

# BMC® Performance Manager Express for Hardware User Guide



## Supporting

BMC Performance Manager Express for Hardware

Version 2.5.00

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Before you contact Sentry Software, please ensure you have the following information available so that Customer Support can begin working on your problem immediately:

#### *Product information*

- product name
- product version (release number)
- license number and password (trial or permanent)

#### *Operating system and environment information*

- machine type
- operating system type, version, and service pack or other maintenance level such as PUT or PTF
- system hardware configuration
- serial numbers
- related software (database, application, and communication) including type, version, and service pack or maintenance level

#### *Sequence of events leading to the problem*

#### *Commands and options that you used*

#### *Messages received (and the time and date that you received them)*

- product error messages
- messages from the operating system, such as file system full
- messages from related software



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## Overview

BMC Performance Manager Express for Hardware enables administrators to monitor the hardware of their diverse servers. This is a single PM that is able to monitor the hardware of different server brands: IBM®, HP®, DELL®, Sun Microsystems®, NEC®, Fujitsu-Siemens® and many others.

Once installed, BMC Performance Manager Express for Hardware requires no configuration and automatically detects the environment and starts monitoring the hardware: status of the disks and the RAID controllers, temperature of the system, speed of the fans, power supplies, and network interfaces etc.

As the solution connects to vendor-specific instrumentation agents on the servers to collect hardware information, it is vital to install these “agents” on your systems prior to installing the PM.

### Important

Please refer to the Supported Platforms and Requirements table to see which instrumentation agents are required on the different managed elements.

This document explains how to use BMC Performance Manager Express for Hardware.

This guide details all the available features, and explains how the monitoring functions for the different hardware components. The document also gives you a brief look “inside” BMC Performance Manager Express for Hardware, to help demonstrate how the product works. A troubleshooting section lists the most frequently asked questions.

The product documentation consists of:

1. [Installation Guide](#) – for details on how to install and run the product.
2. [User Guide](#) – current document
3. [Reference Guide](#) – for details on application classes, parameters, connector and platform details
4. [Release Notes](#) – tells you about the enhancements in this version.
5. [Platform-specific Guides](#) – for details on the installation of vendor-specific hardware agents

For the sake of convenience, the product is called BPM Express for Hardware within the documentation.

## Installation procedure in a nutshell

### *Prerequisites*

1. BPM Express for Hardware is a PM for the Portal and therefore needs to be installed within the BMC Portal environment.
2. As this is an agent-less performance manager for the web-based BMC Performance Manager Portal, it can be installed on just one managed element equipped with the Portal.
3. Minimum version of BMC Portal should be 2.5.00.
4. The RSM program should be installed on a Windows system (it can be the same as the Portal)
5. Install the vendor-specific instrumentation agents or system management tools on the managed elements to be monitored prior to installing the PM. See the [platform-specific guides](#) for details
6. Download the product package i.e. a PAR file from BMC EPD or the [Sentry Software Web site](#).

### *Installation*

1. Place the file: **Hardware-Sentry-PM-2.5.00.par** in a known location within the BMC Performance Manager Portal environment.
2. **Logon** to the **Portal** using super-admin credentials.
3. In the **Portal** tab click on **Tasks > Performance Managers** and then click on **Import** to import the file.
4. Browse to open a file selection dialogue box, select **Hardware-Sentry-PM-2.5.00.par > Upload**.
5. The Portal uploads the PAR file to the database, and BPM Express for Hardware for BMC Portal now appears in the list of Performance Managers as Published (under Type), which means it is installed
6. Logout and log in as user.

## Getting Started

---

This section gives you brief glimpse at how BPM Express for Hardware works and what hardware components it monitors.

## How it Works

BPM Express for Hardware is a PM that enables BMC Performance Manager Portal to monitor computer hardware (disk status, temperatures, CPU, power supplies etc.).

It gathers hardware information from different sources such as manufacturer-specific agents, standard management technologies, SNMP, WBEM, etc., and displays this information within the Portal environment.

In order to work properly, BPM Express for Hardware needs certain hardware information sources to be available. Depending on the platform, it relies on manufacturer-specific instrumentation layer and/or on standard management technology such as WBEM or SNMP. On startup, BPM Express for Hardware automatically detects which hardware information source is available and then uses this poll data on the hardware health of the computer. BPM Express for Hardware collects such data from each server and reports it in your Portal console.

The image below represents how BPM Express for Hardware monitors the hardware of a Fujitsu-Siemens® computer:

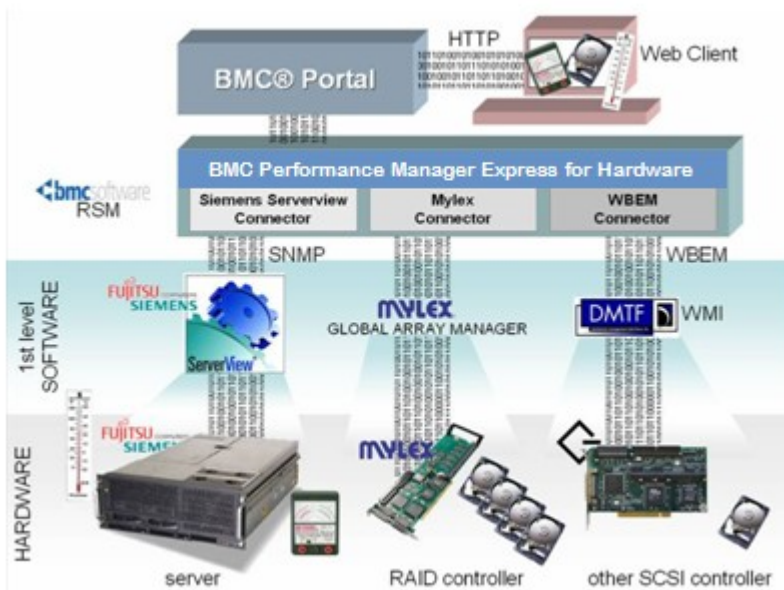


Figure 1: How it works

- The Siemens® ServerView® agent shows the temperatures, the fans, the power supplies and the voltages of the Siemens computer through SNMP
- The Mylex® GAM Server shows the status of the physical and logical disks of the Mylex RAID Controller through SNMP
- The Windows WMI provider shows the status of the physical disks attached to the standard SCSI controller through WBEM

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- BPM Express for Hardware detects and automatically connects to all three information sources (Siemens ServerView, Mylex GAM Server and Windows WMI provider).
- BPM Express for Hardware gathers only useful hardware information from these sources and displays it within the Portal framework

## Understanding BPM Express for Hardware within the Portal

Here's an overview of the basic outline of BPM Express for Hardware within BMC Performance Manager Portal.

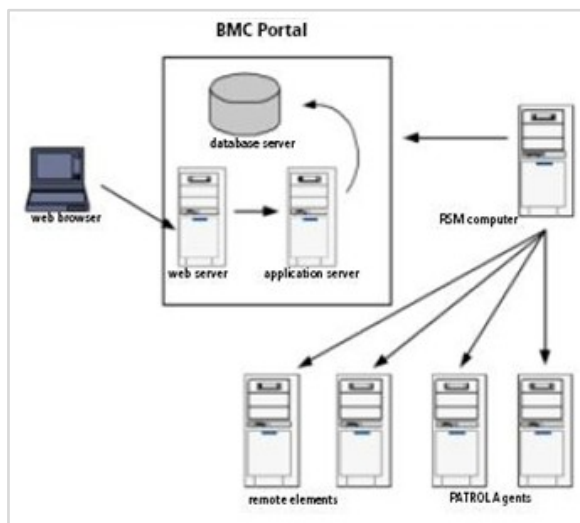
### The environment

- The BMC Portal as you know, is composed of a database, an application server, and a web server, and provides the access point for its utilities and modules.
- The BMC Performance Manager Portal extends the features in the Portal, enabling you to leverage both agent-less technologies and the PATROL agent to monitor the availability and performance of your business infrastructure.
- BPM Express for Hardware is based on agent-less technology, is designed for the Portal and uses the same web-based interface and Portal features common to all modules.

### The interaction

- BPM Express for Hardware is leveraged by the BPM Portal module that uses Remote Service Monitors (RSMs) to collect metrics about your infrastructure.
- An RSM is a computer on which you have installed the RSM program. Depending on the size of your environment, you can implement one or many RSMs. To know what to monitor on the specified infrastructure elements, the RSM uses PMs—and therefore for hardware monitoring, it banks on the BPM Express for Hardware.
- All Performance Managers, and the application classes that they contain, are installed on the Portal, and saved in the Portal database when you select them from an installation CD or when you import them via the Portal user interface. Performance Managers that are installed on the Portal are available to all users on the Portal who have the appropriate user permissions.

The figure below shows the interaction between BPM Express for Hardware and BMC Portal:



- The BMC Performance Manager Portal module resides on the Portal application server.
- The RSMs obtain parameter metrics from the monitored elements and send events and parameter metrics to the Portal.
- When you specify an application that is set on the specified RSM, the RSM queries the Portal for the corresponding PM (BPM Express for Hardware in this case).
- After retrieval from the Portal, BPM Express for Hardware PM remains on the RSM.

Figure 2: Interaction between the Portal and the PM

## **Integrating BPM Express for Hardware**

BPM Express for Hardware is a Performance Manager (PM) for the Portal. This is an agent-less version, i.e. – it does not require the PATROL agent to be installed on each managed element as the monitoring is done remotely on the Portal environment.

Once installed within the BMC Performance Manager Portal environment, the hardware information and status of the monitored servers should be available via the web browser used to access the Portal.

Please refer to the [Installation Guide](#) for details on the installation procedure.

## The Need for Manufacturer-specific Instrumentation Agents/Layer

Often, the standard operating system layer is not a sufficient hardware information source and most computers require an additional manufacturer-specific agent for BMC Express for Hardware to function properly. In most cases, server vendors provide the required hardware monitoring agent for their server models.

Depending on the platform, a single agent can monitor the temperatures, fans, voltages, power supplies and RAID systems, or, the platform may require separate agents for environment and disk monitoring. Or at times, more than one instrumentation agent is required to mine the missing data.

