**3GPP TSG-WG SA2 Meeting #152-e *S2-220xxxx***

**Electronic Meeting, 2022‑08‑17 -- 2022‑08‑26**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.228** | **CR** | draft | **rev** | **-** | **Current version:** | **17.3.0** |  |
|  | | | | | | | | |
| *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 | **x?** | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | IMS procedures related to UE mobility between PLMNs for deployment without IMS-level roaming agreement | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson, xx | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI18? | | | | |  | ***Date:*** | | | 2022-06-15 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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:*** | | If there is not IMS level roaming agreement, the P-CSCF is always in the HPLMN, so called IMS home routed roaming. In such cases when a UE moves between PLMNs, the PLMNs may support keeping the PDN connection/PDU session instead of re-establishment of it. In this case there may be requirment e.g. for the VPLMN to get access to IMS call related information due Lawful Interception, see LS S2-2203662 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Adding procedure for mobility between PLMNs for IMS Home routed roaming. Editorial updates | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Mobility between PLMNs may need re-establishment of PDN connection/PDU session depending on regulatory requirments | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | W.1, W.2.1 (new), W.2.2 (new), W3, W4 (new), W.4.1 (new), W.4.2 (new), W.4.3 (new), Y.9.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 1st changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Annex W (normative):  
Support of IMS Services for roaming users in deployments without IMS-level roaming interfaces

# W.1 General

This clause describes the functions that are used to support IMS services for roaming users in deployments without IMS-level roaming interfaces. This annex is applicable to for UEs connected to EPS and 5GS. In this roaming model the Packet Switch anchor (i.e. PGW or UPF) is located in the home PLMN and therefore UE IMS signalling and user plane are routed to home PLMN.

In LBO roaming model where P-CSCF is in VPLMN, see Annex M.

# W.2 Architecture

## W.2.1 EPS

The architecture to support IMS services for roaming users, including Voice over IMS, in deployments without IMS-level roaming interfaces is shown in figure W.2-1

The following architecture requirements apply:

- P-CSCF (at HPLMN) identifies the serving network (VPLMN) where the UE is located using the procedure defined in clause W.3.



Figure W.2-1: Home Routed IMS architecture

## W.2.2 5GS

See clause Y.9.2.

# W.3 VOID

# W.4 Procedures related to PLMN ID change

## W.4.1 Subscription to changes in PLMN ID at IMS Initial Registration

In deployments without IMS-level roaming interfaces, the home network determines the serving PLMN of the UE using procedure defined in TS 23.203 [54] or TS 23.503 [95], where P-CSCF requests the PCRF/PCF to report the PLMN identifier where the UE is currently located. The received PLMN ID information is then forwarded in the SIP REGISTER request.

This procedure shall be applied by the P-CSCF at initial UE IMS registration.

The below procedure relates to EPS, the corresponding procedure for 5GS is defined in Annex Y..



Figure W.3-1: Subscription by P-CSCF to changes in PLMN ID during initial IMS Registration

1. The UE sends a SIP REGISTER request to the P-CSCF.

2. If this is initial IMS registration then the P-CSCF subscribes to the PCRF to be notified of the PLMN ID where the UE is currently attached. The subscription is active for as long as the UE is IMS registered.

3. The PCRF forwards the PLMN ID to the P-CSCF. The P-CSCF stores the PLMN ID.

4. The P-CSCF includes the received PLMN ID in the SIP REGISTER request before forwarding the request to the I-CSCF.

5. Normal IMS registration procedure is then completed.

## W.4.2 UE is not active in an IMS voice session

The following procedure shall apply by IMS at reception of PLMN change when UE is not in active call, and when the PDN connection/PDU session is kept at PLMN change

H-PCRF/PCF

I/S-CSCF

:

,

CSCF

-

P

UE

2. NOTIFY (PLMN Change)

SIP NOTIFY (re-register)

SIP NOTIFY (re-register)

5. Re-registration Procedure

SIP NOTIFY (re-register)

1. PLMN change detected

3. SIP MESSAGE (PLMN change, Re-athentication request)…

4. SIP NOTIFY (re-Authenticate)

Figure W.4.1-1: Procedure for PLMN change

1. EPC/5GC detects PLMN change.

2. H-PCRF/PCF notifies P-CSCF that PLMN change has occured.

3. P-CSCF sends SIP MESSAGE with "PLMN change" which may also contain a "Re-authentication request" depending on need for IMS re-registration at PLMN change.

