**3GPP TSG-RAN WG2 Meeting #116-e *R2-21xxxx***

**Electronic meeting, November 01 – 12, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.321** | **CR** |  | **rev** |  | **Current version:** | **16.6.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Running CR to 38.321 for SCG activation/deactivation | | | | | | | | | |
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| ***Source to WG:*** | vivo | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_NR\_DC\_enh2-Core | | | | |  | ***Date:*** | | | 2021-10-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | To introduce SCG activation/deactivation feature. | | | | | | | | |
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| ***Summary of change:*** | | Capture the below related agreements on LTE\_NR\_DC\_enh2-Core WI.  **RAN2#112e**   * Continue RAN2 work with the assumption that when the SCG is deactivated, the UE does not monitor PDCCH on the PSCell. This assumption can be reconsidered if issues are found. * RAN2 assumes that UE will not perform SRS transmission while the SCG is deactivated. This assumption can be reconsidered if issues are found. * SCG RRC reconfiguration can select the SCG activation state (activated/deactivated) at PSCell addition/change, RRC resume or HO. * While the SCG is deactivated:   - there can be SCG SCells in deactivated state  - there cannot be SCG SCells in activated state  - it is FFS whether there can be SCells in SCG dormant state.  **RAN2#113e**   * SCG activation can be requested by MN/SN/UE. FFS on how to accept/reject the procedure. FFS which signalling is used. * SCG deactivation can be requested by MN/SN. FFS whether UE can request deactivation. FFS on how to accept/reject the procedure. FFS which signalling is used. * RRC signalling is defined for the interaction between UE/MN and MN/SN in SCG activation/deactivation. FFS if lower-layer signalling is needed. * Confirm that there is no PUSCH transmission on deactivated SCG. FFS if any other UL is allowed towards SCG. * Confirm that there is no PDCCH monitoring on PSCell of the deactivated SCG. * Confirm that there is no support of SCell dormancy for SCG SCells within a deactivated SCG. * NW-triggered SCG activation is indicated to the UE via the MCG. * NW-triggered SCG deactivation can be indicated to the UE via the MCG. FFS via SCG.   **RAN2#115e**   * We will support RACHless SCG activation in Rel-17. * UE-initiated activation is still FFS. * The TAT associated with the PSCell continues running when the SCG is switched from activated to deactivated state and the UE considers the TA as valid as long as it is still running. * If instructed by the network in the SCG activation indication, the UE performs random access towards the PSCell (even if the TAT is still running). * The SCG activation indication can indicate the TCI state (with or without BWP switching) for PDCCH/PDSCH reception. Otherwise, the UE uses the previously activated TCI states and the network should ensure that the relevant TCI states are configured and activated for the UE to monitor PDCCH at RACH-less SCG activation. * The UE performs RLM and BFD on PSCell while the SCG is deactivated if network configures it.   **RAN2#116e**   * At PSCell addition/change/HO/RRC resume, in case the SCG state is configured as deactivated, the UE does not perform random access. If the network wants the UE to perform random access, it can indicate the SCG as activated and deactivate it after the random access by RRC or MAC CE if supported. * Upon SCG deactivation, instruct the SCG MAC entity to perform partial MAC reset (FFS for the details). | | | | | | | | |
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| ***Consequences if not approved:*** | | SCG activation/deactivation is not supported. | | | | | | | | |
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| ***Clauses affected:*** | | 5.X | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  |  | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

### 5.1.1a Initialization of variables specific to Random Access type

The MAC entity shall:

1> if *RA\_TYPE* is set to *2-stepRA*:

2> set *PREAMBLE\_POWER\_RAMPING\_STEP* to *msgA-PreamblePowerRampingStep*;

2> set *SCALING\_FACTOR\_BI* to 1;

2> apply *preambleTransMax* included in the *RACH-ConfigGenericTwoStepRA*;

2> if the Random Access procedure was initiated for handover or SCG activation; and

2> if *cfra-TwoStep* is configured for the selected carrier:

3> if *msgA-TransMax* is configured in the *cfra-TwoStep*:

4> apply *msgA-TransMax* configured in the *cfra-TwoStep*.

