**3GPP TSG-RAN WG3 #126 R3-247773**

**Orlando, FL, USA, 18-22 November 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** | **-** | **rev** | **-** | **Current version:** | **18.3.0** |  |
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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 |  | Radio Access Network | **x** | Core Network |  |

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| ***Title:***  | Stage-2 updates for intra-SN S-CPAC with MN involvement |
|  |  |
| ***Source to WG:*** | Ericsson, Nokia, CATT, LG Electronics, Huawei |
| ***Source to TSG:*** | R3 |
|  |  |
| ***Work item code:*** | NR\_Mob\_enh2-Core |  | ***Date:*** | 2024-11-21 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-18 |
|  | *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 canbe 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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | As per the agreements in RAN2, it is feasible to send multiple XnAP messages to transfer CG-Config and CG-CandidateList. Therefore, no updates are required for stage-3, but the stage-2 description can be revised. The simplest approach is to ensure that both the SN Modification Request and SN Modification Request Acknowledge are sent. This allows CG-Config to be included in the SN Modification Required and CG-CandidateList to be included in the SN Modification Request Acknowledge message.**Q1: Are both CG-Config and CG-CandidateList related to same configuration of intra-SN subsequent CPAC in MN format, and must be sent together in the same SN Modification Required XnAP message?****RAN2 response:** From RAN2 perspective, the CG-Config and CG-CandidateList are related to different part of UE configurations of intra-SN SCPAC configured by the MN, and not required to be sent together in the same SN Modification Required XnAP message.**Q2: If both RRC messages must be sent together, is it feasible to include both CG-Config message and CG-CandidateList messages in a single RRC message (new or existing), which could then be transferred in a single SN Modification Required XnAP message?****RAN2 response:** RAN2 understands that two XnAP messages can be sent from the SN to the MN to transfer CG-Config message and CG-CandidateList messages separately. |
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| ***Summary of change:*** | Include a note and procedural text stating that the MN should trigger the SN modification procedure for intra-SN subsequent CPAC upon receiving the SN Modification Required message from the SN.Impact Analysis:Impact assessment towards the previous version of the specification (same release): The CR has isolated impact because the change affects only the Subsequent CPAC function.The CR is backwards compatible from a protocol point of view. |
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| ***Consequences if not approved:*** | Ambiguity remains how to transfer both CG-Config and CG-CandidateList for the same configuration. |
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| ***Clauses affected:*** | 10.3.2, 10.20 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ... |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

### 10.3.2 MR-DC with 5GC

The SN Modification procedure may be initiated either by the MN or by the SN and be used to modify the current user plane resource configuration (e.g. related to PDU session, QoS flow or DRB) or to modify other properties of the UE context within the same SN. It may also be used to transfer an RRC message from the SN to the UE via the MN and the response from the UE via MN to the SN (e.g. when SRB3 is not used). In NGEN-DC and NR-DC, the RRC message is an NR message (i.e., *RRCReconfiguration*) whereas in NE-DC it is an E-UTRA message (i.e., *RRCConnectionReconfiguration*). In case of CPA, inter-SN CPC or subsequent CPAC, this procedure is used to modify CPA, inter-SN CPC or subsequent CPAC configuration within the same candidate SN. In case of CPA, inter-SN CPC or subsequent CPAC, this procedure may also be triggered by the candidate SN to add some prepared PSCells from the suggested list or cancel part of the prepared PSCells. In case of intra-SN CPC or subsequent CPAC, this procedure is used to configure, modify or release intra-SN CPC or subsequent CPAC configuration. In case of intra-SN SCG LTM, this procedure is used to configure, modify or release intra-SN SCG LTM configuration. This procedure may be initiated by the MN or SN to request the SN or MN to activate or deactivate the SCG. This procedure can also be used to support coordination between the MN and the SN for managing the configuration and reporting of QoE measurements and/or RAN visible QoE measurements in NR-DC.

The SN modification procedure does not necessarily need to involve signalling towards the UE.

**MN initiated SN Modification**



Figure 10.3.2-1: SN Modification procedure - MN initiated

The MN uses the procedure to initiate configuration changes of the SCG within the same SN, including addition, modification or release of the user plane resource configuration. The MN uses this procedure to perform handover within the same MN while keeping the SN, when the SN needs to be involved (i.e. in NGEN-DC). The MN also uses the procedure to query the current SCG configuration, e.g. when delta configuration is applied in an MN initiated SN change. The MN also uses the procedure to provide the S-RLF related information to the SN or to provide additional available DRB IDs to be used for SN terminated bearers. The MN also uses this procedure to activate or deactivate the SCG. The MN may not use the procedure to initiate the addition, modification or release of SCG SCells. The SN may reject the request, except if it concerns the release of the user plane resource configuration, or if it is used to perform handover within the same MN while keeping the SN. Figure 10.3.2-1 shows an example signalling flow for an MN initiated SN Modification procedure.

