HP Service Quality Management Solution V3.2

User Guide

Edition: 1.0

for the Windows and Linux operating systems

June 2014

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Contents

Preface

This guide is designed to be used as an initial point of reference to begin working with the HP Service Quality Management Solution.

This document presents and explains the various concepts regarding different components that are included in the SQM Solution providing a holistic view of the entire solution, as well as a brief insight of the different stages involved in the SQM Solution lifecycle.

The guide is organized in such a manner that the user is initially given an overview of the entire solution and introduction of each major component integrated in the solution. The guide then uses the high-level overview to drill down and explain each concept regarding the various stages of the SQM Solution lifecycle using real-life examples.

Intended Audience

This document is intended for the following users:

- SQM Solution users
- SQM Solution administrators.

Abbreviations and Acronyms

The following table describes the abbreviations and acronyms used in this document.

Abbreviation	Description
APM	Application Performance Management software
BR	Business Rule
BSM	Business Service Management
BSMC	BSM Connector
CI	Configuration Item
CIT	Configuration Item Type
CMDB	Configuration Management Database
CMS	Configuration Management System (HP Software) Communications and Media Solutions (HP ES CMS)
DDM	Discovery & Dependency Mapping
DDP	Discovery & Dataload Pack (CMS)

DFP	Data Flow Probe
DSA	Data Source Adapter
DPS	BSM Data Processing Server
ES	Enterprise Service
ETI	Event Type Indicator
GTW	BSM Gateway Server
HI	Health Indicator
KPI	Key Performance Indicator
KQI	Key Quality Indicator
MA	Monitoring Adapter
OSS	Operations Support System
RTSM	Run-time Service Model
SA	Service Adapter
SID	Shared Information Data Model
SiS	SiteScope
SLA	Service Level Agreement
SLM	Service Level Management
SMF	Service Management Foundation
SQM	Service Quality Management
TMF	TeleManagement Forum
TV	Television
uCMDB	Universal Configuration Management Database
UTM	Unified Topology Manager

SQM / BSM terms

As HP Software and HP CMS OSS transformation use different terminology, the following table provides a mapping between the terms used by the two organizations.

SQM (CMS)	BSM
Key Performance Indicators	Health Indicators
Key Quality Indicators	Key Performance Indicators
KPI Enrichment Service	KPI Assignment and HI Assignment

Associated documents

The HP Business Service Management, BSM Connector, SiteScope and SQM documents are available at: http://support.openview.hp.com/selfsolve/manuals.

Additional SQM Solution materials (like the SQM Solution product briefs) are available at: Operations Support System Assurance Solutions.

This document contains references to the following documents:

Document Title	File Name
HP Business Service Management Installation Guide	BSM_InstallationGuide.pdf
HP Business Service Management BSM System Requirements and Support Matrixes	BSM_SysReqs_SupportMatrixes.pdf
HP BSM Connector Installation and Upgrade Guide	HP_BSM_Connector_Installation_and_Upgrade_Guide.htm
HP BSM Patch Installation Guide	BSM_PatchInstallationGuide.pdf
HP Data Flow Probe Installation Guide	BSM_DataFlowProbe_Install_Guide.pdf
HP SiteScope Deployment Guide	SIS_Deployment.pdf
HP SQM Solution Service Management Foundation Installation and Configuration Guide	HP SQM Solution Service Management Foundation Installation and Configuration Guide.pdf
HP SQM Solution TeMIP Service Adapter Installation and Configuration Guide	HP SQM Solution TeMIP Service Adapter Installation and Configuration Guide.pdf
HP TeMIP Service Console Installation Guide	HP TeMIP Service Console Installation Guide.pdf
HP TeMIP Service Console Configuration and User Guide	HP TeMIP Service Console Configuration and User Guide.pdf
BSM - Database Guide	BSM_DatabaseGuide.pdf
BSM - Data Flow Management Guide	BSM_DataFlowMgmt.pdf
BSM – Glossary	BSM_Glossary.pdf
BSM - Platform Administration	BSM_PlatformAdministration.pdf
BSM - RTSM Administration Guide	BSM_RTSM_Administration.pdf
BSM – RTSM Modeling Guide	BSM_ModelingGuide.pdf
BSM - User Guide	BSM_User_Guide.pdf
BSM – Using BSM Connector	BSM_Connector_User.pdf
SiS - Using SiteScope	SIS_UsingSiteScope.pdf
SQM – Generic DDP Integration Guide	SQM_Generic_DDP_Integ.pdf

Typographic Conventions

This document uses the following conventions to identify special information:

Convention	Information Type/Example
( ) [round brackets]	Supplementary information *Ex*: Configuration Item (CI)
Bold type	Fields names, menus, dialog title, important information and concepts. Example of menu: Admin > Service Level Management > Repository.
Italic type	Application / component names. Ex: The *Create Agreement Wizard* dialog displays.
Code type	Source code / file contents. Example: <applicableCITypes ids="configuration_item,"/>

Support

You can visit the HP Software support web site at:
http://support.openview.hp.com/support.jsp

HP Software online software support provides customer self-solving capabilities. It provides a fast and efficient way to access interactive technical support tools needed to manage your business. As a valued support customer, you can benefit by using the support site to:

- Search for knowledge documents of interest
- Submit enhancement requests online
- Download software patches
- Submit and track progress on support cases
- Manage a support contract
- Look up HP support contacts
- Review information about available services
- Enter discussions with other software customers
- Research and register for software training.

Chapter 1

HP SQM Solution 3.2 Overview

The new HP SQM solution 3.2 uses a number of HP software components from HP Software BSM 9.2x.

The HP SQM solution V3.2 Service Management Foundation builds upon

- HP Application Performance Management (APM) 9

  Within APM, the Business Service Management (BSM) is the component that provides the Run Time Service Model (RTSM), HP APM Real-Time dashboard and Service Level Management capabilities of SQM.

The HP SQM Solution V3.2 Service Adapters build upon

- HP BSM Connector 9.2x, which is used to collect metrics and events from HP and 3rd party data sources.

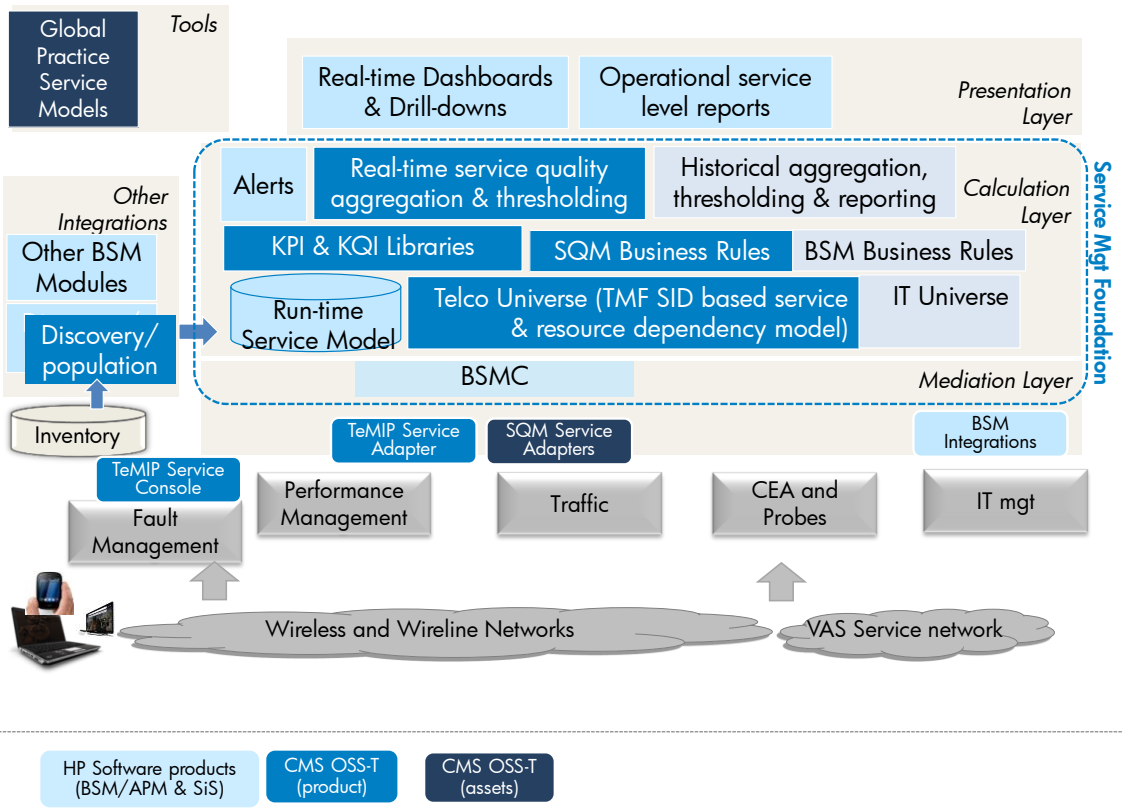
The HP SQM Solution adds Telecom focused capabilities to the HP BSM core components to help Communication Service Providers (CSPs) easily manage services and their service quality from end to end, monitor associated service levels and support Quality of Experience (QoE). It delivers near real time visibility on Service Quality and Operational Level Agreements compliance across the service delivery chain.

An HP SQM Solution is formed of different components:

- The HP Service Management Foundation, which provides the core HP SQM capabilities
- HP SQM Service Adapters to collect Key Performance Indicators (aka BSM Health Indicators) from underlying OSS applications

The following figure presents an overview of the SQM Solution, its components, and their organization:

HP BSM product components are represented in pale blue
HP CMS OSS-T product components are represented in medium blue
Additional HP CMS Assets are represented in dark blue



SQM Solution Overview

1.1 HP Service Management Foundation

The HP Service Management Foundation (SMF) provides the basic set of common components required to build a SQM Solution.

It includes:

- The Telco Universe model defined in the RTSM. Telco Universe model contains predefined entities and relationships from the Telco industry
- A library of pre-defined Key Performance Indicators, Key Quality Indicators and Business Rules
- A library of pre-defined Queries, Views and Context Menus.
- It includes queries for CI Resolution: SQM_CIR, SQM_CIR_LOCATION and SQM_CIR_PARTY.
- A framework of common discovery resources used by the Discovery & Dataload Packs
- SQM add-ons to the different BSM modules.
- TeMIP Content Pack: including TeMIP specific HI, KPI, HI Assignment, KPI Assignment, Business Rules and Context Menu;
- TeMIP OMi Example Content Pack: including TeMIP specific HI mapping rule, Filter for mapping rule and KPI Assignment

- Digital Service Content Pack: including Digital Service specific HI, KPI, HI Assignment and KPI Assignment;
- TeMIP and Digital Service pre-defined Service Health views
- The SMF installer.

1.2 Service Adapters

A Service Adapter is an essential component of the SQM Solution and provides Key Performance Indicators collected from the data source and delivered to the SQM Solution.

For instance, the TeMIP Service Adapter collects the alarm events from the TeMIP Service Console.

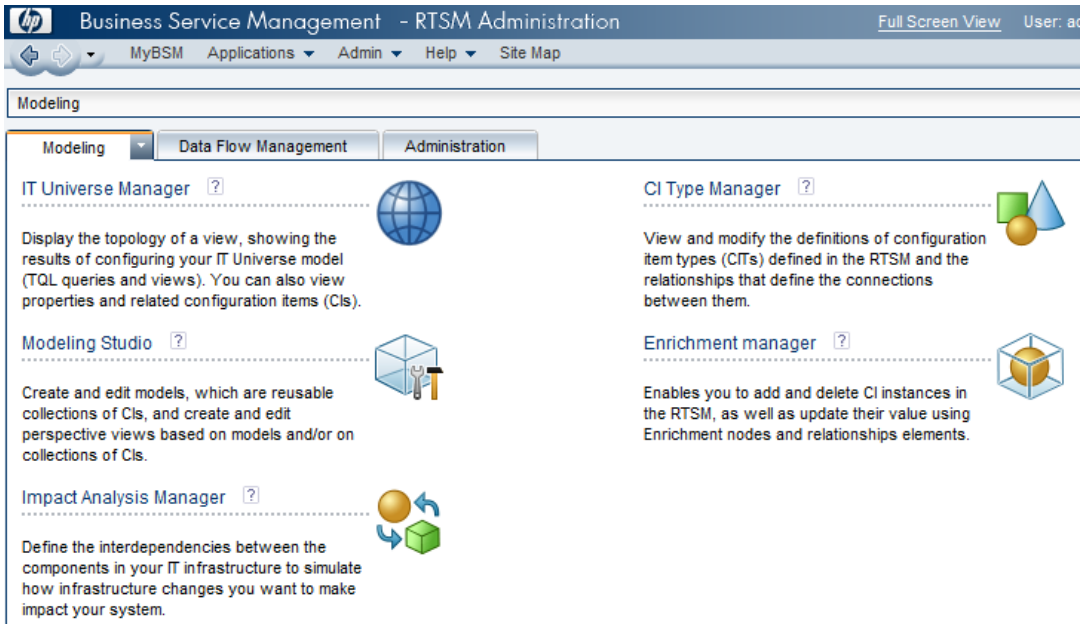
A Service Adapter also performs mediation between the samples defined in the data source and the Key Performance Indicators defined in the SQM Solution, for instance:

- Map a sample into a metric or event with different name
- Then SQM Solution will map the metric or event into a Health Indicator accordingly.

A Service Adapter can come from the library of off-the-shelf Service Adapters or it can be created by the local team.

1.3 Service modeling with RTSM Administration

On BSM GUI, browse to **Admin -> RTSM Administration**.

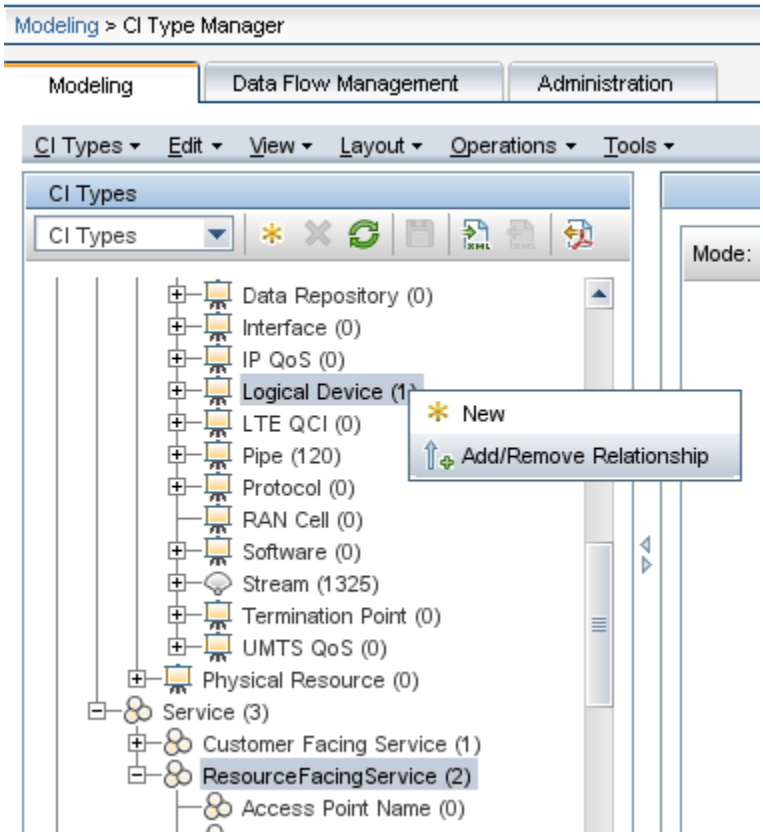


Use the RTSM Administration tools to set up / update Service Model.

- Administration
    - Package Manager Import predefined Service Model and/or export customized Service Model

- Modeling
    - CI Type Manager Create new CI Types, modify/delete existing CI Types, Add/Remove Relationships between CI Types; Create new Relationship Type; Create Triplets
    - Modeling Studio Create Query, create View and create Model
    - Enrichment manager Create Enrichment Rule to update/create/delete CI instances and/or Relationship instances, disable/enable Enrichment Rules

      The below figure shows an example of Relationship creation between 2 CI Types:

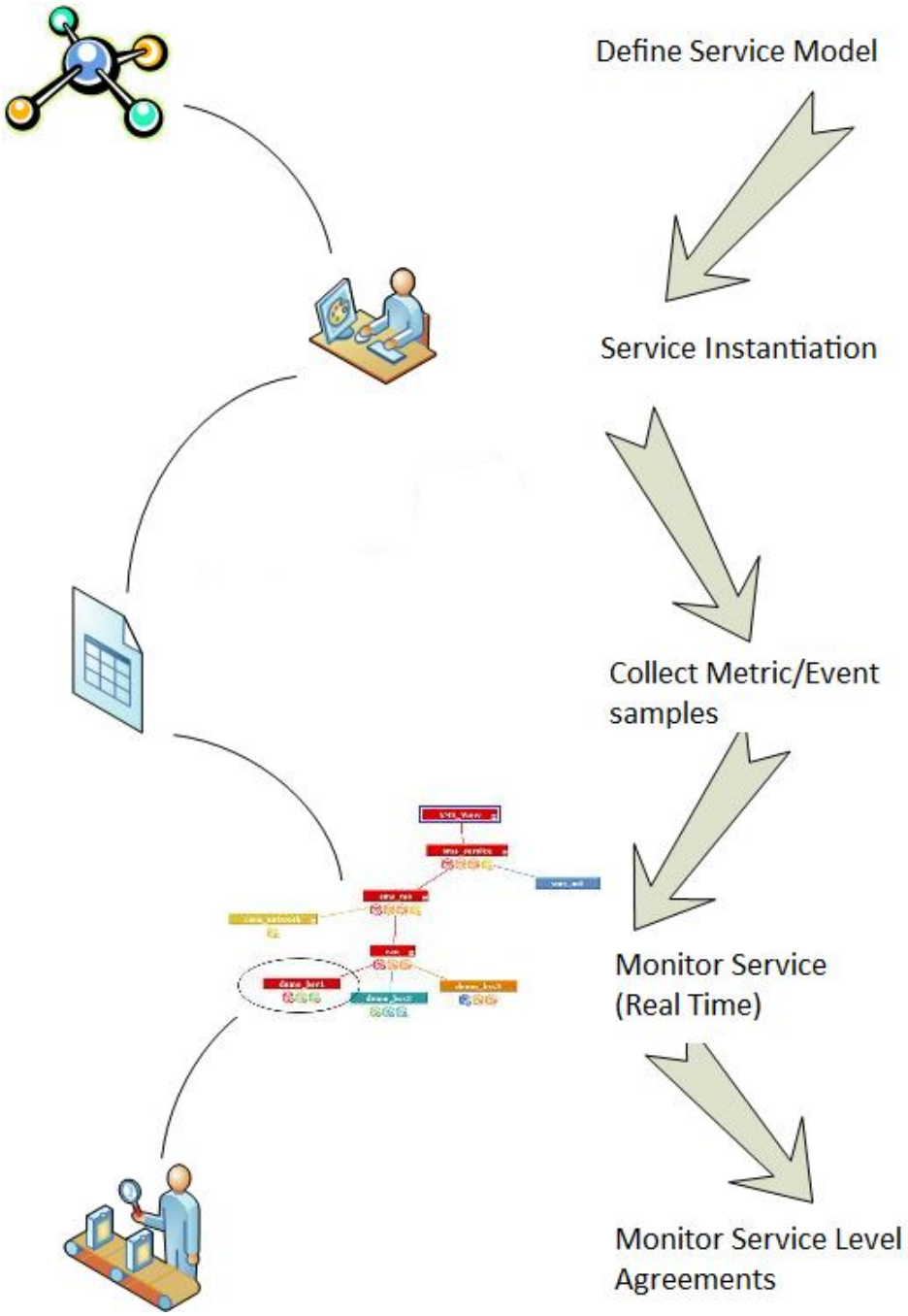


- Data Flow Management

For detailed information, please refer documents *HP BSM RTSM Modeling Guide, HP BSM RTSM Administration Guide and HP BSM RTSM Data Flow Management Guide*

1.4 SQM Lifecycle

In this section, you will learn about the various stages that are involved in the entire SQM lifecycle. This will provide a clear picture of how the SQM Solution is used to achieve Service Quality Management goals and objectives. In short, this section presents a snapshot of what is explained in detail, in the rest of this User Guide.



SQM Lifecycle

1.4.1 Service Model Definition

Defining a service model involves performing a logical decomposition of a service into service elements and capturing the dependencies and the business logic that exist between the service elements and finally, organizing the service elements into a package.

Use RTSM administration to create Entity Types, Relationships, Calculated relationships and Views.

1.4.2 Service Instantiation

Service creation consists in instantiating services and their service elements. It refers to the complete lifecycle of the CIs and their relationships. Instantiating a service involves identifying and selecting appropriate entities (CI types) from the already defined service model in order to create CIs, defining relationships between the CIs, modifying and performing other operations on CIs and relationships and even deleting CIs and relationships are part of the Service instantiation process.

1.4.3 Data Collection

Data collection consists in collecting metrics, events and alarms from different sources using the HP SQM Service Adapters, and creates metrics or events for service quality monitoring.

For example, TeMIP Service Adaptor collects alarms messages from TeMIP Service Console, and then sends Event samples to BSM. In addition, data collection can also be performed through the different out of the box integrations provided by HP Software. Please refer to the HP Software BSM documents for the list of available integrations.

1.4.4 Service Monitoring

Service Monitoring refers to the near real-time capability of the SQM solution. It consists in monitoring the services, their associated KPIs and KQIs and to check compliance with the service objectives. Key Performance Indicators (KPIs) are also compared for availability percentages and performance times, which behavior is determined by the Business Rules and thresholds defined when deploying the solution.

1.4.5 Service Level Monitoring

The SQM Solution also monitors the compliance to agreed-upon levels of service. This functionality is delivered by the HP BSM Service Level Management application. With Service Level Management, reports can be viewed to see how well actual service levels compare with agreement goals are. Alerts are generated if violation occurs. The results of comparisons can be viewed in reports.

For example, the Over-time Report allows the information to be collected for a specific period that is defined in the SLA.

1.5 Deployment Configuration

HP SQM Solution 3.2 now supports both Windows platform and Linux platform.

The SQM Solution deployment includes 2 parts: deployment of HP Software BSM products and deployment of SQM products.

1.5.1 System Requirements

Following Operating Systems are supported:

Windows:

➢ Windows Server 2008 Enterprise Edition SP2 or later (64 bit)

➢ Windows Server 2008 Standard Edition SP2 or later (64 bit)

➢ Windows Server 2008 R2 Enterprise Edition SP1 or later (64 bit)

➢ Windows Server 2008 R2 Standard Edition SP1 or later (64 bit)

➢ Windows Server 2008 R2 Datacenter Edition SP1 or later (64 bit)

Linux:

➢ Red Hat Enterprise Linux 5.3 or any later 5.x version (Intel x64 64 bit)

Note:

Regardless of the operating system version, the entire Distribution (with OEM support) and the latest recommended Patch Cluster are required.

If you are running Windows Server 2008 SP2, User Access Control (UAC) must always be disabled.

1.5.2 Platform Architecture Diagram

The HP SQM Solution supports multiple deployment configurations. The certified deployment configurations include:

- BSM typical on Windows + 1 BSMC on Windows
- BSM 2-box on Windows + 1 BSMC on Windows
- BSM typical on Linux + 1 BSMC on Linux
- BSM 2-box on Linux + 1 BSMC on Linux
- BSM typical on Windows + 1 BSMC on Windows + DFP on Windows
- BSM 2-box on Windows + 1 BSMC on Windows + DFP on Windows
- BSM typical on Linux + 1 BSMC on Linux + DFP on Windows
- BSM 2-box on Linux + 1 BSMC on Linux + DFP on Windows

Since the DFP on Linux does not support discovery function, only DFP on Windows included in above deployment configurations. To run discovery jobs with Linux deployment configuration, we recommend including a Windows server and running DFP on the server.

If there is no DFP on Windows, other CI instantiation method should be considered. For details, please refer section 3.1

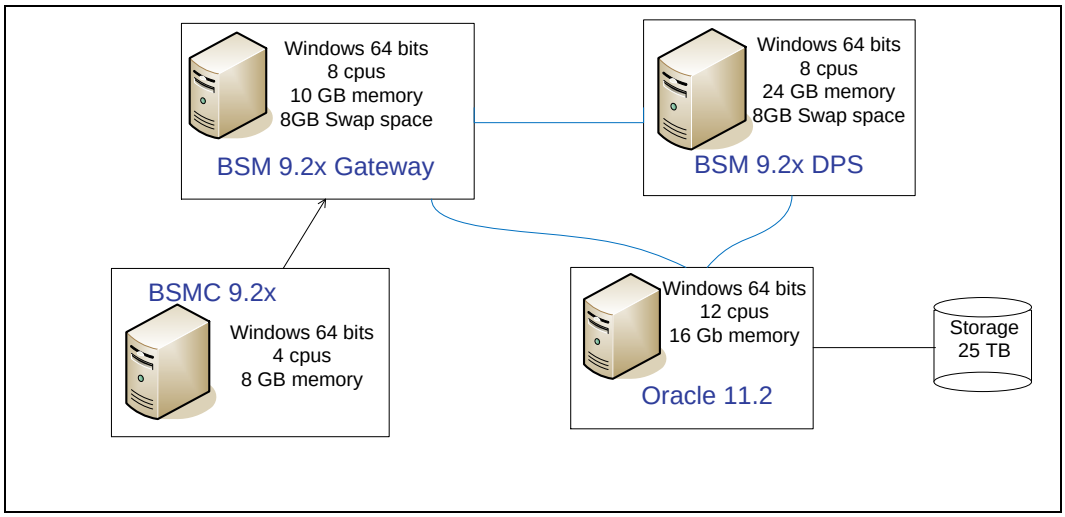
1.5.3 Example deployment on Windows

According to different requirement, the platform architecture will be different.

The below diagram illustrates the general SQM Windows Platform Architecture and the communication among the components. It includes:

- a BSMC Server as Data Collector, on which SQM Service Adapter deployed
- two-box BSM deployment includes a BSM Gateway server and a BSM Data Processing Server.

Note: SQM Service Management Foundation will be deployed on DPS server.



1.5.4 HP Software BSM Product Deployment

It is recommended to install all Servers on the same network segment.

After target servers are available, user can follow deployment instructions of BSM and BSMC.

For details of supported Hardware and Operation System, and detailed deployment instructions, please refer documents *HP Business Service Management System Requirements and Support Matrixes*.

1.5.5 SQM Product Deployment

After HP Software BSM product deployment completed, SQM product deployment process will start.

- Install SMF on BSM typical server or DPS server
- Install Service Adapter on BSMC server

Note: If DSA exists, it can be deployed on other server. For details, refer relative Deployment Guide.

For detailed deployment instructions, please refer relative documents *HP SQM Solution V3.2 Service Management Foundation Installation and Configuration Guide* and *HP SQM Solution V3.2 TeMIP Service Adapter Installation and Configuration Guide*

Chapter 2

Service Modeling

The HP SQM Solution comes with predefined service models as well as elements to refine and build additional service models. These are built by describing all the entities involved with associated relationships between them.

The entities and relationships together represent a model of all the components of the Telco Universe in which your business functions.

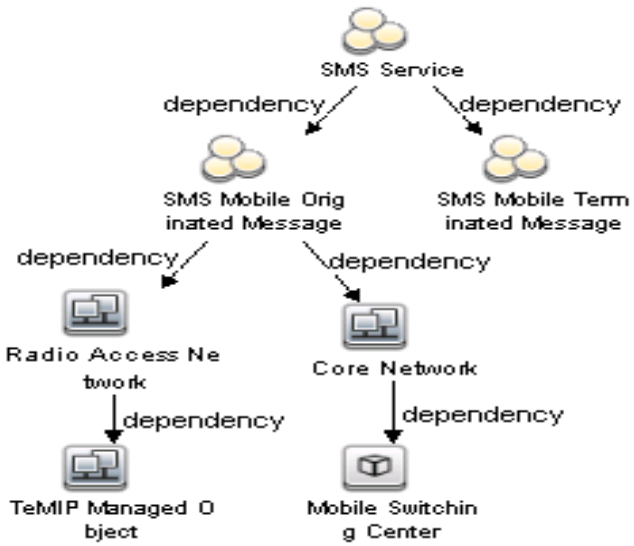
In principle, the service modeling activity addresses the following needs:

- Share a common definition of the services across different stakeholders
- Ensure consistency between all different perceptions
- Isolate services from the underlying technologies and vendors
- Build dependency path between the service components to identify impacts and causes
- Build a library of service components for easy changes and growth.

Therefore, the modeling activity consists of:

- Performing a meaningful break down of services into definition of service components hierarchy
- Capturing the dependency and business logic between service components
- Structuring the service components as packages.

