3GPP TSG-RAN WG2 #112-e Draft R2-2010746

Electronic Meeting, 2nd – 13th November 2020

Agenda Item: 6.8.5

Source: Ericsson (rapporteur)

Title: Summary of [AT112-e][227][DCCA] Remaining capability topics for DCCA

Document for: Discussion, Decision

# 1 Introduction

This document is to kick off the following email discussion:

* [AT112-e][227][NR][DCCA] Remaining capability topics for DCCA (Ericsson)

Scope:

* + - Discuss DCCA corrections under 6.8.5 marked for the discussion to see which CRs could be agreeable. Can also consider RAN1 input (if any arrives on time).

Intended outcome:

* + - Discussion summary in [R2-2010746](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2010746.zip) (by email rapporteur).

Deadline for providing comments, for rapporteur inputs, conclusions and CR finalization:

* + - Initial deadline (for companies' feedback): 2nd week Tue, UTC 1000
		- Initial deadline (for rapporteur's summary in [R2-2010746](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2010746.zip)): 2nd week Tue, UTC 14:00

# 2 Discussion

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide input to provide their contact information in this table:

|  |  |
| --- | --- |
| Company | Delegate contact |

|  |  |
| --- | --- |
| Nokia | Jarkko.t.koskela@outlook.com |
| Qualcomm | chengp@qti.qualcomm.com |
| MediaTek | Chun-Fan.Tsai@mediatek.com |
| Ericsson | stefan.wager@ericsson.com |
| ZTE | liu.jing30@zte.com.cn |
| Huawei | wangrui46@huawei.com |
| OPPO | wangshukun@oppo.com |

Companies are requested to add their comments for each of the treated CRs of this email discussion in the boxes below.

## 2.1 Direct SCell activation

[R2-2009186](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009186.zip) Correction to 36.306 on UE capability of direct SCell activation Qualcomm Incorporated, Ericsson CR Rel-16 36.306 16.2.0 1790 - F LTE\_NR\_DC\_CA\_enh-Core

[R2-2009187](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009187.zip) Correction to 36.331 on UE capability of direct SCell activation Qualcomm Incorporated, Ericsson CR Rel-16 36.331 16.2.1 4456 - F LTE\_NR\_DC\_CA\_enh-Core

[R2-2010114](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2010114.zip) UE capability of direct E-UTRAN SCG SCell activation Huawei, HiSilicon discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

[R2-2009554](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009554.zip) Direct Scell activation capability Nokia, Nokia Shanghai Bell discussion Rel-16 LTE\_NR\_DC\_CA\_enh-Core

*Rapporteur comment: These contributions all discuss UE capability signalling for E-UTRA direct SCell activation for the NE-DC SCG. This was discussed also during RAN2#111-e and the following was noted:*

TBD whether directSCellActivation-r15 can be applied also for the SCG SCell case.

- QC thinks this was introduced for euCA and not NE-DC. Nokia wonders how we can separate if it doesn’t exist for LTE.

* FFS whether directSCellActivation-r15 can be applied also for the NE-DC SCG SCell case.
* Postponed

*Based on the contributions to this meeting, there are now two options presented for handling the UE capability for the NE-DC SCG SCell case:*

1. *Introduce a new capability bit. This option is presented in the first two CRs (*[*R2-2009186*](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009186.zip) *and* [*R2-2009187*](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009187.zip)*). Motivation mentioned in the CRs for this option is that the current capability bit was introduced in Rel-15 for the LTE CA case, hence it is not clear whether the same bit also applies to NE-DC? Another motivation is to align with NR-DC, where there are different bits for MCG and SCG.*
2. *Reuse the existing directSCellActivation-r15 capability bit. This option is presented in the two discussion papers (*[*R2-2010114*](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2010114.zip) *and* [*R2-2009554*](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009554.zip) *). Motivation mentioned in the contributions for this option is that apart from directSCellActivation-r15 there are also many other capabilities defined in Rel-15, for which it was not defined whether they apply for the MCG or the SCG, e.g. dormantSCellState-r15, directSCellHibernation-r15. There may also be possible interoperability impact of this change in case some vendors already implemented this feature.*