NOTE 1: Regularory requirements in country of target PLMN may require possibility to get access to IMS signalling information. In case of source PLMN has encryption for IMS signaling, the Re-Registration procedure can change encryption to null encryption which would enable target PLMN to get access to the IMS signalling information.

4. S-CSCF sends SIP NOTIFY (re-authentication) to the UE.

5. UE initiate re-registration procedure. During the re-registration procedure, the P-CSCF may update the SIP signalling encryption depending on roaming agreements, e.g., moving from HPLMN to VPLMN can result in turning off encryption.

## W.4.3 UE is active in an IMS voice session

The following procedure shall apply by IMS at reception of PLMN change when UE is active in a IMS voice call

4. SIP NOTIFY (re-Authenicate)

3. SIP MESSAGE (PLMN change, Re-authenticate request)?

2. NOTIFY (PLMN Change)

5. IMS Re-Registration procedure

6. SIP MESSAGE (Re-Invite request)

7. SIP Re-INVITE

UE

P

-

CSCF

I/S-CSCF

H-PCRF/PCF

1. PLMN change detected

TAS

0. UE active in a voice call

5. re-Registration Procedure

8. SIP 200 OK

Figure W.4.1-1: PLMN change detected by EPC/5GC

0. UE is active in an IMS voice call.

1. EPC/5GC detects PLMN change.

2. H-PCRF/PCF notifies P-CSCF that PLMN change has occured.

3. P-CSCF sends SIP MESSAGE with "PLMN change" which may also contain a "Re-authentication request" depending on need for IMS re-registration at PLMN change. S-CSCF forwards the SIP MESSAGE to TAS so that TAS may update any charging records with PLMN change.

NOTE 1: Regularory requirements in country of target PLMN may require possibility to get access to IMS signalling information. In case of source PLMN has encryption for IMS signaling, the Re-Registration procedure can change encryption to null encryption which would enable target PLMN to get access to the IMS signalling information.

4. S-CSCF sends SIP NOTIFY (re-authentication) to the UE.

5. UE initiate re-registration procedure. During the re-registration procedure, the P-CSCF may update the SIP signalling encryption depending on roaming agreements, e.g., moving from HPLMN to VPLMN can result in turning off encryption.

6. When registration procedure ready, P-CSCF sends SIP MESSAGE with a "re-Invite request" to TAS.

7. TAS sends SIP Re-INVITE to UE.

8. SIP 200 OK.

NOTE 2: Sending a SIP Re-INVITE will enable the Target PLMN to get access to IMS signalling information of ongoing call, such as codecs used, called party and calling party. The need for this depends on regulatory requirements in the target PLMN.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 2nd changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## Y.9.4 Subscription to changes in PLMN ID at IMS Initial Registration

In IMS local breakout where P-CSCF is located in VPLMN (see Annex M.1 and Annex M.3), the home network determines the serving PLMN of the UE from the location of the P-CSCF during initial IMS Registration, using the P‑CSCF network identifier.

In deployments without IMS-level roaming interfaces, the home network determines the serving PLMN of the UE using procedure defined in TS 23.503 [95], where P-CSCF requests the PCF to report the PLMN identifier where the UE is currently located. The received PLMN ID information is then forwarded in the SIP REGISTER request.

This procedure shall be applied by the P-CSCF at initial UE IMS registration.



Figure Y.9.4-1: Subscription by P-CSCF to changes in PLMN ID during initial IMS Registration

1. The UE sends a SIP REGISTER request to the P-CSCF.

2. If this is initial IMS registration then the P-CSCF subscribes to the PCF to be notified of the PLMN ID where the UE is currently attached. The subscription is active for as long as the UE is IMS registered.

3. The PCF forwards the PLMN ID to the P-CSCF. The P-CSCF stores the PLMN ID.

4. The P-CSCF includes the received PLMN ID in the SIP REGISTER request before forwarding the request to the I-CSCF.

5. Normal IMS registration procedure is then completed.

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