**3GPP TSG-CT WG1 Meeting #138-eC1-225755**

**E-Meeting, 10th – 14th October 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  |  | **CR** | **3798** | **rev** |  | **Current version:** |  |  |
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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 | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:***  | Clarification on disabling the E-UTRA capability and supporting S1 mode |
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| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** | 2022-09-28 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | An excerpt from TS 24.301 is shown as follows, in order to avoid unwanted handover between NR cells and LTE cells, the UE shall disable the E-UTRA capability although the UE supports S1 mode. “*When the UE supporting N1 mode together with S1 mode needs to stay in N1 mode, in order to prevent unwanted handover or cell reselection from NG-RAN to E-UTRAN, the UE shall disable the E-UTRA capability and:**- the UE shall set the S1 mode bit to "S1 mode not supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message (see 3GPP TS 24.501 [54]);**- the UE shall not include the S1 UE network capability IE in the REGISTRATION REQUEST message (see 3GPP TS 24.501 [54]); and**- the UE NAS layer shall indicate the access stratum layer(s) of disabling of the E-UTRA capability.*”As for the above description, two concepts (i.e., the UE supporting S1 mode or not and the UE enabling the E-UTRA capability or not) are comprehended. If the S1 mode is supported, the UE may enable or disable the E-UTRA capability. If the S1 mode is not supported, the UE is always disabling the E-UTRA capability.Note a similar description for SNPN in TS 24.501 subclause 5.5.1.2.2 quoted as follows, a statement for the S1 mode and E-UTRA capability is needed since both of them have similar logic. “*If the UE is not SNPN enabled, the UE is always considered to be not operating in SNPN access operation mode. If the UE is SNPN enabled, the UE can operate in SNPN access operation mode. Details of activation and deactivation of SNPN access operation mode at the SNPN enabled UE are up to UE implementation.*” |
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| ***Summary of change:*** | Add a clarification on the relationship between disabling E-UTRA capability and supporting S1 mode.  |
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| ***Consequences if not approved:*** | Confusing spec for implementers due to unclear relationship between disabling E-UTRA capability and supporting S1 mode. |
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| ***Clauses affected:*** | 4.5 |
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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 ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* First Change \* \* \* \*

## 4.5 Disabling and re-enabling of UE's E-UTRA capability

The UE shall only disable the E-UTRA capability when in EMM-IDLE mode.

When the UE supports both N1 mode and S1 mode then the UE's capability to access the 5GCN via E-UTRA shall not be affected, if the UE's E-UTRA capability is disabled or enabled.

If the UE does not support S1 mode, the UE is always considered to be disabling the E-UTRA capability. If the UE supports S1 mode, the UE can enable or disable E-UTRA capability.When the UE is disabling the E-UTRA capability not due to redirection to 5GCN required, it should proceed as follows:

a) select another RAT (GERAN, UTRAN, or NG-RAN if the UE has not disabled its N1 mode capability for 3GPP access as specified in 3GPP TS 24.501 [54]) of the registered PLMN or a PLMN from the list of equivalent PLMNs;

b) if another RAT of the registered PLMN or a PLMN from the list of equivalent PLMNs cannot be found, or the UE does not have a registered PLMN, then perform PLMN selection as specified in 3GPP TS 23.122 [6]. As an implementation option, instead of performing PLMN selection, the UE may select another RAT of the chosen PLMN. If disabling of E-UTRA capability was not due to UE initiated detach procedure for EPS services only, the UE may re-enable the E-UTRA capability for this PLMN selection; or

c) if no other allowed PLMN and RAT combinations are available, then the UE may re-enable the E-UTRA capability and remain registered for EPS services in E-UTRAN of the registered PLMN. If the UE chooses this option, then it may periodically attempt to select another PLMN and RAT combination that can provide non-EPS services. How this periodic scanning is done, is UE implementation dependent.

When the UE is disabling the E-UTRA capability upon receiving reject cause #31 "Redirection to 5GCN required" as specified in clauses 5.5.1.2.5, 5.5.1.3.5, 5.5.3.2.5, 5.5.3.3.5 and 5.6.1.5, it should proceed as follows:

i) If the UE is in NB-S1 mode:

1) if lower layers do not provide an indication that the current E-UTRA cell is connected to 5GCN or lower layers do not provide an indication that the current E-UTRA cell supports CIoT 5GS optimizations that are supported by the UE, search for a suitable NB-IoT cell connected to 5GCN according to 3GPP TS 36.304 [21];

2) if lower layers provide an indication that the current E-UTRA cell is connected to 5GCN and the current E-UTRA cell supports CIoT 5GS optimizations that are supported by the UE then perform a core network selection to select 5GCN as specified in 3GPP TS 24.501 [54] clause 4.8.4A.1; or

