
HP OpenView Service Quality Manager



Mobile Data Services Value Pack User's Guide

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Preface

This document describes how to install and configure the Mobile Data Services Value Pack used in combination with the HP OpenView Service Quality Manager (SQM) platform. It also explains how to use the Mobile Data Services Value Pack to design the data model and reports for use by the HP OpenView SQM platform, and provides troubleshooting information.

Intended audience

This document is intended for HP OpenView SQM integrators and administrators.

Required knowledge

It is assumed that the reader is familiar with the functionality of HP OpenView SQM and has previous experience of the following:

- System administration and operations
- Service level management.

It is assumed that the reader is familiar with the concepts described in the following books:

- *HP OpenView Service Quality Manager Overview*
- *HP OpenView Service Quality Manager Administrators Guide*
- *HP OpenView Service Quality Manager Information Modeling Reference Guide*

The goal of this document is not to describe Mobile Data Services. It is assumed that the reader is already familiar with this domain.

Software versions

The software versions referred to in this document are specified in chapter 2.1, “Software and hardware requirements”.

Typographical conventions

The following typographical conventions have been used throughout this document.

`Courier` font:

- Source code and examples of file contents
- Commands that you enter on the screen
- Pathnames

Italic text:

- Filenames, programs and parameters in the text
- The names of other documents referred to in this guide

Bold text:

- New terms
- Emphasized words
- Keyboard key names

Associated documents

For a full list of HP OpenView SQM user documentation, see the *HP OpenView Service Quality Manager Product Family Introduction*.

Support

Please visit our HP OpenView web site at: openview.hp.com/

There you will find contact information as well as details about the products, services, and support HP OpenView has to offer.

The OpenView Support area of the HP OpenView web site includes:

- Downloadable documentation
- Troubleshooting information
- Patches and updates
- Problem reporting
- Training information
- Support program information

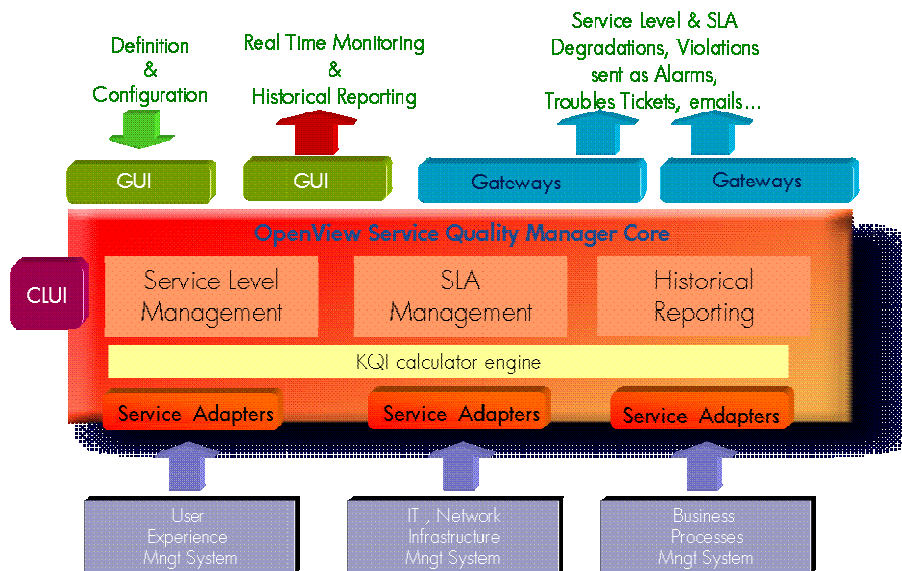
Value Pack description

1.1 HP OpenView Service Quality Manager

HP OpenView Service Quality Manager (SQM) provides a complete service quality management solution. It consolidates quality indicators across all domains—telecom, IT networks, servers, and applications—providing end-to-end visibility on service quality. HP OpenView SQM links service quality degradations to potential effects on business, allowing network support personnel to address problems and prioritize actions proactively.

HP OpenView SQM monitors the service quality by aggregating information coming from all data sources, such as the network, the IT infrastructure, and the service provider's business processes. Using this information, service operators can pinpoint infrastructure problems and identify their potential affect on customers, services, and service level agreements (SLAs).

Figure 1 HP OpenView SQM main components



For a detailed description of HP OpenView SQM, see the *HP OpenView Service Quality Manager Overview*.

1.2 What is a Value Pack?

1.2.1 Objective

The HP OpenView Service Quality Manager Value Pack software extends the value and benefits of the HP OpenView Service Quality Manager.

The objective of each Value Pack is to:

- Provide optimized time to value through preconfigured platforms
 - Reduce time to deployment through pre-implemented best practices
 - Facilitate integration with the customer environment
- Leverage from projects, partners and industry standards
 - Include Service Management specialist expertise and recommendations
- Improve the value delivered by the HP OpenView Service Quality Manager product
 - Enrich engine capabilities with customer-centric, predefined specialized added value
 - Provide an operational foundation for a solution that can easily be customized and extended to map customer contexts
- Ensure a secure cost of operations
 - Include a multi-technology/vendor catalogue of solutions and components that constantly develop in line with new services

1.2.2 HP OpenView SQM Value Pack approach

1.2.2.1 Defining the service model and KQIs

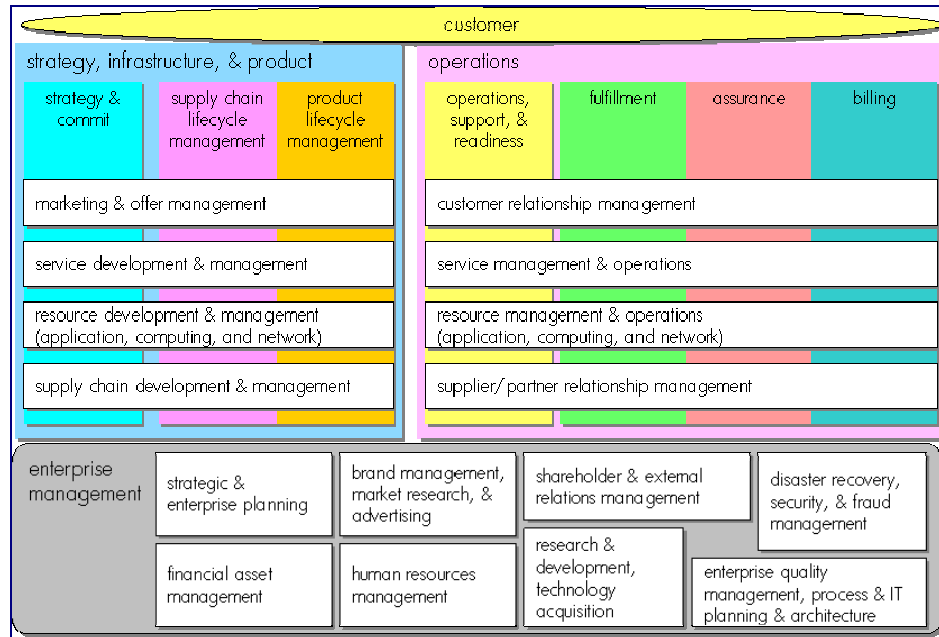
The methodology generally used to develop SLA and service management solutions consists in repeatedly performing the following steps in order to constantly improve the solution.

1. Define the scope of requirements by looking at the various use cases. For example, you can use the key operational processes defined in the Enhanced Telecom Operation Map (eTOM) produced by the Telemanagement Forum (www.tmfcentral.com) as a reference to analyze what would be the most suitable metrics for characterizing those processes.

A use case would then consist in:

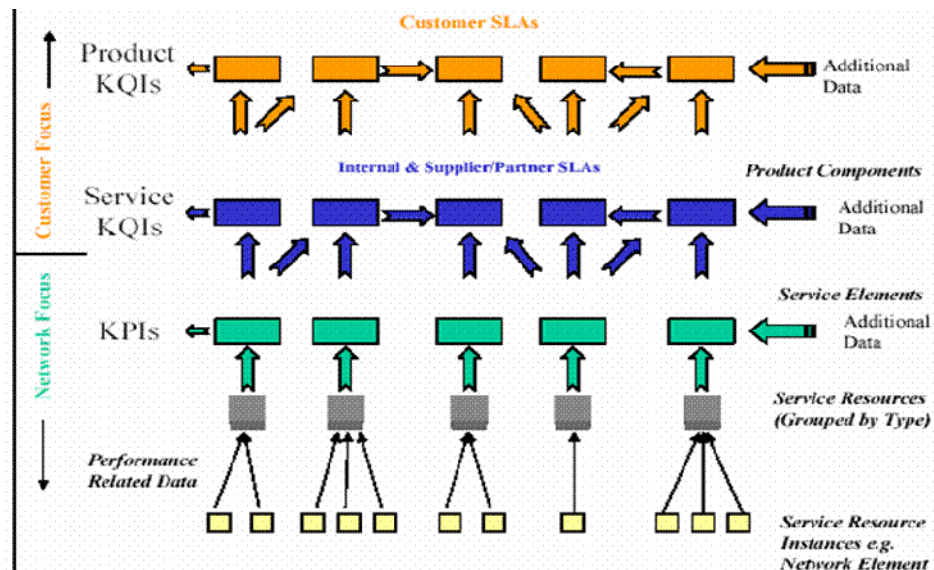
- Describing the standard activities of people using the system.
- Identifying the key metrics and policy that describe both the operator's business (i.e. the process aspects) and how the domain operates (i.e. the technological aspects).
- Defining a set of KQIs (Key Quality Indicators) that can continually provide the current and historical status of those metrics.
- Defining how these KQIs can be used by other systems, and specifying those systems.

Figure 2 eTOM (TeleManagement Forum)



- As the following figure illustrating how KQIs can be defined at the top of an indicator hierarchy shows, the second step consists in analyzing all available data sources and defining how the KQIs are computed and/or aggregated from the raw data.

Figure 3 Key Indicator hierarchy

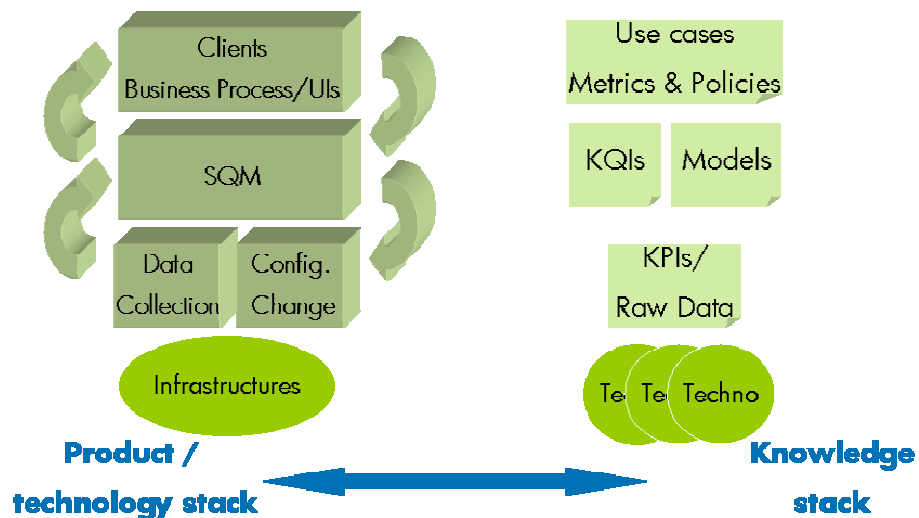


- The third step consists in designing a service model which structures the KQIs providing data on service components into a service, to provide a consistent and comprehensive view of that service.

The purpose of a service model is to provide a solution catering for many different domains, ranging from access devices, service access points, transport networks, and applications to activation and maintenance processes, each of which contributes to a service and its management. A service model ensures that all views provided to interested parties are consistent.

4. The final step consists in doing the following for the service model concerned:
 - Deploying real services as individual instances of the service model.
 - Defining service levels (“classes of service”) in line with objectives of the different types of users (Customer Relations personnel, Planning Department, Account Managers, Service Managers, etc.)
 - Defining SLAs in terms of contracts binding a particular service instance and a particular Service Level for a customer.
 - Defining reports that provide specific views of services, service availability, SLA status, etc.
 - Deploying data collection and integration with Third Party Products.

Figure 4 Conceptual integration of SQM and data source



1.2.2.2 Data source analysis

There are many potential sources of raw data from which KQIs can be computed. These data sources can be categorized as follows:

- Fault Management systems, providing:
 - Fault statistics analyzed by network element group, service resource group, severity, age, etc.
 - Statuses and status changes for network elements and service resources
- Performance management systems, providing:
 - Performance data from all domains involved in service delivery
 - Comparisons between delivered performance and performance commitments
- Mediation/usage systems, providing:
 - Information on data traffic and volumes, based on the number of users and applications, and the service profiles
- Probes, providing:
 - End-to-end performance metrics (using active probes to simulate users)

- Detailed experience of service access and use by users (using passive probes to decode signaling protocols)
- Application log files, providing:
 - Error codes and volumes providing information on application sessions and service consumption
- Trouble ticketing systems, providing:
 - Information on customer outages and problem resolution delays, from which service data including MTTRs and MTBFs, etc. can be calculated
- Service Provisioning systems, providing:
 - Service ordering and activation information, from which data such as the Mean Time To Deliver (MTTD) can be calculated

You must therefore analyze the data sources to select, combine and aggregate the most significant and economical metrics needed to compute the required KQIs.

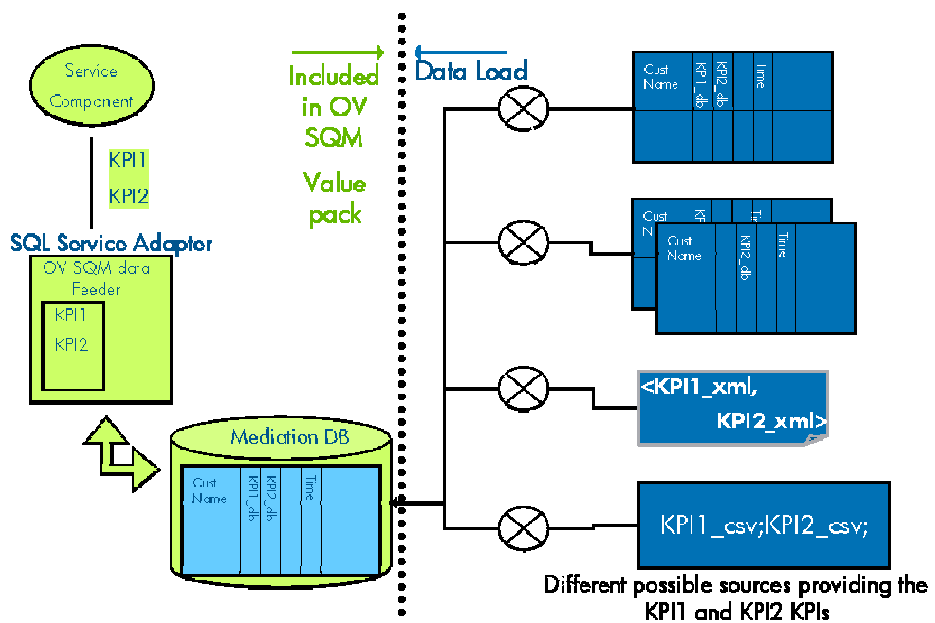
1.2.2.3 Data collection

As integration of Service Quality Management systems with data sources to collect service related metrics is always complex to implement, one of the OpenView SQM Value Pack's aims is to provide a quick and easy way to simplify this process by:

- Normalizing interfaces by providing a mediation database (Mediation DB) included in the OpenView SQM core product.
- Providing a set of tables in which the predefined collected metrics are loaded.
- Providing suitable dedicated Service Adapters to connect to the mediation database and retrieve the predefined metrics feeding the service model.

In some cases, the OpenView SQM Value Pack includes additional tools used to load data from major Third Party Products.

