3GPP TSG-RAN WG2 #109bis-e R2-20xxxxx

Electronic Meeting, April 20th – 30th 2020

Agenda Item: 6.10.6

Source: ZTE Corporation

Title: [AT109bis-e][038][DCCA] MCG SCell and SCG configuration with RRC Resume

Document for: Discussions, Decision

# 1 Introduction

This document is to kick off the following email discussion:

* [AT109bis-e][038][DCCA] MCG SCell and SCG Configuration with RRC Resume (ZTE)

Scope: Treat topics in 6.10.6, based on [R2-2003812](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_109bis-e\Docs\R2-2003812.zip) and comments. Can start discussion on non-controversial proposals immediately, if any. Wait for on-line discussion for contriversial proposal.

Part 1: Determine which issues that need resolution, find agreeable proposals. Deadline: April 24 0700 UTC

# 2 Discussion

Regarding the summary of AI 6.10.6 in [R2-2003812](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_109bis-e\Docs\R2-2003812.zip), there are three proposals. Companies are requested to add their comments for each of proposal in the boxes below.

## LS to RAN3 on stored AS context

RAN2 has just made the following agreement during RAN2\_109bis.

* The *sPCellCommonConfig* for the PSCell is saved as part of the UE AS Inactive AS context.

One company pointed out in [2] that RAN3’s spec may need update based on this agreement. See below the highlighted sentence.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~extract from TS 38.473 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

9.3.1.94 Lower Layer Presence Status Change

This IE indicates lower layer resources’ presence status shall be changed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| Lower Layer Presence Status Change | M |  | ENUMERATED (suspend lower layers, resume lower layers ...) | “suspend lower layers” will store CellGroupConfig except ReconfigurationWithSync “resume lower layers” shall restore SCG and only set after "suspend lower layers" has been indicated  Editor Note: The usage of this IE may need to be refined. |

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**Q1: Do company agree to send LS to RAN3 to to inform that stored UE Inactive AS context needs update? (E.g. to update the field description of “Lower Layer Presence Status Change”).**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| OPPO | Disagree | “Lower Layer Presence Status Change” indicates what will be stored in DU for UE from network point of view. The *servingCellConfigCommon* is common for all UE, not for one specific UE. It makes sense not to store for one UE.  For the case that store related SCG configuration as a part of the AS context, I think it means what will be stored in UE side.  So it seems no impact on RAN3. |
| Nokia | Disagree | Indeed, we don’t understand the need to have this. |
| LG | Agree | According to the above description highlighted in yellow, upon reception of this message with suspend lower layers, a gNB-DU may store CellGroupConfig except *ReconfigurationWithSync* for the suspended SCG of the UE.  RAN2 already agreed to store *servingCellConfigCommon* forPSCell in the inactive AS context:   * “The *sPCellCommonConfig* for the PSCell is saved as part of the UE AS Inactive AS context.   Based on the observations above, it is concerned that stored information for SCG context within the UE is not aligned to information for suspended SCG within the network (i.e. DU). Hence, current RAN3 spec is not aligned to RAN2’s understanding. To resolve this issue, we should send an LS to RAN3. Based on the LS, RAN3 may update, if necessary. |
| Interdigital | Agree | RAN3 specifications indicates that the lower configuration, except for ReconfigurationWithSync will be stored. Based on latest agreements, part of the ReconfigurationWithSync is part of the inactive UE context, and should also be stored by the network when lower layers are suspended for the SCG. |
| Ericsson | No Strong view | But would not hurt to check/align with RAN3 |
| MediaTek | No Strong view |  |
| NEC | No Strong view | This semantics description is originally written by RAN3 without RAN2 formal informatin via LS. So the update can be done by RAN3 themselves. but Ok to send an LS, if many companies want. |
| Qualcomm | No strong view |  |
| Spreadtrum | No Strong view | Maybe we can inform RAN3 the agreements made in RAN2 and let them check whether to update the specification or not. |
| Huawei | No strong view | It’s ok to send a LS to align with RAN3. |
| Apple | No strong view | We also think RAN3 can update their spec without the RAN2 LS if something is really needed. |
| vivo | Agree |  |
| Samsung | No strong view |  |
| ZTE | Agree |  |

