Key Performance Indicator for OMA Enablers Technical Specification

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Open Mobile Alliance

OMA-TS-KPIinOMA-V1_0-20120731-A

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1. Scope

This document aims at specifying:

- the common template for KPI definition
- the functions and expected behaviors of KPIinOMA-enabled instance
- the interface exposed by KPIinOMA-enabled instance

The common template for KPI definition specifies all the fields for the KPI definition. All of the KPI definition for different OMA Enabler will follow the same template.

These functions and behaviors of KPIinOMA-enabled instance relate to:

- Performance Measurement Collection function
- Performance Measurement Reporting function
- Configuration function

This document also specifies the message flows, message patterns and data formats used for message exchanges between KPIinOMA-enabled instance and requestor (Operational Environment). The parameters used for the message are specified as well.

2. References

2.1 Normative References

[OMA-KPIinOMA-RD] "Key Performance Indicators for OMA Enablers Requirements", Open Mobile Alliance™, OMA-RD-KPIinOMA-V1_0, URL:http://www.openmobilealliance.org/

[OMA-KPIinOMA-AD] "Key Performance Indicators for OMA Enablers Architecture", Open Mobile Alliance™, OMA-AD-KPIinOMA-V1_0, URL:http://www.openmobilealliance.org/

[OMA-SEC_CF] "Enabler Release Package for OMA Security Common Function", Open Mobile Alliance™, OMA-ERP-SEC_CF-V1_0-20080902-A, URL:http://www.openmobilealliance.org/

[RFC1446] "Security Protocols for version 2 of the Simple Network Management Protocol (SNMPv2)", J. Galvin et al, Apr, 1993, URL:http://www.ietf.org/rfc/rfc1446.txt

[RFC1448] "Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)", J. Case et al, Apr 1993, URL:http://www.ietf.org/rfc/rfc1448.txt

[RFC1450] "Management Information Base for version 2 of the Simple Network Management Protocol (SNMPv2)", J. Case et al, Apr 1993, URL:http://www.ietf.org/rfc/rfc1450.txt

[RFC2119] "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997, URL:http://www.ietf.org/rfc/rfc2119.txt

[RFC2616] "Hypertext Transfer Protocol – HTTP/1.1", R.Fielding et al, June 1999, URL:http://www.ietf.org/rfc/rfc2616.txt

[RFC2617] "HTTP Authentication: Basic and Digest Access Authentication", J. Franks et al, June 1999, URL:http://www.ietf.org/rfc/rfc2617.txt

[RFC2228] "FTP Security Extensions", M. Horowitz et al, October 1997, URL:http://www.ietf.org/rfc/rfc2228.txt

[RFC2577] "FTP Security Considerations", M. Allman et al, May 1999, URL:http://www.ietf.org/rfc/rfc2577.txt

[RFC4234] "Augmented BNF for Syntax Specifications: ABNF". D. Crocker, Ed., P. Overell. October 2005, URL:http://www.ietf.org/rfc/rfc4234.txt

[RFC959] "FILE TRANSFER PROTOCOL (FTP)", J. Postel et al, October 1985, URL:http://www.ietf.org/rfc/rfc959.txt

[SCRRULES] "SCR Rules and Procedures", Open Mobile Alliance™, OMA-ORG-SCR_Rules_and_Procedures, URL:http://www.openmobilealliance.org/

2.2 Informative References

[OMADICT] "Dictionary for OMA Specifications", Version 2.8, Open Mobile Alliance™, OMA-ORG-Dictionary-V2_8, URL:http://www.openmobilealliance.org/

3. Terminology and Conventions

3.1 Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119].

All sections and appendixes, except “Scope” and “Introduction”, are normative, unless they are explicitly indicated to be informative.

3.1.1 Additional Conventions

Explanation of the XML Type in tables is as follows:

- E = Elements
- A = Attributes
- 1,2,3, etc = nesting level of the element
- Attributes apply to the parent Element.

Each message start with a message element, noted as E.

The cardinality of the data type is “1” unless specified otherwise. Explanation of the data type canrdinality in message Tables is as follow:

- 0..1 means the parameter is either missing or has exactly one occurrence
- 0..unbounded means the parameter has zero or more occurrences.
- 1..unbounded means the parameter has one or more occurrences.

Informative illustration of a table:

Parameter name	XML Type	Data type	Description
Message Name	E		Indicates the name of the message.
Name	E1	String	Indicates the name of the element.
SubName	A	Byte [0..unbounded]	Indicate the possible subNames of the Name element.

