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Presentation of Technical Specification to TSG SA

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Abstract of document:

This is a Technical Specification on the Performance Management Integration Reference Point CMIP Solution Set for 3GPP Release 6.

This is the fourth part of a set of specifications the purpose of which is to provide the essential Performance Management (PM) capabilities for measurement job administration, performance alarm handling and management of measurement file transfer over the Itf-N.

This work is done against the WID contained in SP-020499 (Work Item ID: OAM-PM).

Changes since last presentation to TSG-SA :
New

Outstanding Issues:
None.

Contentious Issues:
None.

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Technical Specification

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Contents

Foreword

This Technical Specification (TS) 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 32.411: "Performance Management (PM) Integration Reference Point (IRP): Requirements";

TS 32.412: "Performance Management (PM) Integration Reference Point (IRP): Information Service (IS)";

TS 32.413: "Performance Management (PM) Integration Reference Point (IRP): Common Object Request Broker Architecture (CORBA) Solution Set (SS)";

TS 32.414: "Performance Management (PM) Integration Reference Point (IRP): Common Management Information Protocol (CMIP) Solution Set (SS)".

This TS-family describes the requirements and information model necessary for the Telecommunication Management (TM); Performance Management (PM) Integration Reference Point (IRP) of 3G systems. The TM principles and TM architecture are specified in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].

As for the scope and definitions of Performance Management cf. 3GPP TS32.401 [3], 3GPP TS32.411[4].

1 Scope

The present document defines the performance management integration reference point for the CMIP solution set. It provides all the GDMO and ASN.1 definitions necessary to implement the PM IRP Information Service (TS 32.412 [7]) for the CMIP interface. In detail:

- clause 4 contains an introduction to some basic concepts of the CMIP interfaces;
- clause 5 contains the GDMO definitions for the Performance Management over the CMIP interfaces;
- clause 6 contains the ASN.1 definitions supporting the GDMO definitions provided in clause 5.

This Solution Set specification is based on 3GPP TS32.412 (v6.1.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 32.401: "Telecommunication management; Performance Management (PM); Concept and requirements".

[4] 3GPP TS 32.411: "Telecommunication management; Performance Management (PM) Integration Reference Point (IRP): Requirements".

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

[6] 3GPP TS 32.304: "Telecommunication management; Configuration Management (CM); Notification Integration Reference Point (IRP): Common Management Information Protocol (CMIP) Solution Set (SS) ".

[7] 3GPP TS 32.412: "Telecommunication management; Performance Management (PM) Integration Reference Point (IRP): Information Service (IS)".

[8] 3GPP TS 32.312: "Telecommunication management; Generic Integration Reference Point (IRP) management: Information Service (IS)".

[9] 3GPP TS32.314: "Telecommunication management; Generic Integration Reference Point (IRP) management: Common Management Information Protocol (CMIP) SS".

[10] ITU-T Recommendation X.710 (10/97): "Information technology - Open Systems Interconnection - Common Management Information service".

[11] ITU-T Recommendations X.711 (10/97): "Information technology - Open Systems Interconnection - Common management information protocol: Specification".

3 Definitions and abbreviations

3.1 Definitions

For the purpose of the present document the terms and definitions given in 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.401 [3], 3GPP TS 32.411 [4] 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:

ASN.1	Abstract Syntax Notation number 1
CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CMISE	Common Management Information Service Element
DN	Distinguished Name
EM	Element Manager
GDMO	Guidelines for the Definition of Managed Objects
IOC	Information Object Class
IRP	Integration Reference Point
Itf-N	Interface N (interface between NM and EM/NE)
ITU-T	International Telecommunication Union - Telecommunications
M	Mandatory
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
O	Optional
PM	Performance Management

4 Basic aspects

4.1 Architectural aspects

The PM IRP Information Service description is based on Information Object Classes (IOC), relationships among IOC and interfaces (used or implemented by IOC) which include operations and notifications.

In the present document for the CMIP interfaces the IOC are modelled as GDMO "Managed Object Classes" (MOC), defined specifically for performance management, the operations are modelled as GDMO "Actions" of a MOC while the notifications are modelled as GDMO "Notifications" included in the MOC that need to report events to a Manager.

The handling of notifications described in the present document is based on the Notification IRP CMIP Solution Set (3GPP TS 32.304 [6]).

4.2 Mapping

The semantics of the PM IRP is defined in 3GPP TS 32.412 [7]. The definitions of the management information given there are independent of any implementation technology and protocol. This clause maps these protocol-independent definitions onto their equivalences of the CMIP solution set of the PM IRP.

4.2.1 Mapping of Information Object Classes

For the PM IRP CMIP Solution Set the Information Object Classes (IOC) and the Interfaces defined in TS 32.412 [7] are mapped onto Managed Object Classes (MOC) as given in the following table. These MOC include all the Attributes, Actions and Notifications necessary to model performance management as described in TS 32.412 [7].