***Question 1: Do companies prefer option A or B?***

|  |  |  |
| --- | --- | --- |
| Company | Option A or B? | Comments |
| Nokia |  | We should not change release 15 understanding of capability. Release 15 direct scell activation capability does not distinguish SCG case and that should not be changed as it is NBC change.  |
| Qualcomm | Option A | For Nokia’s comment, please note that we have updated CR based on comments from last meeting with below changes:* Clarify that old Rel-15 capability (*directSCellActivation-r15*) is also applied to LTE-DC (besides LTE SA).

Hence, we don’t think option A has NBC change because the feature of direction activation in NE-DC is introduced in Rel-16. It seems we don’t have example of an old capability (e.g. Rel-15 bit) could forward compatibility with a feature introduced in next release. Thus, we think introducing a new capability for NE-DC is a better way than allowing a new way of capability forward compatibility. Furthermore, introducing a new capability for NE-DC would also be in line with the way it is handled in NR-DC case, where there are different bits for MCG and SCG. |
| MediaTek | Option A | Similar view as QC |
| Ericsson | Option A |  |
| ZTE | Option A | Although we prefer to reuse existing capability, it is acceptable for us to add a new one. The orginal capability can be regarded as applicable to SCG of LTE-DC. |
| Huawei | Option B | ProponentWe do not see the need to introduce a new capability bit, however if all other companies prefer this, we can accept it. |
| OPPO | Option A | No strong opinion.  |

*Rapporteur summary: 5 companies support option A. 2 companies support option B. There was a concern raised on possible NBC issue for option A, but that was clarified by Qualcomm and supported by others. Since option B proponent was also fine to follow majority view, rapporteur suggests to go with Option A. Since there were no comments received on the actual content of the CRs, it seems R2-2009186 and R2-2009187 can be agreed as is.*

1. [R2-2009186](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009186.zip) and [R2-2009186](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2009186.zip) can be agreed.

*In addition to above,* [*R2-2010114*](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2010114.zip) *also makes the following proposal:*

**Proposal 2: All Rel-15 E-UTRA UE capabilities related to SCells apply for SCells of the E-UTRA MCG and for SCells of the E-UTRA SCG in NE-DC SCG.**

***Question 2: Do companies agree with proposal 2 above?***

|  |  |  |
| --- | --- | --- |
| Company |  (Yes or No) | Comments |
| Nokia | Yes | That is assumption unless problems are found |
| Qualcomm | Partly | Besides direct activation (*directSCellActivation-r15),* we agree other capabilities (mainly related to dormant state) are applied to both SCells of MCG and SCell of SCG  |
| MediaTek | No | At least for IOT purpose, we see some value to separate the capability for MCG and SCG. We prefer not to confirm this right now and could be discussed if we really found some problem. Also saying “all” capability is too strong. It should be discussed case by case.  |
| Ericsson | Yes | We agree with Nokia that this should be the assumption, the exceptions to this rule need to be discussed case by case. |
| ZTE | Yes | Same view as Nokia and Ericsson.  |
| Huawei | Yes | Proponent. If that is the assumption, 36.306 should also be updated to capture it in the concerned capabilities. |
| OPPO | Yes  | Agree with Nokia. |

*Rapporteur summary: 6 out of 7 companies agree that apart from directSCellActivation-r15 discussed in previous question, the assumption is that Rel-15 E-UTRA UE capabilities related to SCells apply for SCells of the E-UTRA MCG and for SCells of the E-UTRA SCG in NE-DC SCG. One company is concerned to agree proposal 2 as is and think it should be discussed case by case. Rapporteur thinks that is anyway the understanding that if problems arise for a particular capability, then it can be discussed. Rapporteur suggests a slight reformulation of the proposal as follows:*

1. RAN2 assumes UE capabilities related to SCells apply for SCells of the E-UTRA MCG and for SCells of the E-UTRA SCG. Exceptions to this can be discussed case by case.

