**3GPP TSG-CT WG1 Meeting #129-eC1-21xxxx**

**Electronic meeting, 19-23 April 2021 Revision of C1-212062**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.501** | **CR** |  | **rev** | **1** | **Current version:** | **17.2.1** |  |
|  | | | | | | | | |
| *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:*** | New 5GMM cause for satellite access | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | China Mobile, Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GSAT\_ARCH-CT | | | | |  | ***Date:*** | | | 2021-04-09 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | “Indicating to the UE a PLMN is not allowed to operate at the UE location” is specified in the TS 23.502 by the agreed CR#2482 (S2-2101677). In addition, SA2 states the following points related to the reject cause after verifying the UE’s location:   1. "SA2 has considered this reject cause for UEs that receive it over non-terrestrial networks in the context of 5GSAT\_ARCH WI and studied it in antecedent study and expects that the impact of this reject cause in this procedure is applicable to PLMN selection for UEs in non-terrestrial networks." 2. "The meaning (or scope) of this reject cause is to indicate to the UE that the PLMN it is currently attempting to register to or is registered to, cannot provide services to the UE in its present location (i.e. the country or international area the UE is determined to be physically located in by the network). This does not prevent the UE from selecting the same PLMN again in another country."   Therefore, it is suggested to define a new 5GMM cause in TS 24.501 to be aligned with stage 2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | To define a new 5GMM cause in TS 24.501 to be aligned with stage 2. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Indicating to the UE a PLMN is not allowed to operate at the UE location by the AMF will not be supported in stage 3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 9.11.3.2, A.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | 1. Update “Reason for change” to reference the SA2’s CR. 2. Update the version of TS 24.501. 3. Add a NOTE to point out the new defined cause is only applicable for NR satellite access. | | | | | | | | |

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

#### 9.11.3.2 5GMM cause

The purpose of the 5GMM cause information element is to indicate the reason why a 5GMM request from the UE is rejected by the network.

The 5GMM cause information element is coded as shown in figure 9.11.3.2.1 and table 9.11.3.2.1.

The 5GMM cause is a type 3 information element with 2 octets length.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| 5GMM cause IEI | | | | | | | | octet 1 |
| Cause value | | | | | | | | octet 2 |

Figure 9.11.3.2.1: 5GMM cause information element

Table 9.11.3.2.1: 5GMM cause information element

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cause value (octet 2) | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | |
| Bits | | | | | | | | | | | | | | | | | | | |
| 8 | | 7 | | 6 | | 5 | | 4 | | 3 | | 2 | | 1 | |  | |  | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 1 | | 1 | |  | | Illegal UE | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 1 | |  | | PEI not accepted | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 1 | | 1 | | 0 | |  | | Illegal ME | |
| 0 | | 0 | | 0 | | 0 | | 0 | | 1 | | 1 | | 1 | |  | | 5GS services not allowed | |
| 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 0 | | 1 | |  | | UE identity cannot be derived by the network | |
| 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | |  | | Implicitly de-registered | |
| 0 | | 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 1 | |  | | PLMN not allowed | |
| 0 | | 0 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | |  | | Tracking area not allowed | |
| 0 | | 0 | | 0 | | 0 | | 1 | | 1 | | 0 | | 1 | |  | | Roaming not allowed in this tracking area | |
| 0 | | 0 | | 0 | | 0 | | 1 | | 1 | | 1 | | 1 | |  | | No suitable cells in tracking area | |
| 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 0 | |  | | MAC failure | |
| 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 1 | |  | | Synch failure | |
| 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 1 | | 0 | |  | | Congestion | |
| 0 | | 0 | | 0 | | 1 | | 0 | | 1 | | 1 | | 1 | |  | | UE security capabilities mismatch | |
| 0 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | | 0 | |  | | Security mode rejected, unspecified | |
| 0 | | 0 | | 0 | | 1 | | 1 | | 0 | | 1 | | 0 | |  | | Non-5G authentication unacceptable | |
| 0 | | 0 | | 0 | | 1 | | 1 | | 0 | | 1 | | 1 | |  | | N1 mode not allowed | |
| 0 | | 0 | | 0 | | 1 | | 1 | | 1 | | 0 | | 0 | |  | | Restricted service area | |
| 0 | | 0 | | 0 | | 1 | | 1 | | 1 | | 1 | | 1 | |  | | Redirection to EPC required | |
| 0 | | 0 | | 1 | | 0 | | 1 | | 0 | | 1 | | 1 | |  | | LADN not available | |
| 0 | | 0 | | 1 | | 1 | | 1 | | 1 | | 1 | | 0 | |  | | No network slices available | |
| 0 | | 1 | | 0 | | 0 | | 0 | | 0 | | 0 | | 1 | |  | | Maximum number of PDU sessions reached | |
| 0 | | 1 | | 0 | | 0 | | 0 | | 0 | | 1 | | 1 | |  | | Insufficient resources for specific slice and DNN | |
| 0 | | 1 | | 0 | | 0 | | 0 | | 1 | | 0 | | 1 | |  | | Insufficient resources for specific slice | |
| 0 | | 1 | | 0 | | 0 | | 0 | | 1 | | 1 | | 1 | |  | | ngKSI already in use | |
| 0 | | 1 | | 0 | | 0 | | 1 | | 0 | | 0 | | 0 | |  | | Non-3GPP access to 5GCN not allowed | |
| 0 | | 1 | | 0 | | 0 | | 1 | | 0 | | 0 | | 1 | |  | | Serving network not authorized | |
| 0 | | 1 | | 0 | | 0 | | 1 | | 0 | | 1 | | 0 | |  | | Temporarily not authorized for this SNPN | |
| 0 | | 1 | | 0 | | 0 | | 1 | | 0 | | 1 | | 1 | |  | | Permanently not authorized for this SNPN | |
| 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 0 | |  | | Not authorized for this CAG or authorized for CAG cells only | |
| 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 0 | | 1 | |  | | Wireline access area not allowed | |
| 0 | | 1 | | 0 | | 0 | | 1 | | 1 | | 1 | | 0 | |  | | PLMN not allowed to operate at the present UE location | |
| 0 | | 1 | | 0 | | 1 | | 1 | | 0 | | 1 | | 0 | |  | | Payload was not forwarded | |
| 0 | | 1 | | 0 | | 1 | | 1 | | 0 | | 1 | | 1 | |  | | DNN not supported or not subscribed in the slice | |
| 0 | | 1 | | 0 | | 1 | | 1 | | 1 | | 0 | | 0 | |  | | Insufficient user-plane resources for the PDU session | |
| 0 | | 1 | | 0 | | 1 | | 1 | | 1 | | 1 | | 1 | |  | | Semantically incorrect message | |
| 0 | | 1 | | 1 | | 0 | | 0 | | 0 | | 0 | | 0 | |  | | Invalid mandatory information | |
| 0 | | 1 | | 1 | | 0 | | 0 | | 0 | | 0 | | 1 | |  | | Message type non-existent or not implemented | |
| 0 | | 1 | | 1 | | 0 | | 0 | | 0 | | 1 | | 0 | |  | | Message type not compatible with the protocol state | |
| 0 | | 1 | | 1 | | 0 | | 0 | | 0 | | 1 | | 1 | |  | | Information element non-existent or not implemented | |
| 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 0 | | 0 | |  | | Conditional IE error | |
| 0 | | 1 | | 1 | | 0 | | 0 | | 1 | | 0 | | 1 | |  | | Message not compatible with the protocol state | |
| 0 | | 1 | | 1 | | 0 | | 1 | | 1 | | 1 | | 1 | |  | | Protocol error, unspecified | |
|  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| Any other value received by the mobile station shall be treated as 0110 1111, "protocol error, unspecified". Any other value received by the network shall be treated as 0110 1111, "protocol error, unspecified". | | | | | | | | | | | | | | | | | | | |

