ETSI TS 132 442 V12.0.0 (2014-10)



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

Telecommunication management;
Trace Management Integration Reference Point (IRP);
Information Service (IS)
(3GPP TS 32.442 version 12.0.0 Release 12)



Reference RTS/TSGS-0532442vc00 Keywords GSM, LTE, UMTS

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Contents

Intelle	ectual Property Rights	2
Forev	word	2
Moda	al verbs terminology	2
Forev	word	5
Introd	duction	5
1	Scope	<i>6</i>
2	References	<i>6</i>
3	Definitions and abbreviations.	7
3.1	Definitions	
3.2	Abbreviations	
4	System Overview	
4.1	System context	
4.2	Compliance rules	8
5	Information Object Classes	
5.1	Imported information entities and local labels	
5.2	Class diagram	
5.2.1	Attributes and relationships	
5.2.2	Inheritance	
5.3	Information object class definitions	
5.3.1	TraceJob	
5.3.1.1		
5.3.1.2		
5.3.1.3 5.3.2	3 Attribute constraints	
5.3.2.1		
5.3.2.1 5.3.2.2		
5.3.2.2 5.3.3	Z Attributes	
5.3.3.1 5.3.3.1		
5.3.4	ManagedEntity	
5.3.4.1		
5.4	Information relationship definitions	
5.4.1	relation-traceIRP-traceJob (M)	
5.4.1.1	· /	
5.4.1.2		
5.4.2	relation-traceJob-managedEntity (M)	
5.4.2.1		
5.4.2.2		
5.4.3	relation-traceJob-traceRecord (M)	
5.4.3.1		
5.4.3.2		
5.5	Information attribute definitions	
5.5.1	Definition and legal values	
6	Interface Definition	18
6.1	Class diagram representing interfaces	
6.2	Generic rules	
6.3	TraceIRPManagement (M)	
6.3.1	Operation activateTraceJob(M)	19
6.3.1.1		
6.3.1.2	2 Input parameters	20
6.3.1.3	3 Output parameters	22
6.3.1.4	4 Pre-condition	22

6.3.1.5	Post-condition	23		
6.3.1.6	Exceptions	23		
6.3.1.7	Constraints	23		
6.3.2	Operation deactivateTraceJob(M)	24		
6.3.2.1	Definition	24		
6.3.2.2	Input parameters	24		
6.3.2.3	Output parameters			
6.3.2.4	Pre-condition	24		
6.3.2.4	Post-condition	24		
6.3.2.6	Exceptions	25		
6.3.3	Operation listTraceJob (M)	25		
6.3.3.1	Definition	25		
6.3.3.2	Input parameters			
6.3.3.3	Output parameters			
6.3.3.4	Pre-condition	27		
6.3.3.5	Post-condition	27		
6.3.3.6	Exceptions			
6.3.3.7	Constraints	27		
6.3.4	Operation listActivatedTraceJobs (M)	28		
6.3.4.1	Definition	28		
6.3.4.2	Input parameters	28		
6.3.4.3	Output parameters	28		
6.3.5	Notification notifyTraceRecordingSessionFailure (O)			
6.3.5.1	Definition	28		
6.3.5.2	Input parameters	28		
6.3.5.3	Triggering event	28		
6.3.5.3.1	From state	28		
6.3.5.3.2	To state	29		
6.3.6	Notification notifyTraceSessionLocalActivation (M)	29		
6.3.6.1	Definition	29		
6.3.6.2	Input parameters	29		
6.3.6.3	Triggering event	29		
6.3.6.3.1	From state	29		
6.3.6.3.2	To state	29		
6.3.7	Notification notifyTraceSessionIdentities (CM)	30		
6.3.7.1	Definition	30		
6.3.7.2	Input parameters	30		
6.3.7.3	Triggering event	30		
6.3.7.3.1	From state	30		
6.3.7.3.2	To state			
6.3.7.4	Constraint	30		
Annex A	(informative): Change history	31		
History	listory			

Foreword

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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)".
- 32.443 "Trace Management Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)".
- 32.445 "Trace Management Integration Reference Point (IRP): eXtensible Markup Language (XML) file format definition".

The present document is part of a TS-family which describes the information service necessary for the Telecommunication Management (TM) of 3G systems. The TM principles and TM architecture are specified in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].

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 describes the mechanism used for control and configuration of the Trace, Minimization of Drive Test (MDT) and Radio Link Failure (RLF) reporting functionality through Itf-N. This specification is applicable to UMTS networks and EPS networks. GSM Trace is outside of the scope of this specification.

The conditions for supporting Network Sharing are stated in 3GPP TS 32.441 [13].

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 32.102: "Telecommunication management; Architecture". [3] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and definitions". [4] Void. [5] 3GPP TS 32.622: "Telecommunication management; Configuration Management (CM); Generic network resources Integration Reference Point (IRP); Network Resource Model (NRM)". 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM); [6] Notification Integration Reference Point (IRP): Information Service (IS)". 3GPP TS 32.342: "Telecommunication management; File Transfer (FT) Integration Reference [7] Point (IRP): Information Service (IS)".
- [8] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management: Information Service (IS)".
- [9] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".
- [10] 3GPP TS 32.602: "Telecommunication management; Configuration Management (CM); Basic CM Integration Reference Point (IRP): Information Service (IS)".
- [11] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol specification"
- [12] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".
- [13] 3GPP TS 32.441: "Trace Management Integration Reference Point (IRP): Requirements".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.150 [3] and the following apply:

IRPAgent: See 3GPP TS 32.102 [2]. **IRPManager:** See 3GPP TS 32.102 [2].