## 2.2 NR-DC cell group signalling

[R2-2010029](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2010029.zip) Cell group filtering for NR-DC Ericsson discussion LTE\_NR\_DC\_CA\_enh-Core

*Rapporteur comment: The contribution proposes to introduce cell group filtering in UE capability request as a measure to reduce the size of signalled UE capabilities. Instead of the UE indicating all supported cell grouping alternatives into MCG and SCG per supported band combination, the network would indicate to the UE in the filtered capability request how it intends to group the requested bands into MCG and SCG. The following benefits are mentioned:*

* *reduced overhead per signalled BC*
* *reduced number of BCs reported by the UE*
* *reduced network processing for parsing the UE capabilities*
* *not limited to max 5 bands per BC*

*The following proposals were made:*

**Proposal 1: Introduce a field for cell group filtering in *UECapabilityRequest* for the network to indicate to the UE the cell grouping it intends to use.**

**Proposal 2: If the network does not provide a cell group filter, the UE shall only indicate NR-DC support for BCs where it supports FR1-FR2 NR-DC, as in Rel-15.**

**Proposal 3: If the network provides a cell group filter, the UE shall only indicate NR-DC support for BCs for which it supports the requested grouping.**

***Question 3: Do companies agree with the above proposals 1, 2, 3?***

|  |  |  |
| --- | --- | --- |
| Company | Agreeable proposals (1,2,3) | Comments |
| Nokia | None | Too late to discuss in release 16 totally new type of capability signaling. We do not see any problems of following LTE principles in capability signaling for cell grouping. Secondly synchronous cell grouping is also discussed in other WGs (RAN1/4) and we should not make premature agreements.  |
| Qualcomm | Positive (although may not conclude in this meeting) | Because we have sent LS to RAN1/RAN4 for their input, we think it seems not quite likely to conclude this issue. However, we are positive to consider these 3 proposals, which sounds reasonable to us. One thing we are not sure is whether such solution is scalable enough, assuming different NR-DC implementations by different gNBs/vendors within a PLMN? For example, will it end up in signalling many NR-DC band combinations in UE Capability Enquiry? Note that UE capability filters need to be echoed back in UE Capability Information. Obviously, we do not want to repeat a large number of band combinations back and forth only for the purpose of UE capability filtering. |
| MediaTek | None | First we prefer to wait RAN1/RAN4 conclusion on synchronous cell grouping capability. Secondly, it is not entire clear to us how does this filtering mechanism work. It seems that the proposal is to use 2 band list to indicate all kind of band combination of NR-DC. We think this request much more time to discuss. |
| Ericsson | 1,2,3 | But we agree further discussion may be needed to set the details of how cell group filtering could be introduced in UE capability enquiry. Ideally, similar as for band filtering, the purpose should be to limit the information the UE has to compile and transmit to the network.Regarding the comment from Qualcomm, our intention was not to signal band combinations in the UE capability enquiry, but rather a cell grouping filter, in terms of how the network plans to use bands into MCG and SCG. The filter would apply to all reported band combinations. There may be deployments in which the NR-DC configuration in terms of supported bands and their cell grouping changes in different parts of the PLMN. There could be different ways of handling this, e.g. the network may request capabilities again with different filtering. The network could request and store different versions of UE capabilities with different cell grouping filters. We are open to discuss solutions. |
| ZTE | None | We also prefer to wait for RAN1/4’s conclusion first. Signalling optimization can be discussed after we finalize the basic sync cell group capability.  |
| Huawei | Postpone | We prefer to wait for RAN4’s feedback on our LS first, although we see value of the intention. |

*Rapporteur summary: Majority of the responding companies prefer to await the input from RAN1/RAN4 on cell grouping for synchronous NR-DC before deciding the RAN2 signalling. There was however some interest for the cell grouping filtering approach, at least some companies agreed with the intention, but it is apparent that more discussion is needed on detailed solutions.*

