**3GPP TSG-CT WG1 Meeting #122-eC1-200661**

**Electronic meeting, 20-28 February 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | **1979** | **rev** | **-** | **Current version:** | **16.3.0** |  |
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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:*** | Single downlink data only indication and release of N1 NAS signalling connection | | | | | | | | | |
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| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_CIoT | | | | |  | ***Date:*** | | | 2020-02-17 |
|  |  | | | |  | |  | | |  |
| ***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 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:*** | | A 5GS UE supporting CP CIoT optimization that indicates “Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected” expects as a EPS UE supporting CP CIoT optimization that the NW will initiate the release of the N1 NAS signaling connection following the single downlink data has been forwarded to the UE. This logic is missing in the specification. | | | | | | | | |
| ***tbd*** | |  | | | | | | | | |
| ***Summary of change:*** | | For the CONTROL PLANE SERVICE REQUEST message and UL NAS TRANSPORT message, the NW initiates the release of the N1 NAS signaling connection if the UE indicates “Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected” and the single downlink data has been forwarded to the UE. | | | | | | | | |
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| ***Consequences if not approved:*** | | Incomplete feature. | | | | | | | | |
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| ***Clauses affected:*** | | 5.4.5.2.3, 5.6.1.4.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 \*\*\*\*\*

##### 5.4.5.2.3 UE-initiated NAS transport of messages accepted by the network

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

a) "N1 SM information", the AMF looks up a PDU session routing context for:

1) the UE and the PDU session ID IE in case the Old PDU session ID IE is not included, and:

NOTE 1: If the Old PDU session ID IE is not included in the UL NAS TRANSPORT message and the AMF has received a reallocation requested indication from the SMF, the AMF needs to ignore the reallocation requested indication.

i) if the AMF has a PDU session routing context for the PDU session ID and the UE, and the Request type IE is either not included or is included but set to other value than "initial request", "existing PDU session", "initial emergency request", "existing emergency PDU session" or "MA PDU request", 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;

ii) 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, the Request type IE is included and is set to "existing PDU session" or "MA PDU request", and the S-NSSAI associated with the PDU session identified by the PDU session ID is allowed for the target access type, the AMF shall forward the 5GSM message, the PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN (if received) and the request type towards the SMF identified by the SMF ID of the PDU session routing context;

iii) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, and the Request type IE is included and is set to "initial request" or "MA PDU request":

A) the AMF shall select an SMF with following handlings:

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

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

- 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

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

If the DNN IE is included, the AMF shall use the UE requested DNN as the DNN determined by the AMF; and

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

- contains the default DNN for the S-NSSAI, the AMF shall use the default DNN as the DNN determined by the AMF; and

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

NOTE 2: SMF selection is outside the scope of the present document.

NOTE 3: As part of SMF selection, the PCF can provide the AMF with a DNN selected by the network different from the DNN determined by the AMF.

B) if the SMF selection is successful:

- if the DNN selected by the network is a LADN DNN, the AMF shall determine the UE presence in LADN service area;

- the AMF shall store a PDU session routing context for the PDU session ID and the UE, shall set the SMF ID in the stored PDU session routing context to the SMF ID corresponding to the DNN in the user's subscription context obtained from the UDM; and

- the AMF shall forward the 5GSM message, the 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, the MA PDU session information and UE presence in LADN service area (if DNN received corresponds to an LADN DNN) towards the SMF identified by the SMF ID of the PDU session routing context;

iv) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is included and is set to "existing PDU session" or "MA PDU request", and the AMF retrieves an SMF ID associated with:

A) the PDU session ID matching the PDU session ID received from the UE, if any; or

B) the DNN matching the DNN received from the UE, otherwise;

such that the SMF ID includes a PLMN identity corresponding to the UE's HPLMN or the current PLMN, then:

A) the AMF shall store a PDU session routing context for the PDU session ID and the UE, shall set the SMF ID in the stored PDU session routing context to the retrieved SMF ID; and

B) the AMF shall forward the 5GSM message, the PDU session ID, the S-NSSAI, the mapped S-NSSAI (if available in roaming scenarios), the DNN (if received) and the request type towards the SMF identified by the SMF ID of the PDU session routing context;

v) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is included and is set to "initial emergency request", and the AMF does not have a PDU session routing context for another PDU session ID of the UE indicating that the PDU session is an emergency PDU session:

A) the AMF shall select an SMF. The AMF shall use the emergency DNN from the AMF emergency configuration data as the DNN, if configured. The AMF shall derive the SMF from the emergency DNN or use the statically configured SMF from the AMF emergency configuration data, if configured; and

B) if the SMF selection is successful:

- the AMF shall store a PDU session routing context for the PDU session ID and the UE, shall set the SMF ID in the stored PDU session routing context to the SMF ID of the selected SMF, and shall store an indication that the PDU session is an emergency PDU session in the stored PDU session routing context; and