For example: The IBM Director Agent monitors and provides information about temperatures, fans, voltages, power supplies and the ServeRAID disks for IBM xSeries and Netfinity servers. On the other hand, the Siemens ServerView Agent only monitors the sensors on the motherboard of the server (temperatures, voltages, fans and power supplies) and so the Mylex GAM Server is required to monitor the Mylex RAID controller of the server.

Please refer to the [Installation Guide](#) and the [platform-specific guides](#) for further details.

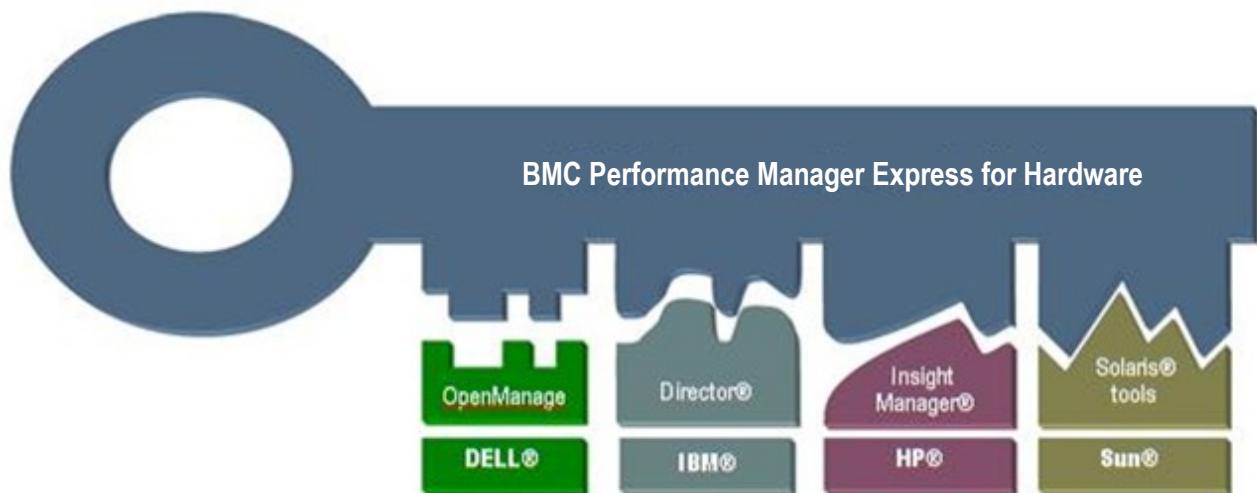


Figure 3: BPM Express for Hardware needs the underlying instrumentation agents on the elements

## Using BPM Express for Hardware to monitor hardware

Once BPM Express for Hardware is installed on the Portal and all the pre-requisites have been met, the hardware information of the monitored computers – called “elements” in Portal terminology, are displayed in your web browser of the Portal environment.

Operators and administrators just have to look at view under “Infrastructure” on the Portal site, to see the hardware health of their monitored servers in the same way they see the operating system or database health. Under each server icon, a tree represents all the monitored hardware components for the server.

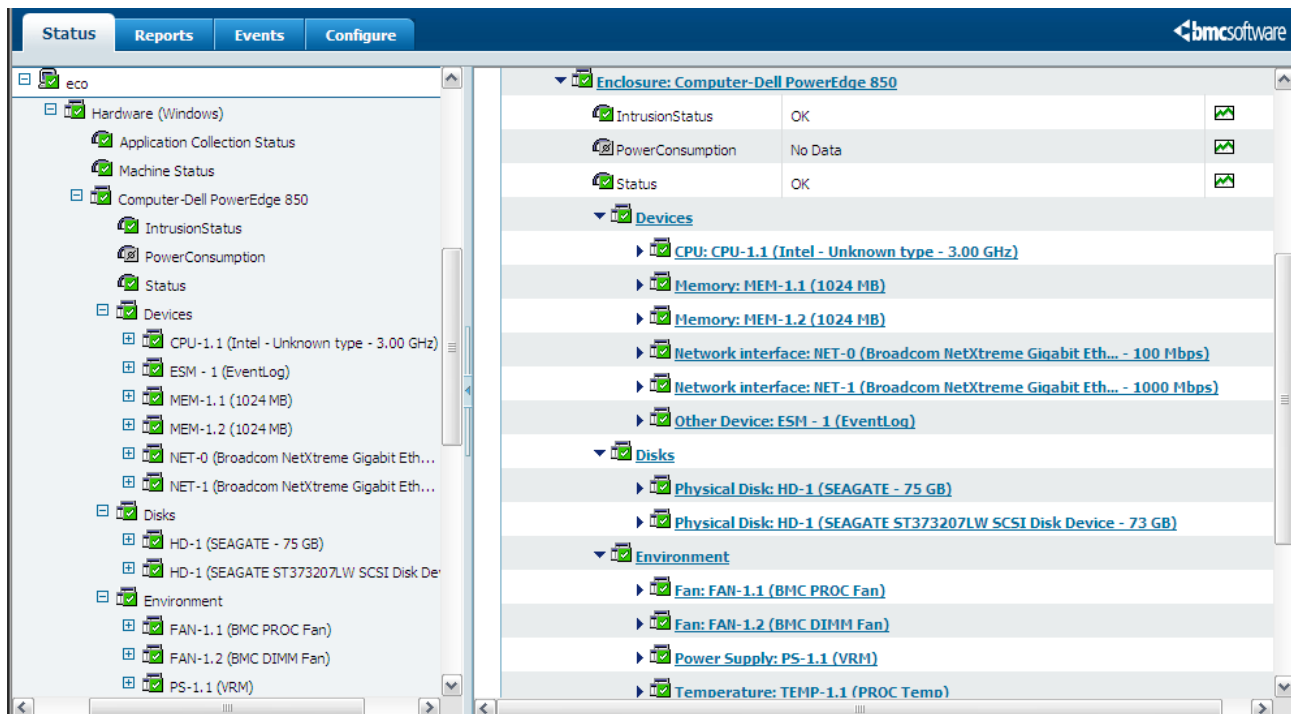


Figure 4: Monitoring with BPM Express for Hardware

## Supported Platforms and Requirements

Required environment: BMC Performance Manager Portal version 2.5.00

For BPM Express for Hardware to collect information from a managed system, it requires specific instrumentation agents or system management tools to be present on the managed system.

Typical Platform	Operating System	Required Instrumentation Agent/System Tools
Dell PowerEdge	Microsoft Windows	DELL OpenManage Server Administrator, WMI
Dell PowerEdge	Linux	DELL OpenManage Server Administrator, Linux system commands, SmartMonTools
Fujitsu-Siemens BX Blade servers	N/A	Fujitsu-Siemens Management Blade
Fujitsu-Siemens PRIMERGY	Microsoft Windows	Fujitsu-Siemens ServerView / Fujitsu-Siemens ServerView RAID Agent / Promise FastTrack SNMP Agent / LSI GAM Server / LSI MegaRAID SAS SNMP Agent / LSI MegaRAID PowerConsole / Mylex GAM Server , WMI
Fujitsu-Siemens PRIMERGY	Linux	Fujitsu-Siemens ServerView / Fujitsu-Siemens ServerView RAID Agent / Promise FastTrack SNMP Agent / LSI GAM Server / LSI MegaRAID SAS SNMP Agent / LSI MegaRAID PowerConsole / Mylex GAM Server, Linux system commands, SmartMonTools
HP C-Class BladeSystem	Windows	HP Insight Management Agent
HP C-Class BladeSystem	Linux	HP Insight Management Agent
HP P-Class BladeSystem	N/A	iLO
HP AlphaServer	Tru64	HP Insight Management Agent
HP 9000	HP-UX	HPU system tools
HP Integrity	Windows	HP Insight Management Agent
HP Integrity	Linux	HP Insight Management Agent
HP Integrity	HP-UX	HPUX system commands + MP/GSP
HP Proliant	Windows	HP Insight Management Agent, WMI

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Typical Platform	Operating System	Required Instrumentation Agent/System Tools
HP Proliant	Linux	HP Insight Management Agent, Linux system commands, SmartMonTools
HP NetServer	Windows	Toptools
HP SuperDome (Itanium)	Windows	HP Insight Management Agent
HP SuperDome (Itanium)	Linux	HP Insight Management Agent
HP SuperDome (Itanium)	HP-UX	HP-UX system commands + MP/GSP
HP SuperDome (PA-RISC)	HP-UX	HP-UX system commands + MP/GSP
IBM RS/6000, IBM eServer p5 IBM pSeries, IBM AIX	IBM AIX	IBM AIX system commands
IBM xSeries, IBM NetFinity	Microsoft Windows	IBM Director Agent ,WMI
IBM xSeries, IBM NetFinity	Linux	IBM Director Agent , Linux system commands, SmartMonTools
NEC Express5800	Microsoft Windows	NEC ESMPRO Agent, WMI
NEC Express5800	Linux	NEC ESMPRO Agent
StorageTek LSeries	Storage	StorageTek LSeries SNMP Agent
StorageTek SreamLine	Storage	StorageTek StreamLine SNMP Agent
Sun Fire (SPARC)	Solaris	Solaris system commands
Sun Fire (SPARC, T1, T2)	Solaris	Solaris system commands + Sun ALOM card (Sun Advanced Lights-Out Management)
Sun Fire F12K, F15K, F20K, F25K	Solaris	Solaris system commands + SMS utilities intsalled on the system controller
Sun Fire X64	Solaris	Ipmitool, Isiutil
Sun Fire X64	Linux	Ipmitool, Isiutil

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**Important**

Generally server manufacturers furnish instrumentation agents and system tools for free and these are either found on the CD-ROM provided with the server or, on the manufacturer's web site. Unless mentioned otherwise, the manufacturer's instrumentation agent must be installed on the monitored server for BPM Express for Hardware to function properly.

For details on how to install the required instrumentation agent on the systems, please refer to the [platform-specific guides](#) available on the Sentry Software website.

As Sentry Software is continuously working on the support of new hardware information, sources and new platforms that can be monitored with BPM Express for Hardware will continue to grow.

Please check our web site <http://www.sentrysoftware.net> to find the latest updates. Updates are in the form of patches are for free and do not need an upgrade of the PM itself, unless there are structural changes.