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.150 [3] and the following apply:

IOC	Information Object Class
IRP	Integration Reference Point
IS	Information Service
MDT	Minimization of Drive Tests
OMG	Object Management Group
RCEF	RRC Connection Establisment Failure
RLF	Radio Link Failure
UML	Unified Modelling Language (OMG)

4 System Overview

4.1 System context

The general definition of the System Context for the present IRP is found in 3GPP TS 32.150 [3] subclause 4.7.

In addition, the set of related IRP(s) relevant to the present IRP is shown in the two diagrams below.

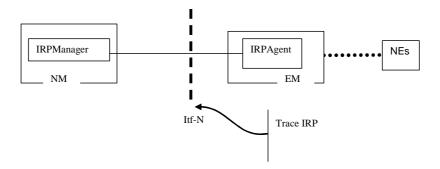


Figure 4.1.1: System Context A

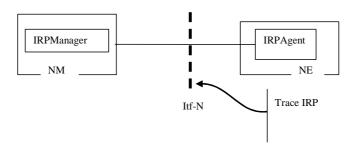


Figure 4.1.2: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations*, *notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.150 [3].

5 Information Object Classes

5.1 Imported information entities and local labels

Label reference	Local label
3GPP TS 32.622 [5], information object class, Top	Тор
3GPP TS 32.622 [5], information object class, IRPAgent	IRPAgent
3GPP TS 32.622 [5], information object class, GenericIRP	GenericIRP
3GPP TS 32.302 [6], information object class, NotificationIRP	NotificationIRP
3GPP TS 32.342 [7], information object class, FileTransferIRP	FileTransferIRP
3GPP TS 32.602 [10], information object class, ManagedEntity	ManagedEntity

5.2 Class diagram

5.2.1 Attributes and relationships

This clause introduces the set of Information Object Classes (IOCs) that encapsulate information within the IRPAgent. The intent is to identify the information required for the TraceIRP implementation of its operations and notification emission. This clause provides the overview of all support object classes in UML. Subsequent clauses provide more detailed specification of various aspects of these support object classes.

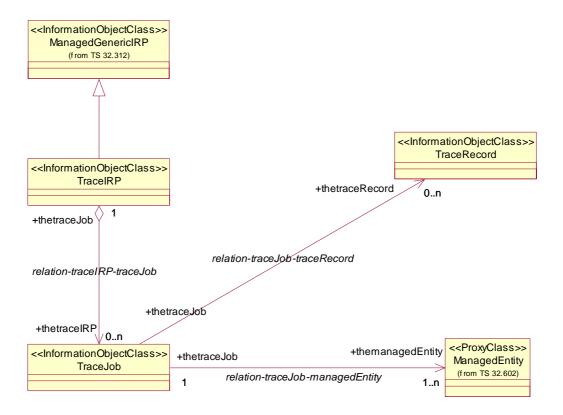
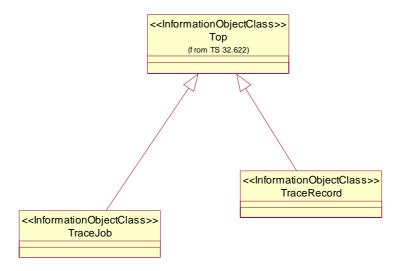


Figure 5.2.1: Information Object Class (IOC) UML diagram

5.2.2 Inheritance



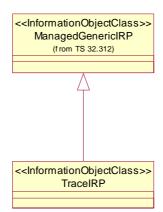


Figure 5.2.2: Information Object Class Inheritance UML Diagram

5.3 Information object class definitions

5.3.1 TraceJob

5.3.1.1 Definition

It represents a task that controls the Trace Sessions and collects the trace data (i.e. collects the TraceRecord of multiple ManagedEntity instances). The TraceReference is a unique ID, which identifies the Trace Session that has been created by the TraceJob and activated to one or multiple ManagedEntity instance(s).

It represents also the task that controls the UE based network performance measurements.

When a TraceJob is created the following attributes cannot be modified via the Itf-N:

- TraceReference
- ListOfInterfaces
- ListofNeTypes
- TraceDepth
- TraceTarget
- TriggeringEvent
- JobType
- areaScope
- ListOfMeasurements
- ReportingTrigger
- ReportInterval
- ReportAmount
- EventThreshold
- LoggingInterval
- LoggingDuration
- IPAddressOfTCE
- AnonymizationofMDTData
- MeasurementPeriodLTE
- MeasurementPeriodUMTS
- CollectionPeriodRrmUmts
- CollectionPeriodRrmLte
- PositioningMethod
- MeasurementQuantity
- PLMNTarget

If for any reason the TraceIRP determines that a Trace Session has been activated in its ManagedEntity(ies) the TraceIRP shall emit the "noitfyTraceSessionLocalActivation" notification to the subscribed IRPManagers to inform the active Trace Sessions. The IRPManagers can decide whether they deactivate the Trace Session or keep the Trace Session active. (E.g. if the TraceReference is colliding with an existing TraceJob"s TraceReference, the IRPManager may decide to immediately deactivate the Trace Session in that ManagedEntity.)

The TraceJob shall use its information to activate and configure Trace Session(s) in the requested ManagedEntity instance(s). When the TraceIRP determines that there are available TraceRecord files, it shall emit a notification to all subscribed IRPManagers informing the availability of the files. The method and the notification of the available files is described in the File Transfer IRP (3GPP TS 32.342 [7]).

If a TraceJob receives an indication from one of its ManagedEntity that starting a Trace Recording Session is failed for any reason, the "notifyTraceRecordingSessionFailure" notification may be emitted to inform all subscribed IRPManagers that there was a Trace Recording Session that was not started in the ManagedEntity.

