**3GPP TSG-CT WG1 Meeting #133-eC1-216659**

**E-meeting, 11-19 November 2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.301** | **CR** | **3626** | **rev** | **1** | **Current version:** | **17.4.1** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Paging restrictions with Connection Release in EPS | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Apple, InterDigital, Nokia, Nokia Shanghai Bell, Samsung | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | MUSIM | | | | |  | ***Date:*** | | | 2021/10/25 |
|  |  | | | |  | |  | | |  |
| ***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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As per 24.301, subclause 5.6.1.1, among triggers to initiate the Service Request procedure we have the following case: 5.6.1.1 General This procedure is used when:  …  - the UE that is MUSIM capable and in EMM-IDLE mode requests the network to remove the paging restriction; or  And subsequently as per case o in subclause 5.6.1.1, we have:  o) the UE that is MUSIM capable and in EMM-IDLE mode is requesting the network to remove the paging restriction;  So, it seems the UE can initiate Service Request procedure just to remove the paging restrictions in EMM-IDLE mode in EPS. However, after removing the paging restrictions, there is no reason for UE to remain in connected mode. The UE can request the network to release the NAS signalling connection after completion of the Service Request procedure and return to idle mode as well. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | When a MUSIM capable UE in EMM-IDLE mode is requesting the network to remove the paging restrictions, it can also request the network to release the NAS signalling connection after completion of the Service Request procedure and return to idle mode. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The MUSIM capable UE will unnecessarily remain in connected mode longer than necessary resulting in network resources being tied up and UE draining battery power leading to sub-optimal experience. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.6.1.2.1, 5.6.1.2.2, 5.6.1.4.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

##### 5.6.1.2.1 UE is not using EPS services with control plane CIoT EPS optimization

For cases a, b, c, h, k, l and o when the UE wants to remove the paging restriction and then not release the NAS signalling connection in clause 5.6.1.1:

- if the UE is not configured for NAS signalling low priority, the UE initiates the service request procedure by sending a SERVICE REQUEST message to the MME;

- if the UE is configured for NAS signalling low priority, and the last received ATTACH ACCEPT message or TRACKING AREA UPDATE ACCEPT message from the network indicated that the network supports use of EXTENDED SERVICE REQUEST for packet services, the UE shall send an EXTENDED SERVICE REQUEST message with service type set to "packet services via S1"; or

NOTE: A UE configured for dual priority is configured for NAS signalling low priority indicator.

- if the UE is configured for NAS signalling low priority and the last received ATTACH ACCEPT message or TRACKING AREA UPDATE ACCEPT message from the network did not indicate that the network supports use of EXTENDED SERVICE REQUEST for packet services, the UE shall instead send a SERVICE REQUEST message.

For cases a, b, c, h, k, l, and o in clause 5.6.1.1, after sending the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message with service type set to "packet services via S1", the UE shall start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED.

For case d in clause 5.6.1.1, the UE shall send an EXTENDED SERVICE REQUEST message, start T3417ext and enter the state EMM-SERVICE-REQUEST-INITIATED.

For case e in clause 5.6.1.1:

- if the UE is in EMM-IDLE mode, the UE shall send an EXTENDED SERVICE REQUEST message, start T3417ext-mt and enter the state EMM-SERVICE-REQUEST-INITIATED;

- if the UE is in EMM-CONNECTED mode and if the UE accepts the paging, the UE shall send an EXTENDED SERVICE REQUEST message with the CSFB response IE indicating "CS fallback accepted by the UE", start T3417ext-mt and enter the state EMM-SERVICE-REQUEST-INITIATED; or

- if the UE is in EMM-CONNECTED mode and if the UE rejects the paging, the UE shall send an EXTENDED SERVICE REQUEST message with the CSFB response IE indicating "CS fallback rejected by the UE" and enter the state EMM-REGISTERED.NORMAL-SERVICE. The network shall not initiate CS fallback procedures.

For cases f, g, i and j in clause 5.6.1.1, the UE shall send an EXTENDED SERVICE REQUEST message, start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED.

For case o in clause 5.6.1.1, when the UE wants to remove the paging restriction and then release the NAS signalling connection, the UE shall send an EXTENDED SERVICE REQUEST message with Service type set to "packet services via S1"and set Request type to "NAS signalling connection release" in the UE request type IE. The UE shall start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED. The UE shall not include the Paging restriction IE in the EXTENDED SERVICE REQUEST message.