*Hardware components monitored*

Depending on the managed system, BPM Express for Hardware monitors:

- Disks (RAID and non-RAID disks)
- Disk enclosures
- Fans
- Memory modules
- Network interfaces
- Power supplies
- Processors
- Temperature
- Voltage

**Important**

For details on what hardware components are detected on each system, please see the Connectors & Platforms Reference Table in the [Reference Guide](#) and click on the *Connector Name* applicable to your system/typical platform.

All product documentation is also available in an online format accessible from within the product as well as in the [BPM Express for Hardware Online Technical Library](#) on the Sentry Software website.

## Inside BPM Express for Hardware

### Architecture

BPM Express for Hardware is principally composed of a common hardware monitoring engine: **BPM-Express-Hardware-2.5.00.par** containing the following files:

- SEN\_HW\_Hardware\_BCEL\_2-5.2-2.5.00\_Build\_214.jar
- SEN\_HW\_Hardware\_2500-2.5.00\_Build\_214.jar

Upon startup, BPM Express for Hardware tests each connector in order to detect which hardware information sources are available (manufacturer-specific hardware agents, standards instrumentation layers, etc.). This is called *Detection*.

Once BPM Express for Hardware knows which hardware information sources are available and can be connected to, it tries to discover the hardware environment by querying these selected hardware information sources, as per instructions in the corresponding \*.hdf files. This is called *Discovery*.

Finally, when the detection and discovery processes are complete, BPM Express for Hardware starts collecting data about the discovered hardware environment (status, temperatures, voltages, etc.) by querying the detected hardware information sources as described in the corresponding \*.hdf files. This is called *Collection*.

The table below shows the synopsis of the actions performed:

Action	Description
<b>Activation</b>	Activates the SEN_HW_MAIN class.
<b>Detection</b>	<p>Tests each connector in order to detect which hardware information sources are available on the monitored element and can be connected to.</p> <p>Detection is carried out when the <b>Hardware (&lt;platform&gt;)</b> class is added to an element or every time the RSM service is restarted.</p>
<b>Discovery</b>	<p>Discovers the hardware environment by querying the previously detected hardware information sources.</p> <p>Creates the other class instances (SEN_HW_TEMPERATURE, SEN_HW_PHYSICALDISK, etc.)</p> <p>Discovery is carried out every hour by default.</p>
<b>Collection</b>	<p>Polls previously detected hardware information sources to gather data about the hardware environment.</p> <p>Polling is carried out every 5 minutes by default.</p>

## The Connectors

Each connector is an *.hdf* file that is dedicated to one source of hardware information. The purpose of each connector file is to instruct how BPM Express for Hardware should connect to the hardware information source available on a platform and describe what information is available through this source. For example, *SEN\_HW\_Director41NT.hdf* describes how to get information from the IBM Director 4.1 Agent and then monitor an IBM xSeries server.

An *.hdf* file can tell the BPM Express for Hardware engine to execute the following actions:

- Query a SNMP agent (*get*, *get\_next*, and *tables*)
- Execute a WBEM query ((using WMI for Windows and the Pegasus implementation of WBEM for Linux)
- Execute an OS command (using Telnet and SSH)

Each *.hdf* file uses a mix of these actions to enable BPM Express for Hardware to gather useful data from a given hardware information source.

### Note on HDF files

The “.hdf” files deployed on the RSM at  
%RSM\_HOME%\RSMxx\server\rsm\tmp\deploy\tmpxxxxxSentrySoftware-HardwareSentry-solution-2.5.00.par-native.  
The “.hdf” files released by Sentry Software are encrypted and therefore cannot be updated or modified by the end-user.

## The Detection Process

Once the BPM Express for Hardware class is added to an element, it:

- Gets the list of available connectors “\*.hdf” files from  
%RSM\_HOME%\RSMxx\server\rsm\tmp\deploy\tmpxxxxxSentrySoftware-HardwareSentry-solution-2.5.00.par-native.
- Tests the detection criteria (OS type, NT service, processes, SNMP request, etc.) for each *.hdf* file found
- Marks the *.hdf* files as *detected* once the detection criteria is successfully passed. There may be several connectors detected at one time (typically: one connector for the temperatures, voltages, etc., one for the RAID disk controller and one for the non-RAID disk controller)
- Launches the discovery process

### Note

Only one “.hdf” file can describe the computer model and manufacturer and only one icon for the computer will be created. The BPM Express for Hardware engine will ensure that only one “.hdf” describing the computer model will be marked as "detected".

## The Discovery Process

The discovery process is launched just after the end of the detection process. It takes the following actions:

- Processes the *Enclosure.Discovery* section of the detected connectors that describe the computer model and create the main *Hardware* icon (class: SEN\_HW\_ENCLOSURE). Most of other icons (disk controllers, fans, temperatures, etc.) will be created under this computer icon.
- Launches the disk controller discovery that processes the *Disk Controller.Discovery* section of each detected *.hdf* file and creates the SEN\_HW\_DISKCONTROLLER icons.
- Launches the other discoveries (fans, temperatures, voltages, power supplies, logical disks, physical disks and other devices) that will process the corresponding sections of each detected *.hdf* file and create the corresponding icons.

### Note

With a view to optimization, the discovery process is as parallelized as possible. All the independent objects are processed at the same time.

## The Collection Process

Once the discovery process is complete, the collection process starts:

- Every five minutes, BPM Express for Hardware spawns several paramlets that are responsible for the collection of information about a given device type.
- For example, the SEN\_HW\_FAN\_CLASS paramlet will gather fan information from the different detected hardware information sources, as described in the corresponding *Fan.Collect* section of each detected *.hdf* file.
- These paramlets are "attached" to the main Hardware (<platform>) icon (SEN\_HW\_MAIN class) and not to the corresponding classes and instances.
- When a device is marked as "missing" by the discovery process (i.e. had been discovered but is no longer discovered), the collection process no longer queries the hardware information source and simply sets the status of the object to alarm.

# Monitoring

---

Monitoring the hardware components with the BPM Express for Hardware is very simple. Once installed, as per the instructions given in the [Installation Guide](#), BPM Express for Hardware automatically detects all the various hardware components and displays them in the web-based interface.

There is no configuration or set-up to be done in order to monitor the hardware of your infrastructure. All you have to do is set/modify thresholds (if required) as per your specific requirements.

This section gives details about all the components monitored by BPM Express for Hardware.

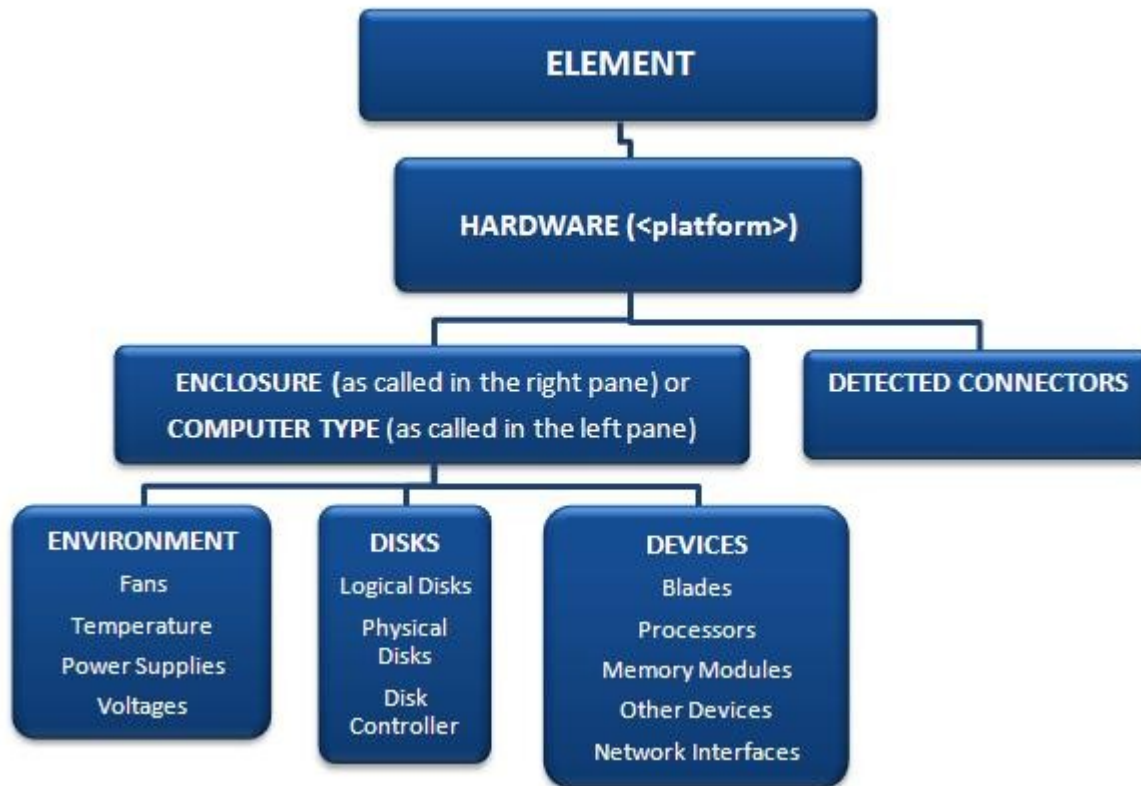
## The Basics

### Automatic detection of hardware components – No configuration required

BPM Express for Hardware requires no configuration to discover and monitor the hardware components within your BMC Performance Manager Portal environment.

Once the PM is installed and the class is added to an element or element profile, an icon labeled **Hardware (<platform>)** appears in the Portal interface and the PM discovers all the hardware components of the managed element.

The discovered hardware components of the monitored element are grouped under certain container icons:



In the left pane of the **Status** tab, the hardware component icons are shortened as follows:

#### Environment

- Fans – FAN
- Temperature - TEMP
- Power Supply - PS
- Voltage - VOLT

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**Disks**

- Logical disk - LD
- Physical disk - HD
- Disk Controller - CTRL

**Devices**

- Blade - BL
- Processors - CPU
- Memory Module - MEM
- Other Device - name of the actual "other device" as reported by the underlying instrumentation agent
- Network Interface - NET

BPM Express for Hardware sets thresholds by default on all parameters, but you can modify the thresholds as per your specific requirements.