1. The MN sends the *SN Modification Request* message, which may contain user plane resource configuration related or other UE context related information, PDU session level Network Slice info and the requested SCG configuration information, including the UE capabilities coordination result to be used as basis for the reconfiguration by the SN. In case a security key update in the SN is required, a new *SN Security Key* is included. In case the PDCP data recovery in the SN is required, the *PDCP Change* *Indication* is included which indicates that PDCP data recovery is required in SN. In case of coordination between the MN and the SN on QoE and/or RAN visible QoE measurement configuration and reporting, the *SN Modification Request* message may contain the *QMC Coordination Request* IE.

2. The SN responds with the *SN Modification Request Acknowledge* message, which may contain new SCG radio configuration information within an SN RRC reconfiguration message*,* and data forwarding address information (if applicable). If the MN requested the SCG to be activated or deactivated, the SN indicates whether the SCG is activated or deactivated. In case of coordination between the MN and the SN on QoE and/or RAN visible QoE measurement configuration and reporting, the *SN Modification Request* *Acknowledge* message may contain the *QMC Coordination Response* IE.

NOTE 1: For MN terminated bearers to be setup for which PDCP duplication with CA is configured in NR SCG side, the MN allocates up to 4 separate Xn-U bearers and the SN provides a logical channel ID for primary or split secondary path to the MN.

 For SN terminated bearers to be setup for which PDCP duplication with CA is configured in NR MCG side, the SN allocates up to 4 separate Xn-U bearers and the MN provides a logical channel ID for primary or split secondary path to the SN via an additional MN-initiated SN modification procedure.

2a. When applicable, the MN provides data forwarding address information to the SN. For SN terminated bearers using MCG resources, the MN provides Xn-U DL TNL address information in the *Xn-U Address Indication* message.

3/4. The MN initiates the RRC reconfiguration procedure, including an SN RRC reconfiguration message. The UE applies the new configuration, synchronizes to the MN (if instructed, in case of intra-MN handover) and replies with MN RRC reconfiguration complete message,including an SN RRC response message, if needed. In case the UE is unable to comply with (part of) the configuration included in the MN RRC reconfiguration message, it performs the reconfiguration failure procedure.

5. Upon successful completion of the reconfiguration, the success of the procedure is indicated in the *SN Reconfiguration Complete* message.

6. If instructed, the UE performs synchronisation towards the PSCell of the SN as described in SN addition procedure. Otherwise, the UE may perform UL transmission after having applied the new configuration.

7. If PDCP termination point is changed for bearers using RLC AM, and when RRC full configuration is not used, the SN Status Transfer takes place between the MN and the SN (Figure 10.3.2-1 depicts the case where a bearer context is transferred from the MN to the SN).

8. If applicable, data forwarding between MN and the SN takes place (Figure 10.3.2-1 depicts the case where a user plane resource configuration related context is transferred from the MN to the SN).

9. The SN sends the *Secondary RAT Data Usage Report* message to the MN and includes the data volumes delivered to and received from the UE as described in clause 10.11.2.

NOTE 2: The order the SN sends the *Secondary RAT Data Usage Report* message and performs data forwarding with MN is not defined. The SN may send the report when the transmission of the related QoS flow is stopped.

10. If applicable, a PDU Session path update procedure is performed.

**SN initiated SN Modification with MN involvement**



Figure 10.3.2-2: SN Modification procedure - SN initiated with MN involvement

The SN uses the procedure to perform configuration changes of the SCG within the same SN, e.g. to trigger the modification/release of the user plane resource configuration, to trigger the release of SCG resources (e.g., release SCG lower layer resources but keep SN), and to trigger PSCell changes (e.g. when a new security key is required or when the MN needs to perform PDCP data recovery). The MN cannot reject the release request of PDU session/QoS flows and the release request of SCG resources. The SN also uses the procedure to request the MN to provide more DRB IDs to be used for SN terminated bearers or to return DRB IDs used for SN terminated bearers that are not needed any longer. The SN also uses this procedure to activate or deactivate the SCG. Figure 10.3.2-2 shows an example signalling flow for SN initiated SN Modification procedure.