Table 4.2.1: Mapping of Information Object Classes

IS IOC	CMIP SS MOC
PMIRP	pMIRP

4.2.2 Mapping of Operations

The following table maps the Interface/Operations defined in the IS of the PM IRP onto their equivalents in the CMIP SS. These are qualified as Mandatory (M) or Optional (O).

Table 4.2.2: Mapping of Operations

IS Interface	Qualifier	IS Operation	CMIP SS Equivalent	Qualifier
PMIRPOperations_1	M	createMeasurementJob	CMISE M-ACTION service, action type: createMeasurementJob	M
		stopMeasurementJob	CMISE M-ACTION service, action type: stopMeasurementJob	M
		suspendMeasurementJob	CMISE M-ACTION service, action type: suspendMeasurementJob	O
		resumeMeasurementJob	CMISE M-ACTION service, action type: resumeMeasurementJob	O
		listMeasurementJobs	CMISE M-ACTION service, action type: listMeasurementJob	M
PMIRPOperations_2	O	createThresholdMonitor	CMISE M-ACTION service, action type: createThresholdMonitor	M
		deleteThresholdMonitor	CMISE M-ACTION service, action type: deleteThresholdMonitor	M
		listThresholdMonitors	CMISE M-ACTION service, action type: listThresholdMonitors	M
PMIRPOperations_3	O	suspendThresholdMonitor	CMISE M-ACTION service, action type: suspendThresholdMonitor	M
		resumeThresholdMonitor	CMISE M-ACTION service, action type: resumeThresholdMonitor	M
GenericIRPVersionOperation	M	getIRPVersion	CMISE M-ACTION service, action type: getIRPVersion, see Note	M
GenericIRPProfileOperation	O	getNotificationProfile	CMISE M-ACTION service, action type: getPNotificationProfile, see Note	M
		getOperationProfile	CMISE M-ACTION service, action type: getOperationProfile, see Note	M

NOTE: The Interfaces GenericIRPVersionOperation and GenericIRPProfileOperation are defined in 3GPP TS 32.312 [8] and inherited from TS32.314 [9].

4.2.3 Mapping of Operation Parameters

The following tables in this subclause show the parameters of each operations defined in the IS 3GPP TS 32.412 [8] and their equivalents in this CMIP SS.

The input parameters of the operations are mapped onto "Action information" (cf. GDMO and ASN.1 definitions for more details).

The output parameters of the operations are mapped onto "Action response" (cf. GDMO and ASN.1 definitions for more details).

Table 4.2.3.1: Parameter mapping of the operation *createMeasurementJob*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
iOCName	IN	M	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): mOCName	M
iOCInstanceList	IN	M	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): mOCInstanceList	M
measurementCategoryList	IN	M	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): measurementCategoryList	M
granularityPeriod	IN	M	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): granularityPeriod	M
reportingPeriod	IN	M	M-ACTION parameter 'Action reply' (CreateMeasurementJobInfo): reportingPeriod	M
startTime	IN	O	M-ACTION parameter 'Action reply' (CreateMeasurementJobInfo): startTime	M
stopTime	IN	O	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): stopTime	O
schedule	IN	O	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): schedule	O
jobId	OUT	M	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): jobId	M
unsupportedList	OUT	M	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): unsupportedList	M
status	OUT	M	M-ACTION parameter 'Action information' (CreateMeasurementJobInfo): status	M

Table 4.2.3.2: Parameter mapping of the operation *stopMeasurementJob*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
jobId	IN	M	M-ACTION parameter 'Action information' (StopMeasurementJobInfo): jobId	M
status	OUT	M	M-ACTION parameter 'Action information' (StopMeasurementJobInfo): status	M

Table 4.2.3.3: Parameter mapping of the operation *suspendMeasurmentJob*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
jobId	IN	M	M-ACTION parameter 'Action information' (SuspendMeasurementJobInfo): jobId	M
status	OUT	M	M-ACTION parameter 'Action information' (SuspendMeasurementJobInfo): status	M

Table 4.2.3.4: Parameter mapping of the operation *resumeMeasurmentJob*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
jobId	IN	M	M-ACTION parameter 'Action information' (ResumeMeasurementJobInfo): jobId	M
status	OUT	M	M-ACTION parameter 'Action information' (ResumeMeasurementJobInfo): status	M

Table 4.2.3.5: Parameter mapping of the operation *listMeasurmentJobs*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
jobIdList	IN	M	M-ACTION parameter 'Action information' (ListMeasurementJobsInfo): jobIdList	M
jobInfoList	OUT	M	M-ACTION parameter 'Action information' (ListMeasurementJobsInfo): jobInfoList	M
status	OUT	M	M-ACTION parameter 'Action information' (ListMeasurementJobsInfo): status	M

