**3GPP TSG-SA5 Meeting #129-e *S5-201375rev2***

**Online, , 24th Feb 2020 - 4th Mar 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **32.422** | **CR** | **0316** | **rev** | **-** | **Current version:** | **16.0.0** |  |
|  |
| *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 | **X** | Core Network | **X** |

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|  |
| ***Title:***  | Add MDT signalling activation and deactionvation mechanisms for 5G |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** | 5GMDT |  | ***Date:*** | 2020-02-12 |
|  |  |  |  |  |
| ***Category:*** | B |  | ***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 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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Add MDT signalling activation and deactionvation mechanism for 5G |
|  |  |
| ***Summary of change:*** | Add signalling activation and deactivation mechanism for 5G in clause 4.1.2 and 4.1.4 to be aligned with corresponding work in RAN2 (Running CR R2-2000925 Endorsed as baseline). New reference is added. |
|  |  |
| ***Consequences if not approved:*** | MDT signalling activation and deactivation mechanism for 5G would be missing  |
|  |  |
| ***Clauses affected:*** | 2, 4.1.2.X, 4.1.2.X.1, 4.1.2.X.2, 4.1.2.X.3, 4.1.2.X.4, 4.1.4.X |
|  |  |
|  | **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***

# 2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

NOTE: Overall management principles are defined in 3GPP TS 32.101 [1].

[1] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".

[2] 3GPP TS 32.421: "Telecommunication management; Subscriber and equipment trace: Trace concepts and requirements".

[3] 3GPP TS 32.423: "Telecommunication management; Subscriber and equipment trace: Trace data definition and management".

[4] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[5] 3GPP TS 52.008: "Telecommunication management; GSM subscriber and equipment trace".

[6] 3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2".

[7] 3GPP TS 23.205: "Bearer-independent circuit-switched core network; Stage 2".

[8] 3GPP TS 23.108: "Mobile radio interface layer 3 specification, core network protocols; Stage 2 (structured procedures)".

[9] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

[10] 3GPP TS 29.232: "Media Gateway Controller (MGC) - Media Gateway (MGW); interface; Stage 3".

[11] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[12] 3GPP TS 29.060: "General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP) across the Gn and Gp interface".

[13] 3GPP TS 25.413: "UTRAN Iu interface Radio Access Network Application Part (RANAP) signalling".

[14] 3GPP TS 23.218: "IP Multimedia (IM) session handling; IM call model; Stage 2".

[15] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS); Stage 2".

[16] 3GPP TS 29.228: "IP Multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and message contents".

[17] 3GPP TS 29.328: "IP Multimedia Subsystem (IMS) Sh interface; Signalling flows and message contents".

[18] Enabler Release Definition for OMA Device Management Specifications, version 1.2, The Open Mobile Alliance™ (URL:http://www.openmobilealliance.org/).

[19] 3GPP TS 32.240: "Telecommunication management; Charging management; Charging architecture and principles".

[20] 3GPP TS 32.260: "Telecommunication management; Charging management; IP Multimedia Subsystem (IMS) charging".

[21] 3GPP TS 23.401: "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access".

[22] 3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".

[23] 3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Architecture description".

[24] 3GPP TS 32.442: "Telecommunication management; Trace management Integration Reference Point (IRP); Information Service (IS)".

[25] 3GPP TS 29.273: "Evolved Packet System (EPS); 3GPP EPS AAA interfaces".

[26] 3GPP TS 29.272: "Evolved Packet System (EPS); Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol".

[27] 3GPP TS 32.615: "Telecommunication management; Configuration Management (CM); Bulk CM Integration Reference Point (IRP): eXtensible Markup Language (XML) definitions".

[28] 3GPP TS 32.342: "Telecommunication management; File Transfer (FT) Integration Reference Point (IRP): Information Service (IS)".

[29] 3GPP TS 29.212: " Policy and Charging Control (PCC);Reference points".

[30] 3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT);Overall description; Stage 2".

[31] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol specification"

[32] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[33] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[34] 3GPP TS 29.274: "3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".

[35] 3GPP TS 32.622: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP): Network Resource Model (NRM)".

[36] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol".

[37] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN): Overall description stage 2".

[38] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer - Measurements".

[39] 3GPP TS 32.130: "Network sharing; Concepts and requirements".

