**3GPP TSG-CT WG1 Meeting #132-eC1-21xxxx**

**E-meeting, 11-15 October 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | **3683** | **rev** | **1** | **Current version:** | **17.4.1** |  |
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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 |  | Core Network |  |

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| ***Title:*** | Triggering Service Request procedure due to lower layers request for ProSe layer-2 UE-to-network relay | | | | | | | | | |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, OPPO, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_ProSe | | | | |  | ***Date:*** | | | 2021-09-30 |
|  |  | | | |  | |  | | |  |
| ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | **As per stage-2 TS 23.304 clause 6.5.2.2:**  *4. If the 5G ProSe Layer-2 UE-to-Network Relay is in CM\_IDLE state, triggered by the request received from the 5G ProSe Layer-2 Remote UE, the 5G ProSe Layer-2 UE-to-Network Relay performs Service Request procedure in the clause 4.2.3.2 of TS 23.502 [5].*  **And as per the reply LS from RAN2 to SA2 (C1-215522/R2-2109127):**  ***Q6)*** *For Layer-2 UE-to-Network Relay, SA2 studied the trigger from Remote UE to UE-to-Network Relay in CM\_IDLE to perform Service Request (as described in step 4 of clause 6.5.2.2 of TS 23.304) and would like to know whether the trigger is from AS layer or not.*  ***[Answer]:***  *RAN2 agreed on the following in RAN2#113:*  *(…)*  *Based on the above, RAN2 understands that for relay UE in CM\_IDLE, a suitable timing for the trigger for service request is from AS layer, e.g. upon reception of a message on the default L2 configuration on PC5 as in above Step 2.*  The above statements confirm that when the UE acts as 5G ProSe layer-2 UE-to-network relay then it needs to perform a Service Request procedure to establish the connection with the network upon getting a request from lower layers (Access Stratum) as lower layers start to receive the messages from the Remote UE that needs to be relayed to the network.  This request from lower layers to perform Service Request is currently not captured as a possible trigger for the procedure, hence this needs to be added.  It is worth to note that, the current triggers for 5G ProSe are captured in TS 24.501 clause 5.6.1.1 as following:  n) the UE in 5GMM-IDLE mode over 3GPP access has to request resources for ProSe direct discovery over PC5 or ProSe direct communication over PC5 (see 3GPP TS 23.304 [6E]);  which covers only the requests from upper layers for ProSe Discovery and communication, but it doesn't cover the requests for Relaying from lower layers. | | | | | | | | |
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| ***Summary of change:*** | | Indicating that, the Service Request procedure can be triggered by a 5G ProSe layer-2 UE-to-network relay UE in IDLE mode due to a request lower layers. | | | | | | | | |
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| ***Consequences if not approved:*** | | No possibility to perform layer-2 relay due to no possibility for the 5G ProSe layer-2 relay UE to establish the connection with the network. | | | | | | | | |
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| ***Clauses affected:*** | | 5.6.1.1 | | | | | | | | |
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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:*** | |  | | | | | | | | |

\*\*\*\*\* First change \*\*\*\*\*

#### 5.6.1.1 General

The purpose of the service request procedure is to change the 5GMM mode from 5GMM-IDLE to 5GMM-CONNECTED mode. If the UE is not using 5GS services with control plane CIoT 5GS optimization, this procedure is used to request the establishment of user-plane resources for PDU sessions which are established without user-plane resources. In latter case, the 5GMM mode can be the 5GMM-IDLE mode or the 5GMM-CONNECTED mode if the UE requires to establish user-plane resources for PDU sessions. If the UE is using 5GS services with control plane CIoT 5GS optimization, this procedure can be used for UE initiated transfer of user data via the control plane from 5GMM-IDLE mode.

NOTE 1: The lower layer indicates when the user-plane resources for PDU sessions are successfully established or released.

