**3GPP TSG-CT WG1 Meeting #124-eC1-203808**

**Electronic meeting, 2-10 June 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **24.501** | **CR** | **2376** | **rev** | **1** | **Current version:** | **16.4.1** |  |
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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 | **x** |

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| ***Title:***  | PDU session transfer between 3GPP and non-3GPP when CP CIoT 5GS optimization is being used |
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| ***Source to WG:*** | Samsung |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5G\_CIoT |  | ***Date:*** | 2020-05-26 |
|  |  |  |  |  |
| ***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:*** | The UE can transfer sessions between 3GPP and non-3GPP access.However, the transfer of such sessions should consider if the UE is using CIoT 5GS optimization.For example, when UP CIoT 5GS optimization is being used, a session may be transferred to the non-3GPP access and can continue as a normal N3 data transfer session without optimizations in the lower layers which are anyways not supported.On the other hand, when CP CIoT 5GS optimization with CP-only connection is being used, such a session cannot be transferred to non-3GPP since CP optimization is not supported over non-3GPP access (i.e. both CPSR and UL NAS TRANSPORT with CIoT user data cannot be sent over non-3GPP).The current specification has not considered the case of CP CIoT optimization with CP-only connections. This document addresses this scenario which should be prohibited. |
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| ***Summary of change:*** | Add text to:1. Specify restrictions wrt tranfer of PDU sessions between 3GPP and non-3GPP access when CP CIoT optimization is being used
2. Specify the use case when AMF needs to avoid sending of NOTIFICATION message over 3GPP access to transfer PDU sessions from non-3GPP access when CP CIoT optimizations are being used.
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| ***Consequences if not approved:*** | Wrong attempts to transfer PDU sessions between 3GPP and non-3GPP access leading to abnormal behaviour. |
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| ***Clauses affected:*** | 5.4.5.2.5, 5.6.3.1, 6.4.1.1 |
|  |  |
|  | **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:*** |  |

\*\*\*\*\* Begin change \*\*\*\*\*

##### 5.4.5.2.5 Abnormal cases on the network side

The following abnormal cases in AMF are identified:

a) if the Payload container type IE is set to "N1 SM information" and:

1) if the Old PDU session ID IE is not included in the UL NAS TRANSPORT message, the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request"or "MA PDU request", and the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

2) if the Old PDU session ID IE is included in the UL NAS TRANSPORT message, the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request", the AMF received a reallocation requested indication from the SMF indicating that the SMF is to be reallocated, and the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f);

3) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "existing PDU session"or "MA PDU request", and the user's subscription context obtained from the UDM does not contain an SMF ID for the PDU session ID matching the PDU session ID received from the UE or for the DNN matching the DNN received from the UE such that the SMF ID includes a PLMN identity corresponding to the UE's HPLMN or the current PLMN, then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

4) if the Old PDU session ID IE is included in the UL NAS TRANSPORT message, and the AMF has a PDU session routing context for the old PDU session ID and the UE and does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request" and the AMF has not received a reallocation requested indication, the AMF should select an SMF with following handlings:

 If the S-NSSAI IE is not included and the user's subscription context obtained from UDM:

i) contains one default S-NSSAI, the AMF shall use the default S-NSSAI as the S-NSSAI;

ii) contains two or more default S-NSSAIs, the AMF shall use one of the default S-NSSAIs selected by operator policy as the S-NSSAI; and

iii) does not contain a default S-NSSAI, the AMF shall use an S-NSSAI selected based on operator policy as the S-NSSAI.

Editor's note [eNS; CR# 1996]: It is FFS how the AMF selects an S-NSSAI for the PDU session if {none of the subscribed S-NSSAIs marked as default is included in the allowed NSSAI} or {all subscribed S-NSSAIs marked as default are subject to NSSAA and no NSSAA for these S-NSSAIs is completed as a success}.

