Onboard Failure Logging (OBFL)

Note For complete syntax and usage information for the commands used in this chapter, see these publications:

http://www.cisco.com/en/US/docs/ios/12_0s/feature/guide/12sobfl.html

Note For complete syntax and usage information for the switch commands used in this chapter, see the *Cisco Catalyst 4500 Series Switch Command Reference* and related publications at this location:

http://www.cisco.com/en/US/products/hw/switches/ps4324/index.html

If a command is not in the *Catalyst 4500 Series Switch Command Reference*, you can locate it in the Cisco IOS library. See the *Catalyst 4500 Series Switch Cisco IOS Command Reference* and related publications at this location:

http://www.cisco.com/en/US/products/ps6350/index.html

Prerequisites for OBFL

None.

Restrictions for OBFL

They include:

- Software Restrictions—If a device (router or switch) intends to use *linear* flash memory as its OBFL storage media, Cisco IOS software must reserve a minimum of two physical sectors (or physical blocks) for the OBFL feature. Because an erase operation for a linear flash device is done on per-sector (or per-block) basis, one extra physical sector is needed. Otherwise, the minimum amount of space reserved for the OBFL feature on any device must be at least 8 KB.

- Firmware Restrictions—If a line card or port adapter runs an operating system or firmware that is different from the Cisco IOS operating system, the line card or port adapter must provide device driver level support or an interprocess communications (IPC) layer that allows the OBFL file system to communicate to the line card or port adapter. This requirement is enforced to allow OBFL data to be recorded on a storage device attached to the line card or port adapter.

- Hardware Restrictions—To support the OBFL feature, a device must have at least 8 KB of nonvolatile memory space reserved for OBFL data logging.

Information About OBFL

Overview of OBFL

The Onboard Failure Logging (OBFL) feature collects data such as operating temperatures, hardware uptime, interrupts, and other important events and messages from system hardware installed in a Cisco router or switch. The data is stored in nonvolatile memory and helps technical personnel diagnose hardware problems.

Information about Data Collected by OBFL

OBFL Data Overview

The OBFL feature records operating temperatures, hardware uptime, interrupts, and other important events and messages that can assist with diagnosing problems with hardware cards (or *modules*) installed in a Cisco router or switch. Data is logged to files stored in nonvolatile memory. When the onboard hardware is started up, a first record is made for each area monitored and becomes a base value for subsequent records. The OBFL feature provides a circular updating scheme for collecting continuous records and archiving older (historical) records, ensuring accurate data about the system. Data is

recorded in one of two formats: continuous information that displays a snapshot of measurements and samples in a continuous file, and summary information that provides details about the data being collected. The data is displayed using the **show logging onboard** command. The message "No historical data to display" is seen when historical data is not available.

Temperature

Temperatures surrounding hardware modules can exceed recommended safe operating ranges and cause system problems such as packet drops. Higher than recommended operating temperatures can also accelerate component degradation and affect device reliability. Monitoring temperatures is important for maintaining environmental control and system reliability. Once a temperature sample is logged, the sample becomes the base value for the next record. From that point on, temperatures are recorded either when there are changes from the previous record or if the maximum storage time is exceeded. Temperatures are measured and recorded in degrees Celsius.