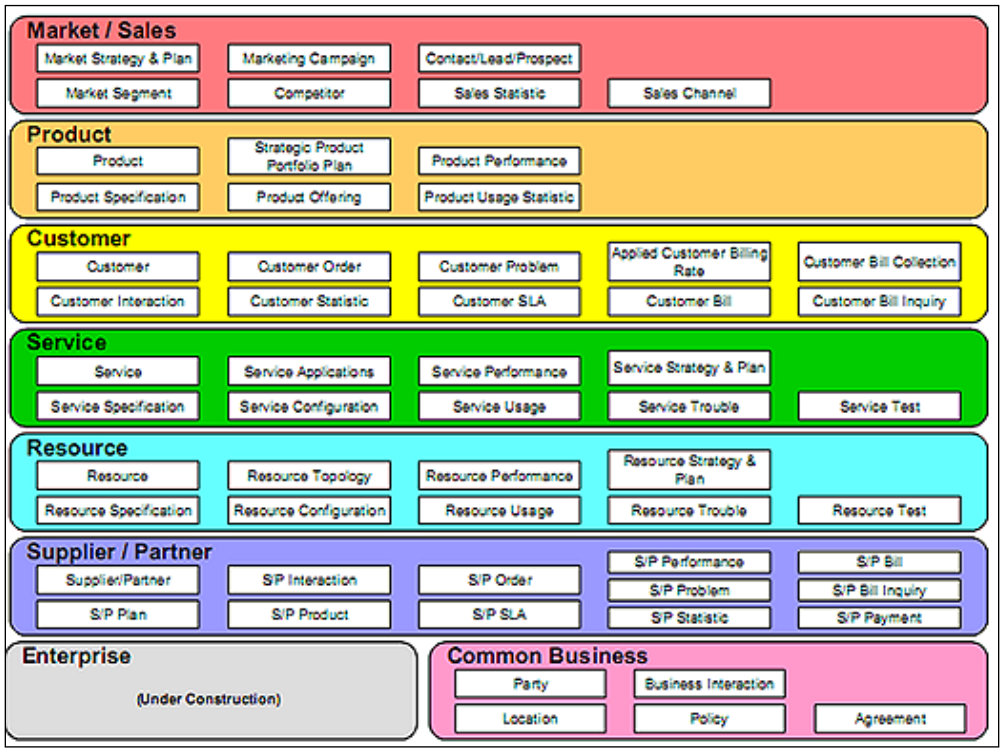
The following example of a service model shows how entities are linked for service delivery:



2.1 HP SQM Data Model

HP SQM supports a data model which is based on the TeleManagement Forum Shared Information Data (TMF SID) model, and further extended and iterated with mobile and fixed line services, service elements and their dependencies. This model also includes predefined KPIs, KQIs, and calculation and propagation rules to compute service quality and user experience metrics. Definitions and enrichment rules are based on industry standards such as TMF GB.923 and GB917, relevant 3GPP 32 series technical specifications, ETSI TS 102 250 and 126 944, as well as HP's experience from successful HP SQM solution deployments worldwide.

The following figure shows the identification of different TM Forum SID domains, also representing core entities in each domain.



Implementation wise, the SQM capitalizes on the BSM Dependency Model (in the RTSM) which defines the entity types and the relationships between the entity types, as well as the attributes, which make up the entity and relationship.

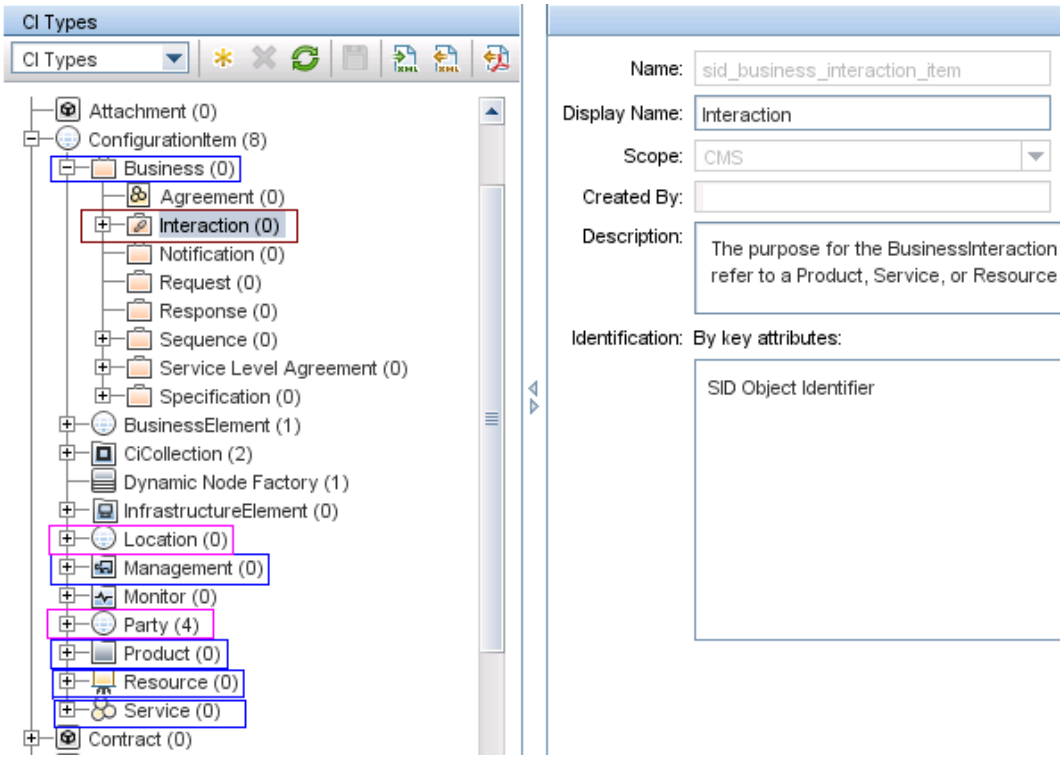
These entity types and relationships are used in the definition of the services hosted by the HP Service Quality Management solution.

2.2 HP SQM Telco Universe Model

In order to better modularize the rich information delivered as part of the HP Service Management Foundation, the Telco Universe is formed by RTSM Packages, which are relevant to Service Quality Management modeling hierarchy. These RTSM packages contain the definition of CI and CI Types definitions, inheritance and relations.

- SQM_SMF_SID: contains the Shared Information Model entities
- SQM_SMF_SQM: contain Service Quality Management common definitions

- SQM_SMF_DigitalTV: contains definitions for the Digital TV domain
- SQM_SMF_FixedMobileConvergence: contains definitions that are common to fixed and mobile services
- SQM_SMF_MobileNetwork: contains definitions for Mobile Networks
- SQM_SMF_MobileServiceElement: contain definitions for mobile services
- SQM_SMF_TeMIP: contains definitions for TeMIP service model



From the above figure, the whole SQM Telco Universe model is categorized into 7 model packages:

- Business: it contains the entity types required to model agreements, contracts and the individual items of a contract or process
- Location: it contains the entity types based on BSM pre-defined entity type “location”, such as "sqm_region".
- Management: this package contains the entity types required to model the service components as managed by an external system. For instance, it contains the entity types needed to model the service components viewed through an existing Fault Management system (e.g. HP TeMIP), defining specific indicators along with a management model on its own.
- Party: it contains the entity types based on BSM pre-defined entity type “party”, including the entity types required to model the customer of the services, such as "sqm_corporate_customer".
- Product: this package contains the entity types required to model the products sold to customers
- Resource: this package contains the entity types required to model the resources that make up the services

- Service: this package contains the entity types required to model the services packaged as part of the products

There are 5 SQM defined root entity types: “sid_business_interaction”, “sid_management_domain”, “sid_product”, “sid_resource” and “sid_service”. On these SQM base entity types and the entity types that based on “location” and “party”, SQM adds the following benefits and attributes:

Attributes

- **SID Object Identifier** (“sid_object_identifier”)

  It is used to unambiguously distinguish between different object instances.

- **Monitored by** (“monitored_by”)

  The default value of all SQM entity types is a string_list with only a word “SQM”

Additional domains:

- **Quality of Experience**, contains the entity types needed to represent user-related information that may be collected:

  from the end-user devices
  using active end-to-end probes
  using probes deployed in specific places of the infrastructure.

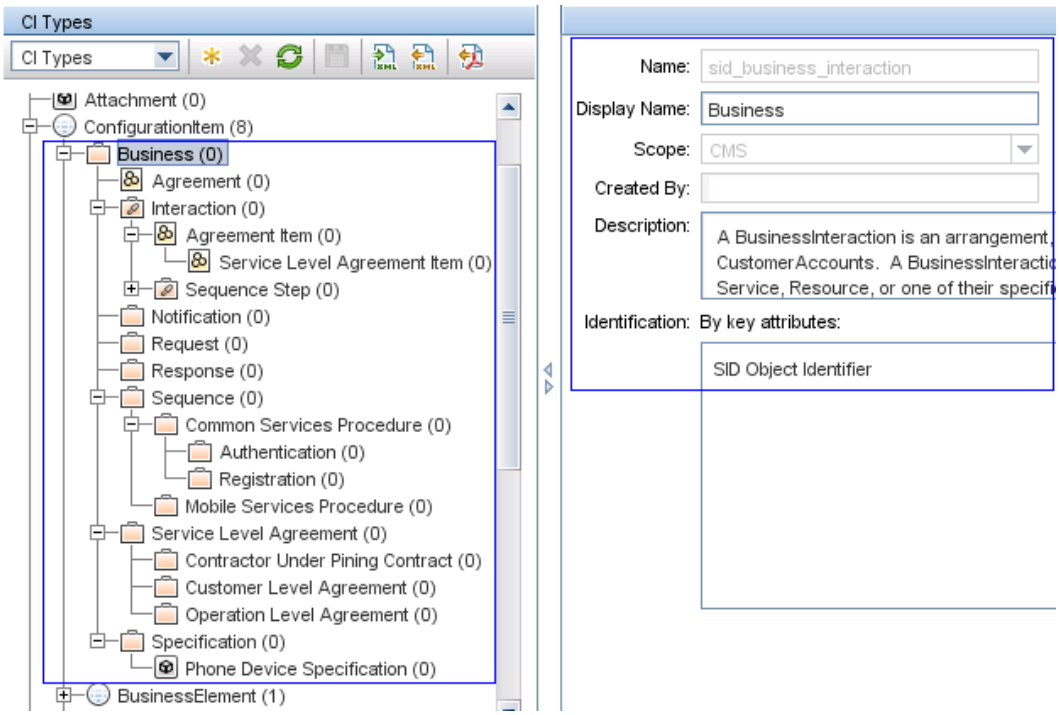
- **Sequence Step**, contains the entity types needed to represent the different steps of a process. For instance, the **Sequence Step** entity type allows to model the different steps involved in the download of a ring tone to a mobile device.

- Additional ready-to-use concrete entity types, for instance “sqm_live_tv” and "dtv_digital_music" in the Product domain

Within the SQM Solution, an entity is also known as Configuration Item (or a CI) and an entity type is also called Configuration Item type (or a CI type).

2.2.1 Entity Types in the Business Package

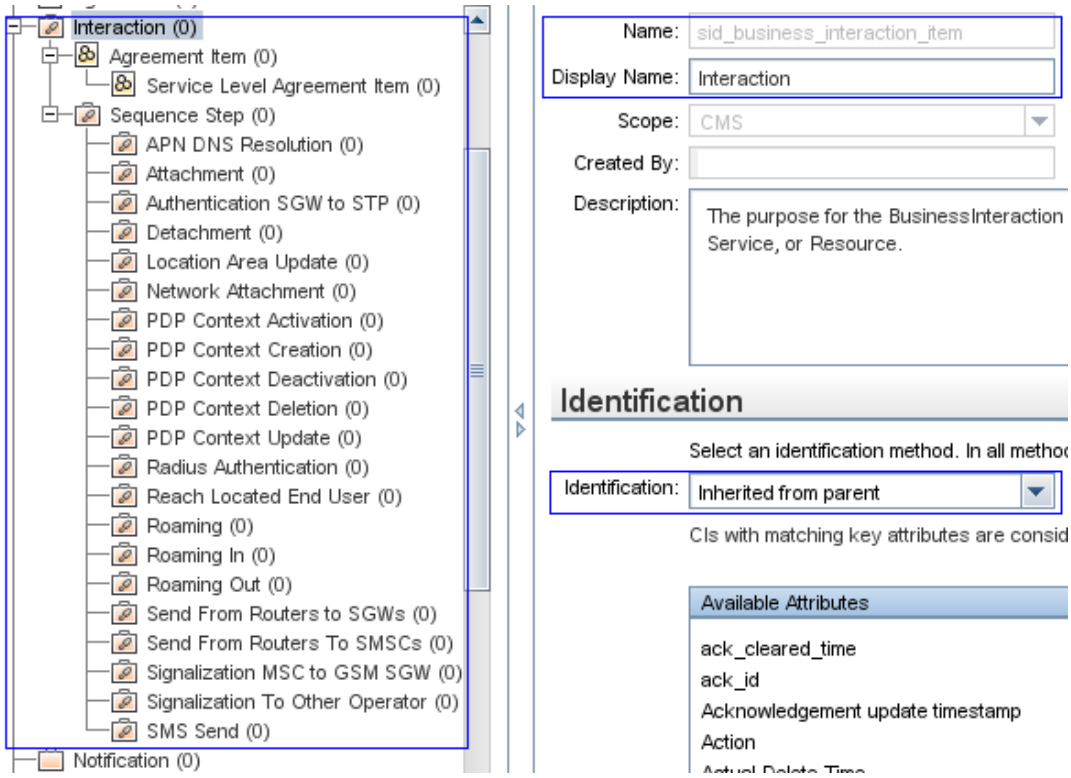
The Business package in the HP SQM Telco Universe model represents a series of Business entity types. The following figure depicts several ready-to-use entity types that currently exist in the Business package:



For example, the Specification entity type in the Business package is a root entity type, which is used to create entity types based on it. It has ABASTRACT_CLASS qualifier.

2.2.1.1 Entity types in the Interaction sub package

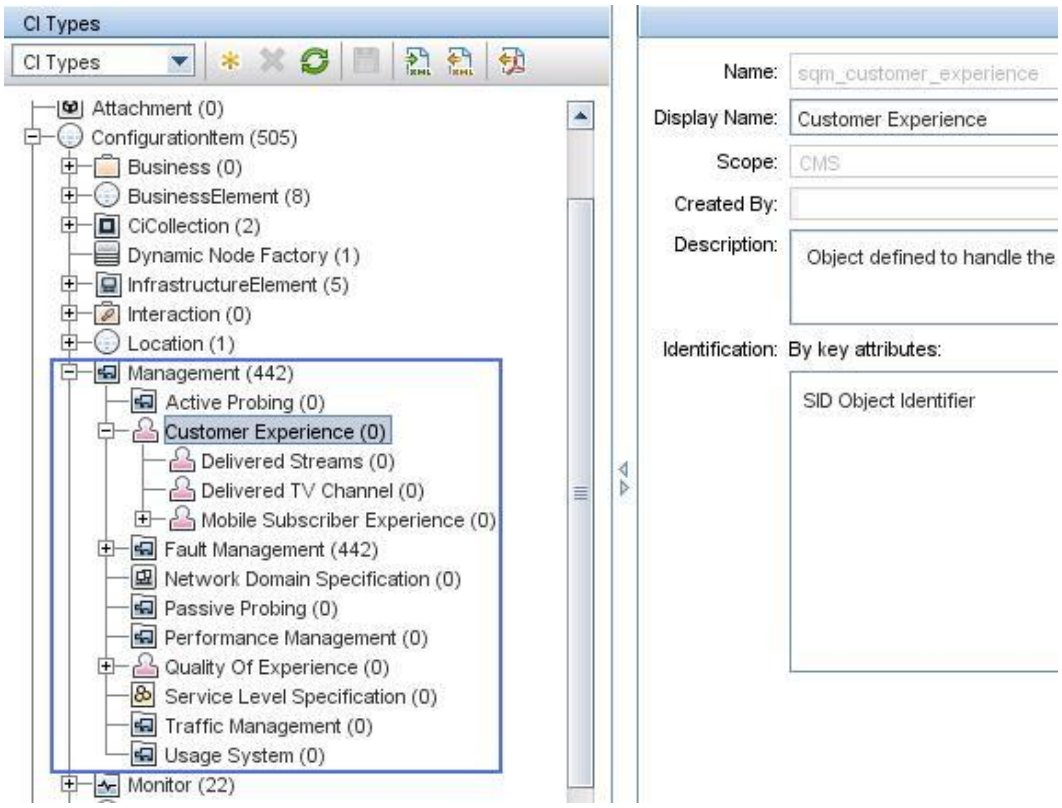
The Interaction package in the HP SQM Telco Universe model has 2 sub packages, Agreement Item and Sequence Step.



For example, the Authentication SGW to STP entity type in the Interaction package is used to create entities or instances of an authentication step during interaction between equipments.

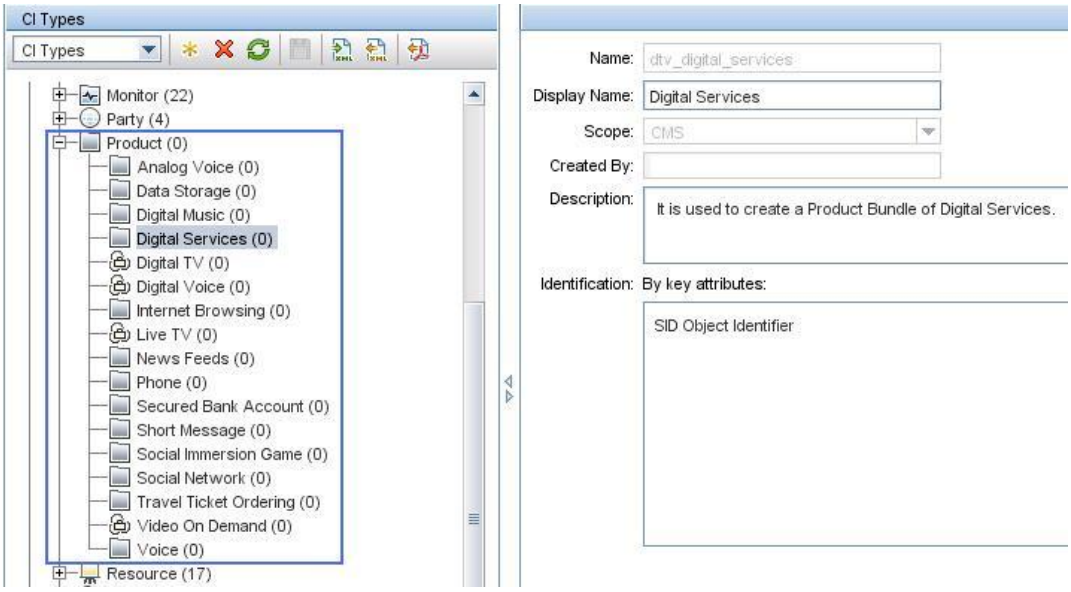
2.2.2 Entity types in the Management package

The Management package in the HP SQM Telco Universe model represents a special group of entities that corresponds to a particular objective, for example, combining customer feedback on different channels, streams and mobile services into one logical group of entities Customer Experience. The following figure depicts different entity types that currently exist in the Management package:



2.2.3 Entity Types in the Product Package

The Product package in the HP SQM Telco Universe model represents a product that may comprise of several services and resources on offer. The following figure depicts several ready-to-use entity types that currently exist in the Product package:



For example, the Digital Services entity type in the Product package is used to create entities or instances of a product that has been identified as digital services type. Therefore, these entities will be contained in the Digital Services entity type.

2.2.4 Entity Types in the Resource Package

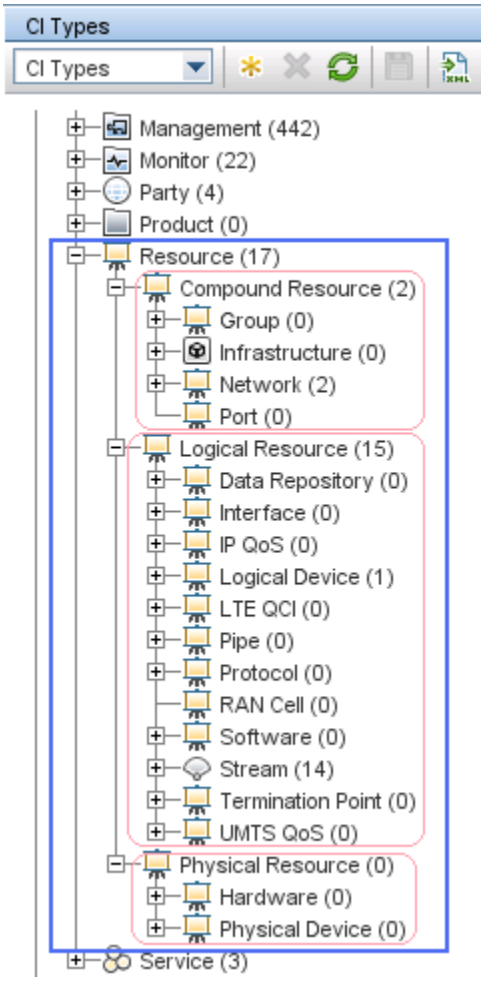
The Resource package in the HP SQM Telco Universe model represents manageable objects or entities that make up a service (customer-facing or resource-facing service).

The Resource package consists of three main sub packages:

- Compound Resource
- Logical Resource
- Physical Resource

The Compound Resource is used to describe managed entities that are collection of other managed entities. The Logical Resource describes different logical aspects of devices (e.g., device interfaces). Finally, the Physical Resource describes different types of hardware that represents a Product.

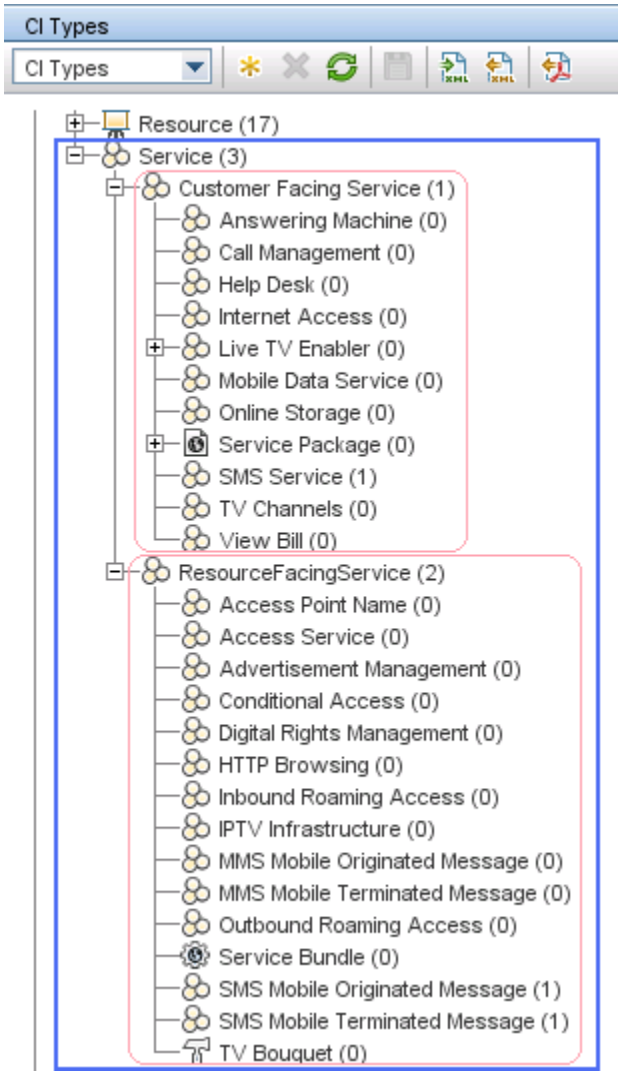
The following figure depicts different entity types that currently exist in the Resource package:



2.2.5 Entity Types in the Service Package

The Services package in the HP SQM Telco Universe model represents a service that may comprise of a logical arrangement of functionalities that makes up a product.

The following figure depicts different entity types that currently exist in the Service package:



The service package consists of two sub packages. The first is Customer Facing Service comprising of several entity types relevant to services accessed directly by the customer i.e. supports customer interaction. The other type is the Resource Facing Service, and these kinds of services are "internal" services that are required to support a Customer Facing Service but have no direct interaction with the customer.

For more information about entity types in the above packages, please refer to *Telco Universe Reference Guide*.

2.2.6 Relationships between Entity Types

The HP SQM Solution comes equipped with pre-defined relationships that can be used to represent the hierarchy, link and dependency of entities. The relationships available in the SQM Solution are in addition to those available in BSM. The SQM Solution exploits the existing BSM relationships to create new relationship instances defining the dependencies between the different models existing in Telco Universe.

The following examples show that the Telco Universe model consists of multiple instances of a single BSM relationship, representing the dependencies between different entities:

Relationship: Located In (sid_link_located_in)

FromModel Name: Compound Resource (sid_compound_resource)

EndModel Name: Location (location)

Description: The sid_link_located_in BSM relationship is used to identify link between the Compound Resource and Location entities.

Relationship: Specified By (sid_link_specified_by)

FromModel Name: Resource (sid_resource)

EndModel Name: Specification (sid_specification)

Description: The sid_link_specified_by BSM relationship is used to identify link between the Resource and Specification entities, hence defining a new relationship instance.

For a full list of relationships defined in the SQM Solution Telco Universe model, please refer to *Telco Universe Reference Guide*.

2.2.7 Calculated Relationship

Besides Relationship, in SQM solution, there are also calculated relationships defined between relative CI Types.

The following example shows that the Telco Universe model consists of relative calculated relationship for each relationship, to enable KPI propagation:

Relationship: Located In (sid_link_located_in)

FromModel Name: Logical Resource (sid_logical_resource)

EndModel Name: Location (location)

Description: The sid_link_located_in BSM relationship is used to identify link between the Logical Resource and Location entities.

Calculated Relationship: sid_link_located_in

FromModel Name: sid_logical_resource

EndModel Name: location

calculated-link-type: impact_dependency

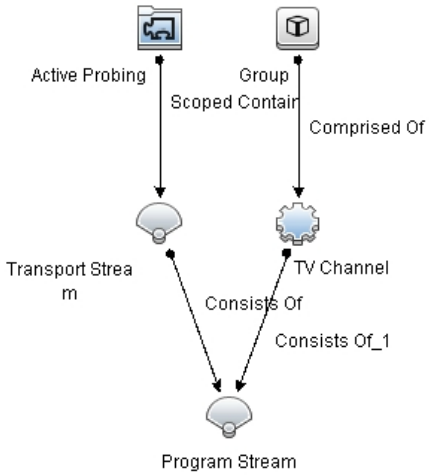
is-forward: true

Description: The sid_link_located_in calculated relationship represents the fact that one Logical Resource CI is linked to another Location CI using an Impacted By (Directly) relationship. The CIs can be seen in the same model.

2.3 Service View

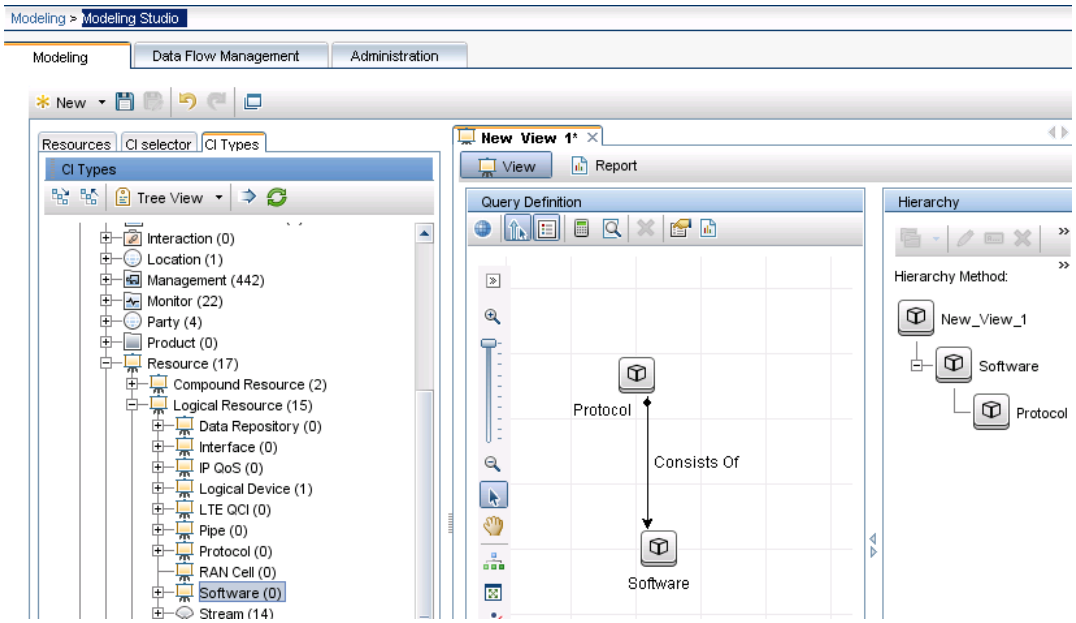
In SQM solution, the structure of a Service View is built using the entity types and the relationships pre-defined in the Telco Universe model. The view automatically displays all entity and relationship instances present in the RTSM, which matches the defined view structure.

The following figure shows an example Service View:



To create a service view, you will be required to perform the following steps.

