排除Nexus 7000高CPU使用率故障

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简介

本文档介绍在Cisco Nexus 7000系列平台上监控CPU使用率并解决CPU使用率过高问题的流程。

Nexus 7000平台上的CPU使用情况

Nexus 7000平台是基于Linux的系统，具有优先调度程序，允许对所有进程的CPU资源进行公平访问。

与Cisco Catalyst 6500系列不同，它没有单独的路由处理器(RP)和交换机处理器(SP)。

- Supervisor引擎1有一个双核处理器。
- Supervisor引擎2配有四核处理器。
- 管理引擎2E有两个四核处理器。

Cisco NX-OS操作系统采用主动式CPU多任务处理，因此进程可以利用空闲的CPU来更快地完成任务。

因此，history选项会报告不一定表示存在问题的可能的CPU峰值。但是，如果平均CPU使用率与正常基准CPU使用率相比仍然较高，请检查高CPU使用率。

启用默认硬件速率限制器(HWRL)和默认控制平面策略(CoPP)，以帮助保护Nexus 7000平台上的管理引擎带内接口。

命令和示例EEM脚本基于Nexus 7000版本6.1及更早版本，并会在未来版本中发生更改。

用于监控进程和CPU的命令和脚本

命令

思科 CLI 分析器（仅适用于注册客户）支持某些 show 命令。要查看对 show 命令输出的分析，请

使用思科 CLI 分析器。

show processes命令

使用此命令以显示有关活动进程的信息。

```
switch# show processes

PID    State  PC        Start_cnt    TTY   Type  Process
-----  -----  --------  -----------  ----  ----  -------------
    1      S  41520eb8            1     -     0  init
    2      S         0            1     -     0  kthreadd
    3      S         0            1     -     0  migration/0
    4      S         0            1     -     0  ksoftirqd/0
    5      S         0            1     -     0  watchdog/0
    6      S         0            1     -     0  migration/1
    7      S         0            1     -     0  ksoftirqd/1
    8      S         0            1     -     0  watchdog/1
    9      S         0            1     -     0  events/0
   10      S         0            1     -     0  events/1
   11      S         0            1     -     0  khelper
   12      S         0            1     -     0  kblockd/0
```

字段	描述
PID	进程 ID
状态	进程状态
PC	十六进制格式的当前程序计数器
Start_cnt	进程已启动或重新启动的次数
TTY	控制该进程的终端.连字符(—)通常表示守护程序不在任何特定终端上运行。
Process	进程的名称

进程状态	描述
D	不间断睡眠（通常是I/O）
R	可运行（在运行队列上）
S	睡眠
T	已跟踪或已停止
Z	已停用的（僵尸）进程
NR	没有运行
ER	预期正在运行，但当前未运行

show system resources命令

使用此命令以显示系统相关的CPU和内存统计信息。

```
switch#show system resources
Load average: 1 minute: 0.36 5 minutes: 0.39 15 minutes: 0.44
Processes : 1068 total, 1 running
```

```
CPU states : 0.5% user, 5.5% kernel, 94.0% idle
Memory usage: 8245436K total, 3289920K used, 4955516K free
Current memory status: OK
```

字段	描述
负载	正在运行的进程数。平均值反映过去1、5和15分钟的系统负载。
流程	系统中的进程数以及发出命令时实际运行的进程数。
CPU 状态	过去一秒钟内用户模式、内核模式和空闲时间下的CPU使用率百分比。对于双核 Supervisor，CPU在两个内核之间取平均值。
内存使用情况	总内存、已用内存、可用内存、用于缓冲区的内存和用于缓存的内存（以千字节为单位）。缓冲区和缓存包括在已用内存统计信息中。

show processes cpu 命令

使用此命令可显示进程级别的CPU使用情况：

```
switch#show processes cpu | ex 0.0

PID Runtime(ms) Invoked uSecs 1Sec Process
----- ----------- -------- ----- ------ -----------
26 66399 269718 246 0.9% kide/1
2908 115550 11310 10216 2.9% platform
3223 7248 9208 787 0.9% R2D2_usd

CPU util : 1.0% user, 3.0% kernel, 96.0% idle
Please note that only processes from the requested vdc are shown above
```

字段	描述
Runtime (ms)	进程已使用的CPU时间（毫秒）
Invoked	已调用进程的次数
uSecs	每个进程调用的平均CPU时间（微秒）
1秒	最近一秒钟的CPU使用率百分比

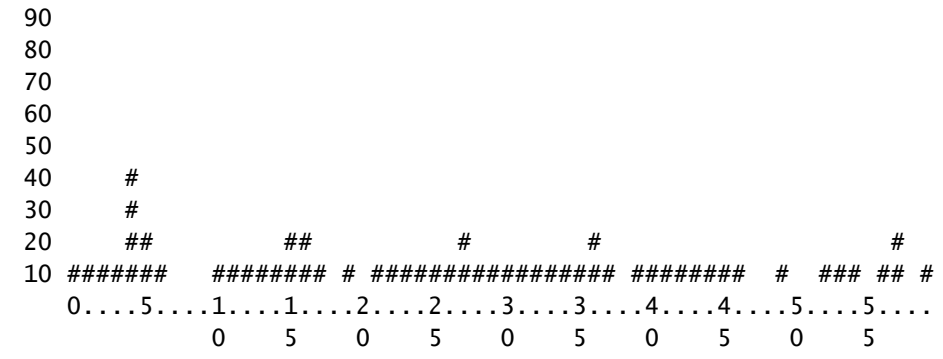
要找出属于特定进程ID (PID)的所有线程的CPU使用情况，请使用show process cpu detail <pid>命令（在NX-OS版本6.2x中提供）。

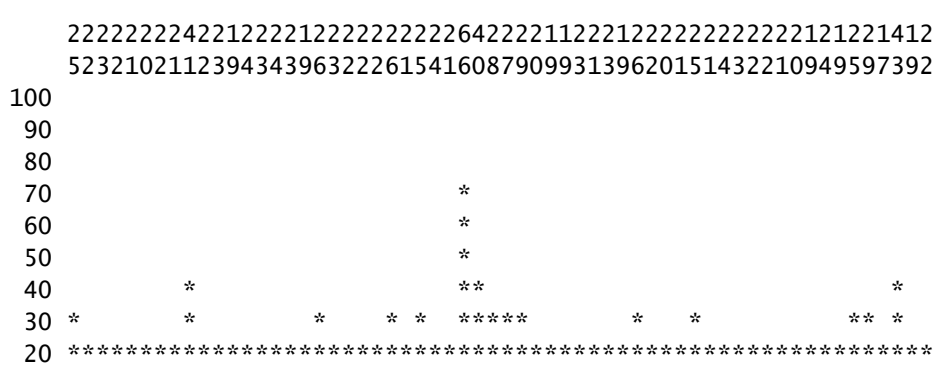
show processes cpu history命令