Temperature Example

```
Switch# sh logging onboard temperature
--------------------------------------------------------------------------------
TEMPERATURE SUMMARY INFORMATION
--------------------------------------------------------------------------------
Number of sensors       : 7
Sampling frequency      : 1 minutes
Maximum time of storage : 10 minutes
--------------------------------------------------------------------------------
Sensor                             |   ID  | Maximum Temperature 0C
--------------------------------------------------------------------------------
Stub A                                 0     43
Stub B                                 1     37
XPP                                    2     51
VFE                                    3     61
NFE                                    4     50
CPU                                    5     55
FPGA                                   6     44
-------------------------------------
Temp                        Sensor ID
0C     1    2    3    4    5    6    7
-------------------------------------
1      9y   9y   9y   9y   9y   9y   9y
15     0m   71h  0m   0m   0m   0m   0m
16     0m  183h  0m   0m   0m   0m   0m
-------------------------------------
Temp                        Sensor ID
0C     1    2    3    4    5    6    7
-------------------------------------
17     0m  142m  0m   0m   0m   0m   0m
18     0m  190m  0m   0m   0m   0m   0m
19     0m   30m  0m   0m   0m   0m   0m
20   113h    0m  0m   0m   0m   0m   0m
21    37h    0m  0m   0m   0m   0m 101h
22   107h    0m  0m   0m   0m   0m 106h
23   110m   12m  0m   0m   0m   0m  47h
24    10m  122m  0m   0m   0m   0m 182m
25     0m    0m  0m   0m   0m   0m 120m
26     0m   56h  0m   0m   0m   0m  30m
27     0m  368h  0m   0m   0m   0m   0m
28     0m    8y  0m   0m   0m   0m   0m
29   134m    8y  0m   0m 139h   0m   0m
30     0m  682h 83h   0m 116h   0m   0m
31    90m  738h 31h   0m 200m   0m  95m
```

```
32   209h 935h 138h   0m 120m 141h 258h
33   331h 934h 192m   0m   0m 113h 316h
34   579h   8y 190m   0m   0m 182m 432h
35    17y 149h  80m   0m   0m 150m   8y
36   914h  20m   0m   0m   0m  10m   8y
37   838h 270m   0m 140h  26m   0m   8y
38    47d   0m   0m 102h 108m   0m 790h
39     8y   0m   0m 948m  20m   0m 421h
---------------------------------------
Temp                      Sensor ID
0C    1    2    3    4    5    6    7
---------------------------------------
40   414h   0m   2m 100m  78h   0m 288h
41    74h   0m 113h  40m 340h 134m 113h
42    10m   0m 380h   0m 198h   0m 446m
43   270m   0m   8y   0m 373h   0m   0m
44     0m   0m   8y   0m 683h  45h  10m
45     0m   0m   8y   2m  17y 274h   0m
46     0m   0m 897h 105m  64d 257h   0m
47     0m   0m 785h  27m   8y 169h   0m
48     0m   0m 639h   4m 319h 666h   0m
49     0m   0m 379h  92h 786m  17y   0m
50     0m   0m  94h 330h 270m  61d   0m
51     0m   0m 106m 192h   0m  48d   0m
52     0m   0m   0m 190h   0m   8y   0m
53     0m   0m   0m 573h   0m 227h   0m
54     0m   0m   0m 736h   0m 180m   0m
55     0m   0m   0m 716h   0m 260m   0m
56     0m   0m   0m 902h   0m   0m   0m
57     0m   0m   0m   8y   0m   0m   0m
58     0m   0m   0m   8y   0m   0m   0m
59     0m   0m   0m   8y   0m   0m   0m
60     0m   0m   0m 226h   0m   0m   0m
61     0m   0m   0m 629m   0m   0m   0m

Switch#
```

To interpret this data:

- Number of sensors is the total number of temperature sensors that will be recorded. A column for each sensor is displayed with temperatures listed under the number of each sensor, as available.

- Sampling frequency is the time between measurements.

- Maximum time of storage determines the maximum amount of time, in minutes, that can pass when the temperature remains unchanged and the data is not saved to storage media. After this time, a temperature record will be saved even if the temperature has not changed.

- The Sensor column lists the name of the sensor.

- The ID column lists an assigned identifier for the sensor.

- Maximum Temperature 0C shows the highest recorded temperature per sensor.

- Temp indicates a recorded temperature in degrees Celsius in the historical record. Columns following show the total time each sensor has recorded that temperature.

- Sensor ID is an assigned number, so that temperatures for the same sensor can be stored together.

Operational Uptime

The operational uptime tracking begins when the module is powered on, and information is retained for the life of the module.