 If the DNN IE is not included, and the user's subscription context obtained from UDM:

i) contains the default DNN for the S-NSSAI, the AMF shall use the default DNN as the DNN; and

ii) does not contain the default DNN for the S-NSSAI, the AMF shall use a locally configured DNN as the DNN; and

 If the DNN selected by the network is a LADN DNN, the AMF shall determine the UE presence in LADN service area.

 If the SMF selection is successful, the AMF should store a PDU session routing context for the PDU session ID and the UE, set the SMF ID in the stored PDU session routing context to the selected SMF ID, and forward the 5GSM message, the PDU session ID, the old PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN determined by the AMF, DNN selected by the network (if different from DNN determined by the AMF), the request type and UE presence in LADN service area (if DNN selected by the network corresponds to an LADN DNN) towards the SMF ID of the PDU session routing context.

 If the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

5) if the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is an emergency PDU session, the Request type IE is set to "initial emergency request", the AMF should forward the 5GSM message, the PDU session ID, the S-NSSAI (if configured in the AMF emergency configuration data), the DNN (if configured in the AMF emergency configuration data) and the request type towards the SMF ID of the PDU session routing context.

6) if the Request type IE is set to "initial emergency request" and the S-NSSAI or the DNN is received, the AMF ignores the received S-NSSAI or the DNN and uses the emergency DNN from the AMF emergency configuration data, if any.

7) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, and the Request type IE of the UL NAS TRANSPORT message is either not provided or is provided but set to other value then "initial request", "existing PDU session", "initial emergency request", "existing emergency PDU session" and "MA PDU request", then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

8) if the AMF unsuccessfully attempted to forward the 5GSM message, the PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN and the request type (if received) towards a SMF ID, then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

9) the Old PDU session ID IE is included in the UL NAS TRANSPORT message, the AMF does not have a PDU session routing context for the old PDU session ID and the UE, the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request", the AMF should select an SMF with following handlings

 If the S-NSSAI IE is not included and the user's subscription context obtained from UDM:

i) contains one default S-NSSAI, the AMF shall use the default S-NSSAI as the S-NSSAI;

ii) contains two or more default S-NSSAIs, the AMF shall use one of the default S-NSSAIs selected by operator policy as the S-NSSAI; and

iii) does not contain a default S-NSSAI, the AMF shall use an S-NSSAI selected based on operator policy as the S-NSSAI.

Editor's note [eNS; CR# 1996]: It is FFS how the AMF selects an S-NSSAI for the PDU session if {none of the subscribed S-NSSAIs marked as default is included in the allowed NSSAI} or {all subscribed S-NSSAIs marked as default are subject to NSSAA and no NSSAA for these S-NSSAIs is completed as a success}.

 If the DNN IE is not included, and the user's subscription context obtained from UDM:

i) contains the default DNN for the S-NSSAI, the AMF shall use the default DNN as the DNN; and

ii) does not contain the default DNN for the S-NSSAI, the AMF shall use a locally configured DNN as the DNN; and

 If the DNN selected by the network is a LADN DNN, the AMF shall determine the UE presence in LADN service area.

 If the SMF selection is successful, the AMF should store a PDU session routing context for the PDU session ID and the UE, set the SMF ID in the stored PDU session routing context to the selected SMF ID, and forward the 5GSM message, the PDU session ID, the old PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN determined by the AMF, DNN selected by the network (if different from DNN determined by the AMF), the request type and UE presence in LADN service area (if DNN selected by the network corresponds to an LADN DNN) towards the SMF ID of the PDU session routing context.

 If the SMF selection fails, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

10) if the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is not an emergency PDU session, and the Request type IE is included and is set to "existing emergency PDU session", the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

11) if the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is an emergency PDU session, and the Request type IE is included and is set to "existing PDU session", the AMF may forward the 5GSM message, the PDU session ID, the S-NSSAI (if configured in the AMF emergency configuration data), the DNN (if configured in the AMF emergency configuration data), and the request type towards the SMF identified by the SMF ID of the PDU session routing context.

