Monitoring HP StorageWorks Enterprise Virtual Array (EVA)

eG Innovations Product Documentation

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Total Performance Visibility

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Chapter 1: Introduction

HP StorageWorks EVA disk arrays provide storage virtualization services to mid-sized enterprises. Storage virtualization refers to the process of separating (through abstraction) logical storage from physical storage. The virtualization system presents to the user a logical space for data storage and itself handles the process of mapping it to the actual physical location.

The key features of HP EVA include the following:

1. Places data across more spindles and automatically re-levels when new storage is added;
2. Offers tiered storage;
3. Requires less management resources for supporting, provisioning, and maintaining the storage environment;
4. Does not require storage capacity to be pre-allocated; dynamically adds disks when more storage is required;

This way, the HP EVA array lifts the management burden of traditional storage from the shoulders of administrators, and is hence quiet popular where mission-critical applications generating a high volume of sensitive data are in use. Such environments naturally will be extremely intolerant to issues in the performance of the virtual array, as even the slightest of deviations, be it a slowdown while reading from or writing to the virtual or physical disks supported by the array, excessive space usage on the array, or a failed host port/LUN/disk, can adversely impact application performance. It is therefore imperative that the operational state and condition of the integral components of the array, such as the host port, LUN, physical disk, LUN group, processor, etc., the processing ability of the array, and space usage by the array are continuously monitored, and bottlenecks (if any) reported to administrators instantly. To achieve this purpose, eG Enterprise offers a monitoring model that helps administrators to continuously monitor the HP StorageWorks EVA disk array.

Chapter 2: How to Monitor HP EVA Storage Array Using eG Enterprise?

eG Enterprise monitors the HP EVA Storage Array using an eG external agent on any remote host in the environment. This agent is capable of monitoring the performance of the array via SNMP. The eG agent periodically polls the SNMP MIB of the storage array and collects metrics related to its performance. To pullout performance metrics from the target storage array, a set of pre-requisites should be fulfilled. These pre-requisites have been discussed in the following sections;

- Pre-requisites for Monitoring the HP EVA
- Pre-requisites for Using the HP EVA Perf Component
- Pre-requisites for Using the HP EVA SSSU Component

Once the requirements discussed in the above-mentioned sections are fulfilled, proceed to monitor the HP EVA Storage Array using eG Enterprise. There are two broad steps for monitoring the HP EVA Storage Array:

- Managing the HP EVA Storage Array
- Configuring the tests

2.1 Pre-requisites for Monitoring the HP EVA

To collect the useful statistics discussed above, the eG agent integrates with the following software components bundled with the **HP Command View EVA** software suite:

a. HP StorageWorks Command View EVAPerf

b. HP StorageWorks Storage System Scripting Utility (SSSU)

While a few tests executed by the eG agent use the HP StorageWorks Command View EVAPerf tool, a few others use the HP StorageWorks Storage System Scripting Utility (SSSU) for metrics collection. To ensure the hassle-free execution of these tests, the following primary pre-requisites are to be fulfilled:

1. The eG agent should be deployed on the same system as the EVAPerf and SSSU components mentioned above; to determine whether/not the EVAPerf component is installed on a target host, check for the existence of the following software components on that host:

- *evapdcs.exe* - EVA Data Collection service, which gathers data from the EVAs that are visible to a host and stores it in memory cache
- *evaperf.exe* - HP Command View EVAPerf command line interface
- *evapmext.dll* - DLL extension for Windows Performance Monitor, the graphical user interface
- *EVAPerf - TLViz-Formatter.exe*–EVAPerf TLViz Formatter user interface, which formats the HP CommandView EVAPerf *all* command output so you can view it with the HP TLViz tool.
- *EVADATA.MDB* - A Microsoft Access database template you can use to view the *all* command output in a database. The data from the command output resides in individual tables.
- *MSADODC.OCX* - This .le is required to operate the EVAPerf TLVIZ Formatter use interface

By default, these components will be available in the **C:\Program Files\Hewlett-Packard\EVA Performance Monitor** directory on the host.

Similarly, you can be sure that the SSSU component has been installed on a host if you can locate the *SSSU.exe* file on that host.

2. The SSSU utility should be configured with at least one array

In addition, the tool-specific pre-requisites discussed in the sections that will follow should also be fulfilled.

2.2 Pre-requisites for Using the HP EVA Perf Component

To begin array monitoring using the EVAPerf tool, ensure that the HP Command View EVAPerf component is configured properly:

1. EVA Data Collection service

- The service uses TCP port 860. You may need to open this port on your firewall.
- The service is set to manual start when you install HP Command View EVAPerf.
- When the test runs the HP Command View EVAPerf command line interface, the service starts and remains running until you reboot the host.
- Set the service to start automatically if you use Windows Performance Monitor for background logging. If you execute logging before starting this service, the startup time for the service may

exceed the time that Windows Performance Monitor waits for the .rst data samples.

- You can also start and stop the service using Windows Service Manager.

2. Array

   - Ensure that the array for which you want to gather performance metrics is initialized. Metrics will not be collected for uninitialized arrays.
   - HP recommends that you use unique names for each array.

   Moreover, the eG tests that invoke the EVAPerf component for collecting performance metrics, should be configured with the following:

3. The install directory of the executable, *evaperf.exe* – by default, this will be **C:\Program Files\Hewlett-Packard\EVA Performance Monitor** directory on the host;
4. The WWN (world wide name) or the friendly name of the array to be monitored. To know the friendly name of an array, open the **fnames.conf** file in the install directory of the EVAPerf tool. The sample contents of this file have been provided below:

```
# Generated: Thu Jun 01 20:20:48 2006

# Arrays visible from host: localhost
ARRAY 5000-1FE1-5007-2700 CFTEVA1
ARRAY 5000-1FE1-5007-26F0 CFTEVA2

# Virtual disks for array: CFTEVA1
VDISK 6005-08B4-0010-4B8A-0001-9000-0045-0000 Vdisk001
VDISK 6005-08B4-0010-4B8A-0001-9000-004B-0000 Vdisk002

# Hosts for array: CFTEVA1
HOST 5006-0B00-0032-93D8 cftux1
HOST 5006-0B00-0032-653C cftux1

# Disk groups for array: CFTEVA1
DISKGROUP 5000-1FE1-5007-2700:0
Default Disk Group

# Virtual disks for array: CFTEVA2
VDISK 6005-08B4-0010-6399-0001-E000-007E-0000 Vdisk001
VDISK 6005-08B4-0010-6399-0001-E000-0084-0000 Vdisk002

# Hosts for array: CFTEVA2
HOST 5006-0B00-0032-93D8 cftux1
HOST 5006-0B00-0032-653C cftux1

# Disk groups for array: CFTEVA2
DISKGROUP 5000-1FE1-5007-26F0:0 Default Disk Group
```

Figure 2.1: The fnames.conf file

The **fnames.conf** file (see Figure 2.1) includes a *Arrays visible from host* section that reveals the WWN and friendly name of each array on a particular management server running the HP

Command View EVA – in Figure 2.1 above, *localhost* is the management server name. The entries in this section are of the following format:

```
ARRAY <WWN of Array> <Friendly name of array>
```

For instance, in Figure 2.1, **5000-1FE1-5007-2700** is the WWN of the array, and the **cfteva1** is the friendly name of this array.

2.3 Pre-requisites for Using the HP EVA SSSU Component

To enable eG tests to invoke *SSSU.exe* for metrics collection, the tests should be configured with the following:

1. The WWN of the array to be monitored;
2. The IP address of the management server that manages the array to be monitored;
3. The full path to the install directory of *SSSU.exe*;
4. The Username and Password of the user account that was created during HP Command View EVA installation.

Therefore, prior to test configuration ensure that the aforesaid information is in place.

Once the tests are configured properly, the eG agent executes the tests periodically, invokes the required executable (*evaperf.exe* or *SSSU.exe*), collects the desired metrics, and then presents the metrics in the form of the monitoring model depicted by Figure 3.1.