Operational Uptime Example

```
Switch# sh logging onboard uptime detail
--------------------------------------------------------------------------------
UPTIME SUMMARY INFORMATION
--------------------------------------------------------------------------------
First customer power on : 04/13/2010 19:45:08
Total uptime            :    1 years  34 weeks   3 days  12 hours  50 minutes
Total downtime          :    1 years   7 weeks   3 days  18 hours  12 minutes
Number of resets        : 1409
Number of slot changes  : 19
Current reset reason     : 0x0
Current reset timestamp : 01/29/2013 21:56:43
Current slot            : 5
Current subslot         : 0
Current uptime          :    0 years   0 weeks   0 days   0 hours  20 minutes
--------------------------------------------------------------------------------
Reset   |        |
Reason  | Count  |
--------------------------------------------------------------------------------
No historical data to display
--------------------------------------------------------------------------------


--------------------------------------------------------------------------------
UPTIME CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
Time Stamp          | Reset | Uptime
MM/DD/YYYY HH:MM:SS  | Reason | years weeks days hours   minutes
--------------------------------------------------------------------------------
04/13/2010 19:45:08   0x0      0      0     0     0        0
04/13/2010 22:26:50   0x9      0      0     0     2        0
04/14/2010 18:54:42   0x9      0      0     0    20        0
04/14/2010 21:31:00   0x9      0      0     0     2        0
04/14/2010 22:04:15   0x9      0      0     0     0       25
04/14/2010 22:22:20   0x9      0      0     0     0        5
04/14/2010 23:05:58   0x9      0      0     0     0        5
04/15/2010 19:03:11   0x9      0      0     0    19        0
04/15/2010 21:29:22   0x9      0      0     0     2        0
04/15/2010 21:49:49   0x8      0      0     0     0       10
04/16/2010 18:46:03   0x9      0      0     0    20        0
04/16/2010 19:25:37   0x9      0      0     0     0       25
04/16/2010 19:34:59   0x9      0      0     0     0        0
04/16/2010 19:46:06   0x9      0      0     0     0        0
04/16/2010 19:57:16   0x9      0      0     0     0        5
04/16/2010 20:17:55   0x9      0      0     0     0        0
--------------------------------------------------------------------------------
Time Stamp          | Reset | Uptime
MM/DD/YYYY HH:MM:SS  | Reason | years weeks days hours   minutes
--------------------------------------------------------------------------------
04/16/2010 20:31:28   0x9      0      0     0     0        0
04/16/2010 20:50:07   0x9      0      0     0     0       10
04/16/2010 22:45:15   0x9      0      0     0     0        0
04/18/2010 19:55:25   0x9      0      0     0     0        0
04/18/2010 20:01:52   0x9      0      0     0     0        0
04/19/2010 00:21:42   0x9      0      0     0     0        0
04/19/2010 01:20:33   0x0      0      0     0     0       30
04/19/2010 19:25:04   0x9      0      0     0    15        0
04/19/2010 20:05:04   0x9      0      0     0     0       15
04/19/2010 20:55:43   0x9      0      0     0     0        0
04/19/2010 21:11:52   0x9      0      0     0     0        0
04/19/2010 21:20:35   0x9      0      0     0     0        0
04/19/2010 21:39:45   0x9      0      0     0     0       10
04/19/2010 21:54:50   0x9      0      0     0     0        5
04/19/2010 22:11:48   0x9      0      0     0     0        5
```

```
04/19/2010 22:35:38   0x9      0     0     0     0     5
04/19/2010 22:49:41   0x9      0     0     0     0     0
04/19/2010 23:12:58   0x9      0     0     0     0    10
04/20/2010 00:36:04   0x9      0     0     0     1     0
04/20/2010 00:49:19   0x9      0     0     0     0     5
04/20/2010 00:58:29   0x9      0     0     0     0     0
04/20/2010 16:51:06   0x9      0     0     0    15     0

Switch#
```

The operational uptime application tracks the following events:

- Date and time the customer first powered on a component.

- Total uptime and downtime for the component in years, weeks, days, hours, and minutes.

- Total number of component resets.