Table 1: XML Type Conventions

3.2 Definitions

Key Performance Indicator	See [OMA-KPIinOMA-RD]
KPIinOMA-enabled Instance	See [OMA-KPIinOMA-RD]
Operational Environment	See [OMA-KPIinOMA-RD]
Performance Measurement	See [OMA-KPIinOMA-RD]

3.3 Abbreviations

FTP	File Transfer Protocol
HTTP	HyperText Transfer Protocol
IP	Internet Protocol
KPI	Key Performance Indicator
KPIinOMA	Key Performance Indicators in OMA
MIB	Management Information Base
OE	Operational Environment
OMA	Open Mobile Alliance
PSK-TLS	Pre-Shared Key TLS
SEC_CF	Security Common Function
SNMP	Simple Network Management Protocol
TLS	Transport Layer Security
TS	Technical Specification
XML	Extensible Markup Language

4. Introduction

This document defines the interface and functionalities of Key Performance Indicators in OMA (KPIinOMA) based on requirements defined by the KPIinOMA Requirement Document [KPIinOMA-RD] and in accordance with the architecture defined by the KPIinOMA Architecture Document [KPIinOMA-AD].

Section 5 contains the template for the KPI definition.

Section 6 contains the detailed functional descriptions and operations of the KPIinOMA enabler.

Section 7 contains the description of the message exchange patterns, operations and parameters of the KPI-1 interface.

Section 8 contains interface message bindings and message data formats over the selected protocols.

Section 9 contains details on security considerations between KPIinOMA-enabled Instance and the requestor (Operational Environment).

4.1 Version 1.0

The KPIinOMA Technical Specification covers all requirements [KPIinOMA-RD] of KPIinOMA V1.0.

5. KPI Definition Template

When defining the KPIs for individual enablers, each KPI SHALL follow the template below.

Field	Optional	Description
Name	No	This field is the name of the KPI. The name of the KPI MUST be unique.
Description	No	This field is the brief description of the KPI.
Purpose	No	This field is the purpose of the KPI, to describe what kind of information or requirement will be reflected for the service delivered by the KPIinOMA-enabled Instance.
Formula	No	This field is the formula of the KPI. The field is used to explain how to calculate the KPI based on the collected Performance Measurement. The formula of one KPI can reference another KPI. The referred KPI MUST be defined beforehand and be enclosed in square brackets.
Unit	No	This field is the unit information of the KPI, which could be percentage, time interval, bit/s and etc.
Data Type	No	This field is the data type and the accuracy information of the KPI, which could be real, integer and etc.
Reporting Frequency	No	This field is the minimal reporting frequency for the KPI related Performance Measurements, e.g. every five minutes.
Reporting Duration	No	This field is the period for which the KPI related Performance Measurements will be reported. The KPI reporting duration could be calculated as multiples of the reporting frequency. How to calculate is out of scope for KPI definition.
Data Source	No	This field is about the data source of the KPI, which could be the KPIinOMA-enabled Instance, such as CPM, CAB and etc.
Category	Yes	This field is the KPI category information, which is used by OE to categorize different KPIs. This field is an optional field.

6. KPIinOMA Functions and Operations

6.1 General Concept

6.1.1 Configuration Information

Configuration information can be organized as a unified configuration file in the KPIinOMA-enbled Instance, and it can contain multiple configuration items. The configuration item contains the item name and item value, and may contain description information. The item value SHALL pass the verification to ensure the validity. The configuration item related information MAY be shown through the configuration interface, and the item values are configured and operated by the KPIinOMA-enabled Instance.

To achieve the batch configuration for the KPIinOMA-enabled Instances, the Operational Environment can describe the configuration data based on the unified description format. The configuration data can be described in three parts: interface organization description file, control rule description file and data content description file.

The configuration information includes report criteria, collection condition, KPI calculation method, etc. The detailed configuration items are specified by the Service Provider, and they are not specified in this enabler.

6.1.2 Performance Measurement

Performance Measurement can be organized as a unified file and it can contain multiple Performance Measurement data items. Each data item contains the item name, item value and may contain description information. The item value SHALL pass the verification to ensure the validity. The Performance Measurement may be analysed by the KPIinOMA-enabled Instance to derive the KPI data, and may be shown through the user interface.

The Performance Measurement includes session failure information, session success information, system fault information, system warning information, consumed time information, consumed resource information, etc.

6.1.3 Key Performance Indicator

The Key Performance Indicator is used to indicate the performance of the service enabler. It can be derived from the Performance Measurement. Both KPIinOMA-enabled Instance and Operational Environment can calculate KPI based on the collected or reported Performance Measurement.