5.3.1.2 Attributes

Attribute name	Support Qualifier
traceReference	M
listOfInterfaces	0
listOfNeTypes	CM
traceDepth	CM
traceTarget	M
triggeringEvent	CM
traceCollectionEntityAddress	M
jobType	M
listOfMeasurements	CM
reportingTrigger	CM
reportInterval	CM
reportAmount	CM
eventThreshold	CM
loggingInterval	CM
loggingDuration	CM
areaScope	CM
anonymizationOfMDTData	CM
measurementPeriodLTE	CM
measurementPeriodUMTS	CM
collectionPeriodRrmUmts	CM
collectionPeriodRrmLte	CM
positioningMethod	CM
measurementQuantity	CM
pLMNTarget	CM

5.3.1.3 Attribute constraints

The listOfNeTypes attributes shall be present only for Signalling Based Activation.

The traceTarget shall be public ID in case of a Management Based Activation is done to an ScscfFunction. The TraceTarget shall be cell only in case of the UTRAN cell traffic trace function.

The TraceTarget shall be E-UtranCell only in case of E-UTRAN cell traffic trace function. The traceTarget shall be either IMSI or IMEI(SV) if the Trace Session is activated to any of the following ManagedEntity(ies):

- HssFunction
- MscServerFunction
- SgsnFunction
- GgsnFunction
- BmscFunction
- RncFunction
- MmeFunction

The traceTarget shall be IMSI if the Trace Session is activated to a ManagedEntity playing a role of ServinGWFunction.

In case of subscription based MDT, the traceTarget attribute shall be able to carry (IMSI or IMEI(SV)), the areaScope attribute shall be able to carry a list of (cell or EUtranCell or TA/LA/RA).

In case of area based Immediate MDT, the traceTarget attribute shall be null value, the areaScope attribute shall carry a list of (Utrancell or E-UtranCell).

In case of area based Logged MDT, the traceTarget attribute shall carry an eNodeBs or a RNC. The Logged MDT should be initiated on the specified eNodeB/RNC in TraceTarget. The areaScope attribute shall carry a list of (Utrancell or E-UtranCell or TA/LA/RA)..

In case of RLF reporting, or RCEF reporting, the traceTarget attribute shall be null value, the areaScope attribute shall carry one or list of eNBs.

- traceTarget: This attribute shall be present if Trace or MD,T RLF or RCEF reporting is supported.
- areaScope: This attribute shall be present if MDT is supported.
- triggeringEvent: This attribute shall be present only if Trace is supported.
- listOfMeasurements: This attribute shall be present only if MDT is supported and the JobType attribute is set to ImmediateMDT.
- reportingTrigger: This attribute shall be present only if MDT is supported and the JobType attribute is set to ImmediateMDT and the ListOfMeasurements attribute is configured for M1 (for both UMTS and LTE) or M2 (only for UMTS).
- reportInterval: This attribute shall be present only if MDT is supported and the JobType attribute is set to ImmediateMDT and the ReportingTrigger is configured for PeriodicMeasurements
- reportAmount: This attribute shall be present only if MDT is supported and the JobType attribute is set to ImmediateMDT and the ReportingTrigger attribute is configured for PeriodicMeasurements.
- eventThreshold: This attribute shall be present only if MDT is supported and the JobType attribute is set to ImmediateMDT and the ReportTrigger attribute is configured for A2EventReporting in LTE or 1F/1IEventReporting in UMTS.
- loggingInterval: This attribute shall be present only if MDT is supported and the JobType attribute is set to LoggedMDT.
- loggingDuration: This attribute shall be present only if MDT is supported and the JobType attribute is set to LoggedMDT.
- anonymizationOfMDTData: This attribute shall be present only if MDT is supported and the mdtAreaScope attribute is present.
- measurementPeriodLTE: This attribute shall be present only if MDT is supported and the JobType attribute is set to Immediate MDT or combine Trace and Immediate MDT and the listOfMeasurements parameter for LTE has either M4 or M5 measurement set.
- measurementPeriodUMTS: This attribute shall be present only if MDT is supported and the JobType attribute is set to Immediate MDT or combine Trace and Immediate MDT and the listOfMeasurements parameter for UMTS has M6 or M7 measurements set.
- collectionPeriodRrmUmts: This attribute shall be present only if MDT is supported and the JobType attribute is set to Immediate MDT or combine Trace and Immediate MDT and the listOfMeasurements parameter has any of M3, M4, M5 measurement set in case of UMTS.
- collectionPeriodRrmLte: This attribute shall be present only if MDT is supported and the JobType attribute is set to Immediate MDT or combine Trace and Immediate MDT and the listOfMeasurements parameter has any of M2, M3 measurement set in case of LTE.
- positioningMethod: This attribute shall be present only if MDT is supported and the JobType attribute is set to Immediate MDT or combine Trace and Immediate MDT.
- measurementQuantity: This attribute shall be present only if MDT is supported and the JobType attribute is set to Immediate MDT or combined Trace and Immediate MDT and the reportingTrigger parameter is set to event 1F.

The pLMNTarget shall present for management based activation when several PLMNs are suppored in the RAN.

5.3.2 TraceRecord

5.3.2.1 Definition

TraceRecord is the representation of the files containing the logged information from the Trace Recording Sessions.

5.3.2.2 Attributes

Attribute name	Visibility	Support Qualifier	Read Qualifier	Write Qualifier
fileName	+	M	M	-

5.3.3 TraceIRP

5.3.3.1 Definition

TraceIRPis the representation of the trace management capabilities specified by the present document. This IOC inherits from ManagedGenericIRP IOC specified in 3GPP TS 32.312 [8].