2.4 Managing the HP EVA Storage Array

The eG Enterprise cannot automatically discover the HP EVA Storage Array. This implies that you need to manually add the component for monitoring. Remember that the eG Enterprise automatically manages the components that are added manually. To add a HP EVA Storage Array, do the following:

1. Log into the eG administrative interface.
2. Follow the Components -> Add/Modify menu sequence in the **Infrastructure** tile of the **Admin** menu.
3. In the **COMPONENT** page that appears next, select *HP EVA Storage* as the **Component type**. Then, click the **Add New Component** button. This will invoke Figure 2.2.

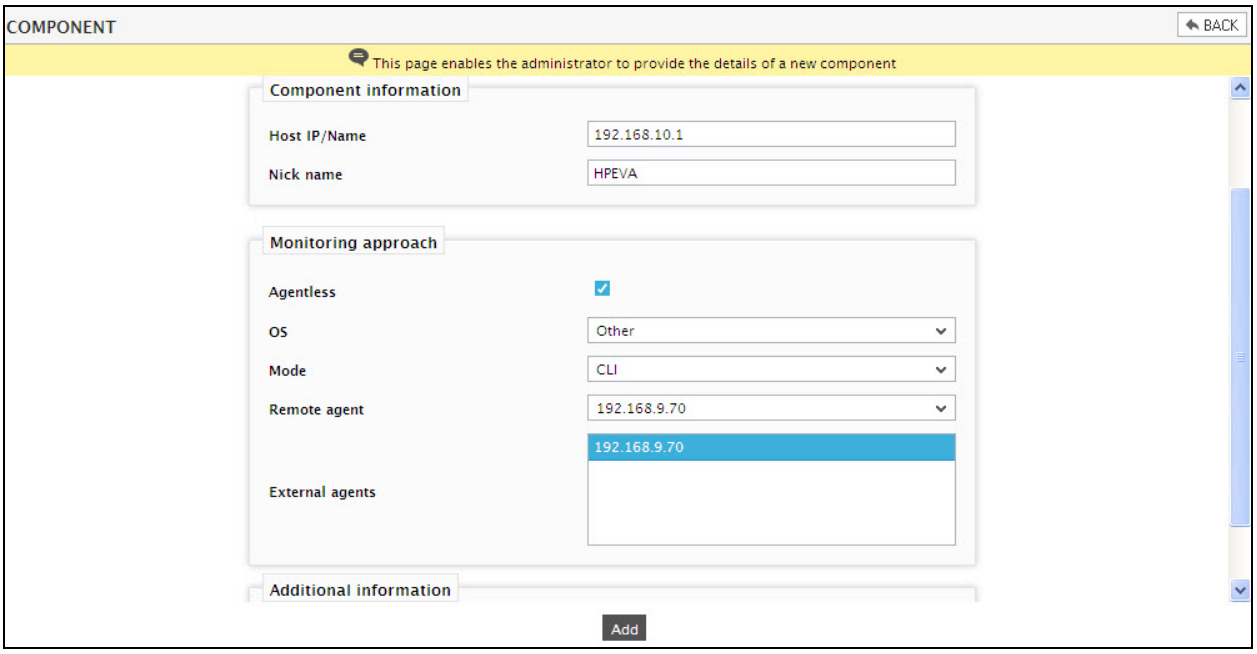

Figure 2.2: Adding an HP EVA Storage array for monitoring

4. Specify the **Host IP** and the **Nick name** of the HP EVA Storage array. Also select **Other** as the **OS** and **SNMP** as the **Mode** as shown in Figure 2.2 and click on the **Add** button to register the changes.

   Note:

   Though the **Mode** is set to **SNMP** while adding a new component, the eG agent will be able to collect metrics from the target environment through the SSSULocation path that will be specified by you during parameter configuration for the tests pertaining to the HP EVA Storage array.

2.5 Configuring the tests

1. Then, click on the **Sign out** button to exit the eG administrative interface. This will bring up Figure 2.3, where you can view the complete list of unconfigured tests for the target array.

List of unconfigured tests for 'HP EVA Storage'

Performance		HPEVA
EVA Array Traffic	EVA Device Ports	EVA Host To Array Requests
EVA Host To Controller Traffic	EVA LUN Group	EVA LUN Traffic
EVA Physical Disk Traffic	EVA Processors	EVA Cache Battery
EVA Cache Memory	EVA Controller Fans	EVA Controller Power Supplies
EVA Controller To Device Port Status	EVA Controller To Host Port Status	EVA Controllers
EVA Disk Group Status	EVA Enclosure EMU	EVA Enclosure Fan
EVA Enclosure Module	EVA Enclosure Power Supply	EVA Enclosure Temperature
EVA FC Ports	EVA Host To LUN Mapping	EVA I/O Bus
EVA LUN Status	EVA Physical Disks	EVA System Status
EVA Disk Groups		

Figure 2.3: Viewing the list of unconfigured tests for the HP EVA array

2. Click on the test names to configure. To know how to configure the tests, refer to **Monitoring the HP StorageWorks Enterprise Virtual Array (EVA) Family** chapter.
3. Finally, signout of the eG administrative interface.

Chapter 3: Monitoring the HP StorageWorks Enterprise Virtual Array (EVA) Family

eG Enterprise provides a 100%, web-based HP EVA Storage monitoring model that observes the state and overall performance of the core components of a HP EVA storage array, and proactively alerts administrators to current/potential issues in array performance.

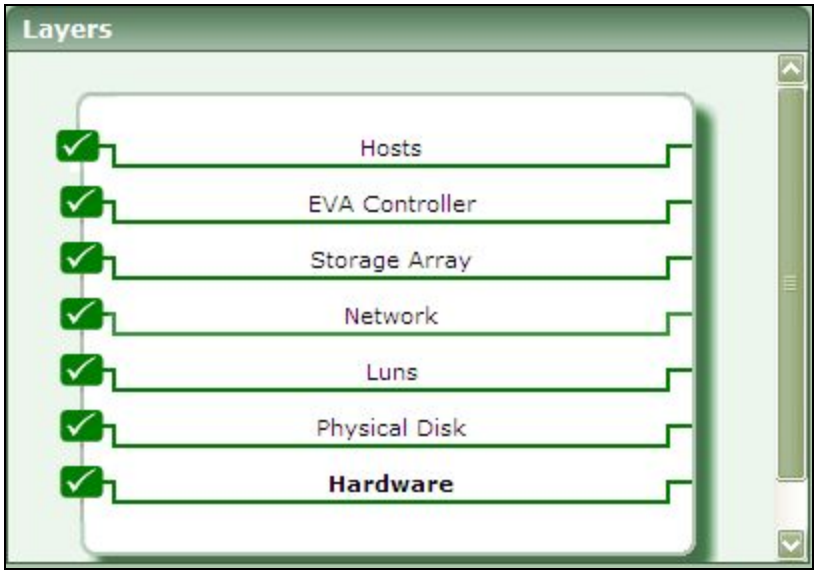

Figure 3.1: The layer model of the HP EVA storage array

Each layer of Figure 1 above is mapped to a wide variety of tests that report a wealth of information pertaining to the HP EVA storage array, using which administrators can find quick and accurate answers to the following queries:

- Has any temperature sensor failed?
- Is the temperature of any sensor abnormally high?
- Have any communication buses failed?
- Has any enclosure EMU failed?
- Are the fans operating normally in the enclosure and on the controller? Has any fan failed?
- Is any enclosure module in an abnormal state currently? If so, which one?
- Has any power supply unit failed in the enclosure or in the controller? Is any unit about to fail?
- Is any disk group running out of space?

- Is the I/O traffic on any disk group abnormally high?
- Are all physical disks on the array healthy? Is any disk inaccessible?
- Is any physical disk experiencing slowdowns in read/write operations?
- Are the LUN groups utilizing their caches effectively, or are too may read/write requests to the LUN groups being serviced by direct disk accesses?
- Has any LUN failed?
- Are all LUNs utilizing their caches effectively, or is any LUN servicing many of its read/write requests by directly accessing the disk?
- Are all device ports on the controller functioning normally?
- Is any device port down?
- Is any device port experiencing too many errors? If so, what type of errors are these?
- Has any fibre channel port failed or is about to fail?
- Are there any invalid/bad fibre channel ports on the controller?
- Is the EVA system operating normally? Does the system have adequate free spaace?
- Has any cache battery failed?
- Are all controllers healthy?
- Is the temperature of any controller very high?
- Is any controller utilizing CPU resources excessively?
- Is the array able to quickly process all requests from external hosts, or are too many outstanding requests in queue? Which external host is responsible for the maximum number of requests?
- Is any host port experiencing a bottleneck during request processing?
- Are too many requests awaiting processing by a host port? If so, which host port is it?

