**SA WG2 Meeting #S2-137E  *S2-2001938***

**24 - 27 February, 2020, Elbonia**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **23.502** | **CR** | **2095** | **rev** | **-** | **Current version:** | **16.3.0** |  |
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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 |  | Core Network | **X** |

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| ***Title:***  | Corrections on EPS fallback and RAT fallback for IMS voice |
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| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | 5GS\_Ph1, TEI16 |  | ***Date:*** | 2020-02-17 |
|  |  |  |  |  |
| ***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:*** | 1. As agreed in [**S2-2001341**](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_136AH_Incheon/Docs/S2-2001341.zip) and [**S2-2001343**](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_136AH_Incheon/Docs/S2-2001343.zip), the PGW-C+SMF reports the EPS Fallback event to the PCF if PCF has subscribed to this event. This means that the SMF needs to differentiate the EPS Fallback procedure and RAT fallback procedure in order to make the accurate reports.However, in current specifications, it specifies that NG-RAN sends the same indication on EPS/RAT fallback to the PGW-C+SMF, see TS 23.502 clause 4.16.3.1 / 4.16.3.2 (“an indication that mobility due to fallback for IMS voice is ongoing”) and TS 38.413 clause 8.2.3 / 9.3.1.2 (cause value "IMS voice EPS fallback or RAT fallback triggered"), without distinguishing the EPS Fallback procedure and RAT fallback procedure. The PGW-C+SMF may determine whether it is EPS fallback or RAT fallback based on the subsequent signaling from the AMF or MME during "handover or redirection to EPS" or "Inter NG-RAN handover or redirection" procedures, but this depends on the implementation, e.g. a timer if configured for waiting for the subsequent signalling before reporting to the PCF. So for simplicity and accuracy, it is proposed that the NG-RAN provides different indications for EPS fallback and RAT fallback to the PGW-C+SMF.2. Following the principle pointed out in **[S2-2001338](https://www.3gpp.org/ftp/tsg_sa/WG2_Arch/TSGS2_136AH_Incheon/Docs/S2-2001338.zip%22%20%5Ct%20%22_blank)** that IMS level signalling should be allowed to be executed in parallel with the resource reservation for voice/video, change should be made to the RAT fallback for IMS voice procedure, similar to the EPS fallback procedure. |
| ***n***  |  |
| ***Summary of change:*** | 1. Clarify that different indications are sent from the NG-RAN to the PGW-C+SMF for EPS fallback and RAT fallback.2. Correct in RAT fallback procedure that the IMS signalling for voice can proceed in parallel with the RAT fallback procedure for resource reservation. |
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| ***Consequences if not approved:*** | 1. SMF fails to differentiate EPS fallback and RAT fallback for IMS voice, and makes wrong reports to PCF.2. IMS procedure is unnecessary impacted due to Inter RAT fallback, which introduces additional latency for call setup.  |
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| ***Clauses affected:*** | 4.13.6.1, 4.13.6.2 |
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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:*** |  |

\* \* \* \* 1st change \* \* \* \*

#### 4.13.6.1 EPS fallback for IMS voice

Figure 4.13.6.1-1 describes the EPS fallback procedure for IMS voice.

When the UE is served by the 5G System, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS. If N26 is not supported, the serving PLMN AMF sends an indication towards the UE during the Registration procedure that interworking without N26 is supported, see clause 5.17.2.3.1 in TS 23.501 [2].



Figure 4.13.6.1-1: EPS Fallback for IMS voice

1. UE camps on NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for voice reaches the NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. NG-RAN is configured to support EPS fallback for IMS voice and decides to trigger fallback to EPS, taking into account UE capabilities, indication from AMF that "Redirection for EPS fallback for voice is possible" (received as part of initial context setup as defined in TS 38.413 [10]), network configuration (e.g. N26 availability configuration) and radio conditions. If NG-RAN decides not to trigger fallback to EPS, then the procedure stops here and following steps are not executed.

 NG-RAN may initiate measurement report solicitation from the UE including E-UTRAN as target.

NOTE 1: If AMF has indicated that "Redirection for EPS fallback for voice is not possible", then AN Release via inter-system redirection to EPS is not performed in step 5.

4. NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Response message towards the PGW-C+SMF (or H-SMF+P-GW-C via V-SMF, in case of roaming scenario) via AMF with an indication that mobility due to EPS fallback for IMS voice is ongoing. The PGW-C+SMF maintains the PCC rule(s) associated with the QoS Flow(s).

5. NG-RAN initiates either handover (see clause 4.11.1.2.1), or AN Release via inter-system redirection to EPS (see clause 4.2.6 and clause 4.11.1.3.2), taking into account UE capabilities. The PGW-C+SMF reports change of the RAT type if subscribed by PCF as specified in clause 4.11.1.2.1, or clause 4.11.1.3.2.

6. When the UE is connected to EPS, either 6a or 6b is executed

6a. In the case of 5GS to EPS handover, see clause 4.11.1.2.1, and in the case of inter-system redirection to EPS with N26 interface, see clause 4.11.1.3.2. In either case the UE initiates TAU procedure; or

6b. In the case of inter-system redirection to EPS without N26 interface, see clause 4.11.2.2. If the UE supports Request Type flag "handover" for PDN connectivity request during the attach procedure as described in clause 5.3.2.1 of TS 23.401 [13] and has received the indication that interworking without N26 is supported, then the UE initiates Attach with PDN connectivity request with request type "handover".

 In inter-system redirection, the UE uses the emergency indication in the RRC message as specified in clause 6.2.2 of TS 36.331 [16] and E-UTRAN provides the emergency indication to MME during Tracking Area Update or Attach procedure. For the handover procedure see clause 4.11.1.2.1, step 1.

7. After completion of the mobility procedure to EPS or as part of the 5GS to EPS handover procedure (see clause 4.11.1.2.1), the SMF/PGW re-initiates the setup of the dedicated bearer for IMS voice, mapping the 5G QoS to EPC QoS parameters. The PGW-C+SMF behaves as specified in clause 4.9.1.3.1. The PGW-C+SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

8. The IMS voice session establishment is continued.

At least for the duration of the voice call in EPS the E-UTRAN is configured to not trigger any handover to 5GS.

\* \* \* \* 2nd change \* \* \* \*

#### 4.13.6.2 Inter RAT Fallback in 5GC for IMS voice

Figure 4.13.6.2-1 describes the RAT fallback procedure in 5GC for IMS voice.

When the UE is served by the 5GC, the UE has one or more ongoing PDU Sessions each including one or more QoS Flows. The serving PLMN AMF has sent an indication towards the UE during the Registration procedure that IMS voice over PS session is supported, see clause 5.16.3.10 in TS 23.501 [2] and the UE has registered in the IMS.



Figure 4.13.6.2-1: RAT Fallback for IMS voice

1. UE camps on source NG-RAN in the 5GS and an MO or MT IMS voice session establishment has been initiated.

2. Network initiated PDU Session modification to setup QoS flow for IMS voice reaches the source NG-RAN (see N2 PDU Session Request in clause 4.3.3).

3. If source NG-RAN is configured to support RAT fallback for IMS voice, source NG-RAN decides to trigger RAT fallback, taking into account on UE capabilities, network configuration and radio conditions.

 Source NG-RAN may initiate measurement report solicitation from the UE including target NG-RAN.

4. Source NG-RAN responds indicating rejection of the PDU Session modification to setup QoS flow for IMS voice received in step 2 by PDU Session Response message towards the SMF (or V-SMF, in case of roaming scenario) via AMF with an indication that mobility due to RAT fallback for IMS voice is ongoing. The SMF maintains the PCC rule(s) associated with the QoS Flow(s).

5. Source NG-RAN initiates Xn based Inter NG-RAN handover (see clause 4.9.1.2) or N2 based inter NG-RAN handover (see clause 4.9.1.3), or redirection to E-UTRA connected to 5GC (see clause 4.2.6). The SMF reports change of the RAT type if subscribed by PCF.

6. After completion of the Inter NG-RAN (inter-RAT) handover or redirection to E-UTRA connected to 5GC, the SMF re-initiates the PDU Session modification to setup QoS flow for IMS voice. The SMF reports about Successful Resource Allocation and Access Network Information if subscribed by PCF.

The IMS signalling related to IMS voice call establishment continues after step 1 as specified in TS 23.228 [55].

At least for the duration of the IMS voice call the target NG-RAN is configured to not trigger inter NG-RAN handover back to source NG-RAN.

\* \* \* \* End of changes \* \* \* \*