This procedure is used when:

- the network has downlink signalling pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink signalling pending over non-3GPP access, the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has uplink signalling pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink user data pending over 3GPP access and the UE is in 5GMM-IDLE mode over 3GPP access;

- the network has downlink user data pending over non-3GPP access, the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has user data pending over 3GPP access and the UE is in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access;

- the UE has user data pending over non-3GPP access and the UE is in 5GMM-CONNECTED mode over non-3GPP access;

- the UE in 5GMM-IDLE mode over non-3GPP access, receives an indication from the lower layers of non-3GPP access, that the access stratum connection is established between UE and network, if T3346 is not running;

- the UE in 5GMM-IDLE or 5GMM-CONNECTED mode over 3GPP access receives a request from the upper layers to perform emergency services fallback and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9];

- the UE has to request resources for V2X communication over PC5;

- the UE has to request resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5;

- the UE that is MUSIM capable and in 5GMM-IDLE mode requests the network to remove the paging restriction; or

- the UE supporting MUSIM requests the release of the NAS signalling connection or rejects the paging request from the network.

This procedure shall not be used for initiating user data transfer or PDU session management related signalling other than for performing UE-requested PDU session release procedure related to a PDU session for LADN when the UE is located outside the LADN service area.

In NB-N1 mode, this procedure shall not be used to request the establishment of user-plane resources:

a) for a number of PDU sessions that exceeds the UE' s maximum number of supported user-plane resources if there is currently:

1) no user-plane resources established for the UE;

2) user-plane resources established for:

i) one PDU session and the Multiple user-plane resources support bit was set to "Multiple user-plane resources not supported" in the 5GMM capability IE; or

ii) two PDU sessions and the Multiple user-plane resources support bit was set to "Multiple user-plane resources supported" in the 5GMM capability IE; or

b) for additional PDU sessions, if the number of PDU sessions for which user-plane resources are currently established is equal to the UE's maximum number of supported user-plane resources.

The service request procedure is initiated by the UE, however, it can be triggered by the network by means of:

- the paging procedure (see subclause 5.6.2) for the transfer of downlink signalling or user data pending over 3GPP access to a UE in 5GMM-IDLE mode over 3GPP access;

- the paging procedure (see subclause 5.6.2) for the transfer of downlink signalling or user data pending over non-3GPP access to a UE in 5GMM-IDLE mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access;

- the notification procedure (see subclause 5.6.3) for the transfer of downlink signalling or user data pending over non-3GPP access to a UE in 5GMM-CONNECTED mode over 3GPP access and in 5GMM-IDLE mode over non-3GPP access; or

- the notification procedure (see subclause 5.6.3) for the transfer of downlink signalling or user data pending over 3GPP access to a UE in 5GMM-IDLE mode over 3GPP access and in 5GMM-CONNECTED mode over non-3GPP access.

NOTE 2: In case the UE is in 5GMM-IDLE mode over 3GPP access and in 5GMM-CONNECTED mode over non-3GPP access and downlink signalling or user data pending over 3GPP access needs to be transferred, the AMF can trigger either the notification procedure or the paging procedure based on implementation.

The UE shall invoke the service request procedure when:

a) the UE, in 5GMM-IDLE mode over 3GPP access, receives a paging request from the network;

NOTE 3: As an implementation option, the MUSIM capable UE is allowed to not invoke service request to respond to paging based on the information available in the paging message, e.g. voice service indication.

