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Technical Specification

3rd Generation Partnership Project;

Technical Specification Group Services and System Aspects;

Telecommunication management;

Communication Surveillance (CS)

Integration Reference Point (IRP);

Solution Set (SS) definitions

(Release 16)

* *

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# 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:

TS 32.351: "Communication Surveillance (CS) Integration Reference Point (IRP): Requirements";

TS 32.352: "Communication Surveillance (CS) Integration Reference Point (IRP): Information Service (IS)";

**TS 32.356: "Communication Surveillance (CS) Integration Reference Point (IRP): Solution Set (SS) definitions"**

The present document is part of a set of technical specifications defining the telecommunication management (TM) of 3G systems. The TM principles are described in 3GPP TS 32.101 [1]. The TM architecture is described in 3GPP TS 32.102 [2]. The other specifications define the interface (Itf-N) between the managing system (manager), which is in general the network manager (NM) and the managed system (agent), which is either an element manager (EM) or the managed NE itself. The Itf-N is composed of a number of integration reference points (IRPs) defining the information in the agent that is visible for the manager, the operations that the manager may perform on this information and the notifications that are sent from the agent to the manager. CS (Communication Surveillance) IRP is one of these IRPs with special function.

To ensure the availability and reliability of the management, an automatic surveillance of the communication between NM and the managed system are required. CSIRP is defined as a capability to achieve this goal.

# 1 Scope

The present document specifies the Solution Set definitions for the IRP whose semantics is specified in TS 32.352 [6] Communication Surveillance IRP: Information Service..

This Solution Set definitions specification is related to 3GPP TS 32.352 V14.0.X [6].

# 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 32.351: "Telecommunication management; Communication Surveillance (CS) Integration Reference Point (IRP): Requirements".

[4] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP): Information Service (IS)".

[5] 3GPP TS 32.311: "Telecommunication management; Generic Integration Reference Point (IRP): Requirements".

[6] 3GPP TS 32.352: "Telecommunication management; Communication Surveillance (CS) Integration Reference Point (IRP): Information Service (IS)".

[7] 3GPP TS 32.306: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Solution Set (SS) definitions".

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

[9] 3GPP TS 32.300: "Telecommunication management; Configuration Management (CM); Name convention for Managed Objects".

[10] 3GPP TS 32.336: "Telecommunication management; Notification Log (NL) Integration Reference Point (IRP): Solution Set (SS) definitions".

[11] 3GPP TS 32.331: "Telecommunication management; Notification Log (NL) Integration Reference Point (IRP): Requirements".

[12] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[13] 3GPP TS 32.150: "Telecommunication management; Integration Reference Point (IRP) Concept and definitions".

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

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

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

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

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [12], 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.150 [13], 3GPP TS 32.351 [3], 3GPP TS 32.352 [6] and 3GPP TS 32.331 [11]. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [12]. And the following apply:

**IRP document version number string (or "IRPVersion"):** see 3GPP TS 32.311 [5].

## 3.2 Abbreviations

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

CORBA Common Object Request Broker Architecture

CS Communication Surveillance

CSIRP Communication Surveillance IRP

DN Distinguished Name

EM Element Manager

IRP Integration Reference Point

IOC Information Object Class

IS Information Service

NE Network Element

NL Notification Log

NM Network Manager

NRM Network Resource Model

SS Solution Set

UML Unified Modelling Language

XML eXtensible Markup Language

# 4 Solution Set definitions

This specification defines the following 3GPP CS IRP Solution Set definitions:

- 3GPP CS IRP CORBA SS (Annex A)

- 3GPP CS IRP XML definitions (Annex B)

- 3GPP CS IRP SOAP Solution Set (Annex C)

Annex A (normative):   
CORBA Solution Set

This annex contains the CORBA Solution Set for the IRP whose semantics is specified in CS IRP: Information Service (TS 32.352 [6]).

# A.1 Architectural Features

The overall architectural feature of CS IRP is specified in 3GPP TS 32.352 [6].

This clause specifies features that are specific to the CORBA SS.

## A.1.1 Syntax for Distinguished Names and Versions

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [9].

The version of this IRP is represented as a string (see also clause 3 for versions).

## A.1.2 Notifications

Notifications are sent according to the Notification IRP: CORBA SS (see 3GPP TS 32.306 [7]).

The contents of the CS IRP notifications are defined in the present document.

# A.2 Mapping

## A.2.1 Operation and Notification mapping

CSIRP: IS 3GPP TS 32.352 [6] defines semantics of operation and notification visible across the CSIRP. Table A.2.1 indicates mapping of these operations and notifications to their equivalents defined in this SS.