Figure 5 OV SQM Value Pack: data collection through a mediation database



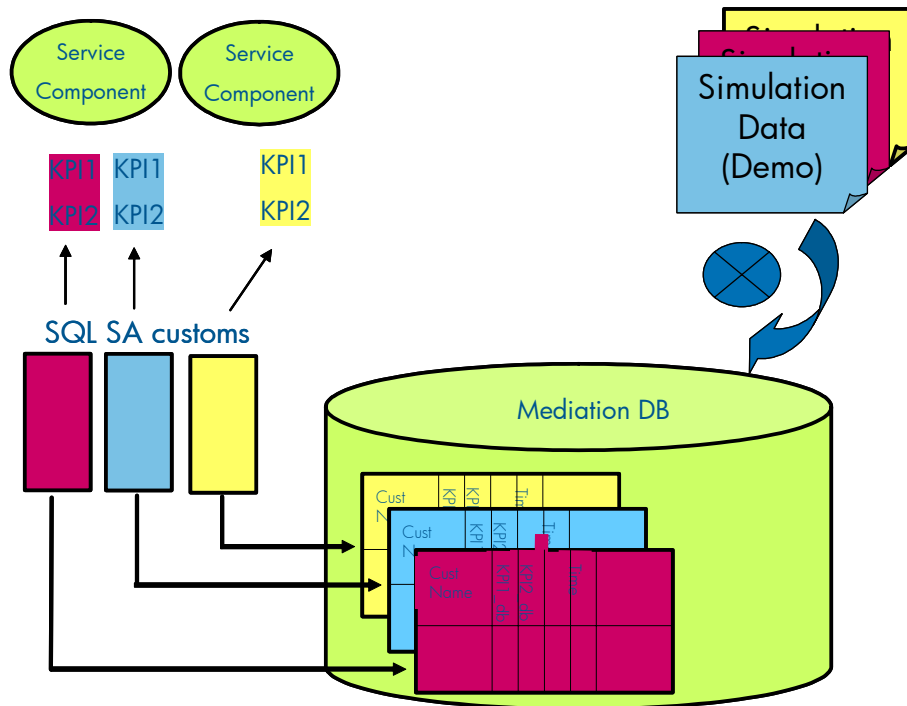
1.2.2.4 Data validation and simulation

Once you have installed your OpenView SQM Value Pack, you can load a set of parameter values in the mediation database tables for that Value Pack.

These parameter values are intended to represent one day's realistic data and are used to do the following:

- Validate the installation and populate the screens and reports with data.
- Demonstrate the product for education or training purposes.

Figure 6 Mediation database data validation and simulation



1.2.2.5 Predefined reports

The OpenView SQM software produces a variety of reports containing service quality, service metrics, trends, and SLA status information. OpenView SQM uses Business Objects to report this service quality information.

OpenView SQM contains a collection of predefined reports including the following:

- Reports on OpenView SQM data, such as service definitions, SLAs, and service levels.
- Reports showing the Mean Time Between Faults and data on the mean time required to repair the faults, service degradation, and the availability of each service and service component.

1.2.3 Typical content of a Value Pack

An OpenView SQM Value Pack contains the following:

- Software add-ons to the OpenView SQM core products
- Tools to install and run the Value Pack on an operational OpenView SQM system

- Documentation on the Value Pack's contents, and information on how to supplement the solution when needed

1.2.3.1 Software add-ons

- Service Model and KQIs, with calculation expressions
- Service Levels, and basic SLAs
- Business Objects universe and reports
- Custom SQL Service Adapters

1.2.3.2 Tools

- Scripts, and one day of data to populate the mediation database
- Scripts to set up the solution set and load the sample into the Service Repository Manager (SRM)

1.2.3.3 Documentation

- *Value Pack User Guide* (this document)
- *Service Model Reference Manual* (HTML)
- *Value Pack Release Notes*

1.2.4 An open solution

HP OpenView SQM Value Packs provide a quick way to deploy a solution in a specific use case. A Value Pack can also be thought of as a starting point for customers wishing to deploy a more comprehensive and specialized solution. The solution has been designed to enable you to expand on the package by leveraging standard OpenView SQM features.

It enables you to do the following, among many other possibilities:

- Create new service instances, new service levels based on the predefined service model, and KQIs customized to different use cases, using the graphical user interface to perform these and other administrative tasks.
- Easily add new KQIs based on the predefined collected data, using the OpenView SQM graphical service designer.
- Add new tables containing new raw data from a new source in the mediation database and create a new Service Adapter, using the HP OpenView SQL SA Toolkit. From these new raw data parameters, you can then define new KQIs for existing or new service components.
- Load real data or collect similar raw data but from another source of data, by modifying the data load scripts.
- Deploy new custom service adapters that connect directly to a data source, so removing the mediation tables and replacing the SQL Service Adapter.
- Create new reports.

1.3 Introduction to the HP OpenView SQM Mobile Data Services Value Pack

1.3.1 Key aspects of GPRS

The newly introduced GPRS technology can be simply characterized as follows:

- GPRS expands on the existing GSM infrastructure by extending the limited range of data services available through GSM technology.
- It allows data to be exchanged using packet switching techniques, optimizing network resource use.
- It facilitates new data services by supporting bit rates of up to 170 kb/s and allows content-based billing.
- It includes a specification for variable QoS:
 - Throughput, peak and mean bit rates can be negotiated
 - Four QoS classes provide for different priority levels and transfer times
 - Subscriber profiles can be used to define service specific QoS attributes

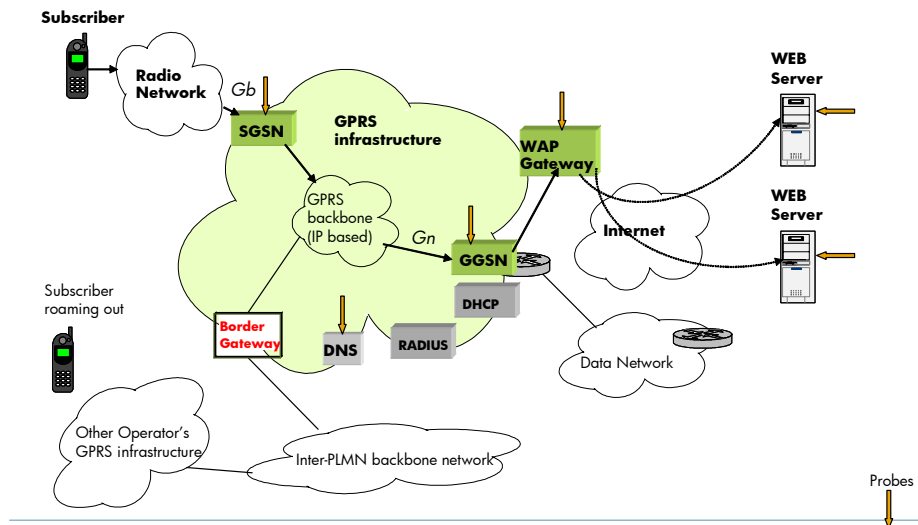
1.3.1.1 New network elements

The following key network elements must be added to 2G networks so that they support GPRS:

- Gateway GSN (GGSN)
 - Serves as a router interfacing with the external packet data network
 - Terminates the tunnel from SGSN
 - Creates the PDP context (with the appropriate QoS)
- Service GSN (SGSN)
 - Serves as a router responsible for packet delivery between the mobile and fixed core networks
 - Manages mobility and security procedures

As well as the GGSN and SGSN, other GPRS backbone server elements such as Billing Gateways or DNS servers performing dedicated tasks and so helping to provide the services, are required.

A Packet Control Unit (PCU) must be added in each Base Station Controller (BSC) to support the GPRS protocols and handle radio channel allocation and management.



1.3.1.2 Mobility

As mobility is a key benefit of the GPRS technology, two different areas must be considered when examining the overall customer experience:

- Session setup:
 - Attaching the mobile to the GSM and/or GPRS (SGSN-HLR) network (i.e. authorizing and localizing the mobile)
 - Activating the PDP context so that the mobile is visible from an external data network. This potentially includes authentication by the end service, and IP address allocation.
- The session itself:
 - Roaming
 - Performance (comparing delivered QoS with expected QoS)

1.3.2 GPRS service management challenges

GPRS involves additional service management challenges such as handling new, more complex business models not encountered in GSM networks.

1.3.2.1 New business models

The new business models found in the GPRS must handle the following aspects:

- Numerous service and content providers
- Multiple subscription plans
- Voice, data, content, usage, and pre-paid billing

Each service management solution must therefore handle each link in the complex GPRS value chain. It must also provide a clear picture of each scope of responsibility through dedicated key indicators measuring each contribution to service provision and maintenance.

1.3.2.2 Handling increased complexity

GPRS services inevitably involve a more complex model than GSM, due to the following:

- New services
- Packages supplied by multiple vendors
- Multiple technologies

Service management solutions must therefore hide this technical complexity from operators.

1.3.2.3 Integrating multiple domains and operational models

GPRS services necessarily require operational models involving multiple domains and operational models. These include the following:

- Radio access networks
- Core networks, and packet networks
- Data centers, and services
- Switching between ‘degraded’ operation and best effort operation
- Interfacing between Voice Network Operations Centers (NOCs) and IP NOCs

Service management solutions must therefore include and combine different technologies and domains in a single complete and consistent view shared by all players.

1.3.2.4 Leveraging OSS applications

Inclusion of Operational Support System (OSS) applications in a service management solution offers operators numerous benefits, including the following:

- Customer- & service-centric approach
- Service impact management (end-to-end view)
- Root-cause analysis
- Task automation
- System scalability & availability

Service management solutions can therefore be used to leverage various layers of existing Operational and Business Support systems by using various specialized levels of contribution from each system to help to provide a consolidated view of operations.

1.3.3 Use cases

1.3.3.1 eTOM and QoS management

The following table illustrates how a solution built on a product such as HP OpenView Service Quality Manager can be used to address the various needs of different entities in service provider companies.

Table 1 HP OpenView Service Quality Manager applications

Area	supplier/partner relationship management	resource management & operations	service management & operations	customer relationship management
Goal	Monitoring the quality of VAS as provided from a Third Party	Monitoring the quality delivered by service resources / components	Monitoring the quality of end-to-end services	VAS monitoring, from the customer standpoint, including full service life cycle (especially provisioning, troubleshooting,..)
Users	Interco/ 3PP Management Center (NMC)	Network Operation (NOC)	Service Operations Center (SOC) – VAS NMC	Customer Service Center (CSC)
Typical KQIs	Content accessibility Service availability Response time	Resource availability Service response time, usage, performance	Service accessibility Service availability Response time	E2E Service accessibility E2E Service availability xTTR
Solution Capabilities	- 3PP or Interco SLA monitoring -	- Trend Analysis & Reporting on targeted NE - Integration with network trouble ticketing systems	- Service modeling in XML language - Service Level Management based on IT/network KQIs	- SLA Management on subs. network and non-network KQIs - Customer troubleshooting integration
Business objectives	Monitor what suppliers provide to back up customer SLA	Optimize use and repair of critical service resources / components	Ensure resources are used consistently to provide expected Service Levels	Enable proactive management of Gold customers

1.3.4 OpenView SQM Mobile Data Services Value Pack software add-ons

The HP OpenView Service Quality Manager Mobile Data Services Value Pack is supplied with the following software add-ons.

1.3.4.1 Service models

The Mobile Data Services Value Pack includes service models for monitoring WAP services and data services via GPRS.

Both service models include a set of service components that provides an end-to-end view of WAP and data services via GPRS.

It should be remembered that the various service components provided with the Mobile Data Services Value Pack have been designed for use with other solutions analyzing other mobile data services.

The service component sharing concept, a key HP OpenView SQM feature, means that both service models can use the GPRS component, for example.

The service components include the following, together with their respective KQIs as defined in “OpenView SQM Mobile Data Services Value Pack: KQIs” on page 18.

- Radio access network, with geographical information
- GPRS backbone
- GPRS backbone IP Services (Radius, DNS, and DHCP)
- GPRS Gateways (xGSN)
- Internet infrastructure
- Internet services (Radius, DNS, and DHCP)
- HTTP, FTP, POP3, SMTP, and WAP servers
- IT servers

1.3.4.2 Service Levels, and basic SLAs

The Mobile Data Services Value Pack is provided with a set of Service Levels corresponding to the various use cases described above.

An SLA is also provided as an example for use in monitoring the simulation data through the OpenView SQM monitoring interface.

Table 2 Available SLAs

User QoS level	Customer Relationship Management	Service Level Management	Resource Management	Partner Management
Premium	VIP GPRS WAP	Target GPRS WAP	Target GPRS Resource	Target GPRS Partner
Baseline	Mass GPRS WAP	Base GPRS WAP	Base GPRS Resource	Base GPRS Partner

1.3.4.3 Predefined reports

Like any service model deployed in HP OpenView Service Quality Manager, the special Mobile Data Services software delivered in the Value Pack uses predefined WebIntelligence reports that are provided by HP OpenView Service Quality Manager. Your HP OpenView Service Quality Manager platform is configured to include the *slreporting* director and its related Business Objects software.

Several categories of information are available in the SQM predefined reports:

- Compliance reports
- Health reports
- Incident reports
- Inventory reports

For further details, see the *HP OpenView Service Quality Manager, Reporting Customization and User's Guide*.

1.3.4.4 Custom SQL Service Adapters

The Mobile Data Services Value Pack contains a set of service adapters adapted from the SQL Service Adapter, for collecting all raw data as described and requested in the service models.

1.3.5 OpenView SQM Mobile Data Services Value Pack: KQIs

1.3.5.1 Requirement for high level Key Quality Indicators

Ideally, a small set of end-to-end historical and real time Key Quality Indicators (KQIs) can provide an instant view of the services, and the SLA health and status. These high level KQIs are effectively composite indicators constructed from primary performance or quality indicators, each of which is provided by different domains and/or different geographies.

Even though the primary input indicators differ, coming from different contexts (technology, vendors, etc.), the same categories of KQIs can be defined (ITU-T Rec. I.350, and Eurescom P806-GI) characterizing the different service management aspects, irrespective of the use case concerned. These KPIs are classified as either Technical KQIs, or Non-technical KQIs.

Technical KQIs:

- **Speed** characterizes the time related QoS aspects associated with a function, such as data transfer or user authentication, showing time related efficiency

characteristics. Speed parameters are defined based on statistics calculated from sets of “duration times”. This function may potentially not be produced with the desired accuracy, however.

- **Accuracy** characterizes the degree of correctness with which a given function is performed. Accuracy parameters are defined based either on the ratio between the number of failures and the number of total attempts, or on the number of failures during an observation period.
- **Compliance** characterizes the percentage of the time, during a contractual period of time, when a KQI objective is not met.

These technical KQIs are available for both the service access (“access”) phase and the actual service consumption (“information transfer”) phase.

Non-technical KQIs:

- **Service provisioning** KQIs relate to parameters for processes involved in providing services or charging services to customers.
- **Service Repair** KQIs relate to parameters for processes involved in restoring services to customers.

The following table provides some examples of Mobile Data Service related KQIs for each of four main eTOM processes: Customer Relationship Management, Service Management & Operations, Resource Management & Operations, and Supplier & Partner Relationship Management.