3.1 The Hardware Layer

Using the tests mapped to this layer, you can quickly determine the current status of the hardware on which EVA storage array operates, and thus be proactively alerted to potential hardware failures. The hardware monitored include the I/O communication buses, the fans and the power supply points on the array controller, and the array enclosure and its components such as temperature sensors, power supply units, modules, EMU, and fans.

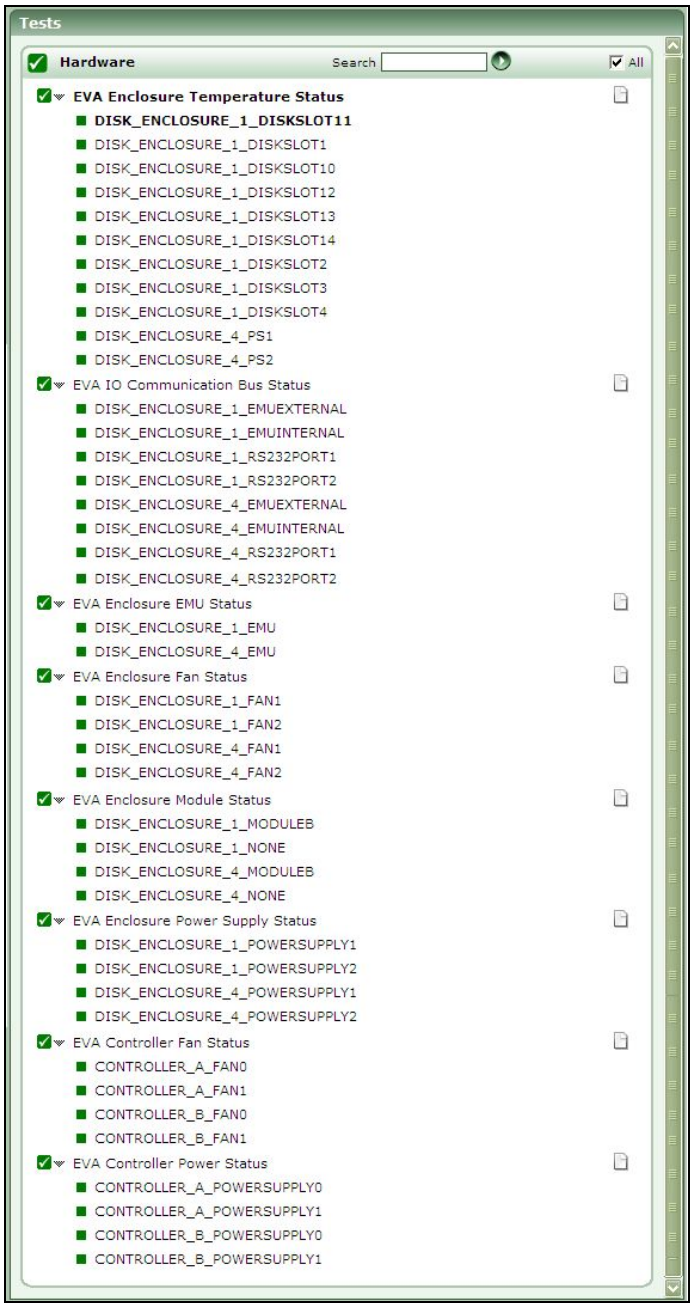

Figure 3.2: The tests mapped to the Hardware layer

3.1.1 EVA Enclosure Temperature Test

This test reports the current operational state and overall health of each temperature sensor contained within an array enclosure.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each temperature sensor within an enclosure.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational status of this temperature sensor.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Value good or attention or normal: 1 Failed or bad: 0 Unknown or not available or notinstalled or not_present or unsupported, etc.: 2 **Note:**

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>By default, this measure reports the States listed in the table above to indicate the current status of each temperature sensor. The graph of this measure however, represents the status of a temperature sensor using the numeric equivalents only.</td></tr>
<tr><td>Failure predicted</td><td>Indicates whether failure of this temperature sensor has been predicted.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>No</td><td>1</td></tr><tr><td>Yes</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table>Note:
By default, this measure reports the States listed in the table above to indicate whether the failure of each temperature sensor has been predicted.. The graph of this measure however, represents the States using the numeric equivalents only.</td></tr>
<tr><td>Enclosure temperature</td><td>Indicates the current temperature of this sensor.</td><td>Fahrenheit</td><td>An abnormally high value for this measure could be a cause for concern.</td></tr>
</table>

3.1.2 EVA I/O Bus Test

This test reports the current status of each enclosure communication bus.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each enclosure communication bus on the controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational mode of this bus.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Value good or attention or normal: 1 Failed or bad: 0 Unknown or not available or notinstalled or not_present or unsupported, etc.: 2 **Note:** By default, this measure reports the

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>States listed in the table above to indicate the current operational status of each bus. The graph of this measure however, represents the status of a bus using the numeric equivalents only.</td></tr>
<tr><td>Failure predicted</td><td>Indicates whether failure of the bus has been predicted.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>No</td><td>1</td></tr><tr><td>Yes</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table>Note:
By default, this measure reports the States listed in the table above to indicate whether the failure of this bus has been predicted. The graph of this measure however, represents the States using the numeric equivalents only.</td></tr>
<tr><td>Bus status</td><td>Indicates the current status of this bus.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>enabled</td><td>1</td></tr><tr><td>disabled</td><td>0</td></tr><tr><td>unknown</td><td>2</td></tr></table>Note:
By default, this measure reports the States listed in the table above to indicate the current status of each bus The graph of this measure however,</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			represents the status of a bus using the numeric equivalents only.

3.1.3 EVA Enclosure EMU Status

This test reports the current operational state of each enclosure EMU.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each enclosure EMU.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current	Status	The values that this measure can report

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td>operational status of this enclosure EMU.</td><td></td><td>and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>good or attention or normal</td><td>1</td></tr><tr><td>Failed or bad</td><td>0</td></tr><tr><td>Unknown or not available or notinstalled or not_present or unsupported, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate the current operational state of each EMU. The graph of this measure however, represents the status of a EMU using the numeric equivalents only.</td></tr>
<tr><td>Failure predicted</td><td>Indicates whether failure of this EMU has been predicted.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>No</td><td>1</td></tr><tr><td>Yes</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate whether failure of this EMU has been predicted. The graph of this measure however, represents the state using the numeric equivalents only.</td></tr>
</table>

3.1.4 EVA Enclosure Fan Status Test

This test reports the current operational state and overall health of each fan contained within an array enclosure.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each fan within an enclosure.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational status of this fan.	Status	The values that this measure can report and the states they indicate are tabulated below:

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>good or attention or normal</td><td>1</td></tr>
<tr><td>Failed or bad</td><td>0</td></tr>
<tr><td>Unknown or not available or notinstalled or not_present or unsupported, etc.</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current operational status of each fan. The graph of this measure however, represents the status of a fan using the numeric equivalents only.
</td></tr>
<tr><td>Failure predicted</td><td>Indicates whether failure of this fan has been predicted.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>No</td><td>1</td></tr>
<tr><td>Yes</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the failure is predicted for this fan. The graph of this measure however, represents the status of a fan using the numeric equivalents only.
</td></tr>
</table>

3.1.5 EVA Enclosure Power Supply Test

This test reports the current operational state and overall health of each power supply unit contained within an array enclosure.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each power supply unit within an enclosure.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational status of this power supply unit.	Status	The values that this measure can report and the states they indicate are tabulated below:

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>good or attention or normal</td><td>1</td></tr>
<tr><td>Failed or bad</td><td>0</td></tr>
<tr><td>Unknown or not available or notinstalled or not_present or unsupported, etc.</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current status of each power supply unit. The graph of this measure however, represents the status of a power supply unit using the numeric equivalents only.
</td></tr>
<tr><td>Failure predicted</td><td>Indicates whether failure of this power supply unit has been predicted.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>No</td><td>1</td></tr>
<tr><td>Yes</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate whether the failure of this power supply unit has been predicted.. The graph of this measure however, represents the States using the numeric equivalents only.
</td></tr>
</table>

3.1.6 EVA Controller Fan Test

This test auto-discovers the fans supported by the controller and reports the status of each fan.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each fan on the controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Fan status	Indicates the current status of this fan.	Status	The values that this measure can report and the states they indicate are tabulated below:

Measurement	Description	Measurement Unit	Interpretation
			<table><tr><th>State</th><th>Value</th></tr><tr><td>Normal, good</td><td>1</td></tr><tr><td>Abnormal, bad</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table> **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current status of each fan. The graph of this measure however, represents the status of a fan using the numeric equivalents only.

