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**Version 1.1.00**

**BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring**

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**Managing Baselines and Key Performance Indicators**
Release Notes for v1.1.00
What's New

- When a new HP 3PAR Storage System is added, the monitoring solution now instantaneously creates the corresponding Monitor in the BPPM console without waiting for the discovery to complete.
- The Port Count attribute has been added to the HP 3PAR Storage System monitor type to report on the number of ports on the storage system.
- The monitoring solution now provides support for WQL query in WBEM client based on SBLIM method.
- The Inbound Bandwidth Utilization, Outbound Bandwidth Utilization and Bandwidth Utilization attributes have been added to the HP 3PAR FC Port and HP 3PAR SAS Port monitor types to measure the bandwidth (inbound, outbound and overall) used by these ports.
- The Unknown Status setting option has been added to set actions to be performed when the monitoring solution is unable to detect the status of a monitored device.
- The Estimated Free System Space attribute has been added to the HP 3PAR Storage Pool monitor type to report on the free space available in the storage pool.

Changes and Enhancements

- The error message displayed in debug files when querying an SMI-S Provider that does not support the HP 3PAR namespace has been improved to be more explicit.
- The mechanism that handles the parsing of WBEM queries has been improved to reduce the consumption of CPU and memory resources.
- The Consumed Capacity attribute of the HP 3PAR Storage Pool monitor type now includes the Snap Administration Space.

Fixed Issues

- The Subscribed Capacity for storage pools was not properly calculated. The computation method has therefore been changed and is now the sum of the host visible capacity for mapped volumes.
Support Information
This section contains information about how to contact Customer Support and the levels of support offered for this and other releases.

If you have problems with or questions about a BMC product, or for the latest support policies, see the Customer Support website at http://www.bmc.com/support. You can also access product documents and search the Knowledge Base for help with an issue at http://www.sentrySoftware.com. If you do not have access to the web and you are in the United States or Canada, contact Customer Support at 800 537 1813. Outside the United States or Canada, contact your local BMC office or agent.
Overview
The pages in this section provide a high-level overview of the product.

- **User Goals and Features**
- **Product at a Glance**
- **Supported Platforms**
- **Prerequisites**

⚠️ Note that for convenience and brevity, reference to **BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring**, may also be made as **BPPM HP 3PAR**.

### User Goals and Features

BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring monitors the following in your environment:

- **Hardware**: batteries, IDE disks, interface cards, magazines, processors, memory, etc.
- **Environment**: temperature, fans, power supplies, voltage, etc.
- **Data traffic and I/Os**: Physical Disks, storage pools, storage systems, volumes, etc.
- **Storage resource availability and utilization**.
Product at a Glance

BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring provides current and historical information through a centralized console so you can easily view and manage your entire IT infrastructure. The product collects hardware and performance metrics into the BMC ProactiveNet Performance Management environment and enables administrators to be warned whenever a problem occurs in their environment.

**BPPM HP 3PAR - Architecture Diagram**

BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring:

- Collects HP 3PAR performance and hardware metrics and bring them into the BMC environment
- Identifies performance bottlenecks
- Manages and helps rationalize disk space consumption
- Reports on activity generated by each protocol
- Analyzes overall traffic and in-depth I/Os, etc.
Supported Platforms

BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring supports any HP 3PAR Storage System that comes with the embedded SMI-S provider.

Prerequisites

BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring relies on the HP 3PAR embedded SMI-S Provider to collect hardware and performance metrics about your HP 3PAR storage systems and bring them into your BPPM Console. In order to fully take advantage of all the capabilities offered by the monitoring solution, make sure that HP 3PAR embedded SMI-S Provider is properly configured.

By default the HP 3PAR SMI-S Provider is not started on the array’s management interface. The startcim must thus be run to start the SMI-S provider. To do so, log on to the HP 3PAR system and trigger the following command:

```
# startcim
CIM server will start in about 90 seconds.
```

You can use the command showcim to verify the status of the CIM server.
Installing the Monitoring Solution
The installation can be handled from A to Z from BMC ProactiveNet Central Monitoring Administration. Once the latest version of the solution has been loaded into BMC ProactiveNet Central Monitoring Administration, administrators can create all the installation packages required for their different operating systems and platforms and save them for later use in the Monitoring Installation Packages list. These packages can then be deployed to multiple computers. Administrators just have to connect to BMC ProactiveNet Central Monitoring Administration from the server where they want to install the package, download it and launch the installation.

This section describes the different steps to follow to install BPPM HP 3PAR:
- Importing BPPM HP 3PAR into Central Administration
- Creating the Installation Package
- Downloading the Installation Package
- Installing the Package

## Importing the Monitoring Solution into Central Administration

The BMC ProactiveNet Central Monitoring Repository includes the current versions of the BMC PATROL Agent and BMC PATROL Monitoring Solutions that you can use with BMC ProactiveNet. If the version available in the Repository does not correspond to the latest one, you will have to manually import it:

1. Log on to **BMC ProactiveNet Central Monitoring Administration**.
2. Click the **Repository** drawer and select **Manage Repository**.
3. Check that the version of the BMC component available is actually the latest one. If not, download the latest version corresponding to your operating system (Windows or UNIX/Linux) available on the [Sentry Software Website](http://sentrysoftware.com) and save it on the local computer from which you are running the Central Monitoring Administration web-based console.
4. From the **BMC ProactiveNet Central Monitoring Administration**, click **Import**.
5. Select **Single solution**.
7. Click **Import**.

The selected archive file is imported to the repository.
Creating the Installation Package

The installation package to deploy to managed systems can be created directly from BMC ProactiveNet Central Monitoring Administration:

1. Log on to **BMC ProactiveNet Central Monitoring Administration**
2. Click the **Repository** drawer and select **Deployable Package Repository**.
3. Click **Add**.
4. Select the operating system and platform for which you want to create a package. The components available in the repository for the selected operating system and platform are displayed.
5. Select the Installation Package Component:
   - From the **Available** components list, select the relevant component.
   - From the **Version** list, select the latest version.
   - Click the right arrow button to move the component into the **Selected Components** list.
     - By default, the appropriate BMC PATROL Agent for the operating system and platform that you chose is included in the Selected components list.
   - Click **Next**. The **Add Component Installation Package** wizard is displayed.
6. Go through the wizard and specify the required PATROL information. The **Installation Package Details** is displayed:
7. Verify that:
   - the operating system and platform are correct
   - the components that you want to include are listed in the **Included Components** list.
8. Provide the following information:
   - **Name**: Enter a unique name for the package.
   - (Optional) **Description**: Enter a description of the package. The description is displayed in the Monitoring Installation Packages list on the Monitoring Repository window.
   - **Format**: Select a file compression format for the package.
9. Click **Save Installation Package**.
10. Click **Close**. The package is now available in the **Monitoring Installation Packages** list.
Creating the Installation Package

You can download an installation package and install the components on one or more hosts. The installation runs silently with the information entered during package creation.

**Recommendation**

If you defined the BMC ProactiveNet Integration Service variable for PATROL Agents in the installation package, ensure the agents are started in phases. Do not start newly deployed agents all at once. Start and configure monitoring for the agents in planned phases to reduce the performance impact on the Integration Service nodes and on the BMC ProactiveNet Server associated with the automatic workflow process.

1. Log on to BMC ProactiveNet Central Monitoring Administration from the computer on which the PATROL Agent is installed.
2. Click the Repository drawer and select Deployable Package Repository.
3. (Optional) To filter the list of installation packages, select an operating system from the Filter by Operating System list.
4. Click the link for the installation package that you want to download.
5. Through the browser's download dialog box, save the installation package.

Installing the Package

1. Copy the installation package to the host where BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring needs to be installed.
2. Extract the installation package as appropriate for your operating system. The package is extracted to the bmc_products directory on the current host.
3. From the bmc_products directory, run the installation utility for your operating system:
   - (UNIX or Linux) RunSilentInstall.sh
   - (Microsoft Windows) RunSilentInstall.exe

The package is installed on the current host. If the package includes a BMC PATROL Agent, the agent sends a configuration request by passing its tags to BMC ProactiveNet Central Monitoring Administration, via the Integration Service. Central Monitoring Administration evaluates policies that match the tags, determines the final configuration to be applied, and sends the configuration information back to the agent. Monitoring is based on the configuration information received by the agent.

If no policy matches the tags associated with the agent, the agent does not receive configuration information. The agent does not begin monitoring until a matching policy is created.
Integrating the Monitoring Solution
Depending on the version of BMC ProactiveNet Performance Management used, integration steps may need to be performed.

**BMC ProactiveNet Performance Management 8.5, 8.6 or 9.0**

To integrate BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring into BMC ProactiveNet Performance Management 8.5, 8.6 or 9.0, you need to create a specific adapter. For more information, please refer to [Integrating the Sentry Software's KMs into BMC ProactiveNet Performance Management (BPPM)](#).

**BMC ProactiveNet Performance Management 9.5**

No specific integration steps need to be performed.
Configuring After Installation
To configure BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring, you need to:

- Add a tag to your PATROL Agents.
- Create a policy, i.e. a template containing the PATROL Agent configuration.
- Assign your policy to one or more PATROL Agents by using the tag that you would have previously added.