**Q2: If answers “Agree” to Q1, any comment to the draft LS provided in** [R2-2003146](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003146.zip) **?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| LG |  | Agreements in draft LS needs to be updated. |
| Interdigital |  | In addition to the updated agreement, suggest the following change to the first sentence:  “RAN2 has decided to update the Inactive AS context related to the stored SCG configuration”. |
|  |  |  |

Summary:

14 companies provided their views, 2 companies think LS is not needed, 4 companies agree to send the LS, and 8 companies have no strong view. Based on the feedbacks, the rapporteur think it is fine to send LS to RAN3 about RAN2’s agreement, and let RAN3 to decide whether/how to update their spec. The draft LS R2-2003146 can be taken as a baseline.

**Proposal 1: Send LS to RAN3, informing on RAN2’s agreement:**

* The *sPCellCommonConfig* for the PSCell is saved as part of the UE AS Inactive AS context.

## restoreSCG in NE-DC

The following agreement made by RAN2 only refers to *reconfigurationWithSync*, which is applicable to UEs configured with NR SCG. One company suggests in [1] to confirm the principle also applies to mobilityControlInfoSCG in case of NE-DC, the corresponding proposal is given in below table.

* For *restoreSCG* upon RRC resume, Network shall always include *secondaryCellGroup* (with at least reconfigurationWithSync) together with *restoreSCG*.

To avoid misleading, the previous agreement can be updated into:

* For *restoreSCG* upon RRC resume, Network shall always include *secondaryCellGroup* (with at least reconfigurationWithSync of NR SCG, or mobilityControlInfoSCG of LTE SCG) together with *restoreSCG*.

**Q3: Do companies agree that the agreement made last meeting can be updated as above?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| OPPO | Agree |  |
| Nokia | No strong opinion | Thought this was the case but if companies want to clarify this bit further then okay to clarify. |
| LG | Agree |  |
| Interdigital | Agree |  |
| Ericsson | Agree |  |
| MediaTek | Agree |  |
| NEC | Agree |  |
| Qualcomm | Agree | It is straight forward to extend previous agreement to support NE-DC. |
| Spreadtrum | Agree |  |
| Huawei | Agree |  |
| Apple | Agree |  |
| vivo | Agree | As *reconfigurationWithSync* only presents in NR spec, the original agreement can only be applicable to MR-DC cases which involve NR SCG.  For NE-DC case that refers to LTE SCG, according to LTE spec the UE performs the SCG change related actions upon receiving an *RRCConnectionReconfiguration* message including *mobilityControlInfoSCG.* Thus, the updated text makes the agreement more correct. |
| Samsung | Agree |  |
| ZTE | Agree |  |

Summary:

14 companies provided their views, 13 companies agree the proposal and 1 company has no strong view.

**Proposal 2: Update the previous RAN2 agreement as below:**

* For *restoreSCG* upon RRC resume, Network shall always include *secondaryCellGroup* (with at least reconfigurationWithSync of NR SCG, or mobilityControlInfoSCG of LTE SCG) together with *restoreSCG*.

## Validity check of stored SCG

Regarding whether and how to check the validity of stored PSCell, 5 companies provide a co-signed contribution [6], including the following solution:

* Solution: network configures RSRP/RSRQ threshold in *RRCResume* message, and UE applies stored SCG configuration only when the stored PSCell quality is above the threshold;

Considering this topic has been discussed for more than 3 meetings, but without consensus. Some companies also suggest to postpone the discussion to Rel-17. So companies are invited to show your views on whether to solve this in Rel-16.