Table 4.2.3.6: Parameter mapping of the operation *createThresholdMonitor*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
iOCName	IN	M	M-ACTION parameter 'Action information' (createThresholdMonitorInfo): mOCName	M
iOCInstanceList	IN	M	M-ACTION parameter 'Action information' (createThresholdMonitorInfo): mOCInstanceList	M
thresholdInfoList	IN	M	M-ACTION parameter 'Action information' (createThresholdMonitorInfo): thresholdInfoList	O
monitorGranularityPeriod	IN	M	M-ACTION parameter 'Action information' (createThresholdMonitorInfo): monitorGranularityPeriod	M
monitorId	OUT	M	M-ACTION parameter 'Action reply' (createThresholdMonitor): monitorId	M
unsupportedList	OUT	M	M-ACTION parameter 'Action reply' (createThresholdMonitor): unsupportedList	M
status	OUT	M	M-ACTION parameter 'Action reply' (createThresholdMonitor): status	M

Table 4.2.3.7: Parameter mapping of the operation *deleteThresholdMonitor*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
monitorId	IN	M	M-ACTION parameter 'Action information' (deleteThresholdMonitor): monitorId	M
status	OUT	M	M-ACTION parameter 'Action information' (deleteThresholdMonitor): status	M

Table 4.2.3.8: Parameter mapping of the operation *listThresholdMonitors*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
monitorIdList	IN	M	M-ACTION parameter 'Action information' (listThresholdMonitorsInfo): mOCName	M
monitorInfoList	OUT	M	M-ACTION parameter 'Action information' (listThresholdMonitorsInfo): monitorInfoList	M
status	OUT	M	M-ACTION parameter 'Action information' (listThresholdMonitorsInfo): status	M

Table 4.2.3.9: Parameter mapping of the operation *suspendThresholdMonitor*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
monitorId	IN	M	M-ACTION parameter 'Action information' (suspendThresholdMonitorInfo): monitorId	M
status	OUT	M	M-ACTION parameter 'Action information' (suspendThresholdMonitorsInfo): status	M

Table 4.2.3.10: Parameter mapping of the operation *resumeThresholdMonitor*

IS Parameter	IN/OUT	Qualifier	CMIP SS Equivalent	Qualifier
monitorId	IN	M	M-ACTION parameter 'Action information' (resumeThresholdMonitorInfo): monitorId	M
status	OUT	M	M-ACTION parameter 'Action information' (resumeThresholdMonitorsInfo): status	M

4.2.4 Mapping of Notifications

The following table maps the Notifications defined in the Information Service of the PM IRP [7] onto the equivalent Notifications of the CMIP solution set for the PM IRP. The CMIP Notifications are qualified as Mandatory (M) or Optional (O).

Table 4.2.4: Mapping of Notifications

IS Notification	CMIP SS Equivalent	Qualifier
notifyMeasurementJobStatusChanged	notifyMeasurementJobStatusChanged	M
notifyThresholdMonitorStatusChanged	notifyThresholdMonitorStatusChanged	O

4.2.5 Mapping of Notification Parameters

In the CMIP Solution Set notifications emitted by an Agent are reported to the Managers by means of the CMISE "M-EVENT-REPORT" service primitive, which again is implemented by means of the "m-EventReport OPERATION" (see ITU-T Recommendations X.710 [10] and X.711 [11]). The argument of the m-EventReport OPERATION is defined in ITU-T Recommendation X.711 [11] as follows:

```
EventReportArgument         ::= SEQUENCE {
        managedObjectClass          ObjectClass,
        managedObjectInstance       ObjectInstance,
        eventTime                   [5] IMPLICIT GeneralizedTime OPTIONAL,
        eventType                   EventTypeId,
        eventInfo                   [8] ANY DEFINED BY eventType OPTIONAL
        }
```

where eventInfo has to be further specified for each notification by means of specific GDMO/ASN.1 definitions.

For the notifications defined in 3GPP TS 32. 412 [8] all parameters are mapped onto their CMIP SS equivalents as shown in the following tables.

Most parameters are mapped to the M-EVENT report parameter 'Event information'. The 'Event information' parameter is described by the ASN.1 definitions given in the present document.

Table 4.2.5.1: Parameter mapping of the notification notifyM*easurementJobStatusChanged*

IS Parameter	Qualifier	CMIP SS Equivalent
objectClass	M	M-EVENT-REPORT parameter ‘Managed object class’
objectInstance	M	M-EVENT-REPORT parameter ‘Managed object instance’
notificationId	M	M-EVENT-REPORT parameter ‘Event information’: notificationIdentifier
eventTime	M	M-EVENT-REPORT parameter ‘Event time’
notificationType	M	M-EVENT-REPORT parameter ‘Event type’
systemDN	C	The IS parameter is conditional and not used in the CMIP SS
jobId	M	M-EVENT-REPORT parameter ‘Event information’: (NotifyMeasurementJobStatusChangedInfo): jobId
jobStatus	M	M-EVENT-REPORT parameter ‘Event information’: (NotifyMeasurementJobStatusChangedInfo): jobStatus
reason	O	M-EVENT-REPORT parameter ‘Event information’: (NotifyMeasurementJobStatusChangedInfo): reason

Table 4.2.5.2: Parameter mapping of the notification *notifyThresholdMonitorStatusChanged*