The Key Performance Indicator includes session success rate information, maximum handling session number, average operation handling time, etc.

6.2 KPIinOMA-enabled Instance

The KPIinOMA-enabled Instance is an OMA enabler implementation, which can work under the KPIinOMA framework and report Performance Measurement to Operational Environment. In the Service Provider's network, it can be the equipment which develops network management characteristics, operated equipment, network node etc.

The KPIinOMA-enabled Instance provides the following functions:

6.2.1 Collection Function

KPIinOMA-enabled Instance collects the Performance Measurement, based on configuration, or after receiving the OEPMCollectionCmd message from the Operational Environment.

KPIinOMA-enabled Instance starts to collect the Performance Measurement after receiving the collection request.

KPIinOMA-enabled Instance receives the performance information reported from the telecommunication equipments (e.g. server or client), and performs the filtering based on its filtering conditions, to discard the filtered data, and report the rest of the data.

KPIinOMA-enabled Instance converts the collected Performance Measurement from different equipments into a unified format. After that, the KPIinOMA-enabled Instance performs the analysis about the relativity, and shows the Performance Measurement through the user interface.

KPIinOMA-enabled Instance logs and stores the collected Performance Measurement for future retrieval.

6.2.2 Reporting Function

KPIinOMA-enabled Instance reports the Performance Measurement using the InstancePMReport message, according to the pre-configured conditions or the received configuration information.

KPIinOMA-enabled Instance responds the Performance Measurement using the OEPMQueryResponse message, as a response to an OEPMQUeryRequest message from the Operational Environment.

6.2.3 Configuration Management Function

KPIinOMA-enabled Instance receives the configuration information by OEConfigurationCmd message from Operational Environment. KPIinOMA-enabled Instance applies the received configuration information.

KPIinOMA-enabled Instance responds the configuration information using the OEConfigQueryResponse message, as a response to an OEConfigQueryRequest message from the Operational Environment.

KPIinOMA-enabled Instance receives the customized information for the network management characteristics defined by the service enabler during the service characteristic development and generates the configuration file for the server's network characteristics to facilitate the service interpretation and management by the Operational Environment.

The Operational Environment retrieves the configuration data from the KPIinOMA-enabled Instance, interprets and shows it to be edited by the external entities. After that, the Operational Environment sends the edited configuration data to the KPIinOMA-enabled Instance, and controls the KPIinOMA-enabled Instance to apply the received configuration data.

6.2.4 KPI Calculation Function

KPIinOMA-enabled Instance requests, receives and stores the performance related data from the network equipments, then generates the Performance Measurement according to the Performance Measurement data definition.

KPIinOMA-enabled Instance checks the Performance Measurement according to the retrieved pre-configured checking rules, and gets the checking result.

KPIinOMA-enabled Instance performs the KPI calculation based on the collected Performance Measurement according to the KPI definition and configuration.

6.2.5 Command Interpreter Function

Command Interpreter Function receives the commands sent by Operational Environment, interprets and processes the received commands directly.

The KPIinOMA-enabled Instance acts according to the processed result, to achieve the remote control by the Operational Environment.

The commands can be configuration query command, configure command, Performance Measurement collect command, Performance Measurement query command, etc.

The Command Interpreter Function may reside in the Operating System of the KPIinOMA-enabled Instance.

6.3 Operational Environment

The Operational Environment is an environment under the KPIinOMA framework, in which the hosted entities have the capability to execute operations related to KPIs. In the Service Provider's network, it can be a network management server, operating equipment, etc.

The Operational Environment is a KPIinOMA requestor (not defined by the KPIinOMA enabler). By invoking the KPI-1 interface, the requestor can:

- Receive Performance Measurements from KPIinOMA-enabled Instance either in response to a Performance Management query or a Performance Management report based on pre-configuration of the KPIinOMA-enabled instance.
- Request the KPIinOMA-enabled Instance to collect Performance Measurements
- Initiate the configuration of the KPIinOMA-enabled Instance
- Query the Performance Measurement or configuration data from KPIinOMA-enabled Instance according to the pre-defined service data query requirements
- Calculate the KPI based on the received Performance Measurement according to the KPI definition.

7. KPI-1 Interface

7.1 Overview

KPI-1 is an interface exposed by the KPIinOMA-enabled Instance to the requestor (Operational Environment).

