

15 Health Statistics

The health statistics feature monitors the consumable resources of a switch, and provides a single integrated source for Network Management Software (NMS), such as X-Vision, to use in obtaining statistics on switch performance. With the health statistics, the user can set specific threshold levels for consumable resources in the switch. Such resources include bandwidth capacity, CAM and CPU usage, and RAM memory usage. If a threshold for a particular resource is exceeded, a notification is sent to the NMS via an SNMP trap.

◆ Important ◆

You must configure your NMS to accept traps from the monitored switch. X-Vision allows you to set which network management stations receive traps. For more information, see the X-Vision online help.

The health statistics software monitors the resource utilization levels and thresholds of a switch, and at fixed intervals collects the current values for each resource being monitored. After obtaining the statistics, the health statistics software checks to see if any rising or falling threshold crossings occurred since its last poll by comparing the current poll data with the previous poll data. If a threshold crossing has occurred, a trap is sent to NMS (such as X-Vision), allowing the system administrator to pinpoint possible performance issues.

Through the UI (user interface), threshold levels can be set, the sampling interval can be changed, and statistics (for a switch, module, or port) can be viewed or cleared.

The Health Statistics Management Menu

To access the Health menu, log on to a switch via a Telnet or console session, and type the following command:

health

If the session is in terse mode, you will need to type **?** to see the menu. If you are in verbose mode, the following screen is displayed:

Command	Health Menu			
hdcfg	Set or view parameters			
hdstat	View device-level statistics			
hmstat	View module-level statistics			
hpstat	View port-level statistics			
hreset	Reset health statistics			
Main	File	Summary	VLAN	Networking
Interface	Security	System	Services	Help
/System/Health %				

The **hdcfg** command allows you to set global thresholds for the switch. The **hdstat**, **hmstat**, **hpstat** commands allow you to view the statistics on a switch, module, or port level, respectively. The **hreset** command resets the statistics for this switch.

Setting Resource Thresholds

The health statistics software operates by monitoring set threshold levels on consumable resources. When a resource exceeds a set level, a trap is generated and sent. These threshold levels are set for the entire switch (or device) by using the **hdcfg** command. To set the threshold level for a switch's consumable resources, enter the **hdcfg** command at the system prompt. The following screen appears:

Device-level Resource Monitoring Configuration

- 1) Set Bandwidth Thresholds :
- 2) Set Miscellaneous Thresholds :
- 3) Set Sampling Interval :

There are three sets of resources that are configurable:

- **Bandwidth thresholds.** These settings allow you to set a percentage of available bandwidth for received traffic, sent traffic, and the backplane. For more information on setting bandwidth thresholds, see *Setting Bandwidth Thresholds* on page 15-3.
- **Miscellaneous thresholds.** These settings allow to set a percentage for memory usage, VCC usage, virtual port usage, and temperature. For more information on setting miscellaneous thresholds, see *Setting Miscellaneous Thresholds* on page 15-4.
- **Sampling interval.** The sampling interval is the number of seconds between health statistics checks. For information on how to set the sampling interval, see *Setting the Sampling Interval* on page 15-6.

Setting Bandwidth Thresholds

Bandwidth is a measure of the amount of traffic a switch can handle for receiving, sending, and on the backplane. The health statistics allow you to set a percentage of available bandwidth, at which an SNMP trap is generated to alert the network administrator that the threshold has been exceeded. To set the threshold levels for switch bandwidth:

1. Enter **health** at a system prompt. The health menu (described above) displays.
2. Enter a **1** at the health menu prompt. The following menu displays:

Bandwidth Resource Monitoring Configuration

```

1) Receive Threshold           : 80
2) Transmit/Receive Threshold : 80
3) Backplane Threshold         : 80

```

3. Threshold values are measured as a percentage of the total capacity of the resource. To change a threshold or sampling interval value, type the index for the field, followed by an equals sign, then the new value. For example, to change the **Receive Threshold** to 50 percent, you would type the following at the prompt:

```
1=50
```

The Receive Threshold would now be set to 50 percent of its total capacity (bandwidth).

4. When you have finished entering the new values, you must enter **save** to keep the new configuration settings.

◆ Note ◆

Changing a threshold value sets the value for all levels of the switch (switch, module, and port). You cannot set different threshold values for each level.