IS Parameter	Qualifier	CMIP SS Equivalent
objectClass	M	M-EVENT-REPORT parameter 'Managed object class'
objectInstance	M	M-EVENT-REPORT parameter 'Managed object instance'
notificationId	M	M-EVENT-REPORT parameter 'Event information': notificationIdentifier
eventTime	M	M-EVENT-REPORT parameter 'Event time'
notificationType	M	M-EVENT-REPORT parameter 'Event type'
systemDN	C	The IS parameter is conditional and not used in the CMIP SS
monitorId	M	M-EVENT-REPORT parameter 'Event information': (NotifyThresholdMonitorStatusChangedInfo): monitorId
monitorStatus	M	M-EVENT-REPORT parameter 'Event information': (NotifyThresholdMonitorStatusChangedInfo): monitorStatus
reason	O	M-EVENT-REPORT parameter 'Event information': (NotifyThresholdMonitorStatusChangedInfo): reason

-- 5 GDMO definitions

```
--Please do not remove the "—" in front of the headline numbering, as it is the CMIP code
--for a comment. This way the whole chapter can be put directly into a compiler.
```

-- 5.1 Managed Object Classes

-- 5.1.1 pmIRP

```
pmIRP MANAGED OBJECT CLASS
   DERIVED FROM
      "3GPP TS32.314" : managedGenericIRP;
   CHARACTERIZED BY
      pmIRPBasicPackage;
   CONDITIONAL PACKAGES
      pmIRPOperationsPackage1              PRESENT IF   "an instance supports it",
      pmIRPOperationsPackage2              PRESENT IF   "an instance supports it",
      pmIRPOperationsPackage3              PRESENT IF   "an instance supports it",
      pmIRPNotificationPackage             PRESENT IF   "pmIRPOperationsPackage2 is supported";
REGISTERED AS {ts32-414ObjectClass 10600};
```

-- 5.2 Packages

-- 5.2.1 pmIRPBasicPackage

```
pmIRPBasicPackage PACKAGE
   BEHAVIOUR
      pmIRPBasicPackageBehaviour;
   ACTIONS
      createMeasurementJob,
      stopMeasurementJob,
      listMeasurementJobs;
   NOTIFICATIONS
      notifyMeasurementJobStatusChanged;
REGISTERED AS {ts32-414Package 10600};

pmIRPBasicPackageBehaviour BEHAVIOUR
DEFINED AS
   "The MOC pmIRP has been defined to provide information about the status of currently running or
    suspended or scheduled PM jobs controlled by the Agent to the Manager.
    An instance of the 'pmIRP' MOC is identified by the value of the attribute 'pmIRPId'.
    The actions 'createMeasurementJob' and 'stopMeasurementJob' is the means for the Manager to
    trigger the creation/ deletion of measurement jobs in the network elements.
    The action 'listMeasurementJobs' returns a list of measurement jobs specified by the input
    parameters running in network elements managed by the same manager.
    The notification 'notifyMeasurementJobStatusChanged' is sent by the Agent to the Manager to
    inform that an measurement job identified by the 'measurementJobId' has been stopped.";
```

-- 5.2.2 pmIRPOperationsPackage1

```
pmIRPOperationsPackage1 PACKAGE
   BEHAVIOUR
      pmIRPOperationsPackage1Behaviour;
   ACTIONS
      suspendMeasurementJob,
      resumeMeasurementJob;
   NOTIFICATIONS
      notifyMeasurementJobStatusChanged;
REGISTERED AS {ts32-414Package 20600};

pmIRPOperationsPackage1Behaviour BEHAVIOUR
DEFINED AS
    "The action 'suspendMeasurementJob' stops the collection of measurement result data done by the
     measurement job in the network element whilst the MOI of measurementJob still exists. The
     notification 'notifyFileReady' or 'notifyFilePreparationError' is emitted after the next
     reporting period is reached.
     The action 'resumeMeasurementJob' resumes one or more suspended measurement jobs. The parameter
     values will be the same as at creation time of the measurement job.";
```

-- 5.2.3 pmIRPOperationsPackage2

```
pmIRPOperationsPackage2 PACKAGE
   BEHAVIOUR
      pmIRPOperationsPackage2Behaviour;
   ACTIONS
      createThresholdMonitor,
      deleteThresholdMonitor,
      listThresholdMonitors;
REGISTERED AS {ts32-414Package 30600};

pmIRPOperationsPackage2Behaviour BEHAVIOUR
DEFINED AS
     "The action 'createThresholdMonitor' supports IRPManager's request to create a ThresholdMonitor
      that defines the thresholds for some specific measurementTypes. If the threshold defined is
      crossed or reached, the related performance alarms will be emitted to subscribed
      IRPManager(s). The action 'deleteThresholdMonitor' deletes a specific threshold monitor.
      The action 'listThresholdMonitors' returns a list of specified or all threshold monitors.";
```