The KPI-1 interface allows the requestor (Operational Environment) to:

- query Performance Measurement or configuration data,
- receive Performance Measurement reported from KPIinOMA-enabled Instance,
- request the Performance Measurement collection, and
- accomplish configuration to KPIinOMA-enabled Instance.

7.2 Performance Measurement Report

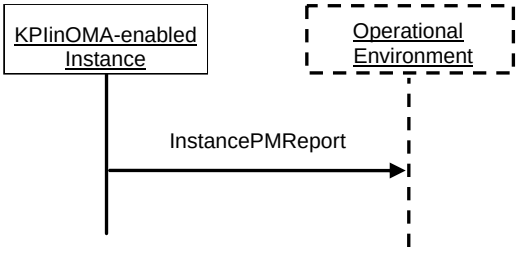

Figure 1: Flow of Performance Measurement Report

Message	Requirement	Direction
InstancePMReport	Mandatory	KPIinOMA-enabled Instance → Operational Environment

Table 2: Requirement and direction for Performance Measurement report message

7.2.1 InstancePMReport message

This message is used by the Operational Environment to receive Performance Measurement reported from the KPIinOMA-enabled Instance.

It is assumed that the underlying transport layer is responsible for acknowledgement of Performance Measurement report.

The parameters are defined in the table below:

Parameter name	Optional	Description
InstanceID	No	Indicates the KPIinOMA-enabled Instance reporting the Performance Measurement.
PM	No	Indicates the reported Performance Measurement. There can be multiple Performance Measurements reported at the same time. See the detailed structure definition in section 7.7.2.

Table 3: InstancePMReport message parameters

7.3 Configuration Command

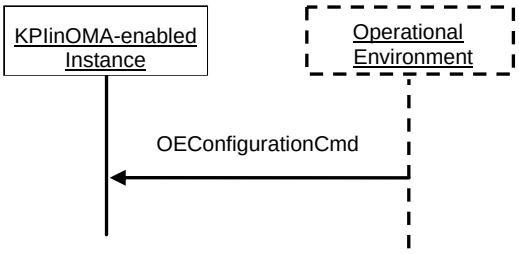

Figure 2: Flow of Configuration Command

Message	Requirement	Direction
OEConfigurationCmd	Mandatory	KPIinOMA-enabled Instance ← Operational Environment

Table 4: Requirement and direction for configuration command message

7.3.1 OEConfigurationCmd message

This message is used by the Operational Environment to send the configuration command the KPIinOMA-enabled Instance.

It is assumed that the underlying transport layer is responsible for acknowledgement of configuration command.

The parameters are defined in the table below:

Parameter name	Optional	Description
OEID	No	Indicates the identifier of the Operational Environment.
ConfigInfo	No	Indicates the configuration information. See the detailed structure definition in section 7.7.1.

Table 5: OEConfigurationCmd message parameters

7.4 Configuration Query

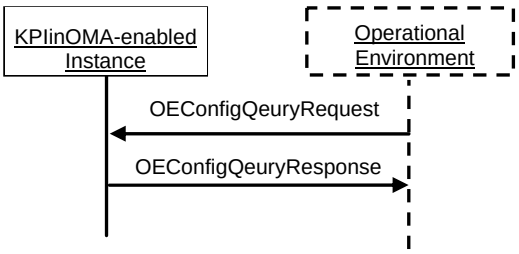

Figure 3: Flow of Configuration Query

Message	Requirement	Direction
OEConfigQueryRequest	Mandatory	KPIinOMA-enabled Instance ← Operational Environment
OEConfigQueryResponse	Mandatory	KPIinOMA-enabled Instance → Operational Environment

Table 6: Requirement and direction for configuration query messages

7.4.1 OEConfigQueryRequest message

This message is used by the Operational Environment to query the configuration information from the KPIinOMA-enabled Instance.

The parameters are defined in the table below:

Parameter name	Optional	Description
OEID	No	Indicates the identifier of the Operational Environment.
ConfigInfoID	No	Indicates the identifier for the queried configuration information.

Table 7: OEConfigQueryRequest message parameters

7.4.2 OEConfigQueryResponse message

This message is used by the KPIinOMA-enabled Instance to respond the configuration information to the Operational Environment.

The parameters are defined in the table below:

Parameter name	Optional	Description
InstanceID	No	Indicates the KPIinOMA-enabled Instance reporting the Performance Measurement.
ConfigInfo	No	Indicates the responded configuration information. See section 7.7.1 for ConfigInfo structure.