3.1.7 EVA Controller Power Status Test

This test auto-discovers the power supply units on the controller and reports the status of each unit.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each power supply on the controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.

Parameter	Description
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Power status	Indicates the current status of this power supply unit.	Status	The values that this measure can report and the states they indicate are tabulated below: State / Value Normal, good: 1 Abnormal, bad: 0 Unknown: 2 **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current state of each power supply. The graph of this measure however, represents the status of a power supply using the numeric equivalents only.

3.2 The Physical Disk Layer

This layer reports the current operational state of the physical disk groups and disks on the HP EVA storage array, and also monitors the traffic to and from each of the disk groups and disks.

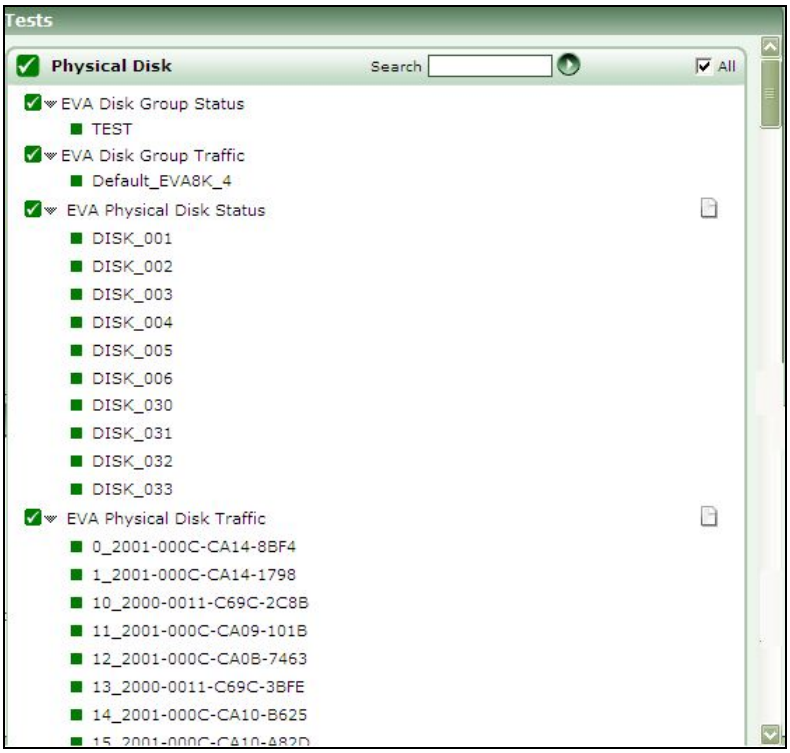

Figure 3.3: The tests mapped to the Physical Disk layer

3.2.1 EVA Disk Group Status

This test reports the current operational state of each disk group on the storage array, monitors the space usage of every group, and enables administrators to accurately identify which disk group is experiencing a space crunch currently.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each physical disk group on the EVA array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.

Parameter	Description
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Disk group operational state</td><td>Indicates the current operational mode of this disk group.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated beow:
<table><tr><th>State</th><th>Value</th></tr><tr><td>good or attention or normal</td><td>1</td></tr><tr><td>Failed or bad</td><td>0</td></tr><tr><td>Unknown or not available or notinstalled or not_present or unsupported, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate the current operational mode of each disk group. The graph of this measure however, represents the status of a fan using the numeric equivalents only.</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
Total storage capacity	Indicates the total storage space on the this group.	GB	
Used storage capacity	Indicates the amount of storage space on this group that is in use currently.	GB	
Percent free space	Indicates the percentage of space available for use on the this group.	Percent	Ideally, the value of this measure should be high. A low value or a value that decreases consistently over time could indicate a potential space crunch on the group.
Disk count	Indicates the number of disks in this group.	Number	
Drive state	Indicates the current state of drives in this group.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Online, Value: 1 State: Offline, Value: 0 State: Unknown, Value: 2 **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current state of drives. The graph of this measure however, represents the status of the drives using the numeric equivalents only.

3.2.2 EVA Disk Groups Test

This test monitors the level of traffic on each physical disk group on an EVA storage array, and helps isolate irregularities in load balancing across the disk groups. Alongside, the test also helps identify which disk group is experiencing processing bottlenecks (if any).

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each disk group on the EVA storage array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA Disk Group Status** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA Disk Group Status** test. To enable device port discovery via the SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Avg read requests	Indicates the rate at which	Reqs /sec	

Measurement	Description	Measurement Unit	Interpretation
	read requests were made to this physical disk group.		
Avg write requests	Indicates the rate at which write requests were received by this physical disk group.	Reqs /sec	
Avg data reads	Indicates the rate at which data is read from disk.	MB/sec	
Avg data writes	Indicates rate at which data is written to this disk group.	MB/sec	
Avg read latency	Indicates the time taken for reading from this disk group.	Ms	Ideally, this value should be low. A high value could indicate that read operations are slowing down for some reason.
Avg write latency	Indicates the time taken for writing to this disk group.	Ms	
Requests in queue	Indicates the number of requests to this disk group that are in queue.	Number	A high value of this measure or a consistent increase in measure value could indicate the existence of a processing bottleneck on the disk group.
Disk count	Indicates number of disks in this disk group.	Number	

3.2.3 EVA Physical Disk Status

This test reports the current operational state, capacity, and accessibility of each physical disk on the EVA array.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each physical disk on the EVA array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational mode of this disk.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Value good or attention or normal: 1 Failed or bad: 0 Unknown or not available or notinstalled or not_present or unsupported, etc.: 2 **Note:** By default, this measure reports the

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>States listed in the table above to indicate the current operational mode of each disk. The graph of this measure however, represents the status of a disk using the numeric equivalents only.</td></tr>
<tr><td>Formatted capacity</td><td>Indicates the current formatted capacity of this disk.</td><td>Millions of blocks</td><td></td></tr>
<tr><td>Drive state</td><td>Indicates the current drive state of this disk.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>Online</td><td>1</td></tr><tr><td>Offline</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table>Note:
By default, this measure reports the States listed in the table above to indicate the current drive status of each disk. The graph of this measure however, represents the drive status of a disk using the numeric equivalents only.</td></tr>
<tr><td>Media accessibility</td><td>Indicates whether this disk is currently accessible or not.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>Yes</td><td>1</td></tr><tr><td>No</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table>Note:</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>By default, this measure reports the States listed in the table above to indicate whether this disk is accessible or not. The graph of this measure however, represents the States using the numeric equivalents only.</td></tr>
<tr><td>Failure predicted</td><td>Indicates whether failure of this disk has been predicted.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>No</td><td>1</td></tr><tr><td>Yes</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table>Note:
By default, this measure reports the States listed in the table above to indicate whether the failure of this power supply unit has been predicted or not. The graph of this measure however, represents the States using the numeric equivalents only.</td></tr>
</table>

3.2.4 EVA Physical Disk Traffic Test

This test monitors the level of traffic on each physical disk on an EVA storage array, and helps isolate irregularities in load balancing across the disks. Alongside, the test also helps identify which disk is experiencing bottlenecks (if any).