5.3.4 ManagedEntity

5.3.4.1 Definition

In case of Signalling Based Activation the ManagedEntity represents the role that can be played by an instance of one of the following IOCs:

- HssFunction
- MscServerFunction
- SgsnFunction
- MmeFunction

In case of Management Based Activation the ManagedEntity represents the role that can be played by an instance of the following IOCs:

- HssFunction
- MscServerFunction
- SgsnFunction
- GgsnFunction
- BmscFunction
- RncFunction
- CscfFunction
- MmeFunction
- ServingGWFunction

In case of Cell Traffic Trace the ManagedEntity represents the role that can be played by an instance of the following IOCs:

- UtranCell
- E-UtranCell

5.4 Information relationship definitions

5.4.1 relation-traceIRP-traceJob (M)

5.4.1.1 Definition

This represents the relationship between TraceIRP and the TraceJob.

5.4.1.2 Roles

Name	Definition
theTraceIRP	It represents the TraceIRP
theTraceJobList	It represents the TraceJobList

5.4.2 relation-traceJob-managedEntity (M)

5.4.2.1 Definition

This represents the relationship between TraceJob and the ManagedEntity.

5.4.2.2 Roles

Name	Definition		
theManagedEntity	The ManagedEntity, when playing this role, represents the actual network resource instance,		
	where a Trace Session is activated.		
theTraceJob	It represents the TraceJob		

5.4.3 relation-traceJob-traceRecord (M)

5.4.3.1 Definition

This represents the relationship between TraceJob and the TraceRecord.

5.4.3.2 Roles

Name	Definition
theTraceJob	It represents the TraceJob
theTraceRecord	It represnts the TraceRecord.

5.5 Information attribute definitions

5.5.1 Definition and legal values

Attribute Name	Definition	Legal Values
anonymizationOfMDTData	It specifies the level of anonymization for an area based MDT.	See 3GPP TS 32.422 [9]
areaScope	It specifies MDT area scope when activates an MDT job.	List of cells/TA/LA/RA for subscription based MDT
	For RLF and RCEF reporting it specifies the eNB or list of eNBs where the RLF or RCEF reports should be collected.	or area based Logged MDT. List of cells for area based Immediate MDT. Cell, TA, LA, RA are mutually exclusive.
		One or list of eNBs for RLF and RCEFreporting.
collectionPeriodRrmLte	It specifies the collection period for collecting RRM configured measurement samples for M2, M3 in LTE. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
collectionPeriodRrmUmts	It specifies the collection period for collecting RRM configured measurement samples for M3, M4, M5 in UMTS. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
eventThreshold	It specifies the threshold which should trigger the reporting in case A2 event reporting in LTE or 1F/1I event in UMTS. The attribute is applicable only for Immediate MDT and when reportingTrigger is configured for A2 event in LTE or 1F event or 1I event in UMTS. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9] , 3GPP TS 25.331 [11] , 3GPP TS 36.331 [12]
jobType	It specifies the MDT mode and it specifies also whether the TraceJob represents only MDT, Trace or a combined Trace and MDT job. The attribute is applicable for Trace, MDT, RCEF and RLF reporting.	See 3GPP TS 32.422 [9]
listOfInterfaces	It specifies the interfaces that needs to be traced in the given ManagedEntityFunction. The attribute is applicable only for Trace. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
listOfMeasurements	It specifies the UE measurements that shall be collected in an Immediate MDT job. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
listOfNETypes	It specifies in which type of ManagedFunction the trace should be activated. The attribute is applicable only for Trace with Signalling Based Trace activation. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
loggingDuration	It specifies how long the MDT configuration is valid at the UE in case of Logged MDT. The attribute is applicable only for Logged MDT. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
loggingInterval	It specifies the periodicty for Logged MDT. The attribute is applicable only for Logged MDT. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9], 3GPP TS 25.331 [11] , 3GPP TS 36.331 [12]
measurementPeriodLTE	It specifies the measurement period for the Data Volume and Scheduled IP throughput measurements for MDT taken by the eNB. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
measurementPeriodUMTS	It specifies the measurement period for the Data Volume and Throughput measurements for MDT taken by RNC. The attribute is applicable only for Immediate MDT. In case this attribute is not used, it carries a null semantic.	See 3GPP TS 32.422 [9]
measurementQuantity	It specifies the measurements that is collected in an MDT job for a UMTS MDT configured for event	See 3GPP TS 32.422 [9]

Attribute Name	Definition	Legal Values
	triggered reporting.	
pLMNTarget	It specifies which PLMN that the subscriber of the	See 3GPP TS 32.422 [9]
	session to be recorded uses as selected PLMN.	
positionigMethod	It specifies what positioning method should be used in	See 3GPP TS 32.422 [9]
	the MDT job.	
reportAmount	It specifies the number of measurement reports that	See 3GPP TS 32.422 [9]
	shall be taken for periodic reporting while the UE is in	
	connected. The attribute is applicable only for	
	Immediate MDT and when reportingTrigger is	
	configured for periodical measurements. In case	
	this attribute is not used, it carries a null semantic.	
reportInterval	It specifies the interval between the periodical	See 3GPP TS 32.422 [9]
	measurements that shall be taken when the UE is in	
	connected mode. The attribute is applicable only for	
	Immediate MDT and when reportingTrigger is	
	configured for periodical measurements. In case	
	this attribute is not used, it carries a null semantic.	0 0000 T0 00 400 [0]
reportingTrigger	It specifies whether periodic or event based measurements should be collected. The attribute is	See 3GPP TS 32.422 [9]
	applicable only for Immediate MDT and when the	
	listOfMeasurements is configured for M1(for both	
	UMTS and LTE) or M2 (only for UMTS). In case this	
	attribute is not used, it carries a null semantic.	
traceCollectionEntityAddress		See 3GPP TS 32.422 [9]
ClacecollectionEntityAddress	within an IRPManager. The attribute is applicable for for	See 3GFF 13 32.422 [9]
	both Trace and MDT	
traceDepth	It specifies the trace depth of the	See 3GPP TS 32.422 [9]
	ManagedEntityFunction instances. The attribute is	000 001 1 10 021 122 [0]
	applicable only for Trace. In case this attribute is not	
	used, it carries a null semantic.	
traceReference	A globally unique identifier, which uniquely identifies the	Any positive integer
	Trace Session that is created by the TraceJob.	value
	The attribute is applicable for both Trace and MDT.	
traceTarget	It specifies the target object of the Trace and MDT. The	The ID type may be
	attribute is applicable for both Trace and MDT. This	IMSI or IMEI or
	attribute includes the ID type of the target and the ID	IMEISV or Public ID or
	value.	Private ID or a Cell or
		an eNB or a RNC. The
		ID value can be a string.
		If the ID type is a Cell,
		the ID value can be
		identified by its DN id.
		IMSI, IMEI, IMEISV,
		Public ID, cell, eNB and
		RNC are mutually
had some of a self-	It are affine the triangular and the first state of	exclusive.
triggeringEvent	It specifies the triggering event parameter of the trace	See 3GPP TS 32.422 [9]
	session. The attribute is applicable only for Trace. In	
	case this attribute is not used, it carries a null semantic.	