3) if lower layers cannot find a suitable NB-IoT cell connected to 5GCN or there is no suitable NB-IoT cell connected to 5GCN which supports CIoT 5GS optimizations that are supported by the UE, the UE, as an implementation option, may indicate to lower layers to remain camped in E-UTRA cell connected to EPC, may then start an implementation-specific timer and enter the state EMM-REGISTERED.LIMITED-SERVICE the UE may re-enable the E-UTRA capability for 3GPP access at expiry of the implementation-specific timer, if the timer had been started, and may then, proceed with the appropriate EMM procedure.

ii) If the UE is in WB-S1 mode:

1) if lower layers do not provide an indication that the current E-UTRA cell is connected to 5GCN or lower layers do not provide an indication that the current E-UTRA cell supports CIoT 5GS optimizations that are supported by the UE, search for a suitable E-UTRA cell connected to 5GCN according to 3GPP TS 36.304 [21];

2) if lower layers provide an indication that the current E-UTRA cell is connected to 5GCN and the current E-UTRA cell supports CIoT 5GS optimizations that are supported by the UE, then perform a core network selection to select 5GCN as specified in 3GPP TS 24.501 [54] clause 4.8.4A.1; or

3) if lower layers cannot find a suitable E-UTRA cell connected to 5GCN or there is no suitable E-UTRA cell connected to 5GCN which supports CIoT 5GS optimizations that are supported by the UE, the UE, as an implementation option, may indicate to lower layers to remain camped in E-UTRA cell connected to EPC, may then start an implementation-specific timer and enter the state EMM-REGISTERED.LIMITED-SERVICE the UE may re-enable the E-UTRA capability for 3GPP access at expiry of the implementation-specific timer, if the timer had been started, and may then, proceed with the appropriate EMM procedure.

The UE shall re-enable the E-UTRA capability when performing a PLMN selection unless:

- the disabling of E-UTRA capability was due to UE initiated detach procedure for EPS services only; or

- the UE has already re-enabled the E-UTRA capability when performing bullets b) or c) above.

If due to handover, the UE moves to a new PLMN in A/Gb, Iu, or N1 mode which is not in the list of equivalent PLMNs and not a PLMN memorized by the UE for which E-UTRA capability was disabled, and the disabling of E-UTRA capability was not due to UE initiated detach procedure for EPS services only, the UE shall re-enable the E-UTRA capability after the RR/RRC connection is released.

If UE that has disabled its E-UTRA capability due to IMS voice not available and CS fallback not available re-enables it when PLMN selection is performed, then it should memorize the identity of the PLMNs where E-UTRA capability was disabled and use that stored information in subsequent PLMN selections as specified in 3GPP TS 23.122 [6].

The UE may support "E-UTRA Disabling for EMM cause #15" and implement the following behaviour:

- if the "E-UTRA Disabling Allowed for EMM cause #15" parameter as specified in 3GPP TS 24.368 [15A] or 3GPP TS 31.102 [17] is present and set to enabled; and

- if the UE receives an ATTACH REJECT or TRACKING AREA UPDATE REJECT message including both EMM cause #15 "no suitable cells in tracking area" and an Extended EMM cause IE with value "E-UTRAN not allowed";

then the UE shall disable the E-UTRA capability, memorize the identity of the PLMN where the E-UTRA capability was disabled and use that stored information in subsequent PLMN selections as specified in 3GPP TS 23.122 [6].

When the UE supporting the A/Gb and/or Iu mode together with the S1 mode needs to stay in A/Gb or Iu mode, in order to prevent unwanted handover or cell reselection from UTRAN/GERAN to E-UTRAN, the UE shall disable the E-UTRA capability and:

- The UE shall not set the E-UTRA support bits of the MS Radio Access capability IE (see 3GPP TS 24.008 [13], clause 10.5.5.12a), the E-UTRA support bits of Mobile Station Classmark 3 IE (see 3GPP TS 24.008 [13], clause 10.5.1.7), the PS inter-RAT HO from GERAN to E-UTRAN S1 mode capability bit and the ISR support bit of the MS network capability IE (see 3GPP TS 24.008 [13], clause 10.5.5.12) in the ATTACH REQUEST message and the ROUTING AREA UPDATE REQUEST message after it selects GERAN or UTRAN;

- the UE shall use the same value of the EPC capability bit of the MS network capability IE (see 3GPP TS 24.008 [13], clause 10.5.5.12) in the ATTACH REQUEST message and the ROUTING AREA UPDATE REQUEST message; and

- the UE NAS layer shall indicate the access stratum layer(s) of disabling of the E-UTRA capability.

