**3GPP TSG-RAN WG2 Meeting #119bis-e draft R2-22xxxxx
Online, 10 - 19 Oct, 2022**

**Source:** Huawei/Apple

**Title:** Report of [AT119bis][303][NES] TP on NW DTX/DRX (Huawei/Apple)

**Agenda Item:** 8.3.2

**WID/SID:** FS\_Netw\_Energy\_NR– Release 18

**Document for:** Discussion and decision

# 1 Introduction

This document is the report of the following discussion:

* [AT119bis][303][NES] TP on NW DTX/DRX (Huawei/Apple)

- Review TP for NW DTX/DRX. Aim to capture some details on how DTX/DRX.

- Identify remaining questions/details that are required to be discussed for next meeting.

Deadline: Friday, Oct. 21th

Please provide your comments before Thursday 2022-10-20 10:00 UTC. Thanks!

# 2 Draft TR

Based on below agreements RAN2 made online, we provide a draft TR on NW DTX/DRX in the [folder](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_119bis-e/Inbox/Drafts/%5BOffline-303%5D%5BNES%5D%20TP%20on%20NW%20DTX%EF%BC%8FDRX%20%28Huawei%EF%BC%8FApple%29).

=> Let’s start with understanding solution in the context of connected

• Example 1: gNB is expected to turn off all transmission and reception for data traffic and reference signal during Cell DTX / DRX OFF duration.

• Example 2: gNB is expected to turn off its transmission / reception only for data traffic during Cell DTX / DRX OFF duration (i.e. gNB will still transmit / receive reference signals).

• Example 3: gNB is expected to turn off its dynamic transmission / reception during Cell DTX / DRX OFF duration (i.e. gNB is expected to still perform periodic transmission / reception, including SPS, CG-PUSCH, SR, RACH, and SRS).

• Example 4: gNB is expected to only transmit reference signals (e.g. CSI-RS for measurement).

**=> RAN2 assumes that the options above are possible for gNB DTX/DRX behavior and discuss UE RAN2 behavior/impact during the DTX/DRX.**

**=> For the purpose of our discussion we will focus on a single UE behavior at any point in time. FFS if we allow multiple configuration of NW DRX/DTX behaviors.**

=> Periodic DTX is assumed as a baseline. The gNB provides indication to UE about NW DTX mode/configuration via dedicated dynamic L1/L2 signaling.

=> Dynamic L1/L2 group signalling from NW to provide NW DTX mode/configuration is also considered in RAN2

=> It is beneficial to align UE DRX with network DTX and DRX alignment among multiple UEs. Details are FFS, including UE transmission/reception behavior during DTX. RAN2 to study the alignment.

Rapporteur first has a quick question on terminology alignment: in above agreement, both "NW DTX/DRX" and "Cell DTX/DRX" are used, but they seem to refer to the same thing. To avoid potential misunderstanding, Rapporteur would like to quickly check companies’ views on whether the terminology can be aligned in the TR.

**Q1: do you agree to align the following terminology in TR? If yes, which one do you prefer?**

1. **NW DTX/DRX**
2. **Cell DTX/DRX**

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| --- | --- | --- | --- |
| **Company** | **Yes / No (to align terminology)** | **If Yes, which option do you prefer** | **Detailed Comments if any** |
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Next, companies are invited to share their detailed comments on the draft TR in below Table. **Please do not insert / make comments in the TR document, which will be hard for Rapporteur to track and respond your comments.**

**Q2: Companies are invited to share their detailed comments on the draft TR in the table below.**

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| --- | --- | --- |
| **Company** | **Detailed comments** | **Rapporteur response** |
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# 3 Remaining issues

According to the discussion during this RAN2 meeting, the agreements and FFSes are captured as below:

• Example 1: gNB is expected to turn off all transmission and reception for data traffic and reference signal during Cell DTX / DRX OFF duration.

• Example 2: gNB is expected to turn off its transmission / reception only for data traffic during Cell DTX / DRX OFF duration (i.e. gNB will still transmit / receive reference signals).

• Example 3: gNB is expected to turn off its dynamic transmission / reception during Cell DTX / DRX OFF duration (i.e. gNB is expected to still perform periodic transmission / reception, including SPS, CG-PUSCH, SR, RACH, and SRS).