-- 5.2.4 pmIRPOperationsPackage3

```
pmIRPOperationsPackage3 PACKAGE
   BEHAVIOUR
      pmIRPOperationsPackage3Behaviour;
   ACTIONS
      suspendThresholdMonitor,
      resumeThresholdMonitor;
REGISTERED AS {ts32-414Package 40600};

pmIRPOperationsPackage3Behaviour BEHAVIOUR
DEFINED AS
    "If successful the action 'suspendThresholdMonitor' blocks the PMIRP from emitting PM related
     alarms. The threshold monitor shall still exist. The notification
     notifyThresholdMonitorStatusChanged is emitted.
     The action 'resumeThresholdMonitor' resumes a suspended threshold monitor. Again, the
     notification notifyThresholdMonitorStatusChanged is emitted.";
```

-- 5.2.5 pmIRPNotificationPackage

```
pmIRPNotificationPackage PACKAGE
   BEHAVIOUR
      pmIRPNotificationPackageBehaviour;
   NOTIFICATIONS
      notifyThresholdMonitorStatusChanged;
REGISTERED AS {ts32-414Package 50600};

pmIRPNotificationPackageBehaviour BEHAVIOUR
DEFINED AS
     "The PMIRP Agent notifies all subscribed IRPManagers about the status changes of a
      ThresholdMonitor. The status changes in that case include Suspended=>Active,
      Active=>Suspended.
      NOTE: The notifyThresholdMonitorStatusChanged notification is mandatory if
      pmIRPOperationsPackage2 is supported.";
```

-- 5.3 Actions

-- 5.3.1 createMeasurementJob

```
createMeasurementJob ACTION
   BEHAVIOUR
      createMeasurementJobBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.CreateMeasurementJobInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.CreateMeasurementJobReply;
REGISTERED AS {ts32-414Action 10600};

createMeasurementJobBehaviour BEHAVIOUR
DEFINED AS
```

```
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to create a MeasurementJob through Itf-N.
     Once created, the attributes of MeasurementJob (except MeasurementJob.jobStatus) and the
     related JobMeasurementSchedule and MeasuredAttribute will not be modified during the life-time
     of the MeasurementJob.
     One MeasurementJob can collect the value of one or multiple measurementTypes. When a
     measurementType is collected by one MeasurementJob for a given instance, another
     MeasurementJob which wants to collect the same measurementType for the same instance with
     different or the same jobGranularityPeriod may be rejected. This behaviour shall be consistent
     for a given implementation by a specific vendor.";
```

-- 5.3.2 stopMeasurementJob

```
stopMeasurementJob ACTION
   BEHAVIOUR
      stopMeasurementJobBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.StopMeasurementJobInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.StopMeasurementJobReply;
REGISTERED AS {ts32-414Action 20600};

stopMeasurementJobBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to stop a MeasurementJob through Itf-N, after
     which the MeasurementJob may still be visible over Itf-N. Whether the MeasurementJob is
     removed from the managed system is vendor specific and out of scope of the present document.
     The behaviour of the IRPAgent when the job is stopped is vendor specific, i.e. the job can be
     stopped at the end of the GranularityPeriod or immediately.
     After the job has been stopped, the notifyFileReady or notifyFilePreparationError
     notification shall be emitted immediately or when the next reporting period is reached";
```

-- 5.3.3 listMeasurementJobs

```
listMeasurementJobs ACTION
   BEHAVIOUR
      listMeasurementJobsBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.ListMeasurementJobsInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.ListMeasurementJobsReply;
REGISTERED AS {ts32-414Action 30600};

listMeasurementJobsBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to list the information of all or a set of
     specified current MeasurementJobs";
```

-- 5.3.4 suspendMeasurementJob

```
suspendMeasurementJob ACTION
   BEHAVIOUR
      suspendMeasurementJobBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.SuspendMeasurementJobInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.SuspendMeasurementJobReply;
REGISTERED AS {ts32-414Action 40600};

suspendMeasurementJobBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to suspend a MeasurementJob through Itf-N. When
     the MeasurementJob is suspended, the collection of measurement result data by the
     MeasurementJob stops regardless of its schedule, but the MeasurementJob continues to exists.
     The suspend operation is necessary in following situation:
      - High work load experienced by managed system.
```

```
      - The specified measurement data is not needed for a specific period of time.
      - Other specific requirement.
     After the job has been suspended, the notifyFileReady or notifyFilePreparationError
     notification shall be emitted immediately or when the next reporting period is reached";
```

-- 5.3.5 resumeMeasurementJob

```
resumeMeasurementJob ACTION
   BEHAVIOUR
      resumeMeasurementJobBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.ResumeMeasurementJobInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.ResumeMeasurementJobReply;
REGISTERED AS {ts32-414Action 50600};

resumeMeasurementJobBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to resume a suspended MeasurementJob. When the
     MeasurementJob is resumed, it will work according to criteria (e.g. granularity period,
     startTime, stopTime, schedule) set up by the corresponding createMeasurementJob operation";
```