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each physical disk on the EVA storage array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA Controller to Device Port Status** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA Controller to Device Port Status** test. To enable device port discovery via the SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability

Parameter	Description
	• Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Disk read requests	Indicates the rate at which read requests were made to this physical disk.	Reqs /sec	The detailed diagnosis of this measure reveals the enclosure number and disk group to which this disk belongs.
Disk write requests	Indicates the rate at which write requests were received by this physical disk.	Reqs /sec	
Data read from disk	Indicates the rate at which data is read from disk.	MB/sec	
Data written to disk	Indicates rate at which data is written to this disk.	MB/sec	
Read latency	Indicates the time taken for reading from this disk.	Ms	Ideally, this value should be low. A high value could indicate that something is slowing down reads from the disk.
Write latency	Indicates the time taken for writing to this disk.	Ms	
Avg. queue size	Indicates the number of requests to this disk that are in queue.	Number	A high value of this measure or a consistent increase in measure value could indicate the existence of a processing bottleneck on the disk.

3.3 The Luns Layer

Using the tests mapped to this layer, you can determine the status of LUN groups and LUNs, and monitor the traffic to and from each LUN.

Figure 3.4: The tests mapped to the Luns layer

3.3.1 EVA LUN Group Test

This test auto-discovers the LUN groups on an EVA storage array, tracks the I/O requests to each group, and reveals how well the cache services these requests.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each LUN group on an EVA storage array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA Lun Status** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can

Parameter	Description
	optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA Lun Status** test. To enable device port discovery via the SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Read requests served from cache	Indicates the rate at which requests to this LUN group were served by the cache.	Reqs /sec	
Data reads from cache	Indicates the rate at which this LUN group read data from the cache.	MB/sec	
Avg. read time from cache	Indicates the average time taken for reading from cache.	Ms	A high value could indicate an I/O bottleneck.
Read requests missed from cache	Indicates the rate at which read requests to the LUN group were serviced by the disk and not the cache.	Reqs/sec	Ideally, this rate should be low. A high rate indicates a large number of direct disk accesses, which in turn may expose the physical disk to overuse, and may increase the processing overheads.
Data read from physical disks	Indicates the rate at which data was read from the physical disk and not the cache.	MB/sec	
Avg. time for disk reads	Indicates the time taken by this test for reading from the physical disk.	Ms	

Measurement	Description	Measurement Unit	Interpretation
Write requests served by cache	Indicates the rate at which write requests to the LUN group were serviced by the cache.	Reqs/sec	
Data written to cache	Indicates the rate at which data was written to the cache.	MB/sec	
Avg. time for disk writes	Indicates the time taken for writing to disk.	Ms	A high value could indicate an I/O bottleneck.

3.3.2 EVA LUN Status Test

This test reports the current operational state of each LUN on the EVA storage array, and also the current state of the read, write, and mirror caches.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each LUN on the EVA array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.

Parameter	Description
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>vDisk operational state</td><td>Indicates the current operational mode of this LUN.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>good or attention or normal</td><td>1</td></tr><tr><td>Failed or bad</td><td>0</td></tr><tr><td>Unknown or not available or notinstalled or not_present or unsupported, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate the current operational status of the LUN. The graph of this measure however, represents the status of a LUN using the numeric equivalents only.
The detailed diagnosis of this measure reports the allocated and requested capacity of each LUN.</td></tr>
<tr><td>vDisk read cache state</td><td>Indicates the current state of the read cache.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Enable</td><td>1</td></tr>
<tr><td>Disable</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current status of the read cache. The graph of this measure however, represents the status of a read cache using the numeric equivalents only.
</td></tr>
<tr><td>vDisk write cache state</td><td>Indicates the current state of the write cache.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Writeback, writethrough</td><td>1</td></tr>
<tr><td>Failed, disabled</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current status of the write cache. The graph of this measure however, represents the status of the write cache using the numeric equivalents only.
</td></tr>
<tr><td>vDisk mirror cache state</td><td>Indicates the current state of the mirror cache.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			State / Value mirrored 1 notmirrored 0 Unknown 2 **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current status of the mirror cache. The graph of this measure however, represents the status of the mirror cache using the numeric equivalents only.
vDisk allocated capacity	Indicates the storage capacity allocated to this LUN/vDisk.	Millions of blocks	
vDisk requested capacity	Indicates the storage capacity requested from this LUN/vDisk.	Millions of blocks	

3.3.3 EVA LUN Traffic Test

LUN is a **Logical Unit Number**. A LUN represents a logical abstraction or, if you prefer, virtualization layer between the physical disk device/volume and the applications. They are also referred to as virtual disks. A virtual disk can also be a Snapshot, Snapclone, or replication volume.

This test auto-discovers the LUNs on an EVA storage array, tracks the I/O requests to each LUN, and reveals how well the cache services these requests.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each virtual disk on an EVA.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA LUN Traffic** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA LUN Traffic** test. To enable device port discovery via the SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis

Parameter	Description
	measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Read requests served by cache	Indicates the rate at which requests to the LUN were serviced by cache.	Reqs/Sec	The detailed diagnosis of this measure reveals the LUN group to which this LUN belongs.
Data read from cache	Indicates the rate at which this LUN read data from the cache.	MB/sec	
Latency for read hits	Indicates the time taken by this LUN for reading from the cache.	Ms	A high value could indicate an I/O bottleneck.
Read miss requests	Indicates the rate at which read requests to the LUN were serviced by the disk and not the cache.	Reqs/sec	Ideally, this rate should be low. A high rate indicates a large number of direct disk accesses, which in turn may expose the physical disk to overuse, and may increase the processing overheads.
Read miss data	Indicates the rate at which data was read from the physical disk and not the cache.	MB/sec	
Latency for read misses	Indicates the time taken by this test for reading from the physical disk.	Ms	
Write request rate	Indicates the rate at which write requests were serviced by vDisk.	Reqs/sec	
Data written to disk	Indicates the rate at which data was written to the disk.	MB/sec	
Write latency	Indicates the time taken for writing to the disk.	Ms	A high value could indicate an I/O bottleneck.

3.4 The Network Layer

This layer reveals the current state and overall health of the device ports and fibre channel ports on the storage controller.

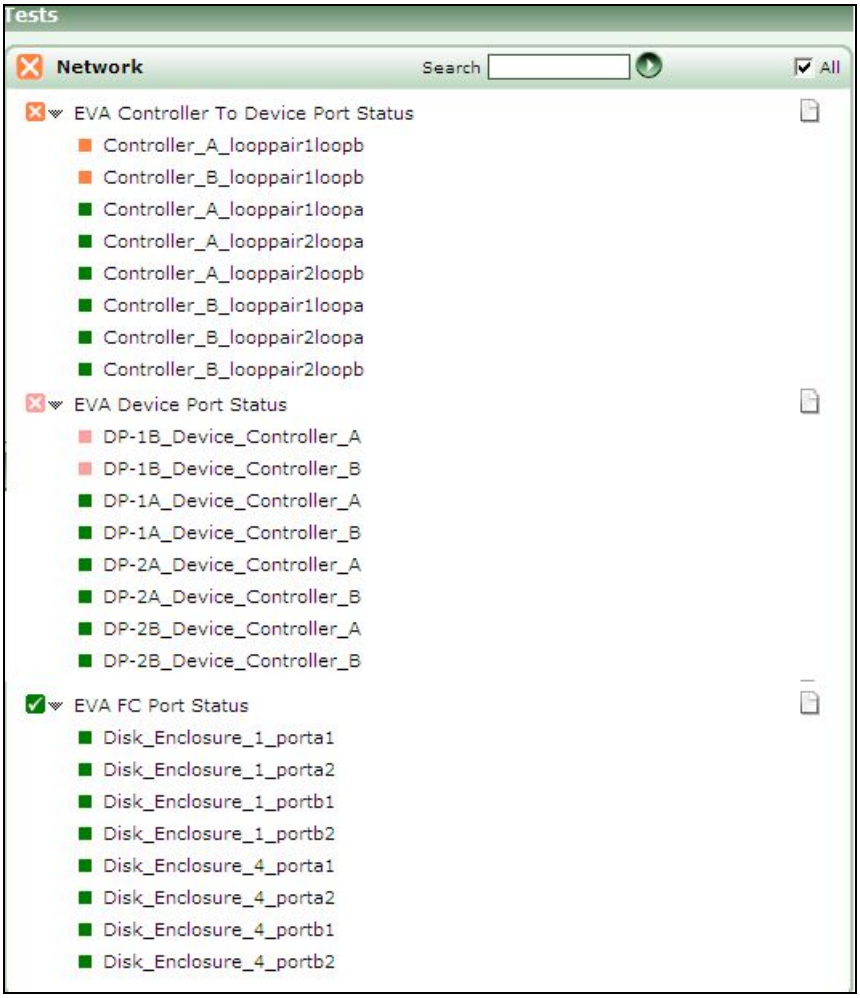

Figure 3.5: The tests mapped to the LUNs layer

3.4.1 EVA Controller to Device Port Status Test

This test reports the current operational mode of each device port on the controller.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each device port on the EVA controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational mode of this device port.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Value good or attention or normal: 1 Failed or bad: 0 Unknown or not available or notinstalled or not_present or unsupported, etc.: 2 **Note:** By default, this measure reports the