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

## A.3 Causes related to PLMN or SNPN specific network failures and congestion/authentication failures

Cause #20 – MAC failure

This 5GMM cause is sent to the network if the USIM detects that the MAC in the AUTHENTICATION REQUEST message is not fresh.

Cause #21 – Synch failure

This 5GMM cause is sent to the network if the USIM detects that the SQN in the AUTHENTICATION REQUEST message is out of range.

Cause #22 – Congestion

This 5GMM cause is sent to the UE because of congestion in the network (e.g. no channel, facility busy/congested etc.).

Cause #23 – UE security capabilities mismatch

This 5GMM cause is sent to the network if the UE detects that the UE security capability does not match the one sent back by the network.

Cause #24 – Security mode rejected, unspecified

This 5GMM cause is sent to the network if the security mode command is rejected by the UE for unspecified reasons.

Cause #26 – Non-5G authentication unacceptable

This 5GMM cause is sent to the network in N1 mode if the "separation bit" in the AMF field of AUTN is set to 0 in the AUTHENTICATION REQUEST message (see 3GPP TS 33.501 [24]).

Cause #28 – Restricted service area

This 5GMM cause is sent to the UE if it requests service in a tracking area of the 3GPP access or in an area of the wireline access, which is a part of the UE's non-allowed area or is not a part of the UE's allowed area.

Cause #43 – LADN not available

This 5GMM cause is sent to the UE if the user-plane resources of the PDU session are not established when the UE is located outside the LADN service area.

Cause #62 – No network slices available

This 5GMM cause is sent by the network if none of the requested network slice(s) in the registration request are allowed and there are no default network slice(s) configured in the network.

NOTE: Network does not send this cause in REGISTRATION REJECT message if the UE does not include a requested NSSAI in the REGISTRATION REQUEST message. In that case, the Network uses other causes (e.g. #13, #15) etc based on the subscription.

Cause #65 – Maximum number of PDU sessions reached

This 5GMM cause is used by the network to indicate that the procedure requested by the UE was rejected as the network has reached the maximum number of simultaneously active PDU sessions for the UE.

Cause #67 – Insufficient resources for specific slice and DNN

This 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to insufficient resources for specific slice and DNN.

Cause #69 – Insufficient resources for specific slice

This 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to insufficient resources for specific slice.

Cause #71 – ngKSI already in use

This 5GMM cause is sent to the network in N1 mode if the ngKSI value received in the AUTHENTICATION REQUEST message is already associated with one of the 5G security contexts stored in the UE.

Cause #73 – Serving network not authorized

This 5GMM cause is sent to the UE if the UE initiates registration towards a serving network and the serving network fails to be authorized by the UE's home network.

Cause #78 –PLMN not allowed to operate at the present UE location

This 5GMM cause is sent to the UE to indicate that the PLMN is not allowed to operate at the present UE location.

NOTE: This cause is only applicable for NR satellite access.

Cause #90 – Payload was not forwarded

This 5GMM cause is sent by the network to indicate that the requested service cannot be provided because payload could not be forwarded by AMF.

Cause #91 – DNN not supported or not subscribed in the slice

This 5GMM cause is sent by the network to indicate that the requested service cannot be provided because payload could not be forwarded by AMF because the DNN is not supported or not subscribed in the slice selected by the network if the UE did not indicate a slice, or the DNN is not supported or not subscribed in the slice indicated by the UE.

Cause #92 – Insufficient user-plane resources for the PDU session

This 5GMM cause is sent by the network to indicate that the requested service cannot be provided due to insufficient user-plane resources for the PDU session.

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