Table A.2.1: Mapping from IS Operations and Notification to SS equivalents

|  |  |  |
| --- | --- | --- |
| IS Operations/ notification TS 32.352 [6] | SS Method | Qualifier |
| getHeartbeatPeriod | get\_heartbeat\_period | M |
| setHeartbeatPeriod | set\_heartbeat\_period | O |
| triggerHeartbeat | trigger\_heartbeat | M |
| notifyHeartbeat | push\_structured\_event (See clause A.3.1) | M |
| getIRPVersion (see note) | get\_cs\_irp\_versions | M |
| getOperationProfile (see note) | get\_cs\_irp\_operations\_profile | O |
| getNotificationProfile (see note) | get\_cs\_irp\_notification\_profile | O |
| NOTE: This operation is of ManagedGenericIRP IOC specified in 3GPP TS 32.312 [4].  The CSIRP IOC of TS 32.352 [6] inherits from it. | | |

## A.2.2 Operation parameter mapping

The CSIRP: IS 3GPP TS 32.352 [6] defines semantics of parameters carried in operations across the CSIRP. The following tables indicate the mapping of these parameters, as per operation, to their equivalents defined in this SS.

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

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| heartbeatPeriod | CSIRPConstDefs::HeartbeatPeriod heartbeat\_period | M |
| status | Return value of type CSIRPConstDefs::Result  Exception:  GetHeartbeatPeriod | M |

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

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| heartbeatPeriod | CSIRPConstDefs::HeartbeatPeriod heartbeat\_period | M |
| status | Return value of type CSIRPConstDefs::Result  Exception:  SetHeartbeatPeriod, InvalidHeartbeatPeriod, ConflictingHeartbeatPeriod, ManagedGenericIRPSystem::ValueNotSupported, ManagedGenericIRPSystem::OperationNotSupported | M |

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

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| managerIdentifier | CSIRPConstDefs::ManagerIdentifier manager\_identifier | M |
| status | Return value of type CSIRPConstDefs::Result  Exception:  TriggerHeartbeat, InvalidManagerIdentifier | M |
| NOTE: For CORBA SS, the managerIdentifier of triggerHeartbeat operation shall be mapped to managerReference which is same as what IRPManager used to subscribe notifications [7]. | | |

Table A.2.2.4: Mapping from IS getIRPVersion parameters to SS equivalents

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| versionNumberSet | Return value of type ManagedGenericIRPConstDefs::VersionNumberSet | M |
| status | Exception:  GetCSIRPVersions | M |

Table A.2.2.5: Mapping from IS getOperationProfile parameters to SS equivalents

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| iRPVersion | ManagedGenericIRPConstDefs::VersionNumber irp\_version | M |
| operationNameProfile, operationParameterProfile | Return value of type ManagedGenericIRPConstDefs::MethodList | M |
| status | Exception:  GetCSIRPOperationsProfile, ManagedGenericIRPSystem::OperationNotSupported, ManagedGenericIRPSystem::InvalidParameter | M |

Table A.2.2.6: Mapping from IS getNotificationProfile parameters to SS equivalents

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| iRPVersion | ManagedGenericIRPConstDefs::VersionNumber irp\_version | M |
| notificationNameProfile, notificationParameterProfile | Return value of type ManagedGenericIRPConstDefs::MethodList | M |
| status | Exception:  GetCSIRPNotificationProfile, ManagedGenericIRPSystem::OperationNotSupported, ManagedGenericIRPSystem::InvalidParameter | M |

## A.2.3 Notification parameter mapping

The semantics of parameters carried in notifications are defined in CSIRP IS (3GPP TS 32.352 [6]).

Table A.2.3 indicates the mapping of these parameters to their OMG CORBA Structured Event [8] equivalents.

The composition of OMG Structured Event, as defined in [8] is:

Header

Fixed Header

domain\_name

type\_name

event\_name

Variable Header

Body

filterable\_body\_fields

remaining\_body

Table A.2.3 lists in the second column all OMG Structured Event attributes. The first column identifies the notification parameters defined in CSIRP IS (3GPP TS 32.352 [6]).