-- 5.3.6 createThresholdMonitor

```
createThresholdMonitor ACTION
   BEHAVIOUR
      createThresholdMonitorBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.CreateThresholdMonitorInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.CreateThresholdMonitorReply;
REGISTERED AS {ts32-414Action 60600};

createThresholdMonitorBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to create a ThresholdMonitor that defines the
     thresholds for some specific measurementTypes. If the threshold defined is (a) crossed or (b)
     reached, the related performance alarms will be emitted to subscribed IRPManager(s).
     Two cases are allowed:
     a) Threshold monitoring is accepted only for measurementType(s) that are already under
        monitoring by an existing MeasurementJob. The IRPManager, when interacting with this
        kind of PMIRP, must first start a MeasurementJob to monitor the measurementTypes and
        then invoke this operation for the same measurementTypes.
     b) Threshold monitoring of measurementType(s) is accepted regardless whether they are
        already under monitoring by existing MeasurementJob(s).";
```

-- 5.3.7 deleteThresholdMonitor

```
deleteThresholdMonitor ACTION
   BEHAVIOUR
      deleteThresholdMonitorBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.DeleteThresholdMonitorInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.DeleteThresholdMonitorReply;
REGISTERED AS {ts32-414Action 70600};

deleteThresholdMonitorBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to delete a specified ThresholdMonitor.
     At the time of the removal, all outstanding (a) threshold-crossing or (b) threshold reaching
     alarms will stay (i.e. the FMIRP Agent's AlarmList will contain an AlarmInformation indicating
     (a) threshold-crossing or (b) threshold reaching). The IRPManager needs to use other means to
         remove the AlarmInformation in the FMIRP AlarmList.";
```

-- 5.3.8 listThresholdMonitors

```
listThresholdMonitors ACTION
   BEHAVIOUR
      listThresholdMonitorsBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.ListThresholdMonitorsInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.ListThresholdMonitorsReply;
REGISTERED AS {ts32-414Action 80600};

listThresholdMonitorsBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to list detailed information about all or
     specified ThresholdMonitors ";
```

-- 5.3.9 suspendThresholdMonitor

```
suspendThresholdMonitor ACTION
   BEHAVIOUR
      suspendThresholdMonitorBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.SuspendThresholdMonitorInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.SuspendThresholdMonitorReply;
REGISTERED AS {ts32-414Action 90600};

suspendThresholdMonitorBehaviour BEHAVIOUR
DEFINED AS
   "The behaviour of this action is described in 32.412.
    This operation supports an IRPManager's request to suspend the ThresholdMonitor. If the
    operation succeeds, the thresholdMonitorStatus shall be set to Suspended. The PMIRP shall not
    emit performance alarms related to this ThresholdMonitor. The ThresholdMonitor shall continue
    to exist";
```

-- 5.3.10 resumeThresholdMonitor

```
resumeThresholdMonitor ACTION
   BEHAVIOUR
      resumeThresholdMonitorBehaviour;
   MODE
      CONFIRMED;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.ResumeThresholdMonitorInfo;
   WITH REPLY SYNTAX
      TS32-414TypeModule.ResumeThresholdMonitorReply;
REGISTERED AS {ts32-414Action 100600};

resumeThresholdMonitorBehaviour BEHAVIOUR
DEFINED AS
    "The behaviour of this action is described in 32.412.
     This operation supports an IRPManager's request to resume a suspended ThresholdMonitor.";
```

-- 5.4 Notifications

-- 5.4.1 notifyMeasurementJobStatusChanged

```
notifyMeasurementJobStatusChanged NOTIFICATION
   BEHAVIOUR
      notifyMeasurementJobStatusChangedBehaviour;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.NotifyMeasurementJobStatusChangedInfo;
REGISTERED AS {ts32-414Notification 10600};

notifyMeasurementJobStatusChangedBehaviour BEHAVIOUR
DEFINED AS
```

```
    "The PMIRP Agent notifies all subscribed IRPManagers about the status changes of a
     MeasurementJob. The status changes include Suspended=>Scheduled, Active=>Suspended,
     Scheduled=>Suspended, Suspended=>Active, Scheduled=>Active, Active=>Stopped,
     Suspended=>Stopped, Scheduled=>Stopped.
     The 'Event Information' field contains the following data:
        - notificationIdentifier
            This ITU-T X.721 standardised parameter, together with MOI (Managed Object Instance),
            unambiguously identifies this notification.
        - reason
            This parameter indicates the reason for stopping/suspending/resuming the
            measurment job (if available).";
```