	Customer Relationship Management	Service Management & Operations	Resources Management & Operations	Supplier Partner Relationship Management
Technical KQIs				
Speed				
<i>Access</i>	<i>E2EAccessibility</i>	<i>ResponseTime (5)</i>	<i>AttachmentProcedureDuration</i>	<i>PDPCreationAvgSetupTime</i>
<i>Information Transfer</i>	<i>AverageThroughput (1)</i>	<i>AverageThroughput (1)</i>	<i>NET_IN_PACKET_RATE (2)</i>	<i>UL_DL_Throughput(3)</i>
Accuracy				
<i>Access</i>	<i>Cust_AttachFailureRatio (4)</i>	<i>RatioRejectURLNotFound (5)</i>	<i>RADIUSefficiency (4)</i>	<i>PDPCreationEfficiency (6)</i>
<i>Information Transfer</i>	<i>RatioUnsolicitedDetach (4)</i>	<i>RatioUnsolicitedDetach (4)</i>	<i>CurrentNbCriticalAlarms (8)</i>	<i>AverageNetErrorRate (9)</i>
Compliance				
<i>Access</i>	Relative to the above parameters	Relative to the above parameters	Relative to the above parameters	Relative to the above parameters
<i>Information Transfer</i>	Relative to the above parameters	Relative to the above parameters	Relative to the above parameters	Relative to the above parameters
Non-technical KQIs				
<i>Repair</i>	Mean service	Mean service	Mean resource	Mean resource

<i>Management</i>	restoration time(*)	restoration time(*)	restoration time(*)	restoration time(*)
<i>Service Provisioning Management</i>	Mean service provisioning time(*)	Mean service provisioning time(*)	Mean resource provisioning time(*)	Mean resource provisioning time(*)

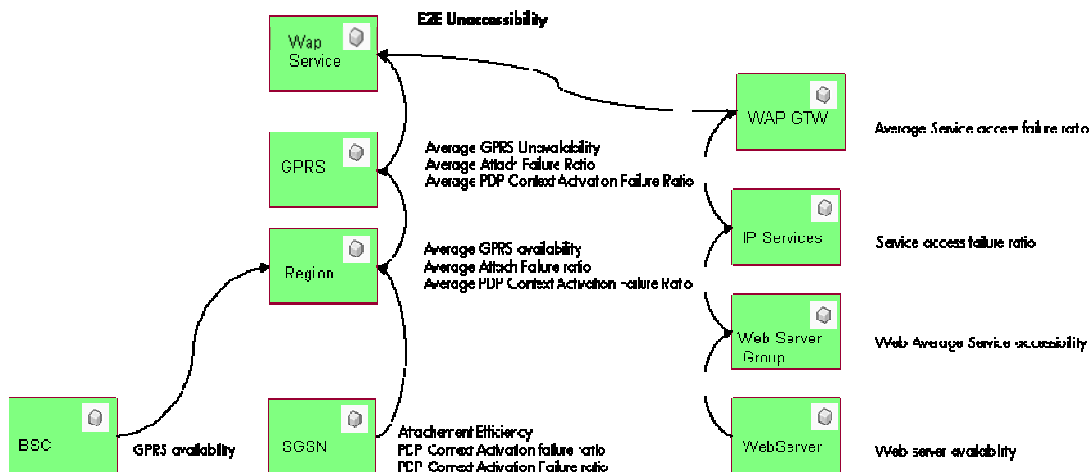
These examples are taken from the following service components:

- (1): from *.WebServersGroup.SCD*
- (2): from *.UnixPlatform.SCD*
- (3): from *APN.SCD*
- (4): from *SGSN.SCD*
- (5): from *WebServer.SCD*
- (6): from *ThirdOperator*
- (7): from *MobileDevice.SCD*
- (8): *BSC.SCD*
- (9): *Network.SCD*
- (*): Not included in the Mobile Data Services Value Pack model

1.3.5.2 “Accessibility” example

The following figure shows how service models are used to define different levels of aggregation, based on geography (grouping together cells in a region, for example) or on function (grouping together servers in a web farm, for example, or combining two functions such as network access and application access). At the top of the model, the OpenView SQM platform finally computes an accessibility parameter providing a synthetic, composite KQI offering a snapshot of end-to-end accessibility.

Figure 7 Service model integration diagram



1.3.6 Multiple data sources

The following tables list most parameters collected from the various systems and used as data sources in the service models.

1.3.6.1 Fault management system

Table 3 Fault management system

Parameter name	Description
<i>NbCritical</i>	Current number of critical alarms on a managed entity
<i>NbMajor</i>	Current number of major alarms on a managed entity
<i>NbMinor</i>	Current number of minor alarms on a managed entity
<i>NbIndeterminate</i>	Current number of indeterminate alarms on a managed entity
<i>NbOutstanding</i>	Current number of outstanding alarms on a managed entity
<i>NbWarning</i>	Current number of warning alarms on a managed entity
<i>LastCreationTime</i>	Timestamp of the last alarm received on a managed entity
<i>LastSeverity</i>	Severity of the last outstanding alarm received on a managed entity
<i>LastSeverityAdditionalText</i>	Additional text for the last alarm received on a managed entity
<i>MaxProblemDuration</i>	Duration of the oldest outstanding problem, from its creation as an alarm object to the current time
<i>WorstSeverity</i>	Worst severity of all of a managed entity's outstanding alarms
<i>WorstSeverityAdditionalText</i>	Additional text linked to the alarm with the worst severity

1.3.6.2 Customer trouble ticketing system

Table 4 Customer trouble ticketing system

Parameter name	Description
<i>Nb_Opened_CustTT</i>	Number of tickets currently opened against a specific item or area (region)

1.3.6.3 End-to-end performance system (active probes)

The following parameters are retrieved from the TCP, DHCP, DNS, FTP, HTTP, ICMP, POP3, RADIUS, SMTP, WAP, and Web servers.

Table 5 End-to-end performance system

Parameter name	Description
<i>SETUPTIME</i>	Time taken to set up the connection

Parameter name	Description
<i>DNS_SETUP_TIME</i>	Time taken to resolve the hostname via DNS
<i>RESPONSETIME</i>	Total response time for the WEB service (DNS setup time + data transfer time)
<i>TRANSFERTPUT</i>	Data transferred/Transfer time, in Kb/s

1.3.6.4 xDRs system (passive probes)

Table 6 xDRs

Parameter name	Description
Connectivity	
<i>Cust_AttachFailureRatio</i>	Attachment failure ratio measured for a given subscriber group
<i>Cust_PDPctxActivationFailureRatio</i>	PDP context activation failure ratio measured for a given subscriber group
<i>Cust_ratioUnsolicitedDeactivation</i>	Unrequested deactivation ratio measured for a given subscriber group
<i>Cust_ratioUnsolicitedDetachment</i>	Unrequested detachment ratio measured for a given subscriber group
<i>AttachementAttemptsNumber</i>	Number of attachment attempts during the acquisition period
<i>AttachementEfficiency</i>	Attachment efficiency, i.e. the number of successful attachments divided by the total number of attachment attempts
<i>AttachementProcedureDuration</i>	Average length of the attachment procedure
<i>AttemptsNumberOfPDPcontextActivation</i>	Number of PDP context activation attempts during the acquisition period
<i>DLUserTrafficThroughput</i>	Downlink throughput during the acquisition interval
<i>EfficiencyOfPDPctxActivation</i>	Efficiency of the PDP context activation procedure, i.e. the number of successful PDP context activations divided by the total number of PDP context activation attempts
<i>NbPDPctxDeactivationByGGSN</i>	Number of PDP context deactivations initiated by the GGSN during the acquisition period
<i>NbPDPctxDeactivationBySGSN</i>	Number of PDP context deactivations initiated by the SGSN during the acquisition period
<i>PDPctxActivationProcedureDuration</i>	Average length of the PDP context activation procedure
<i>ULUserTrafficThroughput</i>	Average uplink throughput during the acquisition interval
Mobility	
<i>AttemptsNumber</i>	Number of intra-SGSN routing area update

Parameter name	Description
	attempts during the acquisition interval
<i>ProcedureDuration</i>	Average length of the intra-SGSN routing area update procedure
<i>RAupdateEfficiency</i>	Efficiency of intra-SGSN routing area updates, i.e. the number of successful routing area updates divided by the total number of routing area update attempts.
Roaming	
<i>OperatorIdentifier</i>	The mobile operator originating PDP context creation attempts
<i>PDPcontextCreationEfficiency</i>	Efficiency of the PDP context creation procedure, i.e. the number of PDP contexts created successfully, divided by the total number of PDP context creation attempts
<i>PDPctxCreationAverageSetup Time</i>	Length of the PDP context creation procedure

1.3.6.5 Application log file system (HTTP server)

Table 7 Application log file system

Parameter name	Description
<i>NbRejectDue2AccessDenied</i>	Total number of requests rejected because access was denied during the acquisition period
<i>NbRejectDue2HostNotFound</i>	Total number of requests rejected because the host was not found during the acquisition period
<i>NbRejectDue2URLnotFound</i>	Total number of requests rejected because the URL was not found during the acquisition period
<i>TotalNbRejectedRequest</i>	Total number of requests that failed during the acquisition period
<i>TotalNbRequest</i>	Total number of requests during the acquisition period

1.3.6.6 IT system performance

Parameter name	Description
<i>GBL_CPU_IDLE_UTIL</i>	The percentage of time the CPU was idle during the acquisition period. This is the total idle time, which includes waiting for I/O to occur.
<i>GBL_CPU_TOTAL_UTIL</i>	Percentage of time the CPU was not idle during the acquisition period
<i>GBL_DISK_TIME_PEAK</i>	Time in seconds the busiest disk was performing I/O transfers during the acquisition period

Parameter name	Description
<i>GBL_DISK_UTIL</i>	Average percentage of time during which disk I/O was being performed during the acquisition period
<i>GBL_DISK_PHYS_READ_RATE</i>	Number of physical reads per second during the acquisition period
<i>GBL_DISK_PHYS_WRITE_RATE</i>	Number of physical writes per second during the acquisition period
<i>GBL_MEM_PAGE_FAULT_RATE</i>	Total number of page faults per second during the acquisition period. A page fault occurs when access to a virtual page that is not currently in memory is attempted.
<i>GBL_MEM_SWAP_RATE</i>	Number of Kbytes transferred between disk and memory during swap operations, per second
<i>GBL_MEM_UTIL</i>	The percentage of available physical memory used during the acquisition period. This includes system memory, buffer cache and user memory.
<i>GBL_NET_PACKET_RATE</i>	The number of inbound and outbound packets sent successfully per second on all network interfaces during the acquisition period. Packets are regarded as having been sent successfully if they are processed without errors or collisions.
<i>GBL_NET_OUTQUEUE</i>	Size of the outbound queue on all network interfaces, during the acquisition period
<i>GBL_NET_IN_ERROR_RATE</i>	The number of inbound errors per second on all network interfaces, during the acquisition period
<i>GBL_NET_ERROR_RATE</i>	The number of errors per second on all network interfaces, during the acquisition period. This metric is updated at the sampling interval, regardless of the number of IP addresses on the system.
<i>GBL_NET_COLLISION_RATE</i>	Number of collisions per second, on all network interfaces, during the acquisition period. A rising rate of collisions relative to the number of outbound packets is an indication that the network is becoming increasingly congested. This metric is updated at the sampling interval, regardless of the number of IP addresses on the system.
<i>GBL_NET_OUT_PACKET_RATE</i>	The number of outbound packets sent successfully per second for all network interfaces, during the acquisition

Parameter name	Description
	period. Packets are regarded as having been sent successfully if they are processed without errors or collisions.
<i>GBL_NET_IN_PACKET_RATE</i>	The number of inbound packets sent successfully per second for all network interfaces, during the acquisition period. Packets are regarded as having been received successfully if they are processed without errors or collisions.

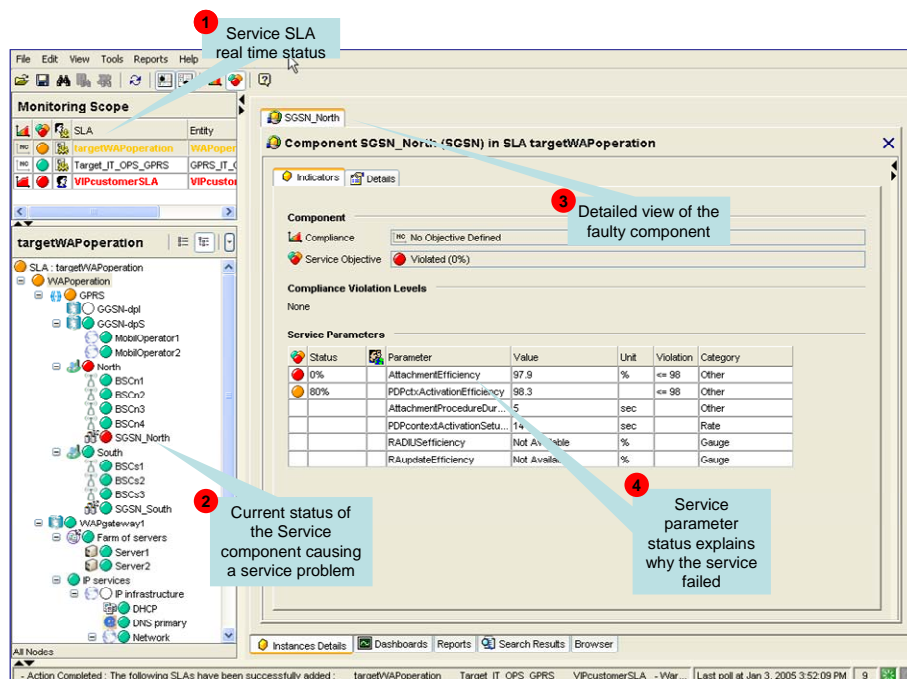
1.3.7 Solution in use

The following sections show how HP OpenView Service Quality Manager can help its users to be more efficient in their daily activities monitoring network resources, end-to-end services, or customer SLAs.

1.3.7.1 Service Level management

The HP OpenView Service Quality Manager real-time monitoring interface provides a quick and simple way to investigate service problems, as shown in the following figure.

Figure 8 HP OpenView Service Quality Manager interface



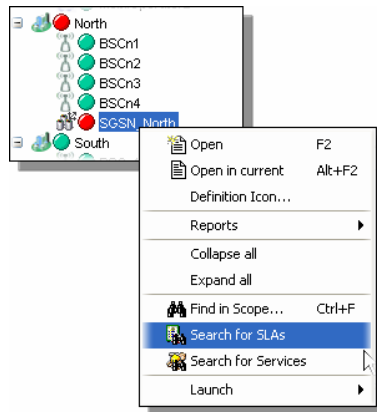
This window displays the following information, as numbered in the figure above:

1. The Monitoring Scope window showing the current status of each monitored service.
2. By selecting one of the monitored SLAs, Operators see a detailed view of that SLA or service. They can define filters to focus on faulty (degraded or violated) components that impact the SLA or service status.

3. A detailed view of the selected component lists the current values of all indicators attached to that component.
4. Parameter statuses, enabling the Operator to see which conditions caused a service failure.

Once they have used HP OpenView Service Quality Manager to find out which service component is causing the problem, the Operator can use a contextual menu to identify each SLA potentially impacted by the service resource concerned, as shown in the following figure.

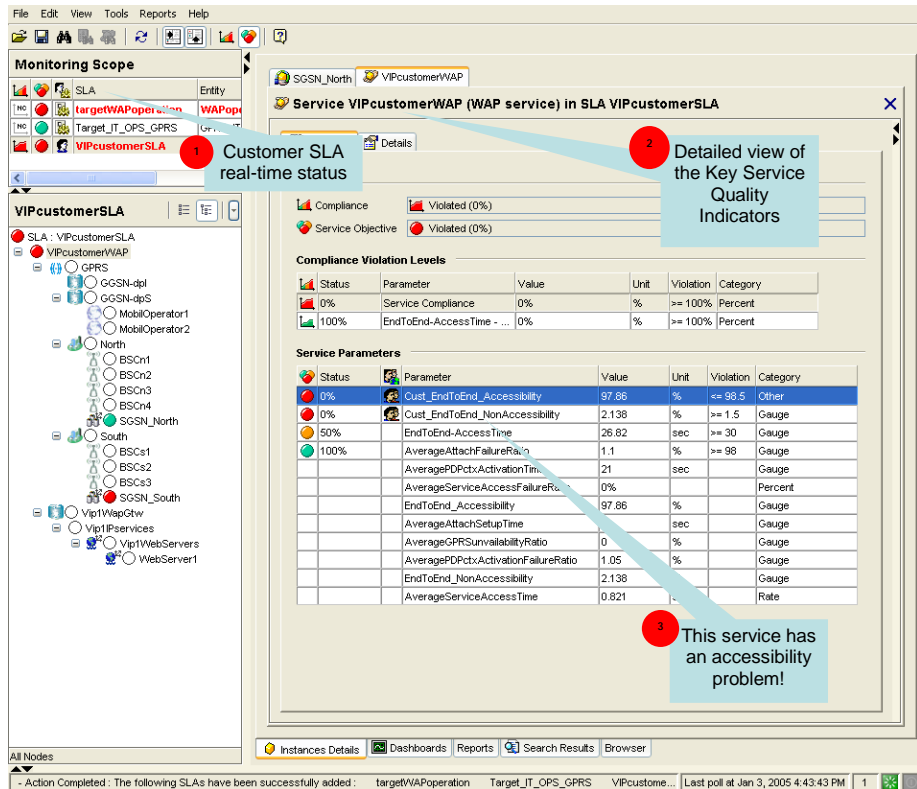
Figure 9 Service component contextual menu



1.3.7.2 Customer SLA management

HP OpenView Service Quality Manager enables those interfacing with customers to meet customer expectations better, by giving them a comprehensive, end-to-end view representing how those customers perceive service utilization, as shown in the following figure.