Table A.2.3: Mapping for notifyHeartBeat

| IS Parameters | OMG CORBA Structured Event attribute | Qualifier | Comment |
| --- | --- | --- | --- |
| There is no corresponding IS attribute. | domain\_name | M | It carries the IRP document version number string. See clause 3.1.  It indicates the syntax and semantics of the Structured Event as defined by the present document. |
| notificationType | type\_name | M | This is the ET\_HEARTBEAT of module of CSIRPConstDefs. |
| There is no corresponding IS attribute | event\_name | M | It carries no information. |
| There is no corresponding IS attribute. | Variable Header |  |  |
| objectClass, objectInstance | One NV pair of filterable\_body\_fields | M | NV stands for name-value pair. Order arrangement of NV pairs is not significant. The name of NV-pair is always encoded in string.  Name of this NV pair is the MANAGED\_OBJECT\_INSTANCE of interface AttributeNameValue of module NotificationIRPConstDefs.  Value of NV pair is a string. See corresponding table in Notification IRP: CORBA SS of [7]. |
| notificationId | One NV pair of remaining\_body | M | Name of NV pair is the NOTIFICATION\_ID of interface AttributeNameValue of module NotificationIRPConstDefs.  Value of NV pair is a long. See corresponding table in Notification IRP: CORBA SS of [7]. |
| eventTime | One NV pair of filterable\_body\_fields | M | Name of NV pair is the EVENT\_TIME of interface AttributeNameValue of module NotificationIRPConstDefs.  Value of NV pair is IRPTime. See corresponding table in Notification IRP: CORBA SS of [7]. |
| systemDN | One NV pair of filterable\_body\_fields | M | Name of NV pair is the SYSTEM\_DN of interface AttributeNameValue of module NotificationIRPConstDefs.  Value of NV pair is a string. See corresponding table in Notification IRP: CORBA SS of [7]. |
| heartbeatPeriod | One NV pair of remaining\_body | M | Name of NV pair is the HEARTBEAT\_PERIOD of interface NotifyHeartbeat of module CSIRPNotifications.  Value of NV pair is a CSIRPConstDefs::HeartbeatPeriod. |
| triggerFlag | One NV pair of remaining\_body | M | Name of NV pair is the TRIGGER\_FLAG of interface NotifyHeartbeat of module CSIRPNotifications.  Value of NV pair is a CSIRPConstDefs::TriggerFlag. |
| locator | One NV pair of remaining\_body | M | Name of NV pair is the CHANNEL\_ID of interface NotifyHeartbeat of module CSIRPNotifications.  Value of NV pair is a CSIRPConstDefs::ChannelId.  This parameter shall be mapped to an identifier of channel. For definition of channel, see OMG Notification Service [8].  The CHANNEL\_ID carry the same meaning but may or may not carry the same value used by OMG defined Channel ID. |
| managerIdentifier | One NV pair of remaining\_body | M | Name of NV pair is the MANAGER\_IDENTIFIER of interface NotifyHeartbeat of module CSIRPNotifications.  Value of NV pair is a CSIRPConstDefs::ManagerIdentifier. |

# A.3 CSIRPNotification Interface

OMG CORBA Notification push operation is used to realise the notification of CSIRPNotifications. All the notifications in this interface are implemented using this push\_structured\_event method.

## A.3.1 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 [8]). 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.4 Solution Set definitions

## A.4.1 IDL definition structure

Clause A.4.2 defines the constants and types used by the CS IRP.

Clause A.4.3 defines the operations which are performed by the CS IRP agent.

Clause A.4.4 defines the notifications which are performed by the CS IRP agent.

## A.4.2 IDL specification “CSIRPConstDefs.idl”

//File: CSIRPConstDefs.idl

#ifndef \_CS\_IRP\_CONST\_DEFS\_IDL\_

#define \_CS\_IRP\_CONST\_DEFS\_IDL\_

// This statement must appear after all include statements

#pragma prefix "3gppsa5.org"

/\* ## Module: CSIRPConstDefs

This module contains commonly used definitions for CSIRP.

=========================================================

\*/

module CSIRPConstDefs

{

typedef unsigned short HeartbeatPeriod;

/\*

If notifyHeartbeat is triggered by NM positively by invoking

triggerHeartbeat operation, the value of this parameter shall be IRPManager,

otherwise, it shall be IRPAgent.

\*/

enum TriggerFlag {IRPManager, IRPAgent};

typedef string ManagerIdentifier;

typedef string ChannelId;

/\*

It specifies whether the operation is success or failed.

\*/

enum Result {SUCCESS, FAILURE};

/\*\*

\* This block identifies attributes which are included as part of the

\* CommunicationSurveillanceIRP. These attribute values should not

\* clash with those defined for the attributes of notification

\* header (see IDL of Notification IRP).

\*/

interface AttributeNameValue

{

const string HEARTBEAT\_PERIOD = "HEARTBEAT\_PERIOD";

const string CHANNEL\_ID = "CHANNEL\_ID";

const string TRIGGER\_FLAG = "TRIGGER\_FLAG";

const string MANAGER\_IDENTIFIER = "MANAGER\_IDENTIFIER";

};

};

#endif // \_CS\_IRP\_CONST\_DEFS\_IDL\_

## A.4.3 IDL specification “CSIRPSystem.idl”

//File: CSIRPSystem.idl

#ifndef \_CS\_IRP\_SYSYEM\_IDL\_

#define \_CS\_IRP\_SYSYEM\_IDL\_

#include <ManagedGenericIRPSystem.idl>

#include <ManagedGenericIRPConstDefs.idl>

#include <CSIRPConstDefs.idl>

// This statement must appear after all include statements

#pragma prefix "3gppsa5.org"

/\* ## Module: CSIRPSystem

This module implements capabilities of CSIRP.

