

ETSI TS 132 421 V13.1.0 (2019-10)



**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);**

LTE;

**Telecommunication management;
Subscriber and equipment trace;
Trace concepts and requirements
(3GPP TS 32.421 version 13.1.0 Release 13)**



Reference

RTS/TSGS-0532421vd10

Keywords

GSM,LTE,UMTS**ETSI**

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2019.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

3GPP™ and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M™ logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	5
Introduction	6
1 Scope	7
2 References	8
3 Definitions, symbols and abbreviations	9
3.1 Definitions	9
3.2 Abbreviations	11
4 Trace concepts and high-level architecture	12
4.1 Trace concepts	12
4.2 Trace high level Architecture	14
4.3 Service Level Tracing for IMS high level Architecture	17
5 Trace requirements	19
5.1 General trace requirements	19
5.2 Requirements for Trace data	20
5.3 Requirements for Trace activation	21
5.3.1 Requirements for Trace Session activation	21
5.3.2 Requirements for starting a Trace Recording Session	23
5.4 Requirements for Trace deactivation	25
5.4.1 Requirements for Trace Session deactivation	25
5.4.2 Requirements for stopping a Trace Recording Session	25
5.5 Requirements for Trace Data reporting	27
5.6 Requirements for Privacy and Security	29
5.7 Requirements for Charging	29
5.8 Use cases for Trace	30
6 Requirements for managing MDT	31
6.1 Business Level Requirements	31
6.2 Specification level requirements	32
6.2.1 Logged MDT and Immediate MDT requirements	32
6.2.2 Logged MBSFN MDT requirements	33
7 Requirements for managing RLF and RCEF reports	35
7.1 Business level requirements	35
7.2 Specification level requirements	35
Annex A (informative): Trace use cases	36
A.1 Use case #1: multi-vendor UE validation	36
A.1.1 Description	36
A.1.2 Example of required data for this use case	36
A.2 Use case #2: subscriber complaint	36
A.2.1 Description	36
A.2.2 Example of required data for this use case	37
A.3 Use case #3: malfunctioning UE	38
A.3.1 Description	38
A.3.2 Example of required data for this use case	38
A.4 Use case #4: checking radio coverage	38
A.4.1 Description	38
A.4.2 Example of required data to cover use case #4	38

A.5	Use case #5: testing a new feature.....	39
A.5.1	Description	39
A.5.2	Example of required data to cover use case #5.....	39
A.6	Use case #6: fine-tuning and optimisation of algorithms/procedures	40
A.6.1	Description	40
A.6.2	Example of required data to cover use case #6.....	41
A.7	Use case #7: Automated testing of Service Provider services.....	41
A.7.1	Description	41
A.8	Use case #8: Regression testing following a network fix.....	41
A.8.1	Description	41
A.9	Use case #9: Service fault localization within a Service Provider network	41
A.9.1	Description	41
A.10	Use case #10: Service fault localization when a service is hosted by a third party Service Provider	41
A.10.1	Description	41
A.11	Use case #11 Analysing drop calls in E-UTRAN	42
A.11.1	Description	42
A.11.2	Example of required data to cover use case #11.....	42
A.12	Use case #12 Periodical sampling of network performance	42
A.12.1	Description	42
A.12.2	Example of required data to cover use case #12.....	42
A.13	Use case #13 Differentiation of area based MDT data by terminal type.....	43
A.13.1	Description	43
A.13.2	Example of required data to cover use case #13.....	43
A.14	Use case #14 Subscriber complaint about MBMS service in the eUTRAN network	43
A.14.1	Description	43
A.14.2	Example of required data to cover use case #14.....	43
A.15	Use case #15 Check MBMS service quality and performance of the eUTRAN Network.....	44
A.15.1	Description	44
A.15.2	Example of required data to cover use case #15.....	44
Annex B (informative):	Change history	45
	History	47

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

ETSI STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/6992750c-c598-402e-bdf5-5a704e1cb317/etsi-ts-132-421-v13.1.0-2019-10>

Introduction

The present document is part of a TS-family covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication management, as identified below:

TS 32.421: "Subscriber and equipment trace: Trace concepts and requirements";

TS 32.422: "Subscriber and equipment trace: Trace control and configuration management";

TS 32.423: "Subscriber and equipment trace: Trace data definition and management";

Subscriber and equipment trace provide very detailed information at call level on one or more specific mobile(s). This data is an additional source of information to Performance Measurements and allows going further in monitoring and optimisation operations.

