**3GPP TSG-CT WG1 Meeting #128-eC1-21xxxx**

**Electronic meeting, 25 February – 5 March 2021**

|  |
| --- |
| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **24.501** | **CR** | **3031** | **rev** | **1** | **Current version:** | **17.1.0** |  |
|  |
| *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)*.* |
|  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |
| --- |
|  |
| ***Title:***  | Handling of 5GMM cause #91 |
|  |  |
| ***Source to WG:*** | MediaTek Inc. |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5GProtoc17 |  | ***Date:*** | 2021-03-04 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)* |
|  |  |
| ***Reason for change:*** | The 5GMM cause #91 "DNN not supported or not subscribed in the slice" is sent to the UE if the 5GSM message could not be forwarded since SMF selection fails because 1) the DNN is not supported in the slice; or 2) neither the DNN provided by the UE nor the wildcard DNN are in the subscribed DNN list of the UE for the slice.In principle 5GMM cause #91 is similar to 5GSM cause #70 "missing or unknown DNN in a slice", however the UE handlings are totally different:* For 5GMM cause #91, the UE is not allowed to retry the same request until the UE is switched off, USIM is removed… etc.
* For 5GSM cause #70, the UE follows the back-off timer and re-attempt indicator.

It is proposed to align the UE handling for 5GMM cause #91 with 5GSM cause #70. |
|  |  |
| ***Summary of change:*** | * The UE handling for 5GMM cause #91 is aligned with the UE handling for 5GSM cause #70 except that if the back-off timer is not provided by the network, the UE use deactivaed timer value by default to avoid backward incompatible issue (i.e., when a Rel-17 UE stays in a Rel-16 network, the network cannot forbid the UE from retrying the same procedure which cause 5GMM #91 error).
* The network is able to include a back-off timer IE when the 5GMM cause IE is set to 5GMM cause #91
	+ If the error is permanent, the timer value can be set to deactivated
	+ If the error is temporary, the timer value can be not provided or set to not deactivated
 |
|  |  |
| ***Consequences if not approved:*** | The retry condition for 5GMM cause #91 is unnecessarily strict which may impact user experience. |
|  |  |
| ***Clauses affected:*** | 5.4.5.3.2, 5.4.5.3.3, 6.4.1.4.3, 8.2.11.5 |
|  |  |
|  | **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:*** |  |

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

##### 5.4.5.3.2 Network-initiated NAS transport procedure initiation

In 5GMM-CONNECTED mode, the AMF initiates the NAS transport procedure by sending the DL NAS TRANSPORT message, as shown in figure 5.4.5.3.2.1.

In case a) in subclause 5.4.5.3.1, i.e. upon reception from an SMF of a 5GSM message without an N1 SM delivery skip allowed indication for a UE or a 5GSM message with an N1 SM delivery skip allowed indication for a UE in the 5GMM-CONNECTED mode, the AMF shall:

a) include the PDU session information (PDU session ID) in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information"; and

c) set the Payload container IE to the 5GSM message.

In case b) in subclause 5.4.5.3.1, i.e. upon reception from an SMSF of an SMS payload, the AMF shall:

a) set the Payload container type IE to "SMS";

b) set the Payload container IE to the SMS payload; and

c) select the access type to deliver the DL NAS TRANSPORT message as follows in case the access type selection is required:

1) if the UE to receive the DL NAS TRANSPORT message is registered to the network via both 3GPP access and non-3GPP access, the 5GMM context of the UE indicates that SMS over NAS is allowed, the UE is in MICO mode, and the UE is in 5GMM-IDLE mode for 3GPP access and in 5GMM-CONNECTED mode for non-3GPP access, then the AMF selects non-3GPP access. Otherwise, the AMF selects either 3GPP access or non-3GPP access.

 If the delivery of the DL NAS TRANSPORT message over 3GPP access has failed, the AMF may re-send the DL NAS TRANSPORT message over the non-3GPP access.

 If the delivery of the DL NAS TRANSPORT message over non-3GPP access has failed, the AMF may re-send the DL NAS TRANSPORT message over the 3GPP access; and

2) otherwise, the AMF selects 3GPP access.

NOTE 1: The AMF selects an access type between 3GPP access and non-3GPP access based on operator policy.

In case c) in subclause 5.4.5.3.1 i.e. upon reception from an LMF of an LPP message payload, the AMF shall:

a) set the Payload container type IE to "LTE Positioning Protocol (LPP) message container";

b) set the Payload container IE to the LPP message payload received from the LMF;

c) set the Additional information IE to an LCS correlation identifier received from the LMF from which the LPP message was received.

NOTE 2: The LCS Correlation Identifier is assigned originally by the AMF except for LPP message transfer associated with event reporting for periodic or triggered location as described in subclause 6.3.1 of 3GPP TS 23.273 [6B], where the LMF assigns the correlation identifier. AMF and LMF assigned correlation identifiers can be distinguished by an implementation specific convention (e.g. use of a different number of octets) to enable an AMF to distinguish one from the other when received in the Additional Information IE in an UL NAS Transport message.