Adding Tags to PATROL Agents

Tags must be set for all your PATROL Agents when creating a policy. If you have not already assigned tags in the deployable install packages you created, you can still manually add them to your policy.

1. In the Navigation pane of Central Monitoring Administration, click Policies and expand the Monitoring policy type.
2. Select a policy view (e.g. All).
3. Click Add to create a new policy or select an existing policy and click Edit to display the Monitoring Policy Configuration dialog box.
4. Check the Agent Configuration box.
5. Click the Agent Configuration link to go straight to the Agent Configuration page.
Under **Agent Properties**, enter the tags that you want to assign to the BMC PATROL Agent. The format of each tag is `tagName:tagDescription` where `tagName` must be replaced by the name of the tag (e.g. `sentryTag`). You can also provide multiple tags, separated by commas.

*If the tag description contains spaces, enclose the description within double quotes. For example, `tag1:"Brief Description",tag2:"Description"`*

7. Click **Finish** to validate your changes.

In the **Agent Selection** page, you will then be able to configure conditions to select BMC PATROL Agents based on the **Agent Tag** property that you have previously added.

# Configuring Monitor Settings

To configure monitor settings:

1. Log on to **BMC ProactiveNet Central Monitoring Administration**.
2. Create a **Monitoring Policy**:
   - In the **Navigation** pane, click the **Policies** drawer.
   - Expand the **Monitoring** folder and select a policy view (e.g. **All**).
   - Click **Next**. The **Monitoring Policy Configuration** wizard is displayed.
   - Click **Next** to configure the monitor.
3. Specify the Monitoring Solution and Monitor Type to be configured:
   - From the **Monitoring Solution** menu, select **HP 3PAR Storage**.
   - From the **Version** menu, select the required version.

   ![Specifying the Monitoring Solution and Monitor Type](image)

4. Specify the **Connection Settings**:
   - **Hostname**: storage system hostname.
   - **Port Number**: Enter the port number that will be used for the connection to the enterprise manager. By default, the HP 3PAR SMI-S provider runs on port 5989 when the encryption option is enabled, or on port 5988 when the encryption is disabled.
   - **Encryption**: Select this option to encrypt the connection.
   - Enter the **WBEM Credentials** that will be used to connect to the HP 3PAR storage system.
5. (Optional) Configure the following options:
   - In the **Discovery Interval** field, specify the frequency in minutes of the discovery process. By default, the solution runs a discovery every 60 minutes.
   - In the **Polling Interval** field, indicate how often new data is collected. By default, the polling interval is set to 2 minutes.
   - Check the **Disable Volumes Monitoring** box if you want to limit the number of instances created and therefore reduce the system resource consumption. Discovery and collect requests and operations will no longer be performed.
   - Specify the volumes to be excluded (**Exclude Volumes** field) or included (**Keep Only Volumes** field). If you specify a regular expression based on the volume PATROL ID, all volumes that match with the specified regular expression will respectively be excluded or included.
6. Click **Add to List** to save the new connection to the HP 3PAR storage system.

7. (Optional) Click the **Advanced** button if you need to:
   - enable the debug mode
   - set advanced configuration variables

8. (Optional) Click the **Schedule** button if you need to schedule automatic reports.

9. (Optional) Click the **Unknown Status** button to indicate the action to perform when the solution returns an **Unknown Status** on a device.

9. Click **Add**. If the monitor configuration has been successfully added, click **Close**.

10. Click **Finish** to save your monitoring policy.
Enabling the Debug Mode

When you encounter an issue and wish to report it to Sentry Software, you will be asked to enable the Debug Mode and provide the debug output to the Sentry Software support team.

To enable the debug mode

1. Log on to BMC ProactiveNet Central Monitoring Administration.
2. Edit the Monitoring Policy that applies to the PATROL Agent for which you need to enable the debug mode:
   - In the Navigation pane, click the Policies drawer.
   - Expand the Monitoring folder and select a policy view (e.g. All).
   - Select your policy and click .
   - Click the Monitor Configuration link.
   - Select the HP 3PAR KM Monitor Type and click .
3. Click the Advanced button.
4. Check the **Enable Debug Mode** box. The solution will store debug information in a log file. By default debug files are stored in the `%PATROL_HOME%\log` folder.

5. In the **Debug End Time** field, enter the date and time at which the system must stop logging debug information. Required format: `yyyy/mm/dd hh:mm:ss`.

6. Click **Close** to save your settings.

⚠️ For the debug mode to be enabled, the Enable Debug Mode must be checked and the Debug End Time must be properly set to a date and time in the future.

---

**Setting Advanced Configuration Variables**

Advanced configuration variables are used to manually set variables that are normally not available through the standard interface.

⚠️ These variables should only be set when instructed so by Sentry Software Support.

---

**To configure a variable**

1. Log on to **BMC ProactiveNet Central Monitoring Administration**.
2. Edit the **Monitoring Policy** that applies to the PATROL Agent for which you need to configure variables:
   - In the **Navigation** pane, click the **Policies** drawer.
   - Expand the **Monitoring** folder and select a policy view (e.g. **All**).
   - Select your policy and click ✏.
   - Click the **Monitor Configuration** link.
   - Select the **HP 3PAR KM** Monitor Type and click ✏.
3. Click the **Advanced** button.

![Advanced Configuration Variables](image)

4. In the **Configuration Variables** section, enter the name of the variable you need to configure and enter the value to be set. The configuration variables available for BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring and their possible values are:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>collectionHubHeapSizeMax</td>
<td>None</td>
<td>Maximum heap size in megabytes allocated to the Java Collection Hub.</td>
</tr>
<tr>
<td>collectionHubHeapSizeMin</td>
<td>None</td>
<td>Minimum heap size in megabytes allocated to Java Collection Hub.</td>
</tr>
<tr>
<td>collectionHubOverrideJavaCommandLine</td>
<td>None</td>
<td>Command line used by the monitoring solution to launch the Java Collection Hub. This variable should only be set if instructed by Sentry Support.</td>
</tr>
</tbody>
</table>
### Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>defaultReinitializationOptions</td>
<td>None</td>
<td>List of default options to be executed by BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring on reinitialization.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• resetThresholds&lt;br&gt;• resetThresholdManagementMode&lt;br&gt;• resetAlertActions&lt;br&gt;• resetOtherAlertSettings&lt;br&gt;• resetDebugMode&lt;br&gt;• resetRemovedPausedObjectList&lt;br&gt;• resetReport&lt;br&gt;• resetSecuritySettings&lt;br&gt;• resetJavaSettings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inset a colon &quot;;&quot; between the variable and its value: &quot;resetThresholds;1&quot;; and if you enter multiple variables, they need to be separated by a carriage return.</td>
</tr>
<tr>
<td>disableJRECheck</td>
<td>0 = JRE validation tests enabled</td>
<td>When set to 1, disable the validation tests of the JRE used by the monitoring solution to run Java code. This can be used to force the monitoring solution to use a non-Sun or non-Oracle JRE.</td>
</tr>
<tr>
<td>disablePslExecuteBugWorkaround</td>
<td>0 = activated</td>
<td>When set to '1', deactivates the workaround in the monitoring solution for a bug in the PslExecute() PSL function. If the monitoring solution detects that the version of the PATROL Agent is affected by the PslExecute() bug, it uses an alternate technique to create asynchronous threads with the event_trigger() function and the RemPsl standard event. The disablePslExecuteBugWorkaround variable disables this workaround.</td>
</tr>
<tr>
<td>exportScheduling</td>
<td>None</td>
<td>Time when the activity and/or Virtual Volumes Mapping Table reports will be generated. Format required: HH:MM:SS</td>
</tr>
<tr>
<td>forceClassicConfigMode</td>
<td>0 = disabled</td>
<td>When the monitoring solution is used with BMC ProactiveNet, all the monitoring solution configuration menus are disabled in the PATROL Consoles. To enable them, set the forceClassicConfigMode variable to 1.</td>
</tr>
<tr>
<td>javaPassword</td>
<td>None</td>
<td>Password associated to the javaUsername variable.</td>
</tr>
<tr>
<td>javaPath</td>
<td>None</td>
<td>Path to the folder containing the Java executable used by the Collection Hub.</td>
</tr>
<tr>
<td>javaUsername</td>
<td>n/a</td>
<td>Username used to launch the Java Collection Hub.</td>
</tr>
<tr>
<td>pausedObjectList</td>
<td>n/a</td>
<td>List of the PATROL object path of the paused objects. (i.e. for which no collection will be performed).</td>
</tr>
<tr>
<td>psCommand</td>
<td>n/a</td>
<td>Command used on UNIX/Linux systems to retrieve the list of the currently running processes. Note: This command is used for debug purpose.</td>
</tr>
<tr>
<td>removedObjectList</td>
<td>n/a</td>
<td>List of instances that have been removed from the monitoring environment through the “Remove” KM Command.</td>
</tr>
<tr>
<td>startupDelay</td>
<td>0 seconds</td>
<td>To specify the number of seconds that BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring will wait before starting its discovery.</td>
</tr>
</tbody>
</table>

5. Click **Add to List**.
6. Click **Close** to save your settings.
You can easily modify or remove a variable by selecting it in the list and clicking either the Modify Selection or the Remove from List buttons.