- the AMF shall 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; and

vi) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is included and is set to "initial emergency request", and the AMF has a PDU session routing context indicating that the PDU session is an emergency PDU session for another PDU session ID of the UE:

A) the AMF shall store a PDU session routing context for the PDU session ID and the UE and shall set the SMF ID in the stored PDU session routing context to the SMF ID of the PDU session routing context for the other PDU session ID of the UE; and

B) the AMF shall 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; or

vii) 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 emergency PDU session", the AMF shall 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; and

viii) if the AMF does not have a PDU session routing context for the PDU session ID and the UE, the Request type IE is included and is set to "existing emergency PDU session", and the AMF retrieves an SMF ID associated with emergency services such that the SMF ID includes a PLMN identity corresponding to the current PLMN, then:

A) the AMF shall store a PDU session routing context for the PDU session ID and the UE, shall set the SMF ID in the stored PDU session routing context to the retrieved SMF ID; and

B) the AMF shall 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; or

2) the UE and the Old PDU session ID IE in case the Old PDU session ID IE is included, and:

i) 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 included and is set to "initial request", and the AMF received a reallocation requested indication from the SMF indicating that the SMF is to be reused, the AMF shall 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 SMF ID of the PDU session routing context for the old PDU session ID and the UE. If the DNN is a LADN DNN, the AMF shall determine the UE presence in LADN service area. The AMF shall forward the 5GSM message, the PDU session ID, the old PDU session ID, the S-NSSAI (if received), the mapped S-NSSAI (if available in roaming scenarios), the DNN, the request type and UE presence in LADN service area (if DNN received corresponds to an LADN DNN) towards the SMF identified by the SMF ID of the PDU session routing context;

ii) 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 included and is set to "initial request", and the AMF received a reallocation requested indication from the SMF indicating that the SMF is to be reallocated:

A) the AMF shall select an SMF with the following handling;

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

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

- 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

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

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

B) if the SMF selection is successful:

- the AMF shall store a PDU session routing context for the PDU session ID and the UE and set the SMF ID of the PDU session routing context to the SMF ID of the selected SMF; and

- the AMF shall 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, the request type, the MA PDU session information and UE presence in LADN service area (if DNN received corresponds to an LADN DNN) towards the SMF identified by the SMF ID of the PDU session routing context for the PDU session ID and the UE;

b) "SMS", the AMF shall forward the content of the Payload container IE to the SMSF associated with the UE;

c) "LTE Positioning Protocol (LPP) 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 UL NAS TRANSPORT message;

d) "SOR transparent container", the AMF shall forward the content of the Payload container IE to the UDM;

e) "UE policy container", the AMF shall forward the content of the Payload container IE to the PCF.

f) "UE parameters update transparent container", the AMF shall forward the content of the Payload container IE to the UDM.

g) "Location services message container":

1) if the Additional information IE is not included in the UL NAS TRANSPORT message, the AMF shall provide the Payload container type and the content of the Payload container IE to the location services application; and

2) if the Additional information IE is included in the UL NAS TRANSPORT message, the AMF shall forward the Payload container type and the content of the Payload container IE to an LMF associated with routing information included in the Additional information IE of the UL NAS TRANSPORT message.

h) "CIoT user data container", the AMF shall look up a PDU session routing context for the UE and the PDU session ID, and:

1) forward the content of the Payload container IE towards the SMF identified by the SMF ID of the PDU session routing context; and

2) initiate the release of the N1 NAS signalling connection:

i) if the Release assistance indication IE is included in the UL NAS TRANSPORT message and the DDX field of the Release assistance indication IE indicates "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

ii) upon subsequent delivery of the next received downlink data transmission to the UE if the Release assistance indication IE is included in the UL NAS TRANSPORT message and the DDX field of the Release assistance indication IE indicates "Only a single downlink data transmission and no further uplink data transmission subsequent to the uplink data transmission is expected".

i) "Multiple payloads", the AMF 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 AMF shall:

i) decode the payload container type field;

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

iii) 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 h) above according to the payload container type field.

\*\*\*\*\* 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:

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 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

b) otherwise, the AMF shall;

1) if the Payload container IE is included in the message and if the Payload container type IE is set to "CIoT user data container", the AMF shall 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 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 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 message, 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; and

5) 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.

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,

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 SERVICE ACCEPT message, then the UE shall perform a local release of all those PDU sessions which are active 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 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" if the user-plane resources cannot be established because the SMF indicated to the AMF that the resource is not available in the UPF (see 3GPP TS 29.502 [20A]).

NOTE: 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.

Editor's note: abnormal cases for the CONTROL PLANE SERVICE REQUEST on the UE and network side are FFS.

If the AMF sends a SERVICE ACCEPT message upon receipt of the CONTROL PLANE SERVICE REQUEST message with uplink data:

- if the UE has indicated support for the control plane CIoT 5GS optimizations; and

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

then the AMF shall include the 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.