For cases p and q in clause 5.6.1.1, the UE shall send an EXTENDED SERVICE REQUEST message,

- for case p in clause 5.6.1.1, set Request type to "NAS signalling connection release" in the UE request type IE and Service type to "packet services via S1"; or

- for case q in clause 5.6.1.1, set Request type to "Rejection of paging" in the UE request type IE and Service type to "packet services via S1" if the UE needs to reject PS paging or to "mobile terminating CS fallback or 1xCS fallback" if the UE needs to reject CS paging; and

start T3417, enter the state EMM-SERVICE-REQUEST-INITIATED and may include its paging restriction preferences in the Paging restriction IE in the EXTENDED SERVICE REQUEST message.

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

##### 5.6.1.2.2 UE is using EPS services with control plane CIoT EPS optimization

The UE shall send a CONTROL PLANE SERVICE REQUEST message, start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED.

For case a in clause 5.6.1.1, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile terminating request". The UE may include the ESM DATA TRANSPORT message. The UE shall not include any ESM message other than ESM DATA TRANSPORT message.

For case b in clause 5.6.1.1,

- if the UE has pending IP, non-IP or Ethernet user data that is to be sent via the control plane radio bearers, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request". The UE shall include an ESM DATA TRANSPORT message in the ESM message container IE. If the UE supports the CP-EDT (see 3GPP TS 36.300 [20]), the UE shall provide the CONTROL PLANE SERVICE REQUEST message in the NAS request to the lower layer to establish a RRC connection as specified in clause 5.3.1.1.

For cases b and m in clause 5.6.1.1,

- if the UE has pending IP, non-IP or Ethernet user data that is to be sent via the user plane radio bearers, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile originating request" and the "active" flag in the Control plane service type IE to 1. The UE shall not include any ESM message container or NAS message container IE in the CONTROL PLANE SERVICE REQUEST message.

For case c in clause 5.6.1.1, the UE shall set the Control plane service type of the CONTROL PLANE SERVICE REQUEST message to "mobile originating request". If the CONTROL PLANE SERVICE REQUEST message is:

- for sending SMS , the UE shall include the SMS message in the NAS message container IE and shall not include any ESM message container IE in the CONTROL PLANE SERVICE REQUEST message; and

- for sending signalling different from SMS, the UE shall not include any ESM message container or NAS message container IE in the CONTROL PLANE SERVICE REQUEST message.

For cases p and q in clause 5.6.1.1, the UE shall send the CONTROL PLANE SERVICE REQUEST message,

- for case p in clause 5.6.1.1 set Request type to "NAS signalling connection release" in the UE request type IE and Control plane service type IE to "mobile originating request"; or

- for case q in clause 5.6.1.1 set Request type to "Rejection of paging" in the UE request type IE and Control plane service type IE to "mobile terminating request"; and

start T3417 and enter the state EMM-SERVICE-REQUEST-INITIATED. Further, the UE may include its paging restriction preferences in the Paging restriction IE in the CONTROL PLANE SERVICE REQUEST message and shall not include any ESM message container or NAS message container IE in the CONTROL PLANE SERVICE REQUEST message.

For case o in clause 5.6.1.1, the Control plane service type of the CONTROL PLANE SERVICE REQUEST message shall indicate "mobile originating request". The UE shall not include the Paging restriction IE and if the UE wants to remove the paging restriction and then release the NAS signalling connection, the UE shall set Request type to "NAS signalling connection release" in the UE request type IE, in the CONTROL PLANE SERVICE REQUEST message.

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

##### 5.6.1.4.1 UE is not using EPS services with control plane CIoT EPS optimization

If EMM-REGISTERED without PDN connection is supported by the UE and the MME and the MME has no active EPS bearer contexts for the UE, for cases a, b, c and o in clause 5.6.1.1, upon receipt of the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message for packet services, after completion of the EMM common procedures according to clause 5.6.1.3, if any, the MME shall send a SERVICE ACCEPT message.

If EMM-REGISTERED without PDN connection is supported by the UE and the MME and the UE has no active EPS bearer contexts, for cases a, b, c and o in clause 5.6.1.1, the UE shall treat the receipt of a SERVICE ACCEPT message as successful completion of the procedure. Otherwise, for cases a, b, c, h, k, l and o in clause 5.6.1.1, the UE shall treat the indication from the lower layers that the user plane radio bearer is set up as successful completion of the procedure. The UE shall reset the service request attempt counter, stop the timer T3417 and enter the state EMM-REGISTERED.