In case d) in subclause 5.4.5.3.1 i.e. upon reception of a steering of roaming information (see 3GPP TS 23.122 [5]) from the UDM to be forwarded to the UE, the AMF shall:

a) set the Payload container type IE to "SOR transparent container"; and

b) set the Payload container IE to the steering of roaming information (see 3GPP TS 23.122 [5]) received from the UDM.

In case e) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded due to routing failure, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded" or 5GMM cause #91 "DNN not supported or not subscribed in the slice".

 The AMF sets the 5GMM cause IE to the 5GMM cause #91 "DNN not supported or not subscribed in the slice", if the 5GSM message could not be forwarded since SMF selection fails because:

1) the DNN is not supported in the slice identified by the S-NSSAI used by the AMF; or

2) neither the DNN provided by the UE nor the wildcard DNN are in the subscribed DNN list of the UE for the S-NSSAI used by the AMF.

 Otherwise, the AMF sets the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded"; and

e) optionally include the Back-off timer value IE if the 5GMM cause IE is set to 5GMM cause #91 "DNN not supported or not subscribed in the slice".

In case f) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded due to congestion control, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #22 "Congestion", the 5GMM cause #67 "insufficient resources for specific slice and DNN" or the 5GMM cause #69 "insufficient resources for specific slice"; and

e) include the Back-off timer value IE.

In case g) in subclause 5.4.5.3.1, i.e. upon reception of a UE policy container from the PCF to be forwarded to the UE, the AMF shall:

a) set the Payload container type IE to "UE policy container"; and

b) set the Payload container IE to the UE policy container received from the PCF.

In case h) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded, because the PLMN's maximum number of PDU sessions has been reached, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #65 "maximum number of PDU sessions reached".

In case h1) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded, because the maximum number of PDU sessions with active user-plane resources has been reached, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #92 "insufficient user-plane resources for the PDU session".

In case h2) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded because the UE requested to establish a PDU session associated with an S-NSSAI for which:

a) the AMF is performing NSSAA and determined to reject the request based on local policy; or

b) the network slice-specific authentication and authorization has failed or the authorization has been revoked;

the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded".

In case i) in subclause 5.4.5.3.1, i.e. upon sending a single uplink 5GSM message which was not forwarded due to service area restrictions, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "N1 SM information";

c) set the Payload container IE to the 5GSM message which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #28 "Restricted service area".

In case j) in subclause 5.4.5.3.1 i.e. upon reception of UE parameters update data (see 3GPP TS 23.502 [9]) from the UDM to be forwarded to the UE, the AMF shall:

a) set the Payload container type IE to "UE parameters update transparent container"; and

b) set the contents of the Payload container IE to the UE parameters update data (see 3GPP TS 23.502 [9]) received from the UDM.

For case k) in subclause 5.4.5.3.1 upon reception from a location services application of a Location services message payload, the AMF shall:

a) set the Payload container type IE to "Location services message container"; and

b) set the Payload container IE to the Location services message payload.

For case k) in subclause 5.4.5.3.1 upon reception from an LMF of a Location services message payload, the AMF shall:

a) set the Payload container type IE to "Location services message container";

b) set the Payload container IE to the Location services message payload; and

c) set the Additional information IE to routing information associated with the LMF from which the Location services message payload was received.

NOTE 3: Case k) in subclause 5.4.5.3.1 supports transport of a Location services message container between a UE and an AMF and between a UE and an LMF. For transport between a UE and an LMF, the Additional information IE is included and provides routing information for the LMF. For transport between a UE and an AMF, the Additional information IE is not included.

In case l) in subclause 5.4.5.3.1, i.e. upon reception from an SMF of a user data container payload, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to "CIoT user data container"; and

c) set the Payload container IE to the user data container.

For case l1) in subclause 5.4.5.3.1, i.e. upon sending a single uplink CIoT user data container or control plane user data which was not forwarded due to routing failure, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to " CIoT user data container";

c) set the Payload container IE to the CIoT user data container or control plane user data which was not forwarded; and

d) set the 5GMM cause IE to the 5GMM cause #90 "payload was not forwarded".

NOTE 4: For case l1) in subclause 5.4.5.3.1, this is also applied for a single uplink CIoT user data container or control plane user data in the CONTRON PLANE SERVICE REQUEST message which was not forwarded due to routing failure.

For case l2) in subclause 5.4.5.3.1, i.e. upon sending a single uplink CIoT user data container which was not forwarded due to congestion control, the AMF shall:

a) include the PDU session ID in the PDU session ID IE;

b) set the Payload container type IE to " CIoT user data container";

c) set the Payload container IE to the CIoT user data container which was not forwarded;

d) set the 5GMM cause IE to the 5GMM cause #22 "Congestion" and include the Back-off timer value IE.