Measurement	Description	Measurement Unit	Interpretation
			States listed in the table above to indicate the current operational state of each device port. The graph of this measure however, represents the status of a device port using the numeric equivalents only.

3.4.2 EVA Device Port Status Test

Ports of type **Device** facilitate communication between the controller and the physical disk. Using this test, you can keep track of the overall health of and problems experienced by the individual device ports on an array controller.

This test monitors the data traffic to and from the EVA storage array, and reports how well the array is able to handle the traffic.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each device port on the controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA Controller to Device Port Status** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can

Parameter	Description
	optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA Controller to Device Port Status** test. To enable device port discovery via the SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Port status	Indicates the status of this device port.	Status	The value 1 for this measure indicates that the port is up and the value 0 indicates the port is down.
Signal loss count	Indicates the number of times signal losses have occurred on this port during the last measurement period.	Number	Ideally, this value should be 0.
Frames with invalid words received	Indicates the number of frames possessing invalid words that were received by this port during the last measurement period.	Number	Ideally, this value should be 0.
Synchronization loss count	Indicates the number of times synchronization losses that occurred on this port during the last measurement period.	Number	Ideally, this value should be 0.
Link failures	Indicates the number of	Number	Ideally, this value should be 0.

Measurement	Description	Measurement Unit	Interpretation
	times link failures occurred on this port during the last measurement period.		
Frames rcvd with EOF delimiter	Indicates the number of frames received with EOF delimiter during the last measurement period.	Number	Ideally, this value should be 0.
Frames discarded	Indicates the number of frames discarded during the last measurement period.	Number	Ideally, this value should be 0.
Frames rcvd with invalid CRC	Indicates the number of frames received with invalid CRC during the last measurement period.	Number	Ideally, this value should be 0.
Protocol errors	Indicates the number of protocol errors that occurred during the last measurement period.	Number	Ideally, this value should be 0.

3.4.3 EVA FC Ports Test

This test indicates the current state and overall health of each Fibre Channel port on the EVA storage array.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each fibre channel on the EVA array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.

Parameter	Description
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational mode of this FC port.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Value good or attention or normal: 1 Failed or bad: 0 Unknown or not available or not-installed or not_present or unsupported, etc.: 2 **Note:** By default, this measure reports the States listed in the table above to indicate the current operational mode of each FC port. The graph of this measure however, represents the operational mode of each FC port using the numeric

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>equivalents only.</td></tr>
<tr><td>Failure predicted</td><td>Indicates whether failure of this FC port has been predicted.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>no</td><td>1</td></tr><tr><td>yes</td><td>0</td></tr><tr><td>Unknown, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate whether the failure of this FC port has been predicted. The graph of this measure however, represents the States using the numeric equivalents only.</td></tr>
<tr><td>Output link</td><td>Indicates the current state of the output link of this FC port.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>Good, normal, active</td><td>1</td></tr><tr><td>Bad, failed, inactive</td><td>0</td></tr><tr><td>Unknown, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate the current status of output link of each FC port. The graph of this measure however, represents the status of an output link of each FC port using the numeric equivalents only.</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Input link</td><td>Indicates the current state of the input link of this FC port.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>Good, normal, active</td><td>1</td></tr><tr><td>Bad, failed, inactive</td><td>0</td></tr><tr><td>Unknown, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate the current status of input link of each FC port. The graph of this measure however, represents the status of input link of each FC port using the numeric equivalents only.</td></tr>
<tr><td>FC port status</td><td>Indicates the current status of the FC port.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>Enabled,good,valid</td><td>1</td></tr><tr><td>Disabled,bad,invalid</td><td>0</td></tr><tr><td>Unknown, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate the current status of each FC port. The graph of this measure however, represents the status of a FC port using the numeric equivalents only.</td></tr>
</table>

3.5 The Storage Array Layer

Using the tests mapped to this layer you can observe the data traffic received and sent by the storage array, measure the space usage of the EVA system, and instantly detect whether the system is over-utilizing the available storage space.

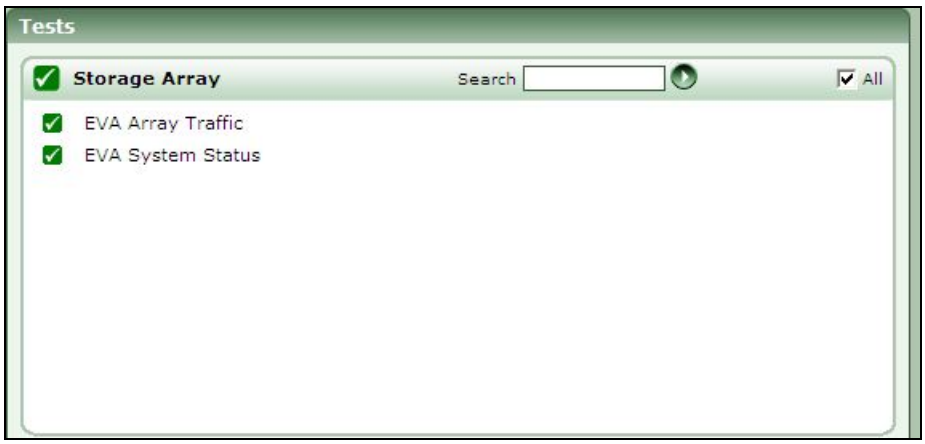

Figure 3.6: The tests mapped to the Storage Array layer

3.5.1 EVA Array Traffic Test

This test monitors the data traffic to and from the EVA storage array, and reports how well the array is able to handle the traffic.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for the EVA storage array that is monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.

Parameter	Description
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Requests received rate	Indicates the rate at which the EVA received requests.	Reqs /sec	
Data transfer rate	Indicates the rate at which the array transferred data in response to requests.	MB/sec	

3.5.2 EVA System Status Test

This test reports the current state of the EVA system, monitors space usage on the system, and alerts administrators to space contentions on the system.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for the EVA system.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.

Parameter	Description
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
System operational state	Indicates the current operational mode of the EVA system.	Status	The values that this measure can report and the states they indicate are tabulated below: State / Value good or attention or normal / 1 Failed or bad / 0 Unknown or not available or notinstalled or not_present or unsupported, etc. / 2 **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current operational mode of the EVA system. The graph of this measure however, represents the operational mode of the EVA system using the numeric equivalents only.

Measurement	Description	Measurement Unit	Interpretation
Total storage space	Indicates the total storage space on the array.	GB	
Used storage space	Indicates the amount of storage space currently utilized.	GB	
Free space	Indicates the percentage of space available for use on the array.	Percent	Ideally, the value of this measure should be high. A low value or a value that decreases consistently over time could indicate a potential space crunch on the array.

3.6 The EVA Controller Layer

The tests mapped to this layer enable you to detect the following:

- Has any cache battery failed?
- Does any controller have a bad cache, a bad mirror connection, or a bad mirror port? If so, which controller is it?
- Has any controller failed?
- Is any controller experiencing abnormally high temperatures?
- Which controller is utilizing CPU excessively?

