**3GPP TSG-SA5 Meeting #155 *S5-243289***

Jeju, South Korea 27 - 31 May 2024

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **32.421** | **CR** | **0138** | **rev** | **2** | **Current version:** | **18.1.0** |  |
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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 | **X** | Core Network | **X** |

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| ***Title:*** | Rel-19 CR 32.421 Trace new RRC reports | | | | | | | | | |
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| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | S5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TraceQoE\_OAM | | | | |  | ***Date:*** | | | 2024-05-17 |
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| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *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:*** | | As of now, RAN2 has developed several RRC reports (RLF Report, RCEF Report, SHR, RE Report, SPR, MHI, VisitedCellInfoList) with the purpose of optimising mobility in the network. Two of these reports, RLF Report and RCEF Report can be explicitly retrieved by a MnS Consumer using Trace. However, a trace job can only trace one of the reports at the same time, not both reports.  If a Trace consumer would like to retrieve both these reports in the same trace job, or to trace one or more of the other RRC reports, the consumer would need to trace the complete RRC protocol. While this can be done, it carries an enormous overhead, as most RRC messages do not carry the RRC reports.  This CR, while being backwards compatible with current behaviour, adds the possibility for an MnS consumer to subscribe to any combination of the RRC reports, and to do so in an efficient manner. | | | | | | | | |
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| ***Summary of change:*** | | Addition of description, background, requirements and use case for being able to trace RRC reports.  Minor editorial corrections. | | | | | | | | |
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| ***Consequences if not approved:*** | | No efficient way for MnS consumers to efficiently subscribe to the existing and new RRC reports. | | | | | | | | |
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| ***Clauses affected:*** | | 1, 2, 3.2, 7, 7.X (new), 7.1, 7.2, A.X (new), A.X.1 (new), A.X.2 (new), A.X.3 (new), A.X.4 (new) | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Revision of S5-242845 of S5-241442 | | | | | | | | |

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# 1 Scope

The present document describes the requirements for the management of Trace and the reporting of Trace data (including FDD mode and TDD mode) across UMTS, EPS or 5G networks as it refers to subscriber tracing (tracing of IMSI or Public User Identity) and equipment tracing (tracing of IMEI or IMEISV). Trace also includes the ability to trace all active calls in a cell or multiple cells (Cell Traffic Trace). The present document also includes the description of Service Level Tracing (tracing of a specific service). It defines the administration of Trace Session activation/deactivation by the management system, the network or User Equipment (UE) itself via signalling, the generation of Trace results in the Network Elements (NEs) and UE and the transfer of these results to one or more Operations Systems.

GSM Trace is outside of the scope of this specification (see [7]).

The present document also describes the requirements for the management of Minimization of Drive Tests (MDT) across UMTS networks, EPS networks or 5G networks and Radio Link Failure (RLF) and RRC Connection Establishment Failure (RCEF) reporting across EPS networks and 5G networks.

Furthermore, it describes requirements for Random Access (RA) Report, Successful Handover Report (SHR), Successful PSCell Change Report (SPR), Mobility History Information (MHI) Report and VisitedCellInfoList reporting for 5G networks.

The present document is built upon the basic Subscriber and UE Trace concept described in clause 4.   
The high-level requirements for Trace data, Trace Session activation/deactivation and Trace reporting are defined in clause 5. Clause 5 also contains an overview of use cases for Trace (the use cases are described in Annex A). Clause 6 defines the requirements for managing MDT. Clause 7 defines the requirements for managing RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList reports. Trace control and configuration management are described in 3GPP TS 32.422 [2], and Trace data definition and management are described in 3GPP TS 32.423 [3].

The present document does not cover any Trace capability limitations within a NE (e.g. maximum number of simultaneous traced mobiles for a given NE) or any functionality related to these limitations (e.g. NE aborting a Trace Session due to resource limitations).

The objectives of the Trace specifications are:

a) to provide the descriptions for a standard set of Trace and MDT data;

b) to produce a common description of the management technique for Trace, MDT, RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList administration and result reporting;

c) to define a method for the reporting of Trace, MDT, RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList results across the management interfaces.

The following is beyond the scope of the present document, and therefore the present document does not describe:

- tracing non-Subscriber or non-UE related events within an NE;

- tracing of all possible parties in a multi-party call (although multiple calls related to the IMSI specified in the Trace control and configuration parameters are traceable).

The definition of Trace and MDT data is intended to result in comparability of Trace and MDT data produced in a multi-vendor wireless UMTS, EPS and/or 5G network(s), for those Trace control and configuration parameters that can be standardised across all vendors' implementations.

Vendor specific extensions to the Trace control and configuration parameters and Trace and MDT data are discussed in 3GPP TS 32.422 [2] and 3GPP TS 32.423 [3].

All functions (trace, MDT etc.) specified in this specification support Network Sharing, with the following conditions:

- It is accepted that the recorded information from the shared nodes is available to the Primary Operator. Recorded information that is collected in a non shared node or cell will only be available to the operator managing the non shared node or cell.

- It is accepted that the recorded information from the shared network shall be delivered to the Participating Operator whose PLMN recording is requested, taking user consent into account. Operators must also agree on sharing the information, but how that agreement is done is outside the scope of this specification. The mapping of TCE IP addresses and TCE addresses must be coordinated among the operators that shares the network. How that coordination is done is outside the scope of this specification.