1. In the BSM GUI, browse to Administration > RTSM Administration > Modeling > Modeling Studio, go to Resource panel, select "Resource" type as View
2. Select a folder (create a new one if needed), click button New and select Pattern View. In the New Pattern View dialog box, select the base TQL query on which your new view is based, or select Create new query to build a new TQL query. The Pattern View Editor opens.
3. Note: Normally choose Create a new query. If a query is already available, user can also create a view based on the existing query.
4. Drag CI Types from left "CI Types" panel, adjust the hierarchy between selected CI Types using right "Hierarchy" panel
5. Set up a relationship between the selected CI Types. Relationships are pre-defined in the Telco Universe model



6. You can also configure constraints for a selected relationship such as:

Filtering: specifying attributes for the target entity. For example, only retrieve program streams that are updated today

Cardinality: defines how many nodes you expect to have at the other end of the relationship. For example, in a relationship between Program Stream and Transport Stream, if the cardinality is 3:1, only the transport streams that are connected to 3 program streams will be retrieved.

7. Save the newly created view to retrieve and display the qualified entities and relationships.

For more information about creating Pattern View using the Administration Interface, refer to the Chapter 10 of the *RTSM Modeling Guide*.

Chapter 3

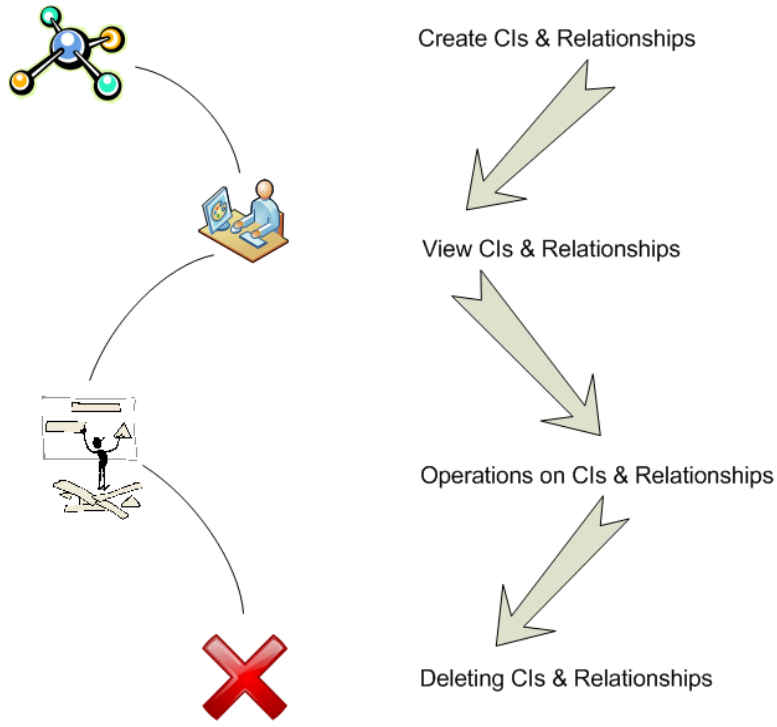
Service Instantiation

A service is composed of service component instances known as Configuration Items (CIs), organized using relationships, which represents the mutual dependencies of the CIs. The notion *Instantiating a service* is used to describe the complete lifecycle of a CI and its relationships, which includes the following stages:

- Creating CIs and relationships
- Viewing CIs and relationships
- Operations/modifications on CIs and relationships
- Deleting CIs and relationships.

It is important to know that instances of the relationships between the CIs must be created, as well as the CIs. The Configuration Items and the relationships are always created, modified and deleted according to what is defined in the Telco Universe model. It is not possible to create, modify or delete a CI or a relationship if it is not allowed by the Telco Universe model. For instance, you cannot create a relationship instance of type *Depends On* between the instances of CI types *Logical Resource* and *Physical Resource*, if the Telco Universe model prevents the creation of such a relationship between the two instances.

The service instantiation stages are discussed in more detail in the following sections.



3.1 Creating CIs and Relationships

The Configuration Items and their relationships can be created, modified and deleted using one of the following methods:

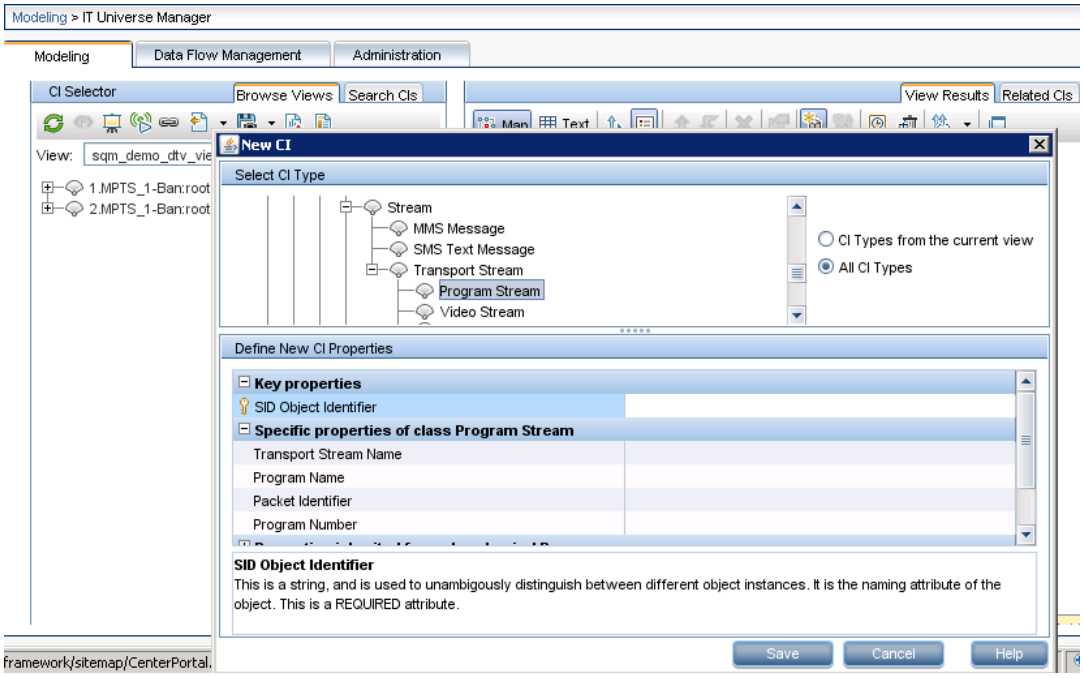
- Administration Interface
- Synchronization between the RTSM and the Configuration Management Systems(implemented with HP uCMDB)
- Unified Topology Manager Populator
- BSMC Topology Script
- SiteScope Topology Script
- RTSM Enrichment Rule
- Discovery & Dataload Pack.

These methods are discussed below in detail.

3.1.1 Administration Interface

The administration interface provided by BSM enables you to create CIs and define relationships manually by selecting the desired CI types and pre-defined relationships in the Telco Universe model. You can only create, modify or delete a CI or a relationship if it is allowed by the Telco Universe model.

CI creation: On BSM GUI, browse to Administration > RTSM Administration > Modeling > IT Universe Manager, click “New CI” icon, set CI attribute values in New CI dialog



CI/relationship modification and deletion: On BSM GUI, browse to **Admin > RTSM Administration > Modeling** > Enrichment manager, create and configure a new enrichment rule to update/delete CIs, or to create/update/delete relationships

For more information about creating CIs and relationships using the Administration Interface, refer to Chapter 8 IT Universe Manager of the *RTSM Modeling Guide*.

3.1.2 RTSM-CMS Synchronization

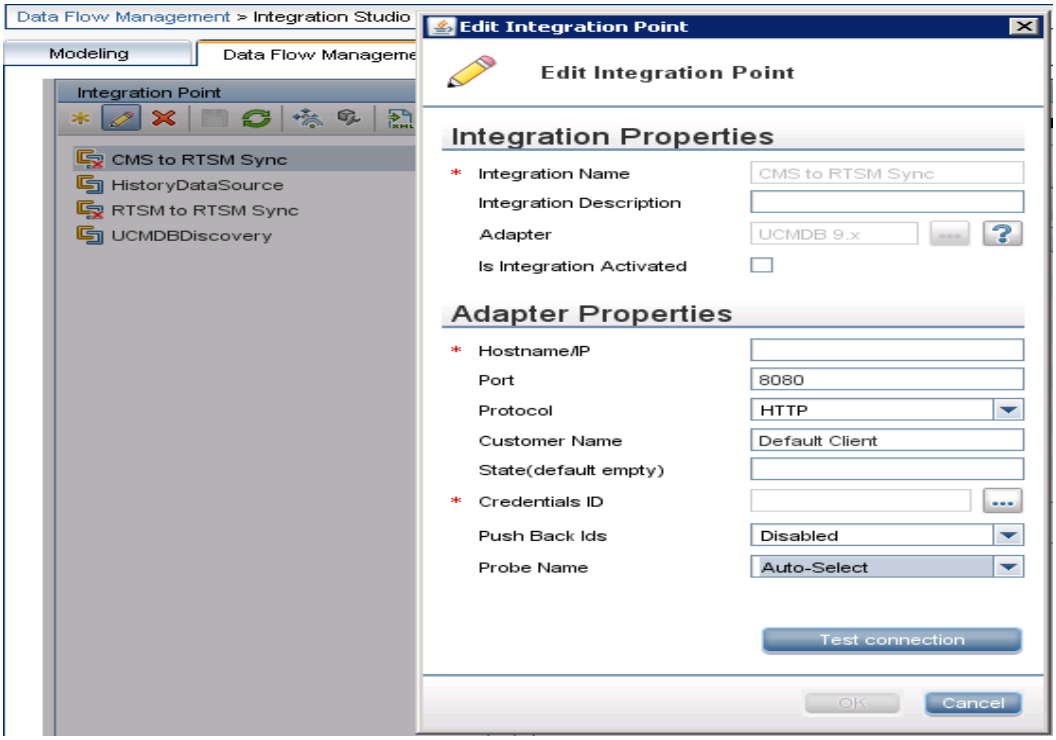
RTSM supports integration with other CMDBs as part of a configuration management system (CMS) to synchronize CI topology data.

The RTSM-CMS Synchronization method uses the Integration Studio to create an integration point for CMSRTSM synchronization. Here the CMS can be an RTSM installation or a standalone CMDB.

Steps:

- Deploy CMStoRTSM_Sync.zip package
- Define an integration point
- Navigate to Admin > RTSM Administration > Data Flow Management > Integration Studio.
- Select the CMS to RTSM Sync integration point.
- Click the Edit Integration Properties button.
- Fill below fields: Credentials, Hostname/IP, Is Integration Activated and Probe Name.
- Click Test Connection and then click OK.
- Schedule the CMS to RTSM Sync population jobs
- Click the Run Diff Job button for each job to make sure that the integration has been successfully configured.

The following figure shows the Edit Integration Point dialog:



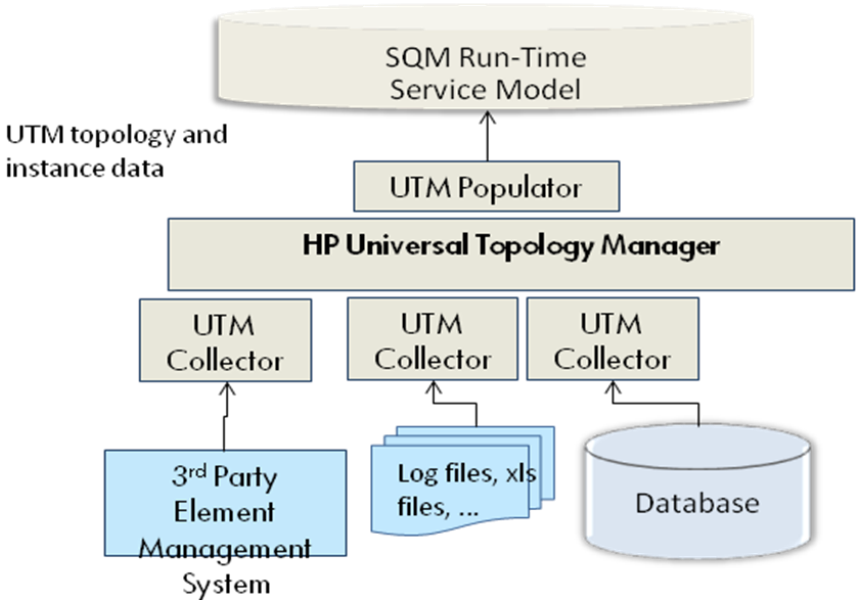
For detailed information, refer to the *RTSM Best Practice document*.

3.1.3 UTM Population

HP UTM is an integration platform for the other OSS products. It can manage many domains configuration data such as Transmission, Switching, 3G, ATM, NGN, IP, FR, Environment etc.

The UTM server maintains up-to-date topology and configuration from various sources (3rd Party Inventory, EMS, Log files …).

The UTM populator populates the up-to-date instance data into the SQM RTSM.



3.1.4 BSMC & SiteScope Topology Script

The BSMC or SiteScope topology script is used to create target CIs and relative relationships. The functionality is implemented by configuring BSMC policies or SiS integration monitors to map to the monitored system properly.

BSMC policies are used by the Service Adapters to integrate data from the monitored systems into the HP Business Service Management. There are several types of policies for various purposes. The HP SQM Solution employs *Event Web Service Listener* and *Event Web Service Listener Script* to create CIs and relationships in the CMDB.

Event is Integration Type; *Web Service Listener Script* and *Web Service Listener* are Policy Types.

The SiS topology scripts are used in SQM Solution 3.1 Service Adapters.

For more information about creating CIs and relationships using the Sitescope Topology Script, refer to the *Using SiteScope Guide*.

Below figure shows an example Topology Script. Its purpose is to create Program Stream instances: 3 attributes values will be set, including the key attribute sid_object_identifier.

Topology Settings

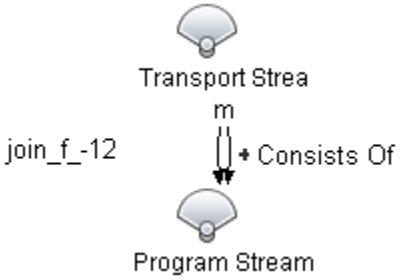
plate: Custom Load Script

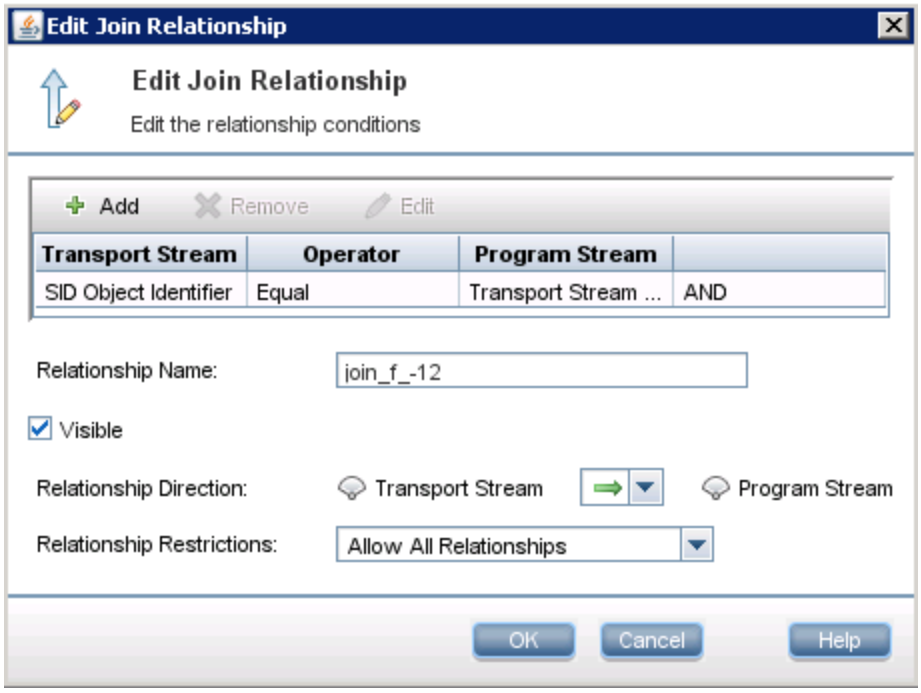
```
1  import logger
2  import modeling
3  from appilog.common.system.types.vectors import ObjectStateHolderVector
4  from appilog.common.system.types import ObjectStateHolder
5  from appilog.common.system.types import AttributeStateHolder
6  from com.hp.ucmdb.discovery.library.scope import DomainScopeManager
7
8
9  def createCIs(CiName):
10
11   osh = ObjectStateHolder("dtv_program_stream")
12
13   osh.setAttribute(AttributeStateHolder("name", CiName))
14   osh.setAttribute(AttributeStateHolder("display_label", CiName))
15   osh.setAttribute(AttributeStateHolder("sid_object_identifier", CiName))
16
17   logger.debug("Program Stream CI instance (%s) has been created", CiName)
18   return osh
19
20 def DiscoveryMain(Framework):
```

3.1.5 RTSM Enrichment Rule

The Enrichment rule method of creating CIs and relationships involves a certain pre-defined condition that must be met for the CIs and relationships to be auto-discovered and added to the RTSM. You can define a condition for the enrichment rule as far as it is allowed by the Telco Universe model.

For example, you can create a specific relationship between two CIs of different types if the CIs have a certain common attribute. The conditions related to discovery of such CIs are defined in the enrichment rule. The following figures shows that a "Consists Of" relationship is created between two different CIs with certain common attribute. This common attribute is discovered by the Join condition in the enrichment rule. In this example, the Join condition is pre-defined in the enrichment rule and is aimed at discovering eligible CIs, thus enabling the enrichment rule to create appropriate relationships between the discovered CIs.

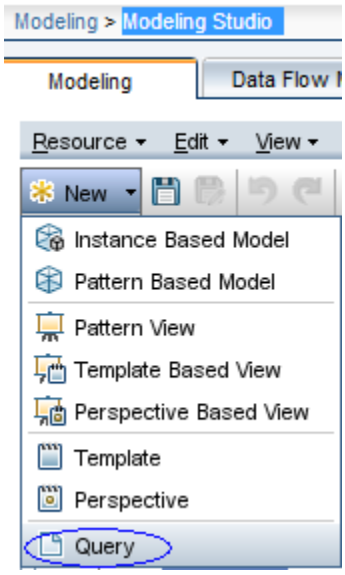




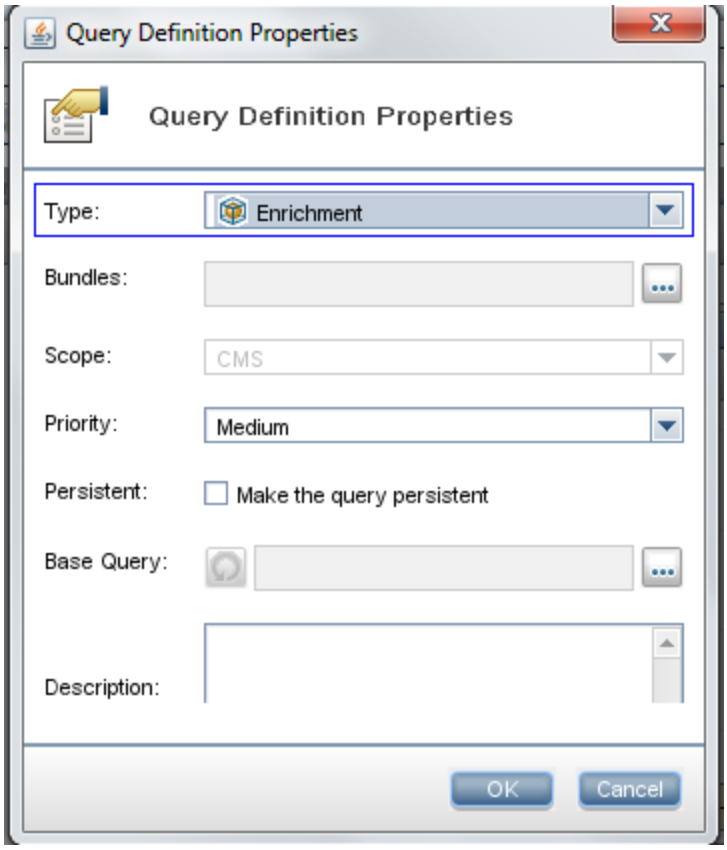
3.1.5.1 How to define an Enrichment Rule

To define the Enrichment Rule, please follow the below steps:

1. Create Query for Enrichment Rule
    a. In BSM GUI, browse to **Admin > RTSM Administration > Modeling > Modeling Studio**
    b. Click **New** button and select **Query**

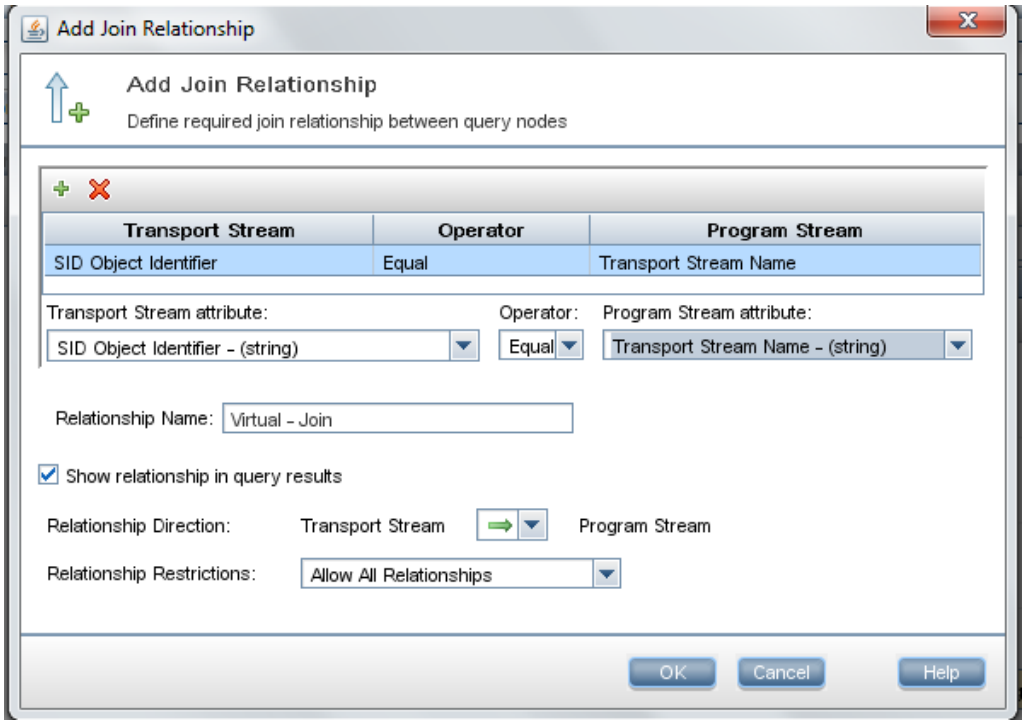


    c. Click button  to open Query Definition Properties dialog, set Type as Enrichment



d. Pull 2 CI Types “Transport Stream” and “Program Stream” from left **CI Types** panel into the query

e. Click button  to create a Join Relationship as the following figure



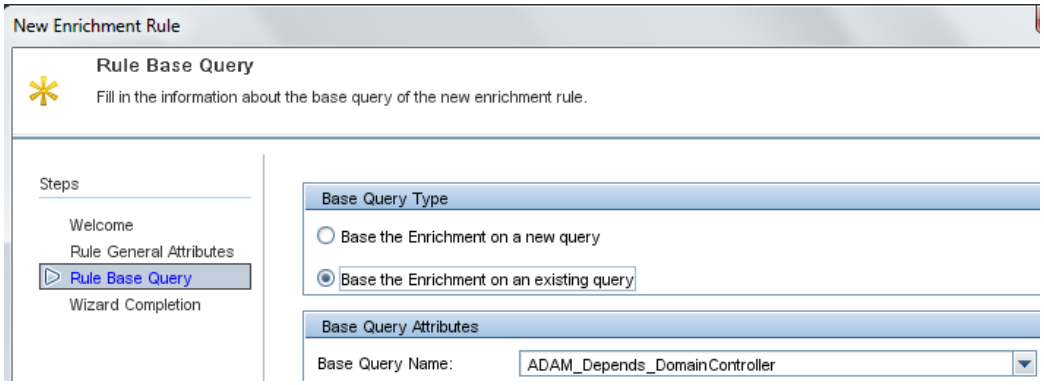
f. Save the query

2. Create Enrichment Rule with the Query previously created

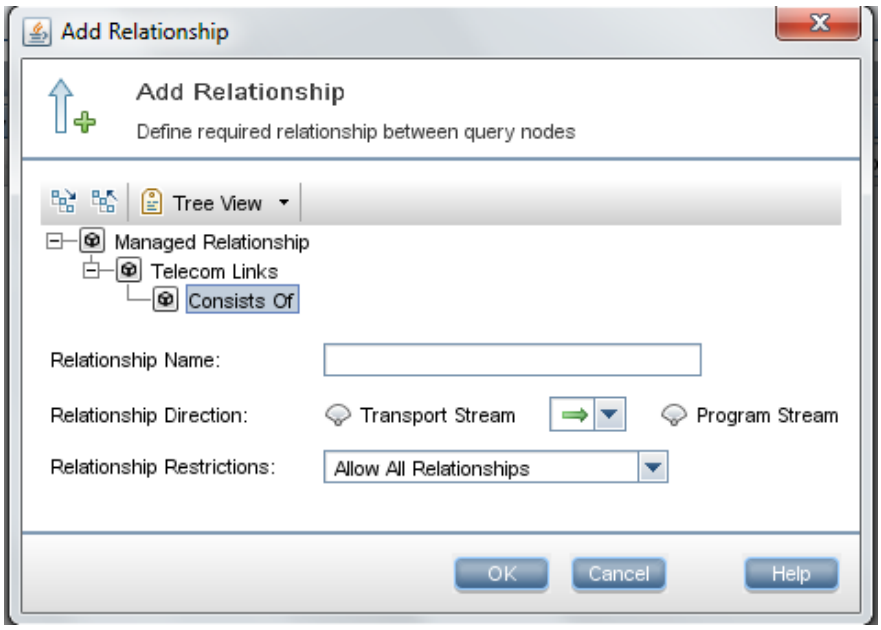
   a. In BSM GUI, browse to **Admin > RTSM Administration > Modeling > Enrichment manager**

   b. Click button  to create a new Enrichment Rule

   c. In **Rule Base Query** panel in **New Enrchment Rule** dialog, select option "**Base the Enrichment on an existing query**", then choose previulsy created query



   d. Select "**Enrichment Mode**", and click button  to add a "Consists Of" relationship



   e. Save the Enrichment Rule.

For more information about creating CIs and relationships using the CMDB Enrichment Rule, refer to *Chapter 13 Enrichment Manager* of the *RTSM Modeling Guide*.

3.1.6 Discovery and Dataload Pack

The Data Flow Probe on Linux is intended for integration use only, and cannot be used for discovery. That means, this Probe installed on Linux server does not appear in the Data Flow Setup window and Discovery jobs cannot run on Linux Server.

3.1.6.1 Discovery and Dataload Pack on windows

The Discovery and Dataload Pack automatically creates the Configuration Items (CIs) and the relationships discovered from the data source, in the uCMDB.

This method works for both BSM RTSM and standalone UCMDB.

It allows auto discovery of CIs and relationships based on the information retrieved from external database or XML files. The created CIs and relationships are then stored in the CMDB.

For instance, the SQM Solution employs the TeMIP DDP for the automatic creation of the entities and relationships discovered by external TeMIP Service Console. This may include, but is not limited to:

- TeMIP Collection, TeMIP Managed Object, TeMIP Service Console and TeMIP Web Server CIs
- The relationships between the discovered CIs.

For more information about creating CIs and relationships using the Discovery and Dataload Pack, refer to the *HP SQM Solution Generic Discovery & Dataload Pack Integration Guide*.

3.2 Viewing CIs and Relationships

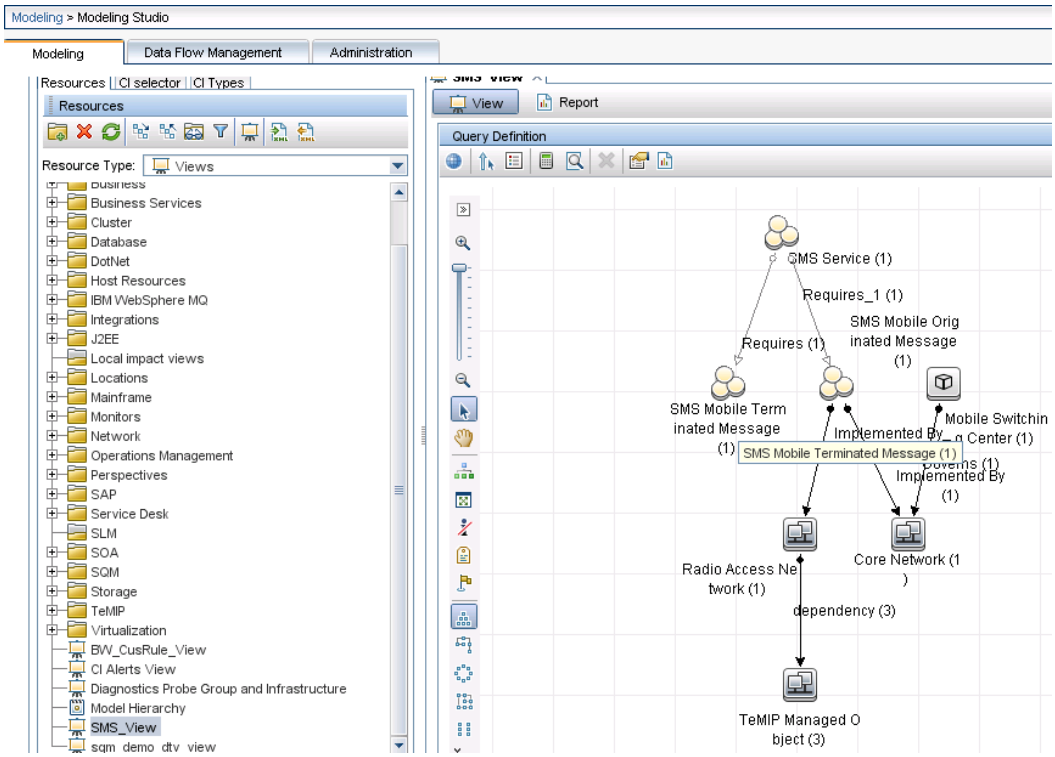
Once the Configuration Items and their relationships are created in the CMDB, you can view a dependency tree for each instance showing different CIs and the existing relationships. The following types of views can be defined in the Modeling Studio interface:

3.2.1 Pattern Views

Pattern views are based on a query that formulates the structure of the view i.e. the view displays only those CIs and relationships that satisfy the query definition. When the view is displayed, it queries the CMDB for all elements that fit the query, and automatically updates the view with those elements.