In case m) in subclause 5.4.5.3.1, the AMF shall:

a) set the Payload container type IE to "Multiple payloads";

b) set each payload container entry of the Payload container IE (see subclause 9.11.3.39) as follows:

i) set the payload container type field of the payload container entry to a payload container type value set in the Payload container type IE as specified for cases a) to l2) above;

ii) set the payload container entry contents field of the payload container entry to the payload container contents set in the Payload container IE as specified for cases a) to l2) above;

iii) set the optional IE fields, if any, to the optional associated information as specified for cases a) to l2) above.



Figure 5.4.5.3.2.1: Network-initiated NAS transport procedure

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

##### 5.4.5.3.3 Network-initiated NAS transport of messages

Upon reception of a DL NAS TRANSPORT message, the UE shall stop the timer T3346 if running.

Upon reception of a DL NAS TRANSPORT message, if the Payload container type IE is set to:

a) "N1 SM information" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message, the 5GSM message in the Payload container IE and the PDU session ID are handled in the 5GSM procedures specified in clause 6;

b) "SMS", the UE shall forward the content of the Payload container IE to the SMS stack entity;

c) "LTE Positioning Protocol (LPP) message container", the UE shall forward the payload container type, the content of the Payload container IE and the routing information included in the Additional information IE to the upper layer location services application;

d) "SOR transparent container" and if the Payload container IE:

1) successfully passes the integrity check (see 3GPP TS 33.501 [24]), the ME shall store the received SOR counter as specified in annex C and proceed as follows: If the Payload container IE indicates a list of preferred PLMN/access technology combinations is provided and the list type indicates:

i) "PLMN ID and access technology list", then the ME shall replace the highest priority entries in the "Operator Controlled PLMN Selector with Access Technology" list stored in the ME; or

ii) "secured packet", then the ME shall behave as if a SMS is received with protocol identifier set to SIM data download, data coding scheme set to class 2 message and SMS payload as secured packet contents of SOR transparent container IE. The SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A]

 If the ACK bit of the SOR header for SOR data type in the SOR transparent container is set to "acknowledgement requested", the ME shall send an acknowledgement in the Payload container IE of an UL NAS TRANSPORT message with Payload type IE set to "SOR transparent container" as specified in subclause 5.4.5.2.2.

 The UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C; or

2) does not successfully pass the integrity check (see 3GPP TS 33.501 [24]) then the UE shall proceed with the behaviour as specified in 3GPP TS 23.122 [5] annex C.

e) Void;

f) Void;

g) "N1 SM information" and:

1) the 5GMM cause IE is set to the 5GMM cause #22 "Congestion", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to DNN based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

2) the 5GMM cause IE is set to the 5GMM cause #28 "Restricted service area", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to service area restrictions along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, enters the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE and, if the DL NAS TRANSPORT message is received over 3GPP access, performs the registration procedure for mobility and periodic registration update (see subclauses 5.3.5 and 5.5.1.3);

3) the 5GMM cause IE is set to the 5GMM cause #65 "maximum number of PDU sessions reached", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the PLMN's maximum number of PDU sessions has been reached, along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message;

4) the 5GMM cause IE is set to the 5GMM cause #67 "insufficient resources for specific slice and DNN", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI and DNN based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

5) the 5GMM cause IE is set to the 5GMM cause #69 "insufficient resources for specific slice", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to S-NSSAI only based congestion control along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE;

6) the 5GMM cause IE is set to the 5GMM cause #90 "payload was not forwarded", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to routing failure along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message;

7) the 5GMM cause IE is set to the 5GMM cause #91 "DNN not supported or not subscribed in the slice", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded because the DNN is not supported or not subscribed in a slice along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE, if any;

8) the 5GMM cause IE is set to the 5GMM cause #92 "insufficient user-plane resources for the PDU session", the UE passes to the 5GSM sublayer an indication that the 5GSM message was not forwarded due to insufficient user-plane resources along with the 5GSM message from the Payload container IE of the DL NAS TRANSPORT message.

h) "UE policy container", the UE policy container in the Payload container IE is handled in the UE policy delivery procedures specified in Annex D;

i) "UE parameters update transparent container" and if the Payload container IE

1) successfully passes the integrity check (see 3GPP TS 33.501 [24]), the ME shall store the received UE parameter update counter as specified in annex C and proceed as follows:

i) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data",

A) the ME shall behave as if an SMS is received with protocol identifier set to SIM data download, data coding scheme set to class 2 message and SMS payload as secured packet contents of UE parameters update transparent container IE. The SMS payload is forwarded to UICC as specified in 3GPP TS 23.040 [4A]; and

B) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the ME receives status bytes from the UICC indicating that the UICC has received the secured packet successfully, the ME shall send an acknowledgement in the Payload container IE of an UL NAS TRANSPORT message with Payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2; and