Table 8: OEConfigQueryResponse message parameters

7.5 Performance Measurement Query

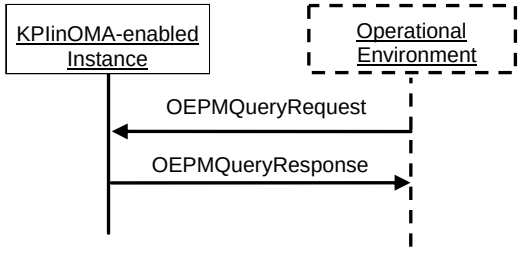

Figure 4: Flow of Performance Measurement Query

Message	Requirement	Direction
OEPMQueryRequest	Mandatory	KPIinOMA-enabled Instance ← Operational Environment
OEPMQueryResponse	Mandatory	KPIinOMA-enabled Instance → Operational Environment

Table 9: Requirement and direction for Performance Measurement query messages

7.5.1 OEPMQueryRequest message

This message is used by the Operational Environment to query the Performance Measurement from the KPIinOMA-enabled Instance.

The parameters are defined in the table below:

Parameter name	Optional	Description
OEID	No	Indicates the identifier of the Operational Environment.
PMID	No	Indicates the queried Performance Measurement. There can be multiple Performance Measurements queried at the same time.

Table 10: OEPMQueryRequest message parameters

7.5.2 OEPMQueryResponse message

This message is used by the KPIinOMA-enabled Instance to respond the Performance Measurement to the Operational Environment.

The parameters are defined in the table below:

Parameter name	Optional	Description
InstanceID	No	Indicates the KPIinOMA-enabled Instance responding the Performance Measurement.
PerformanceMeasurement	No	Indicates the responded Performance Measurement. See section 7.7.2 for PerformanceMeasurement structure.

Table 11: OEPMQueryResponse message parameters

7.6 Performance Measurement Collection

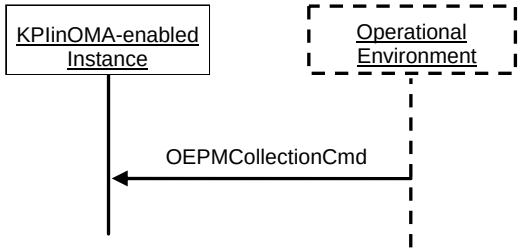

Figure 5: Flow of Performance Measurement Collection

Message	Requirement	Direction
OEPMCollectionCmd	Optional	KPIinOMA-enabled Instance ← Operational Environment

Table 12: Requirement and direction for Performance Measurement collection messages

7.6.1 OEPMCollectionCmd message

This message is used by the Operational Environment to request the KPIinOMA-enabled Instance to start the Performance Measurement collection.

It is assumed that the underlying transport layer is responsible for acknowledgement of collection command.

The parameters are defined in the table below:

Parameter name	Optional	Description
OEID	No	Indicates the identifier of the Operational Environment.
ConfigInfoID	No	Indicates the identifier of the configuration information would be applied.
PMID	No	Indicates the Performance Measurement to be collected. There can be multiple Performance Measurements to be collected at the same time.

Table 13: OEPMCollectionCmd message parameters

7.7 Data Structures

7.7.1 ConfigInfo

The parameters are defined in the table below:

Parameter name	Optional	Description
ConfigInfoID	No	Indicates the identifier for the entire configuration information.
ConfigItem	No	Placeholder element to contain the detailed configuration information for one configuration item.
Name	No	Indicates the name of the configuration item.
Value	No	Indicates the value of the configuration item.
Description	Y	Indicates the description of the configuration item, for example, the purpose of the configuration item, validity constraints, etc. This attribute is optional.

Table 14: ConfigInfo parameters

7.7.2 PerformanceMeasurement

The parameters are defined in the table below:

Parameter name	Optional	Description
PMID	N	Indicates the identifier of the entire Performance Measurement.
PMItem	N	Placeholder element to contain the detailed information for one Performance Measurement item.
Name	N	Indicates the name of the Performance Measurement item.
Value	N	Indicates the value of the Performance Measurement item.
Description	Y	Indicates the brief description of the Performance Measurement item.

