**3GPP TSG-SA2 Meeting # 143E** **(e-meeting)S2-2100284**

 **Elbonia, February 24 – March 09, 2021 (revision of S2-210xxxx)**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **23.401** | **CR** | **3622** | **rev** | **-** | **Current version:** | **16.9.0** |  |
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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 | **X** | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:***  | Function Description for Multi-USIM devices |
|  |  |
| ***Source to WG:*** | Ericsson, LG Electronics, Huawei, China Telecom, Charter, MediaTek, Intel, Vodafone, Spreadtrum, Sony, Apple, Samsung |
| ***Source to TSG:*** | SA2 |
|  |  |
| ***Work item code:*** | MUSIM |  | ***Date:*** | 2021-02-18 |
|  |  |  |  |  |
| ***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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | Introducing overall function description for Multi-USIM device as agreed in TR 23.761  |
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| ***Summary of change:*** | General description for Multi-USIM device function. |
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| ***Consequences if not approved:*** | Missing function description |
|  |  |
| ***Clauses affected:*** | 3.1, 4.3.x(new) |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR …CR …  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* START CHANGE \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

**MME Pool Area:** An MME Pool Area is defined as an area within which a UE may be served without need to change the serving MME. An MME Pool Area is served by one or more MMEs ("pool of MMEs") in parallel. MME Pool Areas are a collection of complete Tracking Areas. MME Pool Areas may overlap each other.

**Serving GW Service Area:** A Serving GW Service Area is defined as an area within which a UE may be served without need to change the Serving GW. A Serving GW Service Area is served by one or more Serving GWs in parallel. Serving GW Service Areas are a collection of complete Tracking Areas. Serving GW Service Areas may overlap each other.

**PDN Connection:** The association between a PDN represented by an APN and a UE, represented by one IPv4 address and/or one IPv6 prefix (for IP PDN Type) or by the UE Identity (for Non-IP and Ethernet PDN Types).

**Default Bearer:** The EPS bearer which is first established for a new PDN connection and remains established throughout the lifetime of the PDN connection.

**Default APN:** A Default APN is defined as the APN which is marked as default in the subscription data and used during the Attach procedure and the UE requested PDN connectivity procedure when no APN is provided by the UE.

**eCall Only Mode:** A UE configuration option that allows the UE to attach at EPS and register in IMS to perform only eCall Over IMS, and an IMS call to a non-emergency MSISDN or URI for test and/or terminal reconfiguration services. For a short period following either such call, an incoming call (e.g. callback from a PSAP or HPLMN operator) or other incoming session (e.g. for USIM reconfiguration) is possible. At other times when the UE is configured in this mode, the UE is required to refrain from any signaling to a network. Use of eCall Only Mode is configured in the USIM for the UE.

**PDN Connection to the SCEF:** The association between a UE, represented by the UE Identity, and a PDN represented by an APN to external packet data network via SCEF to allow transfer of Non-IP data. It includes establishment and persistence of T6 connection between MME and SCEF (see TS 29.128 [79]).

**Emergency attached UE:** A UE which only has bearer(s) related to emergency bearer service.

NOTE 1: The above term is equivalent to the term "attached for emergency bearer services" as specified in TS 24.301 [46].

**LIPA PDN connection:** a PDN Connection for local access (e.g. for IP or Ethernet access) for a UE connected to a HeNB.

**en-gNB:** As defined in TS 37.340 [85].

**SIPTO at local network PDN connection:** a PDN connection for SIPTO at local network for a UE connected to a (H)eNB.

**Correlation ID:** For a LIPA PDN connection, Correlation ID is a parameter that enables direct user plane path between the HeNB and L-GW.

**SIPTO Correlation ID:** For a SIPTO at local network PDN connection, SIPTO Correlation ID is a parameter that enables direct user plane path between the (H)eNB and L-GW when they are collocated.

**Local Home Network:** A set of (H)eNBs and L-GWs in the standalone GW architecture, where the (H)eNBs have IP connectivity for SIPTO at the Local Network via all the L-GWs.

**Local Home Network ID:** An identifier that uniquely identifies a Local Home Network within a PLMN.

**Presence Reporting Area:** An area defined within 3GPP Packet Domain for the purposes of reporting of UE presence within that area due to policy control and/or charging reasons. In the case of E-UTRAN, a Presence Reporting Area may consist in a set of neighbor or non-neighbor Tracking Areas, or eNBs and/or cells. There are two types of Presence Reporting Areas: "UE-dedicated Presence Reporting Areas" and "Core Network pre-configured Presence Reporting Areas" that apply to an MME pool.

**RAN user plane congestion:** RAN user plane congestion occurs when the demand for RAN resources exceeds the available RAN capacity to deliver the user data for a prolonged period of time.

NOTE 2: Short-duration traffic bursts is a normal condition at any traffic load level, and is not considered to be RAN user plane congestion. Likewise, a high-level of utilization of RAN resources (based on operator configuration) is considered a normal mode of operation and might not be RAN user plane congestion.

**IOPS-capable eNB:** an eNB that has the capability of IOPS mode operation, which provides local connectivity (e.g. for IP or Ethernet) and public safety services to IOPS-enabled UEs via a Local EPC when the eNB has lost backhaul to the Macro EPC or it has no backhaul to the Macro EPC.

**IOPS network:** an IOPS network consists of one or more eNBs operating in IOPS mode and connected to a Local EPC.

**Local EPC:** a Local EPC is an entity which provides functionality that eNBs in IOPS mode of operation use, instead of the Macro EPC, in order to support public safety services.