1. Await input from RAN1/RAN4 on cell grouping for synchronous NR-DC before deciding the RAN2 signalling.

*Since this is the first time this approach is discussed in RAN2, companies are also requested to indicate whether they in general support to investigate the possibilities of introducing cell group filtering in UE capability request for NR-DC with the goal to reduce the size of UE capability signalling.*

***Question 4: Do companies agree to investigate further the possibilities of cell group filtering in UE capability request?***

|  |  |  |
| --- | --- | --- |
| Company | Agree (Yes or No) | Comments |
| Nokia | No | see above |
| Qualcomm  | Yes | We are positive to this approach. Since the current proposals are rather high level, we would like to see more detailed solution description. |
| MediaTek | No | We do not have strong desire the have signaling optimization at this stage. But fine to discuss if majorities prefer this. |
| Ericsson | Yes | We think it would be important to explore whether cell group filtering could be applied instead of or in addition to the cell group indication per supported BC.  |
| ZTE | No | See above |
| Huawei | Postpone | See above |

*Rapporteur summary: Some support was expressed, though mainly it was repeated that we should first receive the RAN1/4 input on cell grouping for synchronous NR-DC. As such, the conclusion is the same as for the previous question already captured in proposal 3.*

[R2-2010593](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_112-e/Docs//R2-2010593.zip) MCG and SCG differentiation in asynchronous NR-DC Samsung Electronics discussion Rel-16

*(moved from 6.1.2)*

*Rapporteur comment: The contribution presents two options for how to signal the supported cell grouping into MCG and SCG per supported NR-DC Band Combination.*

***Option 1: LTE cell grouping is re-used, but '0' refers to MCG and '1' refers to SCG in cell grouping option.***

CA-ParametersNRDC-v16xy ::= SEQUENCE {

 supportedCellGrouping-r16 CHOICE {

 threeEntries-r16 BIT STRING (SIZE(6)),

 fourEntries-r16 BIT STRING (SIZE(14)),

 fiveEntries-r16 BIT STRING (SIZE(30))

 } OPTIONAL

}

***Option 2: supportedCellGrouping is a list of SupportedCGMode.***

CA-ParametersNRDC-v16xy ::= SEQUENCE {

 supportedCellGrouping-r16 CHOICE {

 threeEntries-r16 SEQUENCE (SIZE(3)) OF SupportedCGMode,

 fourEntries-r16 SEQUENCE (SIZE(7)) OF SupportedCGMode,

 fiveEntries-r16 SEQUENCE (SIZE(15)) OF SupportedCGMode

 } OPTIONAL

}

SupportedCGMode-v16xy ::= ENUMERATED {none, mode1, mode2, both}

*SupportedCGMode* has one of 4 values:

|  |  |
| --- | --- |
| Value | Meaning |
| *none* | Not support any |
| *mode1* | 0=MCG, 1=SCG |
| *mode2* | 0=SCG, 1=MCG |
| *both* | (0=MCG, 1=SCG) and (0=SCG, 1=MCG) |

***Question 5: Do companies prefer option 1 or 2, or something else?***

|  |  |  |
| --- | --- | --- |
| Company | Option 1, 2 or other? | Comments |
| Nokia | option 1 style | We can reuse LTE cell group signaling. It was long developed and results of extensive analysis.  |
| Qualcomm | option 1 style | Agree with Nokia that option 1 is preferred because its impact to existing LTE cell group signalling is smaller. However, we think we still need to wait RAN1/RAN4 input before making decision |
| MediaTek | Both fine and open for other options | It seems that both option work and we don’t not have strong view on which way to go. We may have to wait one more meeting for RAN1/RAN4 to conclude the design. |
| Ericsson | Other | With the agreement last meeting to explicitly indicate MCG/SCG support, the size of the supported cell grouping field reported per BC will grow to double the size compared to LTE-DC, which was MCG/SCG agnostic. We are concerned with this increase, but also with the limitation to 5 bands per BC, which may become limiting. |
| ZTE | None for now | Suggest to discuss it after receiving RAN1/4’s feedback.  |
| Huawei | Postpone | We prefer to wait for RAN4’s feedback on our LS first too. |

