**3GPP TSG-CT WG4 Meeting #101eC4-205508**

**E-Meeting, 3rd – 13th November 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **23.632** | **CR** | **0026** | **rev** | **-** | **Current version:** | **16.3.0** |  |
|  |
| *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 |  | Core Network | **X** |

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|  |
| ***Title:***  | UE Reachability for IP |
|  |  |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | CT4 |
|  |  |
| ***Work item code:*** | UDICOM |  | ***Date:*** | 2020-11-09 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | It needs to be clarified that the HSS subscribes at the UDM to a notification for UE Reachability For SMS over IP. |
|  |  |
| ***Summary of change:*** | Clarify that the HSS subscribes to UE Reachability notification with event type UE\_REACHABILITY\_FOR\_SMS and reachability for SMS configuration of REACHABILITYLE\_FOR\_SMS\_OVER\_IP |
|  |  |
| ***Consequences if not approved:*** | UDM cannot distinguish between UE Reachability for SMS over NAS and UE Reachability for SMS over IP |
|  |  |
| ***Clauses affected:*** | 5.4.5, 5.5.6.3, 5.5.6.4 |
|  |  |
|  | **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:*** |  |

\* \* \* First Change \* \* \* \*

### 5.4.5 UE Reachability

Figure 5.4.5-1 shows the scenario where the HSS receives a Subscription to notification request for UE-reachability from the IMS-AS for a subscriber who has a 5GC subscription.



Figure 5.4.5-1: Subscription to UE reachability for 5G subscriber

1. The HSS receives a Subscribe request for UE reachability for IP from the IMS-AS.

NOTE: An SBA capable IMS-AS makes use of Nhss\_ImsSDM service to interact with the HSS for this operation as defined in 3GPP TS 23.228 [7]. Otherwise the IMS-AS makes use of Diameter Sh-SNR/SNA command.

2. The HSS reads subscription data from the EPS-UDR.

3. The HSS sets the UE Reachability flags for EPC and if the UE is registered in EPC contacts the registered MME and SGSN to get notified when the UE becomes reachable.

4. If the HSS detects in step 2 that the user has a 5GC subscription, the HSS uses the Nudm\_EventExposure\_Subscribe service operation (one time immediate report requested) to get notified when the UDM detects UE reachability for SMS over IP. Otherwise, continue with step 10.

5. The UDM sets the URRP-AMF flag in the 5GS-UDR and reads data from the 5GS-UDR to get the AMF for 3GPP Access Registration Information and the AMF for non-3GPP Access Registration Information if any.

6-7. [Conditional] If an AMF is registered in UDM for the target UE and the UDM has not already subscribed in AMF due to a previous subscription from a different NF, the UDM subscribes to UE reachability notifications at the registered AMFs by means of the Namf\_EventExposure\_Subscribe service operation (see 3GPP TS 23.502 [5]).

8. The UDM updates the 5GS-UDR with the EE-Subscription for the HSS.

9. The UDM acknowledges the EE Subscription to the HSS.

10. The HSS acknowledges the Sh subscription to the IMS-AS.

11. The HSS updates the EPS-UDR with the Sh subscription for the IMS-AS.

Figure 5.4.5-2 shows the scenario where the UDM detects UE reachability for SMS over IP and notifies the HSS that has previously subscribed.



Figure 5.4.5-2: UE reachability notification for 5G subscriber

1. The UDM receives a Notification or Registration from the AMF.

2. The UDM reads subscription data from the 5GS-UDR.

3. The UDM acknowledges step 1 towards the AMF. If an old AMF is registered in the UDM, the UDM sends a Nudm\_UECM\_DeregistrationNotification service operation to the old AMF.

4. The UDM notifies the HSS (and any other NF that has subscribed) about the reachability of the UE.

5. The HSS reads data from the EPS-UDR to see whether an IMS-AS has subscribed do reachability notification.

6. The HSS acknowledges step 4.

7. The UDM updates the 5GS-UDR to delete the EE-Subscription(s).

8. The HSS notifies the IMS-AS about UE reachability for IP.

NOTE: An SBA capable IMS-AS receives the notification from HSS using the Nhss\_ImsSDM service as defined in 3GPP TS 23.228 [7]. Otherwise the IMS-AS receives the notification via a Diameter Sh-PNR/PNA command.