- Total number of slot (module) changes.

- Current reset timestamp to include the date and time.

- Current slot (module) number of the component.

- Current uptime in years, weeks, days, hours, and minutes.

Interrupts

Interrupts are generated by system components that require attention from the CPU such as ASICs and NMIs. Interrupts are generally related to hardware limit conditions or errors that need to be corrected.

The continuous format records each time a component is interrupted, and this record is stored and used as base information for subsequent records. Each time the list is saved, a timestamp is added. Time differences from the previous interrupt are counted, so that technical personnel can gain a complete record of the component's operational history when an error occurs.

Interrupts Example

```
Switch# sh logging onboard interrupt detail
--------------------------------------------------------------------------------
INTERRUPT SUMMARY INFORMATION
--------------------------------------------------------------------------------
Name                                     |  ID | Offset | Bit |  Count
--------------------------------------------------------------------------------
dropped                                     2    0x0004    0     27323
ipp                                         6    0x5A00    0    983763
ipp high                                   10    0x700A    0     34105
ipp low                                    11    0x9000    0     30211
--------------------------------------------------------------------------------


--------------------------------------------------------------------------------
CONTINUOUS INTERRUPT INFORMATION
--------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS mmm | Name                             |  ID | Offset | Bit
--------------------------------------------------------------------------------
12/12/2011 16:06:43   0  ipp high                            10    0x7AEA    7
12/12/2011 16:06:43   0  dropped                              2    0x0006    0
12/12/2011 16:06:46   0  ipp high                            10    0x7AEC    0
12/12/2011 16:06:46   0  ipp high                            10    0x7AEC    1
12/12/2011 16:06:46   0  ipp high                            10    0x7AEC    4
12/12/2011 16:06:46   0  ipp high                            10    0x7AEC    5
12/12/2011 16:06:46   0  ipp low                             11    0xC000    0
12/12/2011 16:06:46   0  ipp low                             11    0xC000    1
12/12/2011 16:06:46   0  ipp low                             11    0xC000    4
```

```
12/12/2011 16:06:46   0   ipp low                                  11   0xC000   5
12/12/2011 16:06:46   0   ipp high                                 10   0x7AEA   0
12/12/2011 16:06:46   0   ipp high                                 10   0x7AEA   2
12/12/2011 16:06:46   0   ipp high                                 10   0x7AEA   3
12/12/2011 16:06:46   0   ipp high                                 10   0x7AEA   4
12/12/2011 16:06:46   0   ipp high                                 10   0x7AEA   6
12/12/2011 16:06:46   0   ipp high                                 10   0x7AEA   7
12/12/2011 16:06:46   0   dropped                                   2   0x0006   0
12/12/2011 16:06:49   0   ipp high                                 10   0x7AEC   0
12/12/2011 16:06:49   0   ipp high                                 10   0x7AEC   1
-------------------------------------------------------------------------------

Switch#
```

To interpret this data:

- Name is a description of the component including its position in the device.

- ID is an assigned field for data storage.

- Offset is the register offset from a component register's base address.

- Bit is the interrupt bit number recorded from the component's internal register.

- The timestamp shows the date and time that an interrupt occurred down to the millisecond.

Message Logging

The OBFL feature logs standard system messages. Instead of displaying the message to a terminal, the message is written to and stored in a file, so the message can be accessed and read at a later time. System messages range from level 1 alerts to level 7 debug messages, and these levels can be specified in the **hw module logging onboard** command.

