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Technical Specification

**Universal Mobile Telecommunications System (UMTS);
Telecommunication management;
Test management Integration Reference Point (IRP);
Corba solution set
(3GPP TS 32.323 version 5.0.0 Release 5)**



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Foreword

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

The present document is part of the 32.32x-series covering the 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Telecommunication Management; Test management Integration Reference Point (IRP), as identified below:

32.321: "Requirements";

32.322: "Information service";

32.323: "CORBA solution set";

32.324: "CMIP solution set".

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1 Scope

The present document specifies the CORBA Solution Set (SS) for the IRP whose semantics is specified in Test Management IRP: Information Service (IS) (3GPP TS 32.322 [6]).

Clause 1 to 3 provides background information. Clause 4 provides key architectural features supporting the SS. Clause 5 defines the mapping of operations, notification, parameters and attributes defined in IS to their SS equivalents. Clause 6 describes the notification interface containing the push method. Annex A contains the IDL specification.

This Solution Set specification is related to 3GPP TS 32.322 (V5.0.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] Object Management Group 98 (November 1998): "*Notification Service: Joint Revised Submission OMG TC Document telecom/98-11-01*".
- [2] OMG CORBA Services (November 1996): "Common Object Services Specification" (clause 4 contains the Event Service specification).
- [3] 3GPP TS 32.300: "Name Convention for Managed Objects".
- [4] 3GPP TS 32.302: "Telecommunication management; Configuration Management; Notification Integration Reference Point; Information Service version 1".
- [5] 3GPP TS 32.303: "Telecommunication management; Configuration Management; Notification Integration Reference Point; CORBA solution set version 1:1".
- [6] 3GPP TS 32.322-2: "Telecommunication management; Test management Integration Reference Point (IRP); Information service".
- [7] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management".
- [8] 3GPP TS 32.311: "Telecommunication management; Generic Integration Reference Point (IRP) management; Requirements".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions defined in 3GPP TS 32.322 [6] apply. There are no additional definitions applicable to the present document.

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
IOC	Information Object Class
IS	Information Service
NE	Network Element
OMG	Object Management Group
QoS	Quality of Service
SS	Solution Set

3.3 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 [8] provides the rule to derive such a string.

This string is returned in `get_test_management_IRP_versions` method and is carried in the first field of the notification header of all notifications related to Test Management IRP. This string is also returned in `get_notification_categories` method of the Notification IRP Agent, in case that IRP Agent is responsible for emitting notifications related to Test Management IRP.

4 Architectural Features

The overall architectural feature of Test Management IRP is specified in 3GPP TS 32.322-2 [6]. The present document specifies features that are specific to the CORBA SS.

4.1 Notification Services

In implementations of CORBA SS, IRP Agent conveys Test Management information to IRP Manager via OMG Notification Service (OMG Notification Service [1]).

OMG Event Service [2] 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 `TestManagementIRPNotifications` notifications as specified in 3GPP TS 32.322-2 [6].

4.2 Push and Pull Style

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

This Notification CORBA SS [5] specifies that support of Push style is Mandatory (M) and that support of Pull style is Optional (O).

4.3 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.

5 Mapping

5.1 Operation and Notification mapping

Test Management IRP: IS 3GPP TS 32.322-2 [6] defines semantics of operation and notification visible across the Test Management IRP. 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 3G TS 32.322 [6]	SS Method	Qualifier
initiateTests	initiate_tests	M
terminateTests	terminate_tests	M
monitorTest	monitor_test	M
getIRPVersion	get_test_management_IRP_versions	M
getOperationProfile (see note)	get_test_management_IRP_operation_profile	O
getNotificationProfile (see note)	get_test_management_IRP_notification_profile	O
notifyTestResult	push_structured_event (See clause 6.1)	M
NOTE:	This operation is of ManagedGenericIRP IOC specified in [7]. The TestManagementIRP IOC of [6] inherits from it.	

5.2 Operation parameter mapping

The Test Management IRP: IS [6] defines semantics of parameters carried in operations across the Test Management IRP. The following tables indicate the mapping of these parameters, as per operation, to their equivalents defined in this SS.