Figure 10 Monitoring Scope example window

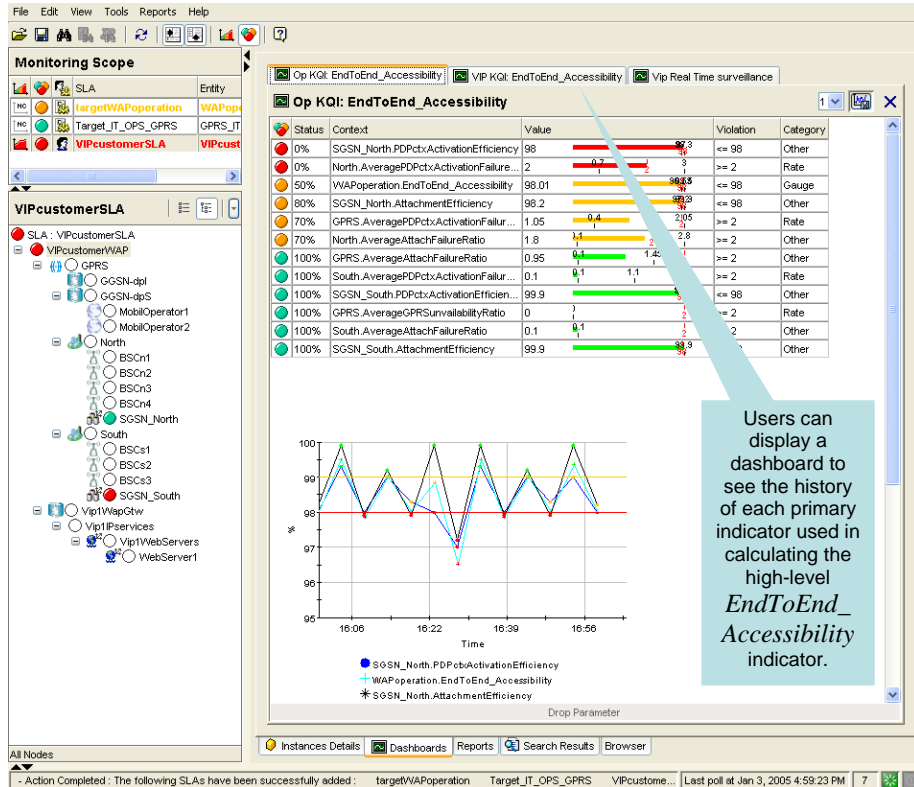


The Monitoring Scope window displays the following information, as numbered in the figure above:

1. The Monitoring Scope window shows the current status of each monitored SLA.
2. A detailed window of the service linked to that customer SLA lists all Key Quality Indicators included in the customer contract and best describing the customer experience regarding the service.
3. The current status of each indicator relative to the objectives set for that customer helps the Operator to understand what problem the service user is currently facing: in this example, there is a problem in accessing the service.

The Operator can use various dashboards to investigate the details behind the *EndToEnd_Accessibility* aggregate indicator, by looking at the history and current status of each primary indicator used in calculating the high-level *EndToEnd_Accessibility* aggregate indicator, as shown in the following figure.

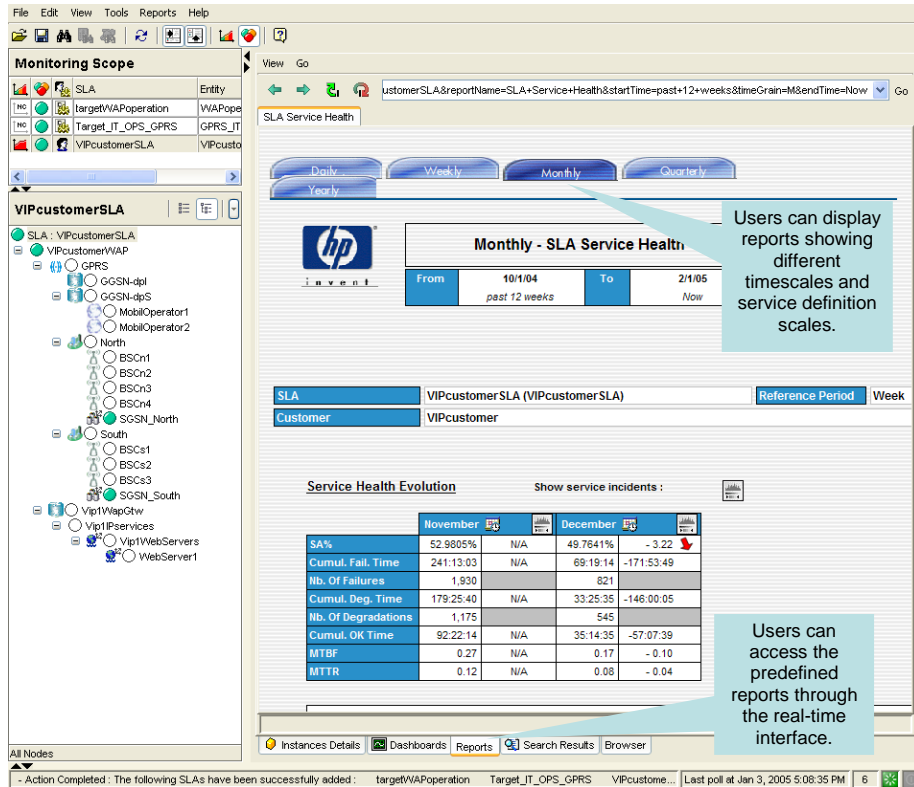
Figure 11 EndToEnd_Availability dashboard



Users can display a dashboard to see the history of each primary indicator used in calculating the high-level EndToEnd_Accessibility indicator.

Operators can display predefined reports providing summary information on service availability over various timescales. End users can display similar reports using a Web-based interface, as shown in the following figure.

Figure 12 SLA reports window



Users can display reports showing different timescales and service definition scales.

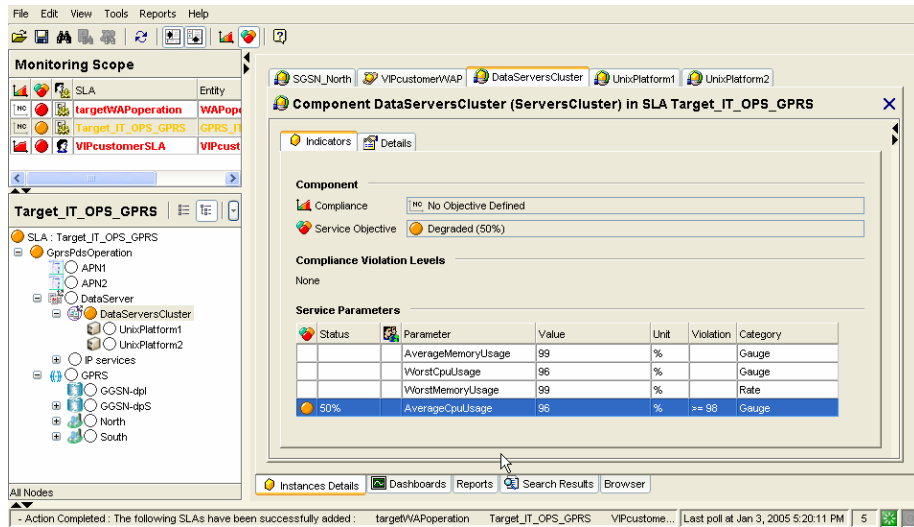
Users can access the predefined reports through the real-time interface.

1.3.7.3 Resource management

HP OpenView Service Quality Manager provides resource managers and network planners with a better understanding of how service resources are performing against expectations, and enables them to proactively plan resource updates to meet business expectations while reducing the effect on the customer experience.

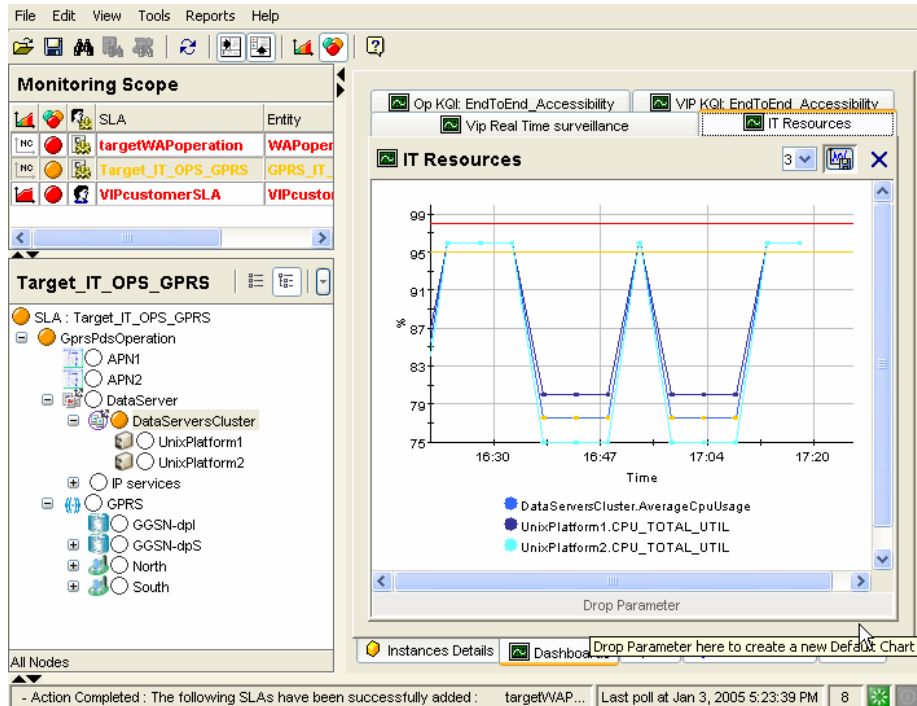
Its Monitoring Scope window shows the current status of each SLA attached to specific monitored resources (such as IT network components, for example), as shown in the following figure.

Figure 13 Component service parameters window



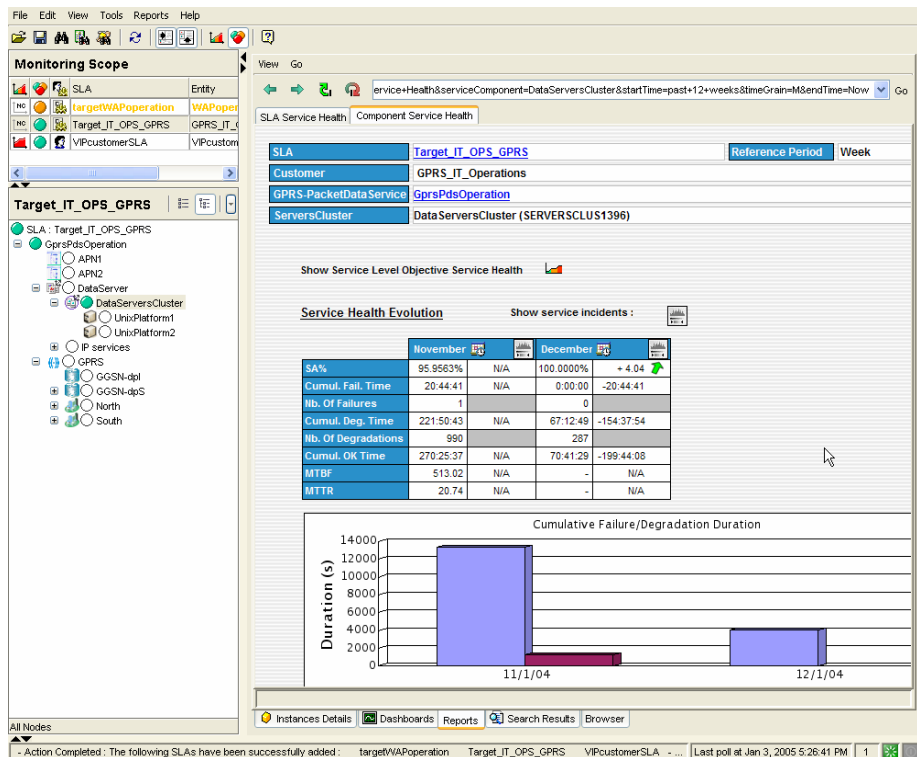
HP OpenView Service Quality Manager's real-time monitoring dashboards help you to analyze complex or aggregate indicators (such as the average CPU usage, for example) through changes in the primary indicators (such as system CPU usage on specific network components, for example), as shown in the following figure.

Figure 14 IT Resources window



Predefined historical reports provide a comprehensive view of the Quality of Service each service component provides. HP OpenView Service Quality Manager's real-time monitoring interface enables you to access and navigate through reports directly from the service tree structure, as shown in the following figure.

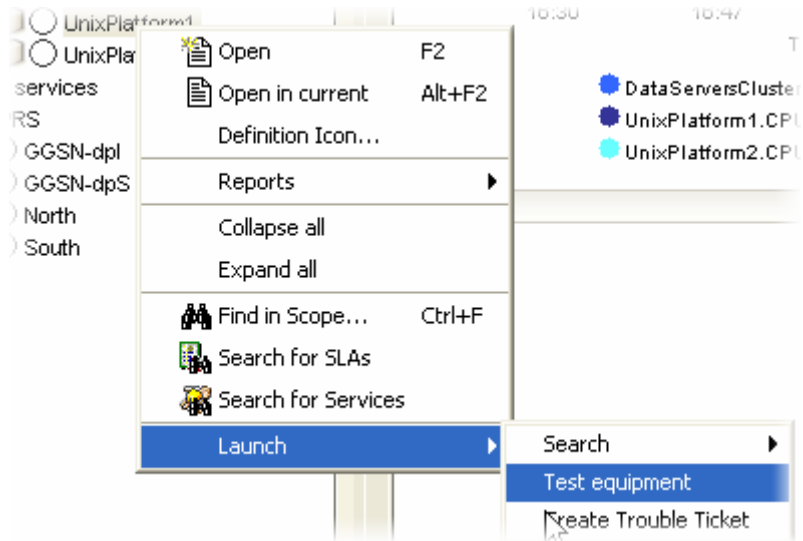
Figure 15 SLA Service Health window



You can also use additional contextual or user-defined menus to simplify operator related tasks. The following figure shows a user launching troubleshooting tools to

test a faulty component from within HP OpenView Service Quality Manager's real-time user interface.

Figure 16 'Launch' contextual menu



Setting up the Value Pack

2.1 Software and hardware requirements

On HP-UX

The Value Pack must be installed on an HP OpenView SQM 1.2 software platform running on an HP-UX hardware platform. An Oracle database must be available on the server that is to hold the mediation database. The OpenView SQM platform must include the following elements:

- `slmonitoring` director
- SA Common V1.2 (`SQMSAGTWCCOMMON`), and the SQL Service Adapter Runtime V1.2 (`SQMSADB`)
- `slreporting` director
- The SQM SNMP Action Executor, if you want to send SNMP traps when an SLA is degraded or violated.