b) the UE, in 5GMM-CONNECTED mode over 3GPP access, receives a notification from the network with access type indicating non-3GPP access;

c) the UE, in 5GMM-IDLE mode over 3GPP access, has uplink signalling pending (except in case i);

d) the UE, in 5GMM-IDLE mode over 3GPP access, has uplink user data pending (except in case j);

e) the UE, in 5GMM-CONNECTED mode or in 5GMM-CONNECTED mode with RRC inactive indication, has user data pending due to no user-plane resources established for PDU session(s) used for user data transport;

f) the UE in 5GMM-IDLE mode over non-3GPP access, with T3346 not active or upon expiry of T3346, receives or has already received an indication from the lower layers of non-3GPP access, that the access stratum connection is established between UE and network;

g) the UE, in 5GMM-IDLE mode over 3GPP access, receives a notification from the network with access type indicating 3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access;

h) the UE, in 5GMM-IDLE, 5GMM-CONNECTED mode over 3GPP access, or 5GMM-CONNECTED mode with RRC inactive indication, receives a request from the upper layers to perform emergency services fallback and performs emergency services fallback as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9];

i) the UE, in 5GMM-CONNECTED mode over 3GPP access or in 5GMM-CONNECTED mode with RRC inactive indication, receives a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) and the UE has a pending NAS procedure other than a registration, service request, or de-registration procedure;

j) the UE, in 5GMM-CONNECTED mode over 3GPP access or in 5GMM-CONNECTED mode with RRC inactive indication, receives a fallback indication from the lower layers (see subclauses 5.3.1.2 and 5.3.1.4) and the UE has pending uplink user data for PDU session(s) with user-plane resources already established but no pending NAS procedure;

k) the UE, in 5GMM-CONNECTED mode and has a NAS signalling connection only, is using 5GS services with control plane CIoT 5GS optimization and has pending user data to be sent via user-plane resources;

l) the UE in 5GMM-IDLE mode over 3GPP access has to request resources for V2X communication over PC5 (see 3GPP TS 23.287 [6C]);

m) the UE that is MUSIM capable and in 5GMM-IDLE mode is requesting the network to remove the paging restriction;

n) the UE in 5GMM-IDLE mode over 3GPP access

- has to request resources for 5G ProSe direct discovery over PC5 or 5G ProSe direct communication over PC5 (see 3GPP TS 23.304 [6E]); or

- acts as 5G ProSe layer-2 UE-to-network relay UE and receives a trigger from lower layers to establish the NAS signalling connection (see 3GPP TS 23.304 [6E]);

o) the UE supports MUSIM,

- is in 5GMM-CONNECTED mode; or

- is in 5GMM-CONNECTED mode with RRC inactive indication, rejects the RAN paging; and requests the network to release the NAS signalling connection and optionally includes paging restrictions; or

Editor's note: Whether UE invokes the service request procedure for case of rejecting RAN paging in 5GMM-CONNECTED mode with RRC inactive indication is subject to RAN2 feedback on NAS-AS interaction.

p) the UE supports MUSIM, in 5GMM-IDLE mode when responding to paging rejects the paging request from the network, requests the network to release the NAS signalling connection and optionally includes paging restrictions.

If one of the above criteria to invoke the service request procedure is fulfilled, then the service request procedure shall only be initiated by the UE when the following conditions are fulfilled:

- its 5GS update status is 5U1 UPDATED, and the TAI of the current serving cell is included in the TAI list; and

- no 5GMM specific procedure is ongoing.

The UE shall not invoke the service request procedure when the UE is in the state 5GMM-SERVICE-REQUEST-INITIATED.

The UE that is MUSIM capable shall not initiate service request procedure for requesting the network to release the N1 NAS signalling connection if the UE is registered for emergency services or if the UE has an emergency PDU session established.



Figure 5.6.1.1.1: Service Request procedure (Part 1)



Figure 5.6.1.1.2: Service Request procedure (Part 2)

A service request attempt counter is used to limit the number of service request attempts and no response from the network. The service request attempt counter shall be incremented as specified in subclause 5.6.1.7.

The service request attempt counter shall be reset when:

- a registration procedure for mobility and periodic registration update is successfully completed;

- a service request procedure is successfully completed;

- a service request procedure is rejected as specified in subclause 5.6.1.5 or subclause 5.3.20; or

- the UE moves to 5GMM-DEREGISTERED state.

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