Error Message Log Example

```
Switch# sh logging onboard message det
--------------------------------------------------------------------------------
ERROR MESSAGE SUMMARY INFORMATION
--------------------------------------------------------------------------------
Facility-Sev-Name     | Count | Persistence Flag
MM/DD/YYYY HH:MM:SS
--------------------------------------------------------------------------------
%CAT4K-3-DIAGNOSTICS_PASSED :   22     LAST
11/24/2010 15:46:20 module passed diagnostics
%CAT4K-2-DIAGNOSTIC_STATUS :    22     LAST
11/24/2010 15:46:20 diagnostic Packet memory Skipped
--------------------------------------------------------------------------------


--------------------------------------------------------------------------------
ERROR MESSAGE CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Facility-Sev-Name
--------------------------------------------------------------------------------
12/15/2010 11:32:39  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/15/2010 11:32:39  %CAT4K-2-DIAGNOSTIC_STATUS : diagnostic Packet memory Skipped
12/15/2010 13:03:41  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/15/2010 13:03:41  %CAT4K-2-DIAGNOSTIC_STATUS : diagnostic Packet memory Skipped
12/15/2010 13:25:02  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/15/2010 13:25:02  %CAT4K-2-DIAGNOSTIC_STATUS : diagnostic Packet memory Skipped
12/15/2010 13:45:34  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/15/2010 13:45:34  %CAT4K-2-DIAGNOSTIC_STATUS : diagnostic Packet memory Skipped
12/15/2010 14:05:01  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/15/2010 14:05:01  %CAT4K-2-DIAGNOSTIC_STATUS : diagnostic Packet memory Skipped
```

```
12/15/2010 14:35:51  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/15/2010 14:35:51  %CAT4K-2-DIAGNOSTIC_STATUS : diagnostic Packet memory Skipped
-------------------------------------------------------------------------------

Switch#
```

To interpret this data:

- A timestamp shows the date and time the message was logged.

- Facility-Sev-Name is a coded naming scheme for a system message, as follows:

  - The Facility code consists of two or more uppercase letters that indicate the hardware device (facility) to which the message refers.

  - Sev is a single-digit code from 1 to 7 that reflects the severity of the message.

  - Name is one or two code names separated by a hyphen that describe the part of the system from where the message is coming.

- The error message follows the Facility-Sev-Name codes. For more information about system messages, see the *Cisco IOS System and Error Messages* guide.

- Count indicates the number of instances of this message that is allowed in the history file. Once that number of instances has been recorded, the oldest instance will be removed from the history file to make room for new ones.

- The Persistence Flag gives a message priority over others that do not have the flag set.

Default Settings for OBFL

The OBFL feature is enabled by default. Because of the valuable information this feature offers technical personnel, it should not be disabled.

Enabling OBFL

To enable OBFL, perform this task:

	Command or Action	Purpose
Step 1	`Router> enable`	Enables privileged EXEC mode (enter your password if prompted).
Step 2	`Router# configure terminal`	Enters global configuration mode.
Step 3	`Router(config)# hw-module module` *module-number* `logging onboard` [`message level` {**1-7**}]	Enables OBFL on the specified hardware module. **Note** By default, all system messages sent to a device are logged by the OBFL feature. You can define a specific message level (only level 1 messages, as an example) to be logged using the **message level** keywords.
Step 4	`Router(config)# end`	Ends global configuration mode.

Configuration Examples for OBFL

The important OBFL feature is the information that is displayed by the **show logging onboard module** privileged EXEC command. This section provides the following examples of how to enable and display OBFL records.

- Enabling OBFL Message Logging: Example
- OBFL Message Log: Example
- OBFL Component Uptime Report: Example
- OBFL Report for a Specific Time: Example

Enabling OBFL Message Logging: Example

The following example shows how to configure OBFL message logging at level 3:

```
Router(config)# hw-module module 1 logging onboard message level 3
```

OBFL Message Log: Example

The following example shows how to display the system messages that are being logged for module 2:

```
Switch# show logging onboard module 2 message continuous
-------------------------------------------------------------------------------
---
ERROR MESSAGE CONTINUOUS INFORMATION
-------------------------------------------------------------------------------
---
MM/DD/YYYY HH:MM:SS Facility-Sev-Name
-------------------------------------------------------------------------------
---
12/13/2012 18:12:32  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/14/2012 17:50:55  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/20/2012 17:45:55  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/20/2012 19:55:27  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/20/2012 20:37:27  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/21/2012 16:09:15  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/07/2013 02:43:06  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/07/2013 04:59:38  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/16/2013 15:36:34  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/17/2013 12:41:44  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 14:03:24  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 14:16:09  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 14:21:59  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 15:23:04  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 15:41:29  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/22/2013 14:59:10  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/24/2013 11:47:27  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/24/2013 16:40:58  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
-------------------------------------------------------------------------------
Switch#
```

