3GPP TSG-RAN WG1 Meeting #100bis-e Tdoc R1-20xxxxx

E-meeting, April 20th - 30th 2020

Agenda: 5

Source: Moderator (Ericsson)

Title: Summary of reply LS on secondary DRX – Apr 22nd

Document for: Discussion, Decision

# 1 Introduction

RAN2 discussed introduction of a secondary DRX group with Carrier Aggregation in NR during RAN2#108 and made the following conditional agreements:

**Conditional on R1 acceptance:**

* A separate *drx-InactivityTimer* and *drx-onDurationTimer* can be configured for the secondary DRX group. R2 understands that this has zero or almost zero impact in R1 and R4
* The combination of cross-carrier scheduling and secondary DRX group is not supported
* FFS if timers for FR2 DRX configuration are shorter than timers for FR1 DRX configuration.
* The intention is to apply secondary DRX configuration to FR2 and existing DRX configuration to FR1
* We send an LS to R1, ask whether there is impact, and if so whether the impact is acceptable.

RAN1 received an LS [1] from RAN2 to check if this feature can be introduced under TEI16 with no or limited impact to RAN1 specifications.

As guided by chairman, this summary is to collect companies’ views on the LS and draft the reply based on companies’ input.

[100b-e-LS-08] Email discussion/approval for a potential reply LS to R1-2000165 by 4/24 (Ericsson, Claes)

# 2 Discussion

In the LS [1], RAN2 asked the following question:

RAN2 has the intention to introduce this enhancement under TEI16 and would like to check that this has zero or very little impacts to RAN1 and RAN4.

In the contribution submitted to RAN1#100bis-e, companies have identified various areas where there seem to be impact to RAN1 specifications. Based on this input, it would seem difficult to answer there is zero of very little impact to RAN1 specifications.

Thus, RAN1 should provide an answer describing there is RAN1 impact. It would also be preferable to provide some additional information to RAN2 in which areas there is impact. The company input discusses three areas: reception of DCI format 2\_6, i.e. WUS, SCell dormancy and CSI measurements. The company input is summarized below from the first round of discussions is summarized below:

Table 1: Summary of company input

|  |  |  |
| --- | --- | --- |
|  | Impact | No or little impact |
| WUS | ZTE, vivo, CATT, Ericsson, Huawei/HiSilicon, MTK, Intel, CMCC, OPPO | Qualcomm, Samsung, Apple |
| SCell dormancy | Vivo, Huawei/HiSilicon | Ericsson, Qualcomm, Samsung, Apple, OPPO, DOCOMO |
| CSI measurements/reporting | ZTE, Huawei/HiSilicon | Ericsson, MTK, Qualcomm, Samsung, Apple, OPPO, DOCOMO |

The moderator interprets “impact” that new definitions, even if they are straightforward, will be needed in RAN1 specifications. There seems to be wide-spread understanding that there is impact on WUS, whereas the views on other areas are diverging.

The moderator notes that the RAN2 LS did not ask RAN1’s opinion about the benefits of secondary DRX.

## 2.1 Proposed response

Based on the initial responses, it seems difficult to directly arrive at a full LS response. Therefore, we will try to agree on parts of the response, to include in the overall description section in the LS response.

### 2.1.1 Minimum response

The minimum response would be the direct answer to RAN2’s question, reflecting the status in RAN1: to the moderator, it would seem clear that RAN1 cannot confirm that secondary DRX has zero of little impact to RAN1, despite the fact that there are three companies that think that there is zero or little impact on RAN1 specifications. However, the LS response should capture the views of RAN1 as a whole. Therefore, we propose to add the following statement to the LS response:

**Statement 1:**

RAN1 cannot confirm that the introduction of secondary DRX has zero or very little impact to RAN1 specifications.

If necessary, this would be a complete response to the LS. The wording is copied from the RAN2 LS.

