

Environmental Monitoring

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Environmental Monitoring and Reporting Functions

Monitoring and reporting functions allow you to maintain normal system operation by identifying and resolving adverse conditions prior to loss of operation.

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Environmental Monitoring Functions

The router provides a robust environment-monitoring system with several sensors that monitor the system temperatures. The following are some of the key functions of the environmental monitoring system:

- Monitoring temperature of CPUs and Motherboard
- Recording abnormal events and generating notifications
- Monitoring Simple Network Management Protocol (SNMP) traps
- Generating and collecting Onboard Failure Logging (OBFL) data
- Sending call home event notifications
- Logging system error messages
- Displaying present settings and status

Environmental monitoring functions use sensors to monitor the temperature of the cooling air as it moves through the chassis.

The router is expected to meet the following environmental operating conditions

- Non-operating Temperature: -40°F to 158°F (-40°C to 70°C)
- Non-operating Humidity: 5 to 95% relative humidity (non-condensing)
- Operating Temperature:

  -40° to 140°F (-40° to 60°C) in a sealed NEMA cabinet with no airflow

  -40° to 158°F (-40° to 70°C) in a vented cabinet with 40 lfm of air

  -40° to 167°F (-40° to 75°C) in a forced air enclosure with 200 lfm of air
- Operating Humidity: 10% to 95% relative humidity (non-condensing)
- Operating Altitude: -500 to 5,000 feet. Derate max operating temperature 1.5°C per 1000 feet.

The following table displays the levels of status conditions used by the environmental monitoring system.

Table 1: Levels of Status Conditions Used by the Environmental Monitoring System

Status Level	Description
Normal	All monitored parameters are within normal tolerance.
Warning	The system has exceeded a specified threshold. The system continues to operate, but operator action is recommended to bring the system back to a normal state.
Critical	An out-of-tolerance temperature or voltage condition exists. Although the system continues to operate, it is approaching shutdown. Immediate operator action is required.

The environmental monitoring system sends system messages to the console, for example, when the conditions described here are met:

Temperature and Voltage Exceed Max/Min Thresholds

The following example shows the warning messages indicating the maximum and minimum thresholds of the temperature or voltage:

```
Warnings :
--------
For all the temperature sensors (name starting with “Temp:”) above,
the critical warning threshold is 100C (100C and higher)
the warning threshold is 80C (range from 80C to 99C)
the low warning threshold is 1C (range from -inf to 1C).

For all voltage sensors (names starting with "V:"),
the high warning threshold starts at that voltage +10%. (voltage + 10% is warning)
the low warning threshold starts at the voltage -10%. (voltage - 10% is warning)
```

Environmental Reporting Functions

You can retrieve and display environmental status reports using the following commands:

- **show diag all eeprom**
- **show environment**
- **show environment all**
- **show inventory**
- **show platform**
- **show platform diag**
- **show platform software status control-processor**
- **show diag slot R0 eeprom detail**
- **show version**
- **show power**

These commands show the current values of parameters such as temperature and voltage.

The environmental monitoring system updates the values of these parameters every 60 seconds. Brief examples of these commands are shown below:

show diag all eeprom

```
Router# show diag all eeprom
MIDPLANE EEPROM data:

Product Identifier (PID) : IR1800-K9
Version Identifier (VID) : V00
PCB Serial Number : FOC21482ZQF
PCB Serial Number : FOC214822CK
PCB Serial Number : FOC21482SY7
Top Assy. Part Number : 68-6479-01
Top Assy. Revision : 13
Hardware Revision : 0.2
Asset ID :
CLEI Code : UNASSIGNED
Power/Fan Module P0 EEPROM data is not initialized

Power/Fan Module P1 EEPROM data is not initialized

Slot R0 EEPROM data:

Product Identifier (PID) : IR1800-K9
Version Identifier (VID) : V00
PCB Serial Number : FOC21482ZQF
PCB Serial Number : FOC214822CK
PCB Serial Number : FOC21482SY7
Top Assy. Part Number : 68-6479-01
Top Assy. Revision : 13
Hardware Revision : 0.2
CLEI Code : UNASSIGNED
```

```
Slot F0 EEPROM data:

Product Identifier (PID) : IR1800-K9
Version Identifier (VID) : V00
PCB Serial Number : FOC21482ZQF
PCB Serial Number : FOC214822CK
PCB Serial Number : FOC21482SY7
Top Assy. Part Number : 68-6479-01
Top Assy. Revision : 13
Hardware Revision : 0.2
CLEI Code : UNASSIGNED
Slot 0 EEPROM data:

Product Identifier (PID) : IR1800-K9
Version Identifier (VID) : V00
PCB Serial Number : FOC21482ZQF
PCB Serial Number : FOC214822CK
PCB Serial Number : FOC21482SY7
Top Assy. Part Number : 68-6479-01
Top Assy. Revision : 13
Hardware Revision : 0.2
CLEI Code : UNASSIGNED
SPA EEPROM data for subslot 0/0:

Product Identifier (PID) : IR1800-ES-5
Version Identifier (VID) : V01
PCB Serial Number :
Top Assy. Part Number : 68-2236-01
Top Assy. Revision : A0
Hardware Revision : 2.2
CLEI Code : CNUIAHSAAA
SPA EEPROM data for subslot 0/1 is not available

SPA EEPROM data for subslot 0/2 is not available

SPA EEPROM data for subslot 0/3 is not available

SPA EEPROM data for subslot 0/4 is not available

SPA EEPROM data for subslot 0/5 is not available

Router#
```