**Note**

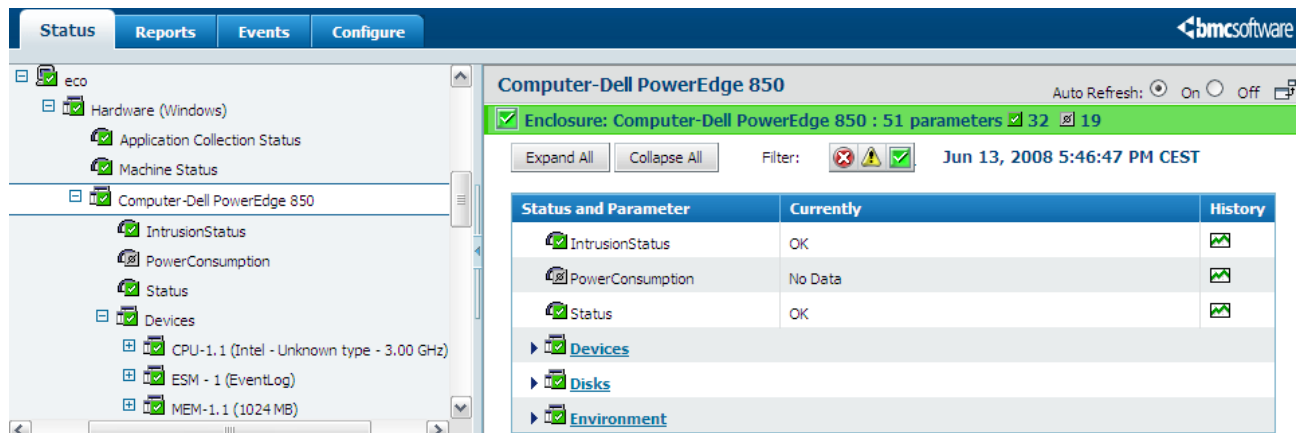
The [Reference Guide](#) gives details for each application class and its parameters.

## Monitoring the Enclosure

### Enclosure Intrusion

On certain platforms, like DELL PowerEdge computers and IBM xSeries computers running Windows or Linux, BPM Express for Hardware can detect if the enclosure of the machine is open.

This intrusion that is detected could mean that somebody has gained physical access to the machine as well as its internal components, especially the physical disks with all the data. It is therefore quite helpful to monitor the enclosure status of servers. Depending on the platform, for each enclosure discovered, the *Status* and *Intrusion Status* parameters are displayed.



The screenshot shows the BMC software interface for monitoring a Dell PowerEdge 850 server. The left pane shows a tree view of hardware components, including 'Computer-Dell PowerEdge 850' with sub-items like 'IntrusionStatus', 'PowerConsumption', 'Status', 'Devices', 'CPU-1.1', 'ESM-1', and 'MEM-1.1'. The main content area displays the enclosure status for 'Computer-Dell PowerEdge 850' with 51 parameters, 32 OK, and 19 warnings. A table shows the current status and history for 'IntrusionStatus' (OK), 'PowerConsumption' (No Data), and 'Status' (OK). Below the table are expandable sections for 'Devices', 'Disks', and 'Environment'.

Status and Parameter	Currently	History
IntrusionStatus	OK	
PowerConsumption	No Data	
Status	OK	

Figure 5: View of the enclosure

Basically, each <Computer Type> (SEN\_HW\_ENCLOSURE) instance represents a box with some hardware components inside. This class represents the computer's main chassis.

- The *Intrusion Status* parameter, when available, raises an alert when the enclosure is opened.
- The *Power Consumption Status*, when available, displays the power consumed in Watts by the element.
- The *Status* parameter, if collected, represents the overall status of all the classes of monitored element.

## Monitoring the Environment: Temperatures, Fans, Voltages and Power-Supplies

BPM Express for Hardware automatically detects the information sources available on the monitored element and displays the hardware information provided by those sources in the Portal interface. It is the **Environment** icon that regroups the icons created for each sensor found for Fans, Temperature, Power Supplies and Voltages. The icons are created automatically.

In the left pane, click on an **Element > Hardware (<platform>) > Computer Type> Environment >** and see the monitored hardware components in detail in the right panel. For each displayed sensor, one or more graphs are built by polling the parameter instances every five minutes. To view these graphs or text reports from the **Status** tab:

Status and Parameter	Currently	History
▶ Fan: FAN-1.1 (BMC PROC Fan)		
▶ Fan: FAN-1.2 (BMC DIMM Fan)		
▶ Power Supply: PS-1.1 (VRM)		
▶ Temperature: TEMP-1.1 (PROC Temp)		
▼ Temperature: TEMP-1.2 (BMC Planar Temp)		
Status	OK	
Temperature	26 degree C	
▶ Voltage: VOLT-1.1 (BMC CMOS Battery)		
▶ Voltage: VOLT-1.2 (PROC VCORE)		
▶ Voltage: VOLT-1.3 (BMC PROC VTT)		
▶ Voltage: VOLT-1.4 (BMC 1.5V PG)		
▶ Voltage: VOLT-1.5 (BMC 1.8V PG)		

Figure 6: Monitoring the environment

- Click the **parameter >** click the corresponding **History icon** that appears in the right pane.
- For parameters with numeric values or Boolean values such as: *Temperature, Voltage, Speed, Speed Percent* and *Used Capacity*, you can see the results either in **Chart view** (graph) or **Table view**. For parameters with text values the report displayed is in table view.

**Alert thresholds:** Depending on the platform and sensors, alert thresholds are automatically set by BPM Express for Hardware whenever possible. When the parameter value breaches these thresholds, it is *Status*, a text parameter that displays the overall status for every instance, that triggers an alert and a notification is sent out according to the options configured in the Portal.

### Important

- If a device appears to be missing, the *Status* parameter will trigger an alert if necessary.
- *Status* is a text parameter that describes the overall status of the corresponding device or sensor. It is this parameter that raises alerts when any of the other parameters for the device breach their thresholds. Alert conditions for *Status* describe in symbolic terms what occurs in the *Status* parameter when thresholds are breached: one exclamation mark triggers a warning; two exclamation marks raise an alarm.

Example: When thresholds for the device are breached, the *Status* parameter reports: “Warning! The fan speed is too low.” or, “ALARM! This fan has stopped working. It will cause an increase in temperatures and could lead to a system shutdown due to overheating” or, as the case may be. The history graph shows the exact details of the problem, its consequences and recommended actions.

### Note

The parameters discovered depend on the server type. All parameters may not be discovered on all servers. Please refer to the [Reference Guide](#) to see which parameters are displayed for the different servers. All product documentation is also available in an online format from within the product as well as in the [BPM Express for Hardware Online Technical Library](#) accessible at the Sentry Software website.

## Fans

To avoid overheating, fans are installed on critical devices such as: processors, power supplies, etc. If a cooling system is not present, an overheated system can throttle the speed of processors and cause slow-downs or ultimately cause shut-downs. Monitoring fans is important since they ensure maintaining the right temperatures for optimal functioning of the system.



Depending on the information available, the *Speed* and/or *Speed Percent* and/or *Status* parameters will be displayed for each detected fan device:

- The *Speed* parameter represents the speed of the corresponding fan in rotations/minute. An alert is triggered if the fan speed is too low for proper functioning.
- The *Speed Percent* parameter represents the speed of the corresponding fan in percentage of its maximal speed. An alert is triggered if the fan speed is too low for proper cooling.
- The *Status* parameter represents the overall status of the fan. An alert is triggered if the fan stops spinning or does not spin fast enough. An alert is triggered if any of the parameters breach their respective thresholds. It is only *Status* that will trigger and display the alerts. When all is fine, *Status* shows “OK”, and when there is problem, it shows “WARNING!” or “ALARM!!” with a detailed description of the issue, its consequences and recommended actions. The alert conditions for *Status* are: “!”=WARNING; “!!”=ALARM.

Example: “ALARM!! This fan is not detected anymore”.

## Temperatures



As with any electronic device, chips and other components of a computer stop working when overheated. Overheating could result in several unrecoverable errors, crashes and even hardware damage. Temperatures may rise too high when a device is abnormally overloaded; a fan is not working properly or when the ambient temperature is too hot. Monitoring the temperatures of the critical devices of your system allows you to take preventive action and avoid a crash from overheating. Depending on the information available, the *Temperature* and/or *Status* parameters will be displayed for each detected temperature sensor:

- The *Temperature* parameter represents the current temperature in degrees Celsius (°C). An alert is triggered if the temperature rises too high.
- The *Status* parameter represents the overall current status of the temperature. An alert is triggered if the temperature gets too high.

When all is fine, *Status* shows “OK”, and when there is problem, it shows “WARNING!” or “ALARM!!” with a detailed description of the issue, its consequences and recommended actions. The alert conditions for *Status* are: “!”=WARNING; “!!”=ALARM.

Example: “ALARM!! The temperature is critically high”

## Power supply



Power supply is the component that transforms the AC Line into electric power needed by the computer. Therefore the power supply is a highly critical device of a computer that should never fail. Due to this, most vendors build servers with redundant power supplies. Monitoring power supplies allows the operators to be alerted when a power supply fails, or in some cases, even when a power supply is overloaded.

Depending on the available information, the *Used Capacity* and/or *Status* parameters will be displayed for each power supply or power unit device:

- The *Used Capacity* parameter represents the power currently in use as a percentage. An alert is triggered when the power supply’s maximum power output is reached.
- The *Status* parameter represents the current status of the power supply. An alert is triggered if an error occurs with the power supply.

## Voltages



Power supplies convert the AC line power into voltages and currents needed by the motherboard of the computer. The stability of the motherboard (and therefore that of the overall computer) strongly depends on this power converter. Voltages that are too low or too high may lead to unpredictable system crashes. Monitoring the value of the different voltages needed by the motherboard will help in detecting system instability.