12) if the AMF has a PDU session routing context for the PDU session ID and the UE, the Request type IE is set to "initial request", then the AMF shall perform a local release of the PDU session identified by the PDU session ID and shall request the SMF to perform a local release of the PDU session, and proceed as specified in subclause 5.4.5.2.3.

13) if the Request type IE is set to "initial request" and the S-NSSAI IE contains an S-NSSAI that is not allowed by the network, then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

14) if the Request type IE is set to "existing PDU session", the AMF has a PDU session routing context for the PDU session ID and the UE, the PDU session routing context indicates that the PDU session is not an emergency PDU session, and the S-NSSAI associated with the PDU session identified by the PDU session ID is not allowed for the target access type, the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

15) if the Request type IE is set to "initial request", "existing PDU session", "modification request" or "MA PDU request", the UE is not configured for high priority access in selected PLMN, and the UE is in non-allowed area or is not in allowed area, the AMF shall send back to the UE the 5GSM message which was not forwarded, and 5GMM cause #28 "Restricted service area" as specified in subclause 5.4.5.3.1 case i).

16) if the Request type IE is set to "initial request" or "MA PDU request", the AMF is pending the receipt of a REGISTRATION REQUEST message indicating "mobility registration updating" in the 5GS registration type IE, and an emergency PDU session exists for the UE (see subclause 5.4.4.3), the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

17) if the timer T3447 is running and the UE supports service gap control:

i) the UE is not configured for high priority access in selected PLMN;

ii) the current NAS signalling connection was not triggered by paging; and

iii) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection,

 then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

18) if the AMF has a PDU session routing context for the PDU session ID and the UE, the Request type IE is not included, the UE is not configured for high priority access in selected PLMN, and the PDU session is not an emergency PDU session, then the AMF shall forward the 5GSM message, and the PDU session ID IE towards the SMF identified by the SMF ID of the PDU session routing context with:

i) an exemptionInd attribute indicating "message was exempted from the DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A], if DNN based congestion control is activated for the selected DNN;

ii) an exemptionInd attribute indicating "message was exempted from the S-NSSAI and DNN based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A], if S-NSSAI and DNN based congestion control is activated for the selected S-NSSAI and the selected DNN; or

iii) an exemptionInd attribute indicating "message was exempted from the S-NSSAI only based congestion activated in the AMF" as specified in 3GPP TS 29.502 [20A], if S-NSSAI only based congestion control is activated for the selected S-NSSAI.

19) if the Request type IE is set to "MA PDU request" and the S-NSSAI IE contains an S-NSSAI that is not allowed by the network on neither access, then the AMF shall send to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

20) if the Request type IE is set to "initial request" and the UE is registered for emergency services over the current access, then the AMF may send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e) or case f).

21) if the Request type IE is set to "existing PDU session", the UE is attempting to transfer a PDU session from 3GPP access to non-3GPP access, and the PDU session is associated with control plane only indication then the AMF shall send back to the UE the 5GSM message which was not forwarded as specified in subclause 5.4.5.3.1 case e).

b) If the Payload container type IE is set to "SMS" and the AMF does not have an SMSF address associated with the UE or the AMF cannot forward the content of the Payload container IE to the SMSF associated with the SMSF address available in the AMF, the AMF shall abort the procedure.

c) If the Payload container type IE is set to "LTE Positioning Protocol (LPP) message container" and if the Additional information IE is not included in the UL NAS TRANSPORT message or the AMF cannot forward the content of the Payload container IE to the LMF associated with the routing information included in the Additional information IE, the AMF shall abort the procedure.

d) If the Payload container type IE is set to "UE policy container" and the AMF does not have a PCF address associated with the UE or the AMF cannot forward the content of the Payload container IE to the PCF associated with the PCF address available in the AMF, the AMF shall abort the procedure.

e) If the Payload container type IE is set to "Location services message container" and if the Additional information IE is included in the UL NAS TRANSPORT message and the AMF cannot forward the content of the Payload container IE to an LMF associated with the routing information included in the Additional information IE, the AMF shall abort the procedure.

f) If the Payload container type IE is set to "SMS" or "LTE Positioning Protocol (LPP) message container":

1) the timer T3447 is running and the UE supports service gap control;

2) the UE is not configured for high priority access in selected PLMN;

3) the current NAS signalling connection was not triggered by paging; and

4) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment ofthe UE in 5GMM-CONNECTED mode receives mobile terminated signaling or downlink data over the user-plane the current NAS signalling connection,

 the AMF shall abort the procedure.

