**3GPP TSG-RAN WG2 Meeting #118-e R2-2206830**

**Online, 9th – 20th May 2022 was R3-223899**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **37.340** | **CR** | **0331** | **rev** | **1** | **Current version:** | **17.0.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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 aspects for CPAC | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | R3 (Ericsson, Qualcomm Incorporated, Intel Corporation, ZTE, Lenovo, CATT) | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_NR\_DC\_enh2-Core | | | | |  | ***Date:*** | | | 2022-05-27 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Some of the description for CPAC is unnecessarily complicated. It contains functional errors and editorial errors. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Clarify early data transmission for MN terminated split/SCG bearers. * For CPC, in order to align with the stage 3 specifications, add the description of Early Status Transfer procedure * For CPC, remove "PDCP PDU forwarding" from the source SN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Some descriptions of CPAC are not accurate. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 10.2, 10.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 was endorsed by RAN3 in R3-223899. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## 10.2 Secondary Node Addition

### 10.2.1 EN-DC

The Secondary Node Addition procedure is initiated by the MN and is used to establish a UE context at the SN to provide resources from the SN to the UE. For bearers requiring SCG radio resources, this procedure is used to add at least the first cell of the SCG. This procedure can also be used to configure an SN terminated MCG bearer (where no SCG configuration is needed). In case of CPA, the procedure can be used for CPA configuration and CPA execution.

**Secondary Node Addition**

Figure 10.2.1-1 shows the Secondary Node Addition procedure.



Figure 10.2.1-1: Secondary Node Addition procedure

1. The MN decides to request the SN to allocate resources for a specific E-RAB, indicating E-RAB characteristics (E-RAB parameters, TNL address information corresponding to bearer type). In addition, for bearers requiring SCG radio resources, MN indicates the requested SCG configuration information, including the entire UE capabilities and the UE capability coordination result. In this case, the MN also provides the latest measurement results for SN to choose and configure the SCG cell(s). The MN may request the SN to allocate radio resources for split SRB operation. The MN always provides all the needed security information to the SN (even if no SN terminated bearers are setup) to enable SRB3 to be setup based on SN decision. In case of bearer options that require X2-U resources between the MN and the SN, the MN provides X2-U TNL address information for the respective E-RAB, X2-U DL TNL address information for SN terminated bearers, X2-U UL TNL address information for MN terminated bearers. In case of SN terminated split bearers the MN provides the maximum QoS level that it can support. The MN may request the SCG to be activated or deactivated. The SN may reject the addition request.

NOTE 1: For split bearers, MCG and SCG resources may be requested of such an amount, that the QoS for the respective E-RAB is guaranteed by the exact sum of resources provided by the MCG and the SCG together, or even more. For MN terminated split bearers, the MNs decision is reflected in step 1 by the E-RAB parameters signalled to the SN, which may differ from E-RAB parameters received over S1.

NOTE 2: For a specific E-RAB, the MN may request the direct establishment of an SCG or a split bearer, i.e., without first having to establish an MCG bearer. It is also allowed that all E-RABs can be configured as SN terminated bearers, i.e. there is no E-RAB established as an MN terminated bearer.

2. If the RRM entity in the SN is able to admit the resource request, it allocates respective radio resources and, dependent on the bearer option, respective transport network resources. For bearers requiring SCG radio resources, the SN triggers Random Access so that synchronisation of the SN radio resource configuration can be performed. The SN decides the PSCell and other SCG SCells and provides the new SCG radio resource configuration to the MN in a *NR RRC configuration* message contained in the *SgNB Addition Request Acknowledge* message. In case of bearer options that require X2-U resources between the MN and the SN, the SN provides X2-U TNL address information for the respective E-RAB, X2-U UL TNL address information for SN terminated bearers, X2-U DL TNL address information for MN terminated bearers. For SN terminated bearers, the SN provides the S1-U DL TNL address information for the respective E-RAB and security algorithm. If SCG radio resources have been requested, the SCG radio resource configuration is provided. If the MN requested the SCG to be deactivated, the SN may keep the SCG activated. If the MN requests the SCG to be activated, the SN shall keep the SCG activated.

NOTE 3: For the SN terminated split bearer option, the SN may either decide to request resources from the MN of such an amount, that the QoS for the respective E-RAB is guaranteed by the exact sum of resources provided by the MN and the SN together, or even more. The SNs decision is reflected in step 2 by the E-RAB parameters signalled to the MN, which may differ from E-RAB parameters received in step 1. The QoS level requested from the MN shall not exceed the level that the MN offered when setting up the split bearer in step 1.

NOTE 4: In case of MN terminated bearers, transmission of user plane data may take place after step 2.

NOTE 5: In case of SN terminated bearers , data forwarding and the SN Status Transfer may take place after step 2.

3. The MN sends to the UE the *RRCConnectionReconfiguration* message including the NR RRC configuration message, without modifying it. Within the MN *RRCConnectionReconfiguration* message, the MN can indicate the SCG is deactivated.

4. The UE applies the new configuration and replies to MN with *RRCConnectionReconfigurationComplete* message, including a NR RRC response message, if needed. In case the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration* message, it performs the reconfiguration failure procedure.

5. The MN informs the SN that the UE has completed the reconfiguration procedure successfully via *SgNB ReconfigurationComplete* message, including the encoded NR RRC response message, if received from the UE.

6. If configured with bearers requiring SCG radio resources and the SCG is not deactivated, the UE performs synchronisation towards the PSCell of the SN. The order the UE sends the *RRCConnectionReconfigurationComplete* message and performs the Random Access procedure towards the SCG is not defined. The successful RA procedure towards the SCG is not required for a successful completion of the RRC Connection Reconfiguration procedure.

7. If PDCP termination point is changed to the SN for bearers using RLC AM, and when RRC full configuration is not used, the MN sends the SN Status Transfer.

8. For SN terminated bearers moved from the MN, dependent on the bearer characteristics of the respective E-RAB, the MN may take actions to minimise service interruption due to activation of EN-DC (Data forwarding).

9-12. If applicable, the update of the UP path towards the EPC is performed.

**Conditional PSCell Addition (CPA)**

Figure 10.2.1-2 shows the Conditional Secondary Node Addition procedure.