=============================================

\*/

module CSIRPSystem

{

/\*\*

\* The InvalidHeartbeatPeriod exception is used when the period

\* value to be set by IRPManager is not a reasonable in IRPAgent's

\* implementation. A very short period may cause IRPAgent to

\* send many heartbeat notification in a short time, which may

\* decrease the performance of IRPAgent. To prevent this,

\* IRPAgent may set the lower limit period in its system

\* implemntation. When the period to be set is shorter the

\* lower limit period, IRPAgent may throw this exception

\* and reject to set the period to new value.

\* Note: set the period to zero must be allowed. The behaviour of

\* setting period to zero pls see definition for Period.

\*/

exception InvalidHeartbeatPeriod

{

unsigned short period\_lower\_limit;

string reason;

};

exception InvalidManagerIdentifier { string reason; };

exception ConflictingHeartbeatPeriod { string reason; };

/\*

System fails to complete the operation. System can provide reason

to qualify the exception. The semantics carried in reason

is outside the scope of this IRP.

\*/

exception GetHeartbeatPeriod { string reason; };

exception SetHeartbeatPeriod { string reason; };

exception TriggerHeartbeat { string reason; };

exception GetCSIRPVersions { string reason; };

exception GetCSIRPOperationsProfile { string reason; };

exception GetCSIRPNotificationProfile { string reason; };

interface CSIRP

{

/\*\*

\* IRPManager invokes this operation to obtain the current

\* heartbeat period.

\*/

CSIRPConstDefs::Result get\_heartbeat\_period(

out CSIRPConstDefs::HeartbeatPeriod heartbeat\_period

)

raises (GetHeartbeatPeriod);

/\*\*

\* IRPManager invokes this operation to set the heartbeatPeriod.

\* If the heartbeatPeriod is modified by one IRPManager, a

\* notifyHeartbeat notification should be emitted

\* immediately to all the subscribed IRPManagers to indicate

\* the new heartbeatPeriod. If the heartbeatPeriod is set to

\* zero, one notifyHeartbeat notification will be

\* emitted immediately and no more

\* notifications unless the heartbeatPeriod is modified again.

\*/

CSIRPConstDefs::Result set\_heartbeat\_period(

in CSIRPConstDefs::HeartbeatPeriod heartbeat\_period

)

raises (SetHeartbeatPeriod,

ConflictingHeartbeatPeriod,

InvalidHeartbeatPeriod,

ManagedGenericIRPSystem::ValueNotSupported,

ManagedGenericIRPSystem::OperationNotSupported);

/\*

\* IRPManager invoke this operation to trigger ET\_HEARTBEAT

\* notification positively.

\*/

CSIRPConstDefs::Result trigger\_heartbeat(

in CSIRPConstDefs::ManagerIdentifier manager\_identifier

)

raises (TriggerHeartbeat, InvalidManagerIdentifier);

/\*\*

\* Return the list of all supported CSIRP versions.

\*/

ManagedGenericIRPConstDefs::VersionNumberSet get\_cs\_irp\_versions (

)

raises (GetCSIRPVersions);

/\*\*

\* Return the list of all supported operations and their supported

\* parameters for a specific CSIRP version.

\*/

ManagedGenericIRPConstDefs::MethodList get\_cs\_irp\_operations\_profile (

in ManagedGenericIRPConstDefs::VersionNumber irp\_version

)

raises (GetCSIRPOperationsProfile,

ManagedGenericIRPSystem::OperationNotSupported,

ManagedGenericIRPSystem::InvalidParameter);

/\*\*

\* Return the list of all supported notifications and their supported

\* parameters for a specific CSIRP version.

\*/

ManagedGenericIRPConstDefs::MethodList get\_cs\_irp\_notification\_profile (

in ManagedGenericIRPConstDefs::VersionNumber irp\_version

)

raises (GetCSIRPNotificationProfile,

ManagedGenericIRPSystem::OperationNotSupported,

ManagedGenericIRPSystem::InvalidParameter);

};

};

#endif // \_CS\_IRP\_SYSTEM\_IDL\_

## A.4.4 IDL specification “CSIRPNotifications.idl”

//File: CSIRPNotifications.idl

#ifndef \_CS\_IRP\_NOTIFICATIONS\_IDL\_

#define \_CS\_IRP\_NOTIFICATIONS\_IDL\_

#include <CSIRPConstDefs.idl>

#include <NotificationIRPNotifications.idl>

// This statement must appear after all include statements

#pragma prefix "3gppsa5.org"

/\* ## Module: CSIRPNotifications

This module contains the specification of all notifications of CS IRPAgent.

============================================================================

\*/

module CSIRPNotifications

{

/\*\*

\* Constant definitions for the FileReady notification

\*/

interface NotifyHeartbeat: NotificationIRPNotifications::Notify

{

const string EVENT\_TYPE = "notifyHeartbeat";

/\*\*

\* This constant defines the name of the period property,

\* which is transported in the filterable\_body fields.

\* The data type for the value of this property

\* is CSIRPConstDefs::HeartbeatPeriod.