**Q4: Do companies agree to introduce mechanism to check the validity of stored PSCell in Rel-16?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| OPPO | Agree | In R15 EN-DC, we agree to support SN blind addition. It is well known that it will impact the performance of the UE due to the blind SN addition.  Now the UE know the measurement results due to the early measurement function, and the there is no chance for the UE to report the measurement results before MSG4. So it make sense to check the validity of the configured SCG or SCells in UE side based on the early measurement results.  The spec change is little but will improve the performance of UE. We cannot see any issue to support it in R16. |
| Nokia | Disagree | This is an enhancement which brings little or no benefit as the next message from network can confirm the SCG cells correctly based on the early measurements. That is the clear and 100% correct approach. |
| LG | Agree | We do not have any issue to support this validity check in Rel-16 since this enhancement has a clear benefit to prevent RA procedure failure to the PSCell. |
| Interdigital | Agree | We see no need to postpone the discussion to Rel17, given the solution addresses the SCG Failure issue during blind configuration, and the RRC spec changes are quite straightforward. |
| Ericsson | Agree | One of the reasons for having resume SCG is latency enhancements (i.e. SCG is up and running as soon as possible). But since network doesn’t have early until msg5 is received by the network, network has to relay on blind resumption of the SCG. Checking the validity of the stored PSCell will ensure that UE will resume only if it still have a good connection from the stored Pscell. Without this, network will have to check from the measurement report if what the UE has been asked to resume with was proper (as the UE can send the resume complete message before the RA/sync with the PSCell succeeds) or wait for the SCG failure information. Since t304 can be have a value of up to 10sec (before the SCG failure is generated), this can be a considerable delay.  Considering the required spec changes are clear from the provided draft CRs, there is no reason to postpone this to later releases. |
| MediaTek | Disagree | This is discussed before and there is clear more one solution to “enhance” the blind resume. At this stage, we don’t think any further enhancement is needed. The gain of this kind behavior is marginal. Usually the idle mode measurement is less accurate than connected measurement, it is thus doubtable for the UE to release the stored PSCell based on IDLE mode measurement result. We prefer not to have this in Rel-16. |
| NEC | Agree (acceptable) | we understand this gives gain for specific case where the previous PSCell is restored. But if a problematic case is foreen, we prefer to have it rather than nothing. So, it is acceptable to us. |
| Qualcomm | Disagree | Same view as Nokia and MediaTek. Generally, we prefer to focus on fixing Rel-16 remaining issues and high-quality CR at this stage. |
| Spreadtrum | Disagree | The UE shall resume the Pscell’s configuration under the control of the network. Then an indication or measurement results based on the early measurement should be sent to the network before resume the configuration.  It’s better to have further discussion in the later release due to the time limit. |
| Huawei | Disagree | Same view as Nokia, MTK, Qualcomm and Spreadtrum. The benefit is questionable to support this, and it definitely will consume much time to discuss. We do not think at this stage, it is realistic to discuss this kind of new feature. |
| Apple | Disagree | Same view as Nokia, MTK, Qualcomm, Spreadtrum and Huawei. There is no consensus on this solution in RAN2, it’s better to have the further discussion in later release. |
| vivo |  | We agree with the motivation to ultilize UE Idle/Inactive measurement results for Validity check of stored SCG. Moreover, the Validity check may also be applied to stored MCG SCell(s). Since there are many details to be discussed and the limited time for R16, we tend to leave the Validity check of stored SCG/MCG SCell(s) topic to R17 scope. |
| Samsung | Disagree | Similar view as expressed by Nokia i.e. we should rather provide proper support to reconfigure SCG based on early measurements. Anyhow, for R16 we should not discuss any such enhancements anymore |
| ZTE | Disagree | This has been discussed for a long time and there is no consensus in RAN2, we prefer to focus on more critical issues in Rel-16, and postpone this topic to next release. |

**Q5: If answers “Agree” to Q4, any comment to the solution proposed in** [R2-2003243](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003243.zip), [R2-2003242](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003242.zip), [R2-2003241](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003241.zip)**?**

|  |  |  |
| --- | --- | --- |
| Company | Agree/Disagree | Comments |
| OPPO | Agree |  |
| Ericsson | Agree |  |
| NEC |  | For RRC CR, it maybe better to add some text to the field description of storedSCG-ConfigurationMaintained to clarify that this can be present only if scg-ResumeThreshold is received in RRC Resume message. |

Summary:

14 companies provided their views, 5 companies agree to introduce mechanism to check the validity of stored PSCell in Rel-16, 9 companies disagree and suggest to further discuss this in next release.