Table 2: Mapping from IS initiateTests parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
testInvocationInitiator	TestManagementIRPConstDefs::TestInvocationInitiator test_invocation_initiator	M
maxTestingStateDuration	long maxtestingStateDuration	M
toBeInitiatedTests	TestManagementIRPConstDefs::ToBeInitiatedTestSeq to_be_initiated_test_seq	M
response	TestManagementIRPConstDefs::InitiateTestsResponse Exceptions: InitiateTests, ManagedGenericIRPSystem::ParameterNotSupported, ManagedGenericIRPSystem::InvalidParameter	M

Table 3: Mapping from IS `terminateTests` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
toBeTerminatedTests	TestManagementIRPConstDefs::ToBeTerminatedTestSeq to_be_terminated_test_seq	M
response	TestManagementIRPConstDefs::TerminateTestsResponse Exceptions: TerminateTests, ManagedGenericIRPSystem::OperationNotSupported, ManagedGenericIRPSystem::ParameterNotSupported, ManagedGenericIRPSystem::InvalidParameter	M

Table 4: Mapping from IS `monitorTest` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
toBeMonitoredTO	TestManagementIRPConstDefs::ToBeMonitoredTO to_be_monitored_TO	M
attributeList	TestManagementIRPConstDefs::TOAttributeList to_attribute_list	M
error	ManagedGenericIRPConstDefs::Signal Exceptions: MonitorTest, ManagedGenericIRPSystem::OperationNotSupported, ManagedGenericIRPSystem::ParameterNotSupported, ManagedGenericIRPSystem::InvalidParameter	M

5.3 Notification parameter mapping

The Test Management IRP: IS [6] defines semantics of parameters carried in notifications. The following table indicates the mapping of these parameters to their OMG CORBA Structured Event (defined in OMG Notification Service [1]) equivalents. The composition of OMG Structured Event, as defined in the OMG Notification Service [1], is:

```

Header
  Fixed Header
    domain_name
    type_name
    event_name
  Variable Header
Body
  filterable_body_fields
  remaining_body

```

The following table lists all OMG Structured Event attributes in the second column. The first column identifies the Test Management: IS [6] defined notification parameters.

Table 5: Mapping for notifyTestResult

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 subclause 3.3. It indicates the syntax and semantics of the Structured Event as defined by the present document.
notificationType	Type_name	M	This is the NOTIFY_TM_TEST_RESULT of module of TestManagementIRPConstDefs.
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 [5].
notificationId	One NV pair of filterable_body_fields	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 [5].
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 [5].
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 [5].
testInvocationInitiator	One NV pair of filterable_body_fields	M	Name of NV pair is the TEST_INVOCATION_INITIATOR of module TestManagementIRPConstDefs. Value of NV pair is a string.
testInvocationId	One NV pair of filterable_body_fields	M	Name of NV pair is the TEST_INVOCATION_ID of module TestManagementIRPConstDefs. Value of NV pair is a string.
testActualStartTime	One NV pair of filterable_body_fields	O	Name of NV pair is the TEST_ACTUAL_START_TIME of module TestManagementIRPConstDefs. Value of NV pair is IRPTime. See corresponding table in Notification IRP: CORBA SS [5].
testActualStopTime	One NV pair of filterable_body_fields	O	Name of NV pair is the TEST_ACTUAL_STOP_TIME of module TestManagementIRPConstDefs. Value of NV pair is IRPTime. See corresponding table in Notification IRP: CORBA SS [5].
testOutcome	One NV pair of filterable_body_fields	O	Name of NV pair is the TEST_OUTCOME of module TestManagementIRPConstDefs. Value of NV pair is the enum TestOutcomeType of TestManagementIRPConstDefs.
mORT	One NV pair of filterable_body_fields	O	Name of NV pair is the MORT of module TestManagementIRPConstDefs. Value of NV pair is a string.