\*/

const string HEARTBEAT\_PERIOD = CSIRPConstDefs::AttributeNameValue::HEARTBEAT\_PERIOD;

/\*

\* This constant defines the name of the

\* channelId property,

\* which is transported in the filterable\_body

\* fields.

\* The data type for the value of this property

\* is CSIRPConstDefs::ChannelId.

\*/

const string CHANNEL\_ID = CSIRPConstDefs::AttributeNameValue::CHANNEL\_ID;

/\*

\* This constant defines the name of the

\* triggerFlag property,

\* which is transported in the filterable\_body

\* fields.

\* The data type for the value of this property

\* is CSIRPConstDefs::TriggerFlag.

\*/

const string TRIGGER\_FLAG = CSIRPConstDefs::AttributeNameValue::TRIGGER\_FLAG;

/\*

\* This constant defines the name of the

\* managerIdentifier property,

\* which is transported in the filterable\_body

\* fields.

\* The data type for the value of this property

\* is CSIRPConstDefs::ManagerIdentifier.

\*/

const string MANAGER\_IDENTIFIER = CSIRPConstDefs::AttributeNameValue::MANAGER\_IDENTIFIER;

};

};

#endif // \_CS\_IRP\_NOTIFICATIONS\_IDL\_

Annex B (normative):   
XML definitions

The annex specifies the XML Definitions for the CS Integration Reference Point (IRP) as it applies to Itf-N, in accordance with CS IRP IS definitions [6], for usage with the Notification Log IRP XML Definitions [10].

# B.1 Architectural features

The overall architectural feature of CS IRP is specified in 3GPP TS 32.352 [6].

This clause specifies features that are specific to the XML Schema definitions.

## B.1.1 Syntax for Distinguished Names

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [9].

# B.2 Mapping

Not present in the current version of this specification.

# B.3 Solution Set definitions

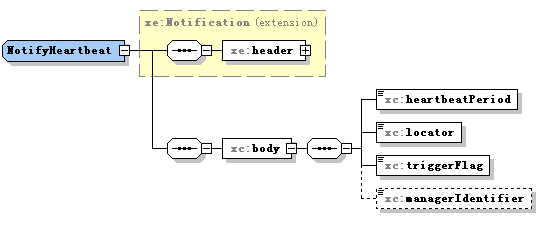
## B.3.1 XML definition structure

Clause B.3.2 provides a graphical representation of the XML elements.

Clause B.3.3 provides XML definitions of CS IRP notifications as defined in 3GPP TS 32.352 [6].

Clause B.3.4 provides XML definitions of CS IRP IOCs as defined in 3GPP TS 32.352 [6].

## B.3.2 Graphical Representation



## B.3.3 XML Schema “cSIRPNotif.xsd”

<?xml version="1.0" encoding="UTF-8"?>

<!--

3GPP TS 32.356 CSIRP Notification XML Schema

cSIRPNotif.xsd

-->

<schema xmlns:xc="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#cSIRPNotif"

xmlns:xci="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#cSIRPIOCs"

xmlns:xe="http://www.3gpp.org/ftp/specs/archive/32\_series/32.306#notification"

xmlns="http://www.w3.org/2001/XMLSchema"

targetNamespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#cSIRPNotif"

elementFormDefault="qualified" attributeFormDefault="unqualified">

<import namespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#cSIRPIOCs"/>

<import namespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.306#notification"/>

<simpleType name="TriggerFlag">

<restriction base="string">

<enumeration value="IRPManager"/>

<enumeration value="IRPAgent"/>

</restriction>

</simpleType>

<complexType name="NotifyHeartbeat">

<complexContent>

<extension base="xe:Notification">

<sequence>

<element name="body">

<complexType>

<sequence>

<element name="heartbeatPeriod" type="xci:HeartbeatPeriod"/>

<element name="locator" type="string"/>

<element name="triggerFlag" type="xc:TriggerFlag"/>

<element name="managerIdentifier" type="string" minOccurs="0"/>

</sequence>

</complexType>

</element>

</sequence>

</extension>

</complexContent>

</complexType>

<element name="NotifyHeartbeat" type="xc:NotifyHeartbeat"/>

</schema>

### B.3.4 XML Schema “cSIRPIOC.xsd”

<?xml version="1.0" encoding="UTF-8"?>

<!--

3GPP TS 32.356 CSIRP Notification XML Schema

cSIRPIOCs.xsd

-->

<schema xmlns:xci="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#cSIRPIOCs"

xmlns:xe="http://www.3gpp.org/ftp/specs/archive/32\_series/32.306#notification"

xmlns="http://www.w3.org/2001/XMLSchema"

targetNamespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#cSIRPIOCs"

elementFormDefault="qualified" attributeFormDefault="unqualified">

<simpleType name="HeartbeatPeriod">

<restriction base="unsignedLong">

<fractionDigits value="0"/>

<minInclusive value="5"/>

<maxInclusive value="60"/>

</restriction>

</simpleType>

<simpleType name="CountDownTimer">

<restriction base="unsignedLong">

<maxInclusive value="60"/>

</restriction>

</simpleType>

<!-- attributes of the CSIRP IOC -->

<element name="heartbeatPeriod" type="xci:HeartbeatPeriod"/>

<element name="countDownTimer" type="xci:CountDownTimer"/>

</schema>

Annex C (normative):  
SOAP Solution Set

The overall architectural feature of CM IRP is specified in 3GPP TS 32.352 [6].