9. The IMS-AS acknowledges step 8.

10. The HSS updates the EPS-UDR to delete the IMS-AS's subscription.

\* \* \* Next Change \* \* \* \*

#### 5.5.6.3 MT SMS delivery failure in 5GC only deployments

Figure 5.5.6.3-1 shows the interactions for the unsuccessful MT SMS delivery case in a 5GC only deployment requiring SMSoIP.



Figure 5.5.6.3-1: MT SMS delivery failure in 5GC only deployments supporting SMSoIP

1 - 7. The message delivery fails after the IP‑SM‑GW has tried all selectable domains, and the IP-SM-GW forwards the received unsuccessful Delivery report to the SMS‑GMSC, as described in steps 1-16 in clause 6.5a of 3GPP TS 23.204 [18].

8. The IP-SM-GW sends a Report SM Delivery Status message to the UDM with accurate results from different domains. If the 5GS-UDR is used, the UDM records the corresponding MWD in the 5GS-UDR.

9. The IP-SM-GW subscribes to the HSS (IMS) for a one-time notification of the UE being reachable again.

10. The HSS (IMS) records the subscription and subscribes to notification on UE Reachability for SMS over IP event at the UDM, using the Nudm\_EE\_Subscribe service operation.

11 - 12. The UDM checks whether UE Reachability has already been subscribed at the registered AMF(s) (i.e. whether URRP-AMF flag is set), querying 5GS-UDR if applicable. If not already subscribed, the UDM subscribes to UE Reachability notification at the AMF(s) using the Namf\_EE service.

If 5GS-UDR is used, the UDM stores the received EE-Subscription from HSS (IMS) in the 5GS-UDR, and if subscription to AMF is performed in this step, the UDM sets the relevant URRP-AMF flag in the 5GS-UDR.

13. The UDM acknowledges the subscription of the HSS (IMS).

14. The SMS-GMSC sends a Report SM Delivery Status message to the UDM. The UDM shall ignore the information provided in this report.

\* \* \* Next Change \* \* \* \*

#### 5.5.6.4 Alert Service Centre in 5GC only deployments

Figure 5.5.6.4-1 shows the interactions when the UE becomes available in a 5GC only deployment requiring SMSoIP.



Figure 5.5.6.4-1: Alert Service Centre procedure in 5GC only deployments supporting SMSoIP

The steps described below are based on the procedure described in clause 6.5b of 3GPP TS 23.204 [18], considering a 5GC only deployment.

1. MT SMS procedure is unsuccessful as described in clause 5.5.6.3.

2. At any time after the unsuccessful SM termination procedure, the UE may become available due to registration in IMS (step 2a). After the IMS registration is finished, the procedure continues as described in step 3.

At any time after the unsuccessful SM termination procedure, the UDM can receive a notification from AMF indicating that the UE is reachable again or an AMF registration (step 2b). The UDM checks whether any NF (e.g. the HSS) has subscribed to notification on UE Reachability for SMS over IP events, querying 5GS-UDR if applicable. If the HSS has subscribed to such notification, the UDM notifies the HSS (step 2c). As the IP-SM-GW has subscribed to the event of UE being reachable again as described in clause 5.5.6.3, the HSS shall notify the IP-SM-GW (step 2d). If the UE is already registered in IMS, the IP-SM-GW shall then send a Ready for SM message to the UDM (step 2e) and the procedure continues as described in step 3. Otherwise, the IP-SM-GW discards the notification message.

3. The UDM checks the user's MWD. If MWD is not null, the UDM sends an Alert Service Centre message to the SMS‑IWMSC.

4. The SMS‑IWMSC forwards the Alert Service Centre procedure to the SMS‑SC.

5. Upon receipt of the Alert Service Centre message, the SMS‑SC re-attempts to send the stored Short Message.

\* \* \* End Of Change \* \* \* \*