Figure 10.2.1-2: Conditional Secondary Node Addition procedure

1. The MN decides to configure CPA for the UE and requests the candidate SN to allocate resources for a specific E-RAB, indicating E-RAB characteristics (E-RAB parameters, TNL address information corresponding to bearer type), provides the upper limit for the number of PSCells to the candidate SN. In addition, for the bearers requiring SCG radio resources, the MN indicates the requested SCG configuration information, including the entire UE capabilities and the UE capability coordination result. In this case, the MN also provides the candidate cells recommended by MN via the latest measurement results for the SN to choose and configure the SCG cell(s). The MN may request the SN to allocate radio resources for split SRB operation. The MN always provides all the needed security information to the SN (even if no SN terminated bearers are setup) to enable SRB3 to be setup based on SN decision. In case of bearer options that require X2-U resources between the MN and the SN, the MN provides X2-U TNL address information for the respective E-RAB, X2-U DL TNL address information for SN terminated bearers, X2-U UL TNL address information for MN terminated bearers. In case of SN terminated split bearers the MN provides the maximum QoS level that it can support. The SN may reject the request.

NOTE 6: For split bearers, MCG and SCG resources may be requested of such an amount, that the QoS for the respective E-RAB is guaranteed by the exact sum of resources provided by the MCG and the SCG together, or even more. For MN terminated split bearers, the MNs decision is reflected in step 1 by the E-RAB parameters signalled to the SN, which may differ from E-RAB parameters received over S1.

NOTE 7: For a specific E-RAB, the MN may request the direct establishment of an SCG or a split bearer, i.e., without first having to establish an MCG bearer. It is also allowed that all E-RABs can be configured as SN terminated bearers, i.e. there is no E-RAB established as an MN terminated bearer.

2. If the RRM entity in the SN is able to admit the resource request, it allocates respective radio resources and, dependent on the bearer option, respective transport network resources, and provides the prepared PSCell ID(s) to the MN. For bearers requiring SCG radio resources, the SN performs Random Access at the CPA execution so that synchronisation of the SN radio resource configuration can be performed. Within the list of cells as indicated within the measurement results indicated by the MN, the SN decides the list of PSCell(s) to prepare and, for each prepared PSCell, the SN decides other SCG SCells and provides the new corresponding SCG radio resource configuration to the MN in an NR RRC configuration message (*RRCReconfiguration\*\*\**) contained in the SgNB Addition Request Acknowledge message. The target SN can either accept or reject each of the candidate cells suggested by the MN, i.e. it cannot come up with any alternative candidates. In case of bearer options that require X2-U resources between the MN and the SN, the SN provides X2-U TNL address information for the respective E-RAB, X2-U UL TNL address information for SN terminated bearers, X2-U DL TNL address information for MN terminated bearers. For SN terminated bearers, the SN provides the S1-U DL TNL address information for the respective E-RAB and security algorithm. If SCG radio resources have been requested, the SCG radio resource configuration is provided.

NOTE 8: For the SN terminated split bearer option, the SN may either decide to request resources from the MN of such an amount, that the QoS for the respective E-RAB is guaranteed by the exact sum of resources provided by the MN and the SN together, or even more. The SNs decision is reflected in step 2 by the E-RAB parameters signalled to the MN, which may differ from E-RAB parameters received in step 1. The QoS level requested from the MN shall not exceed the level that the MN offered when setting up the split bearer in step 1.

NOTE 9: In case of SN terminated bearers, early data forwarding may take place after step 2. For the early data forwarding of SN terminated bearers, the MN forwards the PDCP SDU to the candidate SN and also sends the *Early Status Transfer* message. For the early transmission of MN terminated split/SCG bearers, the MN forwards the PDCP PDU to the candidate SN.

3. The MN sends to the UE an *RRCConnectionReconfiguration* message (*RRCConnectionReconfiguration\**)including the CPA configuration, (i.e. a list of *RRCConnectionReconfiguration\*\** messages)and associated execution conditions, in which a *RRCConnectionReconfiguration\*\** message contains a *RRCReconfiguration\*\*\** received from the candidate SN and possibly an MCG configuration. Besides, the *RRCConnectionReconfiguration* message (*RRCConnectionReconfiguration\**)can also include the current MCG updated configuration, e.g., to configure the required conditional measurements.

4. The UE applies the RRC configuration (in *RRCConnectionReconfiguration\**) excluding the CPA configuration, stores the CPA configurationand replies to the MN with an *RRCConnectionReconfigurationComplete* message (*RCConnectionReconfigurationComplete\**) without any NR RRC response message. In case the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration\** message, it performs the reconfiguration failure procedure.

4a. The UE starts evaluating the execution conditions. If the execution conditionof one candidate PSCell is satisfied, the UE applies *RRCConnectionReconfiguration* message(*RRCConnectionReconfiguration\*\**) corresponding to the selected candidate PSCell, and sends an *RRCConnectionReconfigurationComplete* message (*RRCConnectionReconfigurationComplete\*\**), including an NR RRC message (*RRCReconfigurationComplete\*\*\**) for the selected candidate PSCell, and the selected PSCell information to the MN.

5. The MN informs the SN that the UE has completed the reconfiguration procedure successfully via *SgNB ReconfigurationComplete* message, including the *RRCReconfigurationComplete\*\*\** message. The MN sends the SgNB Release Request message(s) to cancels CPA in the other target candidate SN(s), if configured.

6. The UE performs synchronisation towards the selected PSCell indicated in *RRCConnectionReconfiguration\*\** message. The order the UE sends the *RRCConnectionReconfigurationComplete\*\** message and performs the Random Access procedure towards the SCG is not defined. The successful RA procedure towards the SCG is not required for a successful completion of the RRC Connection Reconfiguration procedure.

7. If PDCP termination point is changed to the SN for bearers using RLC AM, and when RRC full configuration is not used, the MN sends the SN Status Transfer.

8. For SN terminated bearers moved from the MN, dependent on the bearer characteristics of the respective E-RAB, the MN may take actions to minimise service interruption due to activation of EN-DC (Data forwarding).

9-12. If applicable, the update of the UP path towards the EPC is performed.

### 10.2.2 MR-DC with 5GC

The Secondary Node (SN) Addition procedure is initiated by the MN and is used to establish a UE context at the SN in order to provide resources from the SN to the UE. For bearers requiring SCG radio resources, this procedure is used to add at least the initial SCG serving cell of the SCG. This procedure can also be used to configure an SN terminated MCG bearer (where no SCG configuration is needed). In case of CPA, this procedure can be used for CPA configuration and CPA execution.

**MN initiated Secondary Node Addition**

Figure 10.2.2-1 shows the SN Addition procedure.