**Proposal 3: [9/14] RAN2 confirm not to introduce mechanism for checking the validity of stored PSCell in Rel-16.**

## Applicability of RRCConnectionResume in LTE

#Related to RIL Q502, Z302, Z307, Z308#

During 36.331 ASN.1 review, the field description of several fields have indicated that “The field can be included only when the UE is connected to 5GC” (see below). This implies that RRCConnectionResume messge can not be used in case of EN-DC. Thus RILs are raised to make further clarification.

|  |
| --- |
| ***nr-SecondaryCellGroupConfig***  Includes the NR *RRCReconfiguration* message as specified in TS 38.331 [82]. In this version of the specification, the NR RRC message only includes fields *secondaryCellGroup* and/ or *measConfig*. This field can be included only when the UE is connected to 5GC. |
| ***restoreMCG-Scells***  Indicates that the UE shall restore the MCG Scell configurations from the UE AS Context or UE Inactive AS Context, if configured. |
| ***restoreSCG***  If included, the UE shall restore the SCG configurations from the UE AS Context or UE Inactive AS Context, if configured. |
| ***sCellGroupToAddModList***  Indicates the SCell group to be added or modified. This field can be included only when the UE is connected to 5GC. |
| ***sCellGroupToReleaseList***  Indicates the SCell group to be released. This field can be included only when the UE is connected to 5GC |
| ***sCellToAddModList***  List of SCells to be added or modified. This field can be included only when the UE is connected to 5GC. |
| ***sCellToReleaseList***  List of SCells to be released. This field can be included only when the UE is connected to 5GC. |

It is clear that RRC\_INACTIVE state is not supported for UE connected to LTE-EPC. However, it is unclear in Rel-16, whether the “suspended RRC connection” is applicable to LTE-EPC UEs (e.g. EN-DC UEs). Therefore, companies are invited to show your understanding to this issue.

**Q6: Whether *RRCConnectionResume* message can be used to restore NR SCG in case of EN-DC?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| OPPO | No | For my understanding, these configurations is used for RRC\_INACTIVE UE. For EN-DC, the RRC\_INACTIVE UE is not support, so no need to support it.  For RRC\_IDLE with suspend in LTE side, it is introduced for MTC/NB-IOT, so there are no requirements to configure the CA or DC for this kind of UE.  At last, RAN2 did not discuss whether the SCell or SCG can be resumed or not for RRC\_IDLE with suspend case. |
| Nokia | No | We agree this was only for LTE connected to 5GC and not the case with suspend/resume with LTE EPC. |
| LG | No |  |
| Interdigital | No | Restoring the SCG configuration does not apply to the suspended RRC connection of LTE, and so the highlighted fields cannot be provided in the case of EN-DC (where RRC\_INACTIVE is not supported). |
| Ericsson | Yes | I tried to retrace the change history. In the RAN2\_107bis version (<http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_107bis/Docs/R2-1912539.zip>) there was no limitation to 5GC. But they were added in the RAN2\_108 version (<http://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_108/Docs/R2-1915281.zip>) as in email discussion 107bis\_44, it was pointed out that agreements in RAN2 for the inclusion of Scells and SCG config was for resuming from the INACTIVE state. If I remember correctly, the reasoning for that agreement was that at that time in LTE it was not possible to encrypt the msg4 when resuming from IDLE with suspended.  However, in later stages of LTE, it has been agreed to allow the encryption of msg4 from IDLE with suspended as well. Thus, that limitation does not exist anymore. As such, those limitation about 5GC can be removed now from the field descriptions. |
| MediaTek | Yes, but | It is questionable for us whether there is real use case to have this SCG/SCell configuration for connection with suspension. But we are fine to remove this restriction as now MSG4 could be encrypted. |
| NEC | No | our understanding is also that this is applicable for resume from INACTIVE, where UE is connected to 5GC. Apart from security issue, we do not see strong need for this enhancement specific to LTE (resume from Idle). |
| Qualcomm | No strong view | Although LTE IDLE with suspended seems not an important feature to support, it seems also not put too much extra requirement for NW and UE (considering LTE TEI has agreed to send NCC in LTE RRC Release message).  Thus, we don’t have strong view unless much spec impact is identified. |
| Spreadtrum | No strong view |  |
| Huawei | No strong view | We do not see the use case either. |
| Apple | No |  |
| vivo | Yes | It should be supported in all MR-DC cases including EN-DC. |
| Samsung | No | This does not seem critical so we prefer not to add at this late stage. It seems fine to consider this for R17. |
| ZTE | Yes | We think EN-DC is the most important deployment among MR-DC, and RRCConnectionResume with restore/setup SCG is an important feature of fast SCG setup. So we prefer to support this in Rel-16. |