6 Interface Definition

6.1 Class diagram representing interfaces

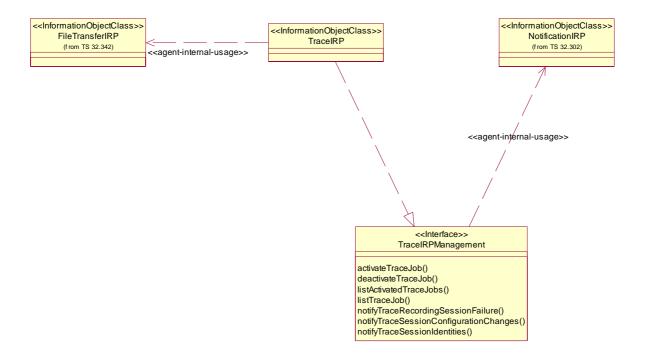


Figure 6.1: Class Diagram

6.2 Generic rules

- **Rule 1:** each operation with at least one input parameter supports a pre-condition valid_input_parameter which indicates that all input parameters shall be valid with regards to their information type. Additionally, each such operation supports an exception operation_failed_invalid_input_parameter which is raised when pre-condition valid_input_parameter is false. The exception has the same entry and exit state.
- Rule 2: each operation with at least one optional input parameter supports a set of pre-conditions supported_optional_input_parameter_xxx where "xxx" is the name of the optional input parameter and the pre-condition indicates that the operation supports the named optional input parameter. Additionally, each such operation supports an exception operation_failed_unsupported_optional_input_parameter_xxx which is raised when (a) the pre-condition supported_optional_input_parameter_xxx is false and (b) the named optional input parameter is carrying information. The exception has the same entry and exit state.
- Rule 3: each operation shall support a generic exception operation_failed_internal_problem which is raised
 when an internal problem occurs and that the operation cannot be completed. The exception has the same entry
 and exit state.

NOTE: These rules are mapped at the solution set level. Pre-conditions and exceptions, generated by these rules, need not appear explicitly in the present document.

6.3 TraceIRPManagement (M)

6.3.1 Operation activateTraceJob (M)

6.3.1.1 Definition

This operation support IRPManager"s request to create a TraceJob through Itf-N.

Once the TraceJob has been created, the attributes of the TraceJob will not be modified during the lifetime of the TraceJob.

One TraceJob can manage Trace Sessions in one or more ManagedEntity.

6.3.1.2 Input parameters

Parameter Name	Qualifier	Information type	Comment
iOCInstance	М	ManagedEntity.objectInstance	It specifies the DN of
			ManagedEntity
			instance where Trace
			Session is to be
listOfInterfaces	_	TraceJob.listOfInterfaces	activated.
listOfNeTypes	O CM	TraceJob.listOfNeTypes	It specifies the type of
TISCOINCI Y DCS	Civi	Tracebob. Tracornery pes	ManagedFunctions.
traceDepth	М	TraceJob.traceDepth	It shows the
		T.	traceDepth set to
			the Trace Session.
traceReference	М	TraceJob.traceReference	It identifies the
			TraceSession.
traceTarget	M	TraceJob.traceTarget	IMSI or IMEI or
			IMEISV or Public ID
			or Private ID or a
			Cell(identified by its DN id) or an eNB or a
			RNC.
			IMSI, IMEI,
			IMEISV, Public ID,
			Cell, eNB and RNC
			are mutually
			exclusive.
triggeringEvent	CO	TraceJob.triggeringEvent	14 19 11
traceCollectionEntityAddress	CM,CO	TraceJob.traceCollectionEntityAddress	
			address to the Trace Collection Entity that
			is associated to the
			TraceJob. See
			3GPP TS 32.422 [9].
jobType	М	TraceJob.jobType	It specifies the type of
			the TraceJob
areaScope	CM	TraceJob.areaScope	It specifies MDT area
			(Cells/TA/RA/LA)
			where the Logged MDT measurements
			shall be collected.
			It specifies one or list
			of eNBs where the
			RLF or RCEF reports
			shall be collected.
			It specifies MDT area
			(list of cells) where
			the Immediate MDT measurements shall
			be collected.
listOfMeasurements	CM	TraceJob.listOfMeasurements	It specifies the
			measurements to be
			collected from the UE
reportingTrigger	CM	TraceJob.reportingTrigger	It specifies the
			reporting trigger
			(event based
			reporting or periodic
reportInterval	CM	TraceJob.reportInterval	reporting) in the UE. It specifies the
1 chor criticer var	CIVI	Tracecon.reportificervar	interval between the
			periodical
			measurements to be
			taken by the UE.
reportAmount	CM	TraceJob.reportAmount	It specifies the
			number of
			measurement reports
			to be taken in

