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TECHNICAL SPECIFICATION

**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
LTE;
Telecommunication management;
Fault Management;
Part 6: Alarm Integration Reference Point (IRP):
Solution Set (SS) definitions
(3GPP TS 32.111-6 version 16.0.0 Release 16)**

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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
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Contents

Foreword

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

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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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:

32.111-1 "Fault Management; Part 1: 3G fault management requirements".

32.111-2 "Fault Management; Part 2: Alarm Integration Reference Point (IRP): Information Service (IS)".

32.111-6 "Fault Management; Alarm 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 Telecommunications Management (TM). The TM principles and TM architecture are specified in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].

A communications system is composed of a multitude of Network Elements (NE) of various types and, typically, different vendors, which inter-operate in a coordinated manner in order to satisfy the network users' communication requirements.

The occurrence of faults in an NE may cause deterioration or loss of this NE's function. Fault Management is the functional area, which allows the operator to detect the occurrence of faults in the network in real-time. Configuration Management and Performance Management are two more functional areas, which require the operator to be alerted to certain conditions in the network.

A standard general-purpose mechanism for the management of logs containing selected notifications from the network is required to provide an ability to perform historical analysis on faults and conditions, which occurred in the network. The TS 32.33x-series, constituting the Notification Log IRP, sets forth such a mechanism - and Annex B of the present document contains the XML definition related to Alarm IRP notifications.

1 Scope

The present document contains the Solution Sets for the IRP whose semantics is specified in Alarm IRP: Information Service (TS 32.111-2 [4]).

These Solution Set specifications are related to 3GPP TS 32.111-2 V14. 0.X [4].

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 32.111-1: "Telecommunication management; Fault Management; Part 1: 3G fault management requirements".

[4] 3GPP TS 32.111-2: "Telecommunication management; Fault Management; Part 2: Alarm Integration Reference Point: Information Service (IS)".

[5] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and definitions".

[6] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[7] 3GPP TS 32.302: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Information Service (IS)".

[8] 3GPP TS 32.306: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Solution Set (SS) definitions".

[9] 3GPP TS 32.311: "Telecommunication management; Generic Integration Reference Point (IRP) management; Requirements".

[10] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management; Information Service (IS)".

[11] 3GPP TS 32.316: "Telecommunication management; Generic Integration Reference Point (IRP) management: Solution Set (SS) definitions".

[12] 3GPP TS 32.331: "Telecommunication management; Notification Log (NL) Integration Reference Point (IRP): Requirements".

[13] 3GPP TS 32.336: "Telecommunication management; Notification Log (NL) Integration Reference Point (IRP): Solution Set (SS) definitions".

[14] OMG TC Document telecom/98-11-01: "OMG Notification Service". http://www.omg.org/technology/documents/

[15] OMG CORBA Services: "Common Object Services Specification, Update: November 22, 1996" (Clause 4 contains the Event Service specification). http://www.omg.org/technology/documents/

[16] W3C SOAP 1.1 specification (http://www.w3.org/TR/2000/NOTE-SOAP-20000508/)

[17] W3C SOAP 1.2 specification (http://www.w3.org/TR/soap12-part1/)

[18] W3C WSDL 1.1 specification (http://www.w3.org/TR/2001/NOTE-wsdl-20010315)

[19] W3C XPath 1.0 specification (http://www.w3.org/TR/1999/REC-xpath-19991116)

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 32.111-1 [3], 3GPP TS 32.111-2 [4], 3GPP TS 32.150 [5] and 3GPP TS 32.331 [12] apply.

IRP document version number string

The IRP document version number (sometimes called “IRP version” or “version number”) string is used to identify the present document. The definition of “IRP document version number string” in 3GPP TS 32.311 [9] provides the rule to derive such a string.

This string is used for the return value of get_alarm_irp_versions(). It is used as return value of get_notification_categories() if the Notification IRP supports the emission of notifications defined by this Alarm IRP version. It is also used in the domain_name attribute of a structured event carrying alarm information defined by this Alarm IRP version.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CORBA	Common Object Request Broker Architecture
IDL	Interface Definition Language
IRP	Integration Reference Point
IS	Information Service
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NL	Notification Log
OMG	Object Management Group
SS	Solution Set
TMN	Telecommunications Management Network
UML	Unified Modelling Language
WSDL	Web Service Description Language
XML	eXtensible Markup Language

4 Solution Set Definitions

This specification defines the following 3GPP Alarm IRP Solution Set Definitions:

Annex A provides the CORBA Solution Set.

