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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 32.353: "Communication Surveillance (CS) Integration Reference Point (IRP): Object Request Broker Architecture (CORBA) Solution Set (SS)";

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 CORBA Solution Set for the IRP whose semantics are specified in TS 32.352 [6] Communication Surveillance IRP: Information Service.

This Solution Set specification is related to 3GPP TS 32.352 V9.0.X.

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 32.303: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)".

[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".

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 32.351 [3] and 3GPP TS 32.352 [6] 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
NM	Network Manager
SS	Solution Set

4 Architectural features

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

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

4.1 Notifications

Notifications are sent according to the Notification IRP: CORBA SS (see 3GPP TS 32.303 [7]).

The contents of the CSIRP notifications are defined in the present document.

4.2 Syntax for Distinguished Names and versions

The format 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).

5 Mapping

5.1 Operation and Notification mapping

CSIRP: IS 3GPP TS 32.352 [6] defines semantics of operation and notification visible across the CSIRP. Table 1 indicates mapping of these operations and notifications to their equivalents defined in this SS.

Table 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 6.1)	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.		

5.2 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 2: 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 3: 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 4: Mapping from IS trigger`Heartbeat` 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 5: 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 6: 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 7: 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

5.3 Notification parameter mapping

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

Table 8 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 8 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 8: 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 [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 [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 [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 [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.

6 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.

6.1 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.

Annex A (normative): IDL specifications

A.1 IDL specification (file name "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.2 IDL specification (file name "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.3 IDL specification (file name "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 (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Cat**	**Old**	**New**
Jun 2004	SA_24	SP-040246	--	--	Submitted to TSG SA#24 for Approval	--	1.0.0	6.0.0
Dec 2004	SA_26	SP-040802	0001	--	Correct mapping of IS-defined non-filterable parameters to SS-defined non-filterable fields - Align IDL style in CS IRP CORBA SS with IDL Style Guide in TS 32.150	F	6.0.0	6.1.0
Mar 2005	SA_27	SP-050179	0002	--	Apply Generic System Context – Align with TS 32.352	F	6.1.0	6.2.0
Mar 2005	SA_27	SP-050179	0003	--	IDL incompliant to the style guide	F	6.1.0	6.2.0
Sep 2005	SA_29	SP-050461	0004	--	Align the CORBA SS IDL with TS 32.150 Style Guide	F	6.2.0	6.3.0
Mar 2006	SA_31	SP-060093	0005	--	Correct the name of attribute "hearbeatPeriod" - Align with 32.352	F	6.3.0	6.4.0
Jun 2007	SA_36	--	--	--	Automatic upgrade to Rel-7 (no CR) at freeze of Rel-7. Deleted reference to CMIP SS, discontinued from R7 onwards.		6.4.0	7.0.0
Dec 2008	SA_42	--	--	--	Upgrade to Release 8	--	7.0.0	8.0.0
Dec 2009	-	-	-	-	Update to Rel-9 version (MCC)	--	8.0.0	9.0.0