Figure 10.2.2-1: SN Addition procedure

1. The MN decides to request the target SN to allocate resources for one or more specific PDU Sessions/QoS Flows, indicating QoS Flows characteristics (QoS Flow Level QoS parameters, PDU session level TNL address information, and PDU session level Network Slice info). In addition, for bearers requiring SCG radio resources, MN indicates the requested SCG configuration information, including the entire UE capabilities and the UE capability coordination result. In this case, the MN also provides the latest measurement results for SN to choose and configure the SCG cell(s). The MN may request the SN to allocate radio resources for split SRB operation. In NGEN-DC and NR-DC, the MN always provides all the needed security information to the SN (even if no SN terminated bearers are setup) to enable SRB3 to be setup based on SN decision. The MN may request the SCG to be activated or deactivated.

For MN terminated bearer options that require Xn-U resources between the MN and the SN, the MN provides Xn-U UL TNL address information. For SN terminated bearers, the MN provides a list of available DRB IDs. The S-NG-RAN node shall store this information and use it when establishing SN terminated bearers. The SN may reject the request.

For SN terminated bearer options that require Xn-U resources between the MN and the SN, the MN provides in step 1 a list of QoS flows per PDU Sessions for which SCG resources are requested to be setup upon which the SN decides how to map QoS flows to DRB.

NOTE 1: For split bearers, MCG and SCG resources may be requested of such an amount, that the QoS for the respective QoS Flow is guaranteed by the exact sum of resources provided by the MCG and the SCG together, or even more. For MN terminated split bearers, the MN decision is reflected in step 1 by the QoS Flow parameters signalled to the SN, which may differ from QoS Flow parameters received over NG.

NOTE 2: For a specific QoS flow, the MN may request the direct establishment of SCG and/or split bearers, i.e. without first having to establish MCG bearers. It is also allowed that all QoS flows can be mapped to SN terminated bearers, i.e. there is no QoS flow mapped to an MN terminated bearer.

2. If the RRM entity in the SN is able to admit the resource request, it allocates respective radio resources and, dependent on the bearer type options, respective transport network resources. For bearers requiring SCG radio resources the SN triggers UE Random Access so that synchronisation of the SN radio resource configuration can be performed. The SN decides for the PSCell and other SCG SCells and provides the new SCG radio resource configuration to the MN within an SN RRC configuration message contained in the *SN Addition Request Acknowledge* message. If the MN requested the SCG to be deactivated, the SN may keep the SCG activated. If the MN requests the SCG to be activated, the SN shall keep the SCG activated. In case of bearer options that require Xn-U resources between the MN and the SN, the SN provides Xn-U TNL address information for the respective DRB, Xn-U UL TNL address information for SN terminated bearers, Xn-U DL TNL address information for MN terminated bearers. For SN terminated bearers, the SN provides the NG-U DL TNL address information for the respective PDU Session and security algorithm. If SCG radio resources have been requested, the SCG radio resource configuration is provided.

NOTE 3: In case of MN terminated bearers, transmission of user plane data may take place after step 2.

NOTE 4: In case of SN terminated bearers, data forwarding and the SN Status Transfer may take place after step 2.

NOTE 5: For MN terminated bearers 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 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. For SN terminated bearers using MCG resources, the MN provides Xn-U DL TNL address information in the *Xn-U Address Indication* message.

3. The MN sends the *MN RRC reconfiguration* message to the UE including the SN RRC configuration message, without modifying it. Within the MN *RRC reconfiguration* message, the MN can indicate the SCG is deactivated.

4. The UE applies the new configuration and replies to MN with *MN RRC reconfiguration complete* message, including an SN RRC response message for SN, 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. The MN informs the SN that the UE has completed the reconfiguration procedure successfully via *SN Reconfiguration Complete* message, including the SN RRC response message, if received from the UE.

6. If configured with bearers requiring SCG radio resources and the SCG is not deactivated, the UE performs synchronisation towards the PSCell configured by the SN. The order the UE sends the *MN RRC reconfiguration complete* message and performs the Random Access procedure towards the SCG is not defined. The successful RA procedure towards the SCG is not required for a successful completion of the RRC Connection Reconfiguration procedure.

7. If PDCP termination point is changed to the SN for bearers using RLC AM, and when RRC full configuration is not used, the MN sends the SN Status Transfer.

8. For SN terminated bearers or QoS flows moved from the MN, dependent on the characteristics of the respective bearer or QoS flow, the MN may take actions to minimise service interruption due to activation of MR-DC (Data forwarding).

9-12. If applicable, the update of the UP path towards the 5GC is performed via a PDU Session Path Update procedure*.*

**MN initiated Conditional PSCell Addition (CPA)**

Figure 10.2.2-2 shows the Conditional SN Addition procedure.



Figure 10.2.2-2: Conditional Secondary Node Addition procedure

1. The MN decides to configure CPA for the UE. The MN requests the target candidate SN to allocate resources for one or more specific PDU Sessions/QoS Flows, indicating QoS Flows characteristics (QoS Flow Level QoS parameters, PDU session level TNL address information, and PDU session level Network Slice info), provides the upper limit for the number of PSCells to the candidate SN. In addition, for bearers requiring SCG radio resources, the MN indicates the requested SCG configuration information, including the entire UE capabilities and the UE capability coordination result. In this case, the MN also provides the candidate cells recommended by MN via the latest measurement results for the SN to choose and configure the SCG cell(s). The MN may request the SN to allocate radio resources for split SRB operation. In NR-DC, the MN always provides all the needed security information to the SN (even if no SN terminated bearers are setup) to enable SRB3 to be setup based on SN decision.

For MN terminated bearer options that require Xn-U resources between the MN and the SN, the MN provides Xn-U UL TNL address information. For SN terminated bearers, the MN provides a list of available DRB IDs. The S-NG-RAN node shall store this information and use it when establishing SN terminated bearers. The SN may reject the request.

For SN terminated bearer options that require Xn-U resources between the MN and the SN, the MN provides in step 1 a list of QoS flows per PDU Sessions for which SCG resources are requested to be setup upon which the SN decides how to map QoS flows to DRB.

NOTE 6: For split bearers, MCG and SCG resources may be requested of such an amount, that the QoS for the respective QoS Flow is guaranteed by the exact sum of resources provided by the MCG and the SCG together, or even more. For MN terminated split bearers, the MN decision is reflected in step 1 by the QoS Flow parameters signalled to the SN, which may differ from QoS Flow parameters received over NG.

NOTE 7: For a specific QoS flow, the MN may request the direct establishment of SCG and/or split bearers, i.e. without first having to establish MCG bearers. It is also allowed that all QoS flows can be mapped to SN terminated bearers, i.e. there is no QoS flow mapped to an MN terminated bearer.