Table 15: PM parameters

8. Protocol Bindings

8.1 Overview

KPIinOMA-1 interface supports at least one of the bindings listed below:

- Hypertext Transfer Protocol version 1.1 (HTTP1.1 [RFC2616])
- Simple Network Management Protocol version 2.0 (SNMP V2 [RFC1448])
- File Transfer Protocol (FTP [RFC959])

The table below shows the overview of protocol bindings for the messages over KPI-1 interface:

Message	HTTP	SNMP	FTP
InstancePMReport	Yes	Yes	Yes
OEConfigCmd	Yes	Yes	
OEConfigQueryRequest	Yes	Yes	
OEConfigQueryResponse	Yes	Yes	
OEPMQueryRequest	Yes	Yes	
OEPMQueryResponse	Yes	Yes	
OEPMCollectionCmd	Yes		

Table 16: KPI-1 Interface Message Protocol Binding Mappings

8.2 HTTP Binding

8.2.1 General

8.2.1.1 Media Type

KPIinOMA-enabled Instance SHALL support messages formatted as entity-bodies with the following media types:

- application/xml media type. The application/xml media type is used when a single KPI-1 interface message is included in the HTTP request/response.
- multipart/mixed media type. The multipart/mixed media type is used when multiple KPI-1 interface messages are concatenated in a single HTTP request/response.

8.2.1.2 HTTP Method

All the request messages SHALL be sent as HTTP POST method requests.

The following optional Headers may be included in the request messages.

- the receiver's address in the request line.
- the Host request-header set to the hostname or IP address of the receiver.
- the User-Agent request-header set to identify the host device (e.g. "vendor-model/version"), and the name and version of the sender as user agent initiating the request.

- the Accept request-header with value “application/xml, multipart/mixed”.
- the Accept-Encoding request-header with value per the supported HTTP compression encodings, i.e. deflate and / or gzip.
- the Accept-Language request-header with value per the supported HTTP supported languages(e.g. en, *).
- the Accept-MsgSize is the maximum message size that terminal can handle.
- the Content-Length entity-header set to the length of the entity-body.
- the Content-Type entity-header with value “application/xml or “multipart/mixed”, as applicable.
- the Interface message(s) as message-body.

If any of these headers are not present in the response to the request, the receiver SHALL assume their *default* values.

All the response messages SHALL be sending as response to the corresponding receiver’s request as specified by the HTTP 1.1 including:

- Status-Line header reflects the outcome of the HTTP POST request
- the ETag entity-header set to a unique value within the scope of the receiver.
- the Content-Encoding entity-header set to the type of HTTP compression applied, if any
- the Content-Length entity-header set to the length of the entity-body
- the Content-Type entity-header with value “application/xml or “multipart/mixed”, as applicable

the Interface message(s) as message-body, if the transaction is successful.

8.2.1.3 KPI-1 Interface Message Bindings

The table below gives an overview of how KPI-1 interface messages are bound to the HTTP based protocol stack.

Message	Direction	HTTP Method
InstancePMReport	KPIinOMA-enabled Instance → Operational Environment	HTTP POST
OEConfigCmd	KPIinOMA-enabled Instance ← Operational Environment	HTTP POST
OEConfigQueryRequest	KPIinOMA-enabled Instance ← Operational Environment	HTTP POST
OEConfigQueryResponse	KPIinOMA-enabled Instance → Operational Environment	HTTP Response (including 200 OK of the underlying method)
OEPMQueryRequest	KPIinOMA-enabled Instance ← Operational Environment	HTTP POST
OEPMQueryResponse	KPIinOMA-enabled Instance → Operational Environment	HTTP Response (including 200 OK of the underlying method)
OEPMCollectionCmd	KPIinOMA-enabled Instance ← Operational Environment	HTTP POST

Table 17: KPI-1 Interface Message Bindings When Uses HTTP Based Stack

8.2.2 Performance Measurement Report

8.2.2.1 InstancePMReport message

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
InstancePMReport	E	String	Indicate the name of the message.
InstanceID	A	String	See description in section 7.2.1.
PM	E1	Structure [1..unbounded]	See description in section 7.2.1. See section 8.2.7.2 for PM structure

Table 18: HTTP InstancePMReport message parameters

8.2.3 Configuration Command

8.2.3.1 OEConfigurationCmd message

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
OEConfigurationCmd	E	String	Indicate the name of the message.
OEID	A	String	See description in section 7.3.1.
ConfigInfo	E1	Structure	See description in section 7.3.1. See section 8.2.7.1 for ConfigInfo structure

Table 19: HTTP OEConfigurationCmd message parameters

8.2.4 Configuration Query

8.2.4.1 OEConfigQueryRequest message

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
OEConfigQueryRequest	E	Structure	Indicate the name of the message.
OEID	A	String	See description in section 7.4.1.
ConfigInfoID	E1	String [1..unbounded]	See description in section 7.4.1.