NOTE: In this state the N1 NAS signalling connection can be released by the network.

g) If the Payload container type IE is set to "CIoT user data container" and:

1) if the AMF does not have a PDU session routing context for the PDU session ID and the UE; or

2) if the AMF unsuccessfully attempted to forward the user data conatiner and the PDU session ID,

 then the AMF may send back to the UE the CIoT user data container which was not forwarded as specified in subclause 5.4.5.3.1 case l1).

h) If the Payload container type IE is set to "CIoT user data container":

1) if the timer T3447 is running and the UE supports service gap control;

2) the UE is not configured for high priority access in selected PLMN;

3) the current N1 NAS signalling connection was not triggered by paging; and

4) mobile terminated signalling has not been sent or no user-plane resources have been established for any PDU session after the establishment of the current NAS signalling connection,

 then the AMF shall send back to the UE the CIoT user data container which was not forwarded as specified in subclause 5.4.5.3.1 case l1).

\*\*\*\*\* Next change \*\*\*\*\*

#### 5.6.3.1 General

The notification procedure is used by the network:

a) to request the UE, by sending the NOTIFICATION message over 3GPP access, to re-establish the user-plane resources of PDU session(s) associated with non-3GPP access over 3GPP access or to deliver 5GSM downlink signalling messages associated with non-3GPP access over 3GPP access when the UE is in 5GMM-IDLE mode over non-3GPP access and in 5GMM-CONNECTED mode over 3GPP access; or

b) to request the UE, by sending the NOTIFICATION message over non-3GPP access, to re-establish user-plane resources of the PDU session(s) or to deliver downlink signalling associated with 3GPP access over 3GPP access when the UE is in 5GMM-CONNECTED mode over non-3GPP access and in 5GMM-IDLE mode over 3GPP access when the UE is not in MICO mode.

The network shall not use the NOTIFICATION message to re-establish user-plane resources of PDU session(s) associated with non-3GPP access over 3GPP access if for every PDU session of the UE that is established over the 3GPP access the PDU session is associated with control plane only indication.

\*\*\*\*\* Next change \*\*\*\*\*

#### 6.4.1.1 General

The purpose of the UE-requested PDU session establishment procedure is to establish a new PDU session with a DN, to perform handover of an existing PDU session between 3GPP access and non-3GPP access, to transfer an existing PDN connection in the EPS to the 5GS, to transfer an existing PDN connection in an untrusted non-3GPP access connected to the EPC to the 5GS, or to establish an MA PDU session to support ATSSS (see 3GPP TS 24.193 [13B]). If accepted by the network, the PDU session enables exchange of PDUs between the UE and the DN.

The UE shall not request a PDU session establishment:

a) for an LADN when the UE is located outside the LADN service area;

b) to transfer a PDU session from non-3GPP access to 3GPP access when the 3GPP PS data off UE status is "activated" and the UE is not using the PDU session to send uplink IP packets for any of the 3GPP PS data off exempt services (see subclause 6.2.10);

c) when the UE is in NB-N1 mode, the UE has indicated preference for user plane CIoT 5GS optimization, the network has accepted the use of user plane CIoT 5GS optimization for the UE, and the UE currently has user-plane resources established for two other PDU sessions; or

x) to transfer a PDU session from 3GPP access to non-3GPP access when the UE has indicated preference for control plane CIoT 5GS optimization, the network has accepted the use of control plane CIoT 5GS optimization for the UE, and the Control plane only indication IE was received in the PDU SESSION ESTABLISHMENT ACCEPT message.