IS Parameters	OMG CORBA Structured Event attribute	Qualifier	Comment
proposedRepairActions	One NV pair of filterable_body_fields	O	Name of NV pair is the PROPOSED_REPAIR_ACTIONS of module TestManagementIRPConstDefs. Value of NV pair is a string.
additionalInformation	Two NV pair of filterable_body_fields	O	Name of one NV pair is the TEST_ADDITIONAL_INFORMATION of module TestManagementIRPConstDefs. Value of NV pair is a string.
fileReference	One NV pair of filterable_body_fields	O	Name of NV pair is FILE_REFERENCE of module TestManagementIRPConstDefs. Value of NV pair is a string.
fileExpiryDate	One NV pair of filterable_body_fields	O	Name of NV pair is the FILE_EXPIRY_DATE of module TestManagementIRPConstDefs. Value of NV pair is IRPTime. See corresponding table in Notification IRP: CORBA SS [5].
There is no corresponding IS attribute.	remaining_body		

6 TestManagementIRPNotification Interface

OMG CORBA Notification push operation is used to realise the notification of TestManagementIRPNotifications. 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 [1]). 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 "TestManagementIRPConstDefs.idl")

```

#ifndef TestManagementIRPConstDefs_idl
#define TestManagementIRPConstDefs_idl

#include "CosNotification.idl"
#include "ManagedGenericIRPConstDefs.idl"

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

/* ## Module: TestManagementIRPConstDefs
This module contains commonly used definitions for Test Management IRP
=====
*/
module TestManagementIRPConstDefs
{
    /*
    This defines the notification type of this Test Management
    IRP.
    */
    const string NOTIFY_TM_TEST_RESULT = "x1";

    /*
    This enum defines the test state
    */
    enum TestStateType {
        NotInitialized,
        Idle,
        Initializing,
        Testing,
        Terminating,
        Disabled
    };

    /*
    This enum defines the test outcome
    */
    enum TestOutcomeType {
        Inconclusive,
        Pass,
        Fail,
        TimeOut,
        PrematureTermination
    };

    /*
    This block defines notification attributes of this IRP.
    These attribute values should not clash with those used
    in Notification header (see IDL of Notification IRP).
    */

    const string TEST_INVOCATION_INITIATOR = "f";
    const string TEST_INVOCATION_ID = "g";
    const string TEST_ACTUAL_START_TIME = "h";
    const string TEST_ACTUAL_STOP_TIME = "i";
    const string TEST_OUTCOME = "j";
    const string MORT = "k";
    const string PROPOSED_REPAIR_ACTIONS = "l";
    const string ADDITIONAL_INFORMATION = "m";
    const string FILE_REFERENCE = "n";
    const string FILE_EXPIRY_DATE = "o";

```

```
typedef string TestInvocationInitiator;
typedef string ToBeMonitoredTO;

typedef CosNotification::PropertySeq NVPairs;

/*
Define a seq of to-be-initiated-test
*/
struct ToBeInitiatedTest
{
    unsigned long max_testing_state_duration;//seconds;0->no limit
    string toBeTestedMORT; //MORT DN
    string vSTOC; //MORT class
    NVPairs vSTONVPair; //MORT attributes in NV pairs
};
typedef sequence <ToBeInitiatedTest> ToBeInitiatedTestSeq;

/*
Define the structure returned by initiate_tests
*/
struct InitiateTestsResponseElement
{
    // If failureReason is NULL, the test is initiated successfully and
    // testInvocationId contains the invocation id.
    // Else, the test initiation fails and failureReason contains
    // the failure reason and testInvocationId contains garbage.
    string failureReason;
    string testInvocationId;
};
typedef sequence <InitiateTestsResponseElement> InitiateTestsResponse;

/*
Define a seq of to-be-terminated-test
*/
typedef string TestInvocationId;
typedef sequence <TestInvocationId> ToBeTerminatedTestSeq;

/*
Define the structure returned by terminate_tests
*/
struct TerminateTestsResponseElement
{
    // If failureReason is NULL, the test has terminated successfully and
    // testInvocationId identifies the terminated invocation.
    // Else, the test termination fails and failureReason contains
    // the failure reason and testInvocationId contains garbage.
    string failureReason;
    string testInvocationId;
};
typedef sequence <TerminateTestsResponseElement> TerminateTestsResponse;

/*
Define the structure of a TOAttributes.
*/
struct TOAttributes
{
    TestStateType testState;
    TestOutcomeType testOutcome;
    NVPairs attributesInNVPairs;
};

};
#endif
```