2> else if *msgA-TransMax* is included in the *RACH-ConfigCommonTwoStepRA*:

3> apply *msgA-TransMax* included in the *RACH-ConfigCommonTwoStepRA*.

2> if the Random Access procedure was initiated for SpCell beam failure recovery (as specified in clause 5.17); and

2> if *beamFailureRecoveryConfig* is configured for the active UL BWP of the selected carrier; and

2> if *ra-PrioritizationTwoStep* is configured in the *beamFailureRecoveryConfig*:

3> set *PREAMBLE\_POWER\_RAMPING\_STEP* to the *powerRampingStepHighPriority* included in the *ra-PrioritizationTwoStep* in *beamFailureRecoveryConfig*;

3> if *scalingFactorBI* is configured in the *ra-PrioritizationTwoStep* in *beamFailureRecoveryConfig*:

4> set *SCALING\_FACTOR\_BI* to the *scalingFactorBI*.

2> else if the Random Access procedure was initiated for handover or SCG activation; and

2> if *rach-ConfigDedicated* is configured for the selected carrier; and

2> if *ra-PrioritizationTwoStep* is configured in the *rach-ConfigDedicated*:

3> set *PREAMBLE\_POWER\_RAMPING\_STEP* to the *powerRampingStepHighPriority* included in the *ra-PrioritizationTwoStep* in *rach-ConfigDedicated*;

3> if *scalingFactorBI* is configured in *ra-PrioritizationTwoStep* in the *rach-ConfigDedicated*:

4> set *SCALING\_FACTOR\_BI* to the *scalingFactorBI*.

2> else if *ra-PrioritizationForAccessIdentityTwoStep* is configured for the selected carrier; and

2> if the MAC entity is provided by upper layers with Access Identity 1 or 2; and

2> if for at least one of these Access Identities the corresponding bit in the *ra-PrioritizationForAI* is set to *one*:

3> if *powerRampingStepHighPriority* is configured in the *ra-PrioritizationForAccessIdentityTwoStep*:

4> set *PREAMBLE\_POWER\_RAMPING\_STEP* to the *powerRampingStepHighPriority*.

3> if *scalingFactorBI* is configured in the *ra-PrioritizationForAccessIdentityTwoStep*:

4> set *SCALING\_FACTOR\_BI* to the *scalingFactorBI*.

2> set *MSGA\_PREAMBLE\_POWER\_RAMPING\_STEP* to *PREAMBLE\_POWER\_RAMPING\_STEP*.

1> else (i.e. *RA\_TYPE* is set to *4-stepRA*):

2> set *PREAMBLE\_POWER\_RAMPING\_STEP* to *powerRampingStep*;

2> set *SCALING\_FACTOR\_BI* to 1;

2> set *preambleTransMax* to *preambleTransMax* included in the *RACH-ConfigGeneric*;

2> if the Random Access procedure was initiated for SpCell beam failure recovery (as specified in clause 5.17); and

2> if *beamFailureRecoveryConfig* is configured for the active UL BWP of the selected carrier:

3> start the *beamFailureRecoveryTimer*, if configured;

3> apply the parameters *powerRampingStep*, *preambleReceivedTargetPower*, and *preambleTransMax* configured in the *beamFailureRecoveryConfig*.

2> if the Random Access procedure was initiated for beam failure recovery (as specified in clause 5.17); and

2> if *beamFailureRecoveryConfig* is configured for the active UL BWP of the selected carrier; and

2> if *ra-Prioritization* is configured in the *beamFailureRecoveryConfig*:

3> set *PREAMBLE\_POWER\_RAMPING\_STEP* to the *powerRampingStepHighPriority* included in the *ra-Prioritization* in *beamFailureRecoveryConfig*;

3> if *scalingFactorBI* is configured in *ra-Prioritization* in the *beamFailureRecoveryConfig*:

4> set *SCALING\_FACTOR\_BI* to the *scalingFactorBI*.