OBFL Component Uptime Report: Example

The following example shows how to display a summary report for component uptimes for module 2:

```
Switch# show logging onboard module 2 uptime
--------------------------------------------------------------------------------
---
UPTIME SUMMARY INFORMATION
--------------------------------------------------------------------------------
---
First customer power on : 12/13/2012 18:12:53
Total uptime            :   0 years   0 weeks   4 days  15 hours  55 minutes
Total downtime          :   0 years   6 weeks   0 days  12 hours  18 minutes
Number of resets        : 20
Number of slot changes  : 1
Current reset reason     : 0x0
Current reset timestamp : 01/29/2013 21:56:18
Current slot            : 2
Current subslot         : 0
Current uptime          :   0 years   0 weeks   0 days   0 hours  30 minutes
--------------------------------------------------------------------------------
---
Reset  |         |
Reason | Count   |
--------------------------------------------------------------------------------
---
No historical data to display
-----------------------------------------------------------------------
Switch#
```

OBFL Report for a Specific Time: Example

The following example shows how to display continuous reports for all components during a specific time period:

```
Switch# show logging onboard module 2 continuous start 18:12:32 13 Dec 2012 end 16:40:58
24 Jan 2013
PID: WS-C4510R+E        , VID: 6  , SN: FOX1503GL5V


--------------------------------------------------------------------------------
UPTIME CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
Time Stamp             | Reset  | Uptime
MM/DD/YYYY HH:MM:SS     | Reason | years weeks days hours   minutes
--------------------------------------------------------------------------------
12/13/2012 18:12:53    0x0       0     0     0     0      0
12/14/2012 17:51:14    0x0       0     0     0    23      0
12/20/2012 17:45:52    0x0       0     0     0     1      0
12/20/2012 19:55:22    0x0       0     0     0     2      0
12/20/2012 20:37:26    0x0       0     0     0     0     40
12/21/2012 16:09:14    0x0       0     0     0     0     10
01/07/2013 02:43:04    0x0       0     0     0     2      0
01/07/2013 04:59:35    0x0       0     0     0     2      0
01/16/2013 15:36:32    0x0       0     0     1    17      0
01/17/2013 12:41:42    0x0       0     0     0     3      0
01/18/2013 14:03:21    0x0       0     0     1     1      0
01/18/2013 14:16:08    0x0       0     0     0     0     10
01/18/2013 14:21:58    0x0       0     0     0     0      0
01/18/2013 15:23:02    0x0       0     0     0     1      0
01/18/2013 15:41:25    0x0       0     0     0     0     15
01/22/2013 14:59:05    0x0       0     0     0     3      0
```

```
--------------------------------------------------------------------------------
Time Stamp            | Reset  | Uptime
MM/DD/YYYY HH:MM:SS   | Reason | years weeks days hours  minutes
--------------------------------------------------------------------------------
01/24/2013 11:47:25   0x0       0      0     0     3       0
01/24/2013 16:40:56   0x0       0      0     0     3       0
--------------------------------------------------------------------------------


--------------------------------------------------------------------------------
ENVIRONMENT CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Device  Name          IOS Version F/W Ver RAM(KB) Event
                    --------------------------------------------------------------
                    VID PID                   TAN         Serial No
--------------------------------------------------------------------------------
12/13/2012 18:12:57 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
12/14/2012 17:50:55 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
12/20/2012 17:45:55 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
12/20/2012 19:55:27 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
12/20/2012 20:37:27 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