show environment:

```
Router# show environment
Number of Critical alarms: 0
Number of Major alarms: 0
Number of Minor alarms: 0

Slot Sensor Current State Reading Threshold(Minor,Major,Critical,Shutdown)
---------- ------------- --------------- ------------ ---------------------------------------
R0 Temp: LM75BXXX Normal 43 Celsius (75 ,80 ,90 ,na )(Celsius)

Router#
```

show environment all:

```
Router# show environment all
Sensor List: Environmental Monitoring
Sensor Location State Reading
Temp: LM75BXXX R0 Normal 48 Celsius
```

show inventory:

```
Router# show inventory
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
INFO: Please use "show license UDI" to get serial number for licensing.
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

NAME: "Chassis", DESCR: "Cisco Catalyst IR1833 Rugged Series Router"
PID: IR1833-K9 , VID: V00 , SN: FCW2447P0EB

NAME: "Power Supply Module 0", DESCR: "Cisco IR1800 DC Power Supply"
PID: PWR-12V , VID: , SN:

NAME: "GE-POE Module", DESCR: "POE Module for On Board GE for Cisco IR183X"
PID: IR1800-I-POE , VID: V00 , SN: FOC24382K4W

NAME: "module 0", DESCR: "Cisco IR-1833-K9 Built-In NIM controller"
PID: IR1833-K9 , VID: , SN:

NAME: "NIM subslot 0/3", DESCR: "Cisco Wide Pluggable Form Factor WIFI6 AP Module"
PID: WP-WIFI6-B , VID: V00 , SN: FOC24490FEP

NAME: "NIM subslot 0/4", DESCR: "P-LTEA-LA Module"
PID: P-LTEA-LA , VID: V01 , SN: FOC22287JMC

NAME: "Modem on Cellular0/4/0", DESCR: "Sierra Wireless EM7430"
PID: EM7430 , VID: 1.0 , SN: 355813070165276

NAME: "NIM subslot 0/5", DESCR: "P-LTEA-LA Module"
PID: P-LTEA-LA , VID: V01 , SN: FOC22287JLZ

NAME: "Modem on Cellular0/5/0", DESCR: "Sierra Wireless EM7430"
PID: EM7430 , VID: 1.0 , SN: 355813070165524

NAME: "NIM subslot 0/0", DESCR: "Front Panel 1 port Gigabitethernet Module"
PID: IR1833-1x1GE , VID: V01 , SN:

NAME: "NIM subslot 0/1", DESCR: "IR1833-ES-4"
PID: IR1833-ES-4 , VID: V01 , SN:

NAME: "module R0", DESCR: "Cisco IR1833-K9 motherboard"
PID: IR1833-K9 , VID: V00 , SN: FOC24384177

NAME: "module F0", DESCR: "Cisco IR1833-K9 Forwarding Processor"
PID: IR1833-K9 , VID: , SN:
```

show platform:

```
Router# show platform
Chassis type: IR1833-K9

Slot Type State Insert time (ago)
--------- ------------------- --------------------- -----------------
0 IR1833-K9 ok 00:04:03
0/0 IR1833-1x1GE ok 00:01:22
0/1 IR1833-ES-4 ok 00:01:22
0/3 WP-WIFI6-B ok 00:01:22
0/4 P-LTEA-LA ok 00:01:21
0/5 P-LTEA-LA ok 00:01:21
R0 IR1833-K9 ok, active 00:04:03
F0 IR1833-K9 ok, active 00:04:03
P0 PWR-12V ok 00:02:00
GE-POE IR1800-I-POE ok 00:02:00
```