If the service type information element in the EXTENDED SERVICE REQUEST message indicates "mobile terminating CS fallback or 1xCS fallback" and the CSFB response IE, if included, indicates "CS fallback accepted by the UE", or if the service type information element in the EXTENDED SERVICE REQUEST message indicates "mobile originating CS fallback or 1xCS fallback" or "mobile originating CS fallback emergency call or 1xCS fallback emergency call", the network initiates CS fallback or 1xCS fallback procedures.

If the EPS bearer context status IE is included in the EXTENDED SERVICE REQUEST message, the network shall deactivate all those EPS bearer contexts locally (without peer-to-peer signalling between the network and the UE) which are active on the network side but are indicated by the UE as being inactive. If a default EPS bearer context is marked as inactive in the EPS bearer context status IE included in the EXTENDED SERVICE REQUEST message, and this default bearer is not associated with the last remaining PDN connection of the UE in the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE. If the default bearer is associated with the last remaining PDN connection of the UE in the MME, and EMM-REGISTERED without PDN connection is supported by the UE and the MME, the MME shall locally deactivate all EPS bearer contexts associated to the PDN connection with the default EPS bearer context without peer-to-peer ESM signalling to the UE.

If the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message for packet services, was sent in a CSG cell and the CSG subscription has expired or was removed for a UE, but the UE has a PDN connection for emergency bearer services established, the network shall accept the SERVICE REQUEST message or the EXTENDED SERVICE REQUEST message for packet services and deactivate all non-emergency EPS bearers locally. The emergency EPS bearers shall not be deactivated.

For cases d in clause 5.6.1.1, and for case e in clause 5.6.1.1 when the CSFB response was set to "CS fallback accepted by the UE", the UE shall treat the indication from the lower layers that the inter-system change from S1 mode to A/Gb or Iu mode is completed as successful completion of the procedure. The EMM sublayer in the UE shall indicate to the MM sublayer that the CS fallback procedure has succeeded. The UE shall stop the timer T3417ext or T3417ext-mt, respectively, and enter the state EMM-REGISTERED.NO-CELL-AVAILABLE.

If the service request procedure was initiated in EMM-IDLE mode and an EXTENDED SERVICE REQUEST message was sent in a CSG cell and the CSG subscription has expired or was removed for the UE, the network need not perform CSG access control if the service type information element indicates "mobile originating CS fallback emergency call or 1xCS fallback emergency call".

For cases f and g in clause 5.6.1.1:

- if the UE receives the indication from the lower layers that the signalling connection is released with the redirection indication to cdma2000® 1x access network or the indication from the lower layers that a change to cdma2000® 1x access network for 1xCS fallback has started (see 3GPP TS 36.331 [22]), the UE shall consider the service request procedure successfully completed, stop timer T3417 and enter the state EMM-REGISTERED.NO-CELL-AVAILABLE;

- if the UE receives the dual Rx/Tx redirection indication from the lower layers (see 3GPP TS 36.331 [22]), the UE shall select cdma2000® 1x access network for 1xCS fallback, consider the service request procedure successfully completed, stop timer T3417 and enter the state EMM-REGISTERED.NORMAL-SERVICE; and

- if the UE receives a cdma2000® signalling message indicating 1xCS fallback rejection by cdma2000® 1x access network, the UE shall abort the service request procedure, stop timer T3417 and enter the state EMM-REGISTERED.NORMAL-SERVICE.

For cases i and j in clause 5.6.1.1, if the UE receives the indication from the lower layers that the signalling connection is released, the UE shall consider the service request procedure successfully completed, stop timer T3417 and enter the state EMM-REGISTERED.NO-CELL-AVAILABLE.

For cases p and q in clause 5.6.1.1, when the UE supporting MUSIM in the EXTENDED SERVICE REQUEST message sets the Request type to "NAS signalling connection release" or to "Rejection of paging" in the UE request type IE, the UE shall treat the receipt of SERVICE ACCEPT message as the successful completion of the procedure and the UE shall reset the service request attempt counter, stop timer T3417 and enter the state EMM-REGISTERED.

For case o in clause 5.6.1.1, if the UE has included the UE request type IE with Request type to "NAS signalling connection release" in the EXTENDED SERVICE REQUEST message, the UE shall treat the receipt of SERVICE ACCEPT message as the successful completion of the procedure. The UE shall reset the service request attempt counter, stop timer T3417 and enter the state EMM-REGISTERED.