1. The SN sends the *SN Modification Required* message including an SN RRC reconfiguration message, which may contain user plane resource configuration related context, other UE context related information and the new radio resource configuration of SCG. The SN may request the SCG to be activated or deactivated. In case of change of security key, the *PDCP Change* *Indication* indicates that an SN security key update is required. In case the MN needs to perform PDCP data recovery, the *PDCP Change* *Indication* indicates that PDCP data recovery is required. In case of coordination between the MN and the SN on QoE and/or RAN visible QoE measurement configuration and reporting, the *SN Modification Required* message may contain the *QMC Coordination Request* IE.

 The SN can decide whether the change of security key is required.

NOTE 3a: In case that a MN initiated conditional reconfiguration (e.g. CHO, MN initiated inter-SN CPC or MN initiated subsequent CPAC) is prepared, and if any execution of a prepared SN initiated intra-SN CPC or SN initiated intra-SN subsequent CPAC without MN involvement procedure or reconfiguration of the SCG, the SN notifies the MN via the *SN Modification Required* message. In this case, the steps 2 and 3 are skipped.

NOTE 3b: In case of SN initiated inter-SN CPC or SN initiated subsequent CPAC and in case that a candidate SN triggered the SN Initiated SN Modification procedure to include some prepared PSCells (within the candidate cells suggested by the source SN in SN initiated inter-SN CPC or SN initiated subsequent CPAC) or to remove some prepared PSCells, the MN may decide to trigger the step 2 towards the source SN.

2/3. The MN initiated SN Modification procedure may be triggered by *SN Modification Required* message, e.g. when an SN security key change needs to be applied, or as described in clause 10.20.

NOTE 3: For SN terminated bearers to be setup for which PDCP duplication with CA is configured in NR MCG side, the SN allocates up to 4 separate Xn-U bearers and the MN provides a logical channel ID for primary or split secondary path to the SN via the nested MN-initiated SN modification procedure.

4. The MN sends the MN RRC reconfiguration message to the UE including the SN RRC reconfiguration message with the new SCG radio resource configuration.

5. The UE applies the new configuration and sends the MN RRC reconfiguration complete message, including an SN RRC response message, if needed. In case the UE is unable to comply with (part of) the configuration included in the MN RRC reconfiguration message, it performs the reconfiguration failure procedure.

6. Upon successful completion of the reconfiguration, the success of the procedure is indicated in the *SN Modification Confirm* message including the SN RRC response message, if received from the UE. In case of coordination between the MN and the SN on QoE and/or RAN visible QoE measurement configuration and reporting, the *SN Modification Confirm* message may contain the *QMC Coordination Response* IE.

7. If instructed, the UE performs synchronisation towards the PSCell configured by the SN as described in SN Addition procedure. Otherwise, the UE may perform UL transmission directly after having applied the new configuration.

8. If PDCP termination point is changed for bearers using RLC AM, and when RRC full configuration is not used, the SN Status Transfer takes place between the MN and the SN (Figure 10.3.2-2 depicts the case where a bearer context is transferred from the SN to the MN).

9. If applicable, data forwarding between MN and the SN takes place (Figure 10.3.2-2 depicts the case where a user plane resource configuration related context is transferred from the SN to the MN).

10. The SN sends the *Secondary RAT Data Usage Report* message to the MN and includes the data volumes delivered to and received from the UE as described in clause 10.11.2.

NOTE 4: The order the SN sends the *Secondary RAT Data Usage Report* message and performs data forwarding with MN is not defined. The SN may send the report when the transmission of the related QoS flow is stopped.

11. If applicable, a PDU Session path update procedure is performed.

**<<<<< NEXT CHANGE >>>>>>**

## 10.20 Subsequent Conditional PSCell Addition or Change

A Subsequent Conditional PSCell Addition or Change (subsequent CPAC) is defined as a conditional PSCell addition or change procedure that is executed after a (conditional) PSCell addition, a (conditional) PSCell change, a PCell change or an SCG release based on pre-configured subsequent CPAC configuration of candidate PSCell(s) without reconfiguration and re-initiation of CPC/CPA. The UE keeps the configured subsequent CPAC configuration (unless the network indicates to release it) and evaluates the execution conditions of candidate PSCells (if provided for the following execution of subsequent CPAC) after completion of a PSCell addition, a PSCell change, a PCell change or an SCG release. Subsequent CPAC configuration can be initiated either by the MN or by the SN.

/\* skip unchanged \*/

**SN initiated intra-SN subsequent CPAC with MN involvement**

This procedure is initiated by the SN for intra-SN subsequent CPAC with MN involvement.