Please provide your comments to the above proposal. If you do not support to include the above proposal in the LS response, please provide a motivation why this does not reflect the situation in RAN1.

|  |  |
| --- | --- |
| Company | Comments |
| Apple | If this is the best we can achieve, i.e. not able to indicate that the impact, if there is any, is acceptable to RAN1. We are fine with the above statement. |
| vivo | Fine with including statement 1 in LS reply. |
| Huawei, HiSilicon | If only the statement 1 is replied, we don’t think a reply LS is needed considering no information is provided to RAN2.  In our view, if a reply LS is sent, all the three statements, Statement 1, Statement 2 and Statement 3, need to be included to reflect the real discussion in RAN1. |
| ZTE | From our perspective, if only statement 1 is provided in the replied LS, RAN2 cannot acquire enough meaningful information from it. Therefore, we think ALL of the statement 1,2 and 3 should be included in the LS. |
| CATT | We are OK with this state if Statement 2 is included. |
| OPPO | This is general observation. If only this can be provided, it is ok for us. But, we afraid it can give very little imformation |
| Qualcomm | We support including Statement 1 in the reply LS. However, we’d like to suggest changing its wording to the following:  RAN1 cannot ~~confirm that~~ reach a consensus whether the introduction of secondary DRX has zero or very little impact to RAN1 specifications.  The reason for the suggested change is that “RAN1 cannot confirm” may imply that RAN1 has agreement that the impact is not zero or small. But the truth is that there are diverse opinions and no agreement can be made. Although there was an argument in RAN1 #100e that we don’t need to send a reply if there is no consensus, we think we should send a reply this time, at least not to hold RAN2 discussion any longer. |
| NTT DOCOMO | We are generally fine with Statement 1, and Qualcomm’s suggestion seems good. |
| Intel | We are fine with statement 1 |
| MTK | Replying statement 1 only is not informative. Specific statement(s), at least statement 2, should be included. We don’t support LS reply with only statement 1. |

### 2.1.2 An area where RAN1 may agree there is impact.

Based on the first round of inputs, many (but not all) companies expressed the view that there is RAN1 impact if WUS and secondary DRX are configured at the same time. Based on the input, it would seem agreeable to include this as a RAN1 view, since companies are willing to compromise on this. The moderator thus proposes to include a statement in the LS response to explain this, using the proposal from CATT:

**Statement 2:**

RAN1 has identified that there is RAN1 impact of secondary DRX related to the UE’s behavior of detecting DCI format 2\_6 and the respective procedures.

Please provide your comments to the above proposal.

|  |  |
| --- | --- |
| Company | Comments |
| Apple | There is no need for this statement, it is not asked by the RAN2 and it does not address the question, i.e. whether the impact is acceptable or not. On the contrary, this statement can only cause further confusion in RAN2 in our view. |
| Vivo | We think statement 2 should be included in the LS reply as it is fact based on the RAN1 discussion so far. |
| Huawei, HiSilicon | As commented on Statement 1, if a reply LS is sent, all the three statements, Statement 1, Statement 2 and Statement 3, need to be included to reflect the real discussion in RAN1. If only one or two of them is informed, no reply LS is needed to mislead/confuse RAN2 discussion. |
| ZTE | We think ALL of the statement 1,2 and 3 should be included in the LS to reflect the discussion in RAN1.  Regarding the impact on DCI format 2\_6, the following needs to be considered.   1. If secondary DRX group is introduced, we need to discuss whether to support configure DCI format 2\_6 per DRX group. 2. UE’s behavior of detecting DCI format 2\_6 needs to be discussed and specified in RAN1 when the active time of two DRX group is not aligned, i.e., one is within active time, the other one is outside active time 3. UE’s behavior of detecting DCI format 2\_6 needs to be discussed and specified in RAN1 when the DRX cycles of two DRX group are not the same, i.e., one is in short DRX cycle, the other one is in long DRX cycle   Therefore, we think statement 2 should be included in the replied LS. |
| CATT | We support statement 2. We could also mention that the impact would be mitigated if secondary DRX group and WUS do not configure in the same time. |
| OPPO | We agree the proposal. This will be helpful for RAN2 make decision, even we cannot make the details of impact. |
| Qualcomm | We are fine with including Statement 2. However, since no issue was identified when the secondary DRX group and the WUS are not configured simultaneously, we should further clarify that in Statement 2. For example:  RAN1 has identified that there is RAN1 impact of secondary DRX related to the UE’s behavior of detecting DCI format 2\_6 and the respective procedures~~.~~, if DCI format 2\_6 and secondary DRX are configured simultaneously. |
| NTT DOCOMO | We agree with CATT and Qualcomm. We should mention on the case that DCI format 2\_6 and secondary DRX are not configured simultaneously. In that case, our view is no or little impact on RAN1 specificaiton. |
| Intel | We are fine with including statement 2. Agree with CATT above. |
| MTK | This statement is an “must” for the LS reply. |