C) if the ME receives a REFRESH command from the UICC as specified in 3GPP TS 31.111 [22A] and if the REG bit of the UE parameters update header in the UE parameters update transparent container IE is set to "re-registration requested", and:

C1) the UE is registered over 3GPP access, then the UE shall wait until it enters 5GMM-IDLE mode over 3GPP access or 5GMM-CONNECTED mode with RRC inactive indication, and then perform a de-registration procedure, delete its 5G-GUTI and initiate a registration procedure for initial registration as specified in subclause 5.5.1.2;

C2) the UE is registered over non-3GPP access and does not have emergency services ongoing over non-3GPP access, then the UE shall locally release the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access, perform a de-registration procedure, delete its 5G-GUTI if the UE is registered to different PLMN on 3GPP access or the UE is not registered over 3GPP access, and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2; and

C3) the UE is registered over non-3GPP access and has an emergency services ongoing over non-3GPP access, then the UE shall wait until the emergency services are completed before locally releasing the N1 NAS signalling connection and enter 5GMM-IDLE mode over non-3GPP access, perform a de-registration procedure, delete its 5G-GUTI if the UE is registered to different PLMN on 3GPP access or if the UE is not registered over 3GPP access, and then initiate a registration procedure for initial registration as specified in subclause 5.5.1.2.

ii) if the UE parameters update list includes a UE parameters update data set with UE parameters update data set type indicating "Default configured NSSAI update data",

A) if the ACK bit of the UE parameters update header in the UE parameters update transparent container is set to "acknowledgment requested" and if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data", the ME shall send an acknowledgement in the Payload container IE of an UL NAS TRANSPORT message with Payload type IE set to "UE parameters update transparent container" as specified in subclause 5.4.5.2.2

B) the ME shall replace the stored default configured NSSAI with the default configured NSSAI included in the default configured NSSAI update data; and

C) if the REG bit of the UE parameters update header in the UE parameters update transparent container is set to "re-registration requested" and the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data", the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility registration update as specified in subclause 5.5.1.3.

 if the UE parameters update list does not include a UE parameters update data set with UE parameters update data set type indicating "Routing indicator update data", the UE used the old default configured NSSAI to create the requested NSSAI in a REGISTRATION REQUEST message, the UE does not have a configured NSSAI for the current PLMN and the UE has an allowed NSSAI for the current PLMN which contains one or more S-NSSAIs that are not included in the new default configured NSSAI, the UE shall wait until it enters 5GMM-IDLE mode and then the UE shall initiate a registration procedure for mobility and periodic registration update as specified in subclause 5.5.1.3; and

2) does not successfully pass the integrity check (see 3GPP TS 33.501 [24]) then the UE shall discard the content of the payload container IE;

j) "Location services message container" and the 5GMM cause IE is not included in the DL NAS TRANSPORT message, the UE shall forward the payload container type, the content of the Payload container IE and the routing information in the Additional information IE if included to the upper layer location services application;

k) "CIoT user data container", the UE shall forward the content of the Payload container IE and the PDU session ID to the 5GSM sublayer; and

l) "CIoT user data container" and:

1) the 5GMM cause IE is set to the 5GMM cause #22 "Congestion", the UE passes to the 5GSM sublayer an indication that the CIoT user data was not forwarded due to DNN based congestion control along with the CIoT user data from the Payload container IE of the DL NAS TRANSPORT message, and the time value from the Back-off timer value IE.

2) the 5GMM cause IE is set to the 5GMM cause #90 "payload was not forwarded", the UE passes to the 5GSM sublayer an indication that the user data container was not forwarded due to routing failure along with the user data container from the Payload container IE and the PDU session ID from the PDU session ID IE of the DL NAS TRANSPORT message.

m) "Multiple payloads", the UE shall first decode the content of the Payload container IE (see subclause 9.11.3.39) to obtain the number of payload container entries and for each payload container entry, the UE shall:

1) decode the payload container type field;

2) decode the optional IE fields and the payload container contents field in the payload container entry; and

3) handle the content of each payload container entry the same as the content of the Payload container IE and the associated optional IEs as specified in bullets a) to l) above according to the payload container type field.