-- 5.4.2 notifyThresholdMonitorStatusChanged

```
notifyThresholdMonitorStatusChanged NOTIFICATION
   BEHAVIOUR
      notifyThresholdMonitorStatusChangedBehaviour;
   WITH INFORMATION SYNTAX
      TS32-414TypeModule.NotifyThresholdMonitorStatusChangedInfo;
REGISTERED AS {ts32-414Notification 20600};

notifyThresholdMonitorStatusChangedBehaviour BEHAVIOUR
DEFINED AS
     " The PMIRP Agent notifies all subscribed IRPManagers about the status changes of a
       ThresholdMonitor. The status changes in that case include Suspended=>Active,
       Active=>Suspended.
       NOTE: The notifyThresholdMonitorStatusChanged notification is mandatory if
       PMIRPOperations_2 is supported.
       The 'Event information' field contains the following data:
        - notificationIdentifier
            This ITU-T X.721 standardised parameter, together with MOI (Managed Object Instance),
            unambiguously identifies this notification.
        - reason
            This parameter specifies the reason why the status of a measurementJob changed.";
```

-- 6 ASN.1 definitions for the PM IRP

```
TS32-414TypeModule {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-Operation-
Maintenance(3) ts-32-414(414) informationModel(0) asn1Module(2) version10600(10600)}

DEFINITIONS IMPLICIT TAGS ::=
BEGIN

--EXPORTS everything

IMPORTS

NotificationIdentifier, EventType, EventTime
   FROM Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module(2) 1}


CMISFilter, ObjectInstance, ObjectClass, EventTypeId
   FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)};

baseNodeUMTS                 OBJECT IDENTIFIER ::= {itu-t (0) identified-organization (4)
                                                    etsi (0) mobileDomain (0)
                                                    umts-Operation-Maintenance (3)}

ts32-414Prefix               OBJECT IDENTIFIER ::= {baseNodeUMTS ts-32-414(414)}
ts32-414                     OBJECT IDENTIFIER ::= {ts32-414}
ts32-414InfoModel            OBJECT IDENTIFIER ::= {ts32-414 informationModel(0)}

ts32-414PmIRPObjectClass     OBJECT IDENTIFIER ::= {ts32-414 managedObjectClass(3)}
ts32-414PmIRPPackage         OBJECT IDENTIFIER ::= {ts32-414InfoModel package(4)}
ts32-414PmIRPParameter       OBJECT IDENTIFIER ::= {ts32-414InfoModel parameter(5)}
ts32-414PmIRPAttribute       OBJECT IDENTIFIER ::= {ts32-414InfoModel attribute(7)}
ts32-414PmIRPAction          OBJECT IDENTIFIER ::= {ts32-414InfoModel action(9)}
ts32-414PmIRPNotification    OBJECT IDENTIFIER ::= {ts32-414InfoModel notification(10)}


-- Start of 3GPP SA5 own definitions

Counter ::= INTEGER

CreateMeasurementJobInfo ::= SEQUENCE OF JobInfo

CreateMeasurementJobReply ::= SEQUENCE
   {
   jobId               JobId,
   unsupportedList     UnsupportedList,
   status              ErrorCauses
   }

CreateThresholdMonitorInfo ::= SEQUENCE OF ThresholdMonitorInfo

CreateThresholdMonitorReply ::= SEQUENCE
   {
   monitorId           MonitorId,
   unsupportedList     UnsupportedList,
   status              ErrorCauses
   }

DeleteThresholdMonitorInfo ::= MonitorId

DeleteThresholdMonitorReply ::= ErrorCauses

ErrorCauses ::= ENUMERATED
   {
   success                            (0),  -- operation / notification successfully performed
   partialSuccess                     (1),
   unknownJob                         (2),
   maxJobReached                      (3),
   jobCannotBeStopped                 (4),
   jobAlreadySuspended                (5),
   jobIsNotSuspended                  (6),
   unknownThresholdMonitor            (9),
   thresholdMonitorAlreadySuspended  (10),
   thresholdMonitorIsNotSuspended    (11),
   failure                          ( 255)    -- operation failed, specific error unknown
```

```
   }

Gauge ::= FLOAT

JobId ::= ObjectInstance

JobInfo ::= SEQUENCE
   {
   mOCName                      GraphicString,
   mOCInstanceList              SEQUENCE OF ObjectInstance, --MOI to be monitored
   measurementCategoryList      SEQUENCE OF ObjectClass,
   granularityPeriod            TimeInterval,       -- {5, 15, 30, 45, 60, 720, 1440} minutes
   reportingPeriod              TimeInterval,       -- must be integer multiple of GranularityPeriod
   startTime                    GeneralizedTime,
   stopTime                     GeneralizedTime,
   schedule                     JobMeasurementSchedule
   }

JobList ::=  SEQUENCE OF JobId

JobListId ::= INTEGER

JobStatus ::= ENUMERATED
   {
   active         (0),
   scheduled      (1),
   suspended      (2),
   stopped        (3)
   }

ListMeasurementJobsInfo ::= JobList

ListMeasurementJobsReply ::= SEQUENCE
   {
   jobInfoList      SEQUENCE OF JobInfo,
   status           ErrorCauses
    }

ListThresholdMonitorInfo ::= SEQUENCE OF MonitorId

ListThresholdMonitorReply ::= SEQUENCE
   {
   monitorInfoList      SEQUENCE OF MonitorInfo,
   status               ErrorCauses
   }

MonitorId ::= ObjectInstance

MonitorInfo ::= SEQUENCE
   {
    mOCName                      GraphicString,
    mOCInstanceList              SEQUENCE OF ObjectInstance,
    thresholdInfoList            ThresholdInfoList,
    monitorGranularityPeriod     TimeInterval
   }

MonitorListId ::= INTEGER

ResumeMeasurementJobInfo ::= JobId

ResumeMeasurementJobReply ::= ErrorCauses

ResumeThresholdMonitorInfo ::= SEQUENCE OF MonitorId

ResumeThresholdMonitorReply ::= ErrorCauses

StartTime ::= GeneralizedTime

StopMeasurementJobInfo ::= SEQUENCE OF JobId

StopMeasurementJobReply ::= ErrorCauses

StopTime ::= GeneralizedTime

SuspendMeasurementJobInfo ::= SEQUENCE OF JobId

SuspendMeasurementJobReply ::= ErrorCauses
```

```
SuspendThresholdMonitorInfo ::= SEQUENCE OF MonitorId

SuspendThresholdMonitorReply ::= ErrorCauses

ThresholdInfo ::= SEQUENCE
   {
   measurementTypeName      GraphicString,
   probableCause            GraphicString,
   specificProblem          GraphicString,
   direction                INTEGER,
   thresholdPack            ThresholdPack
    }

ThresholdMonitorInfo ::= SEQUENCE
   {
   mOCName                       GraphicString,
   mOCInstanceList               SEQUENCE OF ObjectInstance,
   thresholdInfoList             SEQUENCE OF ThresholdInfo,
   monitorGranularityPeriod      TimeInterval
   }

ThresholdMonitorStatus ::= ENUMERATED
   {
    active         (0),
    suspended      (1)
    }

ThresholdPack ::= SEQUENCE
   {
   thresholdValue         ThresholdValue,
   thresholdSeverity      ThresholdSeverity,
   hysteresis             INTEGER
   }

ThresholdSeverity ::= ENUMERATED
   {
   warning       (0),
   minor         (1),
   major         (2),
   critical      (3)
   }

ThresholdValue ::= ENUMERATED
   {
   gauge        (0),
   counter      (1)
   }

TimeInterval ::= INTEGER

UnsupportedList ::= SEQUENCE
   {
   mOCName                  GraphicString,
   mOCInstanceList          SEQUENCE OF ObjectInstance,
   measurementTypeName      GraphicString,
   reason                   GraphicString
   }


END -- of module TS32-414TypeModule
```