Annex B provides the XML Definitions.

Annex C provides the SOAP Solution Set.

Annex A (normative): CORBA Solution Set

A.0 General

This annex contains the CORBA Solution Set for the IRP whose semantics is specified in Alarm IRP: Information Service (TS 32.111-2 [4]).

A.1 Architectural Features

A.1.0 Introduction

The overall architectural feature of Alarm IRP is specified in 3G TS 32.111-2 [4]. This clause specifies features that are specific to the CORBA SS.

A.1.1 Syntax for Distinguished Names

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [6].

A.1.2 Notification Services

In implementations of CORBA SS, IRPAgent conveys Alarm Information to IRPManager via OMG Notification Service (OMG Notification Service [14]).

OMG Event Service [15] provides event routing and distribution capabilities. OMG Notification Service provides, in addition to Event Service, event filtering and Quality Of Service (QOS) as well.

A necessary and sufficient sub set of OMG Notification Services shall be used to support `AlarmIRPNotifications` notifications as specified in 3G TS 32.111-2 [4].

A.1.3 Push and Pull Style

OMG Notification Service defines two styles of interaction. One is called push style. In this style, IRPAgent pushes notifications to IRPManager as soon as they are available. The other is called pull style. In this style, IRPAgent keeps the notifications till IRPManager requests for them.

This CORBA SS specifies that support of Push style is Mandatory (M) and that support of Pull style is Optional (O).

A.1.4 Support multiple notifications in one `push` operation

For efficiency reasons, IRPAgent may send multiple notifications using one single `push` operation. To pack multiple notifications into one `push` operation, IRPAgent may wait and not invoke the `push` operation as soon as notifications are available. To avoid IRPAgent to wait for an extended period of time that is objectionable to IRPManager, IRPAgent shall implement an IRPAgent wide timer configurable by administrator. On expiration of this timer, IRPAgent shall invoke `push` if there is at least one notification to be conveyed to IRPManager. This timer is re-started after each `push` invocation.

A.1.5 AlarmIRPNotifications Interface

OMG CORBA Notification push operation is used to realise the notification of `AlarmIRPNotifications`. All the notifications in this interface are implemented using this `push_structured_event` method.

A.1.5.1 Method push (M)

```
module CosNotifyComm {
…
Interface SequencePushConsumer : NotifyPublish {
void push_structured_events(
in CosNotification::EventBatch notifications)
        raises( CosEventComm::Disconnected);
…
}; // SequencePushConsumer
…
}; // CosNotifyComm
```

NOTE 1: The `push_structured_events` method takes an input parameter of type `EventBatch` as defined in the OMG `CosNotification` module (OMG Notification Service [14]). This data type is the same as a sequence of Structured Events. Upon invocation, this parameter will contain a sequence of Structured Events being delivered to IRPManager by IRPAgent to which it is connected.

NOTE 2: The maximum number of events that will be transmitted within a single invocation of this operation is controlled by IRPAgent wide configuration parameter.

NOTE 3: The amount of time the supplier (IRPAgent) of a sequence of Structured Events will accumulate individual events into the sequence before invoking this operation is controlled by IRPAgent wide configuration parameter as well.

NOTE 4: IRPAgent may push `EventBatch` with only one Structured Event.

A.1.6 Filter

IRPAgent shall optionally support alarm filtering based on IRPManager's supplied alarm filter constraints (e.g. as parameter in `subscribe`() of 3G TS 32.302 [7]. Alarm filtering can be applied in the following cases:

- It is applicable to alarms emitted by IRPAgent via `AlarmIRPNotifications`. IRPManager supplies alarm filter constraint via the `subscribe` method. This filter is effective during the period of subscription.
- It is applicable to alarms returned by IRPAgent via the `out` parameter of `get_alarm_list` method. IRPManager supplies alarm filter constraint via the `get_alarm_list` method. This filter is effective only for this method invocation.
- It is applicable to the calculation of alarm counts returned by IRPAgent via the `out` parameters of `get_alarm_count` method. IRPManager supplies alarm filter constraint via the `get_alarm_count` method. This filter is effective only for this method invocation.

This SS shall use of filter constraint grammar specified by reference OMG Notification Service [14]. The name of the grammar is called "`EXTENDED_TCL`". See clause 2.4, Default Filter Constraint Language in OMG Notification Service [14]. This SS shall use this grammar only.

A.2 Mapping

A.2.1 Operation and Notification mapping

Alarm IRP: IS 3G TS 32.111-2 [4] defines semantics of operation and notification visible across the Alarm IRP. Table A.2.1.1 indicates mapping of these operations and notifications to their equivalents defined in this SS.