**Macro EPC:** the EPC which serves an eNB when it is not in IOPS mode of operation.

**Nomadic EPS:** a deployable system which has the capability to provide radio access (via deployable IOPS-capable eNB(s)), local connectivity (e.g. for IP or Ethernet) and public safety services to IOPS-enabled UEs in the absence of normal EPS

**Multi-USIM UE:** a UE with multiple USIMs, capable of maintaining a separate registered state with a PLMN for each USIM at least over 3GPP Access and supporting one or more of the enhancements described in clause 4.3.x.

**IOPS-enabled UE:** is an UE that is configured to use networks operating in IOPS mode.

**Cellular IoT:** Cellular network supporting low complexity and low throughput devices for a network of Things. Cellular IoT supports IP, Ethernet and Non-IP traffic.

**Narrowband-IoT:** a 3GPP Radio Access Technology that forms part of Cellular IoT. It allows access to network services via E-UTRA with a channel bandwidth limited to 180 kHz (corresponding to one PRB). Unless otherwise indicated in a clause, Narrowband-IoT is a subset of E-UTRAN.

**LTE-M:** a 3GPP RAT type Identifier used in the Core Network only, which is a sub-type E-UTRAN RAT type, and defined to identify in the Core Network the E-UTRAN when used by a UE indicating Category M in its UE radio capability.

**WB-E-UTRAN:** in the RAN, WB-E-UTRAN is the part of E-UTRAN that excludes NB-IoT. In the Core Network, the WB-E-UTRAN also excludes LTE-M.

**DCN-ID:** DCN identity identifies a specific dedicated core network (DCN).

For the purposes of the present document, the following terms and definitions given in TS 23.167 [81] apply:

**eCall Over IMS:** See TS 23.167 [81].

**RLOS attached UE:** A UE is attached only for accessing Restricted Local Operator Services (see TS 23.221 [27]).

**IAB-donor:** For the purposes of this specification, this is a NR Secondary RAN node is further described in TS 37.340 [85] that supports Integrated access and backhaul (IAB) feature and provides connection to the core network to IAB-nodes. It supports the CU function of the CU/DU architecture for IAB defined in TS 38.401 [90].

**IAB-node:** A relay node that supports wireless in-band and out-of-band relaying of NR access traffic via NR Uu backhaul links. It supports the UE function and the DU function of the CU/DU architecture for IAB defined in TS 38.401 [90].

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* NEXT CHANGES \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 4.3.x Support for Multi-USIM UE

#### 4.3.x.1 General

A network and a UE may support one or more of the following enhancements for Multi-USIM UE operation:

- Connection release with or without paging restrictions, as described in clause 4.3.x.2

- Paging indication for voice service, as described in clause 4.3.x.3

- Reject paging request, as described in clause 4.3.x.4

- IMSI Offset, as described in clause 4.3.x.5.

A Multi-USIM UE may include the Multi-USIM Mode Indication to the MME if it has more than one USIM active and intends to use Multi-USIM specific. Based on the received Multi-USIM Mode Indication from the UE, the MME shall indicate to the UE whether the above features are supported or not (based on network capability and local network policy configuration) by means of one or more of following indications: the Reject Paging Feature Supported, Leave Feature Supported, and IMSI offset Feature Supported . These indications are sent during the Attach procedure as specified in clause 5.3.2.1, and the Tracking Area Update procedure as specified in clause 5.3.3.

Editor's note: It is FFS if further capability exchange (e.g. voice indication) is needed.

#### 4.3.x.2 Connection release with or without paging restrictions

In order to mitigate the waste of resources in a network associated with a USIM (e.g. due to using services in a network associated with another USIM), a Multi-USIM UE may indicate to this network that it requests to release S1 connection.

The UE indicates to the network that it requests to release S1 connection, by initiating the Service Request procedure or Tracking Area Update procedure in case UE needs to perform track area update at the same time with this network, including a Leaving/Release indication. If supported by the UE, the UE may also provide, only together with the Leaving/Release indication, a Paging Restriction Information which requests the network to restrict paging. The Paging Restriction Information from UE is stored in the network. The Paging Restriction Information may indicate any of the following:

a) all paging is restricted, or

b) all paging is restricted, except paging for voice service (MMTel voice or CS domain voice), or

c) all paging is restricted, except for certain PDN Connection(s).

NOTE: The UE expects not to be paged for any purpose in case a). The UE expects to be paged only for voice service in case b). The UE expects to be paged only for certain PDN Connection(s) in case c).

The UE returns to the network by initiating the Service Request procedure or Tracking Area Update procedure in case UE needs to perform tracking area update at the same time with this network not including a Leaving/Release indication. The network removes any stored Paging Restriction Information.

NOTE: The UE expects to be paged normally upon removal of the paging restrictions.

#### 4.3.x.3 Paging indication for voice service

The UE and the network may support an indication of voice service (MMTel voice or CS domain voice) in the paging message. The MME determines the voice service based on the Paging Policy Indicator as specified in clause 4.9 for MMTel voice.

Editor's note: It is FFS if further parameter is needed for voice service determination.

#### 4.3.x.4 Reject paging request

The Multi-USIM UE may respond to a page in a network with an indication to this network that the UE determined not to accept the paging request and requests to release S1 connection, e.g. in case the Multi-USIM UE is engaged in an active communication with another network.

NOTE: This indication allows the paging network to reduce wasting network paging resources to this UE.

The Multi-USIM UE attempts to send a Service Request message to the paging network including the above indication as the response to the paging, unless it is unable to do so, e.g. due to UE implementation constraints. Together with the Reject Paging indication, the UE supporting Paging Restriciton Information may include Paging Restriction Information as specified in 4.3.x.2 in the Service Request message.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* END CHANGES \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*