Collect CPU Utilization on Cisco IOS Devices with SNMP

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Introduction

This document describes how to collect CPU utilization on Cisco IOS® devices that use Simple Network Management Protocol (SNMP).

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is only for devices that run Cisco IOS® software.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

Procedure for Devices with Single CPU

Critical router functions, like routing protocol processing and process packet switching are handled in memory and share the CPU. If CPU utilization is high, routing updates can be delayed, and packets that require process switching can be dropped. From the CISCO-PROCESS-MIB, the cpmCPUTotal5minRev MIB object value reports the percentage of the processor in use over a five-minute average.



Note: Use the Cisco MIB Locator to find information about the MIB on a particular platform or software release.

The cpmCPUTotal5minRev MIB object provides a less variable view of the CPU utilization over time than cpmCPUTotal1minRev and cpmCPUTotal5secRev. The one-minute and five-second objects provide shorter-interval measurements that help identify brief increases in utilization. These MIBs enable you to monitor the trends and plan the capacity of your network. A 90% rising threshold for **cpmCPUTotal5minRev** is an initial monitoring example; set the operational threshold according to the platform and its observed CPU baseline. Based on the platform, some routers that run at 90% can exhibit performance degradation versus a high-end router, which can operate fine.

- cpmCPUTotal5secRev (.1.3.6.1.4.1.9.9.109.1.1.1.1.6): The overall CPU busy percentage in the last five-second period. This object deprecates the object cpmCPUTotal5sec and reports a value from 0 to 100%.
- cpmCPUTotal1minRev (.1.3.6.1.4.1.9.9.109.1.1.1.1.7): The overall CPU busy percentage in the last one-minute period. This object deprecates the object cpmCPUTotal1min and reports a value from 0 to 100%.
- cpmCPUTotal5minRev (.1.3.6.1.4.1.9.9.109.1.1.1.1.8): The overall CPU busy percentage in the last five-minute period. This object deprecates the object cpmCPUTotal5min and reports a value from 0 to 100%.

This table shows the new MIBs and their objects beside the old MIBs and the objects they replace:

Version	Cisco IOS Software Releases 12.2(3.5) or later	Cisco IOS Software Releases later to 12.0(3)T and prior to 12.2(3.5)
MIB	CISCO-PROCESS-MIB	CISCO-PROCESS-MIB
Objects	cpmCPUTotal5minRev (.1.3.6.1.4.1.9.9.109.1.1.1.1.8) cpmCPUTotal1minRev (.1.3.6.1.4.1.9.9.109.1.1.1.1.7) cpmCPUTotal5secRev (.1.3.6.1.4.1.9.9.109.1.1.1.1.6)	cpmCPUTotal5min (.1.3.6.1.4.1.9.9.109.1.1.1.1.5) cpmCPUTotal1min (.1.3.6.1.4.1.9.9.109.1.1.1.1.4) cpmCPUTotal5sec (.1.3.6.1.4.1.9.9.109.1.1.1.1.3)

Example

This is an example output from the **show processes cpu** command on a router that runs Cisco IOS® Software Release 12.0(9):

<#root>

```
Router#
```

show processes cpu

```
CPU utilization for five seconds: 2%/1%; one minute: 1%; five minutes: 1%

 PID  Runtime(ms)  Invoked  uSecs    5Sec   1Min   5Min TTY Process
   1         164   137902      1   0.00%  0.00%  0.00%   0 Load Meter
   2         100      119    840   0.57%  0.11%  0.02%   2 Virtual Exec
   3      468644    81652   5739   0.00%  0.04%  0.05%   0 Check heaps
   4           0        1      0   0.00%  0.00%  0.00%   0 Pool Manager
   5           0        2      0   0.00%  0.00%  0.00%   0 Timers
   6           0        2      0   0.00%  0.00%  0.00%   0 Serial Background
   7           0        1      0   0.00%  0.00%  0.00%   0 OIR Handler
   8           0        1      0   0.00%  0.00%  0.00%   0 IPC Zone Manager
   9         348   689225      0   0.00%  0.00%  0.00%   0 IPC Periodic Tim
  10           0        1      0   0.00%  0.00%  0.00%   0 IPC Seat Manager
  11      175300   332916    526   0.00%  0.02%  0.00%   0 ARP Input
  12        3824   138903     27   0.00%  0.00%  0.00%   0 HC Counter Timer
  13           0        2      0   0.00%  0.00%  0.00%   0 DDR Timers
  14           0        1      0   0.00%  0.00%  0.00%   0 Entity MIB API
  15           0        1      0   0.00%  0.00%  0.00%   0 SERIAL A'detect
  16           0        1      0   0.00%  0.00%  0.00%   0 Microcode Loader
  17           0        1      0   0.00%  0.00%  0.00%   0 IP Crashinfo Inp
--<snip>--
```

From the output, this is the relevant information:

Note: On the basis of the Cisco IOS® Software Release that runs on the device, use the appropriate MIB objects.

