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/products/ps11846/prod_command_reference_list.html
- Cisco IOS Release 15.4SY supports only Ethernet interfaces. Cisco IOS Release 15.4SY does not support any WAN features or commands.

Tip

For additional information about Cisco Catalyst 6500 Series Switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/switches/ps708/tsd_products_support_series_home.html

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Prerequisites for OBFL

None.

Restrictions for OBFL

- 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

```
--------------------------------------------------------------------------------
TEMPERATURE SUMMARY INFORMATION
--------------------------------------------------------------------------------
Number of sensors          : 12
Sampling frequency         : 5 minutes
Maximum time of storage    : 120 minutes
--------------------------------------------------------------------------------
Sensor                            |   ID   | Maximum Temperature 0C
--------------------------------------------------------------------------------
MB-Out                              980201     43
MB-In                               980202     28
MB                                  980203     29
MB                                  980204     38
EARL-Out                            910201     0
EARL-In                             910202     0
SSA 1                               980301     38
SSA 2                               980302     36
JANUS 1                             980303     36
JANUS 2                             980304     35
GEMINI 1                            980305     0
GEMINI 2                            980306     0
-----------------------------------------------------------------
Temp                          Sensor ID
0C     1    2    3    4    5    6    7    8    9   10   11   12
-----------------------------------------------------------------
No historical data to display
-----------------------------------------------------------------
--------------------------------------------------------------------------------
TEMPERATURE CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
Sensor                            |   ID   |
--------------------------------------------------------------------------------
MB-Out                              980201
MB-In                               980202
MB                                  980203
MB                                  980204
EARL-Out                            910201
EARL-In                             910202
SSA 1                               980301
SSA 2                               980302
JANUS 1                             980303
JANUS 2                             980304
GEMINI 1                            980305
GEMINI 2                            980306
```

```
-------------------------------------------------------------------------------
       Time Stamp    |Sensor Temperature 0C
MM/DD/YYYY HH:MM:SS |  1    2    3    4    5    6    7    8    9   10   11   12
-------------------------------------------------------------------------------
03/06/2007 22:32:51   31   26   27   27   NA   NA   33   32   30   29   NA   NA
03/06/2007 22:37:51   43   28   29   38   NA   NA   38   36   36   35   NA   NA
-------------------------------------------------------------------------------
```

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

```
-------------------------------------------------------------------------------
UPTIME SUMMARY INFORMATION
-------------------------------------------------------------------------------
First customer power on : 03/06/2007 22:32:51
Total uptime            :   0 years   0 weeks   2 days  18 hours  10 minutes
Total downtime          :   0 years   0 weeks   0 days   8 hours   7 minutes
Number of resets        : 130
Number of slot changes  : 16
Current reset reason    : 0xA1
Current reset timestamp : 03/07/2007 13:29:07
Current slot            : 2
Current uptime          :   0 years   0 weeks   1 days   7 hours   0 minutes
-------------------------------------------------------------------------------
Reset  |        |
Reason | Count  |
-------------------------------------------------------------------------------
0x5         64
0x6         62
0xA1         4
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
UPTIME CONTINUOUS INFORMATION
-------------------------------------------------------------------------------
Time Stamp          | Reset  | Uptime
MM/DD/YYYY HH:MM:SS | Reason | years weeks days hours  minutes
-------------------------------------------------------------------------------
03/06/2007 22:32:51   0xA1      0     0     0     0     0
```

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.
- Reset reason; see Table 18-1 to translate the numbers displayed.
- Count is the number of resets that have occurred for each reset reason.