The following figure shows an example of a pattern view and displays the different entities and relationships discovered as a result of matching the condition set in the pattern view query.

A pattern view is organized with the number of instances of the CIs and relationships. They are displayed with their names and form a hierarchical tree showing the dependencies that exist between the entities.



3.2.2 Perspective based Views

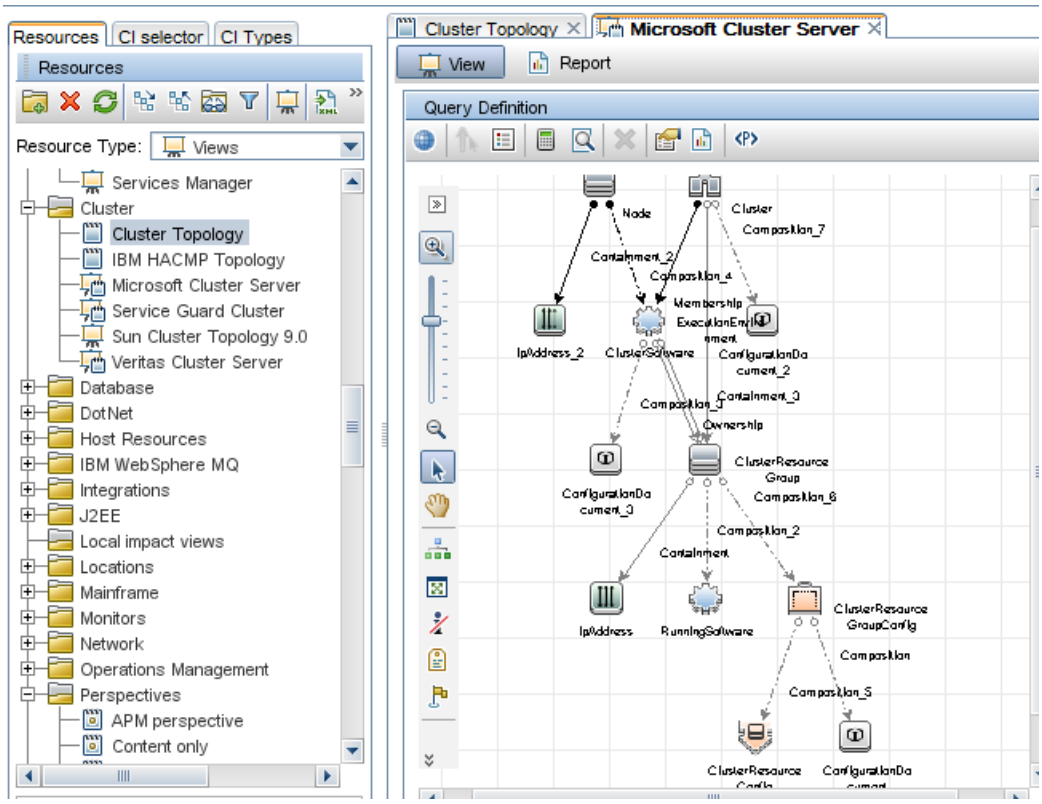
Perspective based views are built by selecting a collection of individual CIs and applying a special type of template, known as a perspective, to it. A perspective is a template that is applied to the CI selection, similar to the pattern in a pattern view.

For information about creating Perspecitve based View, refer to section *Building a Perspective Based View* of the *RTSM Modeling Guide*.

3.2.3 Template based Views

Template based views also rely on queries and are reusable i.e. templates allow you to save the folding rules, relationship rules and parameters you have set in your definition. This makes it easier to build more views with the same settings without having to re-enter the setting information. Any changes made to a template affect all existing views based on that template.

The below figure shows an example Template based View “Microsoft Cluster Server”, which is based from template “Cluster Topology”



For more information about the views available in the HP SQM Solution, refer to the *RTSM Modeling Guide*.

3.3 Auto Removal of CIs and Relationships

The aging mechanism is an auto-delete feature for the CIs and relationships that have not been accessed for a long period. The aging mechanism is disabled by default, and must be enabled in the CMDB settings to work.

When the aging mechanism is enabled, the CI becomes a candidate for deletion if the CI has not been accessed for a specified period (by default, 14 days). By default, the CI is deleted 28 days after the last access time. These default values are set per CI Type and can be changed in the CI Type Manager.

CIs and relationships can also be deleted using three other methods that are already explained earlier. Refer to *Section 3.1 Creating CIs and Relationships* for more information.

For more information about the Aging Mechanism, refer to the *"CI Lifecycle and the Aging Mechanism"* in the *RTSM Administration Guide*.

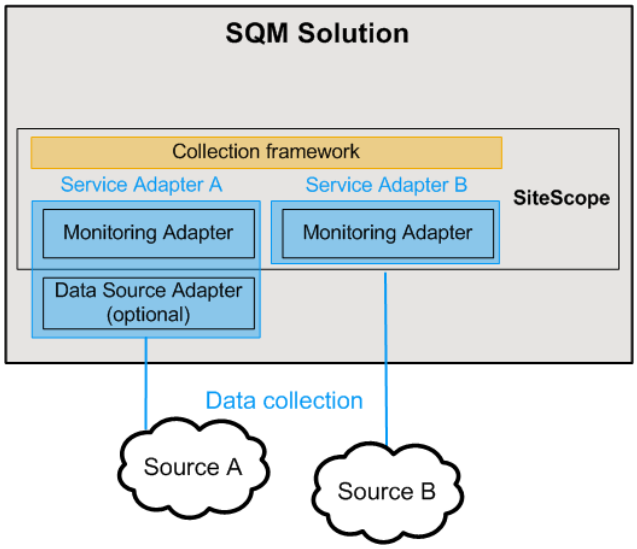
Chapter 4

Service Adapter

A Service Adapter is responsible for retrieving and updating data in the database. The major attribute of a Service Adapter is that it is aware of how specific data is organized and knows the vendor-specific protocol for communication with the database.

A Service Adapter may be composed of two types of adapters:

- A Monitoring Adapter: it is a set of BSMC policies and are responsible for collecting specific data and sending metric/event samples to the BSM
- A Data Source Adapter: it is responsible for collecting data from the data source, formatting data and then sending it to the database or Monitoring Adaptor. The use of a Data Source adapter becomes optional if the Monitoring adapter is able to collect data directly from the data source.



The Monitoring Adapter is an integral part of the Service Adapter:

- It uses the BSMC policy to publish samples with a format defined in the mapping field
- It only requires the policy configuration details.

The Data Source Adapter plays the following vital role for the Service Adapter:

- It adapts the interface of the data source to what is expected by the BSMC policy (usually used with the Web Service Listener)
- It requires customized development (vendor-specific) and runs as a stand-alone application.

4.1 Collection of Data

There are two different procedures to collect data from the data source. The first procedure is using the BSMC policies, which collects the data from the data source e.g. Database, in some cases using the topology script.

The second procedure is using the Data Source Adapter, which collects the raw data from the data source and then converts the data to a suitable format for the BSMC policies. Then the formatted data is sent to the relevant BSMC web service policies or is saved into database.

4.2 BSM Samples

HP Service Management Foundation acquires the value collected by the HP SQM Service Adapters by means of samples. To explain this concept, we can use an example BSMC policy monitor TMP_FLT_CommunicationsAlarm, which is a policy in TeMIP Service Adaptor. Its type is **Event Web Service Listener Script**. In this example, TSC works as a DSA, collected alarms and send samples to the BSMC policy. The policy corresponds to the CommunicationsAlarm KPI and monitors the KPI for the relevant CI. The monitor collects the fields from received samples, and sends Legacy Events type samples to BSM.

For more information about BSMC policy, refer to the *Using BSM Connector* document.

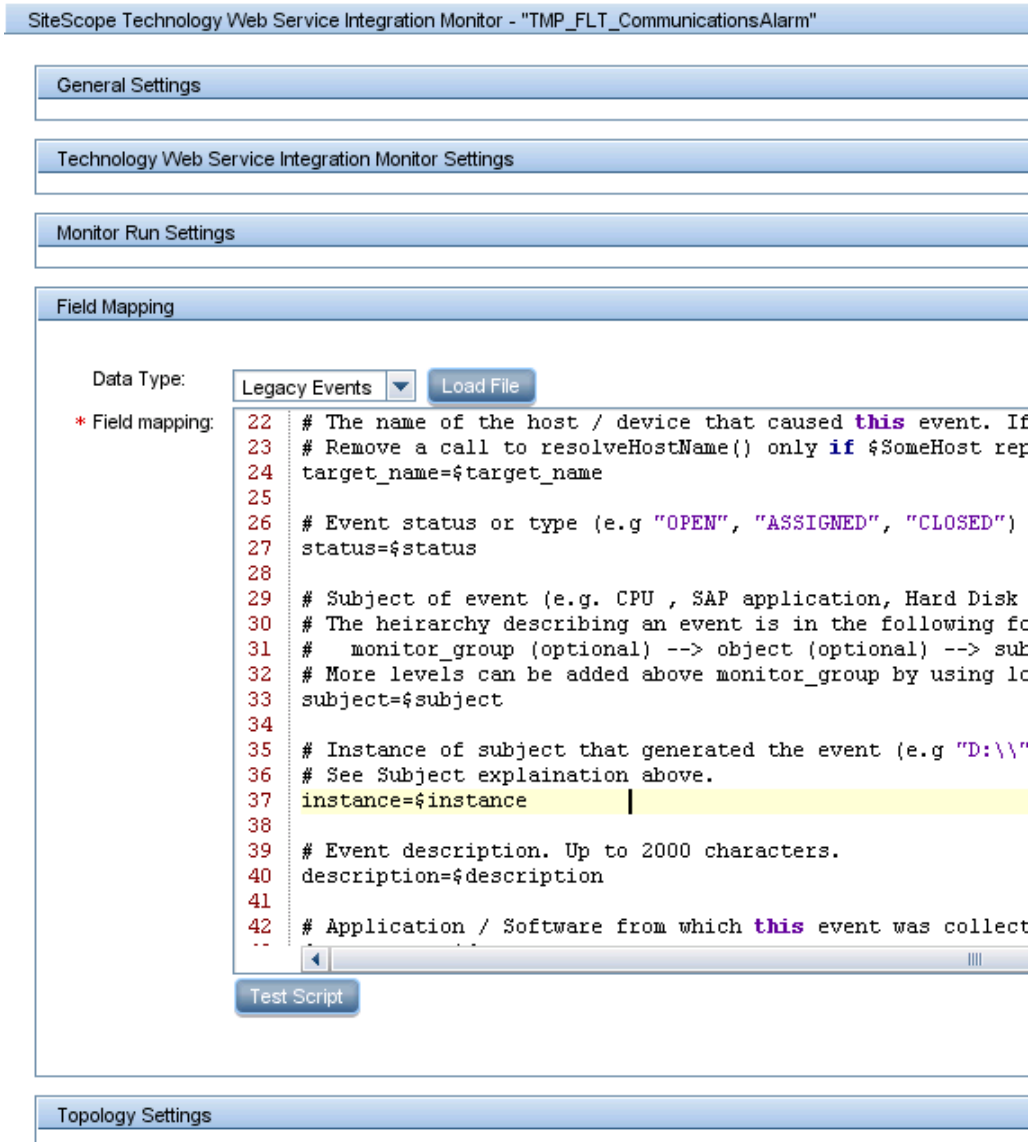
Below figure shows the configuration of monitor with data type as **Legacy Event**:

Description of relative fields:

- severity Severity of event.
- target_name The name of the host / device that caused this event.
- data_source In TeMIP VP, it is to identify the type of Event

  Available values include:

  TeMIP_CommunicationsAlarm, TeMIP_EnvironmentalAlarm, TeMIP_ProcessingErrorAlarm, TeMIP_QualityofServiceAlarm, TeMIP_SelfManagement
- Additional fields:
  - attr1, attr2, attr3, attr4
  - attr5 For long string values up to 2000



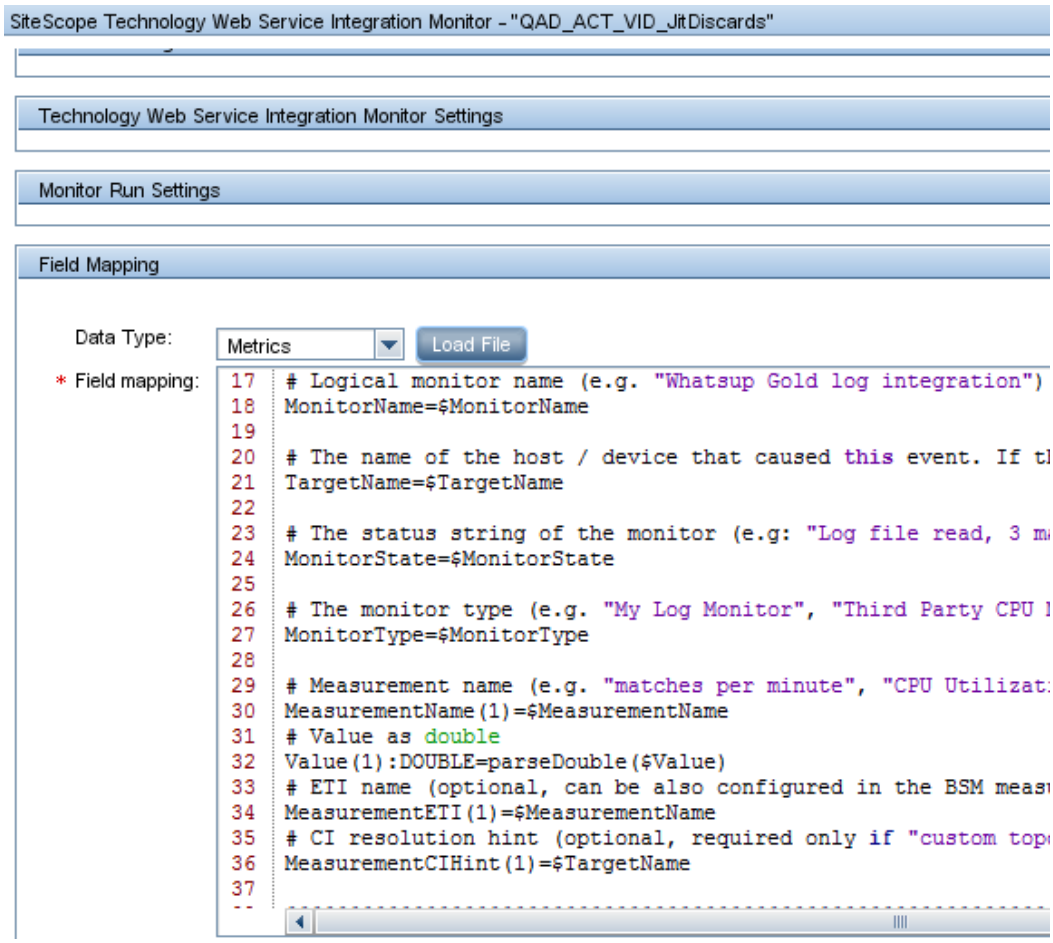
Below figure shows the configuration of monitor with data type as **Metrics**.

Description of relative fields:

- TargetName used to identify the target CI
- MeasurementName used to identify the target HI
- Value used to set sample value

Note: other field can also be used to set sample value if using SQM Generic Sample Rule in HI Configuration

- MeasurementETI used for ETI resolution
- MeasurementCIHint used for CI resolution


SiteScope Technology Web Service Integration Monitor - "QAD_ACT_VID_JitDiscards"
Technology Web Service Integration Monitor Settings
Monitor Run Settings
Field Mapping
Data Type:
Metrics
Load File
* Field mapping:
17 # Logical monitor name (e.g. "Whatsup Gold log integration")
18 MonitorName=$MonitorName
19
20 # The name of the host / device that caused this event. If tl
21 TargetName=$TargetName
22
23 # The status string of the monitor (e.g: "Log file read, 3 m
24 MonitorState=$MonitorState
25
26 # The monitor type (e.g. "My Log Monitor", "Third Party CPU
27 MonitorType=$MonitorType
28
29 # Measurement name (e.g. "matches per minute", "CPU Utilizat
30 MeasurementName(1)=$MeasurementName
31 # Value as double
32 Value(1):DOUBLE=parseDouble($Value)
33 # ETI name (optional, can be also configured in the BSM meas
34 MeasurementETI(1)=$MeasurementName
35 # CI resolution hint (optional, required only if "custom top
36 MeasurementCIHint(1)=$TargetName
37

Chapter 5

Health Indicator, Key Performance Indicators, Business Rules and Assignments

5.1 Health Indicators

Health indicators (HIs) correspond to the lowest level metrics and events collected by the HP Service Management Foundation. These HIs are then transformed into new calculated values using Business Rules, called KPIs in the BSM terminology.

There are three types of data sources that can contribute to an HI's status and value: Legacy Events, OMi Events and Metrics. BSM Connector send events to Service Health (for example, CPU load exceeded threshold); also, BSMC can send samples containing metrics (for example, response time = 6 milliseconds).

When an event is sent to Service Health, it is sent with an ETI (event type indicator). The ETI includes a name and a state, for example CPU_Load:exceeded. Using HI definitions in the indicator repository, Service Health translates the ETI state into one of the standard Service Health statuses (Critical, Major, Minor, and so on).

Metric-based HIs apply calculation rules to the samples generated by the data collectors, to create a calculated HI value. For example, DTV data collector can collect several response time samples. A SLM calculation rule will calculate the average of all those samples, and set the SLM HI's status and value accordingly.

For more information about on HIs in Service Health and SLM, see "*Health Indicators and KPIs - Overview*" in *Using Service Health*

5.2 Key Performance Indicators

Key Performance Indicators in an SMF environment are composed of

- KPIS inherited from the base HP Application Performance Management Foundation (BSM)

- KPIs originating from the SQM that provides additional KPI definitions focusing on the telecom domain, as defined by telecom standards.

Only the later are described here.

The SQM Key Performance Indicators which are standard based and used to monitor the quality of service and to track critical KPIs and KQIs over time. These KPIs are of different types:

1- Generic KPIs are used to measure collective effect of service performances which together determines the satisfaction of a user of a service. These generic KPI definitions are based on 3GPP and ITU-T standards: ITU-T Recommendation E.800, ETSI TR 126 944/3GPP TR 26.944. Generic KPIs apply to all services, and are independent from the service specificity, thus supporting SQM synthetic views of the service quality achievements. For example, the service accessibility reflects the ability for the user to access the services whether the access technology in 2G or 4G.

2- Common KPIs are KPIs which apply to more than one service. For instance a success ratio applies to the number of successful PDP context activation, as it can be applied to the number of successful voice calls. This allows SQM to keep the number of definitions within a reasonable range while preventing redefining several times the same type of metric. These definitions are also based on the relevant 3GPP and ITU-T standards.

3- Domain specific KPIs are measurements which apply to a specific domain or service. These are service specific and are usually used at the lower levels of the service model. Example of service specific KPIs are the “program rate” for Video on demand and “Successful delivery ratio” which apply to SMS and MMS services. These definitions are also based on the relevant 3GPP and ITU-T standards.

KPIs are calculated along their propagation in the service logic CIs according to the business rules. In addition to values, there are also business rules that apply to the CI status and the propagation of these statuses along their propagation in the service logic CIs.

KPIs can be calculated using statuses of HIs, KPIs, or a combination of these. For example, you can specify a rule that sets the severity of the KPI to the worst severity status of any assigned HI, or to the average severity status of all child KPIs.

In the SQM Solution, similar sets of KPIs are available in Service Health (Dashboard) as well as in SLM. The Service Health KPIs work only with the current data to provide the status of the KPI, whereas the SLM KPIs have access to historic data to work with and perform various calculations and comparisons, to generate reports for instance.

Important: In BAC 8, KPIs were calculated for monitor CIs (also known as leaf CIs). From BSM 9, HIs are calculated directly on monitored CIs, and KPIs are calculated either based on HIs, or based on other KPIs, as described above.

5.2.1 HP SMF Generic KPIs

The HP SMF defines a set of 11 generic Key Performance Indicators. Generic KPIs perform the functionality described in the previous section, and serve as KPI categories. Therefore, a Generic KPI may be calculated from a group of logically similar HIs.

KPI name	Description	Example HI
accessibility speed	Time needed to obtain a service when requested by the user	Call Setup Time
accessibility accuracy	Degree of correctness with which the service is obtained	Number of wrongly dispatched calls

Accessibility	The ability to access a service	PdP context activation failure
retainability speed	Rate at which the service is provided, once obtained	Program Rate
retainability accuracy	The degree of correctness with which a service is provided, once obtained	Mean Opinion Score
Retainability	Captures how much a user can enjoy a service	Mean Opinion Score, Perceptual Speech quality
data accuracy	The degree of correctness of the data. For instance, this degree of correctness will be affected if there is a loss of connection with the data source and the metrics and or events cannot be collected during a certain period of time by the HP SQM solution	N/A
Support	The ability to provide a service and assist in its utilization	Number of pending tickets
Security	The protection provided against fraudulent use, unauthorized monitoring, malicious impairment, misuse, human mistake and natural disaster	Number of refused connection attempts
Availability	The ability of a service to be obtained and used within specified tolerance and other given conditions	Availability
Integrity	Represents the degree of accurateness of a calculated measurement. This is used to weight the degree of confidence the user can have in a KPI which is calculated from several lower KPIs, one or more of which could be missing from the data source.	

Generic KPI List

5.2.2 HP SMF Common KPIs

HP SMF defines a set of 25 common Key Performance Indicators, besides the generic KPIs that described in upper section.

KPI name	Default group rule	Applicable rules
MOS	SQM Min Value	SQM % of Degraded

Mean Delay	SQM Average of Values	Subordinates SQM % of Normal Subordinates SQM % of Violated Subordinates SQM Average of Efficiency % SQM Average of Values SQM Compute MAX(HI, HI2) SQM Compute MIN(HI, HI2) SQM Compute RATE(HI, HI2) SQM Compute SUM(HI, HI2) SQM Max Value SQM Min Value SQM Ratio Above Average SQM Ratio Below Average SQM Set KPI From One child KPI SQM Worst of Siblings SQM number of degraded subordinates API Group And Sibling Rule Average of Values Best Status Rule Percentage Rule Sum of Values Rule Summary of values Worst Status Rule
Call Set-up Mean Time	SQM Average of Values	
Set-up Mean Time	SQM Average of Values	
Packet Error Ratio	SQM Max Value	
Session Set-up Time	SQM Max Value	
Failure Ratio	SQM Max Value	
Average Bandwidth	SQM Average of values	
Bandwidth	SQM Min Value	
Second Attempt Success Ratio	SQM Min Value	
Transfer Delay	SQM Max Value	
Packet Loss Ratio	SQM Max Value	
Set-up Time	SQM Max Value	
Average Throughput	SQM Average of Values	
First Attempt Success Ratio	SQM Min Value	
Mean Time	SQM Average of Values	
Round Trip Time	SQM Max Value	
Trustability	SQM Ratio Above Average	
Call Set-up Time	SQM Max Value	
Session Set-up Mean Time	SQM Average of Values	
Round Trip Mean Time	SQM Average of Values	
Attempts	Sum of Values rule	
Jitter	SQM Max Value	
Success Ratio	SQM Min Value	
Utilization	SQM Min Value	

SQM Common KPI list

5.2.3 HP SMF Domain Specific KPIs

HP SMF includes additional specific KPIs which are similar to Common KPIs in functionality, but targeted at for a specific service domain. Following is an example of the KPIs for each domain pre-defined in SQM Solution:

Digital Services Domain: Video Quality

TeMIP Alarms Domain: Communications Status

For details, please check below KPI lists.

Table 1: Digital TV KPI list

KPI name	Default group rule	Applicable rules
Jitter Discards	Worst Status Rule	API Group And Sibling Rule Average of values Best Status Rule Percentage Rule SQM % of Degraded Subordinates SQM % of Normal Subordinates SQM % of Violated Subordinates SQM Average of Values SQM Average of Efficiency % SQM Compute MAX(HI, HI2) SQM Compute MIN(HI, HI2) SQM Compute RATE(HI, HI2) SQM Compute SUM(HI, HI2) SQM Max Value SQM Min Value SQM Ratio Above Average SQM Ratio Below Average SQM Set KPI from One Child KPI SQM Worst of Siblings SQM Number of Degraded Subordinates Sum of Values Rule Summary of values Worst Status Rule
Out Of Sequence	Worst Status Rule	
Program Rate	Worst Status Rule	
Video Quality	Worst Status Rule	

Table 2: TeMIP KPI list

KPI name	Default group rule	Applicable rules
Environmental Status	TeMIP Worst Child Rule	**Dashboard rules:** API Group And Sibling Rule Best Status Rule TeMIP Worst Child Rule Worst Status Rule **SLM rules:** Group Worst Status Worst Child (Max.) Worst Child (Min.)
Processing Error Status	TeMIP Worst Child Rule	
Quality Of Service Status	TeMIP Worst Child Rule	

Communication Status	TeMIP Worst Child Rule	**Dashboard rules:** TeMIP Worst Child Rule Worst Status Rule **SLM rules:** API Group And Sibling Rule Average Outage Duration Worst Child (Max.) Worst Child (Min.)
Equipment Status	TeMIP Worst Child Rule	
Fault Status	TeMIP Worst Child Rule	

5.3 Business Rules

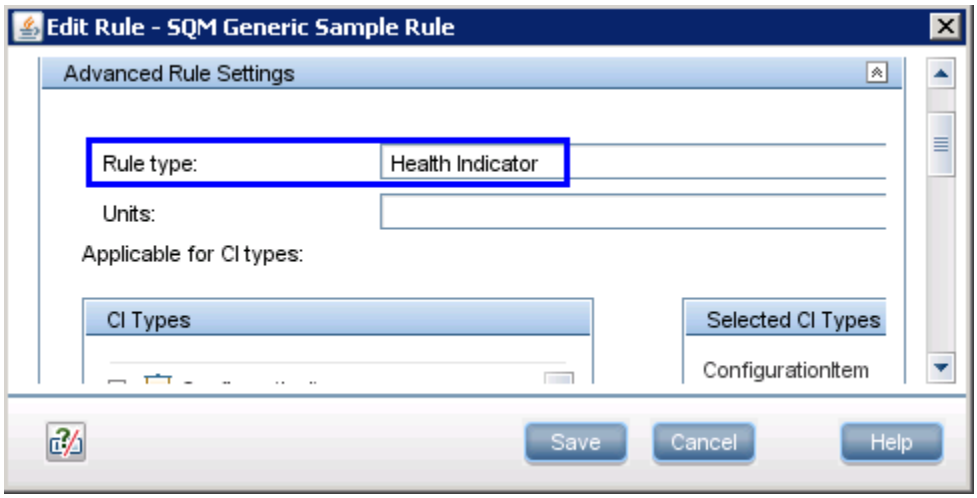
Business Rule defines the logic to be performed in order to compute the measurement for a KPI or HI. Accordingly, there are 2 Business Rule types:

- Health Indicator Rules
- KPI Rules

5.3.1 Health Indicator Rule

Type of business rule that determines health indicator (HI) status based on original sample data coming from monitored CIs.

From following figure, you can see that the value of **Rule Type** field under **Advanced Rule Settings** is **Health Indicator**.