Parameter Name	Qualifier	Information type	Comment
			periodical reporting in the UE
eventThreshold	СМ	TraceJob.eventThreshold	It specifies the threshold triggering the reporting in case of A2 event reporting in LTE or 1F/1I event reporting in UMTS.
loggingInterval	СМ	TraceJob.loggingInterval	It specifies the periodicity of Logged MDT.
loggingDuration	СМ	TraceJob.loggingDuration	It specifies the duration of the Logged MDT at the UE.
anonymizationOfMDTData	СМ	TraceJob.anonymizationOfMDTData	It specifies the anonymization level of an area based MDT.
measurementPeriodLTE	СМ	TraceJob.measurementPeriodLTE	It specifies the measurement period for the Data Volume and Scheduled IP Throughput measurements in the eNB within an Immediate MDT job.
measurementPeriodUMTS	СМ	TraceJob. measurementPeriodUMTS	It specifies the measurement period for the Data Volume and Throughput measurements in the RNC within an Immediate MDT job.
collectionPeriodRrmUmts	СМ	TraceJob.collectionPeriodRrmUmts	It specifies the collection period for M3, M4, M5 in UMTS within an Immediate MDT job.
collectionPeriodRrmLte	СМ	TraceJob.collectionPeriodRrmLte	It specifies the collection period for M2, M3 in LTE within an Immediate MDT job.
positioningMethod	СО	TraceJob.positioningMethod	It specifies the positioning method to be used for the Immediate MDT job.
measurementQuantity	СМ	TraceJob.measurementQuantity	It specifies which measurement should be collected in an event triggered measurement collection.
pLMNTarget	СМ	TraceJob.pLMNTarget	It specifies which PLMN that the subscriber of the session to be recorded uses as selected PLMN.

6.3.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
status	М	ENUM (Success, Failure, PartialSuccess)	
unsupportedList	М	List of <managedentity, td="" tracedepth,<=""><td>It specifies what attributes</td></managedentity,>	It specifies what attributes
			are not supported when a
		listOfMeasurements,reportingTrigger,	Trace Session is activated.
		reportInterval,reportAmount,eventThreshold,	The list can contain one or
		loggingInterval, loggingDuration,	all of the elements and
		anonymizationOfMDTData, measurementPeriodLTE,	relevant only for error
		measurementPeriodUMTS, positioningMethod,	cases.
		measurementQuantity reason, pLMNTarget)	

6.3.1.4 Pre-condition

 $\verb|validTraceReference|| AND | \verb|validTraceDepth|| AND | \verb|validTraceTarget||$

Assertion Name	Definition
validTraceDepth	The traceDepth input parameter is valid.
validTraceReference	The traceReference given is not matching to any existing traceReference value in the
	activated TraceJobs.
validTraceTarget	The traceTarget input parameter is valid.

6.3.1.5 Post-condition

traceSessionActivated

Assertion Name	Definition
traceSessionActivated	The Trace Session identified by the traceReference is activated in the given
	ManagedEntity instances.

6.3.1.6 Exceptions

Exception Name	Definition		
invalidTraceDepth	Condition: (validTraceDepth) is false.		
	Returned Information: output parameter status is set to "Failure".		
	Exit state: Entry State.		
invalidTraceTarget	Condition: (validTraceTarget) is false.		
	Returned Information: output parameter status is set to "Failure".		
	Exit state: Entry State.		
notuniqueTraceReference	Condition: (validTraceReference) is false.		
	Returned Information: output parameter status is set to "Failure".		
	Exit state: Entry State.		
pLMNTargetNotSupported	Condition: (validPLMNTarget) is false.		
	Returned Information: output parameter status is set to "Failure".		
	Exit state: Entry State.		

6.3.1.7 Constraints

Name	Definition
listOfNeTypes	It is a Signalling Based Activated trace that is requested.
traceCollectionEntityAddress CM, CO qualifier	Mandatory when tracing in EPS is supported;
	Mandatory when MDT is supported;
	Optional when tracing in UMTS is supported.
areaScope	MDT is supported or RLF or RCEF reporting is supported
listOfMeasurements	MDT is supported
reportingTrigger	MDT is supported
reportInterval	MDT is supported
reportAmount	MDT is supported
eventThreshold	MDT is supported
loggingInterval	MDT is supported
loggingDuration	MDT is supported
listOfMeasurements	MDT is supported
traceDepth	Trace is supported
triggeringEvent	Trace is supported
anonymizationOfMDTData	MDT is supported
measurementPeriodLTE	MDT is supported
measurementPeriodUMTS	MDT is supported
collectionPeriodRrmUmts	MDT is supported
collectionPeriodRrmLte	MDT is supported

positioningMethod	MDT is supported
pLMNTarget	Several PLMNs are supported in the RAN and a Management Based Activation Trace Session is
	requested.

6.3.2 Operation deactivateTraceJob (M)

6.3.2.1 Definition

This operation supports IPRManager"s request to stop a TraceJob through Itf-N. When this operation is received in the TraceJob shall deactivate the requested Trace Session in the requested ManagedEntity instances.

6.3.2.2 Input parameters

Parameter Name			Comment
traceReference	M	TraceJob.traceReference	This is a unique ID of the TraceJob
traceTarget	М	_	(IMSI or IMEI or IMEISV or Public ID or Private ID or a Cell(identified by its DN id) or an eNB or a RNC. IMSI, IMEI, IMEISV,Public ID, Cell, eNB and RNC are mutually exclusive.

6.3.2.3 Output parameters

Parameter Name	Qualifier	Matching	Comment
		Information	
status	M	ENUM (Success,	The operation may fail because of a specified
		Failure)	or an unspecified reason.
traceRecordingSessionReference	CM		This would indicate if a Trace Recording
			Session is ongoing when the deactivation
			command has been given.