The CPU utilization over the last five seconds [also available through the object busyPer (.1.3.6.1.4.1.9.2.1.56)]

```
%snmpwalk -v2c -c public 172.16.99.1 .1.3.6.1.4.1.9.2.1.56

!--- SNMP Query

enterprises.9.2.1.56.0 = 2

!--- Response
```

- The percentage of CPU time at interrupt level (fast-switched packets), over a 5-second period. If you take the difference between the first and second, you arrive at the 5-second percentage the router spends at the process level. In this case, the router spends 1% at the process level over the last 5-seconds (process- switched packets - No MIB variable).
- The CPU utilization over the last minute [also available through the object avgBusy1

(.1.3.6.1.4.1.9.2.1.57)].

```
%snmpwalk -v2c -c public 172.16.99.1 .1.3.6.1.4.1.9.2.1.57

!--- SNMP Query

enterprises.9.2.1.57.0 = 3

!--- Response
```

- The CPU utilization over the last 5-minutes [also available through the object avgBusy5 (.1.3.6.1.4.1.9.2.1.58)].

```
%snmpwalk -v2c -c public 172.16.99.1 .1.3.6.1.4.1.9.2.1.58

!--- SNMP Query

enterprises.9.2.1.58.0 = 1

!--- Response
```

When you poll CPU utilization variables and any other SNMP variables, the actual CPU utilization is affected. Frequent polling at 1-second intervals can substantially increase CPU utilization on some devices. It is an overkill to poll so frequently, however, take into consideration the impact to CPU when you determine how often you want to poll the variable.

Procedure for Devices with Multiple CPUs

If your Cisco IOS device has several CPUs, you must use CISCO-PROCESS-MIB and the cpmCPUTotal5minRev object from the cpmCPUTotalTable, indexed with cpmCPUTotalIndex. This table allows CISCO-PROCESS-MIB to keep CPU statistics for different physical entities in the router such as, different CPU chips, group of CPUs, or CPUs in different modules/cards. For a single CPU, cpmCPUTotalTable only has one entry.

Information on different physical entities in the router is stored in the entPhysicalTable of RFC 2737 standard-based ENTITY-MIB. You can link between two tables cpmCPUTotalTable and entPhysicalTable easily. Each row of cpmCPUTotalTable has a cpmCPUTotalPhysicalIndex object that keeps the value of the entPhysicalIndex (index of entPhysicalTable), and points to the entry in entPhysicalTable. This corresponds to the physical entity for where the CPU statistics are maintained.

CISCO-PROCESS-MIB provides the CPU utilization values. To associate a CPU entry with a named physical entity, the device must also expose the corresponding ENTITY-MIB entry. ENTITY-MIB is not

required merely to retrieve CPU utilization values.

Example

Monitor the use of multiple CPUs in the chassis.

1. Poll cpmCPUTotal5min (.1.3.6.1.4.1.9.9.109.1.1.1.1.5) to retrieve the "overall CPU busy percentage in the last 5-minute period" for all CPUs in the chassis. The output shows the device has 3 CPUs utilized for 10%, 1%, and 2% during last 5-minutes.

```
%snmpwalk -v2c -c public 172.16.0.1 .1.3.6.1.4.1.9.9.109.1.1.1.1.5

!--- SNMP Query

enterprises.9.9.109.1.1.1.1.5.1 = 10
enterprises.9.9.109.1.1.1.1.5.8 = 1
enterprises.9.9.109.1.1.1.1.5.9 = 2

!--- Response
```



Note: On the basis of the Cisco IOS Software Release that runs on the device, use appropriate MIB objects.

2. To identify the physical entity where these values correspond, poll cpmCPUTotalPhysicalIndex (.1.3.6.1.4.1.9.9.109.1.1.1.1.2). You can see three physical entities with indexes 9, 25 and 28:

```
<#root>

%

snmpwalk -v2c -c public 172.16.0.1 .1.3.6.1.4.1.9.9.109.1.1.1.1.2



!--- SNMP Query

enterprises.9.9.109.1.1.1.1.2.1 = 9
enterprises.9.9.109.1.1.1.1.2.8 = 25
enterprises.9.9.109.1.1.1.1.2.9 = 28

!--- Response
```

3. To identify the card where each physical entry is related, poll the correspondent entPhysicalName (.1.3.6.1.2.1.47.1.1.1.1.7) entry, with the exact indexes 9, 25, 28 from Step 2, as a last digit. You can see that RSP is utilized for 10%, and VIPs in slots 4 and 6 are utilized for 1% and 2%.

```
<#root>
```

```
%

snmpwalk -v2c -c public 172.16.0.1 .1.3.6.1.2.1.47.1.1.1.1.7.9



!--- SNMP Query
47.1.1.1.1.7.9 = "RSP at Slot 2"

!--- Response

%

snmpwalk -v2c -c public 172.16.0.1 .1.3.6.1.2.1.47.1.1.1.1.7.25



!--- SNMP Query
47.1.1.1.1.7.25 = "Line Card 4"

!--- Reponse

%snmpwalk -v2c -c public 172.16.0.1 .1.3.6.1.2.1.47.1.1.1.1.7.28

!--- SNMP Query
47.1.1.1.1.7.28 = "Line Card 6"

!--- Response
```

Related Information

- Understanding VIP CPU Running at 99% and Rx-Side Buffering
- Troubleshooting High CPU Utilization on Cisco Routers
- SNMP Community String Indexing
- Simple Network Management Protocol Index
- Cisco Technical Support & Downloads