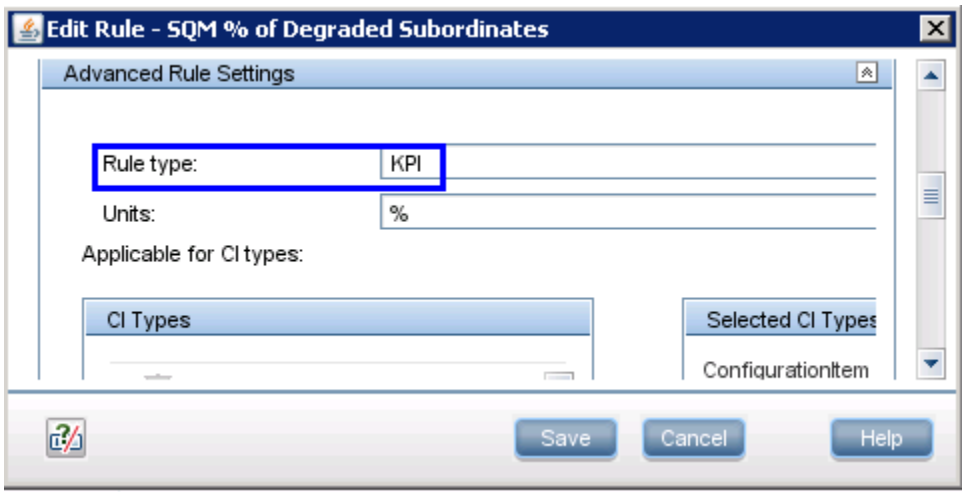
Moreover, in Content Pack definition, the relative filed is **ruleType** and its value is **leaf**. Below is an example element:

```
<rule DisplayName="SQM Generic Sample Rule"
application="dashboard"
classname="com.mercury.am.rules.dashboard.blDashboardRules.FieldTo
ValueRule" description="Calculate HI values, using the value of a
selected field from a sample" domain="Telecom"
resTypeStatus="false" resTypeValue="false" ruleType="leaf"
stableId="0c2f3bb3-23d7-4ed7-b983-8bbcf7ea19cf"
tooltipId="809f69df-a743-4651-b27f-5b90f92829b7" units="">
```

5.3.2 KPI Rule

Type of business rule that determines KPI status based on the calculated results of other KPIs or HIs, rather than from original sample data.

Accordingly, from following figure, you can see that the value of **Rule Type** field under **Advanced Rule Settings** is **KPI**.



In the SQM Solution, a set of pre-defined Business Rules are available in Dashboard as well as in SLM, but it is worthwhile to note that the rules available in Dashboard and SLM are completely independent of each other and have no relation. The Dashboard Business Rules work only with current data or with limited set of historic data to provide the measurement of a KPI, whereas the SLM Business Rules have access to historic data to work with and perform various calculations and comparisons, to generate reports for instance.

5.3.3 SQM Business Rule List

For detailed SQM Business Rule list, please refer the document *HP SQM Solution Business Rule Reference Guide*.

5.3.4 Difference between Java Rule and Groovy Rule

A Java Rule means the Business Rule is code written in Java; and a Groovy Rule means the Business Rule is code written in Groovy.

To implement same function, Java Rule has better performance than Groovy Rule. On the contrary, it is easier to develop a Groovy Rule since Groovy has detailed development guide.

The following table shows the main differences between above 2 types of Business Rules:

	Java Rule	Groovy Rule
Code written	Java	Groovy
Class path	Points to specific class file, e.g. com.hp.sqmbsm.businessrules.dashboard .generic.SQMComputeMaxRule	Points to class path of API rules “API Duration-Based Sample Rule”, “API Group and Sibling

		Rule" or "API Sample Rule", e.g. com.mercury.am.rules.dashboard.blDashboardRules.simplifiedRule.DashboardGroovyRulesGeneratorRule
Rule Parameters	No Rule Parameter "isGroovyRuleType"; No Rule Parameter "rule.template.setting.key"	Has Rule Parameter "isGroovyRuleType" with value set as true; Has Rule Parameter "rule.template.setting.key"
Deployment Method	Copy source file and compile or copy pre-complied class file directly; then deploy Content Pack	Deploy Content Pack (Copy groovy file first if using a text file)
Destination Folder	<DPS_root_directory>\BLE\rules\classes	<DPS_root_directory>\BLE\rules\groovy\rules (if using a text file)

Java Rule and Groovy Rule Differences

5.3.5 Business Rule Usage

Following example shows the usage of Service Health KPI Business Rule **SQM Compute MAX(HI, HI2)**:

1. In a KPI Assignment, add a new KPI Configuration

   Please refer section SQM dashboard KPI Assignment in 5.4.2 for detailed info.

2. Select a KPI

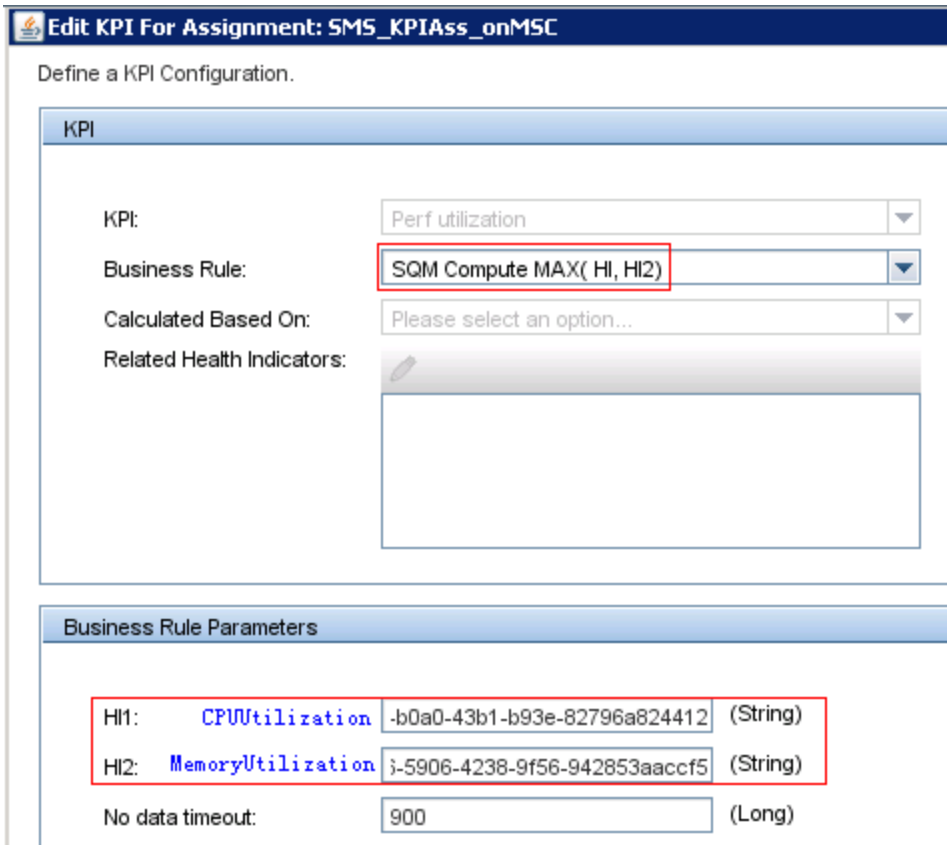
   Make sure BR **SQM Compute MAX(HI, HI2)** is an applicable BR of the KPI.

3. Select **SQM Compute MAX(HI, HI2)** in Business Rule field

4. In Business Rule Parameters, fill HI ID of relative HI HI1 and HI2

   The IDs can be got from HI definition, via **Admin > Service Health > Repositories > Indicators**.

5. Set relative Thresholds.



Following example shows the usage of Service Health KPI Business Rule: **SQM Set KPI from One Child KPI**:

1. In a KPI Assignment, add a new KPI Configuration

   Please refer section SQM dashboard KPI Assignment in 5.4.2 for detailed info.

2. Select a KPI

   Make sure BR **SQM Set KPI from One Child KPI** is an applicable BR of the KPI.

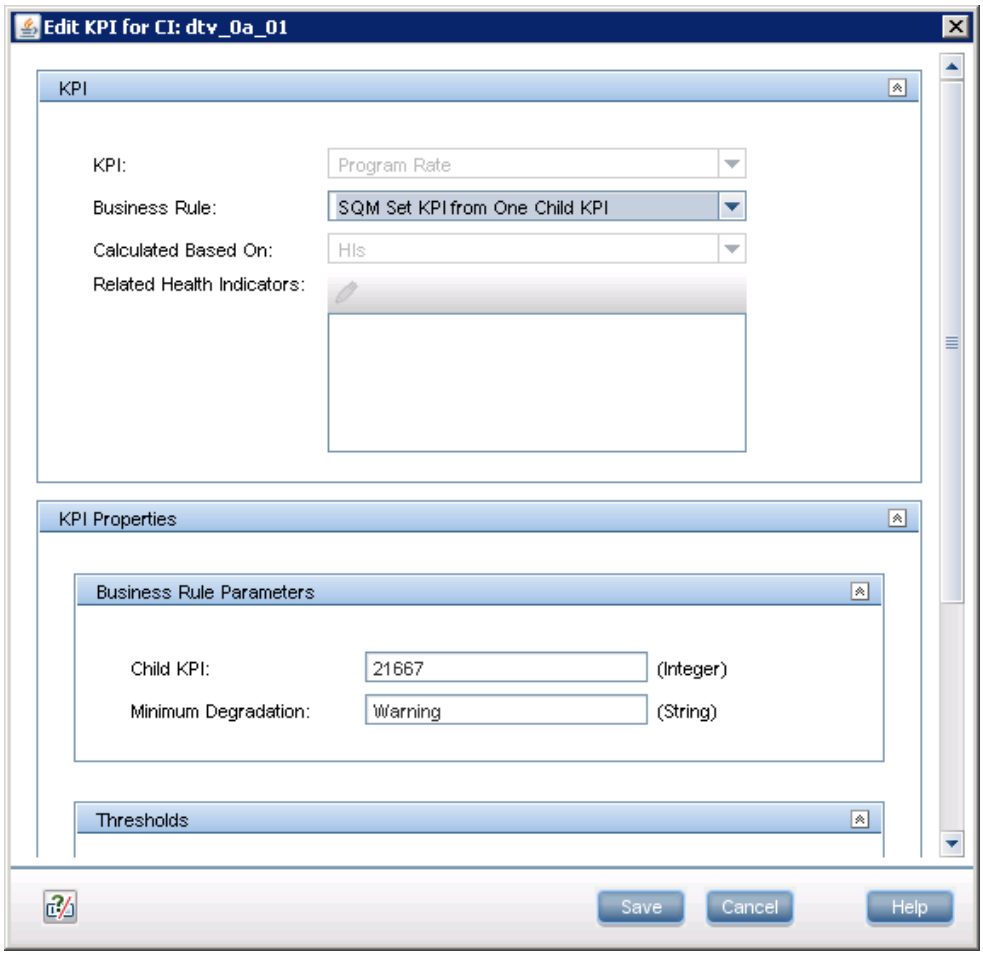
3. Select **SQM Set KPI from One Child KPI** in Business Rule field

4. In Business Rule Parameters, fill the Child KPI and Minimum Degradation

   The Child KPI ID can be got from KPI definition, via **Admin > Service Health > Repositories > KPIs**.

   The Minimum Degradation can be 'Critical', 'Major', 'Minor' or 'Warning'.

5. Set relative Thresholds.



5.4 Assignments

When a new CI is added to the Run-time Service Model (RTSM), the assignment mechanism is automatically triggered. This mechanism assigns the appropriate KPIs, HIs, and context menus to the CI, based on the CI's CI type (CIT).

When a KPI is assigned to a CI, or when a CI is attached to another CI, the propagation mechanism propagates the appropriate KPIs to the parent CIs.

By default, when a KPI is assigned to a CI the KPI is automatically propagated to the CI's parents. Propagation rules enable you to define exceptions to the default KPI propagation, and to propagate other KPIs, the same KPI using a different rule, or no KPIs.

5.4.1 HI Assignment

HI Assignment is a mechanism that is activated to calculate/get data from Metrics or Event samples.

An HI assignment includes 3 parts:

- Assignment Settings
    - Name is mandatory filed, cannot be empty

- ID is a unique GUID. It will be generated by BSM automatically for new HI Assignment.
- Description is optional

- Condition

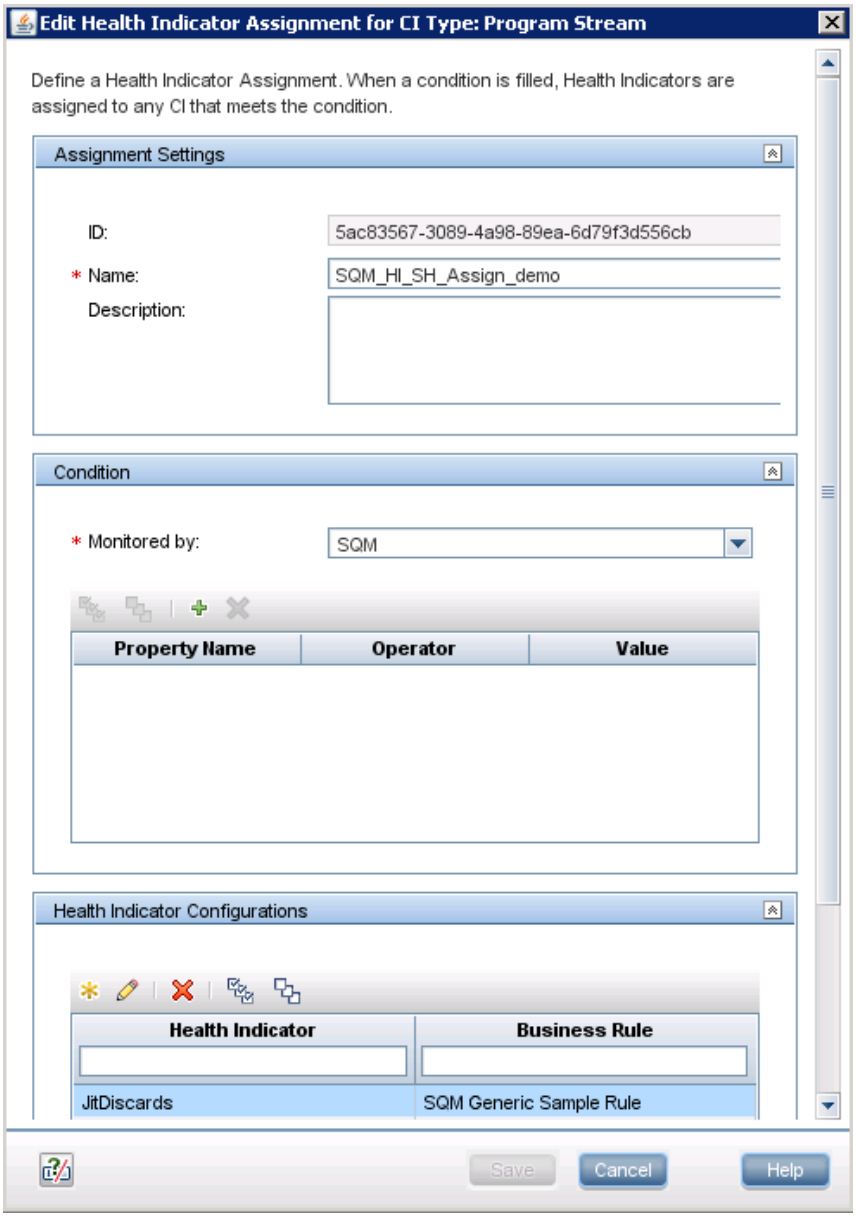
This describes a CI, or sets conditions on the attributes of a CI.

Note: Monitored by = SQM is mandatory for SQM solution.

- Health Indicator Configuration

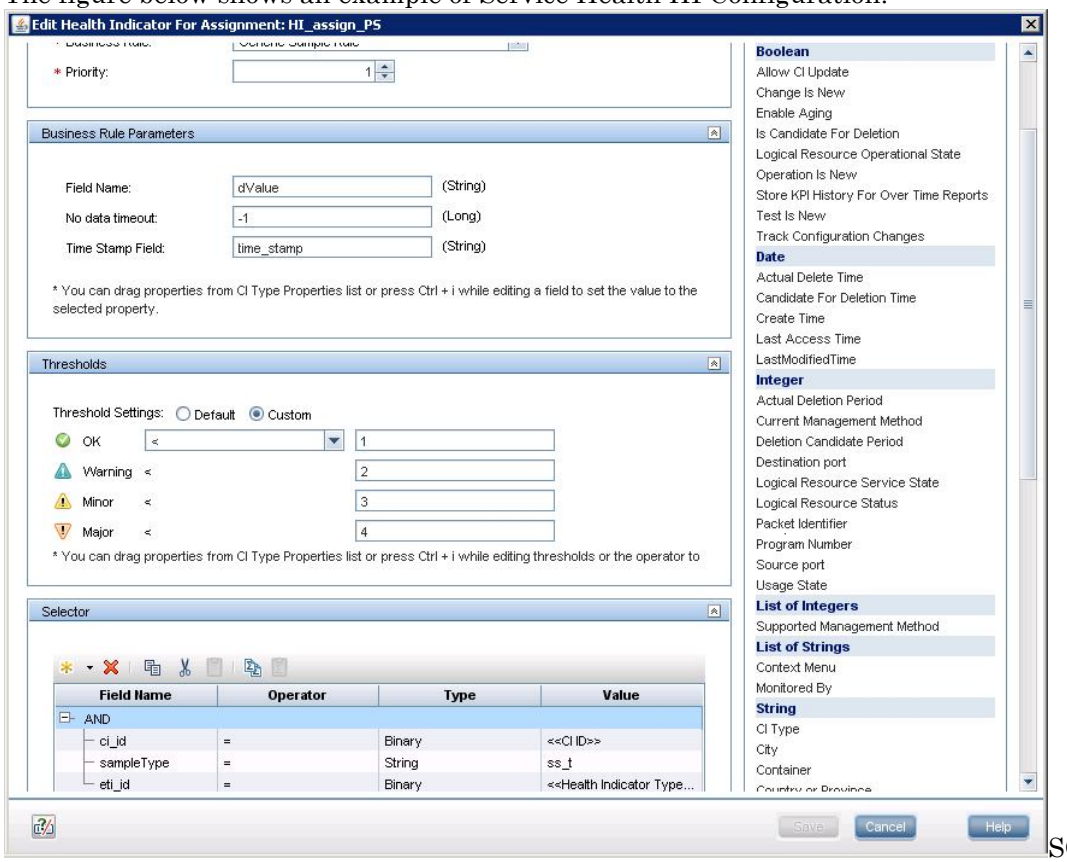
This describes which HIs are assigned to CIs that meets the condition and how they are assigned.

The figure below shows an example Service Health HI Assignment:



Each HI Configuration includes a selected HI, relative Business Rules, Business Rule Parameters, Thresholds and Selector clauses.

The figure below shows an example of Service Health HI Configuration:



SQM suggested Selector clauses are listed below:

- Service Health HI Assignment Selector clauses

[eti_id = <<Health Indicator Type ID>>]

AND

[sampleType = ss_t]

AND

[ci_id = <<CI ID>>]

- SLM HI Assignment Selector clauses

[ci_id = <<CI ID>>]

AND

[eti_id = <<Health Indicator Type ID>>]

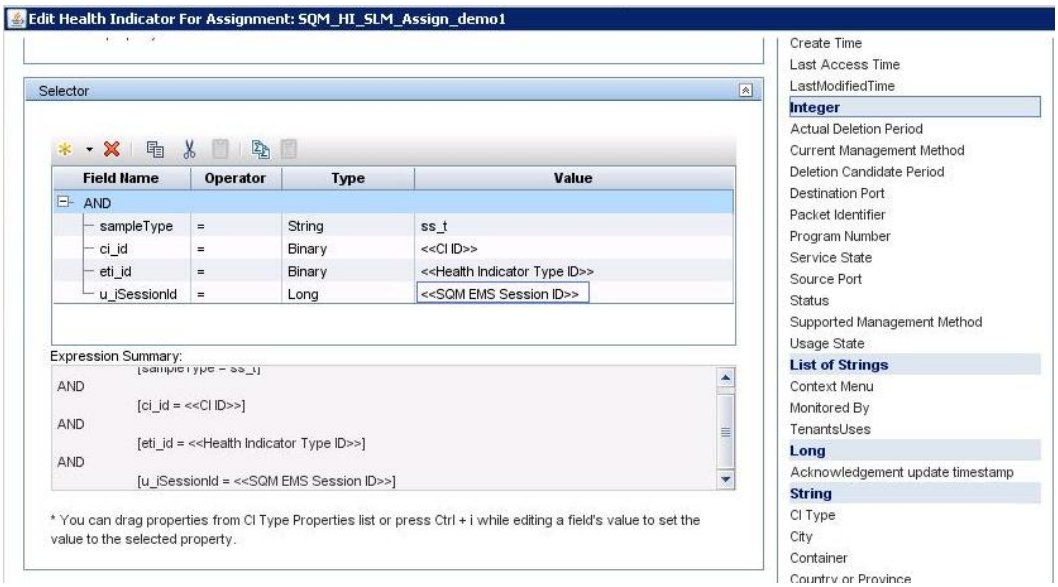
AND

[sampleType = ss_t]

AND

[u_iSessionId = <<SQM EMS Session ID>>]

The figure below shows the Selector of an example SLM HI Configuration:



5.4.2 SQM Dashboard KPI Assignment and Propagation

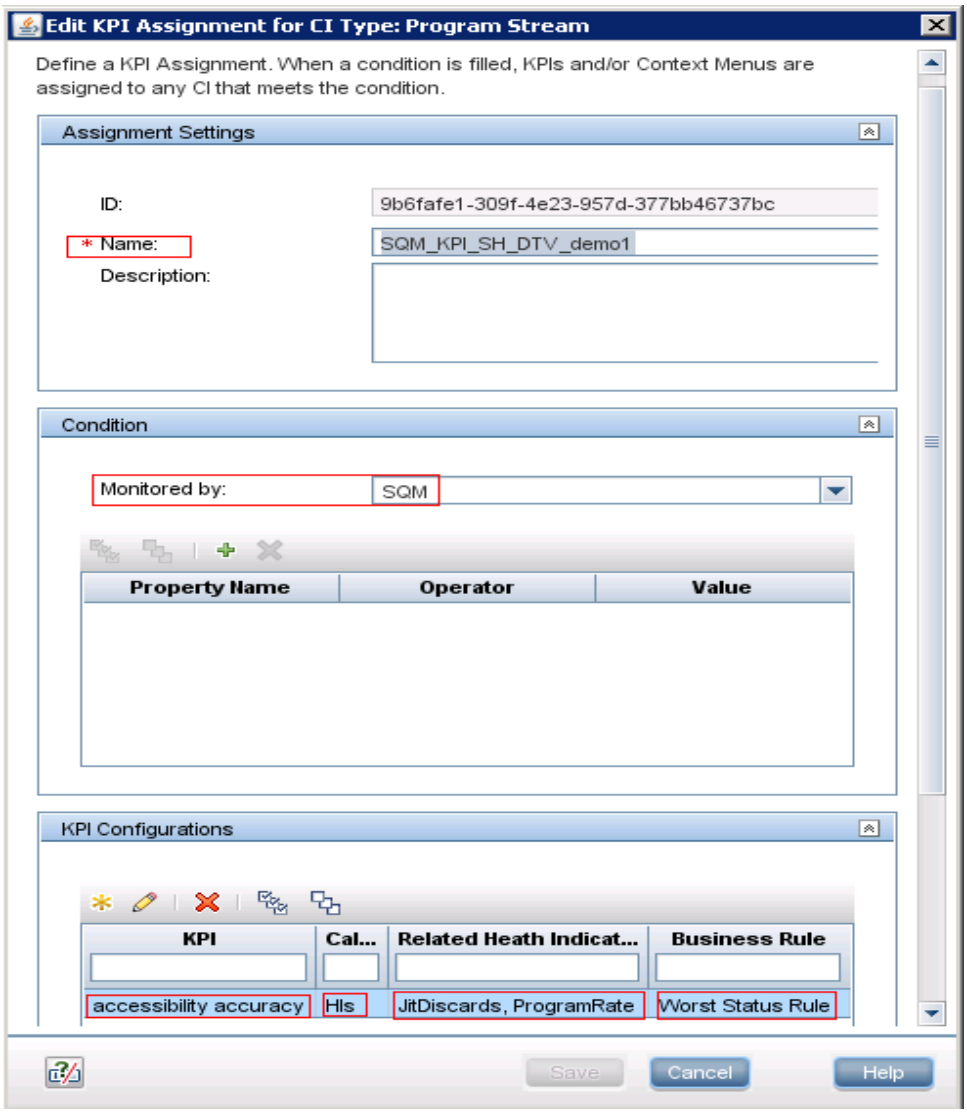
The HIs can be mapped to the relevant KPI. This can be achieved using KPI Assignment, which contains the details of KPI HI mapping conditions.

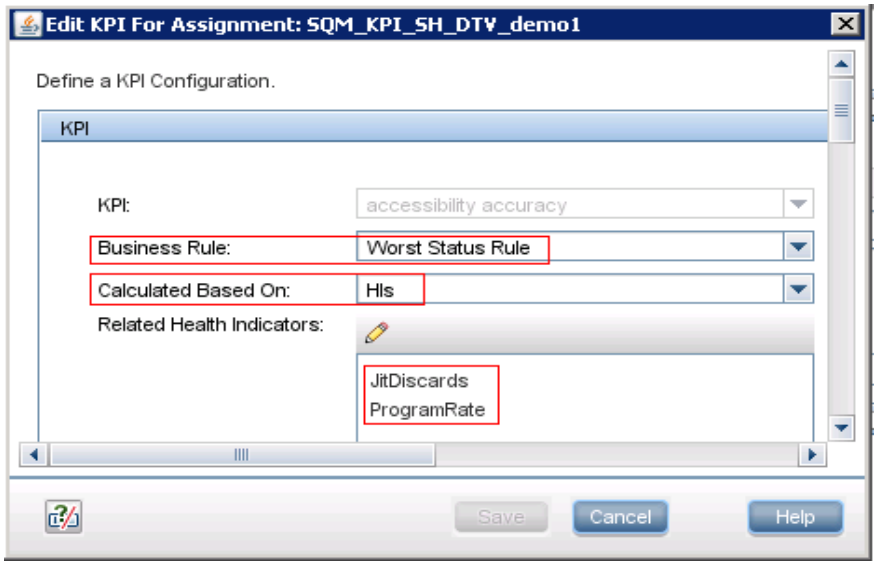
For example, the Mean Delay HI can be mapped to the generic KPI Retainability Speed, because the KPI corresponds to the category description. Alternatively, a HI can be used as it is, e.g. HI QualityOfService Status can be mapped to domain specific KPI QualityOfService Status.

5.4.2.1 SQM dashboard KPI Assignment

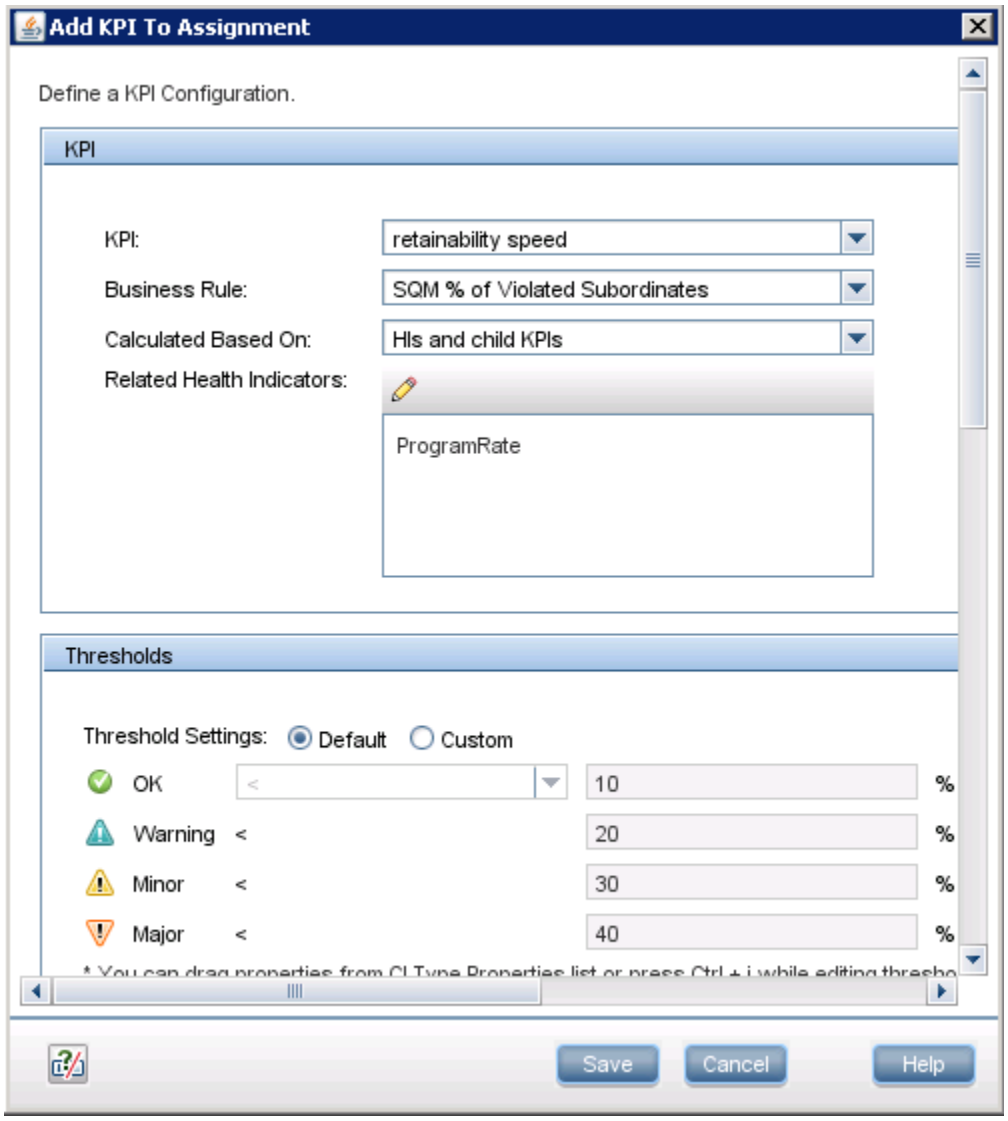
The following figures show an example: **JitDiscards** and **ProgramRate** HI mapped to the **accessibility accuracy** KPI.

