**3GPP TSG-RAN WG2 Meeting #113-e *R2-2101979***

**Electronic Meeting, 2021-01-25 - 2021-02-05**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **37.340** | **CR** | **0251** | **rev** | **-** | **Current version:** | **16.4.0** |  |
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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:***  | Non-support of CHO/CPC with LTE/5GC |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | LTE\_feMob-Core |  | ***Date:*** | 2021-01-26 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | Conditional PSCell Change (CPC) for NGEN-DC is agreed by RAN2 to not be supported in Rel-16.  |
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| ***Summary of change:*** | In 10.1 it is stated that Conditional PSCell Change is not supported for the MR-DC options NE-DC and NGEN-DC.In 10.3.2, it is stated that the CPC configuration cannot be used to configure target PSCell in NGEN-DC.In 10.3.2, for the following procedures, it is stated that the architecture option NGEN-DC is not supported:* SN initiated Conditional SN Modification (CPC) without MN involvement (SRB3 is used)
* SN initiated Conditional SN Modification (CPC) without MN involvement (SRB3 is not used)

**Impact Analysis**Impacted 5G architecture options: (NG)EN-DCImpacted functionality:Conditional PSCell ChangeInter-operability:1. If the network is implemented according to the CR and the UE is not, there is no interoperability issue. 2. If the UE is implemented according to the CR and the network is not, any attempt by the network to configure CPC when UE is connected via LTE to 5GC may fail or cause unpredicted results. |
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| ***Consequences if not approved:*** | Stage-2 remains unclear on whether CPC is supported for NGEN-DC. |
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| ***Clauses affected:*** | 10.1, 10.3.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 36.300 CR 1335  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

Beginning of changes

## 10.1 General

Similar procedures as defined under clause 10.1.2.8 (Dual Connectivity operation) in TS 36.300 [2] apply for MR-DC.

Similar CHO principles as defined in TS 36.300 [2] and TS 38.300 [3] apply for the Conditional PSCell Change in MR-DC.

Conditional PSCell Change is not supported for the MR-DC options NE-DC and NGEN-DC.

Configuration of CHO and CPC for simultaneous operation is not supported in this release.

In case MR-DC is configured, CHO is only supported in Master Node to eNB/gNB Change procedure in this release.

Beginning of next changes

### 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 CPC, this procedure is used to configure or modify CPC configuration within the same SN. The CPC configuration cannot be used to configure target PSCell in NE-DC or in NGEN-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 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.

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).

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 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. 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. 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. 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.

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

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.

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.

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.

**SN initiated SN Modification without MN involvement**

This procedure is not supported for NE-DC.



Figure 10.3.2-3: SN Modification – SN initiated without MN involvement

The SN initiated SN modification procedure without MN involvement is used to modify the configuration within SN in case no coordination with MN is required, including the addition/modification/release of SCG SCell and PSCell change (e.g. when the security key does not need to be changed and the MN does not need to be involved in PDCP recovery). The SN may initiate the procedure to configure or modify CPC configuration within the same SN. Figure 10.3.2-3 shows an example signalling flow for SN initiated SN modification procedure without MN involvement. The SN can decide whether the Random Access procedure is required.

1. The SN sends the *SN RRC reconfiguration* message to the UE through SRB3.

2. The UE applies the new configuration and replies with the *SN RRC reconfiguration complete* message. In case the UE is unable to comply with (part of) the configuration included in the *SN RRC reconfiguration* message, it performs the reconfiguration failure procedure.

3. 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.

**SN initiated Conditional SN Modification (CPC) without MN involvement (SRB3 is used)**

This procedure is supported for the MR-DC options except for NE-DC and NGEN-DC.



Figure 10.3.2-3a: SN Modification – SN-initiated without MN involvement and when CPC is configured and SRB3 is used.

The SN initiates the procedure when it needs to transfer an NR RRC message to the UE and SRB3 is used and CPC is configured.

1. The SN sends the *SN RRC reconfiguration* including CPC configuration message to the UE through SRB3.

2. The UE applies the new configuration. The UE starts evaluating the CPC execution conditions for the candidate PSCell(s). The UE maintains connection with the source PSCell and replies with the *RRCReconfigurationComplete* message to the SN via SRB3.

3. If at least one CPC candidate PSCell satisfies the corresponding CPC execution condition, the UE detaches from the source PSCell, applies the stored configuration corresponding to that selected candidate PSCell and synchronises to that candidate PSCell.

4. The UE completes the CPC execution procedure by sending an *RRCReconfigurationComplete* message to the new PSCell.

**Transfer of an NR RRC message to/from the UE (when SRB3 is not used)**

This procedure is supported for all the MR-DC options.



Figure 10.3.2-4: Transfer of an NR RRC message to/from the UE

The SN initiates the procedure when it needs to transfer an NR RRC message to the UE and SRB3 is not used.

1. The SN initiates the procedure by sending the *SN Modification Required* to the MN including the SN RRC reconfiguration message.

2. The MN forwards the SN RRC reconfiguration message to the UE including it in the *RRC reconfiguration* message.

3. The UE applies the new configuration and replies with the *RRC reconfiguration complete* message by including the SN RRC reconfiguration complete message.

4. The MN forwards the SN RRC response message, if received from the UE, to the SN by including it in the *SN Modification Confirm* message.

5. 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.

**SN initiated Conditional SN Modification (CPC) without MN involvement (SRB3 is not used)**

This procedure is supported for the MR-DC options except for NE-DC and NGEN-DC.



Figure 10.3.2-5: SN Modification – SN-initated without MN involvement when CPC is configured and SRB3 is not used

The SN initiates the procedure when it needs to transfer an NR RRC message to the UE and SRB3 is not used, while CPC is configured.

1. The SN initiates the procedure by sending the *SN Modification Required* to the MN including the SN RRC reconfiguration message with CPC configuration.

2. The MN forwards the SN RRC reconfiguration message to the UE including it in the *RRC reconfiguration* message.

3. The UE replies with the *RRCReconfigurationComplete* message by including the SN RRC reconfiguration complete message. The UE maintains connection with source PSCell after receiving CPC configuration, and starts evaluating the CPC execution conditions for the candidate PSCell(s).

4. The MN forwards the SN RRC response message, if received from the UE, to the SN by including it in the *SN Modification Confirm* message.

5. If at least one CPC candidate PSCell satisfies the corresponding CPC execution condition, the UE completes the CPC execution procedure by an *ULInformationTransferMRDC* message to the MN which includes an embedded *RRCReconfigurationComplete* message to the selected target PSCell.

6. The *RRCReconfigurationComplete* is forwarded to the SN embedded in RRC Transfer.

7. The UE detaches from the source PSCell, applies the stored corresponding configuration and synchronises to the selected candidate PSCell.

End of changes