Annex A (informative): List of assigned Object Identifiers

This annex provides a list with all object identifiers that have been assigned in TS 32.344. These object identifiers shall not be assigned to new objects (also not in new versions of this document).

Basic Object Name	Name and OID of the current TS Version	Name and OIDs of previous TS Versions
Managed Object Classes		
ftIRP	Name: PMIRP OID : ts32-414ObjectClass 10600	--
Packages		
pmIRPBasicPackage	Name: pMIRPBasicPackage OID : ts32-4144Package 10600	--
pMIRPOperationsPackage1	Name: pMIRPOPerationsPackage1 OID : ts32-4144Package 20600	--
pMIRPOperationsPackage2	Name: pMIRPOPerationsPackage2 OID : ts32-4144Package 30600	--
pMIRPOperationsPackage3	Name:pMIRPOPerationsPackage3 OID: ts32-4144Package 40600	--
pMIRPNotificationPackage	Name: pMIRPNotificationPackage OID : ts32-414Package 50600	--
Actions		
createMeasurementJob	NamecreateMeasurementJob OID : ts32-4144Action 10600	--
stopMeasurementJob	Name: stopMeasurementJob OID : ts32-354Action 20600	--
listMeasurementJobs	Name: listMeasurementJob OID : ts32-414Action 30600	--
suspendMeasurementJob	Name: suspendMeasurementJob OID : ts32-414Action 40600	--
resumeMeasurementJob	Name: resumeMeasurementJob OID : ts32-414Action 50600	--
createThresholdMonitor	Name: createThresholdMonitor OID : ts32-414Action 60600	--
deleteThresholdMonitor	Name: createThresholdMonitor OID : ts32-414Action 70600	--
listThresholdMonitor	Name: createThresholdMonitor OID : ts32-414Action 80600	--
suspendThresholdMonitor	Name: createThresholdMonitor OID : ts32-414Action 90600	--
resumeThresholdMonitor	Name: createThresholdMonitor OID : ts32-414Action 100600	--
Notifications		
notifyMeasurementJobStatusChanged	Name: notifyMeasurementJobStatusChanged OID : ts32-414Notification 10600	--
notifyThresholdMonitorStatusChanged	Name: notifyThresholdMonitorStatusChanged OID : ts32-4144Notification 20600	--
Attributes		
--	--	--
Parameters		
--	--	--
Name Bindings		

--	--	--

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Dec 2004	S_26	SP-040785	--	--	Submitted to SA#26 for Approval	1.0.0	