- Target CIT: Program Stream, its class name is dtv_program_stream
- Name: SQM_KPI_SH_DTV_demo1
- Condition: “Monitored by = SQM”
- KPI Configurations: 1 KPI calculated from 2 HIs with BR “Worst Status Rule”
- Calculated based on: HIs
- Note: Available options in BSM GUI are “HIs and child KPIs”, “HIs” and “HIs; if none, use child KPIs”.


Edit KPI Assignment for CI Type: Program Stream
Define a KPI Assignment. When a condition is filled, KPIs and/or Context Menus are assigned to any CI that meets the condition.
Assignment Settings
ID:
9b6fafe1-309f-4e23-957d-377bb46737bc
* Name:
SQM_KPI_SH_DTV_demo1
Description:
Condition
Monitored by:
SQM
Property Name
Operator
Value
KPI Configurations
KPI
Cal...
Related Heath Indicat...
Business Rule
accessibility accuracy
Hls
JitDiscards, ProgramRate
Worst Status Rule
Save
Cancel
Help


Edit KPI For Assignment: SQM_KPI_SH_DTV_demo1
Define a KPI Configuration.
KPI
KPI:
accessibility accuracy
Business Rule:
Worst Status Rule
Calculated Based On:
Hls
Related Health Indicators:
JitDiscards
ProgramRate
Save
Cancel
Help

The figure below shows an example of KPI Assignment with Calculated Based On as “HIs and child KPIs”:



5.4.2.2 SQM dashboard KPI Propagation

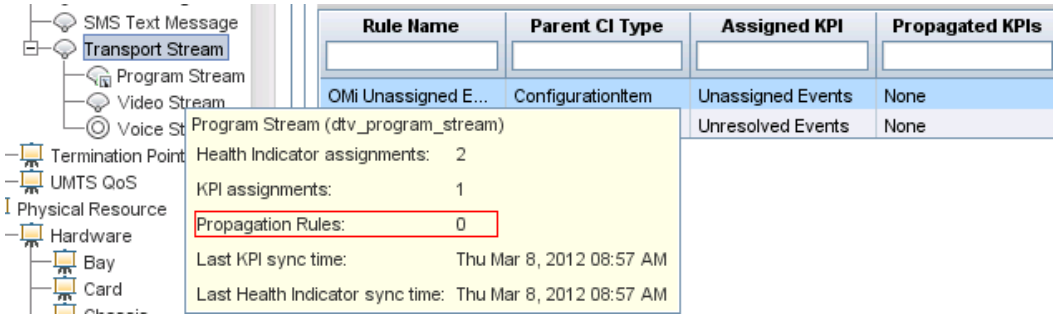
To create, edit or check KPI propagation, browse to **Admin > Service Health > Assignments > Propagation Rules**.

If there is no specific propagation rule defined, by default, KPI will be propagated to parent CIT using BR.

Following figures explain the mechanism:

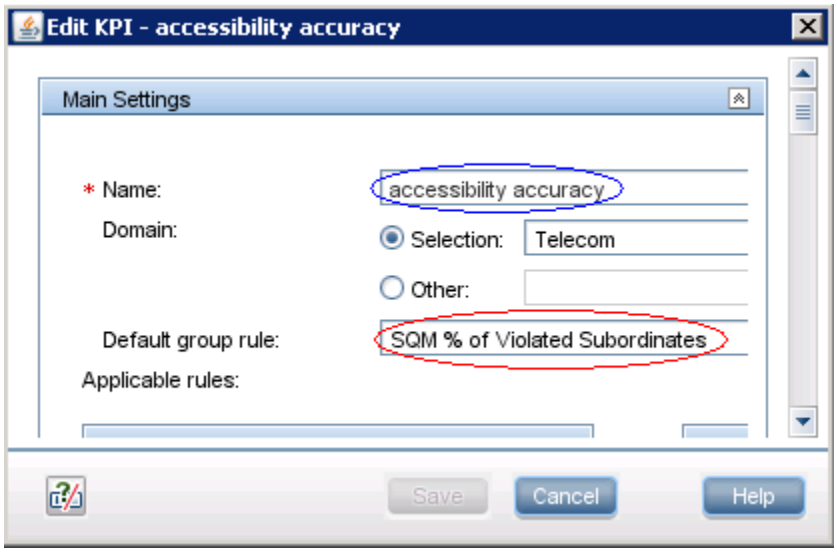
- Figure1 shows that there is no propagation rule of KPI **accessibility accuracy** defined on CIT **Program Stream** and no KPI Assignment on CIT **Transport Stream**

Figure1 Assignments tooltip



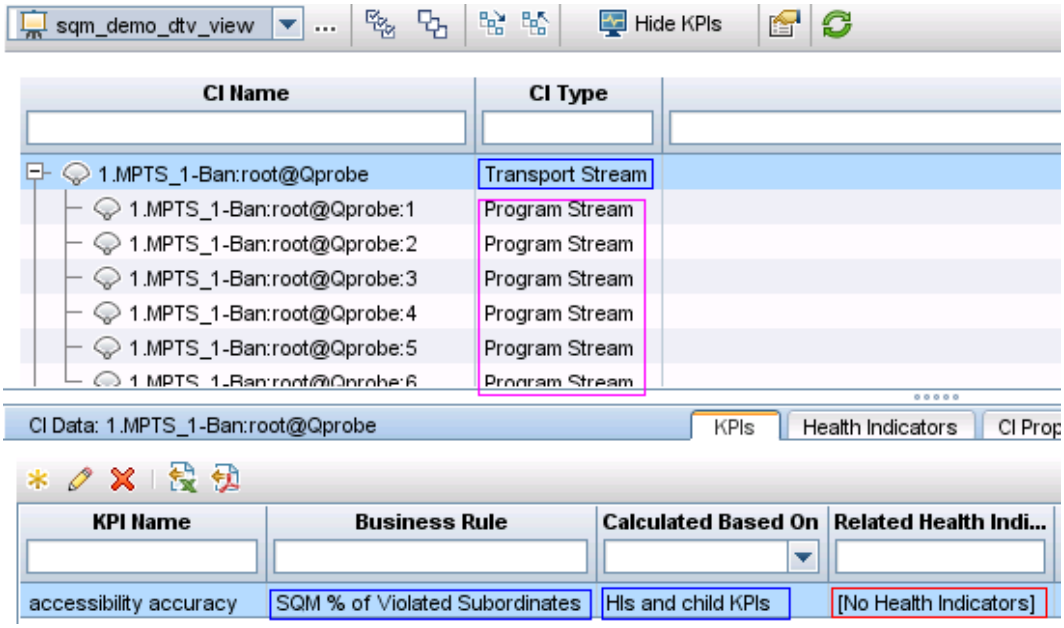
- Figure2 shows that the default BR of KPI accessibility accuracy is SQM % of Violated Subordinates;

Figure2 KPI properties



- Figure3 verifies that KPI **accessibility accuracy** on **Transport Stream** CI propagated from child **Program Stream** CIs
    - Business Rule is SQM % of Violated Subordinates;
    - Calculated Based On is **HIs and child KPIs**
    - No HIs assigned on the **Transport Stream** CI

Figure3 KPI propagation result



To enable customized KPI propagation, to assign KPI to the CI's parent only when a specific condition is filled on a CI with specific BR, a specific KPI Propagation Rule is needed.

Instructions to create a KPI propagation rule:

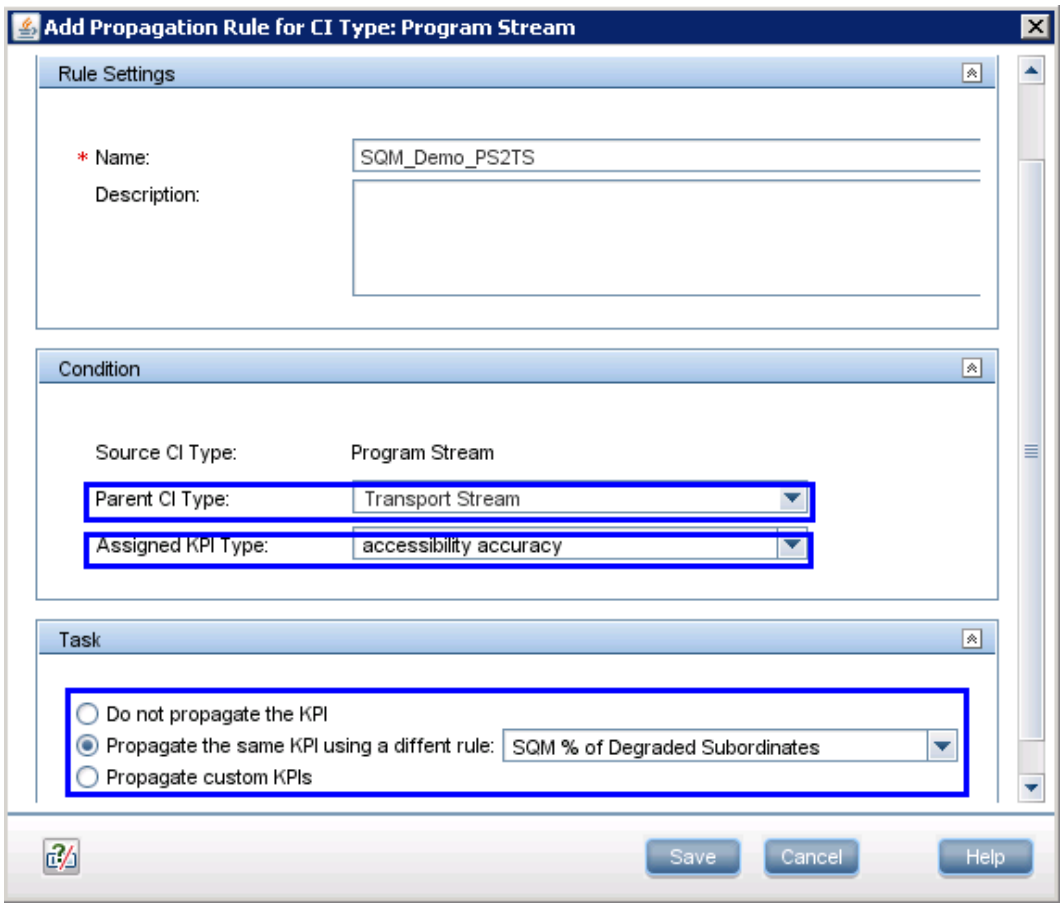
1. Click "Add" button  to open Add Propagation Rule dialog
2. Fill name, set Condition and Task fields
    a. Condition

        Choose Parent CI Type, the default value is ConfigurationItem;
        Choose **Assigned KPI Type**, the default value is **Any KPI**

    b. Task

        To disable default KPI propagation, simply choose default option "**Do not propagate the KPI**";
        To propagate same KPI using specific BR, select 2nd option "Propagate same KPI using a different rule", and choose the BR.

The figure below shows an example KPI Propagation Rule:



For more information about KPI Assignment and Propagation in Dashboard, refer to the *Using Service Health* document.

5.4.3 KPI Assignment and Propagation in SLM

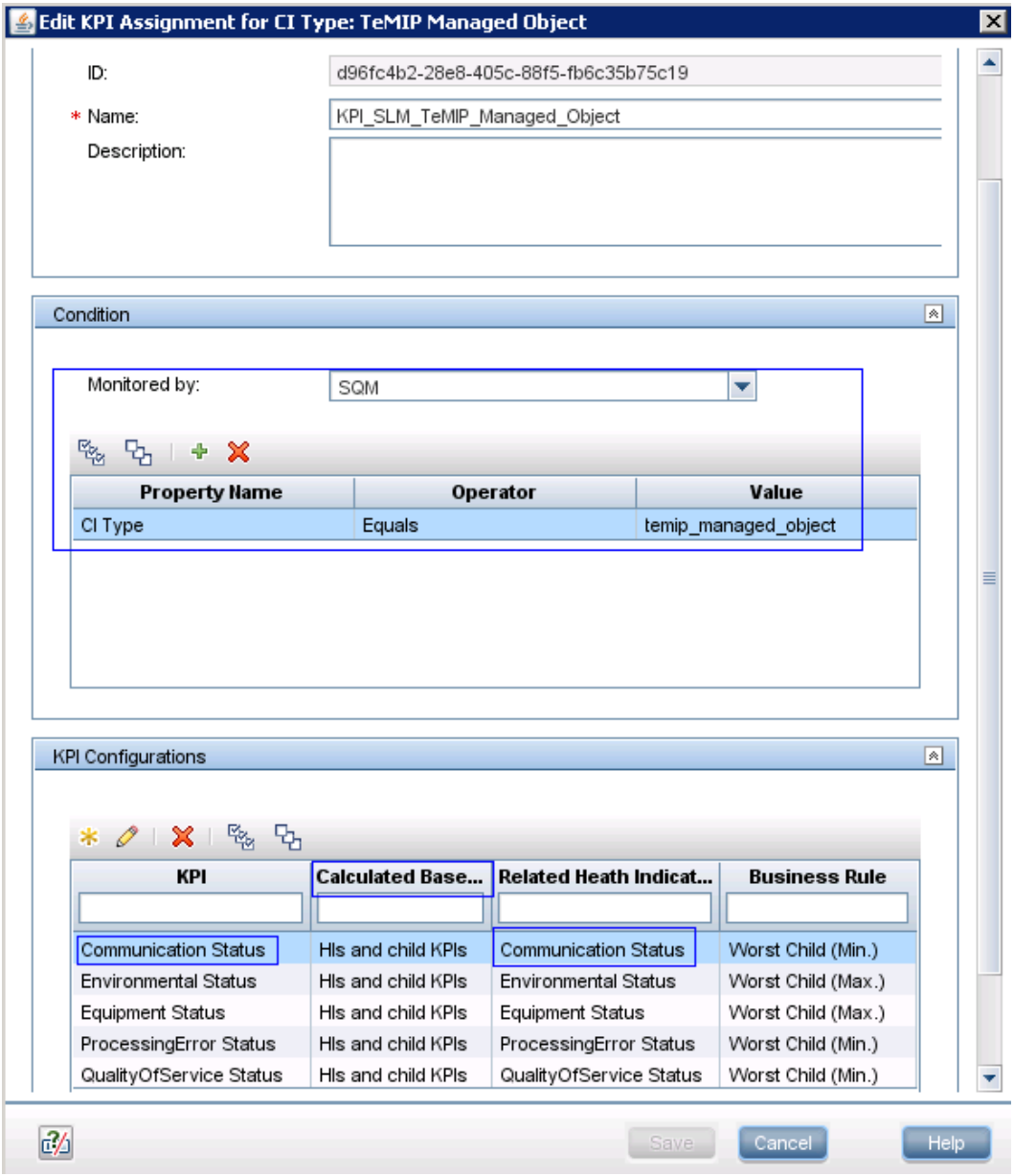
KPI Assignment mechanism in Service Level Management is activated when certain conditions are met, and is aimed to incorporate specific data into Service Level Management, at the monitoring level.

5.4.3.1 SLM KPI Assignment

The following figure shows an example of the SLM KPI Assignment and HI mapped to the KPI:

- Target CIT: TeMIP Management Object, its class name is temip_managed_object
- Name: KPI_SLM_TeMIP_Managed_Object
- Condition: “Monitored by = SQM”
- Note: If there are 2 or more KPI Assignments, since BSM does not support different KPI Assignments to have same condition, user can choose to add some useless additional condition. In this example, an additional condition “CI Type equals temip_management_object” is introduced.
- KPI Configurations: 5 KPI calculated from 5 relative HIs independently

- Calculated based on: HIs and child KPIs
- Note: Same as Dashboard, available options in BSM GUI are “HIs and child KPIs”, “HIs” and “HIs; if none, use child KPIs”.



5.4.3.2 SLM KPI Progagation

The mechanism of SLM KPI propagation is similar as the mechanism of Dashboard KPI propagation.

- To use default KPI propagation, no action needed
- To enable customized KPI propagation, a specific SLM KPI Propagation Rule is needed.

Instructions to create a SLM KPI propagation rule:

1. On BSM GUI, browse to **Admin > Service Health > Assignments > Propagation Rules**, select the Source CI Type in left **CI Type** panel

2. In right **Assignments for CI Type** panel, click "Add" button  to open Add Propagation Rule dialog
3. Fill name, set Condition and Task fields
    a. Condition

       Choose Parent CI Type, the default value is ConfigurationItem;
       Choose **Assigned KPI Type**, the default value is **Any KPI**

    b. Task

       To disable default KPI propagation, simply choose default option "Do not propagate the KPI";
       To propagate same KPI using specific BR, select 2nd option "Propagate same KPI using a different rule", and choose the BR.

For more information about KPI Assignment and Propagation in SLM, refer to the *Using Service Level Management* document.

Chapter 6

Service Monitoring

6.1 Alerts

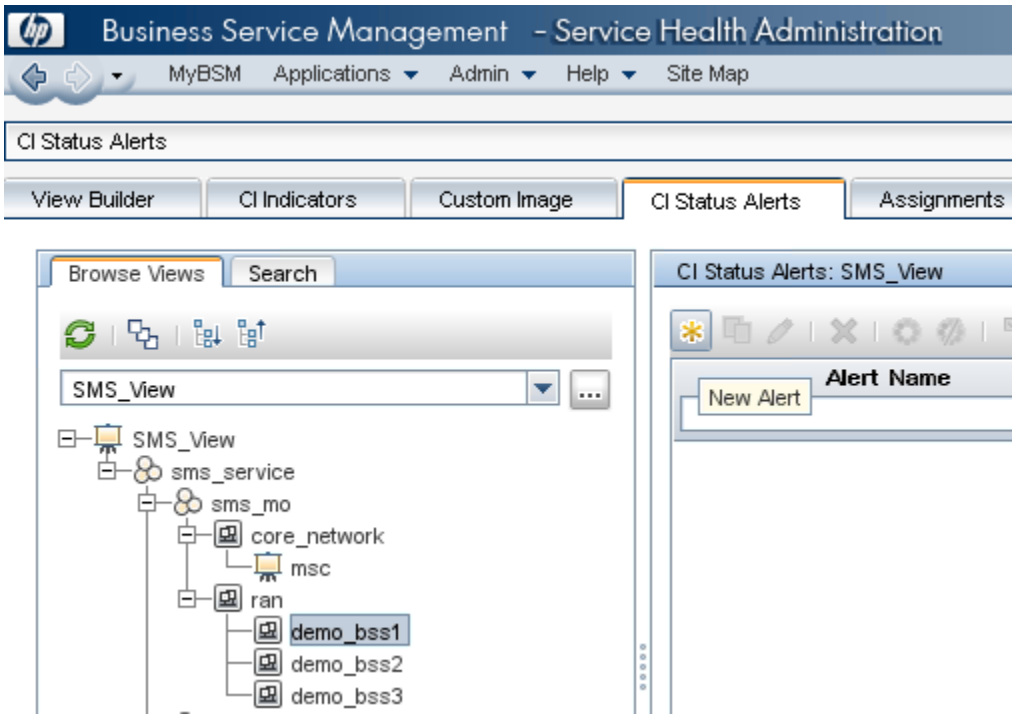
The SQM Solution provides an Alert feature that enables you to receive customized alerts in case a performance threshold is violated. These alerts can be sent to specified users (for instance, by email) or may trigger a pre-defined action (for instance, an SNMP trap). Alerts can be configured in both Dashboard and SLM.

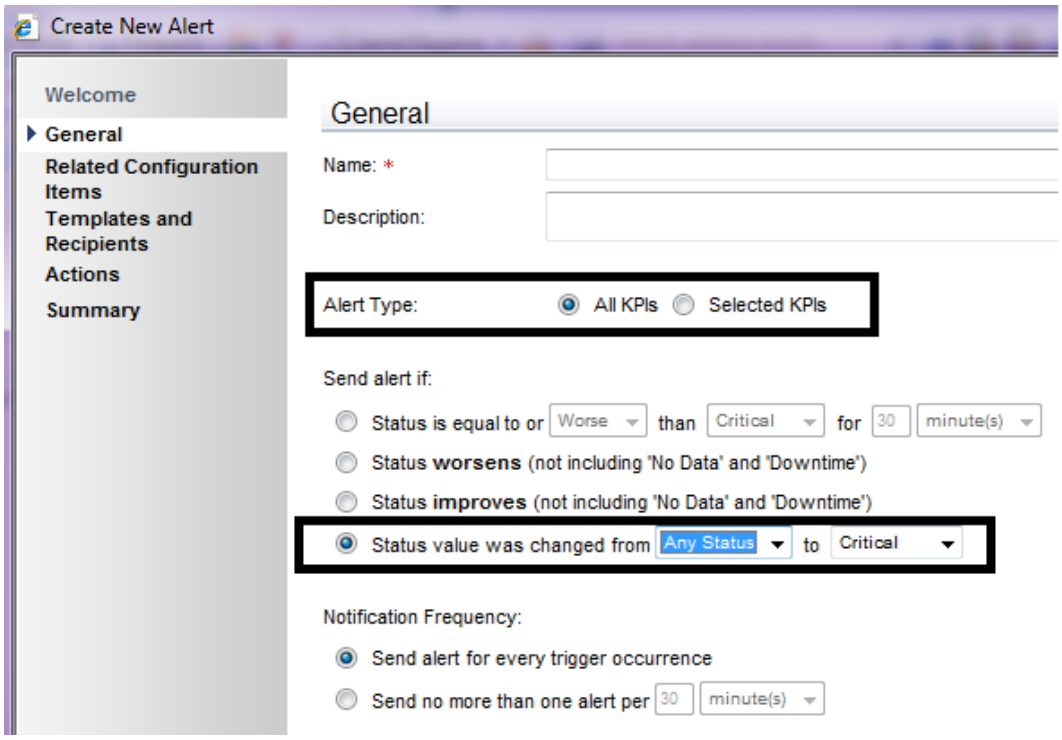
6.1.1 Configuring Alerts in Dashboard

In Dashboard, you can configure Alerts for selected CIs in a view. CI status alerts are triggered by a pre-defined status change for the selected CI, detected by BSM.

Instructions to create and configure a CI Status Alert:

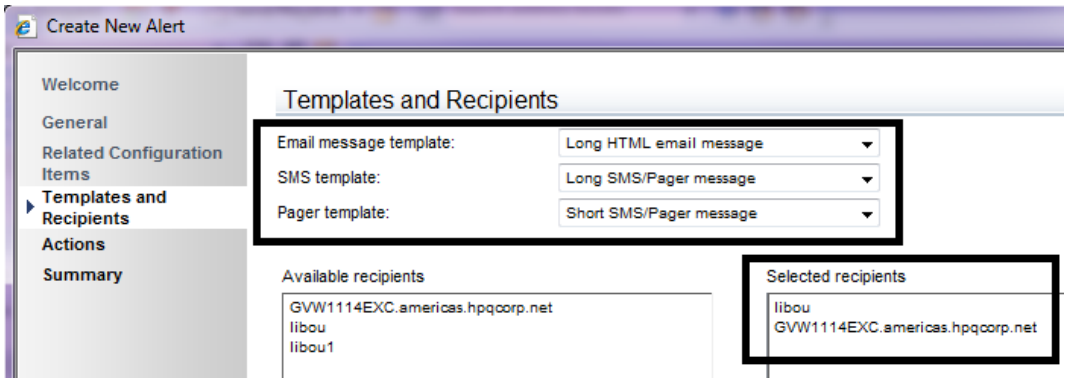
1. Select Admin > Service Health > CI Status Alerts, select a view and a CI, and then click “New Alert” to **Create New Alert** dialog



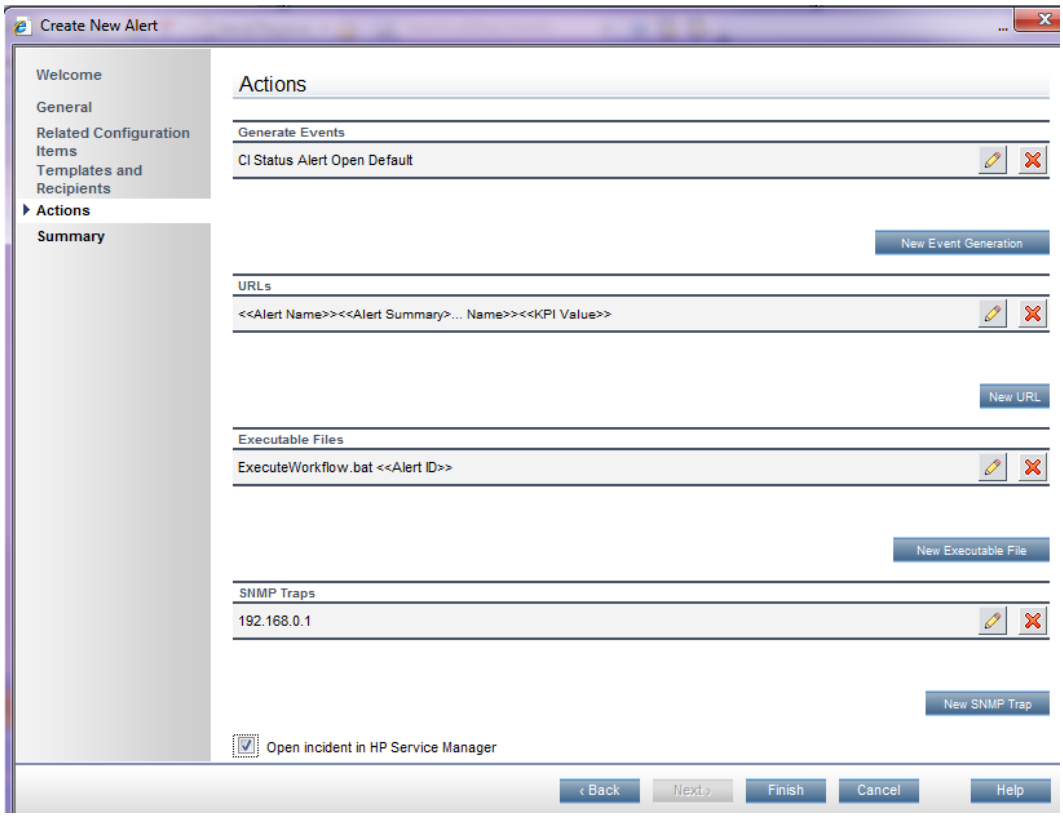


2. In **General** panel, fill **Name** of the alert, select its type (choose default **All KPIs** or choose **Selected KPIs** to apply for a set of selected KPIs belonging to the CI)
3. Select the conditions to trigger the alert and **Notification Frequency**

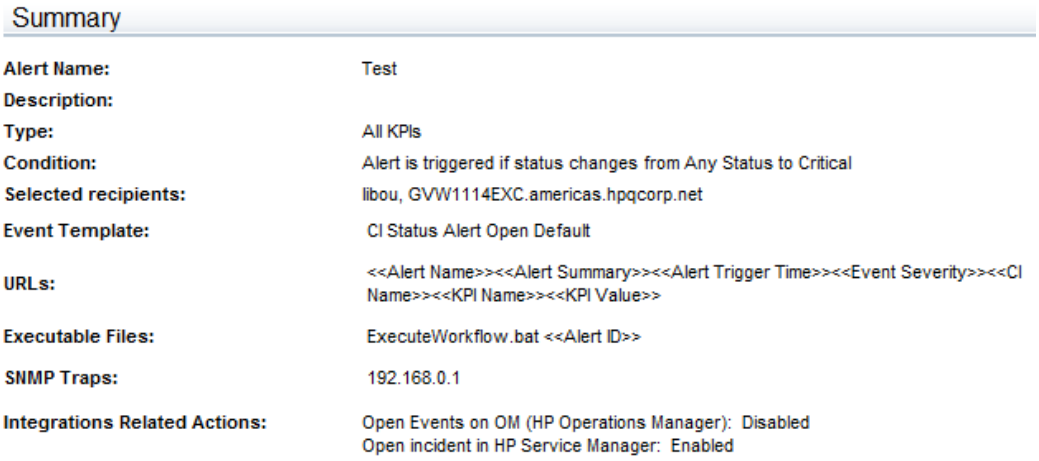
   For example, the alert is sent when the KPI(s) status changed from "Any status" to "Critical" and
4. Select the email, sms and/or pager templates to apply and the alert recipients.