Depending on the available information, the *Voltage* and/or *Status* parameters will be displayed for each voltage sensor on the motherboard:

- The *Voltage* parameter represents the voltage output in milliVolts (mV). An alert is triggered if the voltage goes out of the range.
- The *Status* parameter represents the overall current status of the voltage. An alert is triggered if the voltage output is too low for proper functioning. It triggers an alert if the voltage output is too low for proper functioning or if it goes out of the proper range. It is only Status that will trigger and display the alerts. When all is fine, Status shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for Status are: "!="WARNING; "!="ALARM

Example: "OK" or "ALARM!! This voltage sensor is no longer detected"

## Monitoring Disks: Logical Disks, Physical Disks and Disk Controllers

BPM Express for Hardware automatically detects the information sources available on the monitored computer and displays the hardware information provided by those sources in the Portal interface.

It is the **Disks** icon that regroups the icons created for each sensor found for logical disks, physical disks, and disk controllers. If the components are detected, the icons are created automatically.

In the left pane, click on an **Element > Hardware > Computer Type > Disks** and see the monitored hardware components in detail in the right pane. An icon is created for each storage-related device discovered: logical disks, physical disks and disk controllers. Each icon is labeled with a description of the device: ID, size, vendor, etc.

Status and Parameter	Currently	History
<b>▼ Disk Controller: CTRL-Compaq Array #2</b>		
BatteryStatus	OK	
ControllerStatus	OK	
<b>▶ Logical Disk: LD-2.1 (RAID 5 - 546.9 GB)</b>		
<b>▼ Physical Disk: HD-2.128 (COMPAQ BD1468A4C5 - 146 GB)</b>		
Attached to	Disk Controller: CTRL-Compaq Array #2	
ErrorCount	No Data	
PredictedFailure	OK	
Serial Number	3KS44DKJ000076406YRG	
Status	OK	

Figure 7: Monitoring disks and disk controllers

### Important

An icon will be created for a disk controller only if its parameters discover some values. If not, then the disk controller details will be mentioned in the *Attached to* parameter of the logical/physical disk.

By clicking on the physical/logical disk in the left pane, you can see its details in the right pane. Each of these disks display which disk controller they are attached to, along with the other monitored parameters.

**Note**

If a device appears to be missing, the *Status* parameter will trigger an alert if necessary.

*Status* is a text parameter that describes the overall status of the corresponding device or sensor. It is this parameter that raises alerts when any parameters for the device breach their thresholds. Alert conditions for *Status* describe in symbolic terms what occurs in the *Status* parameter when thresholds are breached: one exclamation mark triggers a warning; two exclamation marks raise an alarm.

Example: If BPM Express for Hardware detects that thresholds have been breached, the *Status* parameter will report, for example: "Warning! This disk is about to fail" or, "ALARM!! This logical disk is no longer detected" or as maybe the case. The history graph shows the exact details of the problem, its consequences and recommended actions.

**Note**

The parameters discovered depend on the server type. All parameters may not be discovered on all servers. Please refer to the [Reference Guide](#) for details on the each application class and their parameters. This documentation is also available in an online format from within the product as well as in the [BPM Express for Hardware Online Technical Library](#) accessible on the Sentry Software website.

## Disk Controllers

A disk controller is a card inside a computer that connects one or several physical disk drives to this computer. Some intelligent disk controllers (such as RAID controllers) manage several physical disks as a single logical disk which is the only disk exposed to the operating system. Monitoring both physical and logical disks is essential to ensure that storage is available.

The aim of the disk controller instance is to act as a container for logical disks and physical disks, and symbolize the way hard drives are setup on the platform. In addition, some information regarding the disk controllers, like their brand, model or driver version, is displayed.

**Important**

An icon will be created for a disk controller only if its parameters discover some values. If not, then the disk controller details will be mentioned in the *Attached to* parameter of the logical/physical disk.

Depending on the information available, the *Battery Status* and *Controller Status* parameters will be displayed.

- The *Battery Status* parameter triggers an alert to predict that the disk controller battery will be unable to support the controller in the event of a power failure.
- The *Controller Status* parameter displays the status of the disk controller.

**Note**

All systems may not be able to provide this information.

## Physical Disks



Physical disks must be monitored to avoid loss of data, unavailability and performance degradation. When available, S.M.A.R.T. technology is used to predict a disk failure.

Depending on the available information, the *Predicted Failure*, *Error Count* and/or *Status* parameters will be displayed for each discovered physical disk:

- The *Predicted Failure* parameter uses S.M.A.R.T. technology to predict physical disk failures. An alert will be triggered if a breakdown of a Physical Disk is predicted.
- The *Error Count* parameter is incremented each time an error occurs on this physical disk. An alert is raised by the *Status* parameter from the first detected error. The *Status* parameter represents the overall status of the physical disk and triggers an alert if any of the parameter thresholds are exceeded.
- The *Status* parameter represents the overall status of the physical disk. It triggers an alert if the physical disk is missing or is not functioning as it should, or if any of the other parameters have breached their thresholds. It is only *Status* that will trigger and display the alerts. When all is fine, Status shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for Status are: "!="=WARNING; "!="=ALARM.

Example: "OK" or "ALARM!! This physical disk is no longer detected."

## Logical Disks

RAID or advanced disk controllers expose several physical disks as a single logical disk to the operating system. The status of a logical disk typically corresponds to the status of a RAID array (on-line, degraded, rebuilding, etc.). The *Status* parameter is displayed for each logical disk discovered.

### Note

For non-RAID disk controllers (as most of IDE controllers, for example), no logical disk will be displayed.

- The *Error Count* parameter represents number of errors encountered by the logical disk since the last counter reset. The error count is automatically reset every 24th hour (by default; this setting is configurable).
- The *Status* parameter represents the overall status of the logical disk. It triggers an alert if the logical disk missing or if any of the other parameters thresholds are breached. It is only *Status* that triggers and displays the alerts. When all is fine, Status shows "OK", and when there is problem, it shows "WARNING!" or "ALARM!!" with a detailed description of the issue, its consequences and recommended actions. The alert conditions for *Status* are: "!="=WARNING; "!="=ALARM.

Example: "ALARM!! This logical disk is no longer detected."

### Note

The Status parameter reports an "ALARM!!" if the *Error Count* parameter is greater than zero (that is: the disk encountered some errors). Since the counter is reset every 24th hour, the corresponding alert on the *Status* parameter will automatically be cleared after 24 hours. This mechanism enables BPM Express for Hardware/Portal to report pure event-driven alerts with no need for manual acknowledgement from the operators.

## Monitoring Devices: Processors, Memory modules, Network Interfaces and Other Devices

BPM Express for Hardware automatically detects the information sources available on the monitored computer and displays the hardware information provided by those sources in the Portal interface.

It is the **Devices** icon that regroups the icons created for each sensor found for the processors, memory modules, network interfaces. If the components are detected, the icons are created automatically.

In the left pane, click on an **Element > Hardware (<platform>) > Computer Type > Devices** and see the monitored hardware components in detail in the right panel. An icon is created for each detected device. Each icon is labeled with a description of the device: ID, size, vendor, role, etc.

The screenshot displays the BMC Software monitoring interface. The left pane shows a tree view of hardware components under 'Hardware (Windows)', with 'Devices' expanded. The right pane shows a table of device parameters and their current status.

Status and Parameter	Currently	History
▶ CPU: CPU-1.1 (Intel - Unknown type - 3.00 GHz)		
▶ Memory: MEM-1.1 (1024 MB)		
▶ Memory: MEM-1.2 (1024 MB)		
▼ Network interface: NET-0 (Broadcom NetXtreme Gigabit Eth... - 100 Mbps)		
ErrorPercent	0 %	
LinkStatus	Plugged	
Status	OK	
▶ Network interface: NET-1 (Broadcom NetXtreme Gigabit Eth... - 1000 Mbps)		
▼ Other Device: ESM - 1 (EventLog)		
Status	OK	

Figure 8: Monitoring devices: CPUs, network interfaces, memory modules, other devices

### Note

If a device appears to be missing, the “*Status*” parameter will trigger an alert if necessary.

*Status* is a text parameter that describes the overall status of the corresponding device or sensor. It is this parameter that raises alerts when any of the other parameters for the device breach their thresholds. Alert conditions for *Status* describe in symbolic terms what occurs in the *Status* parameter when thresholds are breached: one exclamation mark triggers a warning; two exclamation marks raise an alarm.

**Example:** If BPM Express for Hardware detects that thresholds for the device are breached, the *Status* parameter will report for example: “Warning! This network adapter has degraded” or, “ALARM! This network adapter is not detected anymore” or as the case may be. The history graph shows the exact details of the problem, its consequences and recommended actions.

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The *Status* parameter reports an ALARM if the *Error Count* and *Corrected Error Count* parameters report values greater than zero (that is: the disk encountered some errors). Since the counter is reset every 24th hour, the corresponding alert on the Status parameter will automatically be cleared after 24 hours. This mechanism enables BPM Express for Hardware /Portal to report pure event-driven alerts with no need for manual acknowledgement from the operators.

### Note

The parameters discovered depend on the server type. All parameters may not be discovered on all servers. Please refer to the [Reference Guide](#) for details on the each application class and their parameters. This documentation is also available in an online format from within the product as well as in the [BPM Express for Hardware Online Technical Library](#) accessible on the Sentry Software website.

## Processors

Processors (also called CPU, Central Processing Unit) are undoubtedly very critical devices within a computer. While a processor fault may often lead to a system crash without a chance for a monitoring tool to catch the error, it is still helpful to monitor the processors of servers.

In case of a system crash due to a fault in the processor, the system reboots automatically. The reboot is either triggered by the operating system or by the motherboard itself. If a processor is no longer functioning, it is automatically disabled by the BIOS and, if there is one other processor left, the operating system starts with one processor less.

BPM Express for Hardware monitors each processor and verifies if it is present and running. If a processor is missing upon a reboot, BPM Express for Hardware triggers an alert.

On some recent or high-end servers, processors are able to correct some operation errors by themselves (like the ECC memory). If this information is available, it is displayed in the Portal interface. In addition, if the processor is able to predict a failure, this information will be monitored by BPM Express for Hardware and reported in the Portal interface.

