**3GPP TSG-SA5 Meeting #145-e *S5-225169***

**Online, , 15th Aug 2022 - 24th Aug 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **32.422** | **CR** | **0400** | **rev** | **1** | **Current version:** | **17.7.1** |  |
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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 | **X** | Core Network |  |

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| ***Title:*** | Rel-17 CR TS 32.422 add Excess packet delay threshold for signalling-based and management-based MDT | | | | | | | | | |
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| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
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| ***Work item code:*** | e\_5GMDT | | | | |  | ***Date:*** | | | 2022-08-04 |
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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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
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| ***Reason for change:*** | | To support RAN2 and RAN3 for calculation of the PDCP Excess Packet Delay in the UL as LS R3-224079 described, this contribution proposes to add Excess packet delay threshold for signalling-based and management-based MDT. | | | | | | | | |
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| ***Summary of change:*** | | Add Excess packet delay threshould in the trace job. | | | | | | | | |
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| ***Consequences if not approved:*** | | Cannot support calculation of the PDCP Excess Packet Delay in the UL. | | | | | | | | |
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| ***Clauses affected:*** | | 4.1.1.9.2, 4.1.2.17.2, 4.1.2.17.3, 4.10, 5.10.x | | | | | | | | |
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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 | | | | TS28.622 CR S5-225170, TS 28.623 S5-225171 | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

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| **1st modified section** |

##### 4.1.1.9.2 NG-RAN activation mechanisms for management based MDT data collections without IMSI/IMEI(SV)/SUPI selection in the case of non-split architecture

For management based MDT data collection with no IMSI/IMEI(SV)/SUPI criteria in the case of non-split architecture, the UE selection can be done in the radio network at gNB based on the input information received from management system and the user consent information stored in the gNB. This mechanism works for the following OAM input parameters:

- Area information only

The following figure summarizes the flow as an example how the MDT configuration is done utilising the cell traffic trace functionality for this scenario:



Figure 4.1.1.9.2.1: Example for management based MDT activation in NG-RAN in the case of non-split architecture

Whenever the gNB receives the Management based MDT allowed IE in Initial Context Setup Request or in Handover Request message, it shall save it for possible later usage.

1) The management system sends a Trace Session activation request to the gNB. This request includes the parameters for configuring UE measurements:

- Job Type.

- Area Scope where the UE measurements should be collected: list of NG-RAN cells. Tracking Area should be converted to NG-RAN cell.

- List of Measurements.

- Reporting Trigger.

- Report Interval.

- Report Amount.

- Event Threshold.

- Logging Interval.

- Logging Duration.

- Trace Reference.

- TCE IP Address.

- Anonymization of MDT Data.

- Collection Period for RRM Measurements NR (present only if any of M4 or M5 measurements are requested).

- Collection Period M6 in NR (present only if any of M6 measurements (DL or UL) is requested).

- Collection Period M7 in NR (present only if any of M7 measurements (DL or UL)is requested).

- Positioning Method.

- MDT PLMN List.

- Report Type for Logged MDT (periodical logged or event-triggered measurement) for logged MDT only.

- Event Threshold, Hysteresis and Time to Trigger (present only if L1 event is configured for logged MDT)

- Event 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.

- Excess packet delay thresholds (present only if M6 UL measurements are requested).

Note that at the same time not all the parameters can be present. The criteria for which parameters are present are described in clause 5 of the present document.

2) When gNB receives the Trace Session activation request from its management system, it shall start a Trace Session and should save the parameters associated to the Trace Session.

3) gNB shall select the suitable UEs for MDT data collection. The selection is based on the area received from the management system and the area where UE is located, user consent information received from the core network as part of the Management based MDT PLMN List IE (As described in section in 4.9.2 of this document). If the user is not in the specified area or if the Management based MDT PLMN List IE is not present in the UE context the UE shall not be selected by the gNB for MDT data collection. During UE selection, the gNB shall take into account also the UE capability (MDT capability) when it selects UE for logged MDT configuration. If the UE does not support logged MDT, the UE shall not be selected.   
If M4 or M5 measurements are requested in the MDT configuration, gNB should start the measurement according to the received configuration. Details of the measurements are defined in TS 38.314 [50].

4) gNB shall activate the MDT functionality to the selected UEs. When gNB selects a UE, it shall take into account the availability of Management based MDT PLMN List IE in the user context and the area scope parameter received in MDT configuration (Trace Session activation). Detailed description about user consent handling and how it is provided to the gNB is described in section 4.9.2. If there is no Management based MDT PLMN List IE in the user context or the user is outside the area scope defined in the MDT configuration, the UE shall not be selected for MDT data collection. The gNB shall assign Trace Recording Session Reference corresponding to the selected UE. The gNB shall send at least the following configuration information to the UE in case of Logged MDT:

- Trace Reference

- Trace Recording Session Reference

- TCE Id (The value signalled as IP address of TCE from the EM is mapped to a TCE Id, using a configured mapping in the gNB)

- Logging Interval

- Logging Duration

- Absolute time reference

- Area Scope where the UE measurements should be collected: list of NG-RAN cells/TA.