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

##### 6.4.1.4.3 Handling of network rejection not due to congestion control

If the 5GSM cause value is different from #26 "insufficient resources", #28 "unknown PDU session type", #39 "reactivation requested", #46 "out of LADN service area", #50 "PDU session type IPv4 only allowed", #51 "PDU session type IPv6 only allowed", #54 "PDU session does not exist", #57 "PDU session type IPv4v6 only allowed", #58 "PDU session type Unstructured only allowed", #61 "PDU session type Ethernet only allowed", #67 "insufficient resources for specific slice and DNN", #68 "not supported SSC mode", and #69 "insufficient resources for specific slice" or the 5GSM sublayer receives an indication from 5GMM sublayer that the 5GSM message was not forwarded because the DNN is not supported or not subscribed in a slice along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session, and the Back-off timer value IE is included, the UE shall behave as follows: (if the UE is a UE configured for high priority access in selected PLMN, exceptions are specified in subclause 6.2.12):

a) if the timer value indicates neither zero nor deactivated and:

1) if the UE provided DNN and S-NSSAI to the network during the PDU session establishment, the UE shall start the back-off timer with the value provided in the Back-off timer value IE for the PDU session establishment procedure and [PLMN, DNN, S-NSSAI] combination. The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN and S-NSSAI in the current PLMN, until the back-off timer expires, the UE is switched off, the USIM is removed, or the entry in the "list of subscriber data" for the current SNPN is updated; or

2) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment, it shall start the back-off timer accordingly for the PDU session establishment procedure and the [PLMN, DNN, no S-NSSAI], [PLMN, no DNN, S-NSSAI] or [PLMN, no DNN, no S-NSSAI] combination. Dependent on the combination, the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [PLMN, DNN, no S-NSSAI], [PLMN, no DNN, S-NSSAI] or [PLMN, no DNN, no S-NSSAI] combination in the current PLMN, until the back-off timer expires, the UE is switched off, the USIM is removed, or the entry in the "list of subscriber data" for the current SNPN is updated;

b) if the timer value indicates that this timer is deactivated and:

1) if the UE provided DNN and S-NSSAI to the network during the PDU session establishment, the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN and S-NSSAI in the current PLMN, until the UE is switched off, the USIM is removed, or the entry in the "list of subscriber data" for the current SNPN is updated; or

2) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment, the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [PLMN, DNN, no S-NSSAI], [PLMN, no DNN, S-NSSAI] or [PLMN, no DNN, no S-NSSAI] combination in the current PLMN, until the UE is switched off, the USIM is removed, or the entry in the "list of subscriber data" for the current SNPN is updated; and

c) if the timer value indicates zero, the UE may send another PDU SESSION ESTABLISHMENT REQUEST message for the same combination of [PLMN, DNN, S-NSSAI], [PLMN, DNN, no S-NSSAI], [PLMN, no DNN, S-NSSAI], or [PLMN, no DNN, no S-NSSAI] in the current PLMN.

If the Back-off timer value IE is not included, then the UE shall ignore the Re-attempt indicator IE provided by the network in the PDU SESSION ESTABLISHMENT REJECT message, if any.

a) Additionally, if the 5GSM cause value is #8 "operator determined barring", #32 "service option not supported", #33 "requested service option not subscribed" or #70 "missing or unknown DNN in a slice", then:

1) the UE not operating in SNPN access mode shall proceed as follows:

i) if the UE is registered in the HPLMN or in a PLMN that is within the EHPLMN list, the UE shall behave as described above in the present subclause using the configured SM Retry Timer value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22], if available, as back-off timer value; and

ii) otherwise, if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list, or if the SM Retry Timer value is not configured, the UE shall behave as described above in the present subclause, using the default value of 12 minutes for the back-off timer; or

2) the UE operating in SNPN access mode shall proceed as follows:

i) if:

A) the SM Retry Timer value for the current SNPN as specified in 3GPP TS 24.368 [17] is available; or

B) the UE used the USIM for registration to the current SNPN and the SM Retry Timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] is available;

 then the UE shall behave as described above in the present subclause using the configured SM Retry Timer value as back-off timer value; or

NOTE 1: The way to choose one of the configured SM Retry Timer values for back-off timer value is up to UE implementation if both conditions in bullets A) and B) above are satisfied.

ii) otherwise, the UE shall behave as described above in the present subclause, using the default value of 12 minutes for the back-off timer.

b) For 5GSM cause value #27 "missing or unknown DNN", then:

1) the UE not operating in SNPN access mode shall proceed as follows:

i) if the UE is registered in the HPLMN or in a PLMN that is within the EHPLMN list, the UE shall start the back-off timer with the configured SM Retry Timer value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22], if available, as back-off timer value for the PDU session establishment procedure and the [PLMN, DNN] or [PLMN, no DNN] combination. The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current PLMN, until the back-off timer expires, the UE is switched off or the USIM is removed; and

ii) otherwise, if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list, or if the SM Retry Timer value is not configured, the UE shall start the back-off timer with the default value of 12 minutes as back-off timer value for the PDU session establishment procedure and the [PLMN, DNN] or [PLMN, no DNN] combination. The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current PLMN, until the back-off timer expires, the UE is switched off or the USIM is removed; or

2) the UE operating in SNPN access mode shall proceed as follows:

i) if:

A) the SM Retry Timer value for the current SNPN as specified in 3GPP TS 24.368 [17] is available; or