2> else if the Random Access procedure was initiated for handover or SCG activation; and

2> if *rach-ConfigDedicated* is configured for the selected carrier; and

2> if *ra-Prioritization* is configured in the *rach-ConfigDedicated*:

3> set *PREAMBLE\_POWER\_RAMPING\_STEP* to the *powerRampingStepHighPriority* included in the *ra-Prioritization* in *rach-ConfigDedicated*;

3> if *scalingFactorBI* is configured in *ra-Prioritization* in the *rach-ConfigDedicated*:

4> set *SCALING\_FACTOR\_BI* to the *scalingFactorBI*.

2> else if *ra-PrioritizationForAccessIdentity* is configured for the selected carrier; and

2> if the MAC entity is provided by upper layers with Access Identity 1 or 2; and

2> if for at least one of these Access Identities the corresponding bit in the *ra-PrioritizationForAI* is set to *one*:

3> if *powerRampingStepHighPriority* is configured in the *ra-PrioritizationForAccessIdentity*:

4> set *PREAMBLE\_POWER\_RAMPING\_STEP* to the *powerRampingStepHighPriority*.

3> if *scalingFactorBI* is configured in the *ra-PrioritizationForAccessIdentity*:

4> set *SCALING\_FACTOR\_BI* to the *scalingFactorBI*.

2> if *RA\_TYPE* is switched from *2-stepRA* to *4-stepRA* during this Random Access procedure:

3> set *POWER\_OFFSET\_2STEP\_RA* to (*PREAMBLE\_POWER\_RAMPING\_COUNTER* – 1) × (*MSGA\_PREAMBLE\_POWER\_RAMPING\_STEP* – *PREAMBLE\_POWER\_RAMPING\_STEP*).

## 5.X Activation/Deactivation of SCG

*Editor note: for terminology” activation/deactivation of SCG”, further discuss if a better wording is needed.*

The network may activate and deactivate the configured SCG. Upon configuration of an SCG, the SCG is activated unless the parameter *scg-State* is set to *deactivated* for the SCG by upper layers.

The configured SCG is activated and deactivated by:

- receiving *scg-State*;

*Editor note: FFS if MAC CE is used for SCG activation/deactivation.*

The MAC entity shall for the configured SCG:

1> if upper layers indicate that the SCG is activated:

2> activate the SCG, including:

3> activate the PSCell according to the timing defined in TS 38.xxx [xx] for direct SCG activation; i.e. apply normal SCG operation including:

4> SRS transmissions on the PSCell;

4> CSI reporting for the PSCell;

4> PDCCH monitoring on the PSCell;

4> PDCCH monitoring for the PSCell;

4> PUCCH transmissions on the PSCell.

1. else if upper layers indicate that the SCG is deactivated:

2> deactivate the SCG, including:

3> deactivate all the SCells of the configured SCG according to clause 5.9;

3> clear any configured downlink assignment and any configured uplink grant Type 2 associated with the PSCell respectively;

3> clear any PUSCH resource for semi-persistent CSI reporting associated with the PSCell;

3> suspend any configured uplink grant Type 1 associated with the PSCell;

3> flush all HARQ buffers associated with the PSCell;

3> cancel, if any, triggered consistent LBT failure for the PSCell.

3> deactivate the PSCell according to the timing defined in TS 38.xxx [xx], including:

4> not transmit SRS on the PSCell:

4> not transmit on UL-SCH on the PSCell:

4> not monitor the PDCCH on the PSCell.