Figure 10.20-3: Intra-SN subsequent CPAC - SN initiated with MN involvement

Figure 10.20-3 shows an example signalling flow for intra-SN subsequent CPAC initiated by the SN with MN involvement:

1. The SN initiates the conditional SN modification procedure by sending the *SN Modification Required* message, which contains an intra-SN subsequent CPAC initiation indication. The message includes a list of PSCell(s) to prepare and

- either the associated execution conditions proposed for the initial execution of subsequent CPAC;

- or execution conditions proposed for the following execution of subsequent CPAC, and for each prepared PSCell, the SN decides SCG SCells and provides the new corresponding SCG radio resource configuration to the MN in an NR *RRCReconfiguration\*\** message contained in the *SN Modification Required* message.

The SN may include an indication that the SCG radio resource configuration of a prepared PSCell is a complete candidate configuration, i.e. that it is not a delta configuration with respect to the reference SCG configuration.

2/3. The MN initiated SN Modification procedure may be triggered by *SN Modification Required* message, e.g. when an SN security key change needs to be applied or, in case the *SN Modification Required* message in the step 1 is sent by the SN to initiate intra-SN subsequent CPAC, to retrieve additional configuration information.

NOTE 12: For SN terminated bearers to be setup for which PDCP duplication with CA is configured in NR MCG side, the SN allocates up to 4 separate Xn-U bearers and the MN provides a logical channel ID for primary or split secondary path to the SN via the nested MN-initiated SN modification procedure.

4. The MN sends to the UE an *RRCReconfiguration* message including the subsequent CPAC configuration, i.e. a list of *RRCReconfiguration\** messagesand associated execution conditions for the initial execution of subsequent CPAC and execution conditions for the following execution of subsequent CPAC, in which each *RRCReconfiguration\** messagecontains the SCG configuration in the *RRCReconfiguration\*\** message received from the SN in step 1 and possibly an MCG configuration. Besides, the *RRCReconfiguration* messagecan also include an updated MCG configuration, as well as the NR *RRCReconfiguration\*\**\* message generated by the SN, e.g., to configure the required conditional measurements. The *RRCReconfiguration* message may also include a reference configuration and a security update configuration.

5. The UE applies the *RRCReconfiguration* message received in step 4, stores the subsequent CPAC configurationand replies to the MN with an *RRCReconfigurationComplete* message, which can include an NR *RRCReconfigurationComplete\*\*\** message. In case the UE is unable to comply with (part of) the configuration included in the *RRCReconfiguration* message, it performs the reconfiguration failure procedure.

6. If an SN RRC response message is included, the MN informs the SN with the SN *RRCReconfigurationComplete\*\*\** message via *SN Modification Confirm* message. The MN sends the *SN Modification Confirm* message towards the SN to indicate that subsequent CPAC is prepared.

7. The UE starts evaluating the execution conditions for the initial execution of subsequent CPAC. If the execution conditionof one candidate PSCell is satisfied, the UE applies *RRCReconfiguration\** message corresponding to the selected candidate PSCell, and sends an *RRCReconfigurationComplete\** message, including an *RRCReconfigurationComplete\*\** message for the selected candidate PSCell, and information enabling the MN to identify the selected candidate PSCell.

8. If the RRC connection reconfiguration procedure was successful, the MN informs the SN of the selected candidate PSCell via *SN Reconfiguration Complete* message, including the SN *RRCReconfigurationComplete\*\** message.

9. The UE synchronizes to the PSCell indicated in the *RRCReconfiguration\** message applied in step 7.

10. If PDCP termination point is changed for bearers using RLC AM, the SN Status Transfer takes place between the MN and the SN (Figure 10.20-3 depicts the case where a bearer context is transferred from the SN to the MN).

11. If applicable, data forwarding between MN and the SN takes place (Figure 10.20-3 depicts the case where a user plane resource configuration related context is transferred from the SN to the MN).

12. The SN sends the *Secondary RAT Data Usage Report* message to the MN and includes the data volumes delivered to and received from the UE as described in clause 10.11.2.

NOTE 13: The order the SN sends the *Secondary RAT Data Usage Report* message and performs data forwarding with MN is not defined. The SN may send the report when the transmission of the related QoS flow is stopped.

13. If applicable, a PDU Session path update procedure is performed.

NOTE 14: The steps 7-13 can be performed multiple times for the following execution of subsequent CPAC, using the subsequent CPAC configuration provided in step 4. In step 7, the UE starts evaluating the execution conditions for the following execution of subsequent CPAC, instead of the execution conditions for the initial execution of subsequent CPAC.

**SN initiated intra-SN subsequent CPAC without MN involvement (SRB3 is not used)**

The procedure follows the steps described in figure 10.3.2-5.

**SN initiated intra-SN subsequent CPAC without MN involvement (SRB3 is used)**

The procedure follows the steps described in figure 10.3.2-3a.