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Foreword

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Contents

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.

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:

32.441 "Trace Management Integration Reference Point (IRP); Requirements".

32.442 "Trace Management Integration Reference Point (IRP); Information Service (IS)".

32.446 "Trace Management Integration Reference Point (IRP); Solution Set (SS) definitions".

The present document is part of a TS-family which describes the requirements and information model necessary for the Telecommunication Management (TM) of 3G systems. The TM principles and TM architecture are specified in 3GPP TS 32.101 [2] and 3GPP TS 32.102 [3].

Trace provides very detailed information on call level for a specific subscriber or MS. This data is an additional information source to Performance Measurements and allows deeper investigations in problems solving or in case of optimization.

1 Scope

The present document specifies the overall requirements for the Trace Management Integration Reference Point (TraceIRP) as it applies to Itf-N.

The Trace IRP supports the operations that are required for the Subscriber and Equipment trace and the Cell Traffic Trace functionalities.

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 TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 32.101: "Telecommunication management; Principles and high level requirements".

[3] 3GPP TS 32.102: "Telecommunication management; Architecture".

[4] 3GPP TS 32.421: "Telecommunication management; Subscriber and equipment trace; Trace concepts and requirements".

[5] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[6] 3GPP TS 32.423: "Telecommunication management; Subscriber and equipment trace; Trace data definition and management".

[7] 3GPP TS 32.341: "Telecommunication management; File Transfer (FT) Integration Reference Point (IRP): Requirements".

[8] 3GPP TS 32.342: "Telecommunication management; File Transfer (FT) Integration Reference Point (IRP): Information Service (IS)".

[9] 3GPP TS 32.343: "Telecommunication management; File Transfer (FT) Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)".

[10] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and definitions".

[11] 3GPP TS 32.301: "Notification Integration Reference Point (IRP): Requirements".

[12] 3GPP TS 32.302: "Notification Integration Reference Point (IRP): Information Service (IS)".

[13] 3GPP TS 32.303: "Notification Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)".

[14] 3GPP TS 32.305:"Configuration Management (CM); Notification Integration Reference Point (IRP): eXtensible Markup Language (XML) definition".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] apply.

NOTE: A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

4 Trace Concepts

Trace Concepts are defined in 3GPP TS 32.421 [4].

5 Trace Requirements

5.1 Trace Management and Itf-N

The Itf-N may connect the Network Management system to the EM, which can be located in either the DM (system context A) or in the NE (system context B). This is done by means of Integration Reference Points (IRPs).

This clause describes the properties of an interface enabling a NM to monitor a 3G-telecommunication network including - if necessary - the managing EMs. To provide to the NM the Trace Management capability for the network implies that the NM and the EM have to agree on the following:

- The identification of the NEs and UE where the Trace Session Activation is requested.
- The identification of the files containing the trace records for retrieval by a Trace Collection Entity.
- The identification of the subscriber or equipment shall be provided in the trace record files in case of subscriber and equipment trace. In case of Cell Traffic trace the cell identity shall be provided in the trace record file. In the case of trace in E-UTRAN, as neither the subscriber identity nor the equipment identity are provided to eNodeB, none of these identifiers are provided in the trace record files from the eNodeB. The connection to which subscriber or equipment is traced is made by the node that triggers the trace recording session to a Trace Collection Entity which collects the trace logs (indicated by the IP address in the Trace Session's configuration parameters). The connection is done by the triggering node providing the identifier of the subscriber or equipment together with the Trace Reference and the Trace Recording Session Reference in a trace log file or a notification (as the Trace Reference and the Trace Recording Session Reference are included in the trace record files from the eNodeBs).
- Notification of available files containing trace records for retrieval by a collection point indicated by an IP address. The Trace Collection Entity may be part of the NM.
- The network configuration (see the NRM IRPs in 3GPP TS 32.6xy and 32.7xy).