* Example 4: gNB is expected to only transmit reference signals (e.g. CSI-RS for measurement).

**=> RAN2 assumes that the options above are possible for gNB DTX/DRX behavior and discuss UE RAN2 behavior/impact during the DTX/DRX.**

**=> For the purpose of our discussion we will focus on a single UE behavior at any point in time. FFS if we allow multiple configuration of NW DRX/DTX behaviors.**

=> Periodic DTX is assumed as a baseline. The gNB provides indication to UE about NW DTX mode/configuration via dedicated dynamic L1/L2 signaling.

=> Dynamic L1/L2 group signalling from NW to provide NW DTX mode/configuration is also considered in RAN2

=> It is beneficial to align UE DRX with network DTX and DRX alignment among multiple UEs. Details are FFS, including UE transmission/reception behavior during DTX. RAN2 to study the alignment.

Rapporteur identifies the following issues to be further addressed at next RAN2 meeting accordingly:

### #1 Configuration and signalling

The aspects need to be addressed are summarized as below, assuming a single UE behaviour at a time:

1. The detailed information to be configured, e.g. DTX/DRX pattern etc.
2. The signalling design, including but not limited to:
* Configuration by RRC signalling or lower layer signalling?
* Notification procedure and signalling of DTX/DRX mode?
* How group signalling applies to the configuration or mode notification?

**Q3: Do companies agree with the above observation?**

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| **Company** | **Yes / No** | **Comments** |
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In addition to this, there is one FFS on whether to support multiple configurations. It is also worthwhile to address this at next RAN2 meeting. From rapporteur’s observation, the below needs to be addressed:

1. Whether multiple configurations refer to separate configuration between DTX and DRX, or refer to different sets of configurations for DTX, and different sets of configurations for DRX respectively?
2. Whether this brings benefits compared with the assumption of one configuration at a time?
3. The potential signalling impacts.

**Q4: Do companies agree the above aspects need to be addressed for multiple configuration of DRX/DTX?**

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| **Company** | **Yes / No** | **Comments** |
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According to the papers from [R2-2210253](file:///C%3A%5CUsers%5Cmtk65284%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2_RL2%5CTSGR2_119bis-e%5CDocs%5CR2-2210253.zip) and [R2-2210595](file:///C%3A%5CUsers%5Cpanidx%5COneDrive%20-%20InterDigital%20Communications%2C%20Inc%5CDocuments%5C3GPP%20RAN%5CTSGR2_119bis-e%5CDocs%5CR2-2210595.zip) (although not discussed online), there is one open question on whether this DRX/DTX applies per serving cell or per UE. The scenario needs to be understood first: in which cases, when gNB is already in energy saving mode, it still needs to support multiple serving cells as CA. Therefore this aspect may need further discussion on which scenarios are supported.

**Q5: Do companies agree to discuss the scenarios where DTX/DRX is already configured and the gNB still needs to configure multiple serving cells as CA (i.e., DTX/DRX configured together with CA)?**

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| **Company** | **Yes / No** | **Comments** |
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### #2 UE behaviour and gNB behavior

There are 4 examples agreed for DTX/DRX. It would be good that for each example, the detailed UE and gNB behaviour can be analysed. This is also important to assess the benefits of each direction. For each example, it is suggested to analyse the below aspects:

1. From gNB side, which information needs to be transmitted and potential benefits for energy saving
2. from UE side, the behaviour like which information needs to be received, monitoring etc., performance impact compared with normal access, impact on legacy UEs if any

**Q6: Do companies agree with the above observation?**

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| **Company** | **Yes / No** | **Comments** |
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### #3 Alignment

According to the discussion, there will be at least two aspects for discussion:

1. Whether/how to align UE DRX with network DTX, including UE transmission/reception behavior during DTX
2. Whether/how to align DRX alignment among multiple UEs

**Q7: Do companies agree with the above observation?**

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| **Company** | **Yes / No** | **Comments** |
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In addition to the above, there were also a couple of papers discussing UE assistant information. However from rapporteur’s observation, this can be done in a later stage, e.g. normative work directly. As if the above aspects are made clear and feasible, there would be no big problem to re-use existing UE assistance information or enhance whenever needed. So it is better to focus on the above aspects which are more fundamental for the DTX/DRX mechanism.

# 4 Conclusion

To be completed