Contrary to Performance measurements, which are a permanent source of information, trace is activated on user demand for a limited period of time for specific analysis purposes.

Trace plays a major role in activities such as determination of the root cause of a malfunctioning mobile, advanced troubleshooting, optimisation of resource usage and quality, RF coverage control and capacity improvement, dropped call analysis, Core Network and UTRAN end-to-end UMTS procedure validation.

The capability to log data on any interface at call level for a specific user (e.g. IMSI) or mobile type (e.g. IMEI or IMEISV), or service initiated by a user allows getting information which cannot be deduced from Performance measurements such as perception of end-user QoS during his call (e.g. requested QoS vs. provided QoS), correlation between protocol messages and RF measurements, or interoperability with specific mobile vendors.

Moreover, performance measurements provide values aggregated on an observation period; Subscriber and UE Trace give instantaneous values for a specific event (e.g. call, location update, etc.).

If performance measurements are mandatory for daily operations, future network planning and primary trouble shooting; Subscriber and UE Trace is the easy way to go deeper into investigation and UMTS network optimisation.

In order to produce this data, Subscriber and UE Trace are carried out in the NEs, which comprise the network. The data can then be transferred to an external system (e.g. an Operations System (OS) in TMN terminology, for further evaluation).

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 networks or EPS 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 Element Manager (EM), 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, i.e. EM(s) and/or Network Manager(s) (NM(s)).

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 or EPS networks and Radio Link Failure (RLF) reporting across EPS 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 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 and RLF administration and result reporting;
- c) to define a method for the reporting of Trace, MDT and RLF 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 and/or EPS 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 Master 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 Master 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.
- The 3GPP Management reference model, 3GPP TS 32.101 [1] is followed.

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] 3GPP TS 29.207: "Policy control over Gx interface".
- [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".

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

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 21.905 [8] , 32.130 and the following apply:

Cell Traffic Trace: The ability to trace one or more active calls in one or more cells.

Collection Period: TBD

Editor's note: This definition requires RAN2 input.

End user visible events: Refer to OMA Service Provider Requirements [9].

Immediate MDT: See 3GPP TS 37.320 [11].

Logged MDT: See 3GPP TS 37.320 [11].

management activation/deactivation: Trace Session is activated/deactivated in different NEs directly from the EM using the management interfaces of those NEs.

MDT Measurements: See 3GPP TS 37.320 [11].

MBSFN Area: See 3GPP TS 36.300 [14].

MBSFN Area Reserved Cell: See 3GPP TS 36.300 [14].

Signalling Based Activation/Deactivation: Trace Session is activated/deactivated in different NEs using the signalling interfaces between those elements so that the NEs may forward the activation/deactivation originating from the EM

System Context: two different realisations of the telecommunication management architecture. System Context A has the Itf-N between a Network Manager and an Element Manager. System Context B has the Itf-N between a Network Manager and a Network Element that has an embedded Element Manager. See figure 1 in TS 32.101 [1].

Reporting Period: TBD

Editor's note: This definition requires RAN2 input.

Trace: general term used for Subscriber, Equipment and Service Trace.

Trace record: in the NE a Trace record is a set of Traceable data collected as determined by the Trace control and configuration parameters.

Trace Recording Session: time interval within a Trace Session while trace records are generated for the Subscriber, UE or Service being traced. The triggering events starting and stopping a Trace Recording Session are defined in 3GPP TS 32.422 [2] (see figure 1).

Trace Recording Session Reference: identifies a Trace Recording Session within a Trace Session (see figure 1)

