**3GPP TSG-RAN WG2 Meeting #117-e *R2-2203500***

**Online, 21 February – 03 March 2022**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **37.340** | **CR** | **0299** | **rev** | **-** | **Current version:** | **15.15.0** |  |
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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:***  | Clarification on inter-MN handover without SN change |
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| ***Source to WG:*** | Huawei, HiSilicon, Nokia, Nokia Shanghai Bell, Ericsson, ZTE Corporation, Samsung |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_newRAT-Core |  | ***Date:*** | 2022-02-21 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-15 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | For the inter-MN handover without SN change scenario, RAN2 discussed how MN can indicate whether SN should apply delta signalling or full configuration but no conclusion was made and an LS(R2-2106682) was send to RAN3 asking for RAN3’s understading on the follwing questions:*Question 1: In the inter-MN handover without SN change scenario, is the SN UE X2/XnAP ID always required to be present when target MN sends SN Addition Request to SN?**Question 2: For the same scenario, RAN2 would like to confirm with RAN3 if the receipt of SN UE X2/XnAP ID alone may be interpreted by SN to retrieve the SCG configuration to provide delta configuration?*However, according to the reply LS R3-216165, RAN3 didn’t reach consensus and the answers cannot give RAN2 a clear guidance on the way forward. Based on the current situation, the stage2 procedure can be clarified to reflect the discssion without functional chagne.According to the current spec and the offline discussion (R2-2106663), both cases are allowed:Case 1:* Inter-MN HO without SN change (delta config is allowed in SN)
	+ SN UE X2AP ID            present
	+ *sourceConfigSCG*         not present
	+ *scg-RB-Config*               not present

Case 2:* Inter-MN HO without SN change (delta config is allowed in SN)
	+ SN UE X2AP ID            not present
	+ *sourceConfigSCG*               present
	+ *scg-RB-Config*                   present

Note that in the Case 2, target SN is the same as source SN, while the handover procedure looks like a special case of inter-MN HO with SN change, where the source SN is selected as target SN. |
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| ***Summary of change:*** | Clarification on absent/present of SN UE X2AP ID in the inter-MN handover procedure **Impact analysis**Impacted 5G architecture options: MR-DCImpacted functionality: Inter MN handeover with/without SN chagneInter-operability:No inter-operabilty issue |
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| ***Consequences if not approved:*** | The current description is unclear regarding whether the SN UE X2AP ID is used to indicate keeping UE context or to indicate whether delta configuration is applied. |
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| ***Clauses affected:*** | 10.7.1, 10.7.2 |
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|  | **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:*** |  |

*START OF CHANGES*

## 10.7 Inter-Master Node handover with/without Secondary Node change

### 10.7.1 EN-DC

Inter-Master Node handover with/without MN initiated Secondary Node change is used to transfer context data from a source MN to a target MN while the context at the SN is kept or moved to another SN. During an Inter-Master Node handover, the target MN decides whether to keep or change the SN (or release the SN, as described in clause 10.8).

NOTE 1: Inter-system Inter-Master node handover with/without SN change is not supported in this version of the protocol (e.g. no transition from EN-DC to NGEN-DC or NR-DC).



Figure 10.7.1-1: Inter-MN handover with/without MN initiated SN change

Figure 10.7.1-1 shows an example signaling flow for inter-Master Node handover with or without MN initiated Secondary Node change:

NOTE 2: For an inter-Master Node handover without Secondary Node change, the source SN and the target SN shown in Figure 10.7.1-1 are the same node.

1. The source MN starts the handover procedure by initiating the X2 Handover Preparation procedure including both MCG and SCG configuration. The source MN includes the (source) SN UE X2AP ID, SN ID and the UE context in the (source) SN in the *Handover Request* message.

NOTE 3: The source MN may trigger the MN-initiated SN Modification procedure (to the source SN) to retrieve the current SCG configuration before step 1.

2. If the target MN decides to keep the UE context in SN, the target MN sends *SN Addition Request* to the SN including the SN UE X2AP ID as a reference to the UE context in the SN that was established by the source MN. If the target MN decides to change the SN allowing delta configuration, the target MN sends the *SgNB Addition Request* to the target SN including the UE context in the source SN that was established by the source MN. Otherwise, the target MN may send the *SgNB Addition Request* to the target SN including neither the SN UE X2AP ID nor the UE context in the source SN that was established by the source MN.

3. The (target) SN replies with *SN Addition Request Acknowledge*. The (target) SN may include 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. The target MN includes within the *Handover Request Acknowledge* message a transparent container to be sent to the UE as an RRC message to perform the handover, and may also provide forwarding addresses to the source MN. The target MN indicates to the source MN that the UE context in the SN is kept if the target MN and the SN decided to keep the UE context in the SN in step 2 and step 3.

5. The source MN sends *SN Release Request* to the (source) SN including a Cause indicating MCG mobility. The (source) SN acknowledges the release request. The source MN indicates to the (source) SN that the UE context in SN is kept, if it receives the indication from the target MN. If the indication as the UE context kept in SN is included, the SN keeps the UE context.

6. The source MN triggers the UE to apply the new configuration.

7/8. The UE synchronizes to the target MN and replies with *RRCConnectionReconfigurationComplete* message.

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

NOTE 3b: The order the UE performs Random Access towards the MN (step 7) and performs the Random Access procedure towards the SN (step 9) is not defined.

10. If the RRC connection reconfiguration procedure was successful, the target MN informs the (target) SN via *SgNB Reconfiguration Complete* message.

11a. The SN sends the *Secondary RAT* *Data Usage Report* message to the source 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.