Scheduling Automatic Reports

BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring can automatically produce text reports about the monitored storage systems.

To schedule automatic reports

1. Log on to BMC ProactiveNet Central Monitoring Administration.
2. Edit the Monitoring Policy that applies to the PATROL Agent for which you need to schedule automatic reports:
   - In the Navigation pane, click the Policies drawer.
   - Expand the Monitoring folder and select a policy view (e.g. All).
   - Select your policy and click .
   - Click the Monitor Configuration link.
   - Select the HP 3PAR KM Monitor Type and click .
3. Click the Schedule button.

4. In the Schedule section, indicate the time at which report(s) must be generated.
5. Check the Activity report type to automatically generate the following reports:
   - Storage Systems Activity: Reports on Transfer Bytes for all Storage Systems
   - Nodes Activity: Reports on Read and Write Bytes for all nodes
   - FC, Ethernet, and SAS Ports Activity: Reports on Transfer Bytes for all monitored FC, Ethernet, and SAS ports
   - Storage Pools Activity: Reports on Read and Write Bytes for all monitored storage pools
   - Volumes Activity: Reports on Read and Write Bytes for all monitored volumes
   - Physical Disks Activity: Reports on Read and Write Bytes for all monitored disks
6. Check **Virtual Volumes Mapping Table** to automatically generate a text report of the Virtual Volumes-to-hosts mapping table.
7. Click **Close** to save your settings.

---

**The history retention period can be set from the PATROL Console or from the PATROL Agent using a configuration variable. The default collection (retention) period is one day. Whenever a stored attribute value exceeds its retention period, it is automatically deleted from the attribute history file. Refer to BMC documentation for details.**

---

### Configuring the Unknown Status

BPPM HP 3PAR returns an **Unknown Status** when it is unable to detect the status of a monitored device. Even though this situation is rare, you may want to get notified of this **Unknown Status** in a particular way such as a warning or an alarm. To get this specific notice, you need to tell BPPM HP 3PAR how you want the **Unknown Status** to be interpreted by using the **Unknown Status** setting.

To configure the Unknown Status:

1. Configure the **Monitor Settings**.
2. In the **Unknown Status Management** section, click **Unknown Status**.

3. From the drop-down list, select:
   - **0 (OK)** to set the **Status** attribute to OK (default)
   - **1 (Warning)** to trigger a WARNING on the **Status** attribute
   - **2 (Alarm)** to trigger an ALARM on the **Status** attribute

4. Click **Close** to save your settings.
5. In the **Add Monitor Types** dialog box, click **Add**.
Configuring Thresholds

When you are creating or editing a policy, you can add and configure monitor thresholds. The Add Instance Thresholds dialog box presents threshold configuration fields for BMC ProactiveNet monitors that are configured through Central Monitoring Administration.

For details about baselines and Key Performance Indicators (KPI), see BMC ProactiveNet Central Monitoring Administration or BMC ProactiveNet documentation or refer to the Managing Baselines and Key Performance Indicators section. For details about the monitored attributes, refer to the specific monitor type in the Reference Guide section.

Before you begin

Ensure that your monitor configuration is complete before thresholds are applied. Thresholds cannot be applied to monitors that are not configured through Central Monitoring Administration. If you have not done so already, please refer to the section Configuring Monitor Settings.

Recommended Thresholds

Thresholds define acceptable high and/or low values for the data collected. Thresholds can be created as part of a policy that can be applied to multiple monitor types on multiple BMC PATROL Agents.

The Reference Guide provides a list of monitor types with their respective attributes and, when meaningful, a recommended threshold.

⚠️ Do not set server thresholds for availability or Boolean oriented parameters or any other parameters that will have events generated for them by the PATROL Agents.

Configuring Monitor Thresholds

To configure monitor thresholds:

1. Log on to BMC ProactiveNet Central Monitoring Administration.
2. Edit the Monitoring Policy that applies to the PATROL Agent for which you need to configure thresholds:
   - In the Navigation pane, click the Policies drawer
   - Expand the Monitoring folder and select a policy view (e.g. All).
   - Select your policy and click ✒.
3. Check the Server Threshold Configuration box.
4. Click the Server Threshold Configuration link.
5. In the Server Threshold Configuration page, click 📊.
6. Select the relevant Solution, Version, and Monitor Type.
7. In the Instance Name field, specify the instance to which the threshold configuration will be applied. You can either use a string or the following regular expression patterns: ?, +, *, ( ), |,
8. Check the **Match Device Name** box if you want the entire `<deviceName>`\`<instanceName>` string to be considered.
9. From the **Attribute** list, select a monitor attribute.
10. In the **Threshold** section:
    - Select the threshold type.
    - Set the threshold parameters values.
    - Click **Add**.
11. Resume the procedure to configure all the monitor thresholds required.
12. Click **Close**. The configuration details are displayed in the **Server Threshold Configuration** page.
13. Click **Finish**.

New threshold configurations are pushed to BMC PATROL Agents with matching Central Monitoring Configuration tags.

### Editing a Threshold Configuration

To edit a threshold configuration:

1. Log on to **BMC ProactiveNet Central Monitoring Administration**.
2. Edit the **Monitoring Policy** that applies to the PATROL Agent for which you need to edit thresholds:
   - In the **Navigation** pane, click the **Policies** drawer
   - Expand the **Monitoring** folder and select a policy view (e.g. **All**).
   - Select your policy and click **Edit**.
3. Click the **Server Threshold Configuration** link.
4. On the **Server Threshold Configuration** page, select an **Instance Name** and click **Edit**.
5. Edit the threshold configuration values and click **Update**.
6. When you finish editing the threshold configuration, click **Close**.
7. Click **Finish**.

Updated threshold configurations are pushed to BMC PATROL Agents with matching Central Monitoring Configuration tags.

### Deleting a Threshold Configuration

To delete a threshold configuration:

1. Log on to **BMC ProactiveNet Central Monitoring Administration**.
2. Edit the **Monitoring Policy** that applies to the PATROL Agent for which you need to edit thresholds:
   - In the **Navigation** pane, click the **Policies** drawer
   - Expand the **Monitoring** folder and select a policy view (e.g. **All**).
   - Select your policy and click **Edit**.
3. Click the **Server Threshold Configuration** link.
4. On the **Server Threshold Configuration** page, select an **Instance Name** and click **Edit**.
5. Click **Yes** to confirm deletion.
Managing Monitoring Policies

A monitoring policy specifies a set of actions to be taken when a specific condition on the PATROL Agent is fulfilled. First and foremost, actions include monitor configuration. Once a monitor is configured, policies can also specify threshold creation and the setting of baselines. A policy can also include intelligent server-side thresholds so that IT administrators can immediately be alerted on potential problems.

This topic provides general instructions for the following monitoring policy management tasks:

- Editing an existing monitoring policy
- Deleting a monitoring policy
- Enabling/disabling a monitoring policy

Editing an existing monitoring policy

An existing monitoring policy can be edited as follows:

1. In the Navigation pane of Central Monitoring Administration, click the Policies drawer.
2. Expand the Monitoring folder and select a policy view (e.g. All).
3. Select your policy and click.
4. Select one or several Optional Configuration options.
5. Click Next to go through the Monitoring Policy Configuration wizard to edit the monitoring policy settings.
6. Click Finish.

The updated monitoring policy is then deployed to the PATROL agents.

Deleting a monitoring policy

Deleting a monitoring policy may have deep consequences in a production environment. Before deleting a policy, it is recommended to create a new policy with a lower precedence number that will override the older policy. Once this new policy has been thoroughly tested, validated and enabled in production, you can delete the old one.

To delete an old monitoring policy:

1. In the Navigation pane of Central Monitoring Administration, click the Policies drawer.
2. Expand the Monitoring folder and select a policy view (e.g. All).
3. Select the monitoring policy to be deleted and click .
4. Click Yes to confirm deletion.
Deleting a policy deletes all monitor instances and most settings configured through the policy. Devices remain in the User Groups to which they have been added.

Enabling/disabling a monitoring policy

For maintenance and troubleshooting it can be useful to enable or disable policies. When a policy is disabled, the policy and its associations remain intact, but the policy configuration is not applied until the policy is enabled again.

1. In the Navigation pane of Central Monitoring Administration, click the Policies drawer.
2. Expand the Monitoring folder and select a policy view (e.g. All).
3. Select one or more policies and click:
   - ✔ to enable your policy. Please note that policies should not be enabled until they have been tested and validated for production.
   - ✗ to disable your policy.
Monitoring your Storage Environment
Monitoring HP 3PAR storage systems with BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring is very simple. Once the monitoring solution is properly installed and configured, BPPM HP 3PAR automatically detects all the various HP 3PAR storage features and components and displays them in the BMC ProactiveNet Operations Console.

BPPM HP 3PAR helps you:

- Detect high processor utilization
- Diagnose a bad disk layout
- Diagnose slow volumes
- Identify busiest volumes
- Identify a node overload
- Monitor hardware
- Report disk space consumption
- View the overall activity of a storage system

**Detecting High Processor Utilization**

Detecting a high processor utilization is important to prevent nodes overloading that can lead to unpredictable performance degradations. To detect high processor utilization with BPPM, you can create a specific view that will display the **Transfer Byte Rate** and **Processor Utilization** attributes of all the nodes that compose your HP 3PAR storage systems.

