(es). NW can still configure UE with one or more transmission schemes for each HARQ process based on it's implementation.**

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| **Company** | **Supported option(s)** | **Additional comments** |
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It was also noted that HARQ is essential for MAC CEs. As described in the pre-meeting summary, there is no LCP limitation on the MAC CE transmission in IIoT priority index feature (i.e., the MAC CE can be transmitted in both the grant with P0 and the grant with P1). The MAC CE which requires high reliability (e.g. Configured Grant Confirmation for the CG deactivation/activation) maybe transmitted in grant without retransmission instead of other retransmission schemes with retransmissions for high reliability. As a counter, it is noted in that lack of reliability can be overcome by blind retransmission.

**Question 8) If a new LCP restriction is introduced for NTN, should it also apply to MAC CEs?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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# Other Timers

In addition to aspects covered by the pre-meeting summary, the following timers are also to be considered. Companies are encouraged to refer to the contributions listed below for motivation why a specific solution is necessary.

### Drx-RetransmissionTimerDL

It has been agreed that if HARQ feedback is disabled for a HARQ process, the *drx-HARQ-RTT-TimerDL* will not be started. According to legacy specification, the *drx-RetransmissionTimer* will therefore not be started as well. The following contributions discuss possible modification to the *drx-RetransmissionTimer* e.g. whether a new start condition is necessary to support blind retransmission.

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| **Contribution** | **Relevant proposal(s)** | **Company** |
| [R2-2104851](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2104851.zip) | **P6:** The modified trigger condition of drx-RetransmissionTimerDL can be a MAC PDU is received in a configured downlink assignment or the PDCCH indicates a DL transmission when a DRX group is in Active Time. **P7:** The start of the drx-RetransmissionTimerUL(DL) can be offset by UE-specific RTD (UE-gNB delay) in LEO/GEO adding the value of drx-HARQ-RTT-TimerUL(DL) only when HARQ feedback is disabled and the blind retransmission is configured. | CATT |
| [R2-2104967](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2104967.zip) | **P2:** If the functionality of DL blind retransmission is enabled, the UE should start the drx-RetransmissionTimerDL after the end of the PDSCH reception, else if the functionality of DL blind retransmission is disabled, the UE should not start the drx-RetransmissionTimerDL.  | Asia Pacific Telecom, FGI |
| [R2-2105490](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105490.zip) | **P1:** To minimize specification impact, UE would rely on drx-InactivityTimer to support blind retransmission when DL HARQ feedback is disabled and not start drx-RetrasnmissionTimerDL. | Pansonic |
| [R2-2106089](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106089.zip) | **P4:** For HARQ processes with disabled HARQ feedback, there is no need to change the start of drx-RetransmissionTimerDL.**P5:** There is no need to extend the drx-RetransmissionTimerDL. | Ericsson |

**Question 9) Which of the following statements do you support regarding the start of *drx-RetransmissionTimerDL* for HARQ processes with HARQ feedback disabled:**

1. **The start of the *drx-RetransmissionTimerDL* can be offset by UE-specific RTD (UE-gNB delay) in LEO/GEO adding the value of drx-HARQ-RTT-TimerUL(DL) only when HARQ feedback is disabled and the blind retransmission is configured.**
2. **If the functionality of DL blind retransmission is enabled, the UE should start the *drx-RetransmissionTimerDL* after the end of the PDSCH reception, else if the functionality of DL blind retransmission is disabled, the UE should not start the *drx-RetransmissionTimerDL*.**
3. **No need to change start of *drx-RetransmissionTimerDL* (i.e. UE would rely on *drx-InactivityTimer* to support blind retransmission when DL HARQ feedback is disabled and not start *drx-RetransmissionTimerDL*).**

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| **Company** | **Supported statement(s)** | **Additional comments** |
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**Question 10) Do you agree a modified trigger condition of *drx-RetransmissionTimerDL* can be when a MAC PDU is received in a configured downlink assignment or the PDCCH indicates a DL transmission when a DRX group is in Active Time?**

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| **Company** | **Agree/Diasgree** | **Additional comments** |
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**Question 11) Do you agree there is no need to extend the *drx-RetransmissionTimerDL*?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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### SR Prohibit Timer

In RAN2#113bise it was agreed to extend the timer length of sr-ProhibitTimer, with details FFS. This is addressed by the following contributions:

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| **Contribution** | **Relevant proposal(s)** | **Company** |
| [14] [R2-2105529](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105529.zip) | **P1:** Extend SR-prohibitTimer by UE derived RTD.  | Spreadtrum |
| [20] [R2-2106089](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2106089.zip) | **P20**: The values added to sr-ProhibitTimer in NTN shall include values lower than the round-trip time.  | Ericsson |

**Question 12) Do you agree the SR-prohibitTimer should be extended by UE derived RTD?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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**Question 13) Do you agree values added to sr-ProhibitTimer in NTN shall include values lower than the round-trip time?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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### CGT/CGRT

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| **Contribution** | **Relevant proposal(s)** | **Company** |
| [6] [R2-2105249](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_114-e/Docs/R2-2105249.zip) | **P:** UE specific pre-compensation offset for round trip delay (RTD) is applied to CGT and CGRT (if configured), i.e. the configured CGT/CGRT value is extended by UE-specific RTD.  | MediaTek |

**Question 14) Do you agree UE specific pre-compensation offset for round trip delay (RTD) is applied to CGT and CGRT (if configured), i.e. the configured CGT/CGRT value is extended by UE-specific RTD?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
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# Summary

<to be generated pending company feedback>

# Conclusion

<to be generated pending company feedback>

# References

1. R2-2106488 [Pre114-e][103][NTN] Summary 8.10.2.2 - Other MAC aspects (InterDigital)
2. RAN2-114e – R17 NTN-REDCAP\_2021\_05\_19\_1425 (Vice Chair session notes)