**3GPP TSG-RAN WG1 Meeting #110bis-e** **R1-xxxxxxx**

**e-Meeting, October 10 – 19, 2022**

**Agenda Item: 8.13**

**Source: Moderator (Huawei)**

**Title: [110bis-e-R17-DSS-01] draft Summary of further MR-DC/CA Enhancement**

**Document for: Discussion and Decision**

# Introduction

According to the contribution papers under agenda item 8.13 for WI further MR-DC/CA Enhancement, all identified issues are summarized in Section 2.

# Summary of issues

According to all of companies’ contribution documents, three issues are summarized below.

* **Issue-1:** CR for disabling EN-DC power split when SCG is deactivated. [1]

## Issue-1: CR for disabling EN-DC power split when SCG is deactivated.

In [1], clarification on UE procedure for power control when SCG is deactivated is provided. Details of the CR are as follows:

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| ***Reason for change:*** | RAN1#109 agreed a CR in [R1-2205683](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205683.zip) capturing that the power control operation for NR-DC is applicable only when the SCG is activated in clause 7.6.2. by adding the following sentence in the beginning of 7.6.2:  The UE procedures described in this clause are not applicable if the UE is provided *scg-State* [12, TS 38.331].  RAN1 #110 discussed briefly for extending the same to EN-DC, but at the time the need was questioned due to the mandatory dynamic power sharing support between MCG and SCG from Rel-16 onwards allowing the network to configure the full Tx power for each RAT, and the power sharing making sure that LTE can take all the power that is available to it.  It should be noted that the EN-DC deployment may want to configure the LTE MCG with reduced max power in order to guarantee minimum available power for the NR SCG when the SCG is active so that the NR link is able to close the feedback loops and provide needed uplink feedback for the different protocol layers. This can be a desired system configuration even if the UE supported dynamic power sharing between the LTE MCG and the NR SCG as configuring full Tx power to the LTE MCG may lead to power starvation of the NR SCG.  When the UL coverage is running out, the SCG deactivation should be able to free the power allocated ot the SCG for the MCG use the same way this is possible with NR-DC as per the RAN1#109 agreement, and this can be helpful even if the UE supports dynamic power sharing between the LTE MCG and the NR SCG. |
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| ***Summary of change:*** | Condition the UE procedures for power control in clause 7.6.1 on the SCG being activated. |
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| ***Consequences if not approved:*** | Incomplete support for NR-DC enhancements with EN-DC. |

Changes to **TS 38.213**:

\*\*\* Unchanged text is omitted \*\*\*

7.6 Dual connectivity

7.6.1 EN-DC

The UE procedures described in this clause are not applicable if the UE is provided *scg-State* [12, TS 38.331].

If a UE is configured with a MCG using E-UTRA radio access and with a SCG using NR radio access, the UE is configured a maximum power  for transmissions on the MCG by *p-MaxEUTRA* and a maximum power  for transmissions in FR1 on the SCG by *p-NR-FR1*.

The UE determines a transmission power for the MCG as described in [13, TS 36.213] using  as the maximum transmission power. The UE determines transmission power for the SCG in FR1 as described in clauses 7.1 through 7.5 using  as the maximum transmission power. The UE determines transmission power for the SCG in FR2 as described in clauses 7.1 through 7.5.

A UE does not expect to be configured for operation with shortened TTI and/or processing time [13, TS 36.213] on a cell that is included in an EN-DC configuration.

If a UE is configured with , where  is the linear value of ,  is the linear value of , and  is the linear value of a configured maximum transmission power for EN-DC operation as defined in [8-3, TS 38.101-3] for FR1, the UE determines a transmission power for the SCG as follows.

\*\*\* Unchanged text is omitted \*\*\*

## Topics for discussion

The following topic for feMR-DC WI is discussed in the tdocs

**Issue-1**: CR for disabling EN-DC power split when SCG is deactivated.

**The motivation to have this CR seems to disable the text of TS 38.213 on LTE max power below when NR SCG is deactivated.**

*“The UE determines a transmission power for the MCG as described in [13, TS 36.213] using  as the maximum transmission power.”*

Regarding whether to discuss the above topic, companies are invited to provide comments.

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| *Company* | *View* |
| Qualcomm | We think the change is not essential due to the following reasons.   * Since Rel-16, dynamic power sharing for LTE-NR DC (FG8-1) is mandatory with capability signalling set to 1. Therefore, for Rel-17 UE, p-MaxEUTRA and p-NR-FR1 can be configured such that P\_LTE + P\_NR > P\_total. * As clarified in the LS R1-2205718 from RAN4, p-MaxEUTRA and p-NR-FR1 are not mandatory parameters. If not configured, P\_LTE and P\_NR are considered as infinity (captured in RAN4 CR, R4-2211179). * With the above, it is clarified that a UE can allocate a full power to LTE uplink dynamically, regardless of whether SCG is active/deactive, with proper RRC configuration provided by network. |
| ZTE | We don’t have a strong view on this CR, we can be open to adopt it. |
| OPPO | Technically we agree with Qualcomm (the proper configuration can work). On the other hand, we are also ok to have a technical discussion on this issue. |
| vivo | We agree with Qualcomm. Additionally, the *scg-State* is an RRC parameter, i.e., activation/deactivation of the SCG is done by RRC reconfiguration from MCG. The issue mentioned in the CR can be resolved by reconfiguring the max power of LTE MCG together with the NR SCG deactivation configuration. |
| Nokia, NSB | @Qualcomm: The network can of only rely on dynamic power sharing if it doesn’t want to guarantee some UL power budget for the SCG to maintain the L1 and L2 loops.  @vivo: we agree that it is possible for the network to reconfigure the LTE Tx power cap when the *scg-State* is provided to the UE. Our preference is to not have to reconfigure the Tx power caps together with the SCG deactivation, have the SCG deactivation configuration message to only consist of the *scg-State*, and align the EN-DC behaviour to that of the NR-DC. |
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# Conclusions

TBD

# References

1. R1-2210191 Disabling EN-DC power split when SCG is deactivated Nokia, Nokia Shanghai Bell