**Creating the High Processor Utilization View**

**Step 1: Displaying the Transfer Byte Rate Attribute**

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the **Navigation** frame, select the **Main** drawer.
   - Click **Devices**.
   - Click to display the list of devices in a grid.
3. Click the device for which you need to create the **High Processor Utilization** view.
4. The list of monitors for your device is displayed. Expand **Nodes**.

![Displaying the HP 3PAR Nodes](image)

5. Click ✔️ for the first listed node. The following graph is displayed:

![Displaying the HP 3PAR Node Graph](image)

6. By default, the **Status** and **Transfer Byte Rate** attributes are displayed. For this use case, we will only display the **Transfer Byte Rate** attribute. The procedure is as follows:
   - Click the **Attributes & Indicators** tab.
   - Uncheck the **Status** box.

![Selecting the Attributes to Display in the Graph](image)

   - Click **Generate Graph(s)**
7. Add the graph to the view:
   - Click 
     ![Click Image](image)
     The following pop-up is displayed:

   ![Add this graph(s) to View](image)

   - Click **Add to View**.

   ![Add View](image)

   - In the **View Title** field, type **High Processor Utilization** and click **Add View**. The **View created successfully** message appears. Click **Close**.

8. The **High Processor Utilization** view is now created and available under the **Views & Graphs** drawer in the **Navigation** pane.

9. Resume the procedure to add to the **High Processor Utilization** view the **Transfer Byte Rate**
attributes of all the nodes that compose the HP 3PAR storage system.

Step 2: Displaying the Processor Utilization Attribute

1. In the **Main** drawer of the BMC ProactiveNet Operations Console, click **Devices**.
2. Click the relevant device.

![Devices](image)

**Selecting a Device**

3. The list of monitors for your device is displayed. Expand **Nodes**.

![Nodes](image)

**Displaying the HP 3PAR Nodes**

4. Click for the first listed node. The following graph is displayed:
Detecting High Processor Utilization

5. By default, the **Status** and **Transfer Byte Rate** attributes are displayed. We will now only display the **Processor Utilization** attribute. The procedure is as follows:
   - Click the **Attributes & Indicators** tab.
   - Uncheck the **Status** and **Transfer Byte Rate** boxes.
   - Check the **Processor Utilization** box.

6. Add the graph to the view:
   - Click **Add Graph to View**. The following pop-up is displayed:

   **Adding a Graph to View**
   - From the **Add to View** list, select **High Processor Utilization** and click **Add to View**.
The Graph added successfully message appears. Click Close.

7. Resume the procedure to add to the view the Processor Utilization attributes of all the nodes that compose the HP 3PAR storage system.

Displaying the High Processor Utilization View

1. Log on to the BMC ProactiveNet Operations Console.
2. In the Navigation pane, click the Views & Graphs drawer.
3. Click High Processor Utilization.

The following view is displayed:

4. Ensure that the Processor Utilization is lower than 80%. A processor utilization over 80% means that this node is overloaded and that the node constitutes a bottleneck for the storage system.

5. Verify the Transfer Byte Rate of your nodes. If the value of this attribute stays low – while the overall processor utilization is high – it indicates that the node is performing "non productive" tasks. It then may become critical to determine the source of activity that generates the high processor utilization.
Diagnosing a Bad Disk Layout

A non-optimal physical disk layout can cause one single physical disk to become the bottleneck of a SAN. To verify that the I/Os are well-balanced across all physical disks, you can create a specific view in BPPM that will display the Read Byte Rate and Write Byte Rate attributes of each physical disk that compose your HP 3PAR storage systems.

Creating the Bad Disk Layout View

Step 1: Displaying the Read Byte Rate Attribute

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the Navigation frame, select the Main drawer.
   - Click Devices.
   - Click to display the list of devices in a grid.
3. Click the device for which you need to create the Bad Disk Layout view.
4. The list of monitors for your device is displayed. Expand Physical Disks.
Diagnosing a Bad Disk Layout

5. Click for the first listed physical disk. The following graph is displayed:

![Displaying the HP 3PAR Physical Disks Graph]

6. By default, the **Status** and **Transfer Byte Rate** attributes are displayed. For this use case, we will only display the **Read Byte Rate** attribute. The procedure is as follows:
- Click the **Attributes & Indicators** tab.
- Uncheck the **Status** and **Transfer Byte Rate** boxes.
- Check the **Read Byte Rate** box.

![Graph screenshot]

**Selecting the Attributes to Display in the Graph**

- Click **Generate Graph(s)**
- Add the graph to the view:
  - Click ![Add to view icon]. The following pop-up is displayed:

![Add this graph(s) to View]

**Adding a Graph to View - Step 1**

- Click **Add to View**.

![Add View]

**Adding a Graph to View - Step 2**
8. The **Bad Disk Layout** view is now created and available under the **Views & Graphs** drawer in the Navigation pane.

9. Resume the procedure to add to the view the **Read Byte Rate** attributes of all the physical disks that compose the HP 3PAR storage system.

**Step 2: Displaying the Write Byte Rate Attribute**

1. In the **Main** drawer of the BMC ProactiveNet Operations Console, click **Devices**.
2. Click the relevant device.

3. The list of monitors for your device is displayed. Expand **Physical Disks**.
4. Click for the first listed physical disk. The following graph is displayed:

5. By default, the Status and Transfer Byte Rate attributes are displayed. We will now only display the Write Byte Rate attribute. The procedure is as follows:
Click the Attributes & Indicators tab. 
Uncheck the Status and Transfer Byte Rate boxes. 
Check the Write Byte Rate box.

Selecting the Attributes to Display in the Graph

6. Add the graph to the view:
   - Click \[\text{Attributes & Indicators}\] The following pop-up is displayed:

   ![Add this graph(s) to View](image)

   - From the Add to View list, select Bad Disk Layout and click Add to View. The Graph added successfully message appears. Click Close.

7. Resume the procedure to add to the view the Write Byte Rate attribute of all the physical disks that compose the HP 3PAR storage system.

Displaying the Bad Disk Layout View

1. Log on to the BMC ProactiveNet Operations Console.
2. In the Navigation pane, click the Views & Graphs drawer.
3. Click Bad Disk Layout.
4. Verify that the I/Os are well-balanced across all physical disks. Make sure that the Read Byte Rate and Write Byte Rate attributes of all the physical disks have similar average values.
Diagnosing Slow Volumes

If a system administrator complains that his servers are experiencing slow I/Os performance and that it is caused by the SAN, you may want to verify the actual response time of the volumes the server is relying on.

The **Response Time** attribute of the Volume monitor type represents the average time it took to complete the read and write operations on the volume during the collection interval. Typically, the average response time is below 10 milliseconds. You may also want to compare this value to the response time of the other volumes to see whether one server is really getting worse I/O performance than another.

Creating the Slow Volumes View

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the **Navigation** frame, select the **Main** drawer.
   - Click **Devices**.
   - Click ☰️ to display the list of devices in a grid.
3. Click the device for which you need to create the **Slow Volumes** view.
4. The list of monitors for your device is displayed. Expand **Volumes**.
Diagnosing Slow Volumes

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Displaying the HP 3PAR Volumes

5. Click for the first listed volume. The following graph is displayed:

Displaying the HP 3PAR Volume Graph

6. By default, the Operation Rate and Transfer Byte Rate attributes are displayed. For this use case, we will only display the Response Time attribute. The procedure is as follows:
   - Click the Attributes & Indicators tab.
   - Uncheck the Operation Rate and Transfer Byte Rate boxes.
   - Check the Response Time box.
7. Add the graph to the view:

- Click Generate Graph(s)

8. The Slow Volumes view is now created and available under the Views & Graphs drawer in the Navigation pane.
Diagnosing Slow Volumes

9. Resume the procedure to add to the view the **Response Time** attributes of all the volumes that compose the HP 3PAR storage system.

**Displaying the Bad Disk Layout View**

1. Log on to the BMC ProactiveNet Operations Console.
2. In the **Navigation** pane, click the **Views & Graphs** drawer.
3. Click **Slow Volumes**.

**Displaying the Slow Volumes View**

The following view is displayed:

4. If the response time is low, you will need to check the amount of data that is written and read on this volume. The bad performance may simply be due to an abnormally large amount of data to process.
Identifying Busiest Volumes

To identify the volumes that generate the most traffic, you can create a specific view that will display the Read Byte Rate and Write Byte Rate attributes of the Volumes Monitor.

Creating the Busiest Volumes View

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the Navigation frame, select the Main drawer.
   - Click Devices.
   - Click to display the list of devices in a grid.
3. Click the device for which you need to create the Busiest Volumes view.