show platform diag:

```
Router# show platform diag
Chassis type: IR1833-K9

Slot: 0, IR1833-K9
Running state : ok
Internal state : online
Internal operational state : ok
Physical insert detect time : 00:01:09 (00:04:38 ago)
Software declared up time : 00:03:19 (00:02:28 ago)
CPLD version :
Firmware version : 3.9(REL)

Sub-slot: 0/0, IR1833-1x1GE
Operational status : ok
Internal state : inserted
Physical insert detect time : 00:03:51 (00:01:57 ago)
Logical insert detect time : 00:03:51 (00:01:57 ago)

Sub-slot: 0/1, IR1833-ES-4
Operational status : ok
Internal state : inserted
Physical insert detect time : 00:03:51 (00:01:57 ago)
Logical insert detect time : 00:03:51 (00:01:57 ago)

Sub-slot: 0/3, WP-WIFI6
Operational status : ok
Internal state : inserted
Physical insert detect time : 00:03:51 (00:01:57 ago)
Logical insert detect time : 00:03:51 (00:01:57 ago)

Sub-slot: 0/4, P-LTEA-LA
Operational status : ok
Internal state : inserted
Physical insert detect time : 00:03:51 (00:01:56 ago)
Logical insert detect time : 00:03:51 (00:01:56 ago)

Sub-slot: 0/5, P-LTEA-LA
Operational status : ok
Internal state : inserted
```

```
Physical insert detect time : 00:03:51 (00:01:56 ago)
Logical insert detect time : 00:03:51 (00:01:56 ago)

Slot: R0, IR1833-K9
Running state : ok, active
Internal state : online
Internal operational state : ok
Physical insert detect time : 00:01:09 (00:04:38 ago)
Software declared up time : 00:01:09 (00:04:38 ago)
CPLD version : 00000000
Firmware version : 3.9(REL)

Slot: F0, IR1833-K9
Running state : ok, active
Internal state : online
Internal operational state : ok
Physical insert detect time : 00:01:09 (00:04:38 ago)
Software declared up time : 00:03:30 (00:02:17 ago)
Hardware ready signal time : 00:00:00 (never ago)
Packet ready signal time : 00:03:36 (00:02:11 ago)
CPLD version : 00000000
Firmware version : 3.9(REL)

Slot: P0, PWR-12V
State : ok
Physical insert detect time : 00:03:13 (00:02:35 ago)

Slot: GE-POE, IR1800-I-POE
State : ok
Physical insert detect time : 00:03:13 (00:02:35 ago)
```

show platform software status control-processor:

```
Router# show platform software status control-processor
RP0: online, statistics updated 9 seconds ago
Load Average: healthy
1-Min: 0.32, status: healthy, under 5.00
5-Min: 0.33, status: healthy, under 5.00
15-Min: 0.35, status: healthy, under 5.00
Memory (kb): healthy
Total: 3959840
Used: 2894588 (73%), status: healthy
Free: 1065252 (27%)
Committed: 2435656 (62%), under 90%
Per-core Statistics
CPU0: CPU Utilization (percentage of time spent)
User: 0.50, System: 0.91, Nice: 0.00, Idle: 98.07
IRQ: 0.40, SIRQ: 0.10, IOwait: 0.00
CPU1: CPU Utilization (percentage of time spent)
User: 0.81, System: 0.30, Nice: 0.00, Idle: 98.48
IRQ: 0.20, SIRQ: 0.20, IOwait: 0.00
CPU2: CPU Utilization (percentage of time spent)
User: 0.81, System: 2.65, Nice: 0.00, Idle: 95.41
IRQ: 1.12, SIRQ: 0.00, IOwait: 0.00
CPU3: CPU Utilization (percentage of time spent)
User: 7.66, System: 17.05, Nice: 0.00, Idle: 70.58
IRQ: 4.59, SIRQ: 0.10, IOwait: 0.00
Router#
```

show diag slot R0 eeprom detail:

```
Router# show diag slot R0 eeprom detail
Slot R0 EEPROM data:
EEPROM version : 4
Compatible Type : 0xFF
Controller Type : 3457
Hardware Revision : 0.2
PCB Part Number : 73-18820-03
Board Revision : 02
Deviation Number : 0
Fab Version : 02
PCB Serial Number : FOC22106KKH
Top Assy. Part Number : 68-6479-03
Top Assy. Revision : 04
Chassis Serial Number : FCW2213TH07
Deviation Number : 0
RMA Test History : 00
RMA Number : 0-0-0-0
RMA History : 00
Product Identifier (PID) : IR1800-K9
Version Identifier (VID) : V00
CLEI Code : UNASSIGNED
Manufacturing Test Data : 00 00 00 00 00 00 00 00
Field Diagnostics Data : 00 00 00 00 00 00 00 00
Chassis MAC Address : 682c.7b4d.7880
MAC Address block size : 128
Asset ID :
Asset Alias :
PCB Part Number : 73-18821-03
Board Revision : 03
Deviation Number : 0
Fab Version : 02
PCB Serial Number : FOC22106KHD
PCB Part Number : 73-19117-02
Board Revision : 02
Deviation Number : 0
Fab Version : 01
PCB Serial Number : FOC22106KJ9
Asset ID :
Router#
```