Table 18-1 Reset Reason Codes and Explanations

Reset Reason Code (in hex)	Component/Explanation
0x01	Chassis on
0x02	Line card hot plug in
0x03	Supervisor requests line card off or on
0x04	Supervisor requests hard reset on line card
0x05	Line card requests Supervisor off or on
0x06	Line card requests hard reset on Supervisor
0x07	Line card self reset using the internal system register
0x08	—
0x09	—
0x0A	Momentary power interruption on the line card
0x0B	—
0x0C	—
0x0D	—
0x0E	—
0x0F	—
0x10	—
0x11	Off or on after Supervisor non-maskable interrupts (NMI)
0x12	Hard reset after Supervisor NMI
0x13	Soft reset after Supervisor NMI
0x14	—
0x15	Off or on after line card asks Supervisor NMI
0x16	Hard reset after line card asks Supervisor NMI
0x17	Soft reset after line card asks Supervisor NMI

Table 18-1 Reset Reason Codes and Explanations

Reset Reason Code (in hex)	Component/Explanation
0x18	—
0x19	Off or on after line card self NMI
0x1A	Hard reset after line card self NMI
0x1B	Soft reset after line card self NMI
0x21	Off or on after spurious NMI
0x22	Hard reset after spurious NMI
0x23	Soft reset after spurious NMI
0x24	—
0x25	Off or on after watchdog NMI
0x26	Hard reset after watchdog NMI
0x27	Soft reset after watchdog NMI
0x28	—
0x29	Off or on after parity NMI
0x2A	Hard reset after parity NMI
0x2B	Soft reset after parity NMI
0x31	Off or on after system fatal interrupt
0x32	Hard reset after system fatal interrupt
0x33	Soft reset after system fatal interrupt
0x34	—
0x35	Off or on after application-specific integrated circuit (ASIC) interrupt
0x36	Hard reset after ASIC interrupt
0x37	Soft reset after ASIC interrupt
0x38	—
0x39	Off or on after unknown interrupt
0x3A	Hard reset after unknown interrupt
0x3B	Soft reset after unknown interrupt
0x41	Off or on after CPU exception
0x42	Hard reset after CPU exception
0x43	Soft reset after CPU exception
0xA1	Reset data converted to generic data

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

```
-------------------------------------------------------------------------------
INTERRUPT SUMMARY INFORMATION
-------------------------------------------------------------------------------
Name                                                |  ID | Offset | Bit |  Count
-------------------------------------------------------------------------------
No historical data to display
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
CONTINUOUS INTERRUPT INFORMATION
-------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS mmm | Name                             |  ID | Offset | Bit
-------------------------------------------------------------------------------
03/06/2007 22:33:06 450   Port-ASIC #2                        9   0x00E7     6
-------------------------------------------------------------------------------
```

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

```
----------------------------------------------------------------------------
ERROR MESSAGE SUMMARY INFORMATION
----------------------------------------------------------------------------
Facility-Sev-Name      | Count | Persistence Flag
MM/DD/YYYY HH:MM:SS
----------------------------------------------------------------------------
No historical data to display
----------------------------------------------------------------------------
----------------------------------------------------------------------------
ERROR MESSAGE CONTINUOUS INFORMATION
----------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Facility-Sev-Name
----------------------------------------------------------------------------
03/06/2007 22:33:35  %GOLD_OBFL-3-GOLD : Diagnostic OBFL: Diagnostic OBFL testing
```

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 switch` *switch-number* `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 switch 2 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:

```
Router# show logging onboard module 2 message continuous

--------------------------------------------------------------------------------
ERROR MESSAGE CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Facility-Sev-Name
--------------------------------------------------------------------------------
03/06/2007 22:33:35 %SWITCH_IF-3-CAMERR : [chars], for VCI [dec] VPI [dec] in stdby data
path check, status: [dec]
--------------------------------------------------------------------------------
```

OBFL Component Uptime Report: Example

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

```
Router# show logging onboard module 2 uptime

--------------------------------------------------------------------------------
UPTIME SUMMARY INFORMATION
--------------------------------------------------------------------------------
First customer power on : 03/06/2007 22:32:51
Total uptime            :   0 years   0 weeks   0 days   0 hours  35 minutes
Total downtime          :   0 years   0 weeks   0 days   0 hours   0 minutes
Number of resets        : 1
Number of slot changes  : 0
Current reset reason    : 0xA1
Current reset timestamp : 03/06/2007 22:31:34
Current slot            : 2
Current uptime          :   0 years   0 weeks   0 days   0 hours  35 minutes
--------------------------------------------------------------------------------
Reset  |        |
Reason | Count  |
--------------------------------------------------------------------------------
No historical data to display
--------------------------------------------------------------------------------
```