This clause specifies features that are specific to the SOAP SS.

# C.1 Architectural Features

### C.1.1 Syntax for Distinguished Names and versions

The syntax of a Distinguished Name is defined in 3GPP TS 32.300 [9].

The version of this IRP is represented as a string (see also clause 3.1).

## C.1.2 General

The SOAP 1.1 specification [14] and WSDL 1.1 specification [16] are supported.

The SOAP 1.2 specification [17] is supported optionally.

This specification uses "document" style in WSDL file.

This specification uses "literal" encoding style in WSDL file.

The filter language used in the SS is the XPath Language (see W3C XPath 1.0 specification [15]). IRPAgents may throw a FilterComplexityLimit fault when a given filter is too complex.

Relevant definitions are imported from the CSIRP XML definitions of Annex B.

This specification uses a number of namespace prefixes throughout that are listed in Table C.1.2.

Table C.1.2: Prefixes and Namespaces used in this specification

|  |  |
| --- | --- |
| **PREFIX** | **NAMESPACE** |
| (no prefix) | http://schemas.xmlsoap.org/wsdl/ |
| soap | http://schemas.xmlsoap.org/wsdl/soap/ |
| csIRPSystem | http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRPSystem |
| csIRPData | http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRPData |
| genericIRPSystem | http://www.3gpp.org/ftp/specs/archive/32\_series/32.316#GenericIRPSystem |
| ntfIRPNtfSystem | http://www.3gpp.org/ftp/specs/archive/32\_series/32.306#NotificationIRPNtfSystem |

# C.2 Mapping

## C.2.1 Operation and Notification mapping

The CS IRP IS (3GPP TS 32.352 [6]) defines semantics of operation and notification visible across the Itf-N. Table C.2.1 indicates mapping of these operations and notifications to their equivalents defined in this SS.

Table C.2.1: Mapping from IS Operation to SS Equivalents

|  |  |  |  |
| --- | --- | --- | --- |
| IS Operations in 3GPP TS 32.352 [6] | SS Operations | SS Port | Qualifier |
| getHeartbeatPeriod | getHeartbeatPeriod | NLIRPOperations1Port | M |
| setHeartbeatPeriod | setHeartbeatPeriod | NLIRPOperations2Port | O |
| triggerHeartbeat | triggerHeartbeat | NLIRPOperations1Port | M |
| notifyHeartbeat | notify (note 1) | NotificationIRPNtfPort | M |
| NOTE 1: The IS equivalent maps to an XML definition specified in Annex B, and this being an input parameter to the operation notify under the port type ntfIRPNtfSystem:NotificationIRPNtf and under the binding ntfIRPNtfSystem:NotificationIRPNtf of 3GPP TS 32.306 [7]. | | | |

## C.2.2 Operation parameter mapping

The CS IRP IS (3GPP TS 32.352 [6]) defines semantics of parameters carried in the operations. The tables below show the mapping of these parameters, as per operation, to their equivalents defined in this SS.

Table C.2.2.1: Mapping from IS getHeartbeatPeriod parameters to SS equivalents

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| heartbeatPeriod | heartbeatPeriod | M |
| status | status | M |

Table C.2.2.2: Mapping from IS setHeartbeatPeriod parameters to SS equivalents

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| heartbeatPeriod | heartbeatPeriod | M |
| status | status | M |

Table C.2.2.3: Mapping from IS triggerHeartbeat parameters to SS equivalents

|  |  |  |
| --- | --- | --- |
| IS Operation parameter | SS Method parameter | Qualifier |
| managerIdentifier | managerIdentifier | M |
| status | status | M |

## C.2.3 Notification parameter mapping

The CS IRP Notifications are defined in Annex B.

# C.3 Solution Set definitions

## C.3.1 WSDL definition structure

Clause C.3.2 provides a graphical representation of the CS IRP service.

Clause C.3.3 defines the services which are supported the CS IRP agent.

## C.3.2 Graphical Representation

The WSDL structure is depicted in Figure C.3.2 below, depicting port type, binding and service. The port type contains port type operations, which again contains input, output and fault messages. The binding contains binding operations, which have the same name as the port type operations. The binding connects to a port inside the service.