A.2 IDL specification (file name "TestManagementIRPSystem.idl")

```

#ifndef TestManagementIRPSystem_idl
#define TestManagementIRPSystem_idl

#include "TestManagementIRPConstDefs.idl"
#include "ManagedGenericIRPSystem.idl"

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

/* ## Module: TestManagementIRPSystem
This module contains the specification of all methods of TestManagement IRP Agent.
=====
*/
module TestManagementIRPSystem
{
    /*
    System may fail to complete an operation. System can provide reason
    to qualify the failed reason. The semantics carried in reason
    is outside the scope of this IRP.
    */
    exception GetTestManagementIRPVersions { string reason; };
    exception GetTestManagementIRPOperationsProfile { string reason; };
    exception GetTestManagementIRPNotificationProfile { string reason; };
    exception InitiateTests { string reason; };
    exception TerminateTests { string reason; };
    exception MonitorTest { string reason; };

    interface TestManagementIRP
    {
        /*
        Return the list of all supported TestManagement IRP versions.
        */
        ManagedGenericIRPConstDefs::VersionNumberSet
        get_Test_Management_IRP_versions (
        )
        raises (GetTestManagementIRPVersions);

        /*
        Return the list of all supported operations and their supported
        parameters for a specific TestManagement IRP version.
        */
        ManagedGenericIRPConstDefs::MethodList
        get_Test_Management_IRP_operations_profile (
            in ManagedGenericIRPConstDefs::VersionNumber
            test_management_irp_version
        )
        raises (GetTestManagementIRPOperationsProfile,
            ManagedGenericIRPSystem::OperationNotSupported,
            ManagedGenericIRPSystem::InvalidParameter);

        /*
        Return the list of all supported notifications and their supported
        parameters for a specific TestManagement IRP version.
        */
        ManagedGenericIRPConstDefs::MethodList
        get_Test_Management_IRP_notification_profile (
            in ManagedGenericIRPConstDefs::VersionNumber
            test_management_irp_version
        )
        raises (GetTestManagementIRPNotificationProfile,
            ManagedGenericIRPSystem::OperationNotSupported,
            ManagedGenericIRPSystem::InvalidParameter);

        /*
        Request to initiate tests.
        */
        TestManagementIRPConstDefs::InitiateTestsResponse
        initiate_tests (

```

```
        in TestManagementIRPConstDefs::TestInvocationInitiator
            test_invocation_initiator,
        in TestManagementIRPConstDefs::ToBeInitiatedTestSeq
            to_be_initiated_test_seq
    )
    raises (InitiateTests,
           ManagedGenericIRPSystem::InvalidParameter);

/*
Request to terminate tests.
*/
TestManagementIRPConstDefs::TerminateTestsResponse
terminate_tests (
    in TestManagementIRPConstDefs::ToBeTerminatedTestSeq
        to_be_terminated_test_seq
    )
    raises (TerminateTests,
           ManagedGenericIRPSystem::InvalidParameter);

/*
Request test info (to monitor a test).
*/
ManagedGenericIRPConstDefs::Signal monitor_test (
    in TestManagementIRPConstDefs::ToBeMonitoredTO
        to_be_monitored_TO,
    out TestManagementIRPConstDefs::TOAttributes to_attributes
    )
    raises (MonitorTest,
           ManagedGenericIRPSystem::InvalidParameter);

};

#endif
```

Annex B (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2002	S_16	SP-020328	--	--	Submitted to TSG SA #16 for Information	1.0.0	
Sep 2002	S_17	SP-020458	--	--	Submitted to TSG SA #17 for Approval	2.0.0	5.0.0

History

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