5. Finally, define the actions to trigger:
   a. Execute a file
   b. Send a SNMP trap to the Fault Management system
   c. Automatically open an incident in HP Service Manager

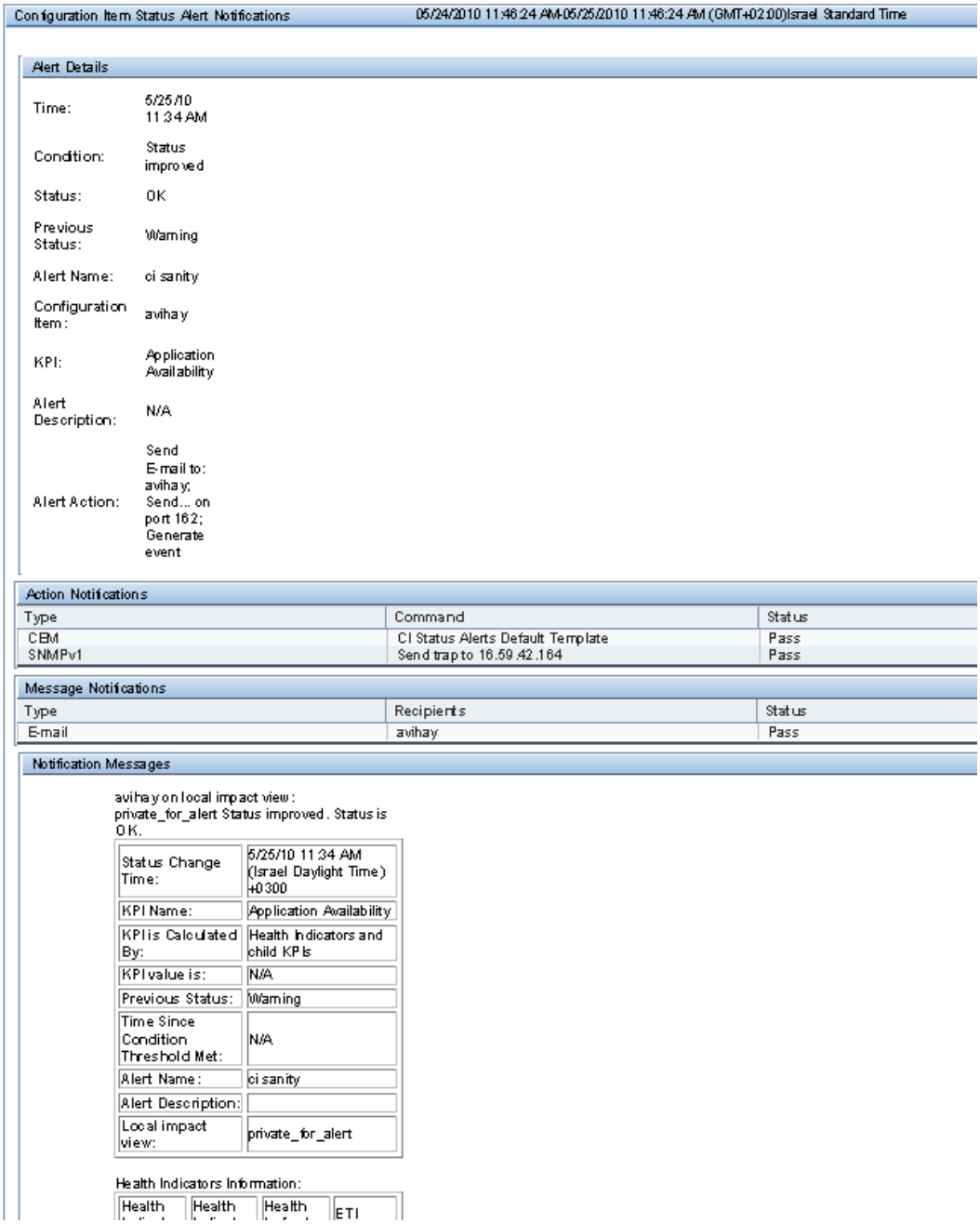


6. Click on the "Finish" button and check the displayed Alert summary



Below comes the example of the Alert functionality check:

- Trigger the Alert
- Add new raw measurements within the testing file (i.e. the simulated data source) to update the relevant KPI statuses to Critical
- Check the content of the CI Status Alert Notification Report



Configuration Item Status Alert Notifications 05/24/2010 11:46:24 AM-05/25/2010 11:46:24 AM (GMT+02:00)Israel Standard Time

Alert Details

Time:	5/25/10 11:34 AM
Condition:	Status improved
Status:	OK
Previous Status:	Warning
Alert Name:	ci sanity
Configuration Item:	avihay
KPI:	Application Availability
Alert Description:	N/A
Alert Action:	Send E-mail to: avihay; Send... on port 162; Generate event

Action Notifications

Type	Command	Status
CBM	CI Status Alerts Default Template	Pass
SNMPv1	Send trap to 16.59.42.164	Pass

Message Notifications

Type	Recipients	Status
E-mail	avihay	Pass

Notification Messages

avihay on local impact view: private_for_alert Status improved. Status is OK.

Status Change Time:	5/25/10 11:34 AM (Israel Daylight Time) +0300
KPI Name:	Application Availability
KPI is Calculated By:	Health Indicators and child KPIs
KPI value is:	N/A
Previous Status:	Warning
Time Since Condition Threshold Met:	N/A
Alert Name:	ci sanity
Alert Description:	
Local impact view:	private_for_alert

Health Indicators Information:

Health	Health	Health	ETI

6.1.2 Configuring SLA Alert

For information about SLA Alert, refer to Chapter *Administer SLA Alerts* in the *Using Service Level Management* document.

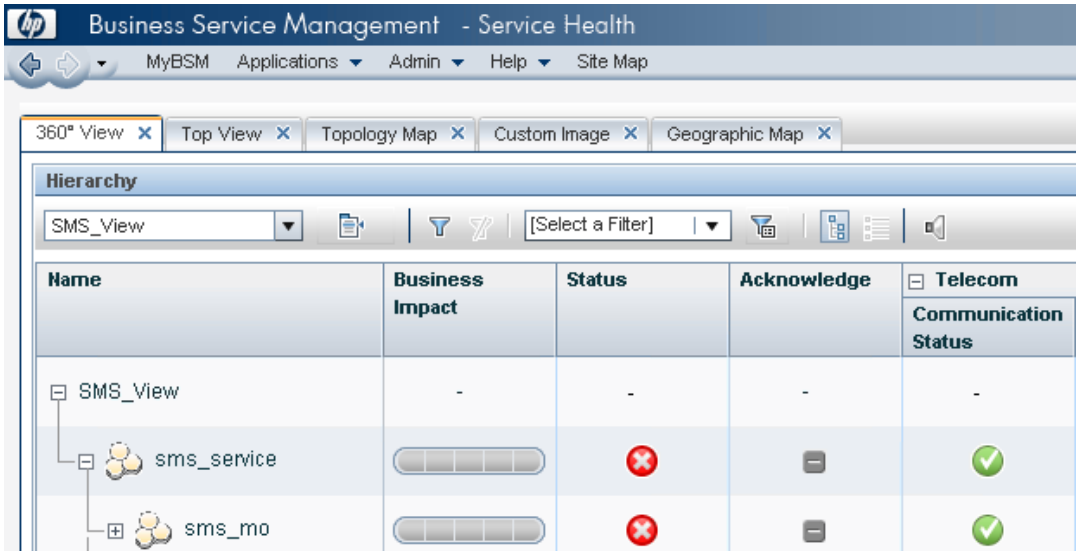
6.2 User Interfaces

6.2.1 The HP SQM Dashboard Views

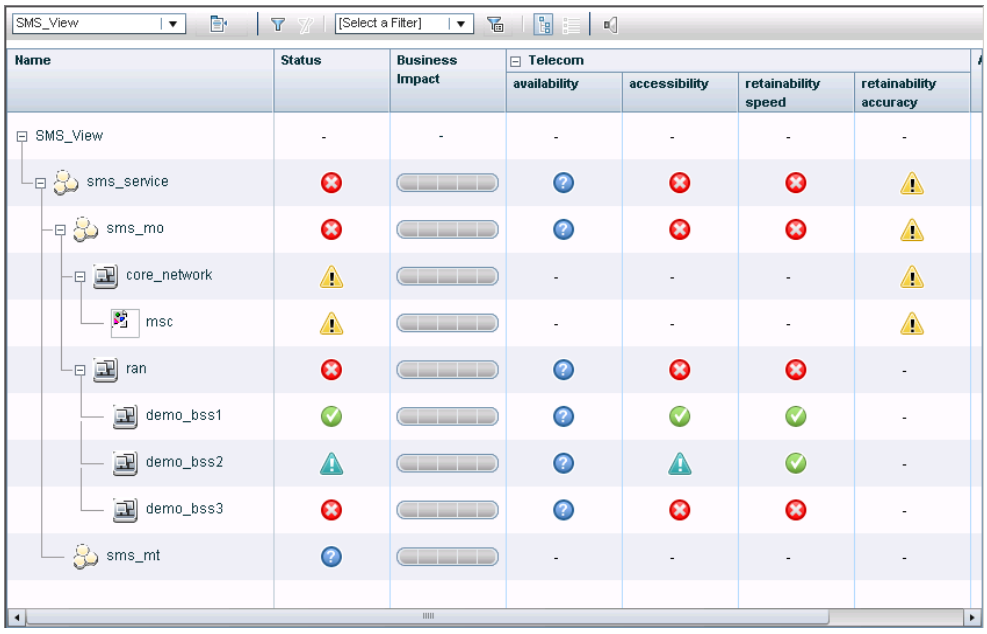
The following process shows how service quality degradation is visualized in the HP Service Quality Management Solution Dashboard and how the different views are used to drill-down into an issue. This process is similar whether the service is a voice service or any other service such as SMS, MMS, mobile TV and others.

- Browse to **Applications** -> **Service Health**

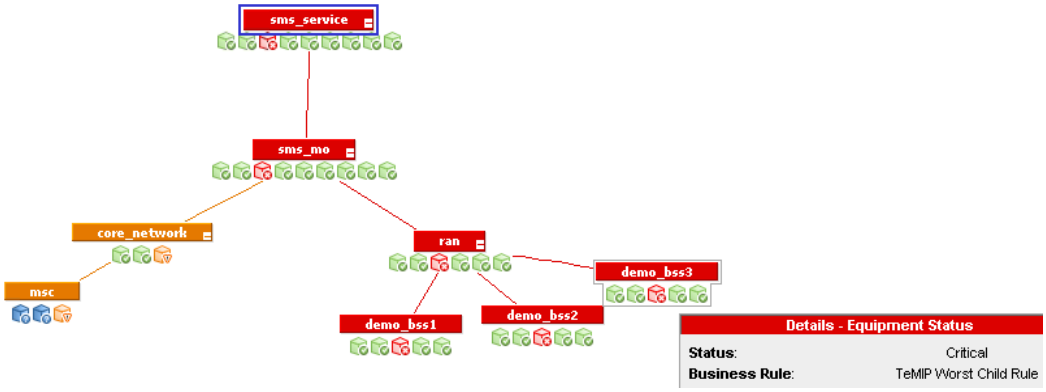
  By default, the view is **360° View**; use it to check detailed KPI status.



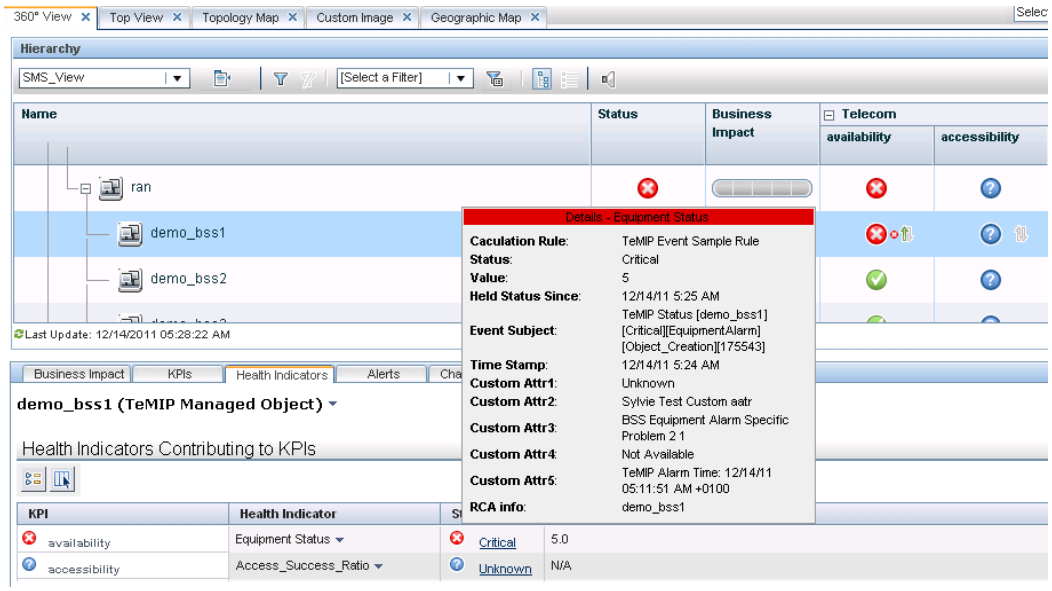
- Display the KPIs associated to various CIs (representing the service resource within the service logic) to start getting an understanding of what and where the service degradation originates from



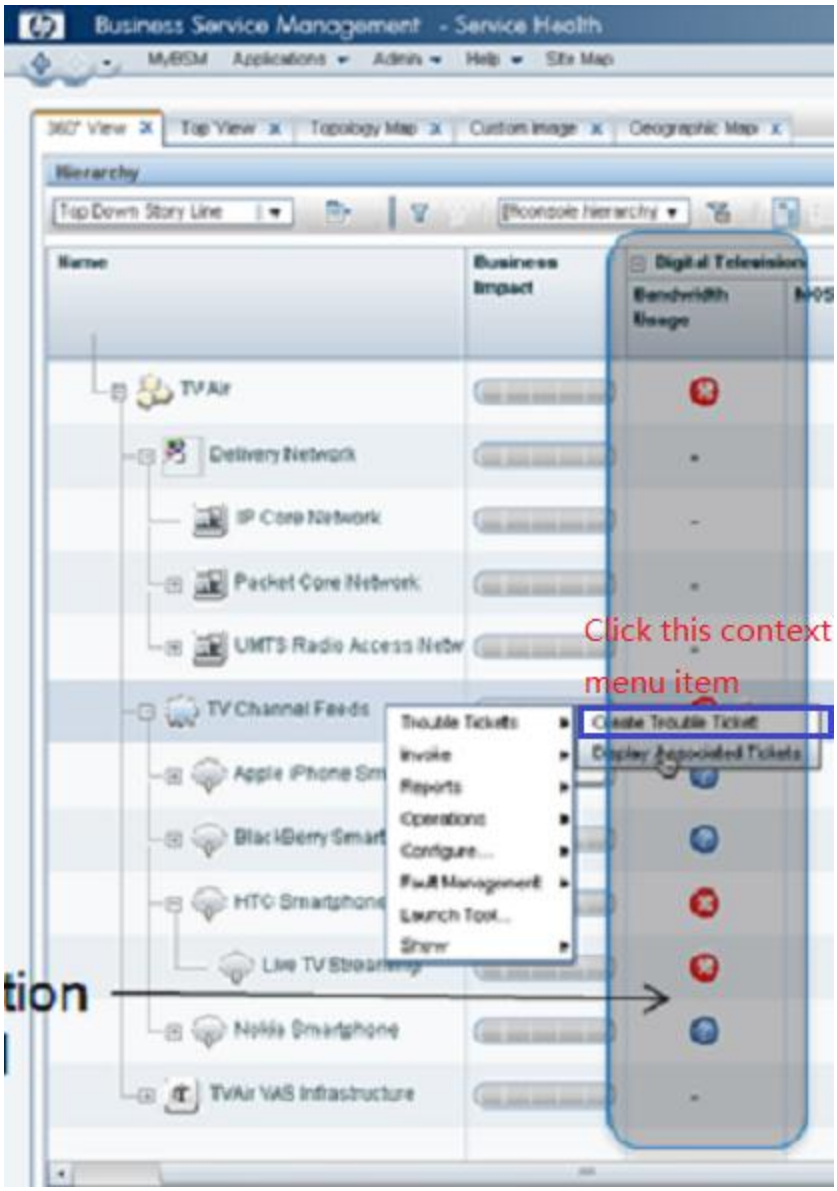
- Drill-down the service tree to better analyze the service degradation (i.e. right-click on the service and display the “problematic subtree”)



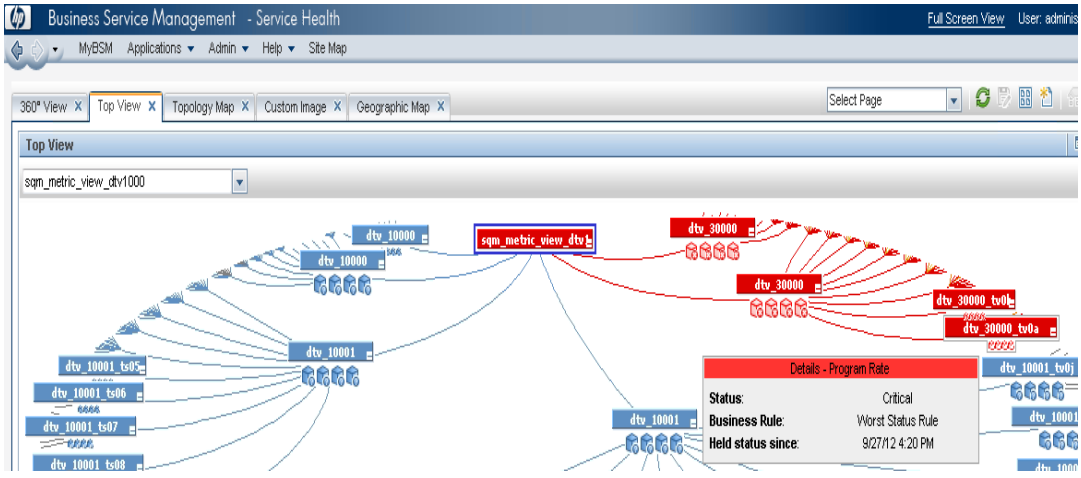
- In 360˚ View, display associated HIs to understand the problem



- If integrated with Service Manager, report the issue by creating a ticket on the problematic CI
    - Show Context Menu
    - Click context menu item ”Trouble Tickets” -> ”Create Trouble Ticket”



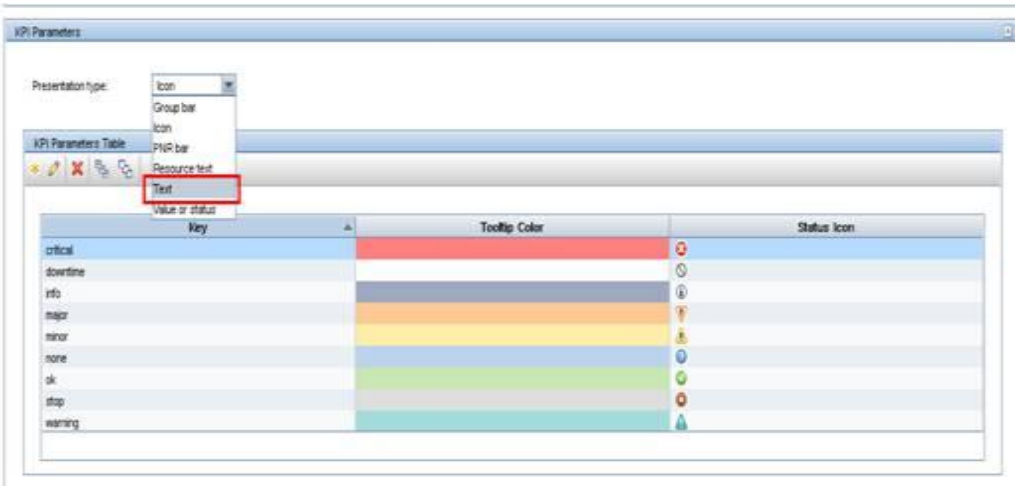
- Use **Top View** to see the impact on the service



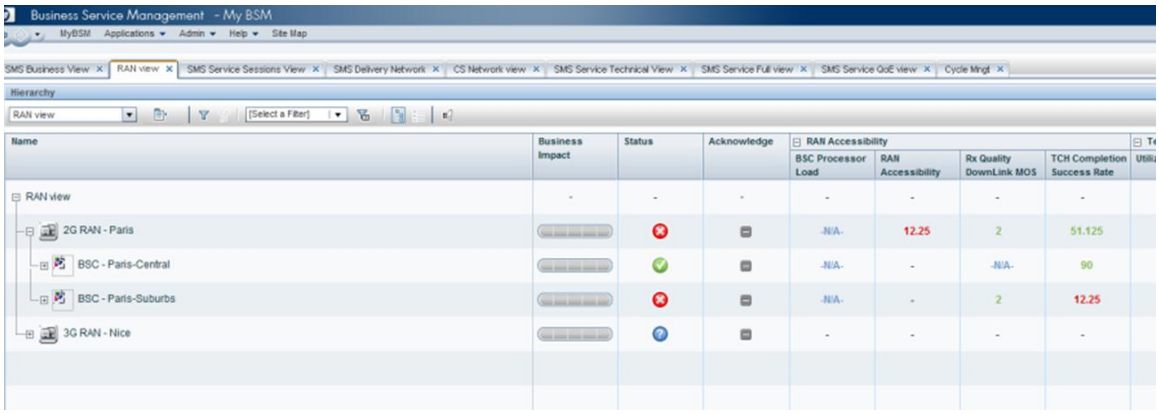
6.2.2 Changing the display of the SQM KPI Dashboard Views

It is possible to display the SQM KPI as status or value. While the previous section gave an example of KPI displayed as status, it is possible to get the same display as values. Here are the steps needed:

- Go to **Admin -> Service Health -> Repositories -> KPIs**
- Choose a KPI and edit it by clicking the pencil button.
- Go to the KPI parameters pane and change presentation type to text



The figure below shows an example result KPI values (RAN Accessibility).



6.2.3 Integrated Applications

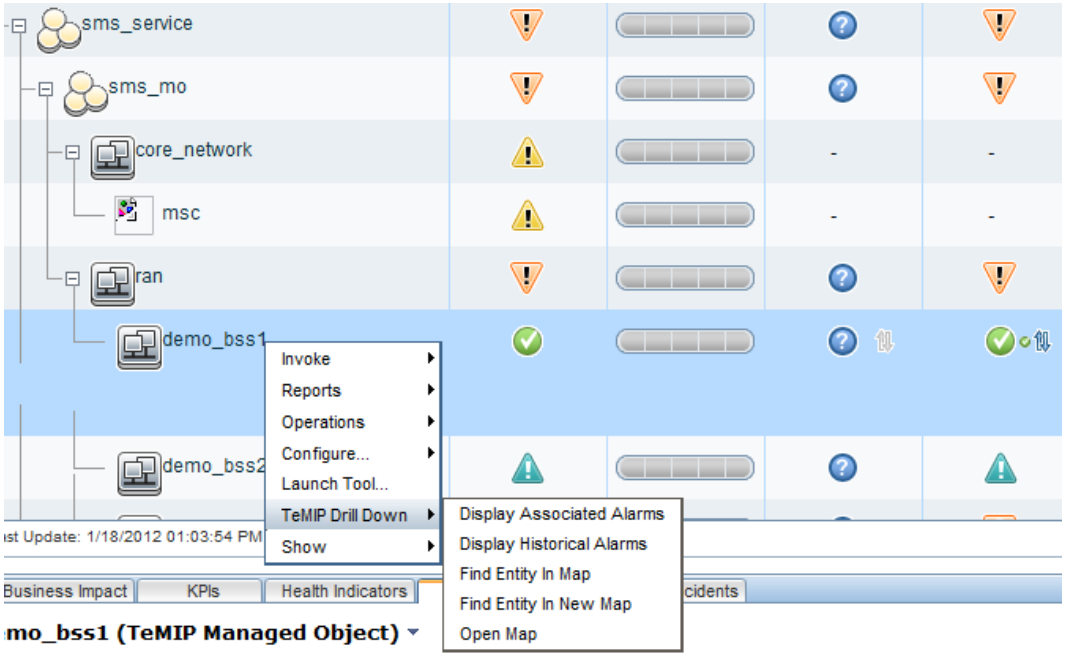
The SQM Solution provides integrated applications that can run independently and enables you to launch these contextual applications from within the BSM Views in the Dashboard.

For instance, you can view and manage the alarms associated with a CI belonging to the TeMIP Alarms domain, by launching the TeMIP application from within the BSM view.

To achieve this task you will be required to perform the following procedure:

8. From the BSM menu bar, select Applications → Service Health, and then select the Top View tab
    1. From the View drop-down menu, select a TeMIP related view
    2. Right click on the relevant CI and select your desired operation from the TeMIP Drill Down menu. This will launch the TeMIP Client application allowing you to view and manage the associated alarm.

The following figure depicts the example for launching an integrated application from within the BSM view.



For more information about creating context menus, refer to the *Using Service Health* document.

Chapter 7

Monitoring Service Level Agreements

Service Level Agreement or SLA is a written agreement between the service provider and the customer. The SLA represents the services that are offered by the service provider as well as the service levels that are agreed upon by the customer and the service provider.

In the SQM Solution, the SLAs can be recorded and used to generate various reports and can help determine whether the agreed service levels are being consistently met.

The SQM Solution offers the Service-based SLAs that are created in BSM. The following sections describe how to create and work with Service Based SLAs.

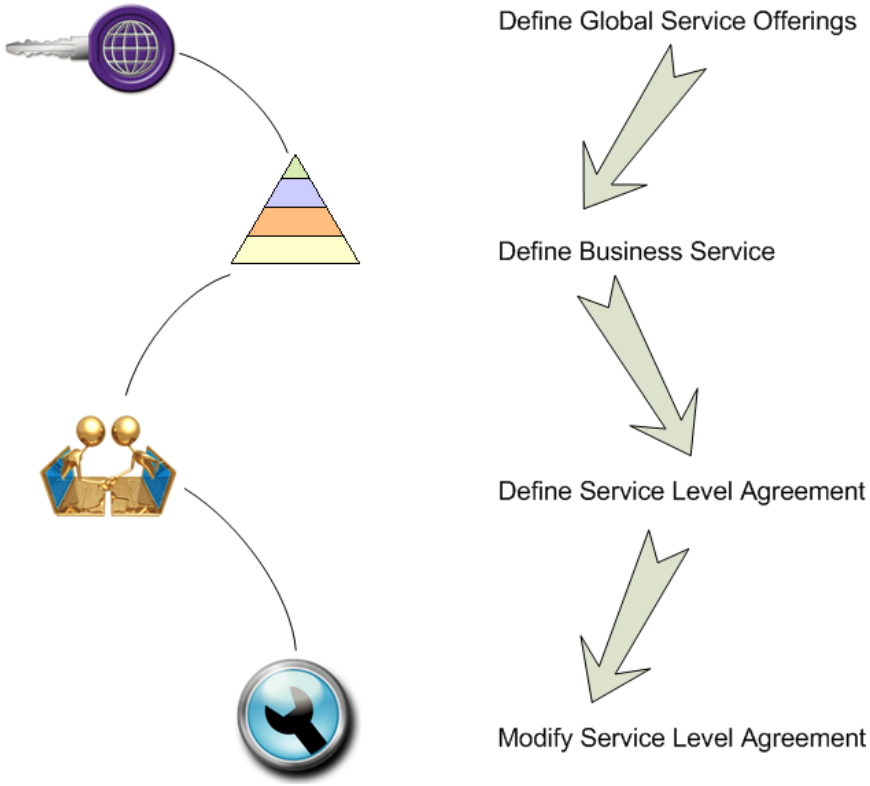
7.1 Creating Service Based SLAs

A Service-based SLA can be described as an agreement based on defined business services. A business service is represented by a Business Service CI, which contains all the CIs related to that service.

The advantage of using the Service-based SLA is that you can reuse the existing Business Service CI when creating a new Service-based SLA that makes use of that business service. For example, you might create a Business Service CI called *Mobile Billing Service*, and attach all CIs related to the mobile billing service to that Business Service CI. The *Mobile Billing Service* CI can then be added to any agreement you create that involves the mobile billing service.

The following sections describe the high-level procedure to define a new Service-based SLA.

For more information about the complete procedure of creating Service-based SLAs, refer to the *Using Service Level Managament* document.