Just to reiterate: If we cannot agree to the proposal, we will not include in the LS response.

Regarding Scell dormancy and the CSI measurements, most companies state there is zero or little impact. It is the view of the moderator that RAN1 will not be able to agree to respond that there is impact.

### 2.1.3 Additional input

Several companies have provided additional input on Scell dormancy and CSI measurements. As previously noted, the views are diverging on these two aspects. Arriving at a unified RAN1 view on these topics would be unlikely. However, we may also include information in the LS response that are views of individual companies, where we also include opposite views when applicable. The information should still be beneficial for RAN2, i.e. on a level of technical detail suitable for RAN2. There is thus little point in adding another level of technical detail, since that would not be relevant for RAN2 anyway.

The moderator would like to bring forward a suggestion along these lines for possible inclusion in the LS response:

**Statement 3:**

Some companies identified that there is RAN1 impact on CSI measurements, whereas some companies stated there is no such impact.

Some companies identified that there is RAN1 impact on SCell dormancy, whereas some companies stated there is no such impact.

Please provide your comments to the above proposal.

|  |  |
| --- | --- |
| Company | Comments |
| Apple | There is no need for this statement, it is not asked by the RAN2 and it does not address the question, i.e. whether the impact is acceptable or not. On the contrary, this statement can only cause further confusion in RAN2 in our view. |
| Vivo | In our view, the impact on CSI measurement/report should be trivial as long as the definition of active time is properly determined (this is RAN2 scope).  However, regarding Scell dormancy, we still have concerns. The UE behaviour combined with secondary DRX and Scell dormancy is not clear. And following questions should be addressed   1. Can a dormancy indication DCI indicating the Scells within a DRX group or across DRX group?    1. Option 1: a dormancy indication DCI can only indicate the dormancy state transition for Scells within the same DRX group.       1. In this case how can an Scell within the 2nd DRX group be indicated? There is currently a limitation that dormancy indication DCI can only be transmitted on Pcell    2. Option 2: a dormancy indication DCI can indicate the dormancy state transition for Scells in a different DRX group       1. In this case, what is the UE behavior is expected when UE receives a dormancy state transition for a Scell in the 2nd DRX group during its DRX OFF state   In our view, to fully address the above questions, the RAN1 impact is not trivial. |
| Huawei, HiSilicon | For the CSI-RS measurement, it may be argued that the CSI measurement is not impacted if DRX Active Time is independently defined per DRX group. However, it should be noted that CSI measurement is not only impacted by the DRX Active Time in Rel-16. In Rel-16, the UE can be configured to do CSI measurement outside Active Time. As an example, it is agreed in power saving WI in the RAN1#100 that in Rel-16 the CSI measurement is still required when the UE is outside Active time in some cases. So, regardless how RAN2 defines the Active Time, RAN1 is responsible for the UE behavior on the CSI measurement and reporting to make sure the new mechanism can work well without significant performance loss. Therefore, we don’t think there is only no impact or little impact on the CSI-RS measurement and reporting. RAN1 may need discussion if secondary DRX group would be introduced, similarly as we have discussed in RAN1 for several meetings for the UE behavior of CSI measurement when WUS is introduced.  For SCell dormancy, the dormancy indication is sent on Pcell, which impacts the UE behavior on the SCell. If the active time is not aligned between Pcell and SCell, new issues, including what VIVO commented, need to be discussed/resolved considering Scell dormancy design in Rel-16 is based on the assumption of single DRX group.  If the group is willing to send a reply LS to RAN2, all the three statements, Statement 1, Statement 2 and Statement 3, need to be included to reflect the real discussion in RAN1. |
| ZTE | We think ALL of the statement 1,2 and 3 should be included in the LS to reflect the discussion in RAN1.  Regarding the impact on CSI measurement and report, according Rel-15 RAN1 spec, UE perform CSI measurements within active time. In addition, UE is expected to perform CSI measurements and report during DRX OndurationTimer but outside the DRX active time in Rel-16. And the detailed spec is being discussed. If secondary DRX group is introduced, I am not convinced that impact is minimal.  Regarding the impact on SCell dormancy indication, we share the same view with VIVO that the secondary DRX group has impact on SCell dormancy indication   1. It should be discussed whether DCI format 2\_6 can be used to indicate SCell dormancy behavior when the corresponding SCell is within DRX Active Time 2. It should be discussed whether DCI format 0\_1/1\_1 can be used to indicate SCell dormancy behavior when the corresponding SCell is outside DRX Active Time   Therefore, we think statement 3 should be included in the replied LS. |
| CATT | We are OK either to include statement 3 or not. |
| OPPO | We think both of them do not have significant impact by 2 DRX group as minimum UE behavior can de define. To make it forward, this general statement is acceptable to us. |
| Qualcomm | We support the second sentence about SCell dormancy. However, for CSI, the first sentence doesn’t look very clear. During the first round of discussion, the CSI issues raised by some companies are related to WUS. Again, along with our comment on Statement 2, no issue was identified when the second DRX group and WUS are not simultaneously configured. Thus, we think we can add some comment for clarification.  Some companies identified that there is RAN1 impact on CSI measurements, if DCI format 2\_6 and secondary DRX are configured simultaneously, whereas some companies stated there is no such impact. |
| NTT DOCOMO | We agree with Qualcomm. |
| Intel | In order to include this information, we think the following suffices.  RAN1 cannot reach consensus whether the introduction of secondary DRX has RAN1 impact on CSI measurements and/or SCell dormancy. |
| MTK | Statement 3 can be included. But we are flexible if statement 2 is included. |