5.2 Managing Trace Sessions

The IRPManager shall be able to request the IRPAgent to:

- Activate a Trace Session for a specific subscriber or equipment in a specific NE. The trace session activation shall be possible both for management based activation and for signalling based activation. The NM may schedule the activation. Note that no scheduling functionality is supported by the IRPAgent. The trace session activation shall also be possible for for cell traffic trace.
- Make the Trace Records in a file available to a Trace Collection Entity. The data format of the file shall be specified in the 3GPP defined trace specifications (See 3GPP TS 32.423 [6]).
- Emit a notification when a Trace Session is activated from the EM directly.
- Emit a notification when a Trace Recording Session was not started in the NE for any reason.
- Interrogate the configuration parameters and other information of a specific Trace Session.
- Interrogate the list of activated Trace Sessions in a specific NE. The Trace Session is identified by the Trace Reference. In case of cell traffic trace the activated Trace Session can be requested for a Trace Reference or a cell identity.
- Deactivate a Trace Session for a specific subscriber or equipment for a specific Trace Session. The trace session deactivation shall be possible for both management based activation and for signalling based activation. The NM may schedule the deactivation. Note that no scheduling functionality is supported by the IRPAgent. The Trace Session deactivation shall also be possible for for cell traffic trace.

The Trace Session Deactivation shall target the same NE as the Trace Session Activation. If the trace session is activated in more than one NE, the trace session shall be deactivated in all those NEs. During Trace Session deactivation the Trace Reference and shall be given. In case of a failed Trace Session Deactivation there shall be a mechanism to ensure that unnecessary Trace Sessions will nor remain active in the network (i.e. send Trace Session Deactivation multiple times, etc.).

The Trace Reference must be unique within the PLMNs where trace is requested when a Trace Session is activated.

It shall be possible that an IRPManager activates/deactivates a Trace Session to multiple NEs for multiple subscribers or equipments.

The IRPManager is responsible for scheduling the Trace Session Activation and Deactivation, i.e. there is no requirement on Itf-N due to scheduling the Trace Session Activation/Deactivation.

5.3 Management of trace record files

5.3.1 General

The IRPManager shall be able to:

- Request a list of available files.
- Request the IRPAgents to emit a notification announcing the availability of the Trace Record files.

For information:

- The requirements for trace record file management may be satisfied by a separate File Transfer IRP.

NOTE: In case of Signalling Based Activation the trace record files may be transferred from a different EM than the Trace Session Activation is sent to! In order to find always the appropriate collection point the IP address of Trace Collection Entity shall be part of the trace control and configuration parameter that needs to be propagated during Trace Session activations.

5.3.2 Managing trace records for roaming cases (inter-operator cases)

It is possible that Trace Session Activation/Deactivation goes across Operator's boundaries. Trace Records may contain sensible information therefore the exchange of trace records between operators are subject to agreements between operators, therefore this case is out of the scope of the present document.

5.3A Requirements specific for managing MDT

All requirements are valid for Logged MDT and Immediate MDT functionality if not mentioned otherwise:

REQ-MDTMGMT-FUN-01 The IRPManager shall be able to configure MDT data collection for one or more IMEI(SV) number.

REQ-MDTMGMT-FUN-02 The IRPManager shall be able to configure MDT data collection for one or more IMSI number.

REQ-MDTMGMT-FUN-03 Each UE measurement result shall be linked to a time stamp. Accuracy of time information (absolute time, relative time) is FFS in RAN. (Editor"s Note: FFS in RAN)

REQ-MDTMGMT-FUN-04 The solutions for collecting UE measurements for the purpose of minimization of drive tests shall be able to work independently from SON support in the network.

REQ-MDTMGMT-FUN-05 The IRPManager shall be able to configure MDT data collection in one or more cells or TA/RA/LA.

REQ-MDTMGMT-FUN-06 The IRPManager shall be able to configure MDT data collection for one or more IMSI in one or more cells or TA/RA/LA.

REQ-MDTMGMT-FUN-07 The IRPManager shall be able to configure MDT data collection for one or more IMEI(SV) in one or more cells or TA/RA/LA.

REQ-MDTMGMT-FUN-08 The IRPManager shall be able to configure UE measurement types, and triggering conditions under which UE measurements would be collected for MDT.

Editor"s note: The detailed list of triggering conditions is FFS.

REQ-MDTMGMT-FUN-9 The IRPManager shall be able to configure the condition of MDT data collection based on certain device capability information (e.g. required free memory, battery status, etc.) .

Editor"s Note: the detailed list of device capabilities for MDT is FFS.

REQ-MDTMGMT-FUN-10 The IRPManager shall be able to configure the condition of MDT data collection based on certain device capability information in one or more cells or in TA/RA/LA.