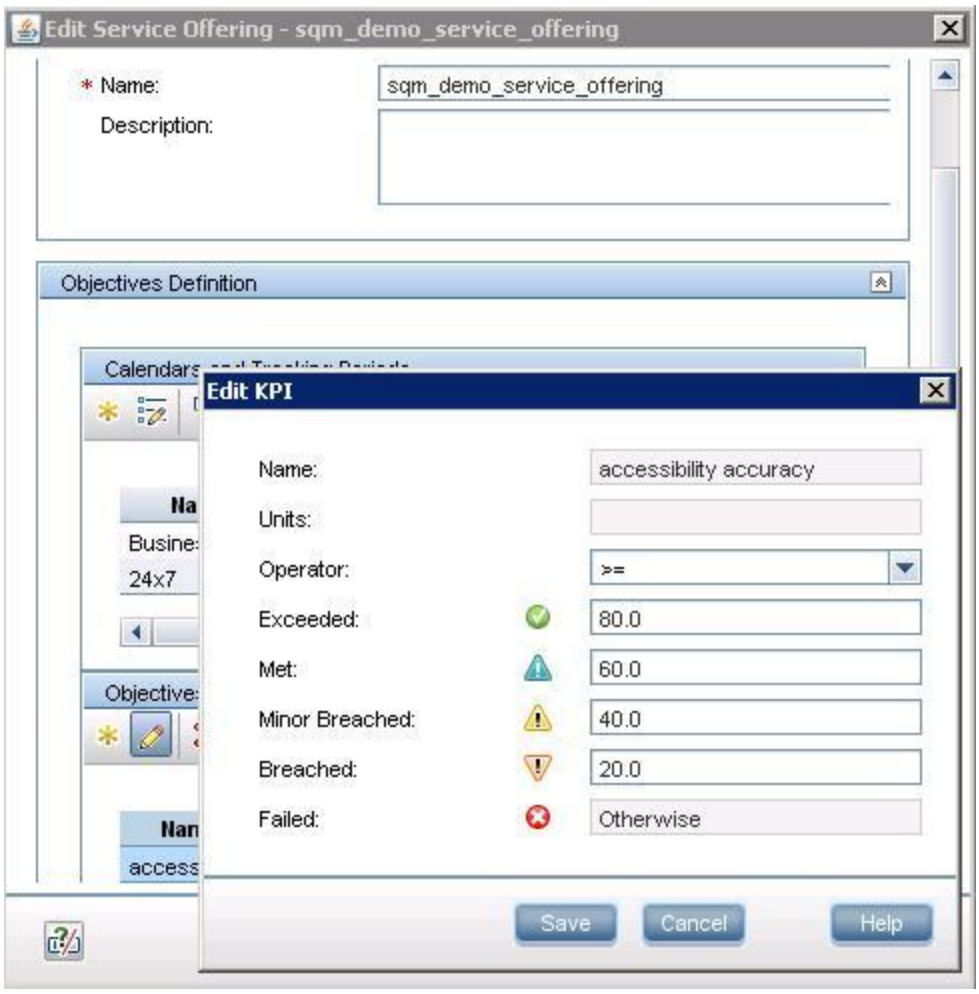


7.1.1 Define Global Offering

A service offering is a set of defined objective thresholds for multiple KPIs, designed for use in service-based agreements. Applying service offerings to Business Service CIs avoids the need to edit individually each KPI attached to each service-related CI.

Global service offerings are service offerings that are available to associate with any Business Service CI. A global service offering is associated with a Business Service CI in SLM.

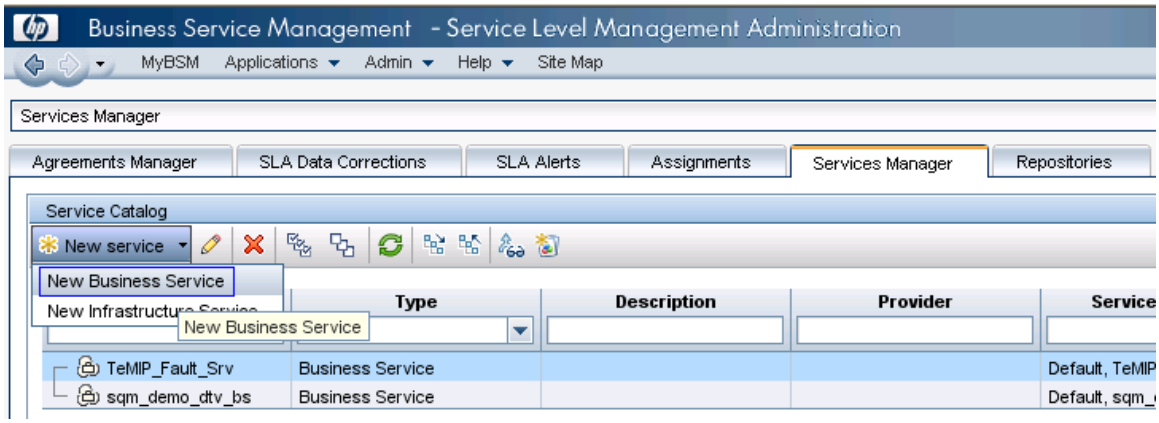
You can create a new Global Service Offering using the **Admin > Service Level Management > Repository → Service and CI Offerings**. Following figure shows an example of Service Offering:



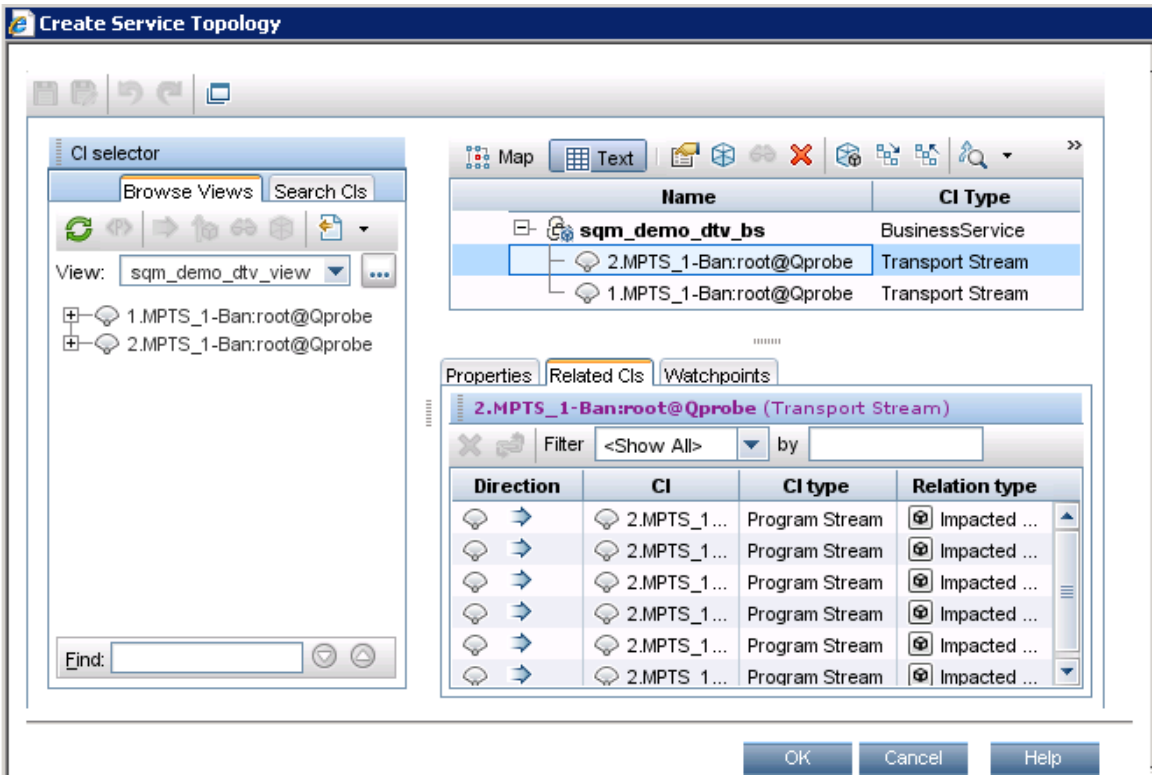
For more information about defining global service/CI offerings, refer to the *Using Service Level Management* document.

7.1.2 Define Business Service

A Business Service CI can be defined as the top node in a service tree and contains all the CIs related to that specific business service. To create a Business Service CI, browse to **Admin** > **Service Level Management** > **Service Manager**, click button * New service and then select **New Business Service**.



You can add the service related CIs while defining the business service using the **Edit Service Topology**.



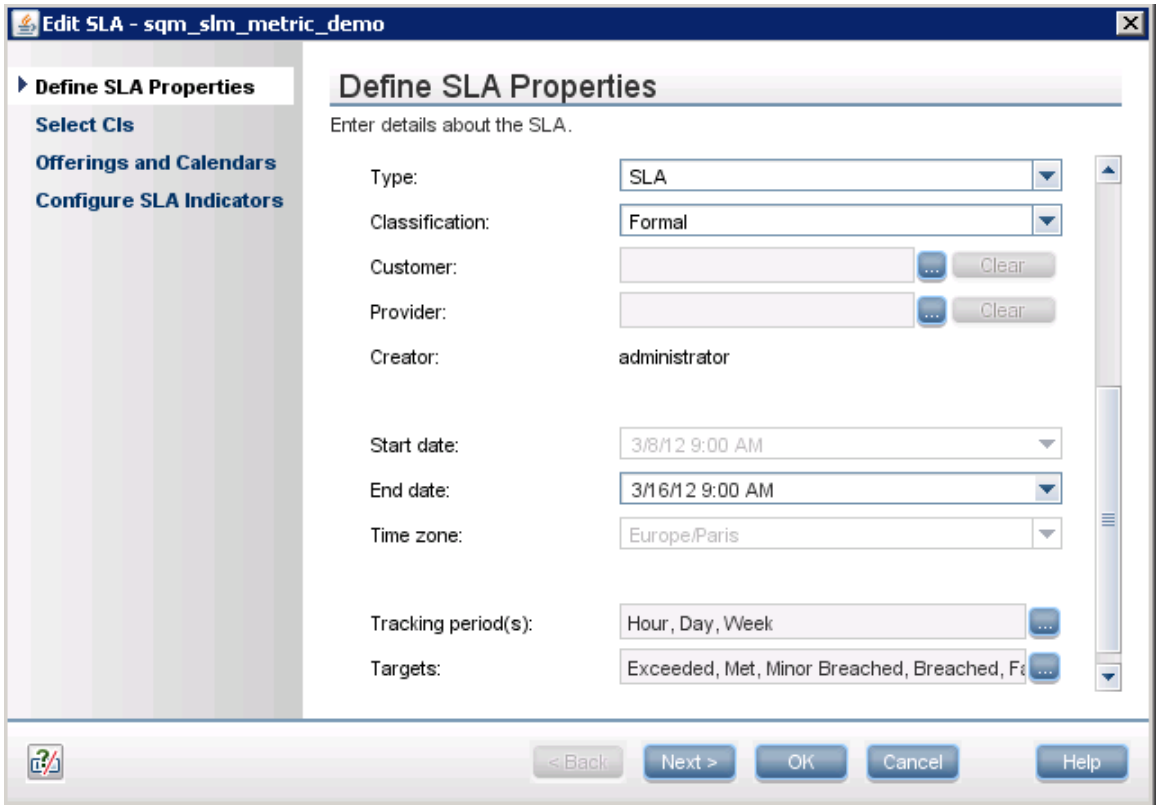
For more information about defining business services, refer to the *Using Service Level Management* document.

7.1.3 Define SLA

Instructions to define a Service Level Agreement:

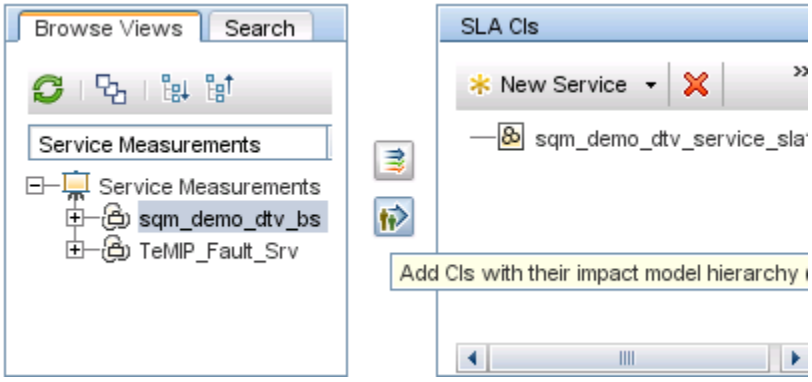
1. Browse to **Admin > Service Level Management > Agreements Manager**
2. Click **New SLA** button  to open **New SLA** dialog

3. In **New SLA** dialog, fill **Name**, select **Type** as **SLA**, select **Classification**, **Start date**, **End date**, **Time zone**, **Tracking period(s)** and **Targets**

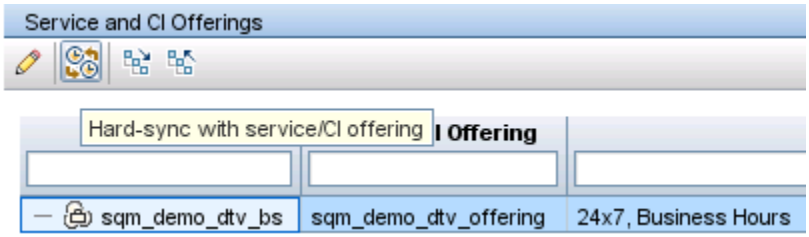


4. Select CIs and

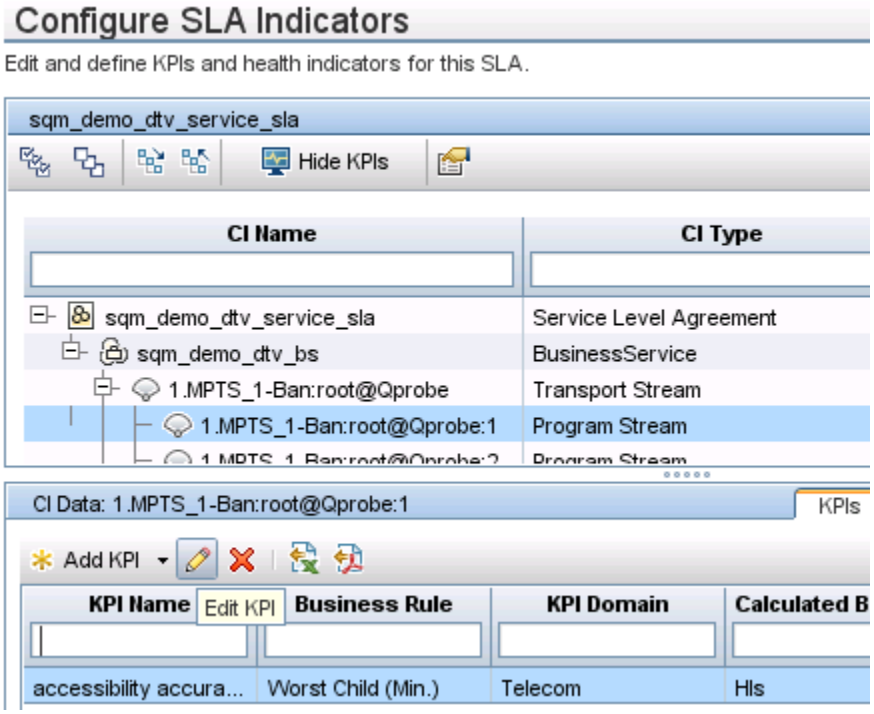
   Note: you can also create new Business Service here.



5. Choose service offering and calendars, select the service and click Hard-sync button to hard-sync it with selected offering



6. Check relative SLA indicators, Add or Edit KPIs/HIs if needed



7. Click **Ok** button to complete the SLA definition.

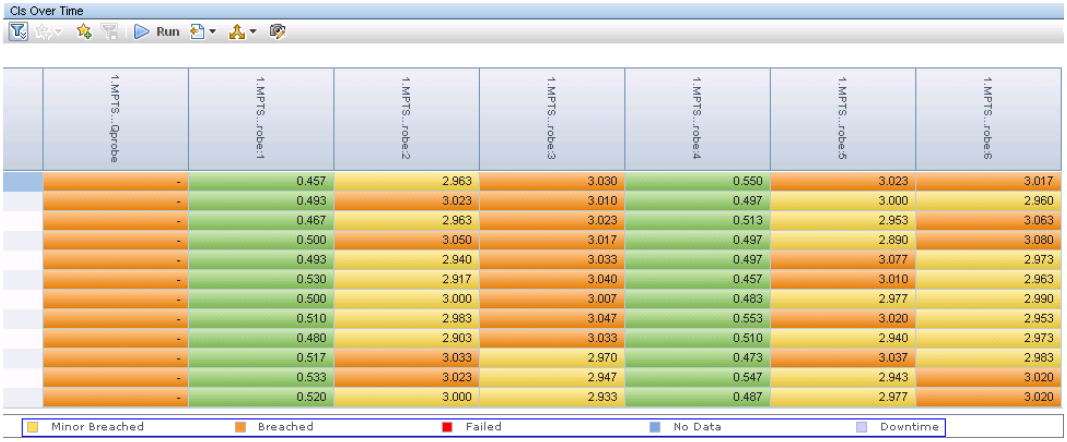
For more information about defining SLAs, refer to the *Using Service Level Management* document.

7.2 Viewing SLA Reports

Once data has been collected and aggregated for the agreement, you can view performance results in the form of various reports in SLM.

Service Level Management reports show you how well actual service levels compare with your goals. The reports provide a bird's eye view of the whole system, and enable you to get an early warning of potential problems, before agreement violations occur.

To check SLA reports, browse to Application > Service Level Management > SLA Reports.



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For more information about SLM Reports, refer to the *Using Service Level Management* document.

Chapter 8

Platform Configurations

8.1 Infrastructure Settings

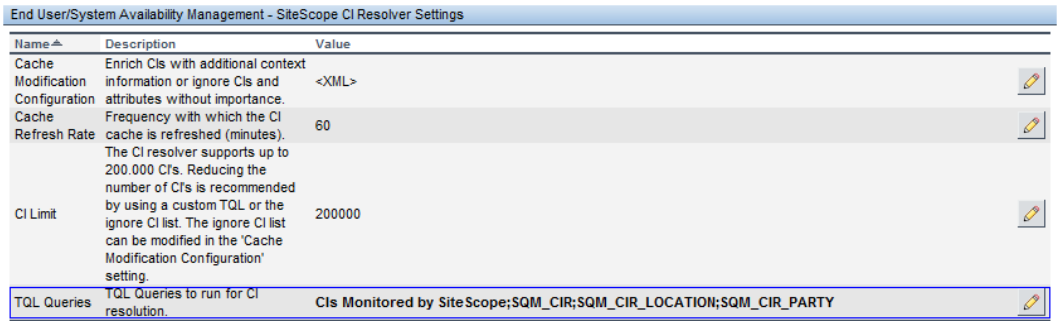
8.1.1 CI Resolution

SQM solution defined several CI resolution queries; therefore, installation of SMF will update BSM CI Resolution settings. If the BSM environment has been customized before SMF installation, and relative information not provided correctly during installation, manual update is required.

8.1.1.1 Check CI Resolution settings

In BSM GUI, following below steps to check current CI Resolution configuration:

1. Browse to **Admin > Platform > Setup and Maintenance > Infrastructure Settings**,
2. Select Context **End User/System Availability Management** in **Applications**
3. Choose section **SiteScope CI Resolver Settings**

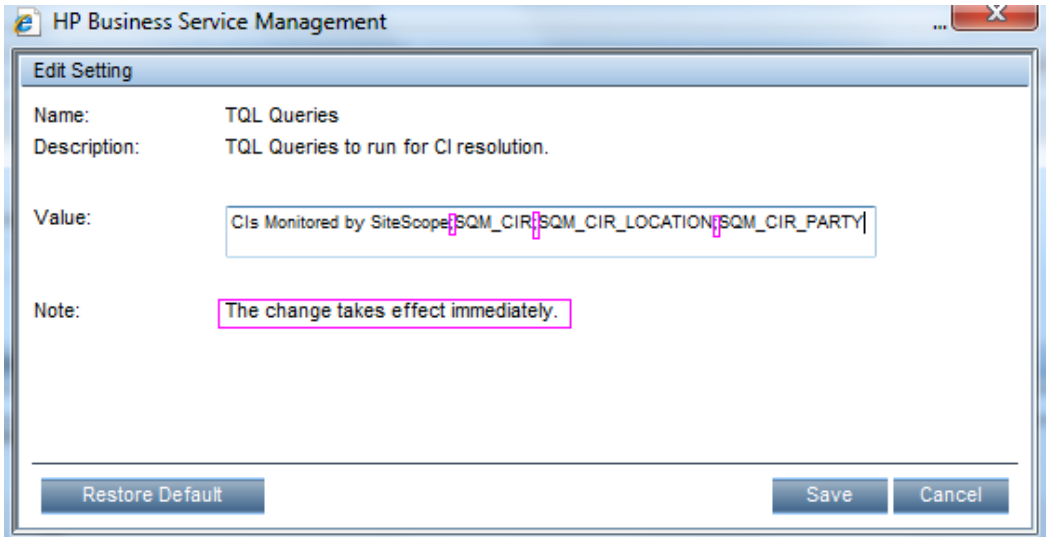


8.1.1.2 Update TQL Queries for CI Resolution

To update the TQL Queries used in CI Resolution, follow the steps listed in Check CI Resolution settings; then click the Edit button in line TQL Queries to update the query list.

Note: The TQL Queries should be separated by '**;**'.

As below figure shown, the change will take effect immediately. It means, when next round of CI Resolution Cache Refresh started, new TQL Queries will be used.



8.2 Profile Management

8.2.1 Overview

The Profile Database Management page, accessed from **Admin > Platform > Setup and Maintenance**, enables you to perform the following database management tasks:

- Create a new database. BSM automatically creates a new database and populates it with profile tables.
- Assign a default profile database. You must assign a default profile database, to enable BSM to collect the following types of data:
    - Service Level Management data
    - data used in Service Health

8.2.2 Partitioning and Purging

The data collection tables in the profile databases can grow to a very large size. Over time, this can severely degrade system performance.

You use the Partition and Purging Managers to instruct the platform to automatically partition historical data for later removal from profile databases.

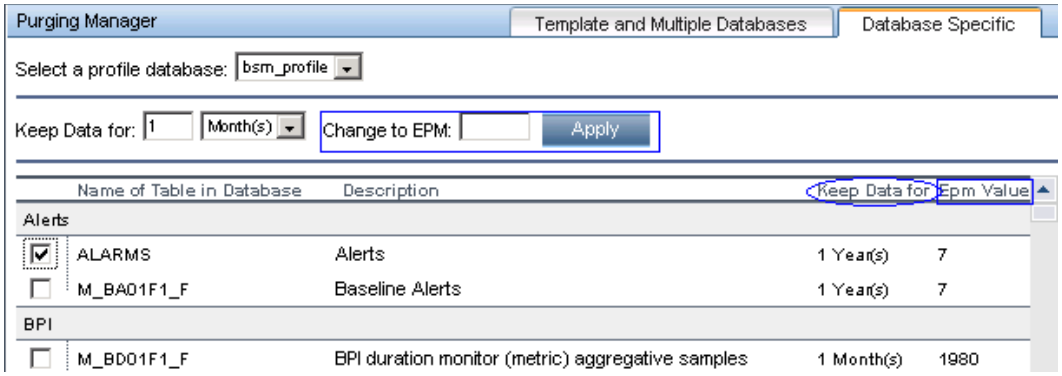
The Partition and Purging Manager splits fast growing tables into partitions at defined time intervals. After a defined amount of time has elapsed, data in a partition is made inaccessible for use in BSM reports. After no more than two hours, a partition is purged from the profile database.

The Partition and Purging Manager is activated for each profile database and handle partitioning and later purging of historical data according to the period listed for the database table. In GUI, the period is shown as "**Keep Data for**".

The size of each partition is determined by the EPM (events per minute) value displayed on the Purging Manager page. Optionally, you may want to adjust the **Epm Value**, if necessary:

- If data partitions are too large (accumulating much more than 1 million rows), raise the EPM value to create new partitions more frequently.

- If data partitions are too small (accumulating much less than 1 million rows), lower the EPM value to create new partitions less frequently.



For more information, refer to Chapter 7 Database Administration in the Platform Administration document.

Appendix

SQM Pattern Views

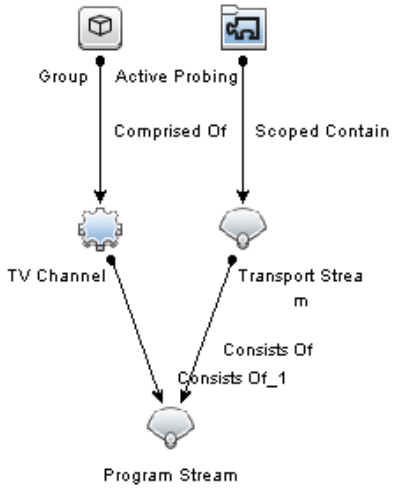
The below table lists all Pattern Views defined in SMF:

Included in model	Pattern View Name	Query Name
Digital TV	DTV active probe	DTV active probe
	Program per active probe	Program per active probe
	TV Channels - Active Probing	TV Channels - Active Probing
TeMIP	TeMIP Managed Objects	TeMIP Managed Objects
	TeMIP Managed Object with Resource	TeMIP Managed Object with Resource
	TeMIP Self Management	TeMIP Self Management

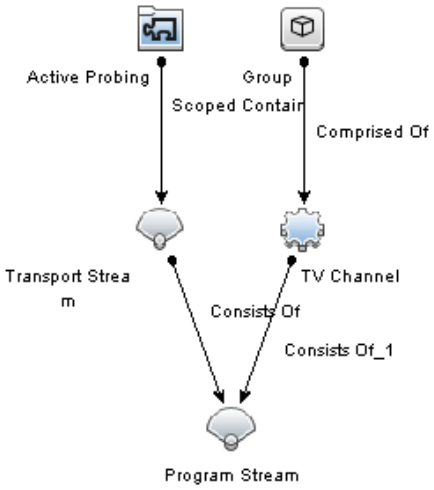
SMF Pattern View list

Pattern View maps

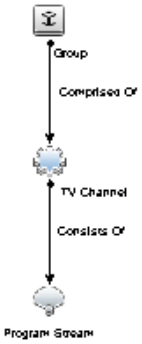
Pattern View Map: **DTV active probe**



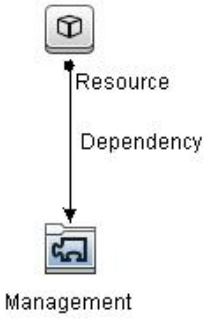
Pattern View Map: **Program per active probe**



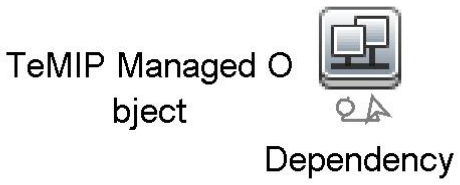
Pattern View Map: **TV Channels - Active Probing**



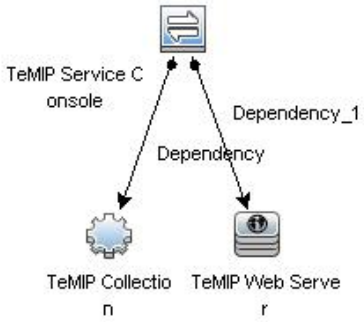
Pattern View Map: **TeMIP Managed Objects**



Pattern View Map: **TeMIP Managed Object with Resource**



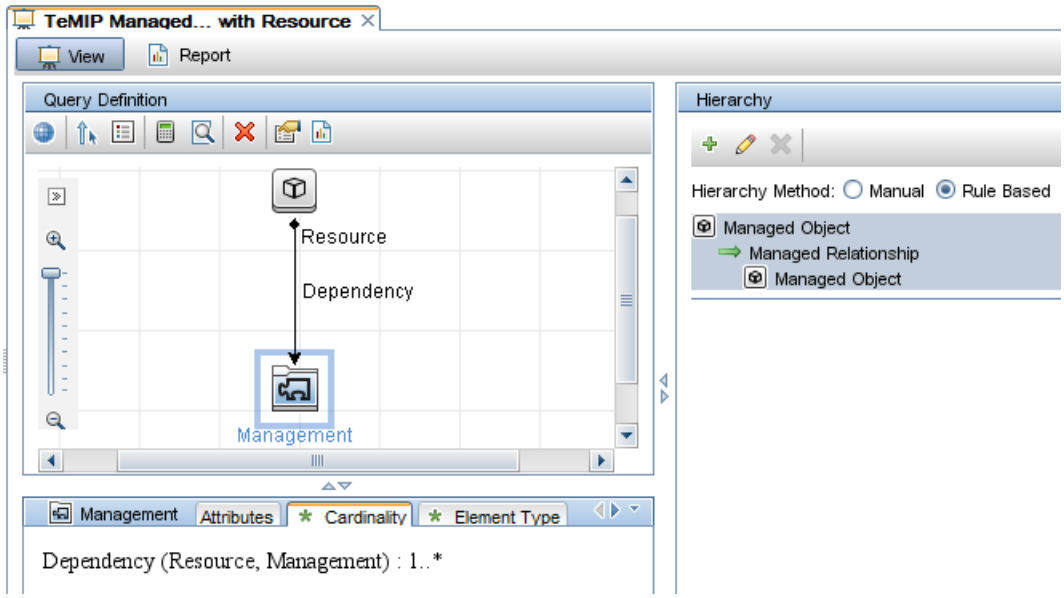
Pattern View Map: **TeMIP Self Management**



Pattern View description

Take view "TeMIP Managed Object with Resource" as an example, as below figure shown:

- the view includes 2 CI Types "Resource" and "Management"
- the condition is there is relationship "Dependency" between Resource CI and Management CI
- Hierarchy method is "Rule Based"



Contact us

To get the latest version please visit site http://support.openview.hp.com/selfsolve/manuals.

To get more technical details, please contact SQM_Support.