Figure C.3.2: CSIRP SOAP Solution Set WSDL structure

## C.3.3 WSDL specification “CSIRPSystem.wsdl”

<?xml version="1.0" encoding="UTF-8"?>

<!--

3GPP TS 32.356 Communication Surveillance IRP SOAP Solution Set

-->

<definitions xmlns="http://schemas.xmlsoap.org/wsdl/"

xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"

xmlns:csIRPSystem="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRPSystem"

xmlns:csIRPData="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRPData"

xmlns:genericIRPSystem="http://www.3gpp.org/ftp/specs/archive/32\_series/32.316#GenericIRPSystem"

xmlns:ntfIRPNtfSystem="http://www.3gpp.org/ftp/specs/archive/32\_series/32.306#NotificationIRPNtfSystem"

targetNamespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRPSystem">

<import namespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.316#GenericIRPSystem"/>

<import namespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.306#NotificationIRPNtfSystem"/>

<types>

<schema targetNamespace="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRPData" xmlns="http://www.w3.org/2001/XMLSchema">

<!-- getHeartbeatPeriod Request -->

<element name="getHeartbeatPeriodRequest">

</element>

<!-- getHeartbeatPeriod Response -->

<element name="getHeartbeatPeriodResponse">

<complexType>

<sequence>

<element name="heartbeatPeriod" type="nonNegativeInteger"/>

<element name="status">

<simpleType>

<restriction base="string">

<enumeration value="OperationSucceeded"/>

<enumeration value="OperationFailed"/>

</restriction>

</simpleType>

</element>

</sequence>

</complexType>

</element>

<!-- getHeartbeatPeriod Fault -->

<element name="getHeartbeatPeriodFault">

<simpleType>

<restriction base="string">

<enumeration value="OperationFailed"/>

</restriction>

</simpleType>

</element>

<!-- triggerHeartbeat Request -->

<element name="triggerHeartbeatRequest">

<complexType>

<sequence>

<element name="managerIdentifier" type="string"/>

</sequence>

</complexType>

</element>

<!-- xx Response -->

<element name="triggerHeartbeatResponse">

<complexType>

<sequence>

<element name="status">

<simpleType>

<restriction base="string">

<enumeration value="OperationSucceeded"/>

<enumeration value="OperationFailed"/>

</restriction>

</simpleType>

</element>

<element name="failureReason" minOccurs="0">

<simpleType>

<restriction base="string">

<enumeration value="invalidManagerIdentifier"/>

<enumeration value="operation\_failed\_invalid\_input\_parameter"/>

<enumeration value="operation\_failed\_internal\_problem"/>

</restriction>

</simpleType>

</element>

</sequence>

</complexType>

</element>

<!-- triggerHeartbeat Fault -->

<element name="triggerHeartbeatFault">

<simpleType>

<restriction base="string">

<enumeration value="OperationFailed"/>

</restriction>

</simpleType>

</element>

<!-- setHeartbeatPeriod Request -->

<element name="setHeartbeatPeriodRequest">

<complexType>

<sequence>

<element name="heartbeatPeriod" type="nonNegativeInteger"/>

</sequence>

</complexType>

</element>

<!-- setHeartbeatPeriod Response -->

<element name="setHeartbeatPeriodResponse">

<complexType>

<sequence>

<element name="status">

<simpleType>

<restriction base="string">

<enumeration value="OperationSucceeded"/>

<enumeration value="OperationFailed"/>

</restriction>

</simpleType>

</element>

<element name="failureReason" minOccurs="0">

<simpleType>

<restriction base="string">

<enumeration value="invalidHeartbeatPeriod"/>

<enumeration value="conflictingHeartbeatPeriod"/>

<enumeration value="operation\_failed\_invalid\_input\_parameter"/>

<enumeration value="operation\_failed\_internal\_problem"/>

</restriction>

</simpleType>

</element>

</sequence>

</complexType>

</element>

<!-- setHeartbeatPeriod Fault -->

<element name="setHeartbeatPeriodFault">

<simpleType>

<restriction base="string">

<enumeration value="OperationFailed"/>

</restriction>

</simpleType>

</element>

</schema>

</types>

<message name="getHeartbeatPeriodRequest">

<part name="parameter" element="csIRPData:getHeartbeatPeriodRequest"/>

</message>

<message name="getHeartbeatPeriodResponse">

<part name="parameter" element="csIRPData:getHeartbeatPeriodResponse"/>

</message>

<message name="getHeartbeatPeriodFault">

<part name="parameter" element="csIRPData:getHeartbeatPeriodFault"/>

</message>

<message name="triggerHeartbeatRequest">

<part name="parameter" element="csIRPData:triggerHeartbeatRequest"/>

</message>

<message name="triggerHeartbeatResponse">

<part name="parameter" element="csIRPData:triggerHeartbeatResponse"/>

</message>

<message name="triggerHeartbeatFault">

<part name="parameter" element="csIRPData:triggerHeartbeatFault"/>

</message>

<message name="setHeartbeatPeriodRequest">

<part name="parameter" element="csIRPData:setHeartbeatPeriodRequest"/>

</message>

<message name="setHeartbeatPeriodResponse">

<part name="parameter" element="csIRPData:setHeartbeatPeriodResponse"/>

</message>

<message name="setHeartbeatPeriodFault">

<part name="parameter" element="csIRPData:setHeartbeatPeriodFault"/>

</message>

<portType name="CSIRPOperations1">

<operation name="getHeartbeatPeriod">

<input message="csIRPSystem:getHeartbeatPeriodRequest"/>

<output message="csIRPSystem:getHeartbeatPeriodResponse"/>

<fault name="getHeartbeatPeriodFault" message="csIRPSystem:getHeartbeatPeriodFault"/>