12/21/2012 16:09:15 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/07/2013 02:43:06 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/07/2013 04:59:38 slot-2:                NA         NA          0 Inserted
--------------------------------------------------------------------------------
ENVIRONMENT CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Device  Name          IOS Version F/W Ver RAM(KB) Event
                    --------------------------------------------------------------
                    VID PID                   TAN         Serial No
--------------------------------------------------------------------------------
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/16/2013 15:36:34 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/17/2013 12:41:44 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/18/2013 14:03:24 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/18/2013 14:16:09 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/18/2013 14:21:59 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/18/2013 15:23:04 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/18/2013 15:41:29 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/22/2013 14:59:10 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/24/2013 11:47:27 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
01/24/2013 16:40:58 slot-2:                NA         NA          0 Inserted
                    Cis WS-C4510R+E            NA          FOX1503GL5V
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
TEMPERATURE CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
Sensor                             | ID |
--------------------------------------------------------------------------------
```

```
Air inlet                              0
Air inlet remote                       1
Air outlet                             2
Air outlet remote                      3


---------------------------------------------
      Time Stamp    |Sensor Temperature 0C
MM/DD/YYYY HH:MM:SS | 0    1    2    3
---------------------------------------------
01/18/2013 12:18:59   32   23   33   27
01/18/2013 12:28:59   32   23   33   27
01/18/2013 12:38:59   32   23   33   27
01/18/2013 12:48:00   32   23   33   27
01/18/2013 12:58:00   32   23   33   27
01/18/2013 13:08:00   32   23   33   27
01/18/2013 13:18:00   32   23   33   27
01/18/2013 13:28:00   32   23   33   27
01/18/2013 13:38:00   32   23   33   27
01/18/2013 13:48:00   32   23   33   27
01/18/2013 13:58:00   32   23   33   27
01/18/2013 14:03:21   30   23   31   27
01/18/2013 14:12:22   32   23   33   27
01/18/2013 14:16:08   30   23   31   27
01/18/2013 14:21:58   30   23   31   26
01/18/2013 14:31:58   32   23   33   28
01/18/2013 14:40:59   32   23   33   28


---------------------------------------------
      Time Stamp    |Sensor Temperature 0C
MM/DD/YYYY HH:MM:SS | 0    1    2    3
---------------------------------------------
01/18/2013 14:47:04   26   23   26   25
01/18/2013 14:57:04   24   22   24   23
01/18/2013 15:07:04   24   22   24   23
01/18/2013 15:17:04   24   22   24   23
01/18/2013 15:23:03   25   22   26   23
01/18/2013 15:25:03   30   22   31   25
01/18/2013 15:35:03   32   23   33   27
01/18/2013 15:41:25   30   23   31   26
01/18/2013 15:51:25   32   23   33   27
01/18/2013 16:00:27   32   23   33   27
01/18/2013 16:10:27   32   23   33   27
01/18/2013 16:20:27   32   23   33   28
01/18/2013 16:30:27   32   23   33   27
01/18/2013 16:40:27   32   23   33   27
01/18/2013 16:50:27   32   23   33   27
01/18/2013 17:00:27   31   23   33   27
01/18/2013 17:10:27   32   23   33   27
01/18/2013 17:20:27   32   23   33   27
01/18/2013 17:30:27   31   23   33   27
01/18/2013 17:40:27   31   23   33   27
01/18/2013 17:50:27   31   23   33   28
01/18/2013 18:00:27   32   24   34   30
01/18/2013 18:09:28   32   24   34   31


---------------------------------------------
      Time Stamp    |Sensor Temperature 0C
MM/DD/YYYY HH:MM:SS | 0    1    2    3
---------------------------------------------
01/18/2013 18:19:28   33   24   35   32
01/18/2013 18:29:28   33   25   35   33
01/18/2013 18:39:28   32   25   36   34
01/18/2013 18:49:28   32   25   36   34
01/18/2013 18:54:28   34   26   39   39
```