OBFL Report for a Specific Time: Example

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

```
Router# show logging onboard module 3 continuous start 15:01:57 1 Mar 2007 end 15:04:57 3
Mar 2007

PID: WS-X6748-GE-TX    , VID:    , SN: SAL09063B85

--------------------------------------------------------------------------------
UPTIME CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
Time Stamp          | Reset  | Uptime
MM/DD/YYYY HH:MM:SS | Reason | years weeks days hours  minutes
--------------------------------------------------------------------------------
03/01/2007 15:01:57   0xA1      0     0     0    10     0
03/03/2007 02:29:29   0xA1      0     0     0     5     0
--------------------------------------------------------------------------------

--------------------------------------------------------------------------------
TEMPERATURE CONTINUOUS INFORMATION
--------------------------------------------------------------------------------
Sensor                            |   ID  |
--------------------------------------------------------------------------------
MB-Out                              930201
MB-In                               930202
MB                                  930203
MB                                  930204
EARL-Out                            910201
EARL-In                             910202
SSA 1                               930301
SSA 2                               930302
JANUS 1                             930303
JANUS 2                             930304
GEMINI 1                            930305
GEMINI 2                            930306
--------------------------------------------------------------------------------
       Time Stamp   |Sensor Temperature 0C
MM/DD/YYYY HH:MM:SS |  1    2    3    4    5    6    7    8    9   10   11   12
--------------------------------------------------------------------------------
03/01/2007 15:01:57   26   26   NA   NA   NA   NA    0    0    0    0    0    0
03/01/2007 15:06:57   39   27   NA   NA   NA   NA   39   37   36   29   32   32
03/01/2007 15:11:02   40   27   NA   NA   NA   NA   40   38   37   30   32   32
03/01/2007 17:06:06   40   27   NA   NA   NA   NA   40   38   37   30   32   32
03/01/2007 19:01:09   40   27   NA   NA   NA   NA   40   38   37   30   32   32
03/03/2007 02:29:30   25   26   NA   NA   NA   NA    0    0    0    0    0    0
03/03/2007 02:34:30   38   26   NA   NA   NA   NA   39   37   36   29   31   31
03/03/2007 04:29:33   40   27   NA   NA   NA   NA   40   38   36   30   32   32
03/03/2007 06:24:37   40   27   NA   NA   NA   NA   40   38   36   29   32   32
03/03/2007 08:19:40   40   27   NA   NA   NA   NA   40   38   36   29   32   32
03/03/2007 10:14:44   40   27   NA   NA   NA   NA   40   38   36   30   32   32
03/03/2007 12:09:47   40   27   NA   NA   NA   NA   40   38   36   30   32   32
03/03/2007 14:04:51   40   27   NA   NA   NA   NA   40   38   36   30   32   32
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
CONTINUOUS INTERRUPT INFORMATION
--------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS mmm | Name                                |  ID | Offset | Bit
--------------------------------------------------------------------------------
03/01/2007 15:01:59 350   Port-ASIC #0                          7   0x00E7     6
03/03/2007 02:29:34 650   Port-ASIC #0                          7   0x00E7     6
--------------------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
ERROR MESSAGE CONTINUOUS INFORMATION
------------------------------------------------------------------------------
MM/DD/YYYY HH:MM:SS Facility-Sev-Name
------------------------------------------------------------------------------
03/01/2007 15:02:15  %GOLD_OBFL-3-GOLD : Diagnostic OBFL: Diagnostic OBFL testing
03/03/2007 02:29:51  %GOLD_OBFL-3-GOLD : Diagnostic OBFL: Diagnostic OBFL testing
------------------------------------------------------------------------------
```

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