Table 20: HTTP OEConfigQueryRequest message parameters

8.2.4.2 OEConfigQueryResponse message

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
OEConfigQueryResponse	E	Structure	Indicate the name of the message.
InstanceID	A	String	See description in section 7.4.2.
ConfigInfo	E1	Structure [1..unbounded]	See description in section 7.4.2. See section 8.2.7.1 for ConfigurationInfo structure.

Table 21: HTTP OEConfigQueryResponse message parameters

8.2.5 Performance Measurement Query

8.2.5.1 OEPMQueryRequest message

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
OEPMQueryRequest	E	Structure	Indicate the name of the message.
OEID	A	String	See description in section 7.5.1.
PMID	E1	String [1..unbounded]	See description in section 7.5.2.

Table 22: HTTP OEPMQueryRequest message parameters

8.2.5.2 OEPMQueryResponse message

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
OEPMQueryResponse	E	structure	Indicate the name of the message.
InstanceID	A	String	See description in section 7.6.1.
PM	E1	Structure [1..unbounded]	See description in section 7.6.1. See section 8.2.7.2 for PM structure.

Table 23: HTTP OEPMQueryResponse message parameters

8.2.6 Performance Measurement Collection

8.2.6.1 OEPMCollectionCmd message

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
OEPMCollectionCmd	E	Structure	Indicate the name of the message.
OEID	A	String	See description in section 7.6.1.
ConfigInfoID	E1	String	See description in section 7.6.1.
PMID	E1	String [1..unbounded]	See description in section 7.6.1.

Table 24: HTTP OEPMCollectionCmd message parameters

8.2.7 HTTP Data Structures

8.2.7.1 ConfigInfo

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
ConfigInfo	E	Structure	Placeholder element to contain one or more the configuration items.
ConfigInfoID	E1	String	See description in section 7.7.1.
ConfigItem	E1	Structure (1..unbounded)	See description in section 7.7.1.
Name	A	String	See description in section 7.7.1.
Value	A	String	See description in section 7.7.1.
Description	A	String (0..1)	See description in section 7.7.1.

Table 25: HTTP ConfigurationInfo parameters

8.2.7.2 PerformanceMeasurement

The parameters are defined in the table below:

Parameter name	XML Type	Data type	Description
PM	E	Structure	Placeholder element to contain one or more the Performance Measurement items.
PMID	E1	String	See description in section 7.7.2.
PMItem	E1	Structure (1..unbounded)	See description in section 7.7.2.
Name	A	String	See description in section 7.7.2.
Value	A	String	See description in section 7.7.2.
Description	A	String (0..1)	See description in section 7.7.2.

Table 26: HTTP PerformanceMeasurement parameters

8.3 SNMP Binding

8.3.1 General

SNMP Agents are programmed to watch for certain system events and problems on the managed equipment, and to send in Traps to the SNMP Manager when they occur. The SNMP interface is pre-configured between the SNMP Manager and the managed equipment. Through the interface, a SNMP Manager sets the query conditions and sends the query conditions to a SNMP Agent to retrieve specific configuration information or state information of the managed equipment. SNMP Agents operates with the managed equipment. Managed equipment interprets the query condition according to the pre-configured interface, and executes the corresponding query operation according to the interpretation result.

In some cases, the KPIinOMA-enabled Instance does not support the SNMP protocol. In the network, a Unified Agent may be deployed to receive and analyze the SNMP request message from the SNMP Manager. The Unified Agent determines the managed device corresponding to the SNMP request message, and transforms the SNMP request message into simplified extensible protocol request message, and sends it to determined managed equipment. After that, the Unified Agent receives the simplified extensible protocol response message from the managed equipment, transforms it into SNMP response message and sends back to SNMP Manager.

When using SNMP binding for the KPIinOMA interface KPI-1, the KPI, Performance Measurement and configuration parameter information will be defined as MIB (Management Information Base).

The Operational Environment acts as the SNMP Manager. The KPIinOMA-enabled Instance acts as the SNMP Agent, and it is also the managed equipment which is managed by the SNMP Manager.

8.3.2 Performance Measurement Report

The KPIinOMA-enabled Instance reports the Performance Measurement to the Operational Environment using the SNMP Trap Only Method.

The reporting condition can be configured on the KPIinOMA-enabled Instance, and the reporting operation is launched when the condition occurs.

8.3.3 Performance Measurement Query

The Operational Environment queries the Performance Measurement from the KPIinOMA-enabled Instance using the SNMP Polling Only method.

8.3.4 Configuration Query

The Operational Environment queries the configuration information from the KPIinOMA-enabled Instance using the SNMP Get method.