REQ-MDTMGMT-FUN-11 The IRPManager shall be able to configure MDT data collection based on one or more IMSI in one or more cells or TA/RA/TA with a set of device capability information.

REQ-MDTMGMT-FUN-12 The IRPManager shall be able to configure MDT data collection based on one or more IMEI(SV) in one or more cells or TA/RA/TA with a set of device capability information.

REQ-MDTMGMT-FUN-13 The IRPManager shall be able to configure MDT data collection based on one or more IMEI(SV) with a set of device capability information.

REQ-MDTMGMT-FUN-14 The IRPManager shall be able to configure MDT data collection based on one or more IMSI with a set of device capability information.

REQ-MDTMGMT-FUN-15 The IRPManager shall be able to configure the periodicity for collecting UE measurements to a centralized collection entity.

REQ-MDTMGMT-FUN-16 The IRPAgent shall have the capability allowing the IRPManager to activate combined tracing and UE MDT measurement collection within the same Trace Session.

REQ-MDTMGMT-FUN-17 The IRPManager shall be able to deactivate MDT data collection by Trace Reference.

REQ-MDTMGMT-FUN-18 The IRPManager shall be able to initiate MDT data collection independently from other mobility related performance measurement and call trace collection.

5.4 Overview of IRPs related to Trace

The Itf-N is built up by a number of IRPs. The basic structure of the IRPs is defined in 3GPP TS 32.101 [2], 3GPP TS 32.102 [3] and 3GPP TS 32.150 [10].

For the purpose of Trace the following IRPs are needed:

- Trace Management IRP (TraceIRP), i.e. 3GPP TS 32.44x (the present TS-family).
- File Transfer IRP (3GPP TS 32.34x [7], [8], [9]).
- Notification IRP (3GPP TS 32.30x [11], [12], [13] and [14].

Annex A (informative): Use Cases

A.1 General

The use cases presented in the present document provides the usability of the Trace IRP. These use cases are different from those ones that are presented in 3GPP TS 32.421 [4].

A.2 Use case #1: Centralized place for Trace Session Activation in case of Management Based Activation

Figure A.2-1 illustrates an example where Operator would like to activate a trace session in the 6 RNCs (example for system context A). The activation method required is Management Based Activation.