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01/18/2013 19:04:28   35   27   42   44
01/18/2013 19:14:28   35   27   42   44
01/22/2013 14:59:05   25   22   26   22
01/22/2013 15:02:05   30   23   31   26
01/22/2013 15:09:06   32   24   34   31
01/22/2013 15:12:06   33   26   37   36
01/22/2013 15:15:06   34   27   40   41
01/22/2013 15:25:06   36   28   43   46
01/22/2013 15:35:06   36   28   43   46
01/22/2013 15:45:06   36   28   43   46
01/22/2013 15:55:06   36   28   44   46
01/22/2013 16:05:06   36   28   43   46
01/22/2013 16:14:07   36   28   43   46
01/22/2013 16:24:07   35   28   43   46
01/22/2013 16:34:07   36   28   44   46
01/22/2013 16:44:07   36   28   43   46
01/22/2013 16:54:07   36   28   43   46
01/22/2013 16:58:07   34   26   41   41


---------------------------------------------
       Time Stamp    |Sensor Temperature 0C
MM/DD/YYYY HH:MM:SS  | 0    1    2    3
---------------------------------------------
01/22/2013 17:00:07   32   24   37   34
01/22/2013 17:10:07   31   24   34   32
01/22/2013 17:20:07   31   23   34   30
01/22/2013 17:30:07   32   24   35   33
01/22/2013 17:40:07   32   24   35   33
01/22/2013 17:49:08   32   24   35   33
01/22/2013 17:59:08   32   24   35   33
01/24/2013 11:47:25   26   22   26   23
01/24/2013 11:49:25   30   24   31   28
01/24/2013 11:56:25   33   25   35   33
01/24/2013 12:06:25   32   25   35   33
01/24/2013 12:16:25   33   25   35   33
01/24/2013 12:26:25   33   25   35   33
01/24/2013 12:36:25   33   25   36   33
01/24/2013 12:46:25   33   25   36   33
01/24/2013 12:56:25   34   27   39   38
01/24/2013 13:01:25   35   28   42   43
01/24/2013 13:11:25   36   29   44   46
01/24/2013 13:21:25   37   29   45   47
01/24/2013 13:30:26   37   29   45   47
01/24/2013 13:40:26   37   29   45   47
01/24/2013 13:50:26   37   29   45   47
01/24/2013 14:00:26   36   29   45   47


---------------------------------------------
       Time Stamp    |Sensor Temperature 0C
MM/DD/YYYY HH:MM:SS  | 0    1    2    3
---------------------------------------------
01/24/2013 14:10:26   37   29   45   47
01/24/2013 14:20:26   37   29   45   47
01/24/2013 14:30:26   36   28   43   45
01/24/2013 14:32:26   34   26   39   39
01/24/2013 14:38:26   33   25   36   33
01/24/2013 14:48:26   34   26   37   36
01/24/2013 14:58:26   34   26   38   36
01/24/2013 15:08:26   34   26   38   37
01/24/2013 15:17:27   34   26   38   37
01/24/2013 15:27:27   34   26   38   37
01/24/2013 16:40:56   26   22   27   24
---------------------------------------------
```

```
-------------------------------------------------------------------------------
ERROR MESSAGE CONTINUOUS INFORMATION
-------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Facility-Sev-Name
-------------------------------------------------------------------------------
12/13/2012 18:12:32  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/14/2012 17:50:55  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/20/2012 17:45:55  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/20/2012 19:55:27  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/20/2012 20:37:27  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
12/21/2012 16:09:15  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/07/2013 02:43:06  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/07/2013 04:59:38  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/16/2013 15:36:34  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/17/2013 12:41:44  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 14:03:24  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 14:16:09  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 14:21:59  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 15:23:04  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/18/2013 15:41:29  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/22/2013 14:59:10  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
01/24/2013 11:47:27  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
-------------------------------------------------------------------------------
ERROR MESSAGE CONTINUOUS INFORMATION
-------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Facility-Sev-Name
-------------------------------------------------------------------------------

01/24/2013 16:40:58  %CAT4K-3-DIAGNOSTICS_PASSED : module passed diagnostics
-------------------------------------------------------------------------------

Switch#
```