2. If the RRM entity in the SN is able to admit the resource request, it allocates respective radio resources and, dependent on the bearer type options, respective transport network resources, and provides the prepared PSCell ID(s) to the MN. For bearers requiring SCG radio resources the SN triggers UE Random Access so that synchronisation of the SN radio resource configuration can be performed. Within the list of cells as indicated within the measurement results indicated by the MN, the SN decides the list of PSCell(s) to prepare and, for each prepared PSCell, the SN decides other SCG SCells and provides the new corresponding SCG radio resource configuration to the MN in an NR RRC configuration message (*RRCReconfiguration\*\*\**), contained in the *SN Addition Request Acknowledge* message. The target SN can either accept or reject each of the candidate cells suggested by the MN, i.e. it cannot come up with any alternative candidates. In case of bearer options that require Xn-U resources between the MN and the SN, the SN provides Xn-U TNL address information for the respective DRB, Xn-U UL TNL address information for SN terminated bearers, Xn-U DL TNL address information for MN terminated bearers. For SN terminated bearers, the SN provides the NG-U DL TNL address information for the respective PDU Session and security algorithm. If SCG radio resources have been requested, the SCG radio resource configuration is provided.

NOTE 8: For MN terminated bearers 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 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.

NOTE 9: In case of SN terminated bearers, early data forwarding may take place after step 2. For the early data forwarding of SN terminated bearers, the MN forwards the PDCP SDU to the candidate SN. For the early transmission of MN terminated split/SCG bearers, the MN forwards the PDCP PDU to the candidate SN.

2a. For SN terminated bearers using MCG resources, the MN provides Xn-U DL TNL address information in the *Xn-U Address Indication* message. In case of early data forwarding in CPA, the MN sends the Early Status Transfer message to the SN.

3. The MN sends to the UE an *RRC reconfiguration* message (*RRC reconfiguration\*)* including the CPA configuration, (i.e. a list of *RRC reconfiguration\*\** messages)and associated execution conditions, in which a *RRC reconfiguration\*\** messagecontains a *RRCReconfiguration\*\*\** received from the candidate SN and possibly an MCG configuration. Besides, the *RRC reconfiguration* message (*RRC reconfiguration\**)can also include the current MCG updated configuration. e.g. to configure the required conditional measurements.

4. The UE applies the RRC configuration (in *RRC reconfiguration\**) excluding the CPA configuration, stores the CPA configurationand replies to the MN with an *RRC reconfiguration complete* message (*RRC reconfiguration complete\**) without any NR SN RRC response message). In case the UE is unable to comply with (part of) the configuration included in the *RRC reconfiguration\** message, it performs the reconfiguration failure procedure.

4a. The UE starts evaluating the execution conditions. If the execution conditionof one candidate PSCell is satisfied, the UE applies *RRC reconfiguration* message (*RRC reconfiguration\*\**) corresponding to the selected candidate PSCell, and sends an MN *RRC reconfiguration complete* message (*RRC reconfiguration complete\*\**), including an NR RRC reconfiguration complete message (*RRCReconfigurationComplete\*\*\**) for the selected candidate PSCell, and the selected PSCell information to the MN.

5. The MN informs the SN that the UE has completed the reconfiguration procedure successfully via *SN Reconfiguration Complete* message, including the *RRCReconfigurationComplete\*\*\** response message. The MN sends the SN Release Request message(s) to cancels CPA in the other target candidate SN(s), if configured.

6. The UE performs synchronisation towards the selected PSCell indicated in *RRC reconfiguration\*\** message. The order the UE sends the MN *RRC reconfiguration complete\*\** message and performs the Random Access procedure towards the SCG is not defined. The successful RA procedure towards the SCG is not required for a successful completion of the RRC Connection Reconfiguration procedure.

7. If PDCP termination point is changed to the SN for bearers using RLC AM, and when RRC full configuration is not used, the MN sends the SN Status Transfer.

8. For SN terminated bearers or QoS flows moved from the MN, dependent on the characteristics of the respective bearer or QoS flow, the MN may take actions to minimise service interruption due to activation of MR-DC (Data forwarding).

9-12. If applicable, the update of the UP path towards the 5GC is performed via a PDU Session Path Update procedure*.*

----------------------------------------------------------------Next Changes--------------------------------------------------------

## 10.5 Secondary Node Change (MN/SN initiated)

### 10.5.1 EN-DC

The Secondary Node Change procedure is initiated either by MN or SN and used to transfer a UE context from a source SN to a target SN and to change the SCG configuration in UE from one SN to another. In case of CPC, the Secondary Node Change procedure initiated either by the MN or SN is also used for CPC configuration and CPC execution.

NOTE 1: Inter-RAT SN change procedure with single RRC reconfiguration is not supported in this version of the protocol (i.e. no transition from EN-DC to DC).

The Secondary Node Change procedure always involves signalling over MCG SRB towards the UE.

**MN initiated SN Change**



Figure 10.5.1-1: SN Change – MN initiated

Figure 10.5.1-1 shows an example signalling flow for the MN initiated Secondary Node Change:

1/2. The MN initiates the SN change by requesting the target SN to allocate resources for the UE by means of the SgNB Addition procedure. The MN may include measurement results related to the target SN. If forwarding is needed, the target SN provides forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration.

NOTE 2: The MN may trigger the MN-initiated SN Modification procedure (to the source SN) to retrieve the current SCG configuration before step 1.

NOTE 2a: In case the target SN includes the indication of the full RRC configuration, the MN performs release of the SN terminated radio bearer configuration and release and add of the NR SCG configuration part towards the UE.

3. If the allocation of target SN resources was successful, the MN initiates the release of the source SN resources including a Cause indicating SCG mobility. The Source SN may reject the release. If data forwarding is needed the MN provides data forwarding addresses to the source SN. If direct data forwarding is used for SN terminated bearers, the MN provides data forwarding addresses as received from the target SN to source SN. Reception of the *SgNB Release Request* message triggers the source SN to stop providing user data to the UE and, if applicable, to start data forwarding.

4/5. The MN triggers the UE to apply the new configuration. The MN indicates to the UE the new configuration in the *RRCConnectionReconfiguration* message including the NR RRC configuration message generated by the target SN. The UE applies the new configuration and sends the *RRCConnectionReconfigurationComplete* message, including the encoded NR RRC response message for the target SN, if needed. In case the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration* message, it performs the reconfiguration failure procedure.

6. If the RRC connection reconfiguration procedure was successful, the MN informs the target SN via *SgNBReconfigurationComplete* message with the encoded NR RRC response message for the target SN, if received from the UE.

7. If configured with bearers requiring SCG radio resources, the UE synchronizes to the target SN.

8. For SN terminated bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends then to the target SN, if needed.

9. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the *SgNB Release Request* message from the MN.

10. The source SN sends the *Secondary RAT* *Data Usage Report* message to the MN and includes the data volumes delivered to and received from the UE over the NR radio for the related E-RABs.