- MDT PLMN List

NOTE: For UEs currently being in idle or inactive mode and camping in the cell the logged MDT configuration cannot be sent. These UEs may be configured when they initiate some activity (e.g., Service Request or Tracking Area Update) at next time.

In case of Immediate MDT, the following parameters shall be sent to the UE:

- List of Measurements

- Reporting Trigger

- Report Interval

- Report Amount

- Event Threshold

- Excess packet delay thresholds (present only if M6 UL measurements are requested)

Note that at the same time not all the parameters can be present. Conditions of the parameters are described in clause 5 of the present document.

gNB performs necessary actions (e.g. activates GNSS module of the UE, enables and collects certain positioning measurements) specified in TS 38.305 [xx] according to the value of Positioning Method (see clause 5.10.19) received in the Trace configuration. gNB captures location information and/or positioning measurements in the MDT trace record.

If Reporting Trigger parameter indicates that all configured RRM measurement trigger should be reported in MDT, then gNB should ask the UE to provide the "best effort" location information together with the measurement reporting by setting the *includeLocationInfo* IE in all RRC measurement reporting configurations.

5) When UE receives the MDT activation it shall start the MDT functionality based on the received configuration parameters.

6) The gNB shall not retrieve MDT report from the UE if UE’s rPLMN does not match the PLMN where TCE used to collect MDT data resides (e.g. gNB’s primary PLMN). When the gNB receives the MDT report from UE, the gNB shall get the Trace Recording Session Reference, Trace Reference and TCE Id from the report, and compare the Trace PLMN (PLMN portion of Trace Reference) with the PLMN where TCE used to collect MDT data resides (e.g. its primary PLMN) and discard MDT report in case of a mismatch. Otherwise if the MDT anonymization requires the IMEI-TAC in the MDT record gNB shall send the Trace Recording Session Reference, Trace Reference, serving cell CGI, and TCE IP Address in the CELL TRAFFIC TRACE message to the AMF via the NG connection. When AMF receives this NG signalling message containing the Trace Recording Session Reference, Trace Reference, serving cell CGI, and the Privacy Indicator (that shall be set to *Logged MDT* or *Immediate MDT* depending on the configured Job Type) if so indicated in the privacy indicator, the AMF shall look up the subscriber identities (IMEI(SV)) of the given call from its database, and send the IMEI-TAC together with the Trace Recording Session Reference and Trace Reference and for immediate MDT also the serving cell CGI to the TCE, as described in section 4.7 of the present document. For logged MDT, AMF will send the IMEI-TAC together with the Trace Recording Session Reference, Trace Reference to the TCE.

NOTE: For management based Immediate MDT, TRSR may be duplicated among different gNBs when multiple cells are selected as the area scope for the same MDT job. In this case, the combination of TRSR and the UE’s serving cell CGI in the MDT report can uniquely identify one trace recording session.

7) For Immediate MDT when the gNB receives the MDT report from the UE in the RRC message the gNB shall capture it and put the UE’s serving cell CGI together with the MDT report from the UE to the trace record. A UE configured to perform Logged MDT measurements in IDLE or INACTIVE indicates the availability of MDT measurements, by means of a one-bit indicator, in *RRCConnectionSetupComplete* message during connection establishment as specified in 3GPP TS 32.421 [2]. The gNB can decide to retrieve the logged measurements based on this indication by sending the UEInformationRequest message to the UE. The UE can answer with the collected MDT logs in UEInformationResponse message.

8) The gNB shall forward the Trace Records to the Trace Collection Entity (TCE). In case of logged MDT, the TCE Id is indicated in the MDT report is translated to the actual IP address of the TCE by the gNB before it forwards the measurement records. (The address translation is using configured mapping in the gNB.) In case of immediate MDT, the IP address of the TCE is indicated for the gNB in the trace configuration.

The Immediate MDT measurement configuration is deleted in the UE together with the RRC context when entering idle or inactive mode.

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

Management system shall validate that the MCC and MNC specified in the Trace Reference is the same as the PLMN supported by all the cells specified in the area scope. If the gNB receives a request with a PLMN in the TraceReference that does not match any PLMN in its list, it shall ignore the request.

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| **2nd modified section** |

##### 4.1.2.17.2 Activation of MDT task before UE attaches to the network in 5GC and NG-RAN

As shown in figure 4.1.2.17.2.1, by adding configurations of MDT management system activate the Trace Session for MDT job.



Figure 4.1.2.17.2.1: 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

- Trace Target: 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

- Collection Period for RRM Measurements NR (present only if any of M4 or M5 measurements are requested).

- Collection Period M6 in NR (present only if any of M6 measurements (DL or UL) is requested).

- Collection Period M7 in NR (present only if any of M7 measurements (DL or UL)is requested).

- Positioning Method

- MDT PLMN List

- Trace Collection Entity IP Address

- Excess packet delay thresholds (present only if M6 UL measurements are requested).

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.

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.

- Trace Collection Entity IP Address.