   ![Image of device selection]

   Selecting a Device

4. The list of monitors for your device is displayed. Expand Volumes.
Identifying Busiest Volumes

5. Click for the first listed volume. The following graph is displayed:

6. By default, the Operation Rate and Transfer Byte Rate attributes are displayed. For this use case, we will only display the Read Byte Rate and Write Byte Rate attributes. The procedure is as follows:
   - Click the Attributes & Indicators tab.
   - Uncheck the Operation Rate and Transfer Byte Rate boxes.
   - Check the Read Byte Rate and Write Byte Rate boxes.
Selecting the Attributes to Display in the Graph

- Click **Generate Graph(s)**

7. Add the graph to the view:

- Click  

  The following pop-up is displayed:

```
Add this graph(s) to View

Graph Name: HP 3PAR Volume Read
Graph Duration: 4 hours
Add to View: Create New View

Add to View  Cancel

*Mandatory fields
```

Adding a Graph to View - Step 1

- Click **Add to View**.

```
Add View

View Title: Busiest Volumes
Layout Type: Four Column(s)
Update Frequency: Daily Hourly Manually
Add View  Cancel

*Mandatory fields
```

Adding a Graph to View - Step 2

- In the **View Title** field, type **Busiest Volumes** and click **Add View**. The **View created successfully** message appears. Click **Close**.

8. The **Busiest Volumes** view is now created and available under the **Views & Graphs** drawer in the **Navigation** pane.

9. Resume the procedure if you want to add to the view the **Read Byte Rate** and **Write Byte**
Rate attributes of the volumes you are interested in.

Displaying the Busiest Volumes View

1. Log on to the BMC ProactiveNet Operations Console.
2. In the Navigation pane, click the Views & Graphs drawer.
3. Click Busiest Volumes.

The following view is displayed:

Identifying the Busiest Volumes
Identifying a Node Overload

To visualize the activity of a node, use the Processor Utilization attribute of the Node monitor. A warning is issued when the processor utilization goes too high, which means that the nodes cannot keep up with the load on the storage system. It is then important to identify what is overloading the nodes.

The Response Time attribute of the Node monitor represents the average time it took the node to process the read and write requests of the hosts. The higher the Response Time goes, the slower I/Os the servers will get. By default, the solution triggers a warning when the node takes more than 30 milliseconds on average to complete the I/O requests and an alarm when the response time reaches 100 milliseconds.

Creating the Node Overload View

Step 1: Displaying the Processor Utilization Attribute

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the Navigation frame, select the Main drawer.
   - Click Devices.
   - Click to display the list of devices in a grid.
3. Click the device for which you need to create the Node Overload view.

Selecting a Device

4. The list of monitors for your device is displayed. Expand Nodes.
Displaying the HP 3PAR Nodes

5. Click for the first listed node. The following graph is displayed:

Displaying the HP 3PAR Node Graph

6. By default, the Status and Transfer Byte Rate attributes are displayed. We will now only display the Processor Utilization attribute. The procedure is as follows:

- Click the Attributes & Indicators tab.
- Uncheck the Status and Transfer Byte Rate boxes.
- Check the Processor Utilization box.

Selecting the Attributes to Display in the Graph

- Click Generate Graph(s)
7. Add the graph to the view:
   - Click Add. The following pop-up is displayed:

   ![Add this graph(s) to View](image)

   **Adding a Graph to View - Step 1**

   - Click Add to View.

   ![Add View](image)

   **Adding a Graph to View - Step 2**

   - In the View Title field, type Node Overload and click Add View. The View created successfully message appears. Click Close.

8. The Node Overload view is now created and available under the Views & Graphs drawer in the Navigation pane.

9. Resume the procedure to add to the view the Processor Utilization attributes of all the nodes that compose the HP 3PAR storage system.
Step 2: Displaying the Response Time Attribute

1. In the **Main** drawer of the BMC ProactiveNet Operations Console, click **Devices**.
2. Click the relevant device.

![Image of BMC ProactiveNet Operations Console]

**Selecting a Device**

3. The list of monitors for your device is displayed. Expand **Nodes**.

![Image of Node Monitors]

**Displaying the HP 3PAR Nodes**

4. Click for the first listed node. The following graph is displayed:

![Graph of HP 3PAR Node Performance]
Identifying a Node Overload

5. By default, the **Status** and **Transfer Byte Rate** attributes are displayed. We will now only display the **Response Time** attribute. The procedure is as follows:
   - Click the **Attributes & Indicators** tab.
   - Uncheck the **Status** and **Transfer Byte Rate** boxes.
   - Check the **Response Time** box.

![Selecting the Attributes to Display in the Graph]

6. Add the graph to the view:
   - Click ![Add to View](image). The following pop-up is displayed:

   ![Adding a Graph to View]

   - From the **Add to View** list, select **Node Overload** and click **Add to View**. The **Graph added successfully** message appears. Click **Close**.

7. Resume the procedure to add to the view the **Response Time** attributes of all the nodes that compose the HP 3PAR storage system.

**Displaying the Node Overload View**

1. Log on to the BMC ProactiveNet Operations Console.
2. In the **Navigation** pane, click the **Views & Graphs** drawer.
3. Click **Node Overload**.
Identifying a Node Overload

Displaying the Node Overload View

The following view is displayed:

Identifying a Node Overload
Monitoring Hardware

To monitor the hardware health of your HP 3PAR storage systems, you can create a specific view that will display the hardware attributes for all the batteries, fans, and power supplies that compose your HP 3PAR Storage Systems.

Creating the “Monitoring Hardware” View

Step 1: Displaying the Batteries Attributes

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the Navigation frame, select the Main drawer.
   - Click Devices.
   - Click to display the list of devices in a grid.
   - Click the device for which you need to create the Monitoring Hardware view.
3. The list of monitors for your device is displayed. Expand Batteries.
4. Click for the first listed battery. The following graph is displayed:

   ![Displaying the HP 3PAR Battery Graph](image)

5. In the Attributes & Indicators tab, check Estimated Run Time and click Generate Graph(s).
6. Add the graph to the view:
   - Click . The following pop-up is displayed:
Adding a Graph to View - Step 1

- In the **Graph Name** field, enter **Battery Status** and **Estimate Run Time**.
- Click **Add to View**.

Adding a Graph to View - Step 2

- In the **View Title** field, type **Monitoring Hardware** and click **Add View**. The **View created successfully** message appears. Click **Close**.

7. Resume the procedure for all the monitored batteries.

Step 2: Displaying the Power Supplies Status

1. In the **Main** drawer of the BMC ProactiveNet Operations Console, click **Devices**.
2. Click the relevant device.
3. The list of monitors for your device is displayed. Expand **Power Supplies**.
4. Click for the first listed power supply. The following graph is displayed:
Displaying the HP 3PAR Power Supply Graph

5. Add the graph to the view:
   - Click [ ] . The following pop-up is displayed:

   ![Add this graph(s) to View]

   Adding a Graph to View - Step 1

   - From the Add to View list, select Monitoring Hardware and click Add to View. The Graph added successfully message appears. Click Close.

6. Resume the procedure for all the monitored power supplies.

Step 3: Displaying the AC/DC Status of the Power Supplies

1. In the Main drawer of the BMC ProactiveNet Operations Console, click Devices.
2. Click the relevant device.
3. The list of monitors for your device is displayed. Expand Power Supplies.
4. Click [ ] for the first listed power supply. The following graph is displayed:
5. In the **Attributes & Indicators** tab:
   - Uncheck the **Status** box
   - Check the **AC Status** and **DC Status** boxes.
   - Click **Generate Graph(s)**.

6. Add the graph to the view:
   - Click ![Add Graph](image). The following pop-up is displayed:

   ![Add this graph(s) to View](image)

   **Adding a Graph to View - Step 1**
   - In the **Graph Name** field, enter **Power Supplies - AC/DC Status**.
   - From the **Add to View** list, select **Monitoring Hardware** and click **Add to View**. The **Graph added successfully** message appears. Click **Close**.

7. Resume the procedure for all the monitored power supplies.

**Step 4: Displaying the Fans Attributes**

1. In the **Main** drawer of the BMC ProactiveNet Operations Console, click **Devices**.
2. Click the relevant device.
3. The list of monitors for your device is displayed. Expand **Fans**.
4. Click for the first listed fan. The following graph is displayed:

![Graph of HP 3PAR Fan](image)

Displaying the HP 3PAR Fan Graph

5. Add the graph to the view:
   - Click . The following pop-up is displayed:

   ![Add Graph to View](image)

   Adding a Graph to View - Step 1
   - In the **Graph Name** field, enter **Fan Status and Speed**.
   - From the **Add to View** list, select **Monitoring Hardware** and click **Add to View**. The **Graph added successfully** message appears. Click **Close**.

6. Resume the procedure for all the monitored fans.

Step 5: Displaying the Disk Temperature Attributes

1. In the **Main** drawer of the BMC ProactiveNet Operations Console, click **Devices**.
2. Click the relevant device.
3. The list of monitors for your device is displayed. Expand **Temperatures**
4. Click for the first listed temperature. The following graph is displayed:
5. Add the graph to the view:
   - Click \( \text{Add to View} \). The following pop-up is displayed:

   ![Add this graph(s) to View](image)

   **Adding a Graph to View - Step 1**

   - In the **Graph Name** field, enter **Temperature**.
   - From the **Add to View** list, select **Monitoring Hardware** and click **Add to View**. The **Graph added successfully** message appears. Click **Close**.