Below is a description of the fields in the **hdcfg** command menu. The default for all monitored resources is eighty (80) percent of the maximum capacity of the resource.

Receive Threshold

The receive threshold sets a percentage of total bandwidth of the switch, module, or port. When the amount of received data exceeds this percentage, an SNMP trap is sent.

Transmit/Receive Threshold

The transmit/receive threshold sets a percentage of the total bandwidth of the switch, module, or port. When the amount of transmitted and received data exceeds this percentage, an SNMP trap is sent.

Backplane Threshold

The backplane threshold sets a percentage of total backplane bandwidth of the switch, module, or port. When backplane usage exceeds this percentage, an SNMP trap is sent.

◆ Note ◆

When “U-turn” switching (i.e., data enters a module port and is transmitted from a port on the same module) is employed, the backplane threshold reading will not be correct. Switched frames are not transmitted over the backplane but are counted by health statistics, causing the backplane percentage reading to be higher than it should be.

Setting Miscellaneous Thresholds

The miscellaneous thresholds cover consumable resources such as memory, VCCs, temperature, and virtual ports. The health statistics allow you to set a percentage of the available resource, at which an SNMP trap is generated to alert the network administrator that the threshold has been exceeded. To set the threshold levels for switch bandwidth:

1. Enter **health** at a system prompt. The health menu (described above) displays.
2. Enter a **2** at the health menu prompt. The following menu displays:

Miscellaneous Resource Monitoring Configuration

1) CAM Threshold	: 80
2) CPU Threshold	: 80
3) Memory Threshold	: 80
4) Vcc Threshold	: 80
5) Temperature Threshold	: 80
6) Virtual Port Threshold	: 80

3. Threshold values are measured as a percentage of the total capacity of the resource. To change a threshold or sampling interval value, type the index for the field, followed by an equals sign, then the new value. For example, to change the **CAM Threshold** to 50 percent, you would type the following at the prompt:

1=50

The CAM Threshold would now be set to 50 percent of its total capacity (memory).

4. When you have finished entering the new values, you must enter **save** to keep the new configuration settings.

◆ Note ◆

Changing a threshold value sets the value for all levels of the switch (switch, module, and port). You cannot set different threshold values for each level.

CAM Threshold (MPM/HRE or NI)

The CAM threshold sets a percentage of the total amount of space available for storing the cache tables. Cache tables maintain associations between received MAC addresses and the ports they were received on. For the switch level, the CAM threshold separately monitors the MPM and the HRE daughtercard (if it is installed) CAM tables. For the module level, it monitors the switching module CAM tables. CAM thresholds are not available on the port level.

When this percentage is exceeded, an SNMP trap is sent.

CPU Threshold

The CPU threshold sets a percentage of the total amount of processing ability for the MPM. When the CPU usage exceeds this percentage, an SNMP trap is sent. The CPU threshold is only used for the switch level.

Memory Threshold

The memory threshold sets a percentage of the total amount to MPM RAM memory for the switch. When RAM usage exceeds this percentage, an SNMP trap is sent. The memory threshold is only used for the switch level.

Vcc Threshold

This threshold sets a percentage of the total number of available VCCs for the switch. When the set percentage of available VCCs is exceeded, an SNMP trap is sent.

Temperature Threshold

This threshold sets the number of degrees for the switch at which an SNMP trap is sent. This threshold is measured in degrees Celsius. The range is from 0 to 100.

Virtual Port Threshold

This threshold sets a percentage of the total number of available virtual ports for the switch. When the set percentage of available virtual ports is exceeded, an SNMP trap is sent.

Setting the Sampling Interval

The sampling interval is the time interval between polls of the switch's consumable resources to see if it is performing within the set thresholds. To set the amount of time between polls:

1. Enter **health** at a system prompt. The health menu (described above) displays.
2. Enter a **3** at the health menu prompt. The following menu displays:

Resource Monitoring Interval Configuration

1) Sampling Interval : 5

3. To change the sampling interval, enter a 1, and equal sign, and the new interval in seconds. For example, to change the sampling interval to 4 seconds, you would enter the following:

1=4

4. When you have finished entering the new value, you must enter **save** to keep the new configuration setting.

Sampling Interval

This sets the number of seconds between internal polling intervals. The health statistics compares the current poll statistics with the last poll statistics to determine whether or not to send a trap. The default for the **Sampling Interval** is five (5) seconds.