When the UE supporting N1 mode together with S1 mode needs to stay in N1 mode, in order to prevent unwanted handover or cell reselection from NG-RAN to E-UTRAN, the UE shall disable the E-UTRA capability and:

- the UE shall set the S1 mode bit to "S1 mode not supported" in the 5GMM Capability IE of the REGISTRATION REQUEST message (see 3GPP TS 24.501 [54]);

- the UE shall not include the S1 UE network capability IE in the REGISTRATION REQUEST message (see 3GPP TS 24.501 [54]); and

- the UE NAS layer shall indicate the access stratum layer(s) of disabling of the E-UTRA capability.

If the UE is disabling its E-UTRA capability before selecting to GERAN, UTRAN or NG-RAN radio access technology, the UE shall not perform the detach procedure of clause 5.5.2.1.

If the UE is required to disable the E-UTRA capability and select GERAN, UTRAN or NG-RAN radio access technology, and the UE is in the EMM-CONNECTED mode:

- if the UE has a persistent EPS bearer context and the ongoing procedure is not a detach procedure, then the UE shall wait until the radio bearer associated with the persistent EPS bearer context has been released;

- otherwise, the UE shall locally release the established NAS signalling connection and enter the EMM-IDLE mode before selecting GERAN, UTRAN or NG-RAN radio access technology.

If the E-UTRA capability was disabled due to the attempt to select GERAN or UTRAN radio access technology progressing the CS emergency call establishment (see clause 4.3.1), the criteria to enable the E-UTRA capability again is UE implementation specific.

If the E-UTRA capability was disabled due to the UE initiated detach procedure for EPS services only (see clause 5.5.2.2.2), upon request of the upper layers to re-attach for EPS services the UE shall enable the E-UTRA capability again. If the E-UTRA capability was disabled due to receipt of EMM cause #14 "EPS services not allowed in this PLMN", then the UE shall enable the E-UTRA capability when the UE powers off and powers on again or the USIM is removed. If E-UTRA capability was disabled for any other reason, the UE shall enable the E-UTRA capability in the following cases:

- the UE mode of operation changes from CS/PS mode 1 of operation to CS/PS mode 2 of operation;

- the UE mode of operation changes from PS mode 1 of operation to PS mode 2 of operation; or

- the UE powers off and powers on again or the USIM is removed;

As an implementation option, the UE may start a timer for enabling E-UTRA when the UE's attach attempt counter or tracking area updating attempt counter reaches 5 and the UE disables E-UTRA capability for cases described in clauses 5.5.1.2.6, 5.5.1.3.4.3, 5.5.1.3.6, 5.5.3.2.6, 5.5.3.3.4.3 and 5.5.3.3.6. The UE should memorize the identity of the PLMNs where E-UTRA capability were disabled. On expiry of this timer:

- if the UE is in Iu mode or A/Gb mode and is in idle mode as specified in 3GPP TS 24.008 [13] on expiry of the timer, the UE should enable the E-UTRA capability;

- if the UE is in Iu mode or A/Gb mode and an RR connection exists, the UE shall delay enabling E-UTRA capability until the RR connection is released;

- if the UE is in Iu mode and a PS signalling connection exists but no RR connection exists, the UE may abort the PS signalling connection before enabling E-UTRA capability;

- if the UE is in N1 mode and is in 5GMM-IDLE mode as specified in 3GPP TS 24.501 [54], on expiry of the timer, the UE should enable the E-UTRA capability; and

- if the UE is in N1 mode and is in 5GMM-CONNECTED mode as specified in 3GPP TS 24.501 [54], on expiry of the timer, the UE shall delay enabling the E-UTRA capability until the N1 NAS signalling connection is released.

If the UE attempts to establish an emergency bearer service or to access RLOS in a PLMN where the E-UTRA capability was disabled due to the UE's attach attempt counter or tracking area updating attempt counter have reached 5, the UE may enable the E-UTRA capability for that PLMN memorized by the UE.

The UE may support being configured for No E-UTRA Disabling In 5GS (see 3GPP TS 24.368 [50] or 3GPP TS 31.102 [17]). If the UE supports being configured for No E-UTRA Disabling in 5GS, No E-UTRA Disabling In 5GS is enabled if the corresponding configuration parameter is present and set to enabled. Otherwise, No E-UTRA Disabling In 5GS is disabled. If No E-UTRA Disabling In 5GS is enabled at the UE and the UE selects an NG-RAN cell in a PLMN where the E-UTRA capability was disabled due to the UE's attach attempt counter or tracking area updating attempt counter having reached 5, the UE shall enable the E-UTRA capability for that PLMN.

For other cases, it is up to the UE implementation when to enable the E-UTRA capability.

NOTE: If the UE is not operating in CS/PS mode 1 operation, the value of the timer for enabling E-UTRA capability is recommended to be not larger than the default value of T3402.

\* \* \* End of Changes \* \* \* \*