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

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

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | 2982 | **rev** | **1** | **Current version:** | **17.1.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** | Update of CPSR procedure for low power location event reporting | | | | | | | | | |
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| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_eLCS | | | | |  | ***Date:*** | | | 2021-03-02 |
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| ***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 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-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:*** | | In TS 23.273 section 6.7.1,  5. The AMF checks the integrity of the NAS message and deciphers its contents. The AMF then invokes an Namf\_Communication\_N1MessageNotify service operation to forward the event report to either the serving LMF or any suitable LMF as described for step 25 for clause 6.3.1. The AMF includes an indication of Control Plane CIoT 5GS Optimisation in the service operation and the serving cell ID.  The AMF provides an indication of CP CIoT 5GS Optimisation to the LMF if the UE sends Location service message in the CPSR. Based on the indication from the AMF, the LMF treats the UE with CP CIoT 5GS optimization differently; The LMF only sends a single Event Report Ack to the UE instead of keeping the session for other procedure e.g., positioning procedure. It has not been specified in TS 24.501.  In addition, if the UE is using CP CIoT 5GS optimisation but if there is pending uplink or downlink data/signaling, the AMF needs not to provide the indication of CP CIoT 5GS Optimisation to LMF as the UE will stay CM-Connected for a while, so that the LMF can perform sub procedure(e.g., positioning procedue) with the UE. Therefore, the AMF needs to determine if there is any pending UL/DL data or signaling to the UE, and then provide the indication to the LMF if there is none. | | | | | | | | |
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| ***Summary of change:*** | | Add description for sending of indication of CP CIoT 5GS Optimisation to an LMF when there is no pending data or signalling for the UE. | | | | | | | | |
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| ***Consequences if not approved:*** | | if AMF always include the CP CIoT indication when UE is in use of CPSR regardless of pending signaling/data for the UE, it blocks opportunity that the LMF performs sub procedure (e.g., positioning procedure) with the UE using CP CIoT optimization.The LMF cannot retrieve precise location information from the UE using CPSR in any case. | | | | | | | | |
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| ***Clauses affected:*** | | 5.6.1.4.2 | | | | | | | | |
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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:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\* NEXT CHANGE \*\*\*\*\*\*\*\*

##### 5.6.1.4.2 UE is using 5GS services with control plane CIoT 5GS optimization

For case a in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile terminating request", after completion of the 5GMM common procedures (if initiated) according to subclause 5.6.1.3, the AMF shall send a SERVICE ACCEPT message.

For case c and d in subclause 5.6.1.1, upon receipt of the CONTROL PLANE SERVICE REQUEST message with Control plane service type indicating "mobile originating request", after completion of the 5GMM common procedures (if initiated) according to subclause 5.6.1.3, the AMF shall send a SERVICE ACCEPT message, except for case d when the DDX field of the Release assistance indication IE or the DDX field of the CIoT small data container IE indicates "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected".

For case a, c and d:

a) if the CIoT small data container IE is included in the message, the AMF shall decipher the value part of the CIoT small data container IE and:

1) if the Data type field indicates "control plane user data", extract the PDU session ID and data content from the CIoT small data container IE, look up a PDU session routing context for the UE and the PDU session ID, and forward the content of the CIoT small data container IE to the SMF associated with the UE;

2) if the Data type field indicates "SMS", forward the content of the CIoT small data container IE to the SMSF associated with the UE; or

3) if the Data type field indicates "Location services message container", and if

i) length of additional information field in the CIoT small data container IE is zero, forward the value of Data type field and the content of the CIoT small data container IE to the to the location services application; or

ii) otherwise forward the value of Data type field and the content of the CIoT small data container IE to the LMF associated with the routing information that is included in the additional information field of the CIoT small data container IE ; or

NOTE x: If the AMF determines there is no pending data or signalling for the UE, the AMF provides an indication of control plane CIoT 5GS Optimisation to the LMF as specified in 3GPP TS 29.518[20B].

b) otherwise, the AMF shall decipher the value part of NAS message container IE and:

1) if the Payload container IE is included in the CONTROL PLANE SERVICE REQUEST message and if the Payload container type IE is set to "CIoT user data container", the AMF shall look up a PDU session routing context for the UE and the PDU session ID, and forward the content of the Payload container IE to the SMF associated with the UE;

2) if the Payload container IE is included in the CONTROL PLANE SERVICE REQUEST message and if the Payload container type IE is set to "SMS", the AMF shall forward the content of the Payload container IE to the SMSF associated with the UE;

3) if the PDU session status IE is included in the CONTROL PLANE SERVICE REQUEST message or the AMF needs to perform a PDU session status synchronization, the AMF shall include a PDU session status IE in the SERVICE ACCEPT message to indicate which PDU sessions associated with the access type the SERVICE ACCEPT message is sent over are active in the AMF;

4) if the Uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST message and the UE is:

i) not in NB-N1 mode; or

ii) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources;

the AMF shall:

i) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions; and

ii) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources;

5) if the Uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST, the UE is in NB-N1 mode, and the UE indicates a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources, the AMF shall not indicate to the SMF to re-establish the user-plane resources for the corresponding PDU sessions; or

6) otherwise, if the Payload container IE is included in the message and if the Payload container type IE is set to "Location services message container", the AMF shall forward the Payload container type and the content of the Payload container IE to the LMF associated with the routing information included in the Additional information IE of the CONTROL PLANE SERVICE REQUEST message.

NOTE x: If the AMF determines there is no pending data or signalling for the UE, the AMF provides an indication of control plane CIoT 5GS Optimisation to the LMF as specified in 3GPP TS 29.518[20B].

For case k) in subclause 5.6.1.1, if the Uplink data status IE is included in the CONTROL PLANE SERVICE REQUEST message and the UE is:

a) not in NB-N1 mode; or

b) in NB-N1 mode and the UE does not indicate a request to have user-plane resources established for a number of PDU sessions that exceeds the UE's maximum number of supported user-plane resources,

the AMF shall:

a) indicate the SMF to re-establish the user-plane resources for the corresponding PDU sessions; and

b) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the user-plane resources re-establishment result of the PDU sessions for which the UE requested to re-establish the user-plane resources.

If the Allowed PDU session status IE is included in the CONTROL PLANE SERVICE REQUEST message, the AMF shall:

a) for a 5GSM message from each SMF that has indicated pending downlink signalling only, forward the received 5GSM message via 3GPP access to the UE after the SERVICE ACCEPT message is sent;

b) for each SMF that has indicated pending downlink data only:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE; and

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if:

i) for a UE not in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE; or

ii) for a UE in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources;

c) for each SMF that have indicated pending downlink signalling and data:

1) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access cannot be performed if the corresponding PDU session ID(s) are not indicated in the Allowed PDU session status IE;

2) notify the SMF that reactivation of the user-plane resources for the corresponding PDU session(s) associated with non-3GPP access can be performed if:

i) for a UE not in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE; or

ii) for a UE in NB-N1 mode, the corresponding PDU session ID(s) are indicated in the Allowed PDU session status IE and the resulting number of PDU sessions with established user-plane resources does not exceed the UE's maximum number of supported user-plane resources; and

3) discard the received 5GSM message for PDU session(s) associated with non-3GPP access; and

d) include the PDU session reactivation result IE in the SERVICE ACCEPT message to indicate the successfully re-established user-plane resources for the corresponding PDU sessions, if any.

If the DDX field in the CIoT small data container IE or the DDX field of the Release assistance indication IE indicates:

1) "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" and if there is no downlink signalling or downlink data for the UE; or

2) "Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected" and upon subsequent delivery of the next received downlink data transmission to the UE and if there is no additional downlink signalling or downlink data for the UE,

the AMF initiates the release of the N1 NAS signalling connection (see 3GPP TS 23.502 [9]).

Upon successful completion of the procedure, the UE shall reset the service request attempt counter, stop the timer T3517 and enter the state 5GMM-REGISTERED.

If the PDU session status information element is included in the CONTROL PLANE SERVICE REQUEST message, then the AMF:

a) shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE on the AMF side associated with the access type the CONTROL PLANE SERVICE REQUEST message is sent over, but are indicated by the UE as being inactive, and

b) request the SMF to perform a local release of all those PDU sessions.