6. Resume the procedure for all the Temperatures monitors.

**Identifying Hardware Issues with the “Monitoring Hardware” view**

The "Monitoring Hardware" view can help you:

- Diagnose Electrical Issues
- Manage Cooling Issues
Diagnosing Electrical Issues

Understanding the basics of the electrical distribution system will help IT administrators diagnose data center electrical issues. Power is delivered to a data center by the local utility company. Once inside the building, the utility power goes to the Automatic Transfer Switch and to the uninterruptible power supply (UPS) units. These units clean the incoming utility system before passing it to power distribution units (PDUs) for conversion. Power will finally be distributed to electrical outlets and servers. During the distribution, power loss or instability can occur. It can be caused by voltage or AC/DC conversion, hence the importance to monitor voltage and power supplies.

Monitoring voltage will help you verify the quality of your power supplies and detect system instability. Voltages that are too low or too high may lead to unpredictable system crashes. For example, if the power supply is weak, the voltage level on the motherboard will not be steady, which could lead to random crashes or to errors at the processor or memory levels.

After hard drives, the power supply is the device that is most likely to fail. The proper operation of this device highly depends on the quality of the data center electrical distribution. Indeed, voltage fluctuations are detrimental to power supplies: they can shorten their life span or impair them.

To monitor voltage and power supplies:

1. Display the Monitoring Hardware View:
   - In the Navigation pane of the BMC ProactiveNet Operations Console, click the Views & Graphs drawer
   - Click Monitoring Hardware.
2. Click the Power Supply Status graph to verify that the power supply status is not degraded. Several degraded power supplies may reveal an issue on the data center electrical distribution.
3. Click the Power Supplies – AC/DC Status graph and verify the AC and DC status are not degraded

Managing Cooling Issues

Even though data centers and servers are cooled with air conditioning and fans, computing systems may be overheated. Because overheating will lead to a general instability, the HP 3PAR Monitoring Solution monitors the fans and all the temperature sensors.

The temperature of the interior of the case of a storage system is controlled with fans. To prevent ambient temperature to get too high, ensure the fan is properly working:

1. Display the Monitoring Hardware View:
   - In the Navigation pane of the BMC ProactiveNet Operations Console, click the Views & Graphs drawer
   - Click Monitoring Hardware.
2. Click the Temperature graph and verify that:
   - the temperature is not too high
   - the status of the temperature sensor is not degraded.
3. Click the Fan Status and Speed graph and verify:
   - the Status attribute to make sure the fan is available and spinning
   - the Speed attribute to check that its speed is not too fast or too low.
Cooling might not be sufficient if the fan speed is too low or if maximum speed is reached.

⚠️ A fan which is not spinning anymore or is turning too slowly should be replaced immediately.
Reporting Disk Space Consumption

Making sure that a storage system has enough remaining disk space available is critical for several reasons:

- SAN administrators want to make sure to be able to provision disk space for new servers when requested, as quickly as possible.
- The storage system itself may need additional disk space for specific features to work properly, like automatic snapshots, mirroring, etc.
- If thin provisioning is used, the remaining disk space becomes dramatically critical since the inability to allocate additional space to a volume when requested by the subscriber host will lead to catastrophic data loss and corruption.

The disk space used is permanently monitored for each storage pool. The **Subscribed Capacity** attribute of the Storage Pool monitor type represents the amount of disk space that has been made available to the subscriber hosts, or in other words, the amount of disk space that is seen by the servers connected to the storage system.

The **Consumed Capacity** attribute of the Storage Pool monitor type represents the actual space usage in the storage pool. For “thin” pools (when thin provisioning is enabled on the storage system), this value is normally lower than the **Subscribed Capacity**, as it is the main purpose of thin provisioning. For traditional pools, the **Consumed Capacity** attribute has the same value as the **Subscribed Capacity** attribute, as the entirety of the subscribed disk space is fully allocated in the storage pool.

The **Consumed Capacity Percentage** attribute is the most critical one, even for non-thin storage pools, as a storage pool usage nearing 100% means that SAN administrators will not be able to create new volumes in the storage pool. By default, no alarm or warning threshold is set on this attribute as the fullness of a storage pool may be a normal situation.

Creating the Disk Space Consumption View

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the **Navigation** frame, select the **Main** drawer.
   - Click **Devices**.
   - Click to display the list of devices in a grid.
3. Click the device for which you need to create the **Disk Space Consumption** view.
4. The list of monitors for your device is displayed. Expand **Storage Pools**.

5. Click ☑️ for the first listed storage pool. The following graph is displayed:
6. By default, the **Oversubscription Situation** and **Transfer Byte Rate** attributes are displayed. For this use case, we will display the **Subscribed Capacity**, **Consumed Capacity** and **Consumed Capacity Percentage** attributes. The procedure is as follows:
   - Click the **Attributes & Indicators** tab.
   - Uncheck the **Oversubscription Situation** and **Transfer Byte Rate** boxes.
   - Check the **Subscribed Capacity**, **Consumed Capacity** and **Consumed Capacity Percentage** boxes.

7. Add the graph to the view:
   - Click **Generate Graph(s)**. The following pop-up is displayed:
Adding a Graph to View  - Step 1

- Click Add to View.

Adding a Graph to View  - Step 2

- In the View Title field, type Disk Space Consumption and click Add View. The View created successfully message appears. Click Close.

8. The Disk Space Consumption view is now created and available under the Views & Graphs drawer in the Navigation pane.

9. Resume the procedure if you want to add to the view the graphs the Subscribed Capacity, Consumed Capacity and Consumed Capacity Percentage attributes of the storage pools you are interested in.

Displaying the Disk Space Consumption View

1. Log on to the BMC ProactiveNet Operations Console.
2. In the Navigation pane, click the Views & Graphs drawer.
3. Click Disk Space Consumption.
The following view is displayed:
Viewing the Overall Activity of a Storage System

In order to visualize the activity of a storage system, use the **Received Byte Rate** and **Sent Byte Rate** attributes of the Storage System monitor. These attributes represent the overall traffic in megabytes per second for each monitored system.

Creating the Overall Activity of a Storage System View

1. Log on to the BMC ProactiveNet Operations Console.
2. Display the list of devices monitored by BPPM:
   - In the **Navigation** frame, select the **Main** drawer.
   - Click **Devices**.
   - Click to display the list of devices in a grid.
3. Click the device for which you need to create the **Overall Activity of a Storage System** view.

4. The list of monitors for your device is displayed.

5. Click for the HP 3PAR storage system. The following graph is displayed:
6. By default, the Transfer Byte Rate attribute is displayed. For this use case, we will display the Received Byte Rate and Sent Byte Rate attributes. The procedure is as follows:
   - Click the Attributes & Indicators tab.
   - Uncheck the Transfer Byte Rate box.
   - Check the Received Byte Rate and Sent Byte Rate boxes.

7. Add the graph to the view:
   - Click The following pop-up is displayed:
Adding a Graph to View - Step 1

- Click Add to View.

Adding a Graph to View - Step 2

- In the View Title field, type Overall Activity of a Storage System and click Add View. The View created successfully message appears. Click Close.

8. The Overall Activity of a Storage System view is now created and available under the Views & Graphs drawer in the Navigation pane.

Displaying the Overall Activity of a Storage System View

1. Log on to the BMC ProactiveNet Operations Console.
2. In the Navigation pane, click the Views & Graphs drawer.
3. Click Overall Activity of a Storage System.
The following view is displayed:

```
View: Overall Activity of a Storage System

Storage System Received Byte Rate and Sent Byte Rate
```

Viewing the Overall Activity of a Storage System
Reference Guide
Monitor Types and Attributes

Introduction

This chapter lists all the monitor types and attributes provided by BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring to monitor your systems.

Please note that depending on the type of managed systems, some attributes may not be available.

Monitor Types

- **HP 3PAR Battery**
- **HP 3PAR Cage**
- **HP 3PAR Ethernet Port**
- **HP 3PAR Fan**
- **HP 3PAR FC Port**
- **HP 3PAR Interface Card**
- **HP 3PAR Internal Disk**
- **HP 3PAR KM**
- **HP 3PAR Magazine**
- **HP 3PAR Memory**
- **HP 3PAR Node**
- **HP 3PAR Physical Disk**
- **HP 3PAR Pool**
- **HP 3PAR Power Supply**
- **HP 3PAR Processor**
- **HP 3PAR SAS Port**
- **HP 3PAR Storage System**
- **HP 3PAR Temperature Disk**
- **HP 3PAR Temperature Port**
- **HP 3PAR Voltage**
- **HP 3PAR Volume**

Baselines and Key Performance Indicators

Some attributes are identified by default as Key Performance Indicators (KPIs) and therefore automatically included in the base lining calculation. To learn more about auto baselining and KPIs, please refer to the Managing Baselines and Key Performance Indicators chapter.