*Rapporteur summary: There was some support for option 1, but many companies prefer to await the RAN1/RAN4 input on the need for cell grouping for synchronous NR-DC before deciding the RAN2 signalling. As such, the conclusion is already captured in proposal 3.*

[R1-2009570](http://www.3gpp.org/ftp/tsg_ran/WG1_RL1//TSGR1_103-e/Docs//R1-2009570.zip), LS reply on cell-grouping UE capability for synchronous NR-DC, Qualcomm

*Rapporteur comment: Related to the cell grouping discussion above, we have now received the response LS to our LS on cell-grouping UE capability for synchronous NR-DC (*[*R2-2008662*](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2//TSGR2_111-e/Docs//R2-2008662.zip)*). In the response LS, RAN1 proposes new capability signalling for PUCCH group across different numerologies.*

*In the LS, it is mentioned that “From RAN1 point of view, framework of PUCCH-grouping capability for NR-CA can also be used as potential solution for synchronous NR-DC, and decision is up to RAN2.”. Companies are thus requested to provide their views on the input from RAN1 below.*

***Question 6: Do companies agree that the new capabilities for PUCCH grouping could provide a framework for a potential cell grouping solution for synchronous NR-DC?***

|  |  |  |
| --- | --- | --- |
| Company | Yes or No  | Comments |
| Ericsson | Maybe | It seems at least that with the new capabilities proposed by RAN1, PUCCH grouping across serving cells with different numerologies is no longer a motivation for introducing cell grouping for synchronous NR-DC.  |
| Huawei | Postpone | We prefer to wait for RAN4’s feedback on our LS, after that we could discuss this further. |
| Nokia | Yes with comments  | It seems clear that RAN1 sees that no new capabilities are needed for synchronous DC as the existing PUCCH capabilities can work i.e. capabilities 6-7 to 6- 6-8 (i.e. groups with same/different numerology) and 6-9(a) (different numerologies across NR carriers within same NR pucch group smaller/larger SCS). As the DC supporting UE will definitely support two PUCCH groups these sub cabalities shown above are able to indicate sufficient capabilities as indicated by RAN1. New capabilities indicate then whether up to 3 or 4 different numerologies in the same PUCCH group is supported by UE.  |
| Qualcomm | Yes | RAN2 should take RAN1 input into account. But we understand it can only be concluded in next meeting  |
| OPPO | Postpone | We think this should be postponed and wait for response LS from RAN1/RAN4. Plus the information from RAN1’s LS on two PUCCH group seems not intact because the UE capability in 22-x only address the case when UE is not configured with two PUCCH group |

*Rapporteur summary: Companies agree the RAN1 LS needs to be taken into account, but that we need to consider also the RAN4 input, which has not arrived yet. Based on the RAN1 input alone, it seems cell grouping for synchronous NR-DC may not be needed. But, it seems we cannot reach agreement in this meeting without the RAN4 input. In order to prepare for decision in next meeting, rapporteur suggests an email discussion could be triggered until next meeting once the RAN4 LS has arrived to discuss the received LSs and their impact on the RAN2 NR-DC cell group capability signalling.*

1. Discuss received LSs from RAN1 and RAN4 on the need for cell grouping for synchronous NR-DC and the impact on RAN2 signalling in email discussion until next meeting.

# Conclusion

Rapporteur would like to thank all companies contributing to this email discussion. Based on the discussions, rapporteur suggests the following proposals:

[Proposal 1 R2-2009186 and R2-2009186 can be agreed.](#_Toc56089556)

[Proposal 2 RAN2 assumes UE capabilities related to SCells apply for SCells of the E-UTRA MCG and for SCells of the E-UTRA SCG. Exceptions to this can be discussed case by case.](#_Toc56089557)

[Proposal 3 Await input from RAN1/RAN4 on cell grouping for synchronous NR-DC before deciding the RAN2 signalling.](#_Toc56089558)

[Proposal 4 Discuss received LSs from RAN1 and RAN4 on the need for cell grouping for synchronous NR-DC and the impact on RAN2 signalling in email discussion until next meeting.](#_Toc56089559)