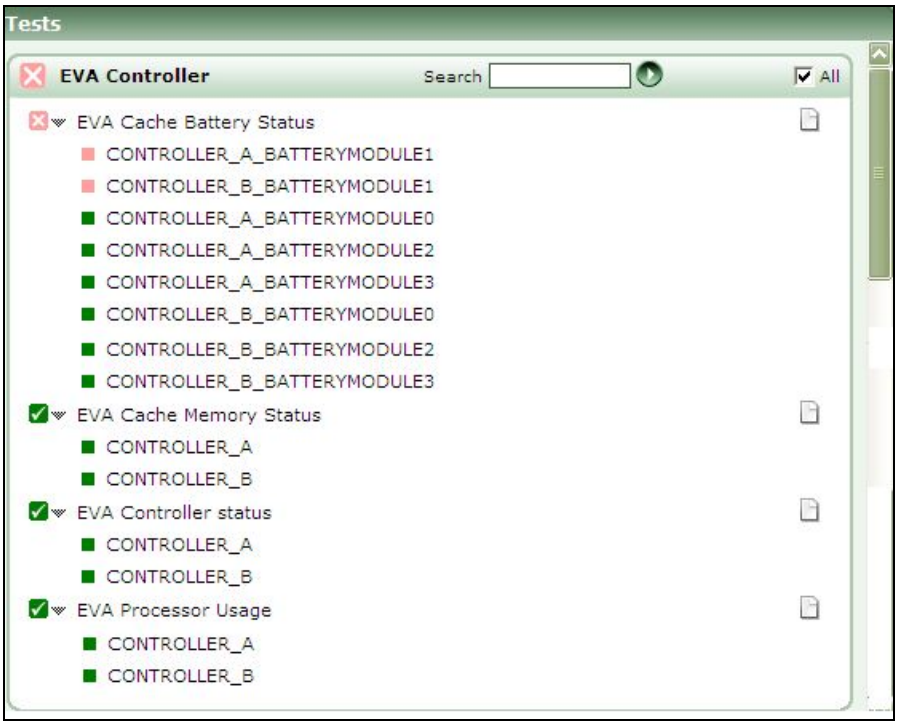

Figure 3.7: The tests mapped to the EVA Controller layer

3.6.1 EVA Cache Battery Test

This test reports the current operational state and overall health of each Cache battery.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each Cache battery.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this

Parameter	Description
	software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational status of this cache battery.	Status	The values that this measure can report and the states they indicate are tabulated below: **State** / **Value** good or attention or normal / 1 Failed or bad / 0 Unknown or not available or notinstalled or not_present or unsupported, etc. / 2 **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current state of each cache battery. The graph of this measure however, represents the status of a cache battery using the numeric equivalents only.
Health state	Indicates the current health of this cache battery.	Status	The values that this measure can report and the states they indicate are tabulated below:

Measurement	Description	Measurement Unit	Interpretation
			<table><tr><th>State</th><th>Value</th></tr><tr><td>Holding_ charge, good</td><td>1</td></tr><tr><td>Failed,bad</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table> **Note:** By default, this measure reports the **State**s listed in the table above to indicate the health state of each cache battery. The graph of this measure however, represents the status of a cache battery using the numeric equivalents only.

3.6.2 EVA Cache Memory Test

For every controller, this test reports the current status of the cache, mirror caches, and mirror ports mapped to the controller.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this

Parameter	Description
	software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Cache state	Indicates the current state of the cache associated with this controller.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Good, normal — Value: 1 State: Bad, failed — Value: 0 State: Unknown — Value: 2 **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current state of the cache. The graph of this measure however, represents the status of the cache using the numeric equivalents only.
Mirror connection1	Indicates the current state of the mirror connection1.	Status	The values that this measure can report and the states they indicate are tabulated below: State: Active,good — Value: 1

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Bad, failed, inactive</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current state of the mirror connection1. The graph of this measure however, represents the status of the mirror connection1 using the numeric equivalents only.
</td></tr>
<tr><td>Mirror Connection2</td><td>Indicates the current state of the mirror connection2.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Active,good</td><td>1</td></tr>
<tr><td>Bad, failed, inactive</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current state of the mirror connection2. The graph of this measure however, represents the status of the mirror connection2 using the numeric equivalents only.
</td></tr>
<tr><td>Mirror port1</td><td>Indicates the current state of the mirror port1.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:</td></tr>
</table>

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Good, normal</td><td>1</td></tr>
<tr><td>Bad, failed</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current state of the mirror port1. The graph of this measure however, represents the status of the mirror port1 using the numeric equivalents only.
</td></tr>
<tr><td>Mirror port2</td><td>Indicates the current state of mirror port 2.</td><td>Number</td><td>
The values that this measure can report and the states they indicate are tabulated below:
<table>
<tr><th>State</th><th>Value</th></tr>
<tr><td>Good, normal</td><td>1</td></tr>
<tr><td>Bad, failed</td><td>0</td></tr>
<tr><td>Unknown</td><td>2</td></tr>
</table>
Note:
By default, this measure reports the States listed in the table above to indicate the current state of the mirror port2. The graph of this measure however, represents the status of the mirror port2 using the numeric equivalents only.
</td></tr>
</table>

3.6.3 EVA Controller Status Test

This test reports the current operational state and temperature state of each EVA controller.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each EVA controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the current operational status of this controller.	Status	The values that this measure can report and the states they indicate are tabulated below:

State	Value
good or attention or normal	1
Failed or bad	0
Unknown or not available or not-installed or not_present or unsupported, etc.	2

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>Note:

By default, this measure reports the States listed in the table above to indicate the current state of the controller. The graph of this measure however, represents the status of the controller using the numeric equivalents only.</td></tr>
<tr><td>Temperature status</td><td>Indicates the current temperature status of this controller.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:

<table><tr><th>State</th><th>Value</th></tr><tr><td>normal</td><td>1</td></tr><tr><td>High, abnormal</td><td>0</td></tr><tr><td>Unknown</td><td>2</td></tr></table>
Note:

By default, this measure reports the States listed in the table above to indicate the current temperature status of each controller. The graph of this measure however, represents the status of the controller using the numeric equivalents only.</td></tr>
</table>

3.6.4 EVA Processor Usage Test

This test tracks the CPU usage of and data traffic handled by the processor on each EVA controller, and thus alerts administrators to any real or potential contention for CPU resources on the controller.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA Controller Status** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA Controller Status** test. To enable device port discovery via the SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
CPU busy time	Indicates the percentage of time the processor on this controller was busy processing requests.	Percent	Comparing the value of this measure across controllers will enable you to accurately identify the controller that is consuming CPU resources excessively. Irregularities in load

Measurement	Description	Measurement Unit	Interpretation
			balancing across controllers can thus be isolated, and relevant remedial action initiated.
Data transfer time	Indicates the percentage of processor time used for data transfer operations.	Percent	Comparing the value of this measure across controllers will enable you to accurately identify the controller that is spending too much CPU on data transfer operations.

3.7 The Hosts Layer

This layer quickly reveals the bad host ports on a controller, busy host ports, external hosts connecting to the LUN that are in a failed state currently, external hosts that are overloading the array, and overloaded host ports on the controller.