Depending on the information available, the *Status* and/or *Corrected Error Count* and/or *Predicted Failure* parameters will be displayed for each discovered processor (CPU):

- The *Status* parameter represents the current status of the processor. An alert is triggered if the processor is not available for proper operation (missing, disable by the BIOS due to a POST error, etc.).
- The *Predicted Failure* parameter reports the predicted failure analysis performed by the processor itself. This information is based on the rate of corrected errors.
- The *Corrected Error Count* parameter represents the number of errors that have been automatically corrected by the processor. This information can be very useful to predict a failure in the near future.

## Memory Modules

The main memory of a computer is actually as critical as the processors since almost all processor operations deal with memory. A single memory fault could lead to a severe computer crash with potential data corruption. On servers, the memory modules (the devices where the memory data is actually stored) often include auto-correction features (ECC), and sometimes even better: RAID5-like memory configuration. These features and configurations allow the memory modules to report statistics on failures, to predict failures, to hot-replace a memory module upon failure, etc.

Depending on the available information and the features provided by the motherboard and the memory modules, the *Error Count* and/or *Predicted Failure* and/or *Status* parameters will be displayed for each discovered memory module:

- The *Error Count* parameter reports the number of errors detected by the memory module and then corrected. A steadily growing value means that the memory module is not reliable and that it could encounter errors that it is unable to correct, which could then lead to a system crash.
- The *Error Status* parameter deals with the same kind of errors as the *Error Count* parameter but in a more accurate manner. The only difference is that, once a specified threshold is reached, an alert is triggered, so the number of errors will not actually be displayed. It is unnecessary to set an error threshold as these thresholds are calculated and set by the systems hardware agent.
- The *Predicted Failure* parameter reported by the memory modules predicts failure by analyzing the trend of the number of detected/corrected errors (thanks to the ECC technology). If this parameter goes into alarm, replacement of the faulty module is highly recommended.
- The *Status* parameter represents the current status of the memory module. An alert is triggered if the memory module reports a failure (in a RAID5-like configuration) or if it goes missing after a computer reboot.

## Network Interfaces

Network interfaces are devices that serve as a common interface for various other devices within a local area network (LAN), or as an interface to allow networked computers to connect to an outside network. It is therefore essential to make sure these devices are linked to the network and function properly. For each network interface discovered, the *Status*, *Error Percent* and/or *Link Status* parameters are displayed:

The *Status* parameter represents the current status of the network interface. An alert is triggered when the network interface does not respond.

- The *Error Percent* parameter gives the percentage of transmitted and received packets that were in error (due to low-level protocol error or physical media problems). A warning is raised when this percentage goes above 10% and an alarm when above 30%. A frequent high error percentage implies there is a serious problem with the cable or the interface.

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- The *Link Status* parameter shows the current status of the network interface to the network (i.e. whether or not it is plugged-in). By default, BPM Express for Hardware will trigger a warning if a network interface previously connected to the network is now unplugged. However, it will not trigger an alert for network interfaces that weren't previously detected/never connected.

## Detecting Missing Devices

The missing device detection mechanism of BPM Express for Hardware alerts operators when a device that was previously detected in the system is no longer found.

This mechanism is very useful when, for example, a non-redundant physical disk does not restart during a system reboot and therefore is no longer seen by the operating system and the monitoring software. When a device is no longer discovered, its *Status* parameter goes into alarm and its label directly shows that it is missing.

The missing device detection feature is enabled by default.

## Monitoring Connectors

By default BPM Express for Hardware automatically tests which connectors are best-suited to the managed system. Once it decides which connectors are applicable to the managed element, an instance of the SEN\_HW\_CONNECTORS class called **Detected Connectors** is created in the Portal interface under **Hardware <platform type>** for the monitored element. The status of the detected connectors is monitored regularly to ensure the availability of the underlying technology.

### Example

BPM Express for Hardware is running on an HP ProLiant server with HP Insight Management Agent.

Upon startup, BPM Express for Hardware detects HP Insight Management Agent, and starts using the corresponding connector to discover the server hardware configuration and monitor the discovered devices.

Additionally, BPM Express for Hardware creates an instance representing the HP Insight Management Agent - Server connector.

Every 5 minutes, its *Status* parameter is updated.

If, for some reason, the HP agent stops working, an alarm is raised on the Status parameter and the devices that were discovered through to this connector are taken offline.

Detected Connectors : 6 parameters <input checked="" type="checkbox"/> 6		
Expand All		Collapse All
Filter: <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>		Jun 12, 2008 4:43:16 PM CEST
Status and Parameter	Currently	History
<input checked="" type="checkbox"/> <b>Connector Name: Dell OpenManage Server Administrator</b>		
	Technology used: SNMP	
<input checked="" type="checkbox"/> Collection Information	Collected Parameters: / Enclosure / Intrusion...	
<input checked="" type="checkbox"/> Status	OK	
<input checked="" type="checkbox"/> Test Report	SNMP TEST: SUCCEEDED. Scroll down to see the full report.	
<input checked="" type="checkbox"/> <b>Connector Name: Dell OpenManage Storage Manager</b>		
	Technology used: SNMP	
<input checked="" type="checkbox"/> Collection Information	Collected Parameters: Disks / Disk Controllers...	
<input checked="" type="checkbox"/> Status	OK	
<input checked="" type="checkbox"/> Test Report	SNMP TEST: SUCCEEDED. Scroll down to see the full report.	

Figure 9: Detected connectors

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The connector monitoring mechanism helps administrators detect ‘real’ hardware errors as it enables a higher monitoring accuracy by not confusing errors actually encountered by hardware components with errors owing to a *connector* or *monitoring-tool* failure.

The parameters for connector monitoring are:

- *Collection Information*: This parameter details which objects will be discovered and which parameters will be collected by this connector.
- *Test Report*: This parameter describes the tests run to evaluate the availability of the technologies used by this connector to monitor the system.
- *Status*: The parameter displays the overall status of the connector. It is this parameter that triggers alerts if any parameters of this class breach their thresholds.

# Thresholds Management

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This section deals with thresholds, their alert conditions and how to modify these parameter thresholds.

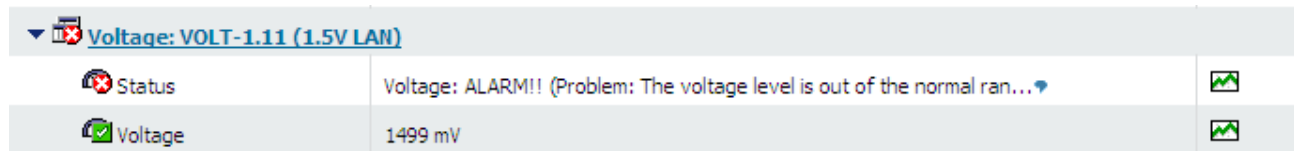
## Threshold Management

By default, BPM Express for Hardware automatically sets alert thresholds on the parameters of monitored elements. Depending on the computer it is running on - BPM Express for Hardware sets different thresholds for the different parameters (temperature, voltage etc.).

### How thresholds are set by BPM Express for Hardware

BPM Express for Hardware dynamically sets the thresholds on all of its parameters, depending on the platform it is running on. It receives the threshold values from the underlying instrumentation agents of the system. This is why a recapitulative table of the thresholds cannot be provided.

The alerts, i.e. the warnings and alarms are configured to be automatically raised via the *Status* parameter of each class. For example, for a Voltage instance – there are two parameters: *Status* and *Voltage*. If the thresholds on the temperature parameter are breached, by default it is the *Status* icon that displays the alert – and not the *Voltage* parameter icon.



Voltage: VOLT-1.11 (1.5V LAN)		
Status	Voltage: ALARM!! (Problem: The voltage level is out of the normal ran...)	
Voltage	1499 mV	

Figure 10: Alerts are raised by the Status parameter

However, if you modify the default thresholds then, the alerts are displayed by the parameter whose thresholds have been modified.

### Parameters configured to trigger alerts

It is only *Status*, the text parameter that shows the overall status of each monitored object and displays the alert conditions of warnings and alarms.

For example, let's take the case of a network interface, which has the following instances under it:

- *Link Status*: Indicates whether or not the card is plugged  
Values: Plugged = OK; Unplugged (if previously plugged) = Alarm
- *Error Percent*: Displays the percentage of errors detected  
Unit: %10-30 = Warning; 30-100 = Alarm
- *Status*: Displays the overall status of the above instances  
Values: OK; Unplugged = Warning; Critical/Missing = Alarm

If the network interface is unplugged, this information will be displayed by *Link Status* parameter icon in the History icon with all the details. However, only the *Status* icon will go into Warning. Similarly, if the *Error Percent* parameter thresholds breach alarm levels, it is the *Status* icon that will trigger and display the alarm and not the *Error Percent* icon.

## Configuration of Alert Conditions

BPM Express for Hardware detects manufacturer-set thresholds for each server and assigns these pre-set thresholds to its symbolic conditions of exclamation marks. BPM Express for Hardware translates the regex of one exclamation mark “!” into a warning, and two exclamation marks into an alarm. By default, the alerts are triggered on the *Status* parameter. You can see these threshold “symbols” for any monitored element under in the **Configure** tab, under **Thresholds**.

Nevertheless, it is possible to modify these pre-set thresholds via the **Configure** tab in the Portal. You must however remember that you have to deactivate the thresholds for the *Status* parameter (which will otherwise continue to consider pre-set thresholds), and instead directly assign threshold values against individual parameters of that class.

### Modifying alert thresholds on parameters

Whenever possible, BPM Express for Hardware automatically sets thresholds for parameters. These threshold values are retrieved from the element’s instrumentation agents and in most cases they are apt for the system.

Generally, there is no need to modify these thresholds but in case BPM Express for Hardware cannot obtain them, or if you prefer a more fault-tolerant monitoring, you can modify the thresholds of each parameter through the **Configure** tab > **Edit Thresholds**

1. To modify the parameter thresholds of several hardware objects of an element, click on the **Hardware icon** in the **Configure** tab > **Thresholds, Properties and Credentials** > **Edit**.

or

1. To modify the thresholds of a particular instance: In the **Configure** tab click on the **instance icon** > **Thresholds, Properties and Credentials** > **Edit**.