Again, if we cannot agree to the proposal, we will not include in the LS response.

### 2.1.4 Summary

In summary, the total response will then consist of the parts that RAN1 can agree on. Thus, the full LS response would consist of

* Statement 1, or
* Statement 1 + Statement 2, or
* Statement 1 + Statement 3, or
* Statement 1 + Statement 2 + Statement 3

It is the moderators view that if RAN1 cannot agree on Statement 1, there is little point in sending an LS response.

# 3 References

1. R1-2000165, LS on secondary DRX group, RAN2, RAN1#100-e, February 2020

1. [R1-2001581](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2001581.zip), Discussion on secondary DRX group, ZTE, RAN1#100bis-e, April 2020

1. [R1-2001582](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2001582.zip), Draft reply LS on secondary DRX group, ZTE, RAN1#100bis-e, April 2020

1. [R1-2001693](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2001693.zip), Discussion on 2nd DRX group, vivo, RAN1#100bis, April 2020

1. [R1-2001845](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2001845.zip), Discussion on impact of secondary DRX group, MediaTek Inc., RAN1#100bis-e, April 2020

1. [R1-2002056](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2002056.zip), Discussion on the RAN1 impacts on Secondary DRX group, CATT, RAN1#100bis-e, April 2020

1. [R1-2002492](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2002492.zip), Draft LS response on secondary DRX group, Ericsson, RAN1#100bis-e, April 2020

1. [R1-2002493](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2002493.zip), On secondary DRX group, Ericsson, RAN1#100bis-e, April 2020

1. [R1-2002578](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2002578.zip), RAN1 impact analysis due to the introduction of secondary DRX cycle, Huawei, HiSilicon, RAN1#100bis-e, April 2020

1. [R1-2002662](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_100b_e/Docs/R1-2002662.zip), Draft reply LS on secondary DRX cycle, Huawei, HiSilicon, RAN1#100bis-e, April 2020