If the SERVICE REQUEST message or an EXTENDED SERVICE REQUEST message for packet services was used, the UE shall locally deactivate the EPS bearer contexts that do not have a user plane radio bearer established upon successful completion of the service request procedure, except for the case when the UE supporting MUSIM in the EXTENDED SERVICE REQUEST message sets the Request type to "NAS signalling connection release" or to "Rejection of paging" in the UE request type IE.

If the EXTENDED SERVICE REQUEST message is for CS fallback or 1xCS fallback and radio bearer establishment takes place during the procedure, the UE shall locally deactivate the EPS bearer contexts that do not have a user plane radio bearer established upon receiving a lower layer indication of radio bearer establishment. The UE does not perform local deactivation of EPS bearer contexts upon receiving an indication of inter-system change from lower layers.

If the EXTENDED SERVICE REQUEST message is for CS fallback or 1xCS fallback and radio bearer establishment does not take place during the procedure, the UE does not perform local deactivation of the EPS bearer context. The UE does not perform local deactivation of EPS bearer contexts upon receiving an indication of inter-system change from lower layers.

If a service request is received from a UE with a LIPA PDN connection, and if:

- a GW Transport Layer Address IE value identifying a L-GW is provided by the lower layer together with the service request, and the P-GW address included in the EPS bearer context of the LIPA PDN connection is different from the provided GW Transport Layer Address IE value (see 3GPP TS 36.413 [23]); or

- no GW Transport Layer Address is provided together with the service request by the lower layer;

then the MME shall locally deactivate all EPS bearer contexts associated with any LIPA PDN connection. Furthermore, if no active EPS bearer contexts remain for the UE, the MME shall not accept the service request as specified in clause 5.6.1.5.

If a service request is received from a UE with a SIPTO at the local network PDN connection, and if the PDN connection is a:

1) SIPTO at the local network PDN connection with stand-alone GW, and if:

- a LHN-ID value is provided by the lower layer together with the service request, and the LHN-ID value stored in the EPS bearer context of the SIPTO at the local network PDN connection is different from the provided LHN-ID value (see 3GPP TS 36.413 [23]); or

- no LHN-ID value is provided together with the service request by the lower layer; or

2) SIPTO at the local network PDN connection with collocated L-GW, and if:

- a SIPTO L-GW Transport Layer Address IE value identifying a L-GW is provided by the lower layer together with the service request, and the P-GW address included in the EPS bearer context of the SIPTO at the local network PDN connection is different from the provided SIPTO L-GW Transport Layer Address IE value (see 3GPP TS 36.413 [23]); or

- no SIPTO L-GW Transport Layer Address is provided together with the service request by the lower layer;

then, the MME takes one of the following actions:

- if all the remaining PDN connections are SIPTO at the local network PDN connections, the MME shall not accept the service request as specified in clause 5.6.1.5; and

- if a PDN connection remains that is not SIPTO at the local network PDN connection and the network decides to set up the S1 and radio bearers, the MME shall upon completion of the setup of the S1 bearers initiate an EPS bearer context deactivation procedure with ESM cause #39 "reactivation requested" for the default EPS bearer context of each SIPTO at the local network PDN connection (see clause 6.4.4.2).

NOTE: For some cases of CS fallback or 1x CS fallback the network can decide not to set up any S1 and radio bearers.

If the UE supporting MUSIM does not include the Paging restriction IE in the EXTENDED SERVICE REQUEST message, the MME shall delete any stored paging restriction preferences for the UE and stop restricting paging.

For cases p and q in clause 5.6.1.1 when the UE supporting MUSIM sets the Request type to "NAS signalling connection release" or to "Rejection of paging" in the UE request type IE in the EXTENDED SERVICE REQUEST message and if the UE requests restriction of paging by including the Paging restriction IE, the MME shall store the paging restriction preferences of the UE and enforce these restrictions in the paging procedure as described in clause 5.6.2.

When the E-UTRAN fails to establish radio bearers for one or more EPS bearer contexts, then the MME shall locally deactivate the EPS bearer contexts corresponding to the failed radio bearers based on the lower layer indication from the E‑UTRAN, without notifying the UE.

If the UE is not using EPS services with control plane CIoT EPS optimization, the network shall consider the service request procedure successfully completed in the following cases:

- when it receives an indication from the lower layer that the user plane is setup, if radio bearer establishment is required;

- otherwise when it receives an indication from the lower layer that the UE has been redirected to the other RAT (GERAN or UTRAN in CS fallback, or cdma2000® 1x access network for 1xCS fallback).

\*\*\* end of change \*\*\*