*Editor note: Upon SCG deactivation, instruct the SCG MAC entity to perform partial MAC reset (FFS for the details).*

## ANNEX

### RAN2#112

**Agreements**

* The work will focus on a single deactivated SCG.
* FFS if SCG RRC reconfiguration can select the SCG activation state (activated/deactivated) at PSCell addition/change, RRC resume or HO.
* Continue RAN2 work with the assumption that when the SCG is deactivated, the UE does not monitor PDCCH on the PSCell. This assumption can be reconsidered if issues are found.
* As a baseline, MN-configured RRM measurement/reporting procedures do not depend on the SCG activation state (deactivated or activated). Further optimisations are not precluded.
* While the SCG is deactivated, PSCell mobility is supported. MN- and SN-configured measurements are supported for deactivated SCG.
* FFS1: Details on the performed measurements (e.g. all SN configured measurements or subset based on certain criteria, restrictions on inter-frequency/RAT)
* FFS2: Support for SCell addition/mobility
* FFS3: Reporting procedure
* FF4: PSCell mobility procedure
* RAN2 assumes that UE will not perform SRS transmission while the SCG is deactivated. This assumption can be reconsidered if issues are found.
* FFS if RACH is needed for SCG reactivation

**Agreements**

**1 SCG RRC reconfiguration can select the SCG activation state (activated/deactivated) at PSCell addition/change, RRC resume or HO.**

**Agreements**

**5: When the SCG is in deactivated state, the UE sends MeasurementReport messages for measurement results of SN-configured measurements embedded in the E-UTRA (if the MCG is EUTRA) or in the NR (if the MCG is NR) ULInformationTransferMRDC message via SRB1**

**6a: When the SCG is in deactivated state, the UE can receive an SCG RRCReconfiguration message embedded in an MCG RRC(Connection)Reconfiguration message on SRB1, like when the SCG is activated, and then the UE**

**- processes the SCG RRCReconfiguration message according to Rel-15/16 procedures (FFS if any restriction/difference)**

**- sends an SCG RRCReconfigurationComplete message in the MCG RRC(Connection)ReconfigurationComplete message according to Rel-15/16 procedures**

**6b: The SCG RRCReconfiguration can change the PSCell. FFS if the UE does RACH towards the target PSCell, in that case.**

**7a: While the SCG is deactivated:**

**- there can be SCG SCells in deactivated state**

**- there cannot be SCG SCells in activated state**

**- it is FFS whether there can be SCells in SCG dormant state.**

**7b: FFS whether SCell can be added/reconfigured/released while the SCG is deactivated or this can be done only at SCG activation or after SCG activation.**

**8a: It is FFS whether the network can configure the UE stop certain configured RRM measurements while the SCG is deactivated, or can release certain RRM measurements at SCG deactivation.**

**8b: Relaxation of RRM measurement requirements (as compared with non-DRX activated cell requirements) while the SCG is deactivated is FFS.**

### RAN2#113

Agreements

1a SCG activation can be requested by MN/SN/UE. FFS on how to accept/reject the procedure. FFS which signalling is used.

1b SCG deactivation can be requested by MN/SN. FFS whether UE can request deactivation. FFS on how to accept/reject the procedure. FFS which signalling is used.

3 RRC signalling is defined for the interaction between UE/MN and MN/SN in SCG activation/deactivation. FFS if lower-layer signalling is needed.

Agreements

1 Confirm that there is no PUSCH transmission on deactivated SCG. FFS if any other UL is allowed towards SCG.

2 Confirm that there is no PDCCH monitoring on PSCell of the deactivated SCG.

3 Confirm that there is no support of SCell dormancy for SCG SCells within a deactivated SCG.

**Agreements**

**1 NW-triggered SCG activation is indicated to the UE via the MCG.**

**9 NW-triggered SCG deactivation can be indicated to the UE via the MCG. FFS via SCG.**

**Agreements**

**2 The UE behaviour when the SCG activation is indicated to the UE via the MCG is one or more of the following options:**

**option 1) similar to reconfiguration with sync, i.e. the UE always initiates random access to the PSCell.**

**option 2) in certain cases:**

**- the UE does not initiate random access and monitors PDCCH on the PSCell (at the latest after the specified processing time).**

**- the SCG can schedule data transmission on the PDCCH**

**The UE decides not to perform random access (one option to be selected):**

**option 2a) if the TA timer is still running and possibly other conditions (FFS how TAT starts)**

**option 2b) based on the contents of the SCG activation indication**

**FFS for option 2a): in the SCG deactivated state, the UE monitors some DL beams (FFS if the same as BFD or RLM) and, if the UE sees that the beams are not good enough (details FFS), the UE either (one of the options to be selected):**