NOTE 3: 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 bearer is stopped.

11-15. If applicable, a path update is triggered by the MN.

16. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue.

**SN initiated SN Change**



Figure 10.5.1-2: SN Change – SN initiated

Figure 10.5.1-2 shows an example signalling flow for the Secondary Node Change initiated by the SN:

1. The source SN initiates the SN change procedure by sending *SgNB Change Required* message which contains target SN ID information and may include the SCG configuration (to support delta configuration) and measurement results related to the target SN.

2/3. The MN requests the target SN to allocate resources for the UE by means of the SgNB Addition procedure, including the measurement results related to the target SN received from the source SN. If forwarding is needed, the target SN provides forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration.

NOTE 3a: In case the target SN includes the indication of the full RRC configuration, the MN performs release of the SN terminated radio bearer configuration and release and add of the NR SCG configuration part towards the UE.

4/5. The MN triggers the UE to apply the new configuration. The MN indicates the new configuration to the UE in the *RRCConnectionReconfiguration* message including the NR RRC configuration message generated by the target SN. The UE applies the new configuration and sends the *RRCConnectionReconfigurationComplete* message, including the encoded NR RRC response message for the target SN, if needed. In case the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration* message, it performs the reconfiguration failure procedure.

6. If the allocation of target SN resources was successful, the MN confirms the release of the source SN resources. If data forwarding is needed the MN provides data forwarding addresses to the source SN. If direct data forwarding is used for SN terminated bearers, the MN provides data forwarding addresses as received from the target SN to source SN. Reception of the *SgNB Change Confirm* message triggers the source SN to stop providing user data to the UE and, if applicable, to start data forwarding.

7. If the RRC connection reconfiguration procedure was successful, the MN informs the target SN via *SgNB Reconfiguration Complete* message with the encoded NR RRC response message for the target SN, if received from the UE.

8. The UE synchronizes to the target SN.

9. For SN terminated bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends then to the target SN, if needed.

10. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the *SgNB Change Confirm* message from the MN.

11. The source SN sends the *Secondary RAT* *Data Usage Report* message to the MN and includes the data volumes delivered to and received from the UE over the NR radio for the related E-RABs.

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

12-16. If applicable, a path update is triggered by the MN.

17. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue.

**MN initiated conditional SN Change**

The MN initiated conditional inter-SN change procedure is used to configure CPC configuration.



Figure 10.5.1-3: Conditional SN Change – MN initiated

Figure 10.5.1-3 shows an example signalling flow for the MN initiated Conditional Secondary Node Change:

1/2. The MN initiates the conditional SN change by requesting the target candidate SN to allocate resources for the UE by means of the SgNB Addition procedure. The MN also provides the candidate cells recommended by MN via the latest measurement results for the SN to choose and configure the SCG cell(s), and provides the upper limit for the number of PSCells. Within the list of cells as indicated within the measurement results indicated by the MN, the SN decides the list of PSCell(s) to prepare and, for each prepared PSCell, the SN decides other SCG SCells and provides the new corresponding SCG radio resource configuration to the MN in an NR RRC configuration message (*RRCReconfiguration\*\*\**) contained in the SgNB Addition Request Acknowledge message with the prepared PSCell ID(s). If forwarding is needed, the target SN provides forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration. The target SN can either accept or reject each of the candidate cells suggested by the MN, i.e. it cannot come up with any alternative candidates.

NOTE 5: The MN may trigger the MN-initiated SN Modification procedure (to the source SN) to retrieve the current SCG configuration before step 1.

3. The MN sends to the UE an *RRCConnectionReconfiguration* message (*RRCConnectionReconfiguration\**)including the CPC configuration, (i.e. a list of *RRCConnectionReconfiguration\*\** messages)and associated execution conditions, in which a *RRCConnectionReconfiguration\*\** message contains a *RRCReconfiguration\*\*\** received from the candidate SN and possibly an MCG configuration. Besides, the *RRCConnectionReconfiguration* message (*RRCConnectionReconfiguration\**)can also include the current MCG updated configuration, e.g., to configure the required conditional measurements.

4. The UE applies the RRC configuration (in *RRCConnectionReconfiguration\**) excluded the CPC configuration, stores the CPC configurationand replies to the MN with an *RRCConnectionReconfigurationComplete* message (*RCConnectionReconfigurationComplete\**) without any NR RRC response message. In case the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration\** message, it performs the reconfiguration failure procedure.

4a. Upon receiving the *RRCConnectionReconfigurationComplete* message from the UE, the MN triggers the Data Forwarding Address Indication procedure to the source SN to inform that the CPC has been configured, the source SN, if applicable, together with the Early Status Transfer procedure, starts early data forwarding. The PDCP SDU forwarding may take place during early data forwarding.

5. The UE starts evaluating the execution conditions. If the execution conditionof one candidate PSCell is satisfied, the UE applies *RRCConnectionReconfiguration* message(*RRCConnectionReconfiguration\*\**) corresponding to the selected candidate PSCell, and sends an *RRCConnectionReconfigurationComplete* message (*RRCConnectionReconfigurationComplete\*\**), including an NR RRC message (*RRCReconfigurationComplete\*\*\*)* for the selected candidate PSCell, and the selected PSCell information to the MN.

6a-6b. The MN triggers the MeNB initiated SgNB Release procedure to inform the source SN to stop providing user data to the UE, and the address of the selected SN and if applicable, to start data forwarding.

7. If the RRC connection reconfiguration procedure was successful, the MN informs the selected target SN via *SgNBReconfigurationComplete* message, including the *RRCReconfigurationComplete\*\*\** message for the target SN. The MN sends the SgNB Release Request messages to cancel CPC in the other target candidate SNs, if configured.

8. If configured with bearers requiring SCG radio resources, the UE synchronizes to the target SN indicated in *RRCConnectionReconfiguration\*\**.

9. For SN terminated bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends to the target selected SN, if needed.

10. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the early data forwarding address in step 3.

11. The source SN sends the *Secondary RAT* *Data Usage Report* message to the MN and includes the data volumes delivered to and received from the UE over the NR radio for the related E-RABs.

NOTE 6: 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 bearer is stopped.

12-16. If applicable, a path update is triggered by the MN.

17. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue.

**SN initiated conditional inter-SN Change**

The SN initiated conditional inter-SN change procedure is used to configure CPC configuration.

The SN initiated conditional inter-SN change procedure may also be initiated by the source SN, to modify the existing CPC configuration, or to trigger the release of the target SN by cancellation of all the prepared PSCells at the target SN and releasing the CPC related UE context at the target SN.