8.3.5 Configure Command

The Operational Environment sends the configuration information to the KPIinOMA-enabled Instance using the SNMP Set method.

8.4 FTP Binding

8.4.1 General

KPIinOMA-enabled Instance MAY support to report the Performance Measurement to Operational Environment using FTP protocol [RFC959].

Only InstancePMReport message can be applied for the FTP binding, all the other messages will not be applied.

8.4.2 Performance Measurement Report

The KPIinOMA-enabled Instance reports the Performance Measurement using the FTP APPEND (with create) (APPE) Method.

It is recommended to use the XML file format to encapsulate the Performance Measurement according to the PM structure defined in section 8.2.7.2. It will be easier for the Operational Environment to understand the reported Performance Measurement. But other file format is not prohibited.

The following parameters need to be configured for the KPIinOMA-enabled Instance prior to the reporting of Performance Measurement:

Parameter name	Optional	Data type	Description
FTPServerIP	N	String	Indicate the IP address of the Operational Environment.
FTPServerPort	N	String	Indicate the port number of the Operational Environment.
InstanceID	N	String	Indicate the identifier of the KPIinOMA-enabled Instance which reports the Performance Measurement.
FTPUserName	N	String	Indicate the user name of the KPIinOMA-enabled Instance.
FTPUserPasswd	N	String	Indicate the user password of the KPIinOMA-enabled Instance.
FTPDir	N	String	Indicate the directory address of the Operational Environment to locate the reported Performance Measurement file.

Table 27: FTP configuration parameters

9. Security Considerations

KPIinOMA-enabled Instance SHALL support the authentication to the request over the KPI-1 interface.

KPIinOMA-enabled Instance SHALL support integrity protection when it reports the Performance Measurement and configuration information to the Operational Environment over the KPI-1 interface.

9.1 HTTP Binding Security

It is recommended to refer to "OMA Security Common Function" [OMA-SEC_CF] by using TLS/PSK-TLS to address the HTTP binding security issues.

9.2 FTP Binding Security

Security mechanisms defined in "FTP Security Extensions" [RFC2228] and the security guidance defined in "FTP Security Considerations" [RFC2577] will address the FTP security issues between KPIinOMA-enabled Instance and Operational Environment.

9.3 SNMP Binding Security

Security mechanisms defined in "Security Protocols for version 2 of SNMP" [RFC1446] will address the SNMP binding security issues between KPIinOMA-enabled Instance and Operational Environment.

Appendix A. Change History (Informative)

A.1 Approved Version History

Reference	Date	Description
OMA-TS-KPIinOMA-V1_0-20120731-A	31 Jul 2012	Status changed to Approved by TP Ref TP Doc# OMA-TP-2012-0288-INP_KPIinOMA_V1_0_for_Final_Approval

Appendix B. Static Conformance Requirements (Normative)

The notation used in this appendix is specified in [SCRRULES].

B.1 SCR for KPIinOMA-enabled Instance

Item	Function	Reference	Requirement
KPI-I-001-M	Support collection function	Section 6.2.1	
KPI-I-002-M	Support reporting function	Section 6.2.2	
KPI-I-003-M	Support configuration management function	Section 6.2.3	
KPI-I-004-O	Support KPI calculation function	Section 6.2.4	
KPI-I-005-M	Support command interpreter function	Section 6.2.5	
KPI-I-006-M	Support sending InstancePMReport message	Section 7.2.1	KPI-I-013-M or KPI-I-014-O or KPI-I-015-O
KPI-I-007-M	Support receiving OEConfigurationCmd message	Section 7.3.1	KPI-I-013-M or KPI-I-014-O
KPI-I-008-M	Support receiving OEConfigQueryRequest message	Section 7.4.1	KPI-I-013-M or KPI-I-014-O
KPI-I-009-M	Support sending OEConfigQueryResponse message	Section 7.4.2	KPI-I-013-M or KPI-I-014-O
KPI-I-010-M	Support receiving OEPMQueryRequest message	Section 7.5.1	KPI-I-013-M or KPI-I-014-O
KPI-I-011-M	Support sending OEPMQueryResponse message	Section 7.5.2	KPI-I-013-M or KPI-I-014-O
KPI-I-012-O	Support receiving OEPMCollectionCmd message	Section 7.6.1	KPI-I-013-M
KPI-I-013-M	Support HTTP 1.1 Protocol Binding	Section 8.2	
KPI-I-014-O	Support SNMP Protocol Binding	Section 8.3	
KPI-I-015-O	Support FTP Protocol Binding	Section 8.4	