**- will perform random access upon reception of the next SCG activation indication from the MCG**

**- reports measurement results (details FFS) via the MCG and wait for reconfiguration.**

**7 Further discuss the format and content of the SCG activation indication from the MCG to the UE after there is more progress on solution 2.**

**5 Continue to discuss whether some kind of beam monitoring (similar to RLM/BFD) should be supported when the SCG is deactivated. FFS if this only applies to when TAT is running.**

**6 Clarify the meaning of "the UE maintains DL sync while the SCG is deactivated" (e.g. whether that is a consequence of doing RRM measurements of the PSCell or something more is needed).**

**8 Further discuss the comparison between**

**- define a mechanism for SCG activation upon UL data arrival on SCG bearers**

**- use split bearer with primary path on MCG (network sees UL data and can initiate activation)**

**11 It is FFS whether the UE can provide some assistance information for deactivation of the SCG (but there is no proposal so far).**

**FFS if in absence of PDCCH monitoring and UL transmission, and it is possible to assume that TA is valid when the TA timer has not expired.**

### RAN2#113bis

Agreements

5 Only the MN can generate an RRC message with SCG (de)activation.

1 Indication of SCG deactivation to the UE via the SCG is not supported.

7 During handover preparation, the target MN can indicate the SCG state in the RRCReconfiguration message to be sent to the UE by the source MN.

8 The MN RRC reconfiguration message used to deactivate SCG and the embedded SN RRC reconfiguration message can reconfigure any parameter (any restriction requires an explicit decision).

9 While the SCG is deactivated, the MN RRC reconfiguration message and the embedded SN RRC reconfiguration message can reconfigure any parameter (any restriction requires an explicit decision).

Agreements

2 The UE can indicate to the MN that the UE would like the SCG to be deactivated. FFS on the details (e.g. reusing UAI or existing messages, information included, etc.). Network can configure whether UE is allowed to do the indication.

* RRM requirements for deactivated PSCell may be different than for activated PSCell. What they could be are FFS pending RAN4 work.

### RAN2#114e

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| * Confirm the scope of the post meeting email discussion:   - RACH-less SCG activation upon SCG activation indication (including related aspects of UE behaviour while the SCG is deactivated)  - UE triggered SCG activation (at least for UL data arrival on SCG bearers)  Multiple phases will be needed to confirm understandings and issues. |

### RAN2#115e

Agreements

* Support all of the following for RACH resources used in network-initiated SCG activation (at least using RRC):
* 1) common RACH resources;
* 3) dedicated RACH resources indicated in the SCG activation indication.
* FFS if we support also 2) (proponents are requested to provide CRs next time to illustrate how this can be done)
* We will support RACHless SCG activation in Rel-17
* Do not consider options 3) and 4)
* 5. The security key update is up to network implementation upon SCG activation from deactivation.
* PDCP entity is not suspended at SCG deactivation for at least AM DRB. FFS for Stage-3 details
* UL data processing is not prohibited during SCG deactivation for at least AM DRB. FFS for Stage-3 details
* UL data transmission to SCG is prohibited during SCG deactivation. FFS for Stage-3 details
* UE-initiated activation is still FFS.
* 1: The TAT associated with the PSCell continues running when the SCG is switched from activated to deactivated state and the UE considers the TA as valid as long as it is still running.
* 2: If instructed by the network in the SCG activation indication, the UE performs random access towards the PSCell (even if the TAT is still running).
* 3: The SCG activation indication can indicate the TCI state (with or without BWP switching) for PDCCH/PDSCH reception. Otherwise, the UE uses the previously activated TCI states and the network should ensure that the relevant TCI states are configured and activated for the UE to monitor PDCCH at RACH-less SCG activation.
* 4: The UE performs RLM and BFD on PSCell while the SCG is deactivated if network configures it.