For details of the OpenView SQM software installation procedure, see the *HP OpenView Service Quality Manager Installation Guide*.

On Windows

Once you have installed the Value Pack, you must install at least the SL Monitoring graphical interface and the SL Administration graphical interface.

If you wish to develop your own Service Model based on the Service Model defined in the Value Pack, you must also install the Service Designer tool on top of the Rational Rose[®] software.

2.2 Value Pack contents

The Value Pack contains two installation kit portions for installation on the two platforms used jointly:

- Unix kit portion, for installation on an HP-UX platform
- Windows kit portion, for installation on a Windows NT, 2000, or XP platform

The contents of each of these kit portions are detailed in the following paragraphs.

You must install both of these kit portions, each on the appropriate platform, as described in “Installation” on page 35.

2.2.1 HP-UX installation kit portion

The Unix installation kit portion contains the following:

- The scripts and data used to populate the mediation database (Mediation DB):

```
$TEMIP_SC_HOME/SolutionSet/GPRS/populate_sqlsa_db
```

Data and SQL scripts are contained in the following directories:

```
$TEMIP_SC_HOME/SolutionSet/GPRS/Database/  
    .../Glance  
    .../InternetServices  
    .../TroubleTicket  
    .../dpS  
    .../IUM  
    .../TeMIP  
    .../dpI
```

- The SQL SA toolkit projects (*.sqltk) and the generated kits (*.zip) are contained in the following directories:

```
$TEMIP_SC_HOME/SolutionSet/GPRS/SQLSA/  
    .../Glance  
    .../InternetServices  
    .../TroubleTicket  
    .../dpS  
    .../IUM  
    .../TeMIP  
    .../dpI
```

- The scripts that deploy and create the SQL SA, and load definitions and instances into the Service Repository Manager (SRM):

```
$TEMIP_SC_HOME/SolutionSet/GPRS/setup_solution
```

- The scripts and data that only register service definitions and instances, together with the Service Levels and SLAs, into the SRM:

```
$TEMIP_SC_HOME/SolutionSet/GPRS/load_definitions  
$TEMIP_SC_HOME/SolutionSet/GPRS/load_instances
```

Their input data is contained in the following directories:

```
$TEMIP_SC_HOME/SolutionSet/GPRS/Definition/  
    .../DFD  
    .../ExprDef  
    .../ServiceDef  
    .../ServiceLevel  
  
$TEMIP_SC_HOME/SolutionSet/GPRS/Instance/  
    .../Customer  
    .../SI  
    .../SIG  
    .../SLA
```

- The script that cleans up the Value Pack:

```
$TEMIP_SC_HOME/SolutionSet/GPRS/cleanup_solution
```

2.2.2 Windows NT/2000/XP installation kit portion

The Windows installation kit portion contains the following:

- Value Pack documentation. This is contained in the following directory:

```
%TEMIP_SC_HOME%\SolutionSet\GPRS\Doc
```

An HTML image of the Service Design, which does not require the Service Designer for display, is also provided, in the following directory:

```
%TEMIP_SC_HOME%\SolutionSet\GPRS\Doc\ModelDesign
```

- Service Model project files used as input for the Service Designer. These are contained in the following directory:

```
%TEMIP_SC_HOME%\SolutionSet\GPRS\Model\Designer
```

- Source code of the Custom Expressions used by the Service Model. These are contained in the following directories:

```
%TEMIP_SC_HOME%\SolutionSet\GPRS\Model\CustomExpressions\java  
%TEMIP_SC_HOME%\SolutionSet\GPRS\Model\CustomExpressions\plsql
```

2.3 Installation

2.3.1 Installation on an HP-UX platform

Logging on

Log on to the HP-UX system where you want to install the HP OpenView Service Quality Manager Mobile Data Services Value Pack, as **root** user.

Installing the kit

To install the Unix portion of the Mobile Data Services Value Pack kit, do the following.

1. If the OpenView SQM kernel is not already installed on the server, do so by following the procedure described in the *HP OpenView Service Quality Manager Installation Guide*.
2. If the OpenView SQM Kernel is not already initialized, you must set up the environment variables by entering the following commands. For further details, see the *HP OpenView Service Quality Manager Installation Guide*.

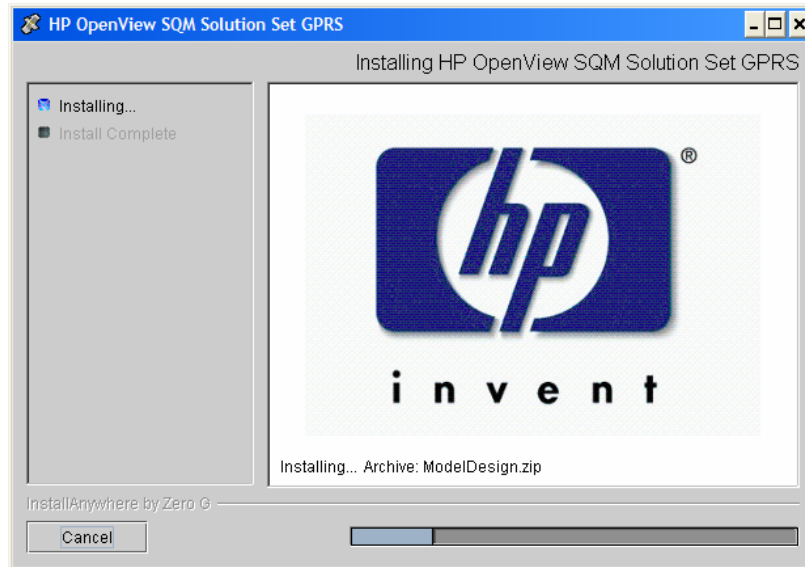
```
# cd $TEMIP_SC_VAR_HOME  
# . $TEMIP_SC_VAR_HOME/temip_sc_env.sh
```

3. Insert the Mobile Data Services Value Pack CD-ROM into your CD-ROM drive, and then execute *SQMSSETGPRS-1.20.00.bin*

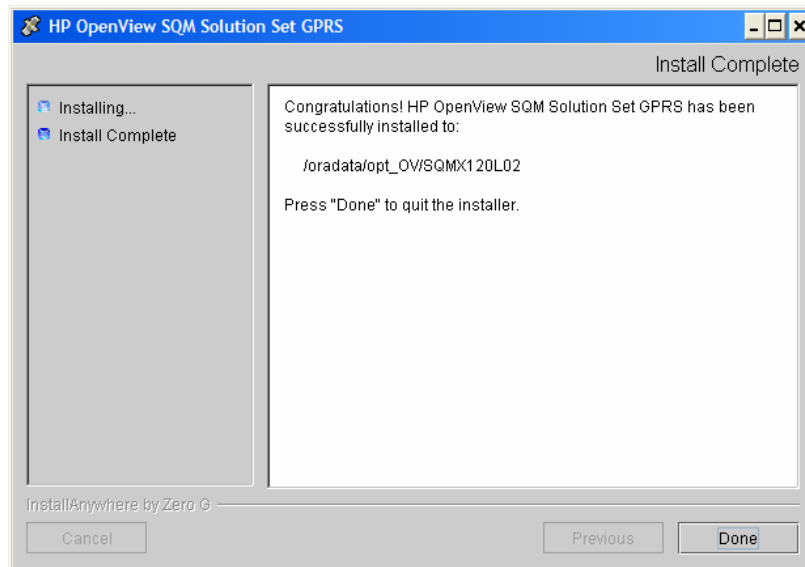
The following output is displayed.

Note:

All the following windows are labeled “SQM Solution Set GPRS”, which is an alias of the “Mobile Data Services Value Pack”.



When the Unix portion of the Mobile Data Services Value Pack has been installed, the following screen is displayed.



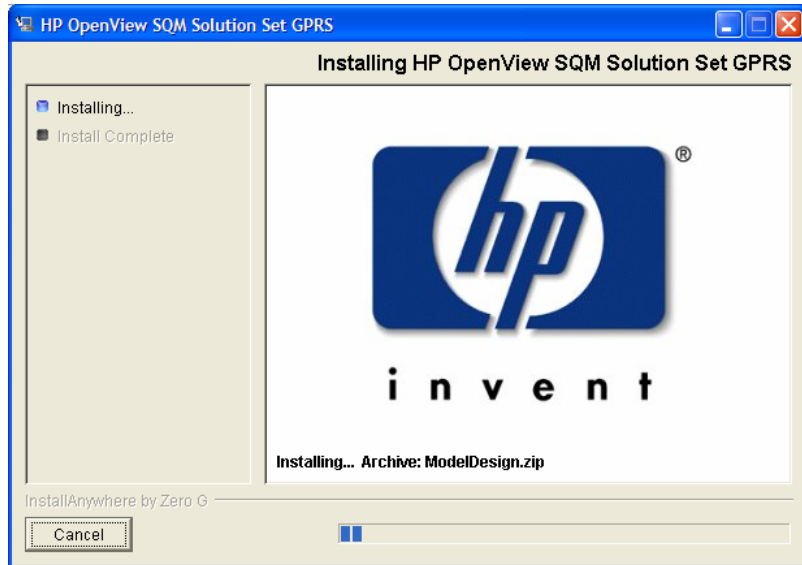
Click **Done** to end the installation process on the Unix platform.

2.3.2 Installation on a Windows NT, 2000, or XP platform

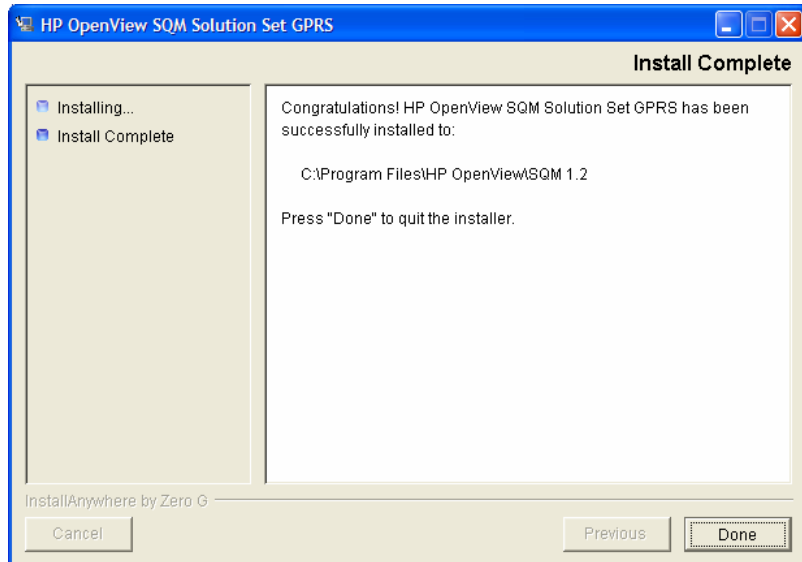
To install the Windows portion of the HP OpenView Service Quality Manager Mobile Data Services Value Pack kit, do the following.

1. Insert the Mobile Data Services Value Pack CD-ROM into your CD-ROM drive, and then open the `SQM-1.20.00\Windows` folder.
2. Run the `SQMSSETGPRS-1.20.00.exe` installer.

The following output is displayed.



When the Windows portion of the Mobile Data Services Value Pack has been installed, the following screen is displayed.



3. Click **Done** to end the installation process on the Windows platform.

2.4 Setting up the Value Pack

To set up the Value Pack, you must execute the three following steps. These have been differentiated so that the mediation database (Mediation DB) can be created if it does not exist, and so that Mediation DB can be populated on a remote HP-UX server.

Note

You must perform each of the following steps under the **root** account. You must do so in order to set up each SQL Service Adapter and set up the **oracle** and **sqmadm** users as necessary.

1. Create the mediation database (i.e. the *sqlsa* database). This step is invoked by executing the *temp_create_database* script.

2. Populate the mediation database with data that has been collected from the different Data Feeder Instances (DFIs) used by the Value Pack. This step is invoked by executing the *populate_sqlsa_db* script.
3. Set up each SQL Service Adapter that collects data from the mediation database, and then register the Service Definitions, Service Levels, Service Instances, and SLA(s) provided by the Value Pack. This step is invoked by executing the *setup_solution* script.

Each of these steps is described in detail below.

2.4.1 Creating the mediation database

The mediation database, *sqlsa*, must be created before the Value Pack is set up. It can be created either on the local HP-UX server or on a remote HP-UX computer, using the Oracle scripts provided with SQM to deploy and delete the Oracle databases used by the *OpenView SQM* applications. For more details of the installation procedure, see the *Service Adapter for HP OpenView Operations Installation, Configuration and User's Guide*.

2.4.1.1 *temip_create_database sqlsa*

This tool is used to deploy all databases used by the HP OpenView SQM system. You must invoke this tool to create the *sqlsa* database on the HP-UX computer that will host it.

Note

You can display help text for this tool by invoking the tool as follows:
`$TEMIP_SC_HOME/oracle/scripts/temip_create_database -h`

To create the mediation database, run the *temip_create_database* tool by doing the following.

1. Enter the following command:

```
$ TEMIP_SC_HOME/oracle/scripts/temip_create_database
```

By invoking the tool without specifying parameters, you run the tool in an interactive mode that asks you to choose which database you wish to create and guides you through the installation process by asking you basic questions.

The *temip_create_database* tool first displays a choice of available databases, as shown below.

```
temip_create_database will deploy a database for one of the
following OpenView SQM products:
```

```

- TeSC logger                (logger)      [1]
- TeSC SPDM                  (spdm)      [2]
- TeSC SRM                    (srm)       [3]
- TeSC Datamart production   (dmprod)    [4]
- TeSC Datamart staging      (dmstag)    [5]
- TeSC SQL SA                 (sqlsa)     [6]
- TeSC BO repository         (borepos)   [7]
- Exit      (terminate the session) [e]
```

```

Please enter the database you want to install:
```

2. Select `sqlsa [6]` to create the mediation database.

The *temip_create_database* tool next asks you which predefined size of database you wish to create (*SMALL*, *MEDIUM*, *LARGE* or *USER*).

3. Select *SMALL*. This size is sufficient to hold the mediation database.

2.4.2 Populating the mediation database

Once you have created the mediation database as described above, execute the following script on the HP-UX computer that hosts the *sqlsa* database.

```
# $TEMIP_SC_HOME/SolutionSet/GPRS/populate_sqlsa_db
```

This script loads the data that has been collected from each DFI used by the Mobile Data Services Value Pack into the mediation database, *sqlsa*. If the *sqlsa* database is not on the same host as the OpenView SQM platform, you must also install the Mobile Data Services Value Pack on the HP-UX computer hosting the *sqlsa* database so that the *populate_sqlsa_db* script is installed on that computer.

The mediation database then contains all data collected from each DFI during one day of operational running, together with a view of each table that updates the record's timestamp to the current date.

2.4.3 Setting up the Mobile Data Services Value Pack

Once you have populated the mediation database as described in the previous paragraph, execute the following script on the HP-UX computer hosting the OpenView SQM platform:

```
# $TEMIP_SC_HOME/SolutionSet/GPRS/setup_solution
```

This script does the following.

1. It creates the SQL Service Adapters that collect the data from the mediation database and publish the Key Performance Indicators to the OpenView SQM platform.

At this stage of the setup process, you are asked to enter the Java DataBase Connectivity (JDBC) parameters used to connect the SQL Service Adapters to the mediation database containing their source data. You must enter the following information:

```
Please enter the
database URL [jdbc:oracle:thin:@haltere.vbe.cpqcorp.net:1521:sqlsa]:
  jdbc:oracle:thin:@yourMediationDBhost.vbe.cpqcorp.net:1521:sqlsa
Please enter the database username [sqlsa]:  sqlsa
Please enter the database password [*****]: sqlsa
Please enter the database JDBC Driver [oracle.jdbc.driver.OracleDriver]:
```

2. Register the Service Definitions and Service Levels in the Service Repository Manager.
3. Load the Service Instances and SLA into the Service Repository Manager.