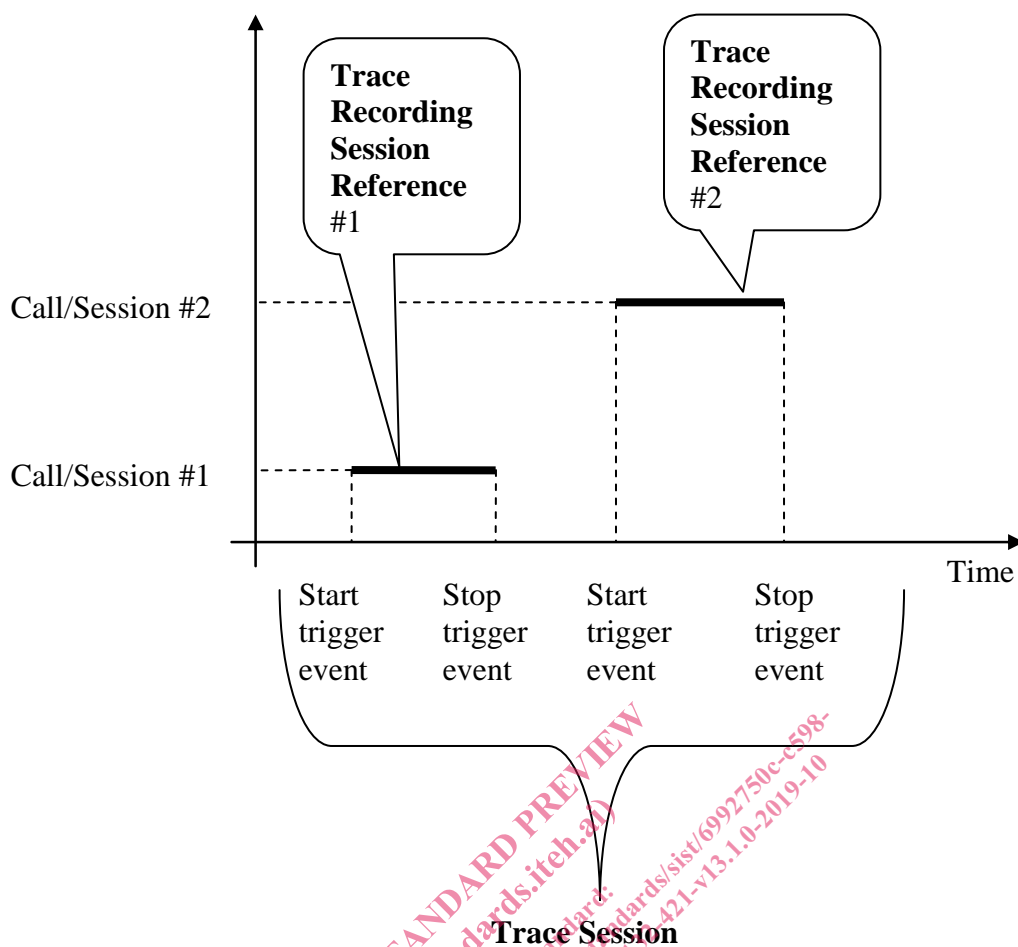


Figure 1: Trace Recording Session

Note that overlapping calls/sessions are possible for e.g. Cell Traffic Trace.

Trace Reference: identifies a Trace Session and is globally unique (see figure 2)

Trace Session: time interval started with a Trace Session Activation and lasts until the Deactivation of that specific Trace Session (see figure 2)

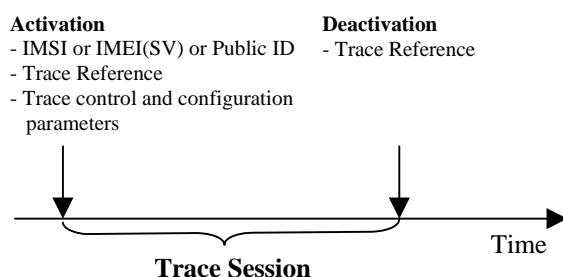


Figure 2: Trace Session

Trace Parameter Configuration: a technique whereby a request for tracing a certain Subscriber, UE or Service is sent by the EM to the NE for execution.

Trace Parameter Propagation: a technique by which the NE processes the trace configuration (received from the EM or another NE) and sends it to the relevant Network Element(s) via signalling interface(s).

Service Level Tracing: Refer to OMA Service Provider Requirements [9].

3.2 Abbreviations

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

MBSFN	MBMS over a Single Frequency Network
MBMS	Multimedia Broadcast Multicast Services
MDT	Minimization of Drive Tests
RCEF	RRC Connection Establishment Failure
RLF	Radio Link FailureTCE Trace Collection Entity

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/6992750c-c598-402e-bdf5-5a704e1cb317/etsi-ts-132-421-v13.1.0-2019-10>