</operation>

<operation name="triggerHeartbeat">

<input message="csIRPSystem:triggerHeartbeatRequest"/>

<output message="csIRPSystem:triggerHeartbeatResponse"/>

<fault name="triggerHeartbeatFault" message="csIRPSystem:triggerHeartbeatFault"/>

</operation>

</portType>

<portType name="CSIRPOperations2">

<operation name="setHeartbeatPeriod">

<input message="csIRPSystem:setHeartbeatPeriodRequest"/>

<output message="csIRPSystem:setHeartbeatPeriodResponse"/>

<fault name="setHeartbeatPeriodFault" message="csIRPSystem:setHeartbeatPeriodFault"/>

</operation>

</portType>

<binding name="CSIRPOperations1" type="csIRPSystem:CSIRPOperations1">

<soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>

<operation name="getHeartbeatPeriod">

<soap:operation soapAction="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#getHeartbeatPeriod" style="document"/>

<input>

<soap:body use="literal"/>

</input>

<output>

<soap:body use="literal"/>

</output>

<fault name="getHeartbeatPeriodFault">

<soap:fault name="getHeartbeatPeriodFault" use="literal"/>

</fault>

</operation>

<operation name="triggerHeartbeat">

<soap:operation soapAction="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#triggerHeartbeat" style="document"/>

<input>

<soap:body use="literal"/>

</input>

<output>

<soap:body use="literal"/>

</output>

<fault name="triggerHeartbeatFault">

<soap:fault name="triggerHeartbeatFault" use="literal"/>

</fault>

</operation>

</binding>

<binding name="CSIRPOperations2" type="csIRPSystem:CSIRPOperations2">

<soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>

<operation name="setHeartbeatPeriod">

<soap:operation soapAction="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#setHeartbeatPeriod" style="document"/>

<input>

<soap:body use="literal"/>

</input>

<output>

<soap:body use="literal"/>

</output>

<fault name="setHeartbeatPeriodFault">

<soap:fault name="setHeartbeatPeriodFault" use="literal"/>

</fault>

</operation>

</binding>

<service name="CSIRPService">

<port name="CSIRPOperations1Port" binding="csIRPSystem:CSIRPOperations1">

<soap:address location="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRP"/>

</port>

<port name="CSIRPOperations2Port" binding="csIRPSystem:CSIRPOperations2">

<soap:address location="http://www.3gpp.org/ftp/specs/archive/32\_series/32.356#CSIRP"/>

</port>

<port name="GenericIRPPort" binding="genericIRPSystem:GenericIRPBinding">

<soap:address location="http://www.3gpp.org/ftp/specs/archive/32\_series/32.316#GenericIRP"/>

</port>

<port name="NotificationIRPNtfPort" binding="ntfIRPNtfSystem:NotificationIRPNtf">

<soap:address location="http://www.3gpp.org/ftp/specs/archive/32\_series/32.306#NotificationIRPNtf"/>

</port>

</service>

</definitions>

Annex D (informative):   
Change history

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Change history** | | | | | | | |
| **Date** | **Meeting** | **TDoc** | **CR** | **Rev** | **Cat** | **Subject/Comment** | **New version** |
| 2010-09 | SA#49 | SP-100512 | -- | -- |  | Presentation to SA for Information and Approval | 1.0.0 |
| 2010-10 | -- | -- | -- | -- |  | Publication | 10.0.0 |
| 2012-09 | SA#57 | - | - | - |  | Automatic upgrade from previous Release version 10.0.0 | 11.0.0 |
| 204-09 | SA#65 | SP-140559 | 001 | - |  | Update the link from Solution Set to Information Service due to the end of Release 12 | 12.0.0 |
| 2016-01 | - | - | - | - |  | Update to Rel-13 version (MCC) | 13.0.0 |
| 2016-06 | SA#72 | SP-160407 | 0002 | - | F | Update the link from IRP Solution Set to IRP Information | 13.1.0 |
| 2017-03 | SA#75 | - | - | - |  | Promotion to Release 14 without technical change | 14.0.0 |
| 2017-06 | SA#76 | SP-170502 | 0003 | - | F | Update the link from IRP Solution Set to IRP Information Service | 14.1.0 |
| 2018-06 | - | - | - | - | - | Update to Rel-15 version (MCC) | **15.0.0** |
| 2020-07 | - | - | - | - | - | Update to Rel-16 version (MCC) | **16.0.0** |