2.4.4 Configuring the Mobile Data Services Value Pack Runtime license

Before you run the HP OpenView Service Quality Manager Mobile Data Services Value Pack, you must configure the SQM-VPACK-MDS license.

The Mobile Data Services Value Pack is supplied with a temporary license, under which it can be used for a trial period of 90 days. This license is activated when the application is executed for the first time.

For details of how to use the *temip_sc_license* utility to retrieve HP OpenView SQM licenses and import them into Autopass, see the *HP OpenView Service Quality Manager Administration Guide*.

2.4.5 Running the Mobile Data Services Value Pack

Once you have executed the *setup_solution* script, you can run the acquisition director. The Mobile Data Services Value Pack director is called *acquisitionGPRS*.

Note:

Before you invoke the *temip_sc_start_director* command described below, you must ensure that the *setup_solution* script has set the JDBC 'CLASSPATH' environment variable in the SQM environment file *\$TEMIP_SC_VAR_HOME/temip_sc_env.sh* if this has not already been done. In this case, you must also source this file, and then stop and start the kernel by executing the commands *temip_sc_stop_kernel* and *temip_sc_start_kernel*. You do not need to restart the OpenView SQM platform itself.

The final message displayed when the *setup_solution* command is executed shows whether or not it is necessary to re-source the *\$TEMIP_SC_VAR_HOME/temip_sc_env.sh* OpenView SQM environment file before you restart the OpenView SQM kernel and start the *acquisitionGPRS* director.

To run the HP OpenView Service Quality Manager Mobile Data Services Value Pack director, do the following.

1. Log on as **sqmadm** user.
2. Execute the following command.

```
# temip_sc_start_director -plat slmv12 -direc acquisitionGPRS
```

This enables you to monitor the statuses of Services and SLAs provided by the Mobile Data Services Value Pack, using the SL Monitoring graphical interface.

SLAs, Customers, Service Instances, and Service Level management tasks are performed using the SL Administration graphical interface, however.

2.4.6 Configuring the HP OpenView SQM platform to run the Mobile Data Services Value Pack

2.4.6.1 Predefined monitoring user profile

The Mobile Data Services Value Pack provides a predefined user profile for the HP OpenView Service Quality Manager real-time monitoring interface. The user name associated to this predefined user profile is *sqmopMDS*. The HP_UX administrator has to create this user before you can login to the HP OpenView Service Quality Manager real-time monitoring interface using this identity.

2.4.6.2 Acquisition period

You do not need to configure the HP OpenView Service Quality Manager platform manually to run the Mobile Data Services Value Pack unless you regenerate the custom SQL Service Adapter (SA) kits. If this is the case, you must then adjust each modified Service Adapter's acquisition period so that it is longer than the data collection period for data provided by the mediation database. The minimum

acquisition periods for Service Adapters provided in the Mobile Data Services Value Pack are as follows:

- *Glance SA*: 5 minutes
- *InternetServices SA*: 5 minutes
- *TroubleTicket SA*: 10 minutes
- *dpS SA*: 5 minutes
- *IUM SA*: 5 minutes
- *TeMIP SA*: 5 minutes
- *dpI SA*: 5 minutes

For details of how to use the TIBCO Designer graphical interface to edit the configuration used by the Central Repository provided with the OpenView SQM Kernel, see the *HP OpenView Service Quality Manager Administration Guide*.

2.5 Cleaning up the Mobile Data Services Value Pack

You can remove the SQL Service Adapter from the HP OpenView SQM platform and deregister the Service Definitions, Service Levels, Service Instances, and SLAs provided with the Mobile Data Services Value Pack from the Service Repository Manager by executing the following HP-UX script:

```
# $TEMIP_SC_HOME/SolutionSet/GPRS/cleanup_solution
```

2.6 Uninstalling the Mobile Data Services Value Pack

2.6.1 Uninstalling the Mobile Data Services Value Pack from HP-UX

Note:

Before you uninstall the Mobile Data Services Value Pack, you must execute the *\$TEMIP_SC_HOME/SolutionSet/GPRS/cleanup_solution* script to remove related data from the Service Repository Manager and from the SQM Central Repository. For further details, see “Cleaning up the Mobile Data Services Value Pack”, above.

Logging on

To log on to the HP-UX computer in order to uninstall the Mobile Data Services Value Pack, do the following.

1. Log on to the HP-UX system as **root** user.
2. Load the OpenView SQM environment variables by entering the following commands.

```
# cd $TEMIP_SC_VAR_HOME  
# . $TEMIP_SC_VAR_HOME/temip_sc_env.sh
```

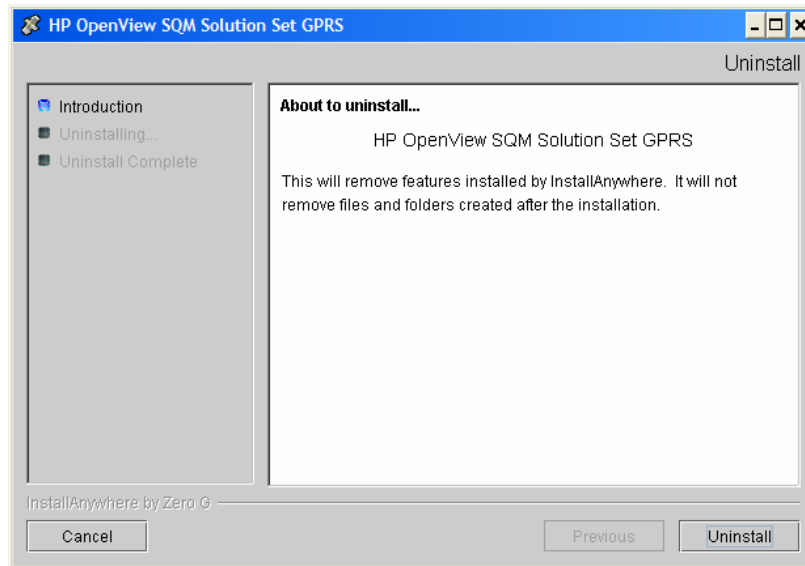
Uninstalling the kit

On the OpenView SQM platform on which the Mobile Data Services Value Pack has been installed, do the following.

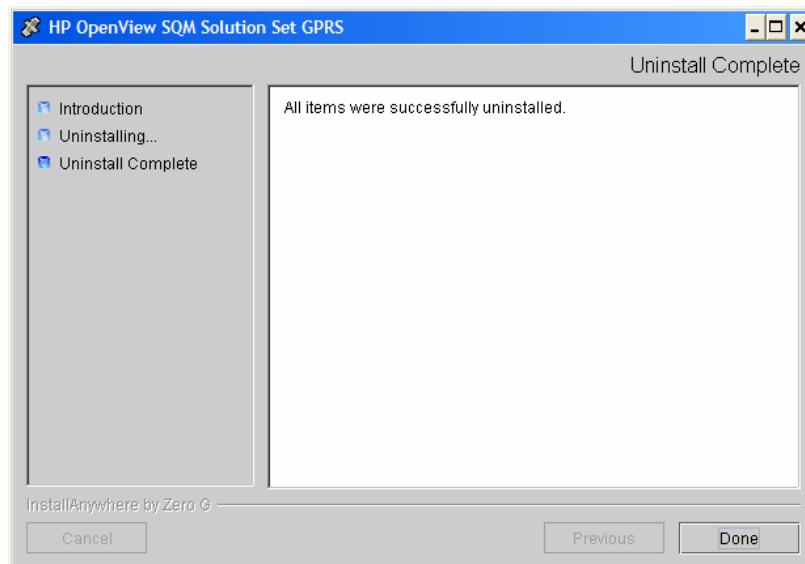
1. Enter the following commands.

```
# cd $TEMP_SC_HOME/SolutionSet/GPRS/Uninstaller  
# ./Uninstall_GPRS
```

The **Uninstall** window is displayed.



2. Click **Uninstall** to remove the software from your system. When all of the software has been removed, the following window is displayed.



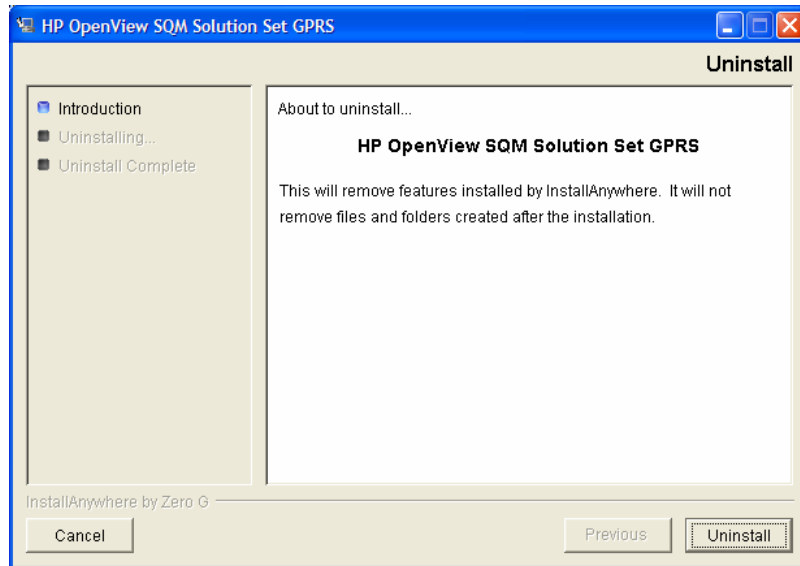
3. To finish, click **Done**.

2.6.2 Uninstalling the Mobile Data Services Value Pack from Windows

To uninstall the Mobile Data Services Value Pack from Windows, do the following.

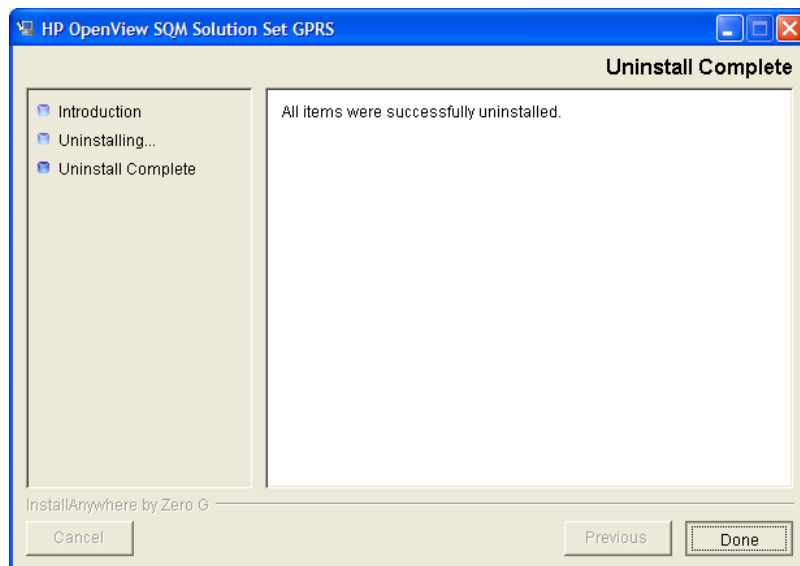
1. From the Windows *Start* menu, select *All programs* → *HP OpenView* → *SQM* → *SSET* → *GPRS* → *Uninstall*.

The **Uninstall** window is displayed.



2. Click **Uninstall**.

The software is uninstalled from your system. When all of the software has been removed, the following window is displayed.



3. To finish, click **Done**.

Mobile Data Services Value Pack model design

The aim of this chapter is to help you to navigate through the Mobile Data Service Definitions provided in the Mobile Data Services Value Pack model. Its intention is not to describe all elements in the model, since these can be easily retrieved and understood using the HP OpenView Service Quality Manager Service Designer.

Instead, it describes the model structure and explains the main Class Diagrams, Sequence Diagrams, and Custom Expressions to help you to understand the key points of the design.

Note

Users that do not intend to customize the Service Definitions provided by the Mobile Data Services Value Pack do not need to read this chapter.

It is assumed that readers of this chapter are familiar with the information modeling concepts described in the *HP OpenView Service Quality Manager Information Modeling Reference Guide*.

3.1 Introduction

The Mobile Data Services Value Pack contains two services on GPRS: a generic data service (*GPRSdataService*), and a WAP service (*WAPservice*). As both services can share the same GPRS infrastructure, the *Global Instance Sharing* property in each Service Component Definition making up this GPRS infrastructure is checked.

3.2 Service Designer project structure

Each model's main Service Designer project file has the **.mdl** suffix. The Service Designer projects that have been used to design the *GPRSdataService* and *WAPservice* service models that the Mobile Data Services Value Pack installs in the `%TEMIP_SC_HOME%\SolutionSet\GPRS\Model\Designer` directory are:

- *GPRS-DataService.mdl*
- *GPRS-WAP.mdl*

Certain service domains (the GPRS infrastructure, Internet Services, and hardware platform domains) are common to the *GPRSdataService* and *WAPservice* models. These common domains are organized as Rational Rose petals, with the **.cat** suffix. Petals are reusable elements which can be loaded into a new service design.

The Mobile Data Services Value Pack installs the following petals in the %TEMIP_SC_HOME%\SolutionSet\GPRS\Model\Designer directory:

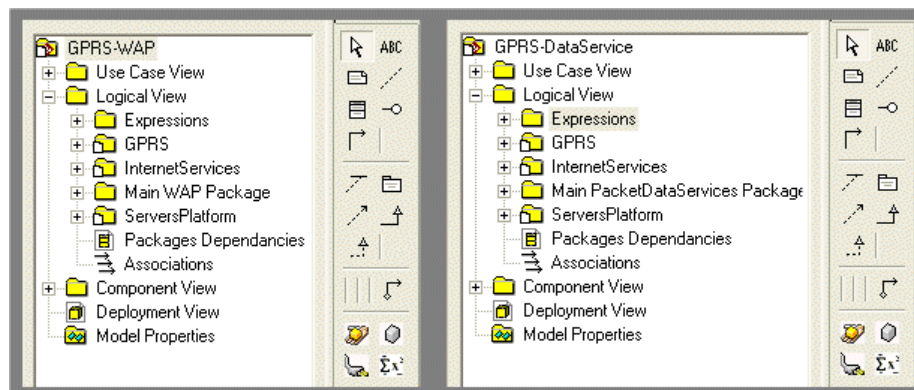
- *GPRS.cat*
- *InternetServices.cat*
- *ServersPlatform.cat*

3.2.1 Package description

As shown in the following figure, the upper level of each Service Designer project provided by the Mobile Data Services Value Pack contains the following packages:

- A main package, consisting in one of the following:
 - *Main WAP package* for the GPRS-WAP service design
 - *Main PacketDataServices package* for the GPRS-DataServices service design
- An *Expressions* package containing predefined SQM expressions and global custom expressions.
- Main packages from the imported petals (i.e. *GPRS*, *InternetServices*, and *ServersPlatform*).