Figure 10.5.1-4: Conditional SN Change – SN initiated

Figure 10.5.1-4 shows an example signalling flow for the Conditional Secondary Node Change initiated by the SN:

1. The source SN initiates the conditional SN change procedure by sending *SgNB Change Required* message which contains a CPC initiation indication. The message also contains target SN ID(s) information and may include the SCG configuration (to support delta configuration), and contains the measurement results related to the target candidate SN(s). The message also includes a list of proposed PSCell candidates recommended by the source SN, including execution conditions, the upper limit for the number of PSCells, and may also include the SCG measurement configurations for CPC (e.g. measId(s) to be used for CPC).

2/3. The MN requests the target candidate SN(s) to allocate resources for the UE by means of the SgNB Addition procedure(s), including a CPC initiation indication, and the measurements results related to the target candidate SN and indicate the list of proposed PSCell candidates received from the source SN, but not including execution conditions. Within the list of PSCells, the SN decides the list of PSCell(s) to prepare and, for each prepared PSCell, the SN decides other SCG SCells and provides the new corresponding SCG radio resource configuration to the MN in an NR RRC configuration message (*RRCReconfiguration\*\*\*\**) contained in the *SgNB Addition Request Acknowledge* message. If forwarding is needed, the target SN provides forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration, and the list of prepared PSCell IDs to the MN. The target SN can either accept or reject each of the candidate cells suggested by the source SN, i.e. it cannot come up with any alternative candidates.

4. The MN may indicate the candidate PSCells accepted by the target SN to the source SN via SgNB Modification Request message, if needed, e.g., when T-SN does not acknowledge all candidate PSCells, otherwise step 4 and 5 are skipped, e.g. when T-SN accepts all candidate PScells.

5. The source SN may provide the updated measurement configurations and the execution conditions for CPC to the MN via SgNB Modification Request Acknowledge message.

6. The MN sends to the UE an *RRCConnectionReconfiguration* message (*RRCConnectionReconfiguration\**)including the CPC configuration, (i.e. a list of *RRCConnectionReconfiguration\*\*\** messages)and associated execution conditions, in which a *RRCConnectionReconfiguration\*\*\** messagecontains a *RRCReconfiguration\*\*\*\** received from the candidate SN and possibly an MCG configuration. Besides, the *RRCConnectionReconfiguration* message (*RRCConnectionReconfiguration\**)can also include the current MCG updated configuration, e.g., to configure the required conditional measurements, as well as the NR RRC configuration message (*RRCReconfigutation\*\**) generated by the source-SN.

7. The UE applies the RRC configuration (in *RRCConnectionReconfiguration\**) excluded the CPC configuration, stores the CPC configurationand replies to the MN with an *RRCConnectionReconfigurationComplete* message (*RCConnectionReconfigurationComplete\**), which can include an NR RRC response message (*RRCReconfigurationComplete\*\**). In case the UE is unable to comply with (part of) the configuration included in the *RRCConnectionReconfiguration\** message, it performs the reconfiguration failure procedure.

8a. If an NR RRC response message is included, the MN informs the source SN with the NR RRC response message (*RRCReconfigutationComplete\*\**) for the source SN via *SgNB Change Confirm* message.

The MN sends the *SgNB Change Confirm* message towards the Source SN to indicate that CPC is prepared, and in such case the source SN continues providing user data to the UE. If early data forwarding is applied, the MN informs the source SN the data forwarding addresses as received from the target SN, the source SN, if applicable, together with the Early Status Transfer procedure, starts early data forwarding. The PDCP SDU forwarding may take place during early data forwarding. In case multiple Target SNs are prepared, the MN includes a list of Target SgNB ID and list of data forwarding addresses to the source SN.

9a-9d. The source SN may send the *SgNB Modification Required* message to trigger an update of CPC execution condition or corresponding SCG measConfig for CPC for the UE if any. In such case in step 9b and 9c, the MN reconfigures the UE as in step 6 and 7.

10. The UE starts evaluating the execution conditions. If the execution conditionof one candidate PSCell is satisfied, the UE applies *RRCConnectionReconfiguration* message(*RRCConnectionReconfiguration\*\*\**) corresponding to the selected candidate PSCell, and sends an *RRCConnectionReconfigurationComplete* message (*RRCConnectionReconfigurationComplete\*\*\**), including an NR RRC message (*RRCReconfigurationComplete\*\*\*\*)* for the selected candidate PSCell, and the selected PSCell information to the MN.

11a-11b. The MN triggers the MeNB initiated SgNB Release procedure to inform source SN to stop providing user data to the UE, and provide the address of the selected target SN and if applicable, start late data forwarding.

12. If the RRC connection reconfiguration procedure was successful, the MN informs the target SN via *SgNB Reconfiguration Complete* message, including the SN *RRCReconfigurationComplete\*\*\*\** response message for the target SN. The MN sends the SgNB Release Request messages to cancel CPC in the other target candidate SNs, if configured.

13. The UE synchronizes to the target SN indicated in *RRCConnectionReconfiguration\*\*\**.

14. For SN terminated bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends then to the target SN, if needed.

15. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the early data forwarding message from the MN.

16. The source SN sends the *Secondary RAT* *Data Usage Report* message to the MN and includes the data volumes delivered to and received from the UE over the NR radio for the related E-RABs.

NOTE 7: The order the source SN sends the *Secondary RAT Data Usage Report* message and performs data forwarding with MN/target SN is not defined. The SgNB may send the report when the transmission of the related bearer is stopped.

17-21. If applicable, a path update is triggered by the MN.

22. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue.

### 10.5.2 MR-DC with 5GC

**MN initiated SN Change**

The MN initiated SN change procedure is used to transfer a UE context from the source SN to a target SN and to change the SCG configuration in UE from one SN to another.

The Secondary Node Change procedure always involves signalling over MCG SRB towards the UE.



Figure 10.5.2-1: SN change procedure - MN initiated

Figure 10.5.2-1 shows an example signalling flow for the SN Change initiated by the MN:

1/2. The MN initiates the SN change by requesting the target SN to allocate resources for the UE by means of the SN Addition procedure. The MN may include measurement results related to the target SN. If data forwarding is needed, the target SN provides data forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration.

NOTE 1: The MN may trigger the MN-initiated SN Modification procedure (to the source SN) to retrieve the current SCG configuration and to allow provision of data forwarding related information before step 1.

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

3. If the allocation of target SN resources was successful, the MN initiates the release of the source SN resources including a Cause indicating SCG mobility. The Source SN may reject the release. If data forwarding is needed the MN provides data forwarding addresses to the source SN. If direct data forwarding is used for SN terminated bearers, the MN provides data forwarding addresses as received from the target SN to source SN. Reception of the *SN Release Request* message triggers the source SN to stop providing user data to the UE.