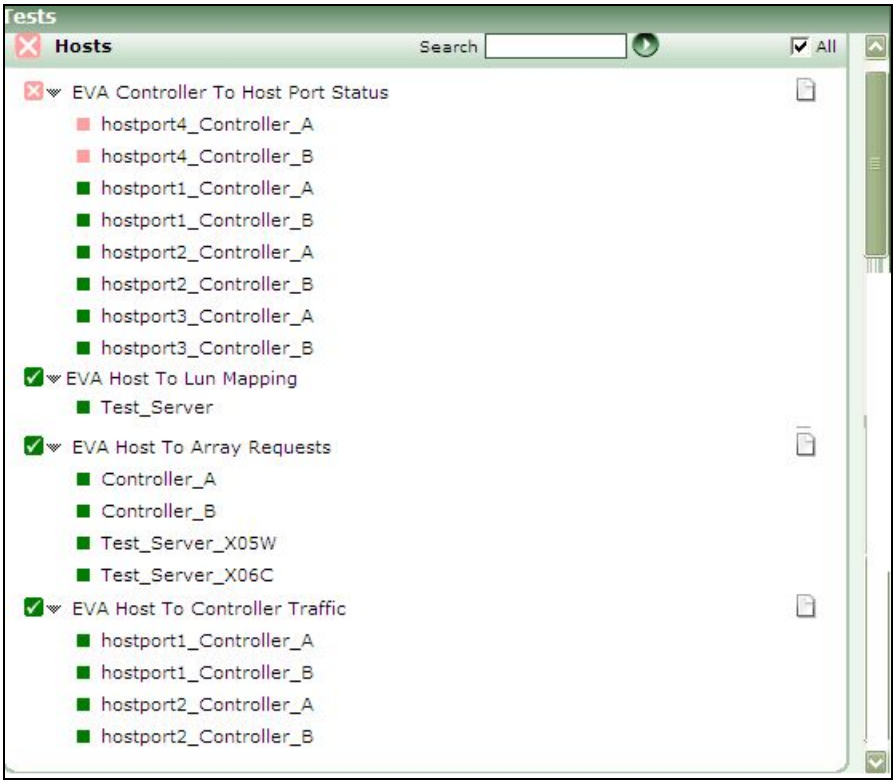

Figure 3.8: The tests mapped to the Hosts layer

3.7.1 EVA Controller to Host Port Status Test

For each host port on a controller, this test reports the operational state and overall health.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each host port on a controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td>Operational mode</td><td>Indicates the current operational mode of this host port.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>good or attention or normal</td><td>1</td></tr><tr><td>Failed or bad</td><td>0</td></tr><tr><td>Unknown or not available or notinstalled or not_present or unsupported, etc.</td><td>2</td></tr></table>
Note:
By default, this measure reports the States listed in the table above to indicate the current operational mode of each host port. The graph of this measure however, represents the status of a host port using the numeric equivalents only.
The detailed diagnosis of this measure indicates the LUN number and virtual disk name associated with this host port.</td></tr>
<tr><td>Port condition</td><td>Indicates the current condition of this host port.</td><td>Status</td><td>The values that this measure can report and the states they indicate are tabulated below:
<table><tr><th>State</th><th>Value</th></tr><tr><td>link_up</td><td>1</td></tr><tr><td>link_down</td><td>0</td></tr><tr><td>fabric_login, etc.</td><td>2</td></tr></table></td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
			Note: By default, this measure reports the **State**s listed in the table above to indicate the current condition of each host port. The graph of this measure however, represents the status of a host port using the numeric equivalents only.

3.7.2 EVA Host to LUN Mapping Test

This test auto-discovers the external hosts connecting to the LUNs on the storage array, and reports the operational state of each such host.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each external host connecting to a LUN on the EVA storage array that is monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EVASystemIP	Specify the IP address of the HP EVA SAN.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	Install the *SSSU.exe* software and specify the full path to the install directory of this software here.
Username and Password	Specify the user credentials using which the HP EVA array is to be accessed.
Confirm Password	Confirm the password by retyping it here.

Parameter	Description
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 120 seconds.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Operational mode	Indicates the operational mode of this host.	Status	The values that this measure can report and the states they indicate are tabulated below: State: good or attention or normal — Value: 1 State: Failed or bad — Value: 0 State: Unknown or not available or notinstalled or not_present or unsupported, etc. — Value: 2 **Note:** By default, this measure reports the **State**s listed in the table above to indicate the current operational mode of each host. The graph of this measure

Measurement	Description	Measurement Unit	Interpretation
			however, represents the status of a host using the numeric equivalents only. The detailed diagnosis of this measure indicates the LUN number and virtual disk name associated with this host.

3.7.3 EVA Host To Array Requests Test

This test monitors the requests flowing from each external host to an array, and helps administrators understand how busy the array is, and which external host is overloading the array.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each external host connected to the array.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA Host To Array Requests** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA Host to Lun Mapping** test. To enable device port discovery via the

Parameter	Description
	SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Queue size	Indicates the current number of outstanding requests from this host.	Number	In times of heavy load, you can compare the value of this measure across hosts to accurately identify which host is responsible for the overload. If the value of this measure grows significantly with time, it could indicate a processing bottleneck on the array, which may require investigation.
Busy responses	Indicates the number of busy responses currently sent to this host.	Number	A busy response is a request transmitted from the array to the host to cease I/O traffic until an internal job queue is reduced.

3.7.4 EVA Host To Controller Traffic Test

This test auto-discovers the host ports handling data traffic on a controller, monitors the load on each port, and indicates how well the controller handles the load.

Target of the test : An EVA Storage Array

Agent deploying the test : A remote agent

Outputs of the test : One set of results for each host port on the controller.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	Refers to the port used by the EVA SAN device. By default, it is *null*.
EvaPerfLocation	Specify the full path of the directory in which the *evaperf.exe* has been installed.
ArrayName	Specify the name of the EVA SAN array that has been configured for monitoring.
SSSULocation	This test uses the EVAPerf software component to auto-discover the device ports on an EVA storage array. The **EVA Controller to Host Port Status** test on the other hand uses the SSSU console to discover device ports. During auto-discovery, the *EVAPerf* utility reports the WWN names of the device ports. In contrast, the SSSU console reports the friendly names of the same device ports. To ensure that device port references are uniform and consistent across tests, you can optionally configure this test to use the SSSU console (instead of EVAPerf) to perform device port discovery. This way, the names of device ports will be the same for this test and the **EVA Controller to Host Port Status** test. To enable device port discovery via the SSSU console, configure the full path to the location of the *SSSU.exe* in the SSSULocation text box. If you prefer not to use *SSSU.exe* for discovering device ports and would rather use the EVAPerf component instead, then, set this parameter to *none*.
Username, Password and Confirm Password	To use the *SSSU.exe* for discovering the friendly names of device ports, specify the user credentials using which the HP EVA array is to be accessed in the Username and Password text boxes. Confirm the password by retyping it in the Confirm Password text box. If you do not wish to use the *SSSU.exe*, then set these parameters to *none*.
Timeout	Indicate the duration (in seconds) for which this test should wait for a response from the storage device. By default, this is set to 60 seconds.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Read requests	Indicates the rate at which read requests were received by this host port.	Reqs/Sec	
Write requests	Indicates the rate at which	Reqs/Sec	

Measurement	Description	Measurement Unit	Interpretation
	write requests were received by this host port.		
Data reads	Indicates the rate at which data is read by this host port.	MB/Sec	
Data writes	Indicates the rate at which data is written to the this host port.	MB/Sec	
Time to process read requests	Indicates the time taken by the controller to service the read requests to this host port.	Ms	Ideally, this value should be low. An unusually high value across hosts could indicate the existence of a bottleneck in I/O processing on the controller.
Time to process write requests	Indicates the time taken by the controller to service the write requests to this host port.	Ms	
Pending requests to cache	Indicates the average number of requests waiting in the queue of this host port.	Number	Ideally, this value should be low. In times of heavy load, you may want to compare the value of this measure across host ports to figure out which port is the busiest.

About eG Innovations

eG Innovations provides intelligent performance management solutions that automate and dramatically accelerate the discovery, diagnosis, and resolution of IT performance issues in on-premises, cloud and hybrid environments. Where traditional monitoring tools often fail to provide insight into the performance drivers of business services and user experience, eG Innovations provides total performance visibility across every layer and every tier of the IT infrastructure that supports the business service chain. From desktops to applications, from servers to network and storage, from virtualization to cloud, eG Innovations helps companies proactively discover, instantly diagnose, and rapidly resolve even the most challenging performance and user experience issues.

eG Innovations is dedicated to helping businesses across the globe transform IT service delivery into a competitive advantage and a center for productivity, growth and profit. Many of the world's largest businesses use eG Enterprise to enhance IT service performance, increase operational efficiency, ensure IT effectiveness and deliver on the ROI promise of transformational IT investments across physical, virtual and cloud environments.

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