6.3.2.4 Pre-condition

validTraceReference

Assertion Name	Definition
validTraceReference	The TraceReference input parameter is valid, which means that the TraceIRP is aware of
	such TraceJob, which has this traceReference value and is aware of the
	ManagedEntity holding such Trace Session.

6.3.2.4 Post-condition

TraceSessionisdeactivated

Assertion Name	Definition
TraceSessionisdeactivate	The Trace Session identified by the traceReference is deactivated in the requested
	ManagedEntity instance and the TraceJob is stopped.

6.3.2.6 Exceptions

Exception Name	Definition
notuniqueTraceReference	Condition: (validTraceReference) is false.
	Returned Information: output parameter status is set to "Failure".
	Exit state: Entry State.

6.3.3 Operation listTraceJob (M)

6.3.3.1 Definition

This operation support IPRManager"s request to list the parameters of a specific TraceJob through Itf-N.

6.3.3.2 Input parameters

Parameter Name	Qualifier	Information type	Comment	
traceReference	М	TraceJob.traceReference	It specifies the Trace Session that is requested for	
			interrogation.	

6.3.3.3 Output parameters

Instance	Parameter Name			Comment	
Insection Inse	iOCInstance	М	ManagedElement.objec	3	
Status					
Status		0			
Status	S		faces		
traceDepth M TraceJob.traceDepth Is shows the traceDepth trace control and configuration parameter that is associated to the TraceJob. TraceJob.traceTarget M M TraceJob.traceCollec M MSI, MRI, MRISV, Public ID,Cell, eNB and RNC are mutually evolusive. TraceJob.traceCollec M TraceJob.traceCollec M TraceJob.traceCollec M TraceJob.traceCollec M TraceJob.Sea 3GPP TS 32.422 [9]. TraceJob.jobType M TraceJob.jobType M TraceJob.traceCollec M TraceJob.Sea 3GPP TS 32.422 [9]. TraceJob.jobType M TraceJob.areaScope M TraceJob.TraceCollec M TraceJob.Trac					
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				to be recorded uses as selected PLMN.	

6.3.3.4 Pre-condition

validTraceReference

Assertion Name	ne Definition	
validTraceReference	The traceReference input parameter is valid, which means that the TraceIRP is aware of	
	such TraceJob, which has this traceReference value and is aware of the	
	ManagedEntity holding such Trace Session.	

6.3.3.5 Post-condition

TraceSessionFound

Assertion Name	Definition		
TraceSessionFound	The TraceIRP has found the requested TraceJob with the traceReference and can read		
	the configured parameters.		

6.3.3.6 Exceptions

Exception Name	Definition
notuniqueTraceReference	Condition: (validTraceReference) is false.
	Returned Information: output parameter status is set to "Failure".
	Exit state: Entry State.

6.3.3.7 Constraints

Name	Definition
traceCollectionEntityAddress CM,CO	Mandatory when tracing in EPS is supported;
qualifier	Mandatory when MDT is supported;
	Optional when tracing in UMTS is supported.
anonymizationOfMDTData	MDT is supported
areaScope	MDT is supported or RLF reporting is supported
listOfMeasurements	MDT is supported
reportingTrigger	MDT is supported
reportInterval	MDT is supported
reportAmount	MDT is supported
eventThreshold	MDT is supported
loggingInterval	MDT is supported
loggingDuration	MDT is supported
traceDepth	Trace is supported
triggeringEvent	Trace is supported
measurementPeriodLTE	MDT is supported
measurementPeriodUMTS	MDT is supported
collectionPeriodRrmUmts	MDT is supported
collectionPeriodRrmLte	MDT is supported
positioningMethod	MDT is supported

measurementQuantity	MDT is supported	
pLMNTarget	Several PLMNs are supported in the RAN and a	
	Managment Based Activation Trace Session is activated.	

6.3.4 Operation listActivatedTraceJobs (M)

6.3.4.1 Definition

This operation support IRPManager"s request to list all the activated TraceJobs through Itf-N.

6.3.4.2 Input parameters

No input parameters for this operation.

6.3.4.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
traceReferenceList		TraceJob.traceRefe rence.objectinstan	The TraceReferenceList provides the identification of each activated Trace Session. If no TraceReference can be found, then this list is empty and status is "Success"
status		ENUM (Success, Failure)	The operation may fail because of a specified or an unspecified reason.

6.3.5 Notification notifyTraceRecordingSessionFailure (O)

6.3.5.1 Definition

The TraceIRP notifies all subscribed IRPManagers and the Trace Collection Entity (if its address is provided) if a Trace Recording Session in a ManagedEntity has not been started due to any problem.

6.3.5.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
objectClass			Notification header
objectInstance	M,Y	TraceIRP.objectInstance	Notification header
eventTime	M,Y		Notification header
notificationType	M,Y	"notifyTraceRecordingSessionFailure"	Notification header
systemDN	M,Y		Notification header
notificationID	O,Y		Notification header
traceRecordingSessionReference	O,N		The Trace Recording Session Reference may be visible only in signalling based activation.
traceReference	M,Y	TraceJob.traceReference	, , ,
reason	O,N		

6.3.5.3 Triggering event

6.3.5.3.1 From state

internalProblemInManagedEntity

Assertion Name	Definition
internalProblemInMa	Because of an internal problem the ManagedEntity cannot start a Trace Recording
nagedEntity	Session.

6.3.5.3.2 To state

newNotificationReported

Assertion Name	Definition			
newNotificationRepo	The "notifyTraceRecordingSessionFailure "notification is emitted to the subscribed			
rted	IRPManager(s).			

6.3.6 Notification notifyTraceSessionLocalActivation (M)

6.3.6.1 Definition

The TraceIRP notifies all subscribed IRPManagers if a Trace Session is configured by the Element Manager.

