**3GPP TSG-WG SA2 Meeting #140E e-meeting  *S2-200xxxx***

**Elbonia, August 19 – September 02, 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **23.502** | **CR** |  | **rev** |  | **Current version:** | **16.5.0** |  |
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| *For* [***HELP***](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 | **X** |

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| ***Title:***  | Intra NG-RAN handover via CN for NR satellite access |
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| ***Source to WG:*** | Vodafone |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | 5GSAT\_ARCH |  | ***Date:*** | 2020-08-04 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories 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:*** | The satellites being considered by this work item are likely to provide coverage in multiple countries, but only have a more limited number of (e.g. 1) feeder links to satellite ground station(s). As a result, the satellite ground station is likely to act as an NG-RAN node to multiple core network nodes in multiple countries.In order to help satisfy LI requirements, when a UE moves in RRC connected state from one country to another country, this NG-RAN node may need to perform an intra NG-RAN node handover via the core network so that the target AMF is located in the country in which the UE is now located. |
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| ***Summary of change:*** | It is clarified that N2 based handover can be used for intra NG-RAN handover.Existing handover procedures for network sharing scenarios (in 4.9.1.3) specify that the target PLMN ID is included in the TAI in the Handover Required message. |
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| ***Consequences if not approved:*** | LI requirements could be circumvented. |
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| ***Clauses affected:*** | 4.9.1.1 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

 \*\*\* Start of Changes \*\*\*

### 4.9.1 Handover procedures in 3GPP access

#### 4.9.1.1 General

These procedures are used to hand over a UE from a source NG-RAN node to a target NG-RAN node using the Xn or N2 reference points. This can be triggered, for example, due to new radio conditions, load balancing or due to specific service e.g. in the presence of QoS Flow for voice, the source NG-RAN node being NR may trigger handover to E-UTRA connected to 5GC.

The Inter NG-RAN node N2 based handover procedure specified in clause 4.9.1.3 may also be used for intra-NG-RAN node handover.

NOTE: One use case for intra-NG-RAN handover is for an NG-RAN node serving a satellite access system that covers more than one country. In such a situation, the UE might move from a “cell” in one country into a “cell” in another country, and the NG-RAN node may need to cause the AMF to change to an AMF in the UE’s new country.

The RRC Inactive Assistance Information is included in N2 Path Switch Request Ack message for Xn based handover or Handover Request message for N2 based handover (see TS 23.501 [2] clause 5.3.3.2.5).

\*\*\* End of Change \*\*\*

\*\*\* The following hightled text is included for information \*

#### 4.9.1.3 Inter NG-RAN node N2 based handover

##### 4.9.1.3.1 General

Clause 4.9.1.3 includes details regarding the inter NG-RAN node N2 based handover without Xn interface.

The source NG-RAN decides to initiate an N2-based handover to the target NG-RAN. This can be triggered, for example, due to new radio conditions or load balancing, if there is no Xn connectivity to the target NG-RAN, an error indication from the target NG-RAN after an unsuccessful Xn-based handover (i.e. no IP connectivity between T-RAN and S-UPF), or based on dynamic information learnt by the S-RAN.

The availability of a direct forwarding path is determined in the source NG-RAN and indicated to the SMFs. If IP connectivity is available between the source and target NG-RAN and security association(s) is in place between them, a direct forwarding path is available.

If a direct forwarding path is not available, indirect forwarding may be used. The SMFs use the indication from the source NG-RAN to determine whether to apply indirect forwarding.

In the case of handover to a shared network, the source NG-RAN determines a PLMN to be used in the target network as specified by TS 23.501 [2]. The source NG-RAN shall indicate the selected PLMN ID (or PLMN ID and NID, see TS 23.501 [2], clause 5.30) to be used in the target network to the AMF as part of the Tracking Area sent in the HO Required message.

If the AMF generates the N2 downlink signalling during the ongoing handover and receives a rejection to a N2 interface procedure (e.g. DL NAS message transfer; Location reporting control; etc.) from the NG-RAN with an indication that an Inter NG-RAN node handover procedure is in progress, the AMF may reattempt the same N2 interface procedure either when the handover is complete or the handover is deemed to have failed if the AMF is still the serving AMF, when possible. If the Inter NG-RAN node handover changes the serving AMF, the source AMF shall terminate any other ongoing N2 interface procedures except the handover procedure.

In order to minimize the number of procedures rejected by NG-RAN, the AMF should pause non-handover related N2 interface procedures (e.g. DL NAS message transfer, Location Report Control, etc.) while a handover is ongoing (i.e. from the time that a Handover Required has been received until either the Handover procedure has succeeded (Handover Notify) or failed (Handover Failure)) and continue them once the Handover procedure has completed if the AMF is still the serving AMF.

If during the handover procedure the AMF detects that the AMF needs be changed, the AMF shall reject any SMF initiated N2 request received since handover procedure started and shall include an indication that the request has been temporarily rejected due to handover procedure in progress.

Upon reception for an SMF initiated N1 and/or N2 request(s) with an indication either from the NG-RAN (via N2 SM Info) or AMF that the request has been temporarily rejected due to handover procedure in progress, the SMF starts a locally configured guard timer. The SMF should hold any signalling messages targeted towards AMF for a given UE during the handover preparation phase unless it detects that the handover execution is completed or handover has failed/cancelled. The SMF may re-attempt, up to a pre-configured number of times, when either it detects that the handover is completed or has failed using message reception or at expiry of the guard timer.

In the case of home routed roaming scenario, the SMF in the Inter NG-RAN node N2 based handover procedure (Figure 4.9.1.3.2-1 and Figure 4.9.1.3.3-1) interacting with the S-UPF, T-UPF, S-AMF and T-AMF is the V-SMF, and the SMF (Figure 4.9.1.3.3-1) interacting with the UPF (PSA) is the H-SMF.

\*\*\* End of Spec extract \*\*\*