Table A.2.1.1: Mapping from IS Notification/Operation to SS equivalents

IS Operation/ notification 3G TS 32.111-2 [4]	SS Method	Qualifier
acknowledgeAlarms	acknowledge_alarms	M
unacknowledgeAlarms	unacknowledge_alarms	O
getAlarmList	get_alarm_list	M
getIRPVersion (note)	get_alarm_irp_versions	M
getAlarmCount	get_alarm_count	O
setComment	comment_alarms	O
clearAlarms	clear_alarms	O
getOperationProfile (note)	get_alarm_irp_operations_profile	O
getNotificationProfile (note)	get_alarm_irp_notification_profile	O
notifyNewAlarm	push_structured_event Note that OMG Notification Service OMG Notification Service [14] defines this method. See clause A.3.1	M
notifyClearedAlarm	push_structured_event See clause A.3.1	M
notifyChangedAlarm	push_structured_event See clause A.3.1	M
notifyChangedAlarmGeneral	push_structured_event See clause A.3.1	O
notifyAckStateChanged	push_structured_event See clause A.3.1	M
notifyAlarmListRebuilt	push_structured_event See clause A.3.1	M
notifyComments	push_structured_event See clause A.3.1	O
notifyPotentialFaultyAlarmList	push_structured_event See clause A.3.1	O
notifyCorrelatedNotificationChanged	push_structured_event See clause A.3.1	O
NOTE: This operation is of ManagedGenericIRP IOC specified in [10]. The AlarmIRP IOC of [4] inherits from it.		

A.2.2 Operation parameter mapping

Reference 3G TS 32.111-2 [4] defines semantics of parameters carried in operations across the Alarm IRP. The following set of tables indicates the mapping of these parameters, as per operation, to their equivalents defined in this SS.

Table A.2.2.1: Mapping from IS `acknowledgeAlarms` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
alarmInformationAndSeverityReferenceList	AlarmIRPConstDefs::AlarmInformationIdAndSevSeq alarm_information_id_and_sev_list Note: perceivedSeverity is optional { alarmId - Mandatory; perceivedSeverity - Optional }	M
ackUserId	string ack_user_id	M
ackSystemId	ManagedGenericIRPConstDefs::StringOpt ack_system_id	O
badAlarmInformationReferenceList	AlarmIRPConstDefs::BadAcknowledgeAlarmInfoSeq bad_ack_alarm_info_list	M
status	ManagedGenericIRPConstDefs::Signal Exceptions: AcknowledgeAlarms, ManagedGenericIRPSystem::ParameterNotSupported, ManagedGenericIRPSystem::InvalidParameter	M

Table A.2.2.2: Mapping from IS `unacknowledgeAlarms` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
alarmInformationReferenceList	AlarmIRPConstDefs::AlarmInformationIdSeq alarm_information_id_list	M
ackUserId	string ack_user_id	M
ackSystemId	ManagedGenericIRPConstDefs::StringOpt ack_system_id	O
badAlarmInformationReferenceList	AlarmIRPConstDefs:: BadAlarmInformationIdSeq bad_alarm_information_id_list	M
status	ManagedGenericIRPConstDefs::Signal Exceptions: UnacknowledgeAlarms, ManagedGenericIRPSystem::OperationNotSupported, ManagedGenericIRPSystem::ParameterNotSupported, ManagedGenericIRPSystem::InvalidParameter	M

Table A.2.2.3: Mapping from IS `getAlarmList` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
alarmAckState, filter	ManagedGenericIRPConstDefs::StringOpt filter	O
baseObjectClass, baseObjectInstance	AlarmIRPConstDefs::DNOpt base_object	O (Note 1)
alarmInformation List	Return value of type AlarmIRPConstDefs::AlarmInformationSeq (Note 2)	M
status	Exceptions: GetAlarmList, FilterComplexityLimit, ManagedGenericIRPSystem::ParameterNotSupported, ManagedGenericIRPSystem::InvalidParameter	M
Note 1: If notification `notifyAlarmListRebuilt` supports indicating that only a part of the alarm list has been rebuilt then this parameter shall be supported. Note 2: Each Structured Event of AlarmIRPConstDefs::AlarmInformationSeq shall have the fields defined in Table A.2.2.4 or Table A.2.2.5.		

Table A.2.2.4: Definition of a Structured Event of AlarmIRPConstDefs::AlarmInformationSeq for alarms not related to security