B) the UE used the USIM for registration to the current SNPN and the SM Retry Timer value in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22] is available;

 then the UE shall start the back-off timer with the configured SM Retry Timer value as back-off timer value for the PDU session establishment procedure and the [SNPN, DNN] or [SNPN, no DNN] combination. The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current SNPN, until the back-off timer expires, the UE is switched off, or the entry in the "list of subscriber data" for the current SNPN is updated; or

NOTE 2: The way to choose one of the configured SM Retry Timer values for back-off timer value is up to UE implementation if both conditions in bullets A) and B) above are satisfied.

ii) otherwise, the UE shall start the back-off timer with the default value of 12 minutes as back-off timer value for the PDU session establishment procedure and the [SNPN, DNN] or [SNPN, no DNN] combination. The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN in the current SNPN, until the back-off timer expires, the UE is switched off, or the entry in the "list of subscriber data" for the current SNPN is updated.

c) For 5GSM cause values different from #8 "operator determined barring", #27 "missing or unknown DNN", #32 "service option not supported", #33 "requested service option not subscribed" and #70 "missing or unknown DNN in a slice", the UE behaviour regarding the start of a back-off timer is unspecified.

When the 5GSM sublayer receives an indication from 5GMM sublayer that the 5GSM message was not forwarded because the DNN is not supported or not subscribed in a slice along with a PDU SESSION ESTABLISHMENT REQUEST message with the PDU session ID IE set to the PDU session ID of the PDU session, and the back-off timer value is not provided:

a) if the UE provided DNN and S-NSSAI to the network during the PDU session establishment, the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN and S-NSSAI in the current PLMN, until the UE is switched off, the USIM is removed, or the entry in the "list of subscriber data" for the current SNPN is updated; or

b) if the UE did not provide a DNN or S-NSSAI or any of the two parameters to the network during the PDU session establishment, the UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message for the same [PLMN, DNN, no S-NSSAI], [PLMN, no DNN, S-NSSAI] or [PLMN, no DNN, no S-NSSAI] combination in the current PLMN, until the UE is switched off, the USIM is removed, or the entry in the "list of subscriber data" for the current SNPN is updated.

The UE shall not stop any back-off timer:

a) upon a PLMN change;

b) upon an inter-system change; or

c) upon registration over another access type.

If the network indicates that a back-off timer for the PDU session establishment procedure is deactivated, then it remains deactivated;

a) upon a PLMN change;

b) upon an inter-system change; or

c) upon registration over another access type.

NOTE 3: This means the back-off timer can still be running or be deactivated for the given 5GSM procedure when the UE returns to the PLMN or when it performs inter-system change back from S1 mode to N1 mode. Thus, the UE can still be prevented from sending another PDU SESSION ESTABLISHMENT REQUEST message for the combination of [PLMN, DNN, S-NSSAI], [PLMN, DNN, no S-NSSAI], [PLMN, no DNN, S-NSSAI], or [PLMN, no DNN, no S-NSSAI] in the PLMN.

If the back-off timer is started upon receipt of a PDU SESSION ESTABLISHMENT REJECT (i.e. the timer value was provided by the network, a configured value is available or the default value is used as explained above) or the back-off timer is deactivated, the UE behaves as follows:

a) after a PLMN change:

1) the UE may send a PDU SESSION ESTABLISHMENT REQUEST message for the combination of [new PLMN, DNN, S-NSSAI], [new PLMN, DNN, no S-NSSAI], [new PLMN, no DNN, S-NSSAI], or [new PLMN, no DNN, no S-NSSAI] in the new PLMN, if the back-off timer is not running and is not deactivated for the PDU session establishment procedure and the combination of [new PLMN, DNN, S-NSSAI], [new PLMN, DNN, no S-NSSAI], [new PLMN, no DNN, S-NSSAI], or [new PLMN, no DNN, no S-NSSAI];

2) as an implementation option, for the 5GSM cause value #8 "operator determined barring", #32 "service option not supported", #33 "requested service option not subscribed" and #70 "missing or unknown DNN in a slice", if the network does not include a Re-attempt indicator IE, the UE may decide not to automatically send another PDU SESSION ESTABLISHMENT REQUEST message for the same combination of [PLMN, DNN, S-NSSAI], [PLMN, DNN, no S-NSSAI], [PLMN, no DNN, S-NSSAI], or [PLMN, no DNN, no S-NSSAI] using the same PDU session type if the UE is registered to a new PLMN which is in the list of equivalent PLMNs; and

3) as an implementation option, for the 5GSM cause value #27 "missing or unknown DNN", if the network does not include a Re-attempt indicator IE, the UE may decide not to automatically send another PDU SESSION ESTABLISHMENT REQUEST message for the same combination of [PLMN, DNN] or [PLMN, no DNN] using the same PDU session type if the UE is registered to a new PLMN which is in the list of equivalent PLMNs;

b) if the network does not include the Re-attempt indicator IE to indicate whether re-attempt in S1 mode is allowed, or the UE ignores the Re-attempt indicator IE, e.g. because the Back-off timer value IE is not included, then:

1) if the UE is registered in its HPLMN or in a PLMN that is within the EHPLMN list and the back-off timer is running for the combination of [PLMN, DNN, S-NSSAI] or [PLMN, DNN, no S-NSSAI], the UE shall apply the configured value SM\_RetryAtRATChange value as specified in 3GPP TS 24.368 [17] or in USIM file NASCONFIG as specified in 3GPP TS 31.102 [22], if available, to determine whether the UE may attempt a PDN connectivity procedure for the same [PLMN, DNN] combination in S1 mode. If the back-off timer is running for the combination of [PLMN, no DNN, S-NSSAI] or [PLMN, no DNN, no S-NSSAI], the same applies for the PDN connectivity procedure for the [PLMN, no DNN] combination in S1 mode accordingly; and

2) if the UE is not registered in its HPLMN or in a PLMN that is within the EHPLMN list, or if the NAS configuration MO as specified in 3GPP TS 24.368 [17] is not available and the value for inter-system change is not configured in the USIM file NASCONFIG, then the UE behaviour regarding a PDN connectivity procedure for the same [PLMN, DNN] or [PLMN, no DNN] combination in S1 mode is unspecified; and

c) if the network includes the Re-attempt indicator IE indicating that re-attempt in an equivalent PLMN is not allowed, then depending on the timer value received in the Back-off timer value IE, for each combination of a PLMN from the equivalent PLMN list and the respective [DNN, S-NSSAI], [DNN, no S-NSSAI], [no DNN, S-NSSAI], or [no DNN, no S-NSSAI] combination, the UE shall start a back-off timer for the PDU session establishment procedure with the value provided by the network, or deactivate the respective back-off timer as follows:

1) if the Re-attempt indicator IE additionally indicates that re-attempt in S1 mode is allowed, the UE shall start or deactivate the back-off timer for N1 mode only; and

2) otherwise, the UE shall start or deactivate the back-off timer for S1 and N1 mode.

If the back-off timer for a [PLMN, DNN] or [PLMN, no DNN] combination, was started or deactivated in S1 mode upon receipt of PDN CONNECTIVITY REJECT message (see 3GPP TS 24.301 [15]) and the network indicated that re-attempt in N1 mode is allowed, then this back-off timer does not prevent the UE from sending a PDU SESSION ESTABLISHMENT REQUEST message in this PLMN for the same DNN, or without DNN, after inter-system change to N1 mode. If the network indicated that re-attempt in N1 mode is not allowed, the UE shall not send any PDU SESSION ESTABLISHMENT REQUEST message in this PLMN for the same DNN in combination with any S-NSSAI or without S-NSSAI, or in this PLMN without DNN in combination with any S-NSSAI or without S-NSSAI, after inter-system change to N1 mode until the timer expires, the UE is switched off or the USIM is removed.

NOTE 4: The back-off timer is used to describe a logical model of the required UE behaviour. This model does not imply any specific implementation, e.g. as a timer or timestamp.

NOTE 5: Reference to back-off timer in this section can either refer to use of timer T3396 or to use of a different packet system specific timer within the UE. Whether the UE uses T3396 as a back-off timer or it uses different packet system specific timers as back-off timers is left up to UE implementation.

When the back-off timer is running or the timer is deactivated, the UE is allowed to initiate a PDU session establishment procedure if the procedure is for emergency services.

If the 5GSM cause value is #28 "unknown PDU session type" and the PDU SESSION ESTABLISHMENT REQUEST message contained a PDU session type IE indicating a PDU session type, the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network, if any. The UE may send another PDU SESSION ESTABLISHMENT REQUEST message with the PDU session type IE indicating another PDU session type or without the PDU session type IE, e.g. using another value which can be used for the rejected component in the same route selection descriptor as specified in 3GPP TS 24.526 [19]. The behaviour of the UE for 5GSM cause value #28 also applies if the PDU session is a MA PDU Session.

If the 5GSM cause value is #39 "reactivation requested", the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network, if any.

NOTE 6: Further UE behaviour upon receipt of 5GSM cause value #39 is up to the UE implementation.

If the 5GSM cause value is #46 "out of LADN service area", the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network, if any. The UE shall not send another PDU SESSION ESTABLISHMENT REQUEST message or another PDU SESSION MODIFICATION REQUEST message for the LADN DNN provided by the UE during the PDU session establishment procedure until the LADN information for the specific LADN DNN is updated as described in subclause 5.4.4 and subclause 5.5.1. The UE shall not indicate the PDU session(s) for the LADN DNN provided by the UE during the PDU session establishment procedure in the Uplink data status IE included in the SERVICE REQUEST message until the LADN information for the specific LADN DNN is updated as described in subclause 5.4.4 and subclause 5.5.1.