**Properties - TEMP-1.2 (CPU 1 Temp)**

**Thresholds, Properties and Credentials**

**Temperature: TEMP-1.2 (CPU 1 Temp)**  
Thresholds

Parameter	Regex	Warning		Alarm		Alert After		
		On?	Threshold	On?	Threshold	# Times	Type	
Status	!	<input checked="" type="checkbox"/>	≥ 1	Larger	<input checked="" type="checkbox"/>	≥ 2	1	Alarm or Warning
Temperature	n/a	<input type="checkbox"/>	≥ 1 degree C	Larger	<input type="checkbox"/>	≥ 2 degree C	1	Alarm or Warning

Figure 11: Editing the parameter thresholds of an instance

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2. Disable the alert conditions in the **Status** parameter, i.e. **un-check** the boxes for **Warning** and **Alarm**

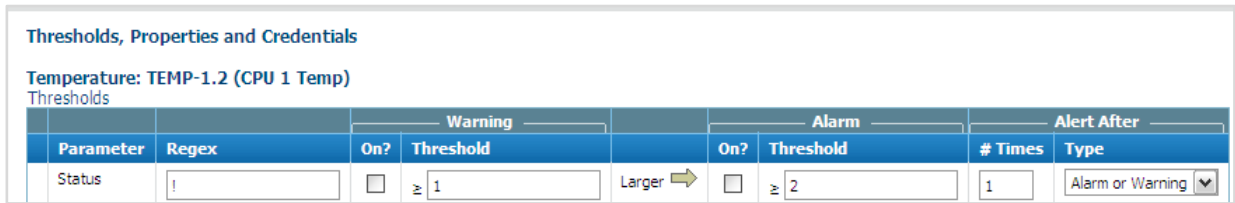


Figure 12: Disable alert conditions on Status parameter – uncheck the boxes

3. Enable the alert conditions on the parameter (*Temperature* in the image below) by checking the boxes, and manually enter the threshold values and click on **Save**.

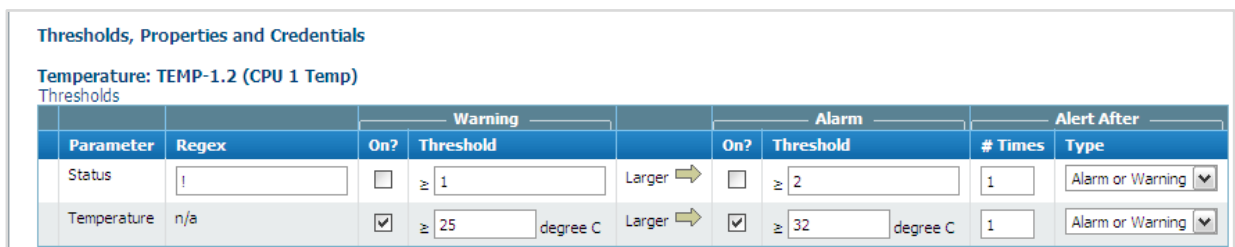


Figure 13: Modify thresholds on parameters

4. The “Success, changes have been saved” message that appears indicates that the modifications have been registered.

Alerts, if any, will be henceforth be displayed by the *Temperature* parameter icon, and not the *Status* icon as is the case when default thresholds are maintained.

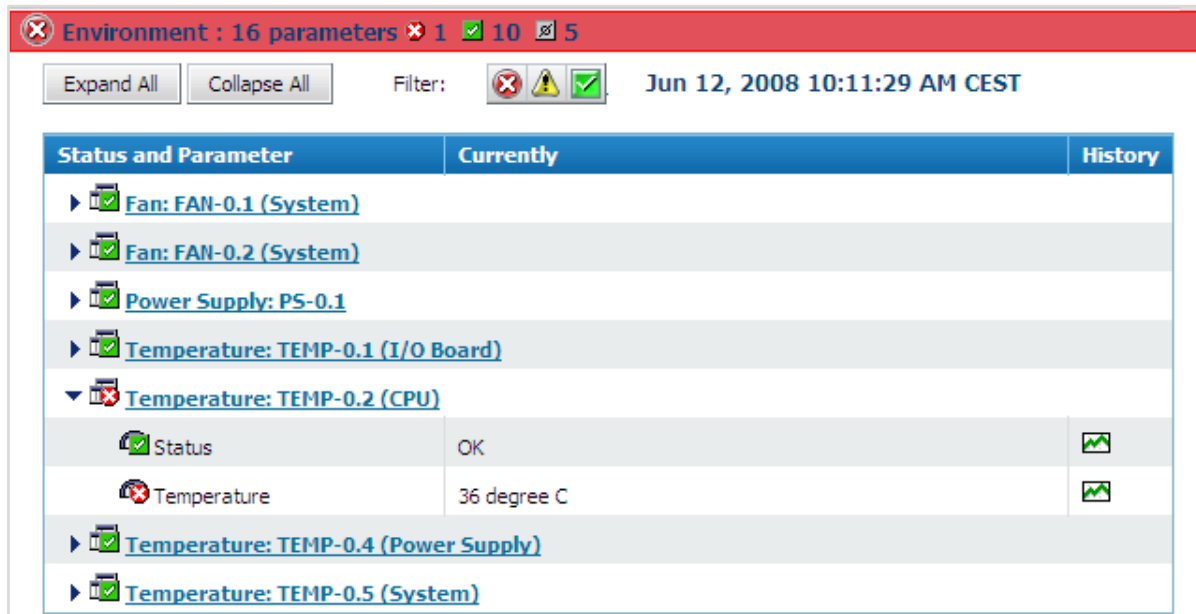


Figure 14: Temperature instance displays alert after modification

# Troubleshooting

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This section lists the most frequently asked questions:

- *Enabling the Debug Mode*
- *BPM Express for Hardware Shows No Monitored Components*
- *Monitors Nothing other than Network Interfaces*
- *Note on RSMs*
- *Unable to See Any Disk Information*
- *Unable to Connect to WMI*

## Enabling the Debug Mode

By default, BPM Express for Hardware sends only the most critical information, warning and error messages to *Status* parameter report. Most often, this information is accurate enough to ensure that BPM Express for Hardware is functioning properly. If you encounter an issue and wish to report it to Sentry Software, you will be asked to enable the Debug Mode and provide the output to Sentry Software support.

To enable the debug mode:

1. **Configure** tab > click on the **element** whose debug output you require.
2. Scroll down to **Application Classes** > click **Edit**.
3. Select **Yes** from the dropdown Debug Mode list > **Save**.
4. Once the debug mode is enabled, delete the files **sen\_hw\_database\_hostname\_\*.dat** stored at **%RSM\_HOME%\RSMxx\server\rsm\tmp\deploy\** or restart the RSM service (restarting RSM will affect othe PMs too).
5. Deletion of the files or an RSM restart will allow BPM Express for Hardware to perform fresh detection, discovery and collection processes.

### Note

Restarting the RSM could affect the output of other PMs if the RSM is shared.

6. By default, BPM Express for Hardware sends its debug output to: **%RSM\_HOME%/RSMxx/SEN\_HW/sen\_hw\_debug\_hostname.log**
7. Wait for 30 minutes and then disable the debug mode by selecting **No** and send the debug file to the support team.

### Warning!

Pay attention to the file size - the debug output of BPM Express for Hardware could be very large when running for several days.

## BPM Express for Hardware Shows No Monitored Components

Even if BPM Express for Hardware is unable to detect any available hardware information source, it should create an icon labeled *Hardware* under the main computer icon.

### 1. Checking the Application Collection Status

This parameter has Boolean values: True or False. “True” indicates that BPM Express for Hardware is functioning; “False” indicates that it is not.

You first need to check whether the *Application Collection Status* has been set to “True” which means that at least one collect has been performed. If this parameter does not display “True”, it means that BPM Express for Hardware has not yet finished its collection for this server. You need to wait until *Application Collection Status* is set to “True” before investigating further.

This parameter is created by default by BMC Performance Manager Portal for every application class that is added. Hence when you add the BPM Express for Hardware application class to an element, this parameter should appear.

### 2. Checking the Machine Status

The second step is to check the *Machine Status* parameter which reports whether BPM Express for Hardware on the RSM was able to communicate with the targeted server with the credentials provided by the user. If so, the *Machine Status* parameter shows “<hostname> is alive. Detected as a <OS> system.” Otherwise, this parameter will report that BPM Express for Hardware cannot communicate with this host. This can be due to several reasons:

- A firewall prevents communication between the RSM and the managed server
- The WMI layer is not been installed or is disabled (Windows only)
- Neither SSH nor telnet connections are allowed on the managed server (UNIX and Linux only)
- The credentials entered are incorrect
- The SNMP community string is incorrect

If *Machine Status* is OK, you need to check which connectors are detected as valid for the targeted server, and compare them to the expected list of connectors as described in the [Installation Guide](#).

### ***3. Checking Connector Detection***

If certain connectors are not detected as valid for the targeted server, enable the debug mode of BPM Express for Hardware, and check the reason that led to the exclusion of those connectors. Several reasons could prevent a connector from being used:

- The SNMP community string is incorrect (only for SNMP-based connectors)
- The administrative/root credentials are missing or are incorrect (only for connectors which need such root/administrative privileges)
- The corresponding hardware agent is not installed or running
- Some instrumentation drivers required by the hardware agent are missing

## Monitors Nothing other than Network Interfaces

This is typically an SNMP issue. Many manufacturer-provided hardware agents use the SNMP technology (DELL OpenManage, HP Insight Management, Fujitsu-Siemens ServerView and for example). Since BPM Express for Hardware gathers hardware information from these agents, you need to enable and properly configure the SNMP layer on the managed servers if an SNMP-based agent is running on them.

However sometimes, like in the case of HP® (Compaq®) ProLiant® servers, the network interface is detected and displayed whilst no other hardware component is detected by BPM Express for Hardware – simply because it cannot communicate with the managed element. So enabling and authorizing the managed server to communicate through the SNMP protocol is essential.

### Configuring SNMP on Windows servers 2003, 2008

Starting with Windows Server 2003, the SNMP service is not configured to allow the "public" community by default. As a consequence, even if the SNMP service is properly installed and the hardware agent properly running, BPM Express for Hardware is not able to gather any hardware information from the SNMP agent. Therefore, on Windows Server computers that run an SNMP-based hardware agent (DELL OpenManage, HP Insight Management or Fujitsu-Siemens ServerView), you first need to install the SNMP service (not installed by default) and then configure it to allow a community to access the SNMP agent.