6.3.6.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
objectClass	M,Y	TraceIRP.objectClass	Notification header
objectInstance	M,Y	TraceIRP.objectInstance	Notification header
eventTime	M,Y		Notification header
notificationType	M,Y	"notifyTraceSessionLocalActivation"	Notification header
systemDN	M,Y		Notification header
notificationID	O,Y		Notification header
traceReference	M,Y	TraceJob.traceReference	
traceTarget	M,Y	TraceJob.traceTarget	
iOCInstance	M,Y	ManagedEntity.objectInstance	

6.3.6.3 Triggering event

6.3.6.3.1 From state

unknownTraceReference

Assertion Name	Definition
unknownTraceReference	The TraceIRP has detected a traceReference associated to a Trace Session in a
	ManagedEntity that is not initiated via the ltf-N.

6.3.6.3.2 To state

newNotificationReported

Assertion Name	Definition
newNotificationReported	The " notifyTraceSessionLocalActivation " notification is emitted to the
	subscribed IRPManager(s).

6.3.7 Notification notifyTraceSessionIdentities (CM)

6.3.7.1 Definition

The TraceIRP or the MmeFunction notifies the Trace Collection Entity about the identities of the subscriber and Equipment in case of tracing a session in E-UTRAN only.

6.3.7.2 Input parameters

Parameter Name	Qualifiers	Matching Information	Comment
objectClass	M,Y	TraceIRP.objectClass, or	Notification
		MmeFunction.objectClass	header
objectInstance	M,Y	TraceIRP.objectInstance, or	Notification
		MmeFunction.objectClass	header
eventTime	M,Y		Notification
			header
notificationType	M,Y	"notifyTraceSessionIds"	Notification
			header
systemDN	M,Y		Notification
			header
notificationID	O,Y		Notification
			header
traceReference	M,Y	TraceJob.traceReference	
traceRecordingSessionReference	M,Y	TraceJob.traceRecordingSessionReference	
traceTarget	M,Y	TraceJob.traceTarget	

6.3.7.3 Triggering event

6.3.7.3.1 From state

FFS

Assertion Name	Definition			
FFS	FFS			

6.3.7.3.2 To state

FFS

Assertion Name	Definition
FFS	FFS

6.3.7.4 Constraint

Name	Definition
notifyTraceSessionIdentities Notification CM qualifier	Tracing is performed only in E-UTRAN

Annex A (informative): Change history

Change history								
Date	TSG#	TSG Doc.	CR	Rev	Subject/Comment	Cat	Old	New
Apr 2007	S5_52	S5-070445			Submitted by SA5 prior SA#36 for Information with the intention to get SA#36 Rel-7 Approval for this TS and the CORBA Solution Set TS 32.443		1.0.0	
Jun 2007	SP-36	SP-070288			Submitted to SA#36 for Approval		1.0.0	7.0.0
Mar 2008	SP-39	SP-080058	0001		Standardize the DN id of UTRAN cell as the identification for the trace target in case of cell traffic trace	F	7.0.0	7.1.0
Dec 2008	SP-42	SP-080846	0002		Introducing EPS in Subscriber and Equipment Trace	С	7.1.0	8.0.0
Dec 2009					Upgrade to Release 9		8.0.0	9.0.0
Jan 2010					Removal of track changes and correction of change history		9.0.0	9.0.1
Dec 2010	SP-50	SP-100833	003	1	Correcting the Identification of IMS Subscriber Tracing - Align with 32.421	F	9.0.1	10.0.0
Mar 2011	SP-51	SP-110102	004	-	Adding Minimization of Drive Tests (MDT) to Trace IRP	В	10.0.0	10.1.0
May 2011	SP-52	SP-110292	007	1	Add areascope parameter as a MDT configuration	F	10.1.0	10.2.0
May 2011	SP-52	SP-110286	800	1	Modify the defintion of traceTarget	С	10.2.0	11.0.0
Dec 2011		SP-110716		1	Add RLF reporting configuration -Align with 32.422	В	11.0.0	11.1.0
Dec 2011	SP-54	SP-110715	015	2	Support multiple cells in area based MDT	Α	11.0.0	11.1.0
Dec 2011		SP-110715	-	2	dd TCE address for UTRAN MDT activation		11.0.0	11.1.0
March 2012	SP-55	SP-120053	020	1	Inconsistency correction on trace target -Align with 32.422	Α	11.1.0	11.2.0
June-2012	SP-56	SP-120368	0215		Alignment of the Anonymization parameter with TS 32.422	Α	11.2.0	11.3.0
Sep-2012	SP-57	SP-120571	0216	1	dding new MDT configuration parameters to align with TS 37.320 and TS 32.422		11.3.0	11.4.0
Sep-2012	SP-57	SP-120571	0219	1	Add missing threshold parameter for UMTS event triggered measurements	Α	11.3.0	11.4.0
		SP-120795	0217	2	Add RCEF reporting	В		
		SP-120795	0222	3	Correction on scope, references and abreviations	F		
		SP-120794	0226	1	Correction of UMTS M2 reporting trigger configuration -Align with 32.422	Α		
Dec-2012	SP-58	SP-120796	0227	1	Introducing common MDT measurement period attribute in Trace IRP	В	11.4.0	11.5.0
		SP-120796	0228	1	Addition of Network Sharing	С		
		SP-120795		1	Add measurement M7	В		
		SP-120795	0230	-	Combine measurement period parameters for LTE	С		
Mar-2013	SP-59	SP-130057	0231	1	Editorial corrections in 32.442	F	11.5.0	11.6.0
Sep-2014	SP-65	SP-140558	0232	-	Addition of missing parameters relating to RCEF	F	11.6.0	11.7.0
Oct 2014					Automatic upgrade (MCC)		11.7.0	12.0.0

History

Document history				
V12.0.0	October 2014	Publication		