[40] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[41] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2"

[42] 3GPP TS 38.300: "NR and NG-RAN Overall Description; Stage 2".

[43] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[44] 3GPP TS 38.401: "NG-RAN; Architecture Description".

[45] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[46] 3GPP TS 28.541: "Network Resource Model (NRM); Stage 2 and stage 3".

[X] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".

***Next change***

#### 4.1.2.X 5GC and NG-RAN Activation mechanism for MDT

##### 4.1.2.X.1 General

UE measurements activation extends the 5GC trace activation procedure, as described in 4.1.2.15. When a Trace Session is activated, configuration parameters of MDT are added into the message.

For IMSI/IMEI(SV)/IMEI-TAC/SUPI based UE selection, or IMSI/IMEI(SV)/IMEI-TAC/SUPI combined with geographical area information, UE performance measurements activation request is propagated to the selected UE.

This mechanism works for the following input parameters:

- IMSI only or

- IMSI and area information or

- IMEI(SV) only or

- IMEI(SV) and area information or

- IMEI-TAC only or

- IMEI-TAC and area information or

- SUPI only or

- SUPI and area information

After the IMSI, IMEISV, IMEI-TAC or SUPI type user attached to the network, the AMF shall forward the MDT configurations to the corresponding gNB which serves the IMSI, IMEISV, IMEI-TAC or SUPI type user. If the area criterion is specified and is not satisfied, the AMF shall keep the MDT configuration first and then forward it to the serving gNB only when the area criterion is satisfied.

**MDT criteria checking on gNB:**

- For immediate MDT, after gNB got the MDT configuration, the gNB can detect the area information and decide whether the selected IMSI/IMEISV/SUPI can fit into the criteria for initiating MDT data collection. If the area information criterion is not met, the gNB keeps the MDT configuration and propagates it during handover as specified in clause 4. 4.

- For logged MDT, the gNB will forward the MDT configuration criteria to the selected IMSI/IMEISV/SUPI. The area criteria checking will be done at UE side after UE received the MDT configuration criteria.

**MDT criteria checking on UE:**

- For immediate MDT, there is no need to do MDT criteria checking on UE.

- For logged MDT, the area criteria checking will be done at UE side after UE received the MDT configuration criteria.

In case of logged MDT, after UE receives from gNB the configuration parameters via the message RRC Connection Reconfiguration, it detects whether it stays within the specified area. If yes, the UE will execute measurement job. Otherwise UE will do nothing but waiting.

In case of Immediate MDT trace (e.g., IMSI/IMEI/SUPI based selection), the Immediate MDT trace session context of the UE shall be preserved in the network when the UE enters idle mode or inactive mode.

The Logged MDT MDT trace session is preserved in the UE until the duration time of the trace session expires, including also multiple idle periods interrupted by various state transistions such as idle-connected-idle state transitions.

The Logged MDT trace session context of the UE is stored in the network as long as the trace session is active, including also the periods when the UE is in connected state.

In the case of signalling based immediate MDT trace, if the UE is in inactive state at the time of receiving the immediate trace, then the gNB that receives this configuration shall store it. The gNB shall also forward it as part of UE context retrieval procedure to the cell in another node that the UE camped onto and is in connected mode.

Two scenarios shall be considered according to UE status when management system activates MDT job: before UE attachment, after UE attachment, different procedures are described in 4.1.2.X.1 and 4.1.2.X.3.

##### 4.1.2.X.2 Activation of MDT task before UE attaches to the network in 5GC and NG-RAN

As shown in figure 4.1.2.X.2.1, by adding configurations of MDT management system activate the Trace Session for MDT job.



Figure 4.1.2.X.2.1: Example of MDT activation procedure in 5GC and NG-RAN

The MDT activation procedure before UE attachment in 5GC is the same as in EPC, When UDM activates the trace, for MDT job, to the AMF the following configuration parameters shall be included in the message:

- Job Type

- IMSI or IMEISV or IMEI-TAC or SUPI

- Area scope (e.g. TA, Cell)

- Trace Reference

- List of measurements

- Reporting Trigger

- Report Interval

- Report Amount

- Event Threshold

- Logging Interval

- Logging duration

- Measurement period NR (if either of the measurements M4, M5 is requested)

- Collection period for RRM measurements NR (present only if any of M2 or M3 measurements are requested).