4/5. The MNtriggers the UE to apply the new configuration. The MN indicates the new configuration to the UE in the *MN RRC reconfiguration message* including the target SN RRC reconfiguration message. The UE applies the new configuration and sends the *MN RRC reconfiguration complete* message, including the SN RRC response message for the target SN, 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. If the RRC connection reconfiguration procedure was successful, the MN informs the target SN via *SN Reconfiguration Complete* message with the included SN RRC response message for the target SN, if received from the UE.

7. If configured with bearers requiring SCG radio resources the UE synchronizes to the target SN.

8. If PDCP termination point is changed for bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends then to the target SN, if needed.

9. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the *SN Release Request* message from the MN.

10. The source 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.

11-15. If applicable, a PDU Session path update procedure is triggered by the MN.

16. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue

**SN initiated SN Change**

The SN initiated SN change procedure is used to transfer a UE context from the source SN to a target SN and to change the SCG configuration in UE from one SN to another.



Figure 10.5.2-2: SN change procedure - SN initiated

Figure 10.5.2-2 shows an example signalling flow for the SN Change initiated by the SN:

1. The source SN initiates the SN change procedure by sending the *SN Change Required* message, which contains a candidate target node ID and may include the SCG configuration (to support delta configuration) and measurement results related to the target SN.

2/3. The MN requests the target SN to allocate resources for the UE by means of the SN Addition procedure, including the measurement results related to the target SN received from the source SN. If data forwarding is needed, the target SN provides data forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration.

3a. For SN terminated bearers using MCG resources, the MN provides Xn-U DL TNL address information in the *Xn-U Address Indication* message.

4/5. The MN triggers the UE to apply the new configuration. The MN indicates the new configuration to the UE in the *MN RRC reconfiguration* message including the SN RRC reconfiguration message generated by the target SN. The UE applies the new configuration and sends the *MN RRC reconfiguration complete* message, including the SN RRC response message for the target SN, 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. If the allocation of target SN resources was successful, the MN confirms the change of the source SN. If data forwarding is needed the MN provides data forwarding addresses to the source SN. If direct data forwarding is used for SN terminated bearers, the MN provides data forwarding addresses as received from the target SN to source SN. Reception of the *SN Change Confirm* message triggers the source SN to stop providing user data to the UE and, if applicable, to start data forwarding.

7. If the RRC connection reconfiguration procedure was successful, the MN informs the target SN via *SN Reconfiguration Complete* message with the included SN RRC response message for the target SN, if received from the UE.

8. The UE synchronizes to the target SN.

9. If PDCP termination point is changed for bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends then to the target SN, if needed.

10. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the *SN Change Confirm* message from the MN.

11. The source 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 3: The order the SN sends the *Secondary RAT Data Usage Report* message and performs data forwarding with MN/target SN is not defined. The SN may send the report when the transmission of the related QoS flow is stopped.

12-16. If applicable, a PDU Session path update procedure is triggered by the MN.

17. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue.

**MN initiated conditional SN Change**

The Conditional Secondary Node Change procedure is initiated by the MN for CPC configuration and CPC execution.



Figure 10.5.2-3: Conditional SN change procedure - MN initiated

Figure 10.5.2-3 shows an example signalling flow for the conditional SN Change initiated by the MN:

1/2. The MN initiates the conditional SN change by requesting the target candidate SN to allocate resources for the UE by means of the SN Addition procedure. The MN also provides the candidate cells recommended by MN via the latest measurement results for the SN to choose and configure the SCG cell(s), provides the upper limit for the number of PSCells. Within the list of cells as indicated within the measurement results indicated by the MN, the SN decides the list of PSCell(s) to prepare and, for each prepared PSCell, the SN decides other SCG SCells and provides the new corresponding SCG radio resource configuration to the MN in an NR RRC configuration message (*RRCReconfiguration*\*\*\*) contained in the SN Addition Request Acknowledge message with the prepared PSCell ID(s). If data forwarding is needed, the target SN provides data forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration. The target SN can either accept or reject each of the candidate cells suggested by the MN, i.e. it cannot come up with any alternative candidates.

NOTE 4: The MN may trigger the MN-initiated SN Modification procedure (to the source SN) to retrieve the current SCG configuration and to allow provision of data forwarding related information before step 1.

3. The MN sends to the UE an *RRC reconfiguration* message (*RRC reconfiguration\*)* including the CPC configuration, (i.e. a list of *RRC reconfiguration\*\** messages)and associated execution conditions, in which a *RRC reconfiguration\*\** messagecontains a *RRCReconfiguration\*\*\** received from the candidate SN and possibly an MCG configuration. Besides, the *RRC reconfiguration* message (*RRC reconfiguration\**)can also include the current MCG updated configuration, e.g., to configure the required conditional measurements.

4. The UE applies the RRC configuration (in *RRC reconfiguration\**) excluded the CPC configuration, stores the CPC configurationand replies to the MN with an *RRC reconfiguration complete* message (*RRC reconfiguration complete\**) without any NR SN RRC response messag). In case the UE is unable to comply with (part of) the configuration included in the *RRC reconfiguration\** message, it performs the reconfiguration failure procedure.

4a. Upon receiving the MN RRC reconfiguration complete message from the UE, the MN informs the SN that the CPC has been configured via Xn-U Address Indication procedure, the source SN, if applicable, together with the Early Status Transfer procedure, starts early data forwarding. The PDCP SDU forwarding may take place during early data forwarding.

5. The UE starts evaluating the execution conditions. If the execution conditionof one candidate PSCell is satisfied, the UE applies *RRC reconfiguration* message (*RRC reconfiguration\*\**) corresponding to the selected candidate PSCell, and sends an MN *RRC reconfiguration complete* message (*RRC reconfiguration complete\*\**), including an NR RRC reconfiguration complete message (*RRCReconfigurationComplete\*\*\**) for the selected candidate PSCell, and the selected PSCell information to the MN.

Editor's Note: Whether a message is needed and which message is used to inform source SN to stop providing user data to the UE, and the address of the selected target SN and if applicable, to start late data forwarding are FFS.

6a-6c. The MN triggers the MN initiated SN Release procedure to inform the source SN to stop providing user data to the UE, and triggers the Xn-U Address Indication procedure to inform the source SN the address of the selected target SN and if applicable, to start late data forwarding.

7. If the RRC connection reconfiguration procedure was successful, the MN informs the selected target SN via *SN Reconfiguration Complete* message, including the SN *RRCReconfigurationComplete\*\*\** response message for the target SN. The MN sends the *SN Release Request* messages to cancel CPC in the other target candidate SNs, if configured.