Summary:

14 companies provided their views, 7 companies think RRCConnectionResume cannot be used in EN-DC. 4 companies prefer to extend RRCConnectionResume message to LTE-EPC UEs because Msg4 can be encrypted now. 3 companies show no strong view.

Considering there is no clear majority, the rapporteur suggests to further discuss it during conference-call.

**Proposal 4: To discuss whether LTE *RRCConnectionResume* message can be used to restore NR SCG in case of EN-DC.**

# 3 Conclusion

In the previous sections we made the following observations:

*Potential easy agreement：*

**Proposal 1: Send LS to RAN3, informing on RAN2’s agreement:**

* The *sPCellCommonConfig* for the PSCell is saved as part of the UE AS Inactive AS context.

**Proposal 2: Update the previous RAN2 agreement as below:**

* For *restoreSCG* upon RRC resume, Network shall always include *secondaryCellGroup* (with at least reconfigurationWithSync of NR SCG, or mobilityControlInfoSCG of LTE SCG) together with *restoreSCG*.

**Proposal 3: [9/14] RAN2 confirm not to introduce mechanism for checking the validity of stored PSCell in Rel-16.**

*Controversial proposal：*

**Proposal 4: To discuss whether LTE *RRCConnectionResume* message can be used to restore NR SCG in case of EN-DC.**

Based on the discussion in the previous sections we propose the following:

# 4 References

1. [R2-2002699](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2002699.zip) Remaining issues of restoreSCG in RRC resume ZTE Corporation, Sanechips discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core
2. [R2-2003128](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003128.zip) Remaining issue on stored SCG context LG Electronics Inc. discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core
3. [R2-2003146](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003146.zip) Draft LS to RAN3 on updated Inactive AS context LG Electronics Inc. LS out Rel-16 To:RAN3
4. [R2-2003241](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003241.zip) Draft 36.331 CR for Handling SCG Configuration in Resume InterDigital, Ericsson, LG, OPPO draftCR Rel-16 36.331 16.0.0 LTE\_NR\_DC\_CA\_enh-Core R2-2000551
5. [R2-2003242](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003242.zip) Draft 38.331 CR for Handling SCG Configuration in Resume InterDigital, Ericsson, LG, OPPO draftCR Rel-16 38.331 16.0.0 LTE\_NR\_DC\_CA\_enh-Core R2-2000552
6. [R2-2003243](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003243.zip) Handling the SCG Configuration in RRC Resume InterDigital, Ericsson, LG, OPPO, KT Corp discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core R2-2000553
7. [R2-2003383](file://D://__会议\2020\3GPP_202004\TSGR2_109bis-e\Docs\R2-2003383.zip) Report on email discussion [Post109e][037][DCCA] RRC open issues (Ericsson) Ericsson discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core