1. In the Services administrative tool, right-click on **SNMP service > Properties**. Click on **Security**:

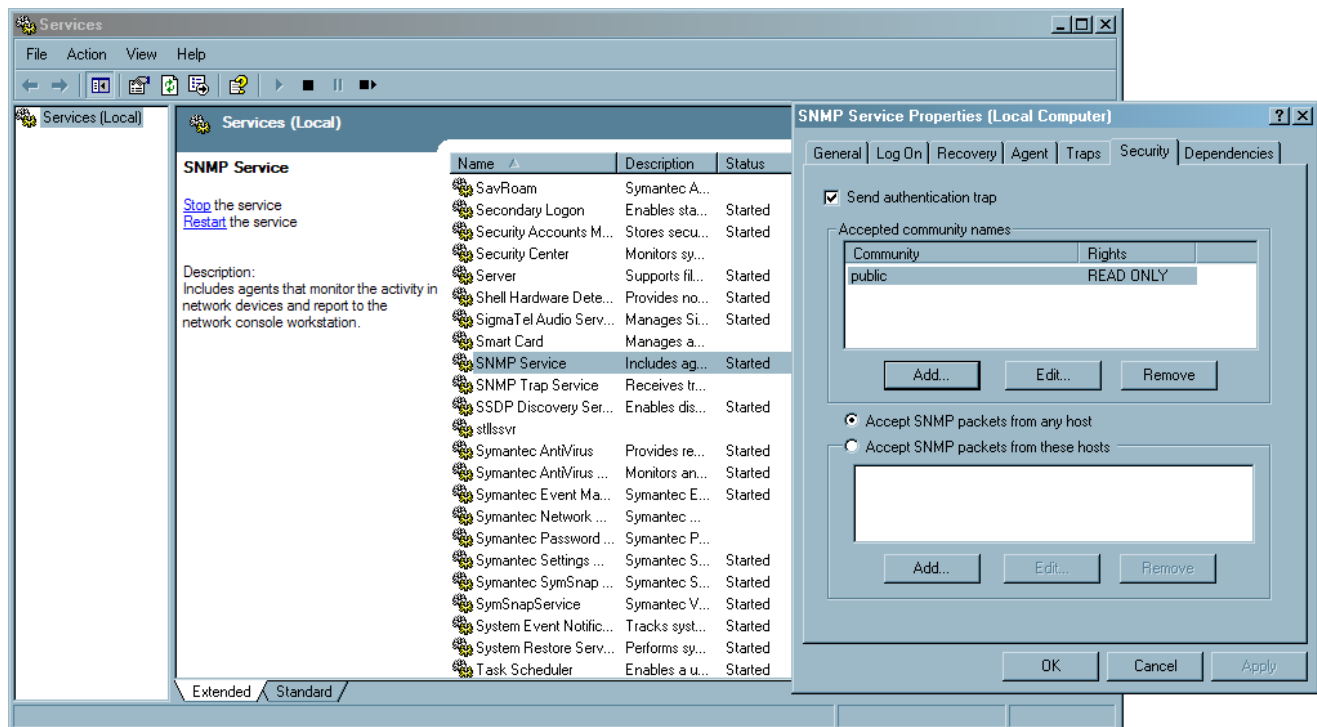


Figure 15: Click on SNMP service > Properties > Security

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2. Click on the first **Add** button and enter a community name that will allow access to the SNMP agent (READ ONLY):

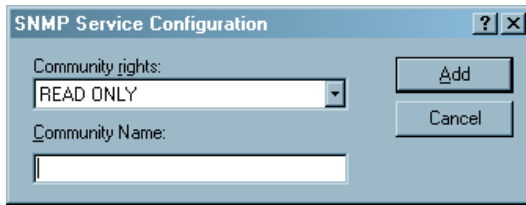


Figure 16: Click on ADD and enter the community name

3. Click **OK**. The new settings are taken into account immediately.
4. Next, you enter the community string for this server on the Portal. Log on as a user > **Configure** tab > **Elements**
5. Expand your infrastructure tree and select the element for which you need to enter the SNMP community string > **Edit**.
6. Scroll down to **Application Classes** section > **Hardware (<platform>)** > **Edit** > **Properties and Credentials**.
7. Enter the SNMP community string on order to enable BPM Express for Hardware to monitor all hardware components of the element and not just the network interface.

**Note on unsupported servers running Windows or Linux**

On officially non-supported servers running Windows or Linux, BPM Express for Hardware will still be able to monitor network cards and internal, non-RAID disks.

## Note on RSMs

In general, an RSM is said to support the monitoring of 10,000 parameters. In the case of BPM Express for Hardware, it is difficult to calculate a precise number of parameters collected since this depends entirely on the element itself and the number of hardware objects discovered: disks, fans, memory modules etc.

On an average, between two to five parameters are collected for each discovered object. The number of hardware objects discovered and the hence number of parameters collected, greatly varies from one managed element to another. The total number of parameters collected directly depends on the number of objects discovered on each element. The number of RSMs required also depends on whether an RSM is dedicated to BPM Express for Hardware alone, or whether there are other PMs on the same RSM.

It should be safe to assume that an RSM dedicated entirely to BPM Express for Hardware should be able to support approximately 150 elements, and an RSM shared by two or more PMs should, on an average, be able to support the monitoring of 60-80 elements.

### Note

The above mentioned figures are just an approximation based on certain client studies and laboratory tests. The number will vary as per actual usage patterns in each environment.

## Reinitializing Certain Parameters

Due to the inner mechanism of servers, and that of BPM Express for Hardware, certain parameters have a tendency to trigger alerts far too frequently. Often these alerts do not indicate a serious problem, and are just a source of annoyance to administrators who have to deal with them all the time. *Error Count* and *Corrected Error Count* are two such parameters. Reinitializing these parameters automatically reduces the triggering of such “ignorable” alerts. It is for this reason that by default, the *Error Count* and *Corrected Error Count* are reinitialized every 24hrs. This time-frame is customizable.

Basically, here’s what happens:

When BPM Express for Hardware detects the parameter *Error Count* for the first time, it notes the number of errors encountered, and keeps that “1<sup>st</sup> discovered” number as a base-count. After this, each time it discovers an *Error Count* greater than this recorded base-count (which becomes its “threshold”, it triggers an alert through the *Status* parameter of that class. This, as you can tell, happens far too often. It is the same with *Corrected Error Count*.

Now, configured by default to “re-initialize” every 24hrs, it is programmed to take the last recorded Error Count/Corrected Error Count as the new “base-count or threshold” for the fresh round after reset. This is the inner mechanism whilst the *display* shows that on reset the count is zero, and if it increases to one, an alarm is triggered.

### Example

- Let’s say the very first discovered *Error Count* for SEN\_HW\_LOGICALDISK is 40.
- Now onwards, every time, BPM Express for Hardware “discovers” the Logical disk, and it meets an *Error Count* of any value greater than 40, the *Status* parameter of that instance will trigger an alert.
- Remember it is programmed for re-initialization every 24hrs.
- So, if during the last “collect” just before the reset takes place, the *Error Count* is ‘48’, BPM Express for Hardware will record ‘48’ as the “base-count” for the next round after re-initialization.
- Therefore, after 24hrs (or the time you set: 6hrs, or 1hour etc), the base-count /threshold for Error Count will be 48, and so on and so forth.

### Classes that contain “re-initializable” parameters:

*Error Count* applies to:

- SEN\_HW\_LOGICALDISK
- SEN\_HW\_MEMORY
- SEN\_HW\_PHYSICALDISK

*Corrected Error Count* applies to

- SEN\_HW\_CPU

## Servers running Windows or Linux

Even on officially un-supported servers running Windows or Linux, BPM Express for Hardware should be able to monitor network cards and internal, non-RAID disks.

## Unable to See Any Disk Information

On some computers, the manufacturer-specific hardware monitoring agent is only responsible for the monitoring of the baseboard: temperatures, fans, voltages and power supplies. In this case, the disk monitoring is handled by the disk controller manufacturer. Therefore, you need to install additional software for your disk monitoring.

Please contact your server vendor to know which software must be used with your disk controller.

### **Important**

See the Connectors & Platforms Reference Table in the [Reference Guide](#) and verify if your system has all the required tools/agents installed on it. Also check the details for your system by clicking on the connector name – this will display the objects discovered by BPM Express for Hardware if all pre-requisites are fulfilled.

## Unable to Connect to WMI

At times BPM Express for Hardware is unable to connect to WMI. There could be two reasons for this:

1. A firewall blocks the WMI protocol.
2. The user does not have sufficient connection rights.

### Firewall is blocking the WMI protocol

If the firewall blocks the WMI protocol, you need to reset the port for RPC/DCOM connections. WMI uses RPC/DCOM, so enabling the DCPM across the firewall should allow it to work. When WMI connects to a remote machine it uses port 135 for the initial negotiation, and then a port is allocated for further connection. Stated below are two links that will help in setting a range of ports for the RPC/DCOM connection. Once you have set a range for RPC/DCOM communication, you can then configure the firewall to allow traffic through this range of ports.

- <http://support.microsoft.com/default.aspx?scid=kb;en-us;154596>
- [http://msdn.microsoft.com/en-us/library/aa389286\(VS.85\).aspx](http://msdn.microsoft.com/en-us/library/aa389286(VS.85).aspx)

### Insufficient connection rights

This means that the user credentials provided are insufficient to access WMI. This error occurs when the connected user is not recognized or is restricted in some fashion by the remote server (for example, the user might be locked out). The reasons may be the following:

Accounts are in different domains, or, changes have recently been made to WMI security:

- Blank passwords, previously permitted, are not allowed in Windows XP and Windows Server 2003.
- The DCOM configuration access setting may have been changed.
- If the target computer is running Windows XP, the Force guest value under the registry key HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa may be set to force the Guest account off (value is zero).

Request your network administrator to accord sufficient rights to the user credentials.

#### About BMC® Software

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