Figure 17 GPRS service design packages



The main package and the petals contain other packages organized as shown in the following figure, which shows the packages contained in the GPRS petal, so that the following are grouped together in the same package:

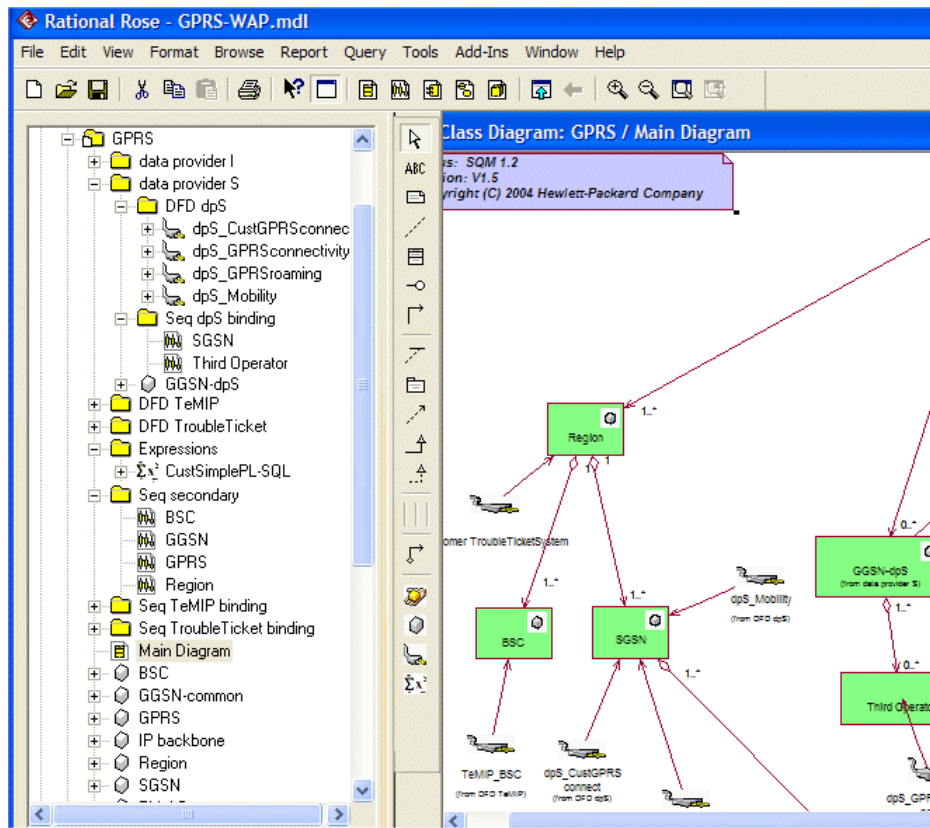
- Data Feeder Definitions (DFDs) provided by a given Service Adapter (SA), such as the *DFD TeMIP* package, for example.
- Sequence diagrams binding the parameters of DFDs provided by a given SA to the primary parameters of the SCDs. Those packages are named *Seq <SAname> binding*, such as *Seq TeMIP binding*, for example.
- Sequence diagrams specifying how secondary parameters are computed. These packages are named *Seq secondary*.
- Custom expressions used in the sequence diagrams specified in the current petal. This package is named *Expressions*.
- Any data types specified in the current petal. This package is named *DataTypes*. The *InternetServices* petal contains a *DataTypes* package, in which the enumerated *AvailabilityOvis* parameter is declared, for example.
- Packages may also include another level of packages used to group together objects provided by the same KPI provider. For instance, some KPIs bound to the

GPRS SCDs are provided by the *dpS* Service Adapter while others are provided by the *dpI* Service Adapter. The nesting packages are named *data provider* <providerName>.

Each petal, together with the main package, contains at least the main class diagram labeled **Main Diagram**.

A sequence diagram is identified by the name of the SCD target of the bindings it specifies.

Figure 18 Packages within the GPRS petal



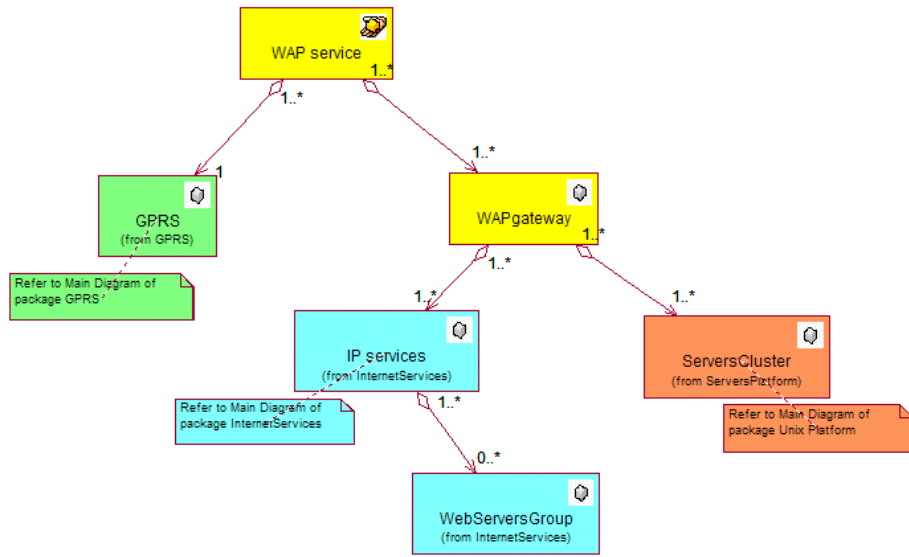
3.3 Key points of the design

3.3.1 WAP on GPRS service

The WAP service provided on a GPRS infrastructure has been designed as shown in the following class diagram. The WAP service comprises the following components:

- GPRS infrastructure
- WAP gateway
- Servers hosting the WAP gateway
- Internet services behind the WAP gateway

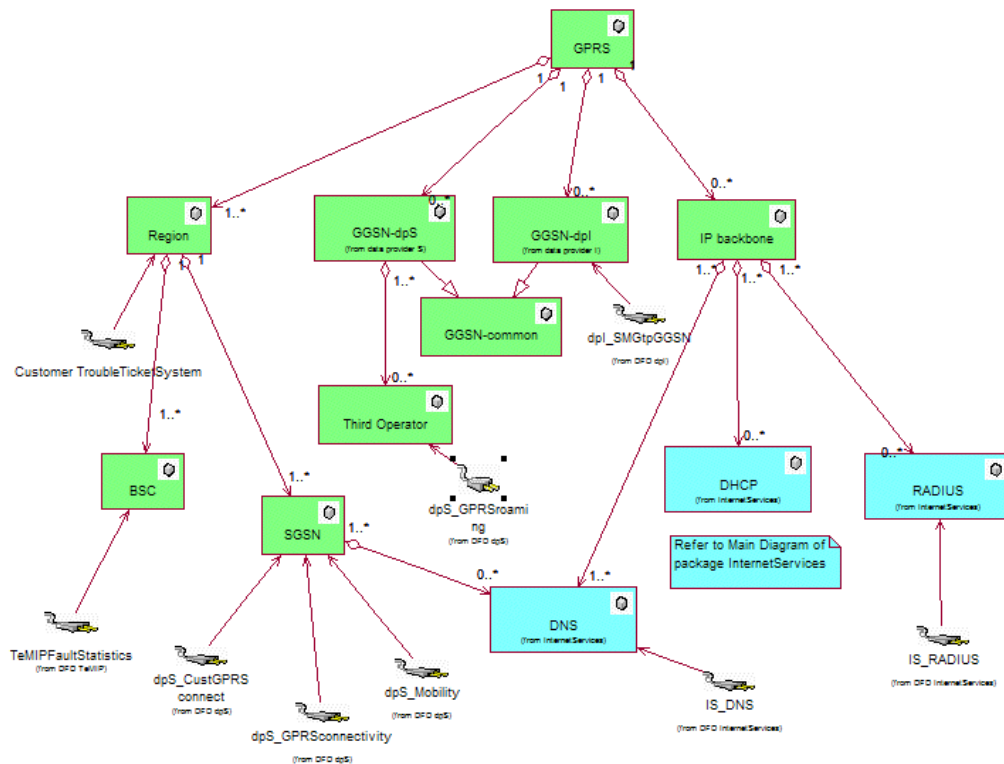
Figure 19 Main GPRS-WAP class diagram



The GPRS infrastructure is modeled as shown in the following class diagram. It is made up of the following elements:

- One or more Gateway GSNs (GGSNs)
- One or more regions containing the radio access network and one or more Service GSNs (SGSNs). In this model, the radio access network is represented only by the BSC unit.
- The IP backbone, and its internal IP services (such as the DNS, for example)

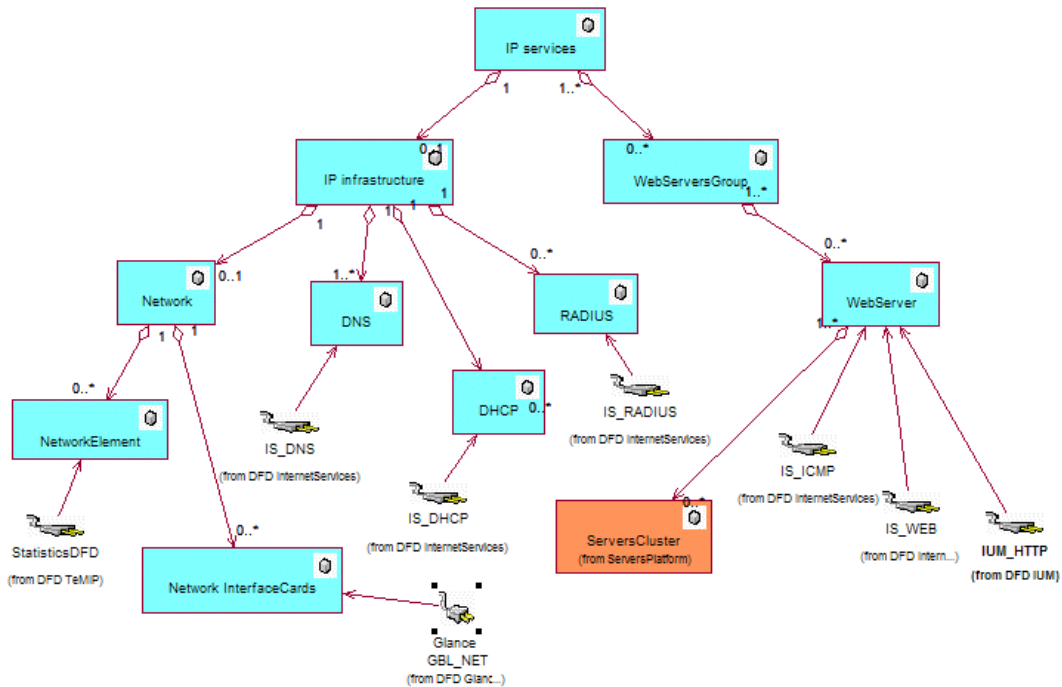
Figure 20 GPRS class diagram



The Internet services used by the GPRS services are modeled as shown in the following class diagram. It is made up of the following elements:

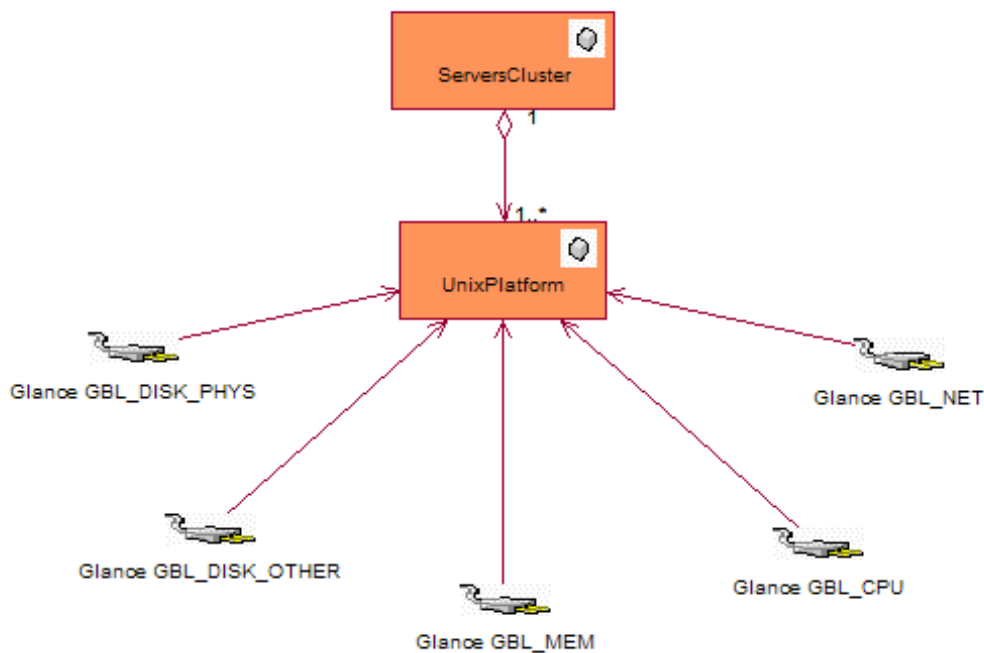
- An IP infrastructure containing the network elements and IP basic services such as the DNS and the DHCP
- One or more Web server groups. A Web server group is defined so that it logically regroups a set of HTTP or WAP servers. A Web server group can be used to contain all HTTP servers provided by a single content provider, for example. It can also be used to sample availability and serviceability of Web pages accessible from a given portal.

Figure 21 Internet Services class diagram



The WAP servers and HTTP servers are hosted by operating system platforms that can potentially be grouped into clusters. These hardware platforms are modeled as shown in the following diagram.

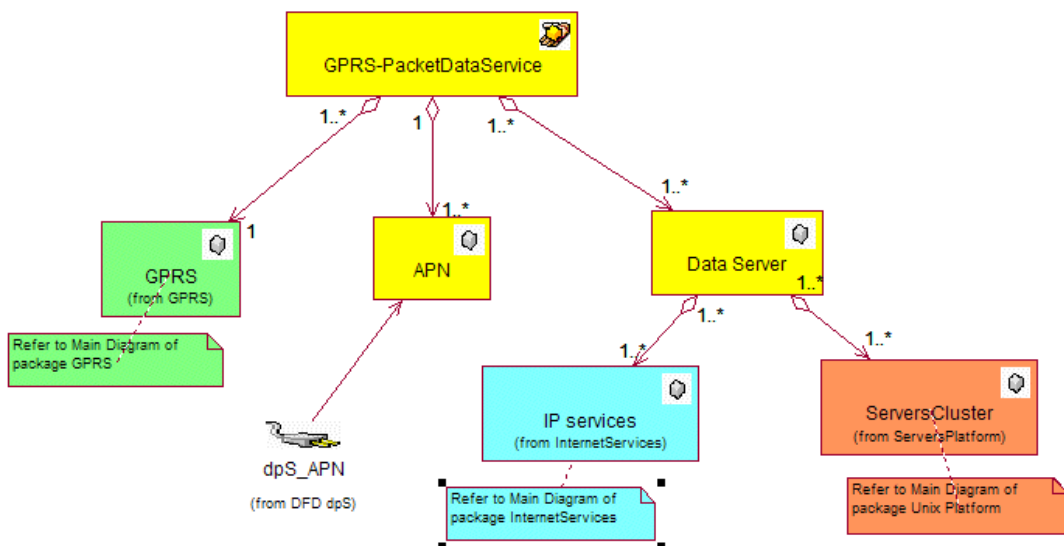
Figure 22 Server Platform class diagram



3.3.2 General Packet Data Service on GPRS

This Packet Data Service only differs from the WAP service at the upper level, as shown in the main Packet Data Service class diagram below.

Figure 23 Main Data Service class diagram



3.4 Key sequence diagrams

This section explains the expressions and sequence diagram used to calculate end-to-end Key Quality Indicators (KQIs) for the WAP on GPRS service. The other

sequence diagrams and expressions displayed using the Service Designer are comparatively simple, and do not require further explanation.