11b. The source MN sends the *Secondary RAT Report* message to MME to provide information on the used NR resource.

12. For bearers using RLC AM, the source MN sends the SN Status Transfer, including, if needed, SN Status received from the source SN to the target MN. The target forwards the SN Status to the target SN, if needed.

13. If applicable, data forwarding takes place from the source side. If the SN is kept, data forwarding may be omitted for SN-terminated bearers kept in the SN.

14-17. The target MN initiates the S1 Path Switch procedure.

NOTE 5: If new UL TEIDs of the S-GW are included, the target MN performs the MN initiated SN Modification procedure to provide them to the SN.

18. The target MN initiates the UE Context Release procedure towards the source MN.

19. Upon reception of the *UE Context Release* message, the (source) SN releases C-plane related resources associated to the UE context towards the source MN. Any ongoing data forwarding may continue. The SN shall not release the UE context associated with the target MN if the UE context kept indication was included in the *SgNB* *Release Request* message in step 5.

10.7.2 MR-DC with 5GC

Inter-MN handover with/without MN initiated SN change is used to transfer UE context data from a source MN to a target MN while the UE context at the SN is kept or moved to another SN. During an Inter-Master Node handover, the target MN decides whether to keep or change the SN (or release the SN, as described in clause 10.8). Only intra-RAT Inter-Master node handover with/without SN change is supported (e.g. no transition from NGEN-DC to NR-DC).



**Figure 10.7.2-1: Inter-MN handover with/without MN initiated SN change procedure**

Figure 10.7.2-1 shows an example signalling flow for inter-MN handover with or without MN initiated SN change:

NOTE 1: For an Inter-Master Node handover without Secondary Node change, the source SN and the target SN shown in Figure 10.7.2-1 are the same node.

1. The source MN starts the handover procedure by initiating the Xn Handover Preparation procedure including both MCG and SCG configuration. The source MN includes the source SN UE XnAP ID, SN ID and the UE context in the source SN in the *Handover Request* message.

NOTE 2: The source 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.

2. If the target MN decides to keep the UE context in source SN, the target MN sends *SN Addition Request* to the SN including the SN UE XnAP ID as a reference to the UE context in the SN that was established by the source MN. If the target MN decides to change the SN allowing delta configuration, the target MN sends the *SN Addition Request* to the target SN including the UE context in the source SN that was established by the source MN. Otherwise, the target MN may send the *SgNB Addition Request* to the target SN including neither the SN UE X2AP ID nor the UE context in the source SN that was established by the source MN.

3. The (target) SN replies with *SN Addition Request Acknowledge*. The (target) SN may include the indication of the full or delta RRC configuration.

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

4. The target MN includes within the *Handover Request Acknowledge* message the MN RRC reconfiguration message to be sent to the UE in order to perform the handover, and may also provide forwarding addresses to the source MN. If PDU session split is performed in the target side during handover procedure, more than one data forwarding addresses corresponding to each node are included in the *Handover Request Acknowledge* message. The target MN indicates to the source MN that the UE context in the SN is kept if the target MN and the SN decided to keep the UE context in the SN in step 2 and step 3.

5a/5b. The source MN sends *SN Release Request* message to the (source) SN including a Cause indicating MCG mobility. The (source) SN acknowledges the release request. The source MN indicates to the (source) SN that the UE context in SN is kept, if it receives the indication from the target MN. If the indication as the UE context kept in SN is included, the SN keeps the UE context.

5c. The source MN sends XN-U Address Indication message to the (source) SN to transfer data forwarding information. More than one data forwarding addresses may be provided if the PDU session is split in the target side.

6. The source MN triggers the UE to perform handover and apply the new configuration.

7/8. The UE synchronizes to the target MN and replies with *MN RRC reconfiguration complete* message.

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

NOTE 2a1: The order the UE performs Random Access towards the MN (step 7) and performs the Random Access procedure towards the SN (step 9) is not defined.

10. If the RRC connection reconfiguration procedure was successful, the target MN informs the (target) SN via *SN Reconfiguration Complete* message.

11a. The source SN sends the *Secondary RAT* *Data Usage Report* message to the source MN and includes the data volumes delivered to and received from the UE over the NR/E-UTRA radio as described in clause 10.11.2.

NOTE 2a2: 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 SN may send the report when the transmission of the related QoS is stopped.

11b. The source MN sends the *Secondary RAT Report* message to AMF to provide information on the used NR/E-UTRA resource.

12. For bearers using RLC AM, the source MN sends the *SN Status Transfer* to the target MN, including, if needed, SN Status received from the source SN. The target forwards the SN Status to the target SN, if needed.

13. If applicable, data forwarding takes place from the source side. If the SN is kept, data forwarding may be omitted for SN terminated bearers or QoS flows kept in the SN.

14-17. The target MN initiates the Path Switch procedure*.* If the target MN includes multiple DL TEIDs for one PDU session in the *Path Switch Request* message, multiple UL TEID of the UPF for the PDU session should be included in the *Path Switch Ack* message in case there is TEID update in UPF.

NOTE 3: If new UL TEIDs of the UPF for SN are included, the target MN performs MN initiated SN Modification procedure to provide them to the SN.

18. The target MN initiates the UE Context Release procedure towards the source MN.

19. Upon reception of the *UE Context Release* message from source MN, the (source) SN releases C-plane related resources associated to the UE context towards the source MN. Any ongoing data forwarding may continue. The SN shall not release the UE context associated with the target MN if the UE contest kept indication was included in the *SN Release Request* message in step 5.

*END OF CHANGES*