- It is accepted that the inter-PLMN recorded information for Logged MDT from the non-shared nodes of Participating Operators may be available to the Primary Operator.

- For signalling based activation, the operators that share a network must coordinate the TCE IP addresses and the TCE address mapping must be coordinated. How that coordination´ is done is outside the scope of this specification.

For UMTS and EPS the 3GPP Management reference model, 3GPP TS 32.101 [1] is followed.

For 5GS the 3GPP Services Based Management Architecture, 3GPP TS 28.533 [20] is followed.

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# 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*.

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

[2] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace: Trace control and configuration management".

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

[4] 3GPP TS 23.002: "Network architecture".

[6] Void

[7] 3GPP TS 52.008: "Telecommunication management; GSM subscriber and equipment trace".

[8] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[9] OMA Service Provider Environment Requirements, OMA-RD-OSPE-V1\_0-20050614-C, The Open Mobile Alliance™ ([URL:http://www.openmobilealliance.org/](http://www.openmobilealliance.org/)).

[10] 3GPP TS 33.401: "System Architecture Evolution (SAE); Security architecture".

[11] 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".

[12] 3GPP TS 32.450: "Key Performance Indicators (KPI) for Evolved Universal Terrestrial Radio Access Network (E-UTRAN): Definitions".

[13] 3GPP TS 32.130: "Network sharing; Concepts and requirements".

[14]3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[15] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[16] 3GPP TS 38.300: "NR and NG-RAN Overall Description; Stage 2".

[17] 3GPP TS 38.401: "NG-RAN; Architecture Description".

[18] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification".

[19] 3GPP TS 25.331: "Radio Resource Control (RRC); protocol specification".

[20] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)"

[21] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)"

[22] 3GPP TS 28.533: "Management and orchestration; Architecture framework"

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

NOTE: Void.

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## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TS 21.905 [8], TS 32.101 [1], TS 32.130 [13], TS 23.501 [15], TS 38.300 [16] and the following apply:

MHI Mobility History Information

RA Random Access

RCEF RRC Connection Establishment Failure

RLF Radio Link Failure

SHR Successful Handover Report

SPR Successful PSCell Change Report

TCE Trace Collection Entity

TCE Trace Collection Entity

SCGF Secondary Cell Group Failure

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# 7 Requirements for managing RRC reports

## 7.X General

The term *RRC reports* is used for the RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList reports for NG-RAN. A NG-RAN node can configure the UE so these reports are generated when specific triggers occur. The UE will notify the NG-RAN node when the reports are available, and the NG-RAN node can subsequently retrieve the reports.

## 7.1 Business level requirements

REQ-RLF-CON-1 The Operator shall be able to collect RLF and RCEF reports from eNBs within their network.

REQ-RLF-CON-2 The collected reports shall be made available in a centralised entity.

REQ-RLF-CON-3 The Operator shall be able to select certain areas for collecting reports.

REQ-RLF-CON-4 The Operator shall be able to collect RLF and RCEF reports from NG-RAN nodes within their network. The Operator shall be able to collect RRC reports from NG-RAN nodes within their network.

## 7.2 Specification level requirements

REQ-RLF-FUN-01 It shall be possible to collect RLF and RCEF reports in one or more eNodeBs.

REQ-RLF-FUN-02 It shall be possible to activate a Trace Session for reports data collection independently from other Trace jobs.

REQ-RLF-FUN-03 It shall be possible to collect reports in one or more NG-RAN nodes.

REQ-RLF-FUN-04 In case of non-file-based trace reporting, binary encoding or GPB shall be used for the transfer of all reports data from data producer to the data consumer.

REQ-RLF-FUN-05 It shall be possible to collect neighbour cell measurements for RLF and RCEF reports in one or more eNodeBs and NG-RAN nodes. It shall be possible to collect neighbour cell measurements for RRC reports in one or more NG-RAN nodes.

REQ-RLF-FUN-06 It shall be possible to collect SCGF information for RLF reports in one or more RAN nodes in the case of MR-DC scenario.

REQ-RLF-FUN-07 It shall be possible to select one, many or all of the RRC reports in a Trace session.

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## A.X Use case #X Collecting RRC reports for analytics

### A.X.1 Goal

Improving and optimising mobility management configuration in network nodes is important to reduce handover failures, poor coverage and low QoE. These improvements and optimisations can be done in the network nodes and also in the OAM system.

To aid this optimisation, RAN3 has defined a set of RRC [X] reports that can be generated by the UE and retrieved by a network node (for example a gNB). These reports consist of the RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList reports for NR.

These reports can be used by network nodes themselves for use by, for example, a decentralized SON function. In rel-18, two of these reports (RLF and RCEF) can also be used by a consumer of Trace reports, for example a centralised SON function or an AI/ML function in the OAM system.

The goal is to make all reports (RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList) available to MnS consumers, for example centralised SON functions, MDAS or NWDAF.

### A.X.2 Pre-conditions

The consumers of the data are operational.

The consumers have subscribed to one or many of the RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList reports.

### A.X.3 Description/steps

1. The consumer(s) subscribe to Trace job(s), indicating one, many or all of the RLF, RCEF, RA, SHR, SPR, MHI and VisitedCellInfoList reports from network nodes.

2. When consumer(s) no longer are interested in the reports, the consumer(s) stops subscribing to the trace(s).

### A.X.4 Post-conditions

Consumers no longer retrieve RRC reports.

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| \*\*\* END OF CHANGES \*\*\* |