In this guide, attributes flagged as KPIs and included by default in the baseline calculation process are respectively identified by the following icon: 📈 KPI
## HP 3PAR Battery

**Attributes**

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Run Time</td>
<td>Provides an estimation of the time the battery will continue to operate.</td>
<td>Minutes</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>(0 = No; 1 = Yes)</td>
<td>Warning = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the battery.</td>
<td>(0 = OK; 1 = Degraded; 2 = Failed)</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM

## HP 3PAR Cage

**Attributes**

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumed Capacity</td>
<td>Number of bytes actually consumed in the cage.</td>
<td>Terabytes (TB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Consumed Capacity Percentage</td>
<td>Percentage of bytes that is actually consumed in the cage.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>(0 = No; 1 = Yes)</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the cage.</td>
<td>(0 = OK; 1 = Degraded; 2 = Failed)</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM
# HP 3PAR Ethernet Port

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>{0 = No; 1 = Yes}</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Received Byte Rate</td>
<td>Bytes received per second.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Received Response Time</td>
<td>Average response time for received operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Response Time</td>
</tr>
<tr>
<td>Response Time*</td>
<td>Average response time for all operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Response Time</td>
</tr>
<tr>
<td>Sent Byte Rate</td>
<td>Bytes sent per second.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Sent Response Time</td>
<td>Average response time for sent operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Statistics</td>
</tr>
<tr>
<td>Status</td>
<td>Status of the port.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes transferred per second (send and received).</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM

---

# HP 3PAR Fan

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>{0 = No; 1 = Yes}</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Speed*</td>
<td>Speed of the fan.</td>
<td>{0 = Stopped; 1 = Medium; 2 = High}</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>
**BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring**

**Version 1.1.00**

### Monitor Types and Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status*</td>
<td>Status of the fan.</td>
<td></td>
<td>(0 = OK; 1 = Degraded; 2 = Failed)</td>
<td>Warning = 1 Alarm = 2 Availability</td>
</tr>
<tr>
<td>Display Name</td>
<td>Description</td>
<td>Unit</td>
<td>Default Alert Conditions</td>
<td>BMC ProactiveNet Attribute Type</td>
</tr>
<tr>
<td>HP 3PAR FC Port</td>
<td>Attributes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bandwidth Utilization</td>
<td>Percentage used of the available bandwidth.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Inbound Bandwidth Utilization</td>
<td>Percentage used of the available inbound bandwidth.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Link Speed</td>
<td>Negotiated or configured link speed (i.e. available bandwidth).</td>
<td>Gigabits per seconds (Gb/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Outbound Bandwidth Utilization</td>
<td>Percentage used of the available outbound bandwidth.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>(0 = No; 1 = Yes)</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Received Byte Rate</td>
<td>Bytes received per seconds.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Received Response Time</td>
<td>Average response time for received operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Statistics</td>
</tr>
<tr>
<td>Response Time*</td>
<td>Average response time for all operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Response Time</td>
</tr>
<tr>
<td>Sent Byte Rate</td>
<td>Bytes sent per second.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Sent Response Time</td>
<td>Average response time for sent operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status</td>
<td>Status of the port.</td>
<td></td>
<td>(0 = OK; 1 = Degraded; 2 = Failed)</td>
<td>Warning = 1 Alarm = 2 Availability</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes transferred per second (send and received).</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM
# HP 3PAR Interface Card

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>{0 = No; 1 = Yes}</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the card.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM

# HP 3PAR Internal Disk

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>{0 = No; 1 = Yes}</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the disk.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM

# HP 3PAR KM

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection Status</td>
<td>Status of the collection. Errors reported by this attribute are only related to the BPPM HP 3PAR itself.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM
# HP 3PAR Magazine

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>{0 = No; 1 = Yes}</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the magazine.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM

# HP 3PAR Memory

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>{0 = No; 1 = Yes}</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the memory.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM

# HP 3PAR Node

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED Status</td>
<td>Status of the LED of the node.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Memory Usage</td>
<td>Percentage of memory currently used in the node.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Operation Rate</td>
<td>Total number of operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Display Name</td>
<td>Description</td>
<td>Unit</td>
<td>Default Alert Conditions</td>
<td>BMC ProactiveNet Attribute Type</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td>------</td>
<td>--------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>{0 = No; 1 = Yes}</td>
<td>None</td>
<td>Availability</td>
</tr>
<tr>
<td>Processor Utilization</td>
<td>Percentage of utilization of the CPU resource.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Byte Rate</td>
<td>Bytes read per second from the node since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Cache Hit Ratio</td>
<td>Percentage of cache hit for read operations.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Operation Rate</td>
<td>Number of read operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Response Time</td>
<td>Average response time for read operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 30 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
<tr>
<td>Response Time</td>
<td>Average response time for all operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 30 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the node.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes read and written per second to the node.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Byte Rate</td>
<td>Bytes written per second from the node since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Cache Hit Ratio</td>
<td>Percentage of cache hit for write operations.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Operation Rate</td>
<td>Number of written operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Response Time</td>
<td>Average response time for write operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 30 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM.

For detailed information about KPI, see Managing Baselines and Key Performance Indicators.

**HP 3PAR Physical Disk**

### Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Size of the physical disk.</td>
<td>Gigabytes (GB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td><strong>Display Name</strong></td>
<td><strong>Description</strong></td>
<td><strong>Unit</strong></td>
<td><strong>Default Alert Conditions</strong></td>
<td><strong>BMC ProactiveNet Attribute Type</strong></td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>----------</td>
<td>-----------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Consumed Capacity Percentage</td>
<td>Percentage of bytes that is actually consumed in the physical disk.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Consumed Capacity</td>
<td>Number of bytes actually consumed in the physical disk.</td>
<td>Gigabytes (GB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Disk Time Utilization</td>
<td>Percentage of utilization of the disk resource.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Errors Per Day</td>
<td>Number of correctable and uncorrectable read and write errors</td>
<td>Errors</td>
<td>Warning ≥ 3 to 99 Alarm ≥ 100</td>
<td>Statistics</td>
</tr>
<tr>
<td>Operation Rate</td>
<td>Total number of operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Queue Length</td>
<td>Pending operations queue length.</td>
<td>Operations</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Byte Rate</td>
<td>Bytes read per second from the physical disk since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Operation Rate</td>
<td>Number of read operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Response Time</td>
<td>Average response time for read operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 20 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
<tr>
<td>Response Time</td>
<td>Average response time for all operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 20 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the physical disk.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes read and written per second to the node.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Byte Rate</td>
<td>Bytes written per second from the physical disk since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Operation Rate</td>
<td>Number of written operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Response Time</td>
<td>Average response time for write operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 20 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM
# HP 3PAR Power Supply

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Status</td>
<td>AC status of the power supply.</td>
<td></td>
<td>Warning = 1</td>
<td>Availability</td>
</tr>
<tr>
<td>DC Status</td>
<td>DC status of the power supply.</td>
<td></td>
<td>Warning = 1</td>
<td>Availability</td>
</tr>
<tr>
<td>Present</td>
<td>Indicates whether the device is</td>
<td></td>
<td>Alarm = 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>still present or not since the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>last discovery. This attribute is</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>updated at each discovery.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the power supply.</td>
<td></td>
<td>Warning = 1</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM

## HP 3PAR Processor

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present</td>
<td>Indicates whether the device is</td>
<td></td>
<td>Alarm = 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>still present or not since the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>last discovery. This attribute is</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>updated at each discovery.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Status*</td>
<td>Status of the processor.</td>
<td></td>
<td>Warning = 1</td>
<td>Availability</td>
</tr>
</tbody>
</table>

* Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM
# HP 3PAR SAS Port

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth Utilization</td>
<td>Percentage used of the available bandwidth.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Inbound Bandwidth Utilization</td>
<td>Percentage used of the available inbound bandwidth.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Link Speed</td>
<td>Negotiated or configured link speed (i.e. available bandwidth).</td>
<td>Gigabits per seconds (Gb/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Outbound Bandwidth Utilization</td>
<td>Percentage used of the available outbound bandwidth.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Packet Received</td>
<td>Total number of packets received per second.</td>
<td>Packets/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Packet Transferred</td>
<td>Total number of packets transmitted per second.</td>
<td>Packets/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This attribute is updated at each discovery.</td>
<td>(0 = No; 1 = Yes)</td>
<td>Alarm = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Received Byte Rate</td>
<td>Bytes received per second.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Received Response Time</td>
<td>Average response time for received operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Response Time</td>
</tr>
<tr>
<td>Response Time*</td>
<td>Average response time for all operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Response Time</td>
</tr>
<tr>
<td>Sent Byte Rate</td>
<td>Bytes sent per second.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Sent Response Time</td>
<td>Average response time for sent operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning ≥ 20</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status</td>
<td>Status of the port.</td>
<td>(0 = OK; 1 = Degraded; 2 = Failed)</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes transferred per second (sent and received).</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM.*
# HP 3PAR Storage System

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection Status</td>
<td>Status of the collection. Errors reported by this attribute are only related to the BPPM HP 3PAR itself.</td>
<td>(0 = OK; 1 = Degraded; 2 = Failed)</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Operation Rate</td>
<td>Total number of operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Port Count</td>
<td>Number of ports on the Storage system. Note: This value can be used to know the number of required licenses for the monitoring system.</td>
<td>Ports</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Power consumed by the storage system.</td>
<td>Watts</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Present</td>
<td>Indicates whether the device is still present or not since the last discovery. This parameter is updated at each discovery.</td>
<td>(0 = No; 1 = Yes)</td>
<td>Warning = 0</td>
<td>Availability</td>
</tr>
<tr>
<td>Read Operation Rate</td>
<td>Number of read operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Received Byte Rate</td>
<td>Bytes received per seconds.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Received Response Time</td>
<td>Average response time for received operations.</td>
<td>Operations/s</td>
<td>Warning &gt; 30 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
<tr>
<td>Response Time</td>
<td>Average response time for all operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 30 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
<tr>
<td>Sent Byte Rate</td>
<td>Bytes sent per seconds.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Sent Response Time</td>
<td>Average response time for sent operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 30 Alarm ≥ 100</td>
<td>Response Time</td>
</tr>
<tr>
<td>Status</td>
<td>Status of the storage system.</td>
<td>(0 = OK; 1 = Degraded; 2 = Failed)</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes transferred per second (sent and received).</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Operation Rate</td>
<td>Number of write operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>

* *Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM*
For detailed information about KPI, see Managing Baselines and Key Performance Indicators.