If the 5GSM cause value is #50 "PDU session type IPv4 only allowed", #51 "PDU session type IPv6 only allowed", #57 "PDU session type IPv4v6 only allowed", #58 "PDU session type Unstructured only allowed", or #61 "PDU session type Ethernet only allowed", the UE shall ignore the Back-off timer value IE provided by the network, if any. The UE shall evaluate the URSP rules if available as specified in 3GPP TS 24.526 [19]. The UE shall not subsequently send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN (or no DNN, if no DNN was indicated by the UE) and the same S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI, if no S-NSSAI was indicated by the UE) using the same PDU session type until any of the following conditions is fulfilled:

a) the UE is registered to a new PLMN which was not in the list of equivalent PLMNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received;

b) the UE is registered to a new PLMN which was in the list of equivalent PLMNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received, and either the network did not include a Re-attempt indicator IE in the PDU SESSION ESTABLISHMENT REJECT message or the Re-attempt indicator IE included in the message indicated that re-attempt in an equivalent PLMN is allowed;

c) the PDU session type which is used to access to the DNN (or no DNN, if no DNN was indicated by the UE) and the S-NSSAI (or no S-NSSAI, if no S-NSSAI was indicated by the UE) are changed by the UE which subsequently requests a new PDU session type;

d) the UE is switched off; or

e) the USIM is removed or the entry in the "list of subscriber data" for the current SNPN is updated.

For the 5GSM cause values #50 "PDU session type IPv4 only allowed", #51 "PDU session type IPv6 only allowed", #57 "PDU session type IPv4v6 only allowed", #58 "PDU session type Unstructured only allowed", and #61 "PDU session type Ethernet only allowed", the UE shall ignore the value of the RATC bit in the Re-attempt indicator IE provided by the network, if any.

NOTE 7: For the 5GSM cause values #50 "PDU session type IPv4 only allowed", #51 "PDU session type IPv6 only allowed", #57 "PDU session type IPv4v6 only allowed", #58 "PDU session type Unstructured only allowed", and #61 "PDU session type Ethernet only allowed", re-attempt in S1 mode for the same DNN (or no DNN, if no DNN was indicated by the UE) using the same PDU session type is not allowed.

If the 5GSM cause value is #54 "PDU session does not exist", the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network, if any. If the PDU session establishment procedure is to perform handover of an existing PDU session between 3GPP access and non-3GPP access, the UE shall release locally the existing PDU session with the PDU session ID included in the PDU SESSION ESTABLISHMENT REJECT message. The UE may initiate another UE requested PDU session establishment procedure with the request type set to "initial request" in the subsequent PDU SESSION ESTABLISHMENT REQUEST message to establish a PDU session with the same DNN (or no DNN, if no DNN was indicated by the UE) and the same S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI, if no S-NSSAI was indicated by the UE).

NOTE 8: User interaction is necessary in some cases when the UE cannot re-establish the PDU session(s) automatically.

If the 5GSM cause value is #68 "not supported SSC mode", the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network, if any. The UE shall evaluate the URSP rules if available as specified in 3GPP TS 24.526 [19]. The UE shall not subsequently send another PDU SESSION ESTABLISHMENT REQUEST message for the same DNN (or no DNN, if no DNN was indicated by the UE) and the same S-NSSAI associated with (if available in roaming scenarios) a mapped S-NSSAI (or no S-NSSAI, if no S-NSSAI was indicated by the UE) using the same SSC mode or an SSC mode which was not included in the Allowed SSC mode IE until any of the following conditions is fulfilled:

a) the UE is registered to a new PLMN which was not in the list of equivalent PLMNs at the time when the PDU SESSION ESTABLISHMENT REJECT message was received;

b) the SSC mode which is used to access to the DNN (or no DNN, if no DNN was indicated by the UE) and the S-NSSAI (or no S-NSSAI, if no S-NSSAI was indicated by the UE) is changed by the UE which subsequently requests a new SSC mode or no SSC mode;

c) the UE is switched off; or

d) the USIM is removed or the entry in the "list of subscriber data" for the current SNPN is updated.

If the UE receives the 5GSM cause value is #33 "requested service option not subscribed" upon sending PDU SESSION ESTABLISHMENT REQUEST to establish an MA PDU session, the UE shall ignore the Back-off timer value IE and Re-attempt indicator IE provided by the network, if any. The UE shall evaluate URSP rules, if available, as specified in 3GPP TS 24.526 [19] and the UE may send PDU SESSION ESTABLISHMENT REQUEST after evaluating those URSP rules.

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

#### 8.2.11.5 Back-off timer value

The AMF shall include this IE when the Payload container IE contains an uplink 5GSM message which was not forwarded due to DNN based congestion control, S-NSSAI and DNN based congestion control, S-NSSAI only based congestion control or the DNN is not supported or not subscribed in a slice, and the Payload container type IE is not set to "Multiple payloads".