- Collection Period for RRM Measurements NR (present only if any of M4 or M5 measurements are requested).

- Collection Period M6 in NR (present only if any of M6 measurements (DL or UL) is requested).

- Collection Period M7 in NR (present only if any of M7 measurements (DL or UL)is requested).

- Positioning Method.

- MDT PLMN List.

- Report Type for Logged MDT (periodical logged or event-triggered measurement) for logged MDT only.

- Events List for Event-Triggered Measurement for logged MDT only.

- Event Threshold, Hysteresis and Time to trigger (present only if L1 event is configured for logged MDT).

- Area Configuration for Neighbouring Cells for logged MDT only.

- Sensor Information for logged MDT and immediate MDT.

- Excess packet delay thresholds (present only if M6 UL measurements are requested).

##### 4.1.2.17.3 Activation of MDT task after UE attachment in 5GC and NG-RAN



Figure 4.1.2.17.3.1: 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.

- Trace Collection Entity IP Address.

- Positioning Method.

- Collection Period for RRM Measurements NR (present only if any of M4 or M5 measurements are requested).

- Collection Period M6 in NR (present only if any of M6 measurements (DL or UL) is requested).

- Collection Period M7 in NR (present only if any of M7 measurements (DL or UL)is requested).

- MDT PLMN List.

- Report Type for Logged MDT (periodical logged or event-triggered measurement) for logged MDT only.

- Events List for Event-Triggered Measurement for logged MDT only.

- Event Threshold, Hysteresis and Time to Trigger (present only if L1 event is configured for logged MDT)..

- Area Configuration for Neighbouring Cells for logged MDT only.

- Sensor Information for logged MDT and immediate MDT.

- Excess packet delay thresholds (present only if M6 UL measurements are requested).

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.

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| **3rd modified section** |

## 4.10 Handling of MDT trace sessions at handover for immediate MDT in NG-RAN

The gNB shall activate the Immediate MDT in the UE if the area based selection conditions are satisfied or not in the target cell after a handover that is made over Xn or N2. If the area based selection conditions are not satisfied in the handover target cell, the gNB may deactivate the Immediate MDT in the UE. The trace sessions and trace recording sessions are not visible for the UE.

In case of signalling based trace activation , the gNB shall propagate the Trace Session parameters together with the MDT specific parameters to the target cell regardless of whether the source or target cell is part of the configured area scope in case of an Intra-PLMN handover over Xn or N2.

For NG-RAN, the MDT configuration received by signalling based trace messages for a specific UE will propagate during intra-PLMN handover and may propagate during inter-PLMN handover if the Signalling Based MDT PLMN List is available and includes the target PLMN. This behaviour applies also for MDT configuration that includes area scope, regardless of whether the source or target cell is part of the configured area scope.

For signalling based MDT configuration , when a UE that has been configured with MDT hands over to another gNB (i.e. in connected mode) and the Signalling Based MDT PLMN List conditions mentioned above are satisfied:

- with an Xn handover for the case of intra-RAT: the MDT configuration shall be passed to the gNB in the Xn handover request for continuity of MDT data collection. The new gNB shall stop the MDT collection if the new conditions are not within the criteria for MDT data collection.

- with an Xn handover for the case of inter-RAT: the MDT configuraiton shall be passed to the eNB or gNB in the Xn handover request for continuity of MDT data collection.

- with an N2 handover and with no AMF relocation: with N2 handover the AMF shall ensure the MDT configuration is sent to the new gNB.

- with an N2 handover and with AMF relocation: MDT configuration shall be passed on to the new AMF on AMF relocation. During inter-AMF handover, the AMF shall propagate the MDT configuration parameters to the target AMF within an N14- Forward Relocation Request message as part of inter-AMF handover procedures. The new AMF shall save the information as part of the UE context and forward the MDT configuration to the new gNB.

The following MDT configuration shall be passed during handovers (Either intra-gNB, inter-gNB or inter-AMF HO):

- Trace Reference

- Trace Recording Session Reference

- Area Scope

- List of Measurements

- Report Amount

- Reporting Trigger

- Event Threshold

- Report Interval

- TCE IP Address

- Job Type

- Positioning Method

- Collection period for RRM measurements NR (present only if any of M4 or M5 measurements are requested)

- Collection Period M6 in NR (present only if any of M6 measurements (DL or UL) is requested).

- Collection Period M7 in NR (present only if any of M7 measurements (DL or UL)is requested).

- MDT PLMN List

- Sensor Information

- Excess packet delay thresholds (present only if M6 UL measurements are requested).

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.

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| **4th modified section** |

### 5.10.x Excess packet delay thresholds

This conditional mandatory parameter defines the excess packet delay thresholds to enable the calculation of the PDCP Excess Packet Delay in the uplink in case of M6 uplink measurements are requested. This parameter is mandatory if the Job Type is set to Immediate MDT and the bit 12 of list of measurements parameter (defined in Section 5.10.3) in NR (M6 for UL) is set to 1.

The parameter can have the following values:

- Excess packet delay threshold

- 5QI value

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| **End modified section** |