# HP 3PAR Storage Pool

## Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Capacity Percentage</td>
<td>Percentage of capacity not consumed in the storage pool.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Available Capacity</td>
<td>Total capacity not consumed in the storage pool.</td>
<td>Terabytes (TB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Consumed Capacity Percentage</td>
<td>Percentage of bytes that is actually consumed in the storage pool.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Consumed Capacity</td>
<td>Number of bytes actually consumed in the storage pool.</td>
<td>Terabytes (TB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Estimated Free System Space</td>
<td>Free space available in the storage pool.</td>
<td>Gigabytes (GB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Operation Rate</td>
<td>Total number of operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Oversubscription Situation*</td>
<td>This metric reports an oversubscription situation, that is when:</td>
<td>(0 = No; 1 = Yes)</td>
<td>Alarm = 1</td>
<td>Statistics</td>
</tr>
<tr>
<td></td>
<td>1. The storage pool is configured for thin provisioning (&quot;thin storage pool&quot;)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. The Subscribed Capacity Percentage attribute is greater than 100%, and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. the Consumed Capacity Percentage attribute is greater than 75%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Such situation is highly critical because the inability to allocate additional space to a volume when requested by the subscriber host will lead to catastrophic data loss and corruption.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Byte Rate</td>
<td>Bytes read per second from the storage pool since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Operation Rate</td>
<td>Number of read operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Subscribed Capacity Percentage</td>
<td>Ratio between the subscribed capacity and the storage pool capacity. Can exceed 100% for thin pools, therefore called oversubscribed.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>
### Display Name Attributes

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscribed Capacity</td>
<td>Sum of the host visible capacity for mapped volumes. Can be greater than the actual capacity of the disk folder when using thin provisioning.</td>
<td>Terabytes (TB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes read and written per second to the storage pool.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Volume Count</td>
<td>Number of volumes in the storage pool.</td>
<td>Volumes</td>
<td>None</td>
<td>--</td>
</tr>
<tr>
<td>Write Byte Rate</td>
<td>Bytes written per second from the storage pool since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Operation Rate</td>
<td>Number of write operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Availability</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM*

### HP 3PAR Disk Temperature

**Attributes**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature*</td>
<td>Current temperature reading in degrees Celsius.</td>
<td>Degrees Celsius (C°)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Temperature Status*</td>
<td>Status of the temperature sensor according to the temperature thresholds settings.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM*

### HP 3PAR Port Temperature

**Attributes**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature*</td>
<td>Current temperature reading in degrees Celsius.</td>
<td>Degrees Celsius (C°)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Temperature Status*</td>
<td>Status of the temperature sensor according to the temperature thresholds settings.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1 Alarm = 2</td>
<td>Availability</td>
</tr>
</tbody>
</table>
**Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM**

### HP 3PAR Voltage

**Attributes**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage*</td>
<td>Status of the voltage sensor according to the voltage thresholds settings.</td>
<td>Megavolt (mV)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Voltage Status*</td>
<td>Voltage reported by the voltage sensor.</td>
<td>{0 = OK; 1 = Degraded; 2 = Failed}</td>
<td>Warning = 1</td>
<td>Alarm = 2</td>
</tr>
</tbody>
</table>

### HP 3PAR Volume

**Attributes**

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumed Capacity Percentage</td>
<td>Percentage of capacity not consumed in the volume.</td>
<td>Percentage (%)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Consumed Capacity</td>
<td>Number of bytes actually consumed in the volume.</td>
<td>Gigabytes (GB)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Operation Rate*</td>
<td>Total number of operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Byte Rate</td>
<td>Bytes read per second from the volume since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Operation Rate</td>
<td>Number of read operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Read Response Time</td>
<td>Average response time for read operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 10</td>
<td>Statistics</td>
</tr>
<tr>
<td>Response Time</td>
<td>Average response time for all operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 10</td>
<td>Response Time</td>
</tr>
<tr>
<td>Time Since Last Activity</td>
<td>Number of days since any activity occurred on the volume.</td>
<td>Days</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Transfer Byte Rate*</td>
<td>Total bytes read and written per second to the volume.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
</tbody>
</table>
### Monitor Types and Attributes

**BMC ProactiveNet Performance Management - HP 3PAR Storage Monitoring**

Version 1.1.00

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
<th>Unit</th>
<th>Default Alert Conditions</th>
<th>BMC ProactiveNet Attribute Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write Byte Rate</td>
<td>Bytes written per second from the volume since the last collect.</td>
<td>Megabytes per seconds (MB/s)</td>
<td>None</td>
<td>Statistics</td>
</tr>
<tr>
<td>Write Operation Rate</td>
<td>Number of write operations per second.</td>
<td>Operations/s</td>
<td>None</td>
<td>Availability</td>
</tr>
<tr>
<td>Write Response Time</td>
<td>Average response time for write operations.</td>
<td>Milliseconds (ms)</td>
<td>Warning &gt; 10</td>
<td>Response Time</td>
</tr>
</tbody>
</table>

*Attributes marked with an asterisk are used by default when visualizing the corresponding monitor instance in BPPM*

### Managing Baselines and Key Performance Indicators

In order to facilitate the detection of abnormalities on your monitored environment, BMC ProactiveNet calculates baselines per attributes based on values collected over a specified period of time to determine a normal operating range. When the collected values for these attributes are out of range, an alert is triggered.

Some attributes are identified by default as Key Performance Indicators (identified with the 📊 icon) and therefore automatically included in the baseline calculation.

### Managing baselines

The baseline is the expected normal operating range for a metric or attribute of a monitor.

The baseline is calculated by collecting the values for a monitor’s attributes and metrics over a specified time period and establishing a low baseline value (consisting of the 10th percentile of all the values for a given time period) and a high baseline value (consisting of the 90th percentile of all the values for a given time period), taking a weighted average of these values over time. A higher weight is given to the latest data being factored into the baseline average. The accuracy of the baseline improves over time.

### Requirements for baseline generation

For baselines to be generated for an attribute, that abnormality threshold means that the threshold exists and is not suppressed.

Additionally, if the Key Performance Indicator (KPI) mode is active, only those attributes that have an active abnormality threshold and are also KPI attributes will have baselines generated for them.

⚠️ *Absolute thresholds (with "outside baseline") or signature thresholds do not satisfy these requirements.*
Managing Key Performance Indicators

The KPI attribute of an attribute can be activated or deactivated manually through the BMC ProactiveNet Administration Console. In this KM, some attributes have been designated as important indicators of performance (KPIs). We do not recommend that these default settings are modified.

However, advanced users may activate or deactivate KPIs from the BMC ProactiveNet Administration Console.

To add or remove Key Performance Indicator (KPI) attributes for a monitor type

1. In the Administration Console, from the menu bar, choose Tools > KPI Administration. The KPI Administration dialog box is displayed.
2. From the Monitor Type list, choose the monitor type for which you want to add or remove KPI attributes. A list of attributes for the selected monitor type is displayed.
3. In the KPI column for the attributes that you want to add or remove as Key Performance Indicators:
   - select the KPI check box to add the corresponding attribute as a KPI
   - deselect the KPI check box to remove the corresponding attribute from the KPIs for that monitor type

⚠️ For complete and detailed information on this procedure, please refer to the BMC ProactiveNet documentation available from BMC Web site.
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About Sentry Software™
Sentry Software, a strategic Technology Alliance Partner of BMC Software, provides comprehensive multi-platform monitoring solutions that enable management of the hardware and software aspects of all servers and SANs and covering up to 100% of custom applications within the BMC ProactiveNet Performance Management environment. Sentry Software also develops adapters for BMC Atrium Orchestrator that enables IT administrators to automate the execution of common requests and tasks that occur in the daily course of IT operations. Combined with BMC’s servers and network automation tools, the adapters allow IT administrators to implement provisioning and decommissioning workflows that cover all layers of their IT infrastructure. Finally, Sentry Software designs connectors that bring storage capacity metrics into BMC Capacity Optimization to ensure IT administrators that their storage infrastructure is properly sized for their current and future needs. The combination of its monitoring, automation, and capacity optimization capabilities for IT infrastructures, makes Sentry Software a key-partner in the storage management marketplace. For more information about Sentry Software, please visit www.sentrysoftware.com.