show version:

```
Router# show version
Cisco IOS XE Software, Version 17.06.01prd23
Cisco IOS Software [Bengaluru], ISR Software (ARMV8EL_LINUX_IOSD-UNIVERSALK9_IOT-M), Version
 17.6.1prd23, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2021 by Cisco Systems, Inc.
Compiled Tue 20-Jul-21 02:28 by mcpre

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GPL code under the terms of GPL Version 2.0. For more details, see the
documentation or "License Notice" file accompanying the IOS-XE software,
or the applicable URL provided on the flyer accompanying the IOS-XE
software.
```

```
ROM: 3.9(REL)

IR1833 uptime is 13 hours, 6 minutes
Uptime for this control processor is 13 hours, 9 minutes
System returned to ROM by Firmware Upgrade
System image file is "bootflash:ir1800-universalk9.17.06.01prd23.SPA.bin"
Last reload reason: Reload Command

This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

Technology Package License Information:
------------------------------------------------------------------
Technology Type Technology-package Technology-package
Current Next Reboot
------------------------------------------------------------------
Smart License Perpetual network-advantage network-advantage
Smart License Subscription None None

The current throughput level is 50000 kbps
Smart Licensing Status: Registration Not Applicable/Not Applicable
cisco IR1833-K9 (1RU) processor with 470123K/6147K bytes of memory.
Processor board ID FCW2447P0EB
Router operating mode: Autonomous
MCU bootloader version: 0x22
MCU application version: 0x4d
1 Virtual Ethernet interface
6 Gigabit Ethernet interfaces
2 Serial interfaces
1 terminal line
4 Cellular interfaces
32768K bytes of non-volatile configuration memory.
3988088K bytes of physical memory.
7475198K bytes of Bootflash at bootflash:.
Configuration register is 0x2102
```

show power:

```
Router# show power
Main PSU :
Total Power Consumed: 8.16 Watts
Router#
```

SNMP Polling of Temperature OID

Support has been added for SNMP MIB to be able to return values from temperature sensors. The output should look similar to the **show environment** CLI.

The output of a **show environment**:

```
router#show environment

Number of Critical alarms:  0
Number of Major alarms:     0
Number of Minor alarms:     0

 Slot        Sensor          Current State   Reading
Threshold(Minor,Major,Critical,Shutdown)
 ----------  --------------  --------------- ------------
---------------------------------------
 R0          Temp: TS1       Normal          42    Celsius      (75 ,80 ,90 ,na )(Celsius)
 R0          Temp: TS2       Normal          37    Celsius      (75 ,80 ,90 ,na )(Celsius)
```

The output from an snmpwalk would look similar to this:

```
[root@sg-centos-hv ~]# snmpwalk -v 2c -c public 33.33.33.204 1.3.6.1.4.1.9.9.13.1.3.1
SNMPv2-SMI::enterprises.9.9.13.1.3.1.2.1 = STRING: "Sensor 1"
SNMPv2-SMI::enterprises.9.9.13.1.3.1.3.1 = Gauge32: 48
SNMPv2-SMI::enterprises.9.9.13.1.3.1.4.1 = INTEGER: 93
SNMPv2-SMI::enterprises.9.9.13.1.3.1.5.1 = INTEGER: 0
SNMPv2-SMI::enterprises.9.9.13.1.3.1.6.1 = INTEGER: 1
SNMPv2-SMI::enterprises.9.9.13.1.3.1.7.1 = INTEGER: 0
```

The ciscoEnvMonTemperatureStatusEntry oid is 1.3.6.1.4.1.9.9.13.1.3.1:

- ciscoEnvMonTemperatureStatusIndex (.1)
- ciscoEnvMonTemperatureStatusDescr (.2)
- ciscoEnvMonTemperatureStatusValue (.3)
- ciscoEnvMonTemperatureThreshold (.4)
- ciscoEnvMonTemperatureLastShutdown (.5)
- ciscoEnvMonTemperatureStatus (.6)

Additional References

The following sections provide references related to the power efficiency management feature.

MIBs

MIBs	MIBs Link
CISCO-ENTITY-FRU-CONTROL-MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use the Cisco MIB Locator at: http://www.cisco.com/go/mibs.

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html