If the PDU session status information element is included in the SERVICE ACCEPT message, then the UE shall perform a local release of all those PDU sessions which are not in 5GSM state PDU SESSION INACTIVE or PDU SESSION ACTIVE PENDING on the UE side associated with the 3GPP access but are indicated by the AMF as being inactive.

If the user-plane resources cannot be established for a PDU session, the AMF shall include the PDU session reactivation result IE in the SERVICE ACCEPT message indicating that user-plane resources for the corresponding PDU session cannot be re-established, and:

a) if the user-plane resources cannot be established because the SMF indicated to the AMF that the UE is located out of the LADN service area (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #43 "LADN not available";

b) if the user-plane resources cannot be established because the SMF indicated to the AMF that only prioritized services are allowed (see 3GPP TS 29.502 [20A]), the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #28 "restricted service area"; or

c) if the user-plane resources cannot be established because:

1) the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]); or

2) the UE is in NB-N1 mode and the result will lead to user-plane resources established for more than two PDU sessions (see 3GPP TS 23.502 [9])

the AMF shall include the PDU session reactivation result error cause IE with the 5GMM cause set to #92"insufficient user-plane resources for the PDU session":

NOTE: For a UE that is not in NB-N1 mode, it is up to UE implementation when to re-send a request for user-plane re-establishment for the associated PDU session after receiving a PDU session reactivation result error cause IE with a 5GMM cause set to #92 "insufficient user-plane resources for the PDU session".

For case d) in subclause 5.6.1.1, the UE shall also treat the indication from the lower layers that the RRC connection has been released as successful completion of the procedure. The UE shall reset the service request attempt counter, stop the timer T3517 and enter the state 5GMM-REGISTERED.

Upon receipt of the CONTROL PLANE SERVICE REQUEST message with uplink data:

- if the DDX field of the Release assistance indication IE or the DDX field of the CIoT small data container IE is set to "No further uplink and no further downlink data transmission subsequent to the uplink data transmission is expected" in the message;

- if the AMF decides to forward the uplink data piggybacked in the CONTROL PLANE SERVICE REQUEST message; and

- if the AMF decides to activate the congestion control for transport of user data via the control plane,

then the AMF shall send SERVICE ACCEPT message with the T3448 value IE included.

If the AMF decides to deactivate the congestion control for transport of user data via the control plane, then the AMF shall delete the stored control plane data back-off time for the UE and the AMF shall not include timer T3448 value IE in the SERVICE ACCEPT message.

If the T3448 value IE is present in the received SERVICE ACCEPT message and the value indicates that this timer is neither zero nor deactivated, the UE shall:

a) stop timer T3448 if it is running;

b) consider the transport of user data via the control plane as successful; and

c) start timer T3448 with the value provided in the T3448 value IE.

If the UE is using 5GS services with control plane CIoT 5GS optimization, the T3448 value IE is present in the SERVICE ACCEPT message and the value indicates that this timer is either zero or deactivated, the UE shall ignore the T3448 value IE and proceed as if the T3448 value IE was not present.

If the UE in 5GMM-IDLE mode initiated the service request procedure by sending a CONTROL PLANE SERVICE REQUEST message and the SERVICE ACCEPT message does not include the T3448 value IE and if timer T3448 is running, then the UE shall stop timer T3448.

For case h) in subclause 5.6.1.1,

a) the UE shall treat the indication from the lower layers when the UE has changed to S1 mode as successful completion of the procedure and stop timer T3517;

b) if a UE operating in single-registration mode has changed to S1 mode, it shall disable the N1 mode capability for 3GPP access (see subclause 4.9.2); and

c) the AMF shall not check for CAG restrictions.

If the CONTROL PLANE SERVICE REQUEST message is for emergency services fallback, the AMF triggers the emergency services fallback procedure as specified in subclause 4.13.4.2 of 3GPP TS 23.502 [9].

\*\*\*\*\*\*\*\* End of CHANGE \*\*\*\*\*\*\*\*