View Switch-Level Statistics

To view the statistics for the entire switch, enter the **hdstat** command at a system prompt. The following table is displayed:

Device Resources	Limit	Curr	1 Min Avg	1 Hr Avg	1 Hr Max
Receive	80	00	00	00	00
Transmit/Receive	80	00	00	00	00
Backplane	80	01	01	01	01
CAM [MPM]	80	00	00	00	00
CAM [HRE]	80	00	00	00	00
CPU	80	93*	13	13	22
Memory	80	50	50	50	50
Temperature	45	44	44	44	44
Virtual Ports	80	11	11	11	11

/System/Health %

Statistics are displayed as percentages of the total resource capacity, and represent data taken from the last sampling interval. If a threshold for a resource was exceeded, then that statistic is marked with an asterisk (*).

◆ Important Note ◆

The **hdstat** command displays CAM usage for the entire chassis. To see CAM usage for switching modules only, use the **camstat** command as described in Chapter 13, "Switch Wide Parameters."

For field descriptions of the device resources column, see *Setting Bandwidth Thresholds* on page 15-3 and *Setting Miscellaneous Thresholds* on page 15-4 above.

◆ **Note** ◆

When calculating percentages, the health statistics cannot display less than one percent. If a single packet is sent through a port, for example, the receive resource usage is represented as one percent.

The following section describes the statistics displayed using the **hdstat** command.

Limit

The set threshold for this resource. You can set the resource levels using the **hdcfg** command. See *Setting Resource Thresholds* on page 15-2 for specific procedures.

Current

The current resource usage. This number is a percentage of the total resource capacity.

1 Minute Average

The average percent of resource use for the last sixty seconds.

1 Hour Average

The average percent of resource use for the last sixty minutes.

1 Hour Maximum

The maximum percent of resource use for the last sixty minutes.

View Module-Level Statistics

To view module level statistics, type the **hmstat** command at a system prompt followed by the slot number. For example, to view the statistics for a module in slot three, type the following:

```
hmstat 3
```

The following screen is displayed:

Slot 3 Resources	Limit	Curr	1 Min Avg	1 Hr Avg	1 Hr Max
Receive	80	00	00	00	00
Transmit/Receive	80	00	00	00	00
Backplane	80	95*	00	00	00
CAM	80	00	00	00	00

/System/Health %

Statistics are displayed as percentages of the total resource capacity, and represent data taken from the last sampling interval. If a threshold for a resources was exceeded, then that statistic is marked with an asterisk (*). For descriptions of the monitored resources, see *Setting Bandwidth Thresholds* on page 15-3 and *Setting Miscellaneous Thresholds* on page 15-4 above.

For descriptions of the statistics, see *View Switch-Level Statistics* on page 15-6.

◆ **Note** ◆

The CPU and memory resources are not applicable to the module level statistics display, and therefore are not shown.

View Port-Level Statistics

To view port-level statistics, type the **hpstat** command at a system prompt as shown:

```
hpstat <slot>/<port>
```

where **<slot>** is the slot number and **<port>** is the port number. For example to view port 1 on slot 3, enter the following:

```
hpstat 3/1
```

The following screen is displayed:

Port 3/1 Resources	Limit	Curr	1 Min Avg	1 Hr Avg	1 Hr Max
Receive	80	00	00	00	00
Transmit/Receive	80	92*	00	00	00
Backplane	80	00	00	00	00

/System/Health %

Statistics are displayed as percentages of the total resource capacity, and represent data taken from the last sampling interval. If a threshold for a resource was exceeded, then that statistic is marked with an asterisk (*). For descriptions of the monitored resources, see *Setting Bandwidth Thresholds* on page 15-3 and *Setting Miscellaneous Thresholds* on page 15-4 above.

For descriptions of the statistics, see *View Switch-Level Statistics* on page 15-6.

Reset Health Statistics

To reset the health statistics for the switch, type the **hreset** command at a system prompt. The following message is displayed:

```
Are you sure you want to reset health statistics? (n) :
```

To confirm your choice to clear the switch health statistics, type **y** at the prompt. After you confirm your choice, the following confirmation notice is displayed:

```
RESET HEALTH STATISTICS
```

◆ **Note** ◆

The **hreset** command clears the statistics for the entire switch. You cannot clear statistics for the module or port level only.