- Positioning method

- MDT PLMN List

Note that at the same time not all the parameters can be present. The conditions are described in clause 5.10 of the present document.

- IP address of Trace Collection Entity

The Specified geographical area field is available when IMSI/IMEI(SV)/IMEI-TAC/SUPI combined with geographical area are needed for UE selection.

When AMF activate MDT activation to gNB, the MDT configuration parameters can be included in the message in the Initial Context Setup:

- Area scope (TA, Cell)

- Trace Reference

- Trace Recording Session Reference

- List of measurements

- Reporting Trigger

- Report Amount

- Report Interval

- Event Threshold

- Logging Interval

- Logging Duration

- IP address of Trace Collection Entity

- Collection period for RRM measurements NR (present only if any of M2 or M3 measurements are requested).

- Measurement period NR (if either of the measurements M4, M5 is requested)

- Positioning method

- MDT PLMN List

 - MDT report type (periodical logged or event-triggered measurement) for logged MDT only

 - MDT specific events list for event-triggered measurement for logged MDT only

 - Area Configuration for neighbouring cells for logged MDT only

 - Sensor information for logged MDT and immediate MDT

##### 4.1.2.X.3 Activation of MDT task after UE attachment in 5GC and NG-RAN



Figure 4.1.2.X.3.1: Example of MDT activation in 5GC and NG-RAN after UE attachment

The MDT activation procedure after UE attachment in 5GC is the same as in EPC, When UDM activates the trace, for MDT job, to the AMF the following configuration parameters shall be included in the message:

- Area scope (TA, Cell)

- Trace Reference

- Trace Recording Session Reference

- List of measurements

- Reporting Trigger

- Report Amount

- Report Interval

- Event Threshold

- Logging Interval

- Logging Duration

- IP address of Trace Collection Entity

- Measurement period LTE (if either of the measurements M4, M5 is requested)

- Positioning method

- Collection period for RRM measurements LTE (present only if any of M2 or M3 measurements are requested)

- MDT PLMN List

 - MDT report type (periodical logged or event-triggered measurement) for logged MDT only

 - MDT specific events list for event-triggered measurement for logged MDT only

 - Area Configuration for neighbouring cells for logged MDT only

 - Sensor information for logged MDT and immediate MDT

In case of logged MDT and the UE is currently being in idle or inactive mode, the AMF is not required to initiate paging of the UE in order to send the configuration.

##### 4.1.2.x.4 Handling of various scenarios during MDT activation

Handling of various scenarios for Signalling based Logged/Immediate MDT are addressed below:

1) Management System initiating MDT activation shall validate that PLMNs specified in the MDT PLMN List are supported by all the cells specified in the area scope If the gNB receives a request where none of the PLMNs in the MDT PLMN List match any PLMN in its list, it shall ignore the request.

2) AMF shall be informed with a TRACE FAILURE INDICATION message if the gNB could not configure the UE because it was in the middle of a handover, see TS 38.413 [X]. AMF shall try to reactivate MDT in the target cell if the target cell scope meets the MDT criteria.

3) When the UE re-enters PLMN (specified in the MDT PLMN List) then the AMF shall be responsible for restarting the Immediate MDT activation (if it is as a result of an Xn handover then one option is AMF could use the path switch request as trigger). However, this is best effort. There can be cases where AMF may not be able to restart the MDT when the UE re-enters the PLMN (specified in the MDT PLMN List): for example: If the UE performs intra gNB handover where path switch is not necessarily sent, the AMF may not be able to restart MDT.

***Next change***

#### 4.1.4.X 5GC deactivation mechanisms for MDT

When the AMF receives a Trace Session Deactivation request for an MDT Trace Session of a UE, it shall act according to the following.

In case of an immediate MDT trace session and the UE being in connected mode, the AMF shall send trace session deactivation toward the eNB/gNB. The eNB/gNB shall deactivate the corresponding MDT RRC measurements in the UE and shall discard the given trace session context.

In case of an immediate MDT trace session and the UE being in idle mode, the AMF shall silently discard the stored trace session context.

In case of an immediate MDT trace session and the UE being in inactive state, the AMF that is aware of inactive state shall silently discard the stored trace session context.

Note: Signaling based deactivation does not apply for logged MDT or Logged MBSFN MDT trace sessions. The logged MDT and Logged MBSFN MDT trace session terminates when logging duration expires.

***End of changes***