8. If configured with bearers requiring SCG radio resources the UE synchronizes to the selected SN indicated in *RRC reconfiguration\*\**.

9. If PDCP termination point is changed for bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends then to the target selected SN, if needed.

10. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the early data forwarding address in step 3.

11. The source 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 5: 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.

12-16. If applicable, a PDU Session path update procedure is triggered by the MN.

17. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue.

**SN initiated conditional inter-SN Change**

The SN initiated conditional inter-SN change procedure is used for CPC configuration and CPC execution.

The SN initiated conditional inter-SN change procedure may also be initiated by the source SN, to modify the existing CPC configuration, or to trigger the release of the target SN by cancellation of all the prepared PSCells at the target SN and releasing the CPC related UE context at the target SN.



Figure 10.5.2-4: Conditional SN change procedure - SN initiated

Figure 10.5.2-4 shows an example signalling flow for the conditional SN Change initiated by the SN:

1. The source SN initiates the conditional SN change procedure by sending the *SN Change Required* message, which a CPC initiation indication. The message also contains candidate target node ID(s) and may include the SCG configuration (to support delta configuration), and contains the measurements results which may include cells that are not CPC candidates. The message also includes a list of proposed PSCell candidates recommended by the source SN, including execution conditions, the upper limit for the number of PSCells, and may also include the SCG measurement configurations for CPC (e.g. measId(s)to be used for CPC).

2/3. The MN requests the target SN(s) to allocate resources for the UE by means of the SN Addition procedure(s), including a CPC initiation indication, and the measurements results which may include cells that are not CPC candidates received from the source SN to the target SN, and indicates the list of proposed PSCell candidates received from the source SN, but not including execution conditions. Within the list of PSCells, the SN decides the list of PSCell(s) to prepare and, for each prepared PSCell, the SN decides other SCG SCells and provides the new corresponding SCG radio resource configuration to the MN in an NR RRC configuration message (*RRCReconfiguration\*\*\*\**) contained in the SgNB *Addition Request Acknowledge* message. If data forwarding is needed, the target SN provides data forwarding addresses to the MN. The target SN includes the indication of the full or delta RRC configuration, and the list of prepared PSCell IDs to the MN. The target-SN can either accept or reject each of the candidate cells suggested by the Source-SN, i.e., it cannot come up with any alternative candidates.

4. The MN may indicate the candidate PSCells accepted by the target SN to the source SN via *SN Modification Request* message, if needed,, e.g., when T-SN does not acknowledge all candidate PSCells, otherwise step 4 and 5 are skipped, e.g. when T-SN accepts all candidate PScells.

5. The source SN may provide the updated measurement configurations and the execution conditions to the MN via *SN Modification Request Acknowledge* message.

6. The MN sends to the UE an *RRC reconfiguration* message (*RRC reconfiguration\**)including the CPC configuration, (i.e. a list of *RRC reconfiguration\*\*\** messages)and associated execution conditions, in which a *RRC reconfiguration\*\*\** messagecontains a *RRCReconfiguration\*\*\*\** received from the candidate SN and possibly an MCG configuration. Besides, the *RRC reconfiguration* message (*RRC reconfiguration\**)can also include the current MCG updated configuration, e.g., to configure the required conditional measurements, as well as the NR RRC configuration message (*RRCReconfiguration\*\**) generated by the source-SN.

7. The UE applies the RRC configuration (in *RRC reconfiguration\**) excluded the CPC configuration, stores the CPC configurationand replies to the MN with an *RRC reconfiguration complete* message (*RRC reconfiguration complete\**), which can include an NR RRC response message (*RRCReconfigutationComplete\*\**). In case the UE is unable to comply with (part of) the configuration included in the *RRC reconfiguration\** message, it performs the reconfiguration failure procedure.

8a. If an SN RRC response message is included, the MN informs the source SN with the SN RRC response message (*RRCReconfigutationComplete\*\**) for the source SN via *SN Change Confirm* message.

The MN sends the *SN Change Confirm* message towards the Source SN to indicate that CPC is prepared, and in such case the source SN continues providing user data to the UE. If early data forwarding is applied, the MN informs the source SN the data forwarding addresses as received from the target SN, the source SN, if applicable, together with the Early Status Transfer procedure, starts early data forwarding. The PDCP SDU forwarding may take place during early data forwarding. In case multiple Target SNs are prepared, the MN includes a list of Target SN ID and list of data forwarding addresses to the source SN.

9a-9d. The source SN may send the *SN Modification Required* message to trigger an update of CPC execution condition or corresponding SCG measConfig for CPC for the UE if any. In such case in step 9b and 9c, the MN reconfigures the UE as in step 6 and 7.

10. The UE starts evaluating the execution conditions. If the execution conditionof one candidate PSCell is satisfied, the UE applies *RRC reconfiguration* message(*RRC reconfiguration\*\*\**) corresponding to the selected candidate PSCell, and sends an *RRC reconfiguration complete* message (*RRC reconfiguration complete\*\*\**), including an NR RRC message (*RRCReconfigurationComplete\*\*\*\*)* for the selected candidate PSCell, and the selected PSCell information to the MN.

11a-11c. The MN triggers the MN initiated SN Release procedure to inform the source SN to stop providing user data to the UE, and triggers the Xn-U Address Indication procedure to inform the source SN the address of the selected target SN and if applicable, starts late data forwarding.

12. If the RRC connection reconfiguration procedure was successful, the MN informs the target SN via *SN Reconfiguration Complete* message, including the SN *RRCReconfigurationComplete\*\*\*\** response message for the target SN. The MN sends the *SN Release Request* messages to cancel CPC in the other target candidate SNs, if configured.

13. The UE synchronizes to the target SN indicated in *RRCConnectionReconfiguration\*\*\**.

14. If PDCP termination point is changed for bearers using RLC AM, the source SN sends the SN Status Transfer, which the MN sends then to the target SN, if needed.

15. If applicable, data forwarding from the source SN takes place. It may be initiated as early as the source SN receives the data forwarding address related information from the MN.

16. The source 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 6: The order the SN sends the *Secondary RAT Data Usage Report* message and performs data forwarding with MN/target SN is not defined. The SN may send the report when the transmission of the related QoS flow is stopped.

17-21. If applicable, a PDU Session path update procedure is triggered by the MN.

22. Upon reception of the *UE Context Release* message, the source SN releases radio and C-plane related resources associated to the UE context. Any ongoing data forwarding may continue.

----------------------------------------------------------------End of Changes--------------------------------------------------------