3.4.1 WAP service end-to-end accessibility calculation

The WAP on GPRS service end-to-end accessibility parameter indicates the probability that a subscriber can access the service, i.e. that transfer of the content begins after the subscriber requests it. Unaccessibility can be due to a failure occurring anywhere in the entire service access chain (GPRS availability at the subscriber's location, attachment, PDP context activation, and WAP service access). WAP service end-to-end accessibility is calculated using the following formula:

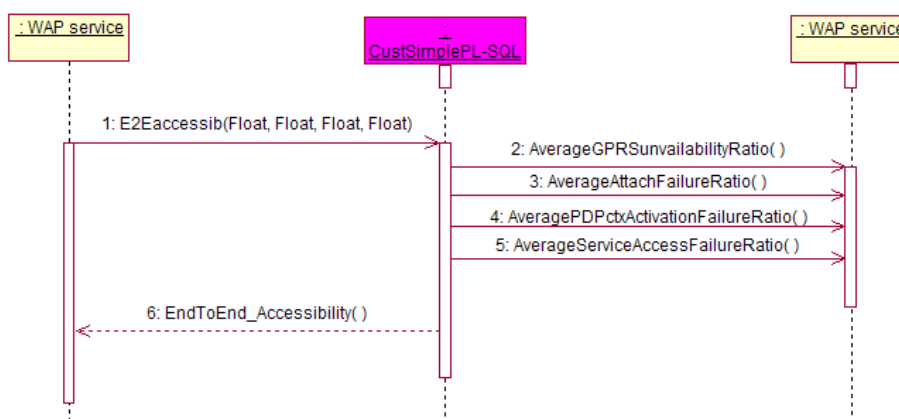
$$\begin{aligned} \text{End2End_accessibility [\%]} = & \\ & (1 - \text{GPRS_Unavailability [\%]}) * \\ & (1 - \text{Attachment_Failure_Ratio [\%]}) * \\ & (1 - \text{PDP_Context_Activation_Failure_Ratio [\%]}) * \\ & (1 - \text{Service_Non_Accessibility [\%]}) \\ & * 100\% \end{aligned}$$

The PLSQL expression that calculates this KQI can be found in the following file:

%TEMP_SC_HOME\SolutionSet\GPRS\Model\CustomExpressions\plsql\sc_wap_E2Eaccessib.sql

The sequence (extracted from the sequence diagram “Main WAP Package → Seq secondary → WAP service”) used to specify this calculation with the Service Designer is show below:

Figure 24 End-to-end accessibility sequence diagram



The four KQIs used as input in calculating end-to-end accessibility are provided by the underlying service components, as follows:

- The GPRS unavailability ratio parameter indicates the probability that GPRS is not available in the cell where the subscriber is situated. The average GPRS unavailability ratio is an average aggregation of the GPRS unavailability ratio for each GPRS region. In this model, the GPRS unavailability ratio for areas controlled by a BSC is based on the number of current critical alarms in those areas.
- The attachment failure ratio indicates the probability that a subscriber cannot attach to GPRS. It shows the ratio between the number of unsuccessful attachment attempts and the total number of attachment attempts. The average attachment failure ratio is an average aggregation of the attachment failure ratio measured for each SGSN.
- The PDP context activation failure ratio denotes the probability that a subscriber cannot activate the invoked PDP context. It shows the ratio between the number

of unsuccessful PDP context activation attempts and the total number of PDP context activation attempts. The GPRS average PDP context activation failure ratio is an average aggregation of the PDP context activation failure ratio measured for each SGSN.

- The service access failure ratio indicates the probability that a subscriber cannot access the service, i.e. that transfer of the content cannot begin. This is the ratio between the number of unsuccessful attempts to access the service and the total number of attempts to access the service.
- The WAP service access failure ratio is the average aggregation of the service access failure ratio calculated for the Web server groups, at the Service Component Definition (SCD) level. This ratio is itself an average aggregation of the access failure ratios measured for each Web server in the group. The model uses the OpenView Internet Services (OVIS) HTTP and WAP probes to measure, from the platform hosting the WAP gateway, the accessibility of the first Web page provided by those Web servers.

3.4.1.1 End-to-end accessibility for a given subscriber group

The GPRS KPI providers can use the end-to-end accessibility ratio described above to provide an aggregate value indicating the attachment failure ratio or number of PDP context activation failures for a given subscriber group. The same calculation is used to provide a customer-specific end-to-end accessibility KQI. This WAP on GPRS service parameter is called *Cust_EndToEnd_Accessibility*.

3.4.2 WAP service end-to-end access time calculation

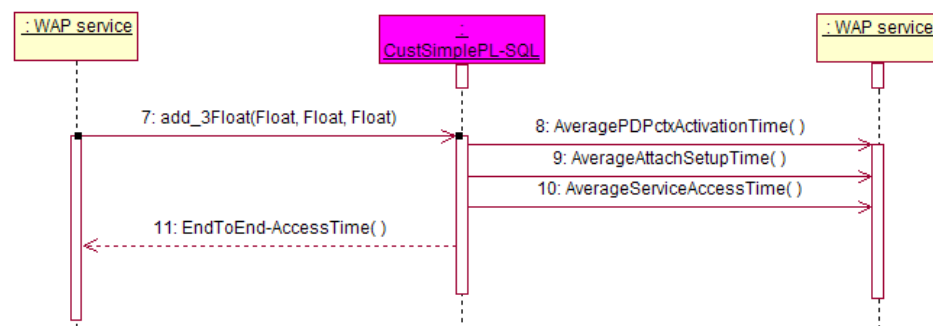
The WAP onto GPRS service end-to-end access time indicates the time it takes to access a service successfully, i.e. the time taken to perform the complete process chain (GPRS attachment, PDP context activation, and WAP service access).

This parameter is calculated using the following formula:

$$\text{End2End_Access_Time} = \text{Average_GPRS_Attach_Setup_Time} + \text{Average_GPRS_PDP_Context_Activation_Time} + \text{Average_Service_Access_Time}$$

The sequence (taken from the “Main WAP Package → Seq secondary → WAP service” sequence diagram) used to define this calculation in the Service Designer is shown below.

Figure 25 End-to-end access time sequence diagram



As in the end-to-end accessibility KQI calculation, the three KQIs used as input in calculating the end-to-end access time are provided by the underlying service components, as follows:

- The GPRS attachment procedure duration is the average aggregation of the attachment procedure durations measured for the SGSN SCD.
- The PDP context activation setup time is the average aggregation of the PDP context activation setup times measured for the SGSN SCD.
- The WAP service access time is the average aggregation of the access setup times for the Web servers in the Web server groups behind the WAP gateway. The setup time comprises the time required to perform the DNS lookup to resolve the address and the time required to establish the connection with a Web server. This parameter is measured from the platform hosting the WAP gateway, using the OpenView Internet Services (OVIS) probes.

3.5 SQL Service Adapter

3.5.1 Data sources, and KPIs

The following data sources are used in the Data Feeder Definition (DFD) integrated within the GPRS Service Definitions. This DFD is shown in the class diagrams above.

- The UNIX operating system KPIs provided by the Glance tools (found in the `/opt/perf/bin/glance` directory on HP-UX). This data is also available via OpenView Operations (OVO).
- Alarm statistics that TeMIP provides for the specified managed objects (the BSCs, in this case).
- Data provided by a Trouble Ticket subsystem used to collect the number of customer Trouble Tickets opened for the GPRS radio access network.
- HTTP error statistics, if these are collected by a customized HP OpenView Internet Usage Manager (IUM).
- Performance data (such as DNS lookup times, connection setup times, transfer times, etc.) that the OVIS probes measure for various Internet protocols (HTTP, HTTPS, WAP, SMTP, FTP, Telnet, TCP/IP, etc.).
- GPRS KPIs provided by the KPI providers, which we label *dpS* and *dpI* in our model and include as examples of third-party providers of GPRS KPIs. These KPI providers, which are intended to represent all those found in that domain, can be integrated into an operational solution. Such third-party systems usually build or retrieve xDR (passive probe) data on GPRS interfaces such as the Gn or Gb interface.

3.5.2 SQL SAs deployed by the Value Pack

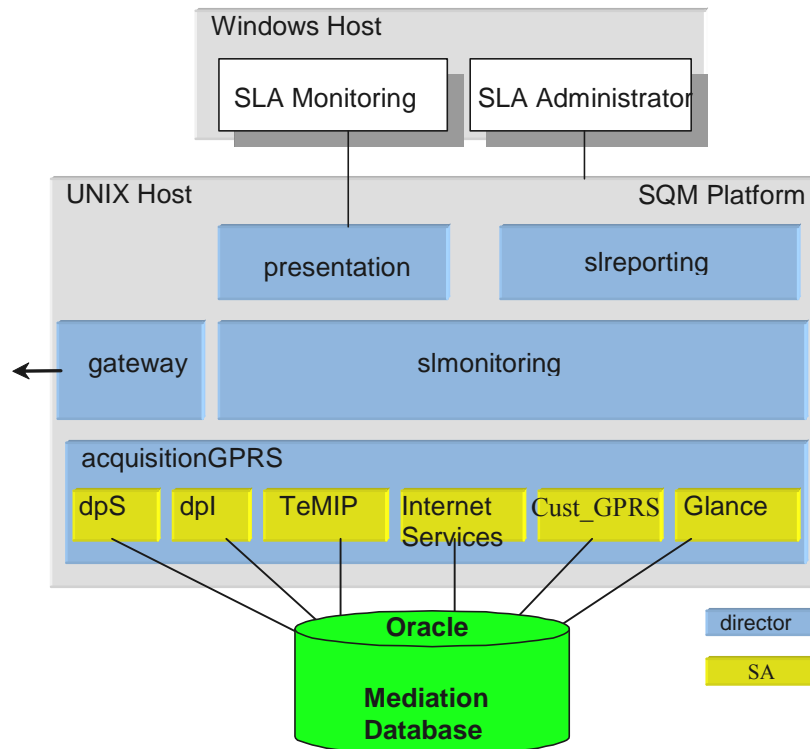
The following figure shows how each runtime component provided by the Value Pack is integrated into the SQM platform. These components are:

- Mediation database
- *acquisitionGPRS* director
- SQL Service Adapters (SQL SAs) embedded in the *acquisitionGPRS* director

Note

These SQL SAs are not the actual SAs that the OpenView SQM provides to collect data on your physical service resources. The SQL SAs retrieve data from the mediation database into which the Value Pack loads data collected in one day from a predefined set of resources used to build the Value Pack. The InternetServices SA installed by the Value Pack is effectively an image of the actual OVIS SA, for example.

Figure 26 Value Pack runtime components



Several SQL SAs are used to collect the KPIs described in the previous paragraph from the Value Pack mediation database in which the live data collected in one day is loaded for the Service Instances and their Service Component Instances deployed by the Value Pack. These SQL SAs, which were built using the SQM SQL SA toolkit, are:

- *dpS SA*: The custom SQL SA that collects from the mediation database the GPRS KPIs provided by the dpS product.
- *dpI SA*: The custom SQL SA that collects from the mediation database the GPRS KPIs provided by the dpI product. (The Value Pack can run without this optional SA, because the dpS SA collects all KPIs required by the Service Definitions.)
- *Internet Services SA*: The custom SQL SA that collects from the mediation database the Internet Services performance data measured by the HP OpenView Internet Services (OVIS) probes and any HTTP error statistics retrieved by a customized HP OpenView IUM.
- *TeMIP SA*: The custom SQL SA that retrieves from the mediation database the alarm statistics provided by OpenView TeMIP on the managed entities.
- *Glance SA*: The custom SQL SA that collects from the mediation database the UNIX performance data measured by the Glance tools.

- *Cust_GPRS SA*: The custom SQL SA that collects from the mediation database the number of opened Trouble Tickets.

Solution building guidelines

4.1 Introduction

You can use the Value Pack as a starting point from which to develop your own solution.

In all cases, you must do at least the following when you transform the Value Pack into an operational solution:

1. You must replace the SQL Service Adapters provided by the Mobile Data Services Value Pack with Service Adapters that collect KPIs for your own service resources.
2. You must use the SL Administrator graphical interface to create the appropriate Service Instances and groups, customers, and SLAs for your own case.

If necessary, you can modify the Service Definitions via the Service Designer, and then load the new model into the SRM before instantiation. You may also need to redefine the Service Levels for your own case, using the SL Administrator graphical interface.

4.2 Modifying the Mobile Data Services Value Pack SQL SA

In most cases, you can use the SQL Service Adapter provided by the Mobile Data Services Value Pack, but you must nevertheless customize so that it can connect to the database in which the KPIs for your own service resources are stored. You can do so using the SQL Service Adapter Toolkit provided with the HP OpenView Service Quality Manager. For details of how to use the SQL SA Toolkit to customize the SQL SA, see the *HP OpenView Service Quality Manager SQL Service Adapter Toolkit Installation, Configuration and User's Guide*. You can use the SQL SA Toolkit's graphical interface to define the mapping between the DFD parameters and the database's TABLE columns. The Value Pack includes the SQL SA toolkit project used to build the initial SQL SA. This project is defined in the file with the *.sqltk* suffix.

Note:

When you use the SQL Service Adapter Toolkit's graphical interface to modify the SQL SA projects provided by the Value Pack, you must set up the properties of the project at least to set your own project paths, and specify the JDBC connector parameters enabling you to access your KPI database.

In all other cases, you must replace an SQL Service Adapter provided by the Mobile Data Services Value Pack by a different type of Service Adapter. This is the case with

the *InternetServices* Service Adapter, for example. The Mobile Data Services Value Pack provides DFD names prefixed with *IS_** that are exact copies of the DFDs provided by the OVIS Service Adapter provided with HP OpenView Service Quality Manager. To switch from the SQL Service Adapter connected to the Mobile Data Services Value Pack mediation database to one that collects Key Performance Indicators from your own Internet Service resources, you can simply replace the Internet Services DFD with the OVIS DFD in the *InternetServices* package of the GPRS Services models, and then set up the OVIS Service Adapter on your Service Quality Manager platform.

Appendix A

Troubleshooting guide

This appendix describes basic methods you can use to check the condition of Value Pack components.

A.1 Installation

You must check that the following Value Pack components are set up correctly on the Service Quality Manager platform:

- The mediation database must be populated and accessible.
- The Service Adapter provided by the Value Pack must be running.
- The Service Definitions and Service Instances must be registered in the Service Repository Manager.

In addition to checking these components, you can verify the contents of the following setup log file created when the Value Pack is set up:

```
$TEMIP_SC_VAR_HOME/trace/Setup_SolutionSet_GPRS.log
```

A.1.1 Service Repository Manager

Diagnostic check

You can check whether the Service Repository Manager has correctly registered the Service Definitions delivered by the Value Pack, by entering the following commands. Each command must return the required definitions. Alternatively, you can use the SL Administrator graphical interface to browse these definitions.

- To check that all definitions required by the *WAPservice* Service Definition have been registered, enter the following command:

```
temip_sc_get_sd -sd WAPservice
```

- To check that all definitions required by the *GPRSdataService* Service Definition have been registered, enter the following command:

```
temip_sc_get_sd -sd GPRSdataService
```

To check whether the Service Repository Manager has correctly registered the Service Instances, Service Levels and SLAs delivered by the Mobile Data Services Value Pack, you can either enter the following commands or use the SL Administrator graphical interface to browse the SLA:

```
temip_sc_get_sla -sd GPRSdataService
```

This command must return the contents of *PremiumPartnerSLA* and *StandardPartnerSLA*.

```
temip_sc_get_sla -sd WAPservice
```

This command must return the contents of *BaseWAPoperation*, *TargetWAPoperation*, *StandardCustomerSLA*, *VIPCustomerSLA*, *PremiumSLAresource*, and *BaseSLAresource*.

A.1.2 Mobile Data Services Value Pack Service Adapters

Diagnostic check

To check that the Service Adapters delivered by the Mobile Data Services Value Pack have been set up correctly, enter the *start director* command as follows:

```
temip_sc_start_director -plat slmv12 -dire acquisitionGPRS
```

Next, check that all Service Adapters are running by entering the following command:

```
temip_sc_show_director -plat slmv12 -dire acquisitionGPRS
```

The *Glance*, *InternetServices*, *TTCust_GPRS*, *dpI*, *dpS*, and *TeMIP* applications must each be running.

A.1.3 Mediation database

Diagnostic check

Use an SQL browser to check that the following *VIEWS* are not empty:

```
CUSTTT_VIEW  
DPS_APN_VIEW  
DPS_CUSTAPN_VIEW  
DPS_CUSTGPRSCONNECT_VIEW  
DPS_GPRSCONNECT_VIEW  
DPS_GPRSROAMING_VIEW  
DPS_MOBILITY_VIEW  
GLANCEVIEW  
IUMHTTPERRORS_VIEW  
OVISVIEW  
SMGTPGGSNKPI  
TEMIP_ALARM_VIEW  
TEMIPFAULTSTATS_VIEW  
TROUBLETICKET_VIEW
```