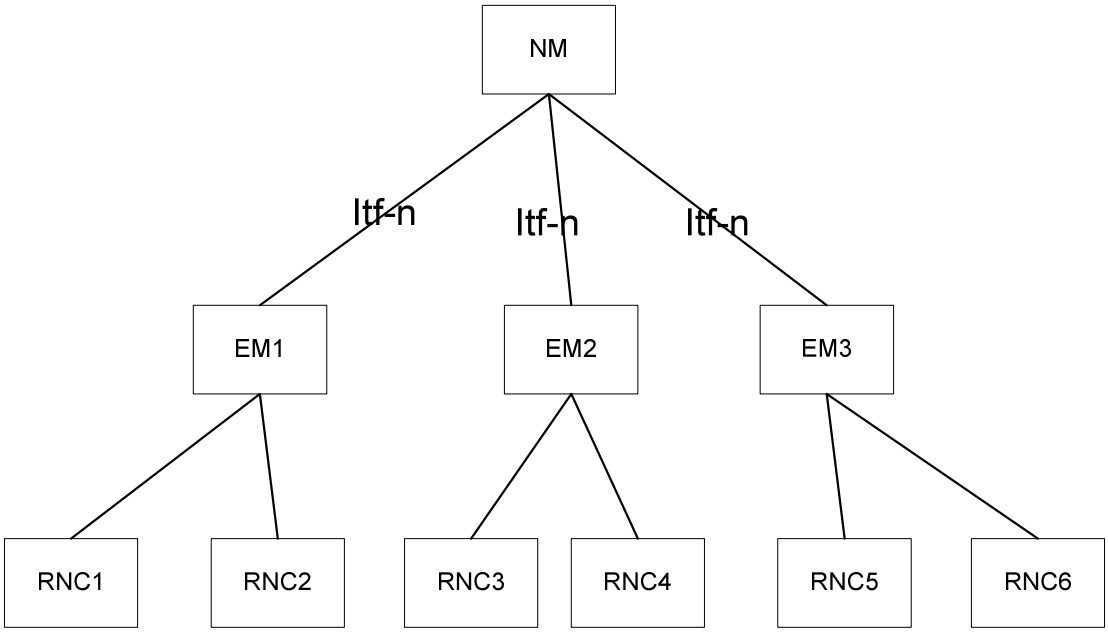

Figure A.2-1: Trace Session Activation for Management Based Activation

Using the trace IRP operator has to give the Trace Session Activation command in the Network Manager only. The Operator has to specify in which NEs trace is required and also has to give the trace control and configuration parameters. The NM (Trace IRP Manager) can initiate the Trace Session Activation to the EMs (Trace IRPAgents). The EMs can send the Trace Session Activation commands to the RNCs.

As shown in this example Trace IRP helps the operator in managing trace in the network.

A.3 Use case #2: Centralized place to collect trace records in case of Signalling Based Activation

Figure A.3-1 shows an example (assuming system context A) where trace records are generated in many different NEs which are managed by different EMs.

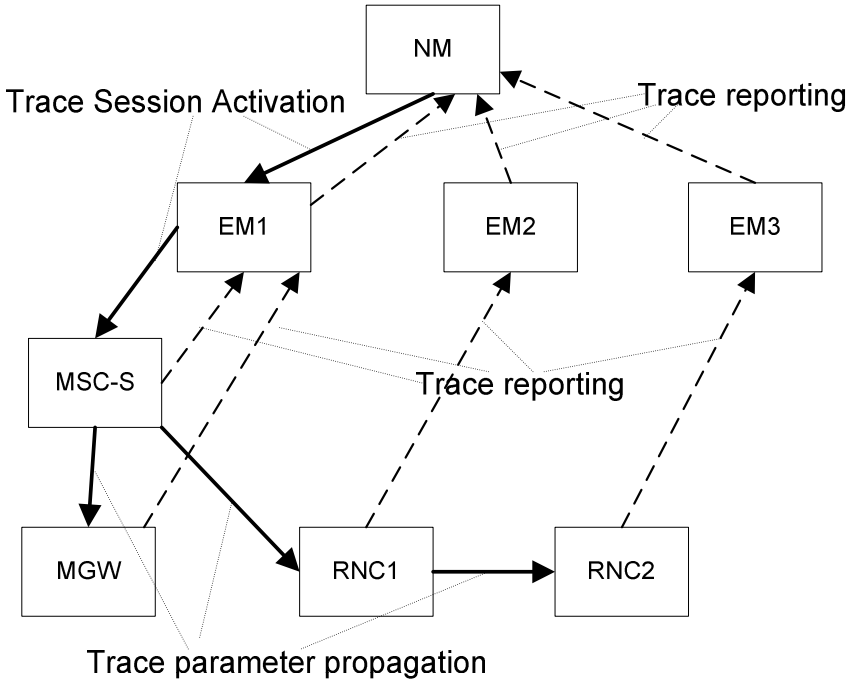

Figure A.3-1: Trace Record Collection in case of Signalling Based Activation

In the example above the trace session is activated from the NM to the MSC-S via EM1. If the subscriber or MS that is being traced starts a call then the trace parameters are propagated to the MGW and to the RNC1.

If during the call the subscriber makes a handover to RNC2, the trace parameters will also be propagated to RNC2.

In this example all the NEs (MSC-S, MGW, RNC1 and RNC2) generate their own trace records and these trace records are sent to the NEs own EMs.

There are three different EMs shown in the figure. Each of them will get the trace records from the NEs they manage. The EMs (traceIRPAgents) can then send the trace records to the NM (traceIRPManager).

By using the TraceIRP the Operator can retrieve all the trace records generated in the network in one place at the NM.

Without the trace IRP the trace records are stored only in the EM level, which in this case is distributed in 3 different boxes and locations.

A.4 Use case #3: Centralized place to collect trace records in case of Signalling Based Activation

Figure A.4-1 shows an example (assuming system context A) where trace records are generated in many different NEs which are managed by different EMs.

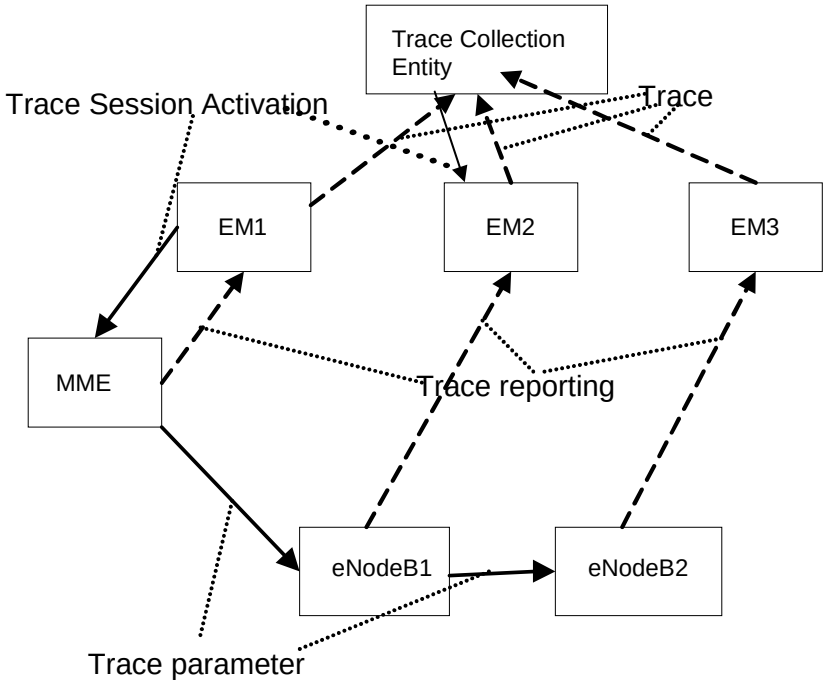

Figure A.4-1: Trace Record Collection in case of Signalling Based Activation

In the example above the trace session is activated from the NM to the MME via EM2 -> EM1. If the subscriber or UE that is being traced starts a call then the trace parameters are propagated to the MME and to the eNodeB1. In the Trace configuration parameters is a Trace Collection Entity IP Address included.

If during the call the subscriber makes a handover to eNodeB2, the trace parameters will also be propagated to eNodeB2.

In this example all the NEs (MME, eNodeB1, eNodeB2) generate their own trace records and these trace records are sent to the NEs own EM.

There are three different EMs shown in the figure. Each of them will get the trace records from the NEs they manage. The EMs (traceIRPAgents) can then send the trace records to the Trace Collection Entity which will be identified by the IP address which is included in the Trace configuration parameters (traceIRPManager). The Trace Collection entity may be located in the NM, EM or in another entity. The Trace files may also be sent directly from the nodes to the Trace Collection Entity.

By using the TraceIRP the Operator can retrieve all the trace records generated in the network in one place, regardless of how many IRPManagers exist.

Without the Trace Collection Entity in the Trace IRP the trace records are stored only in the EM level, which in the abobe example is distributed in 3 different nodes, or they might be sent to different IRPManagers in the NM.

Annex B (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Cat**	**Old**	**New**
Mar 2005	SA_32	SP-060256	--	--	Submitted to SA#32 for Information	--	1.0.0	
Mar 2007	SA_35	SP-070063	--	--	Submitted to SA#35 for Approval	--	2.0.0	7.0.0
Dec 2007	SA_38	SP-070735	0001	1	R7 CR 32.441-700 Correction of Trace IRP	F	7.0.0	7.1.0
Jun 2008	SA_40	SP-080329	0002	--	Introduction of EPC and E-UTRAN in Trace IRP	C	7.1.0	8.0.0
Sep 2008	SA_41	SP-081261	0003	--	Inclusion of Notification IRP	C	8.0.0	8.1.0
Dec 2009	-	-	-	-	Update to Rel-9 version (MCC)	--	8.1.0	9.0.0
Sep 2010	SA_49	SP-100492	0004	--	Adding requirements for managing UE based network performance measurements	B	9.0.0	10.0.0
Mar 2011	SA_51	SP-110102	0005	--	Change "UE based network performance measurements" to "MDT" - Align cross-3GPP terminology on MDT work	F	10.0.0	10.1.0
June 2013	SA_60	SP-130302	0016	--	Remove IMS Service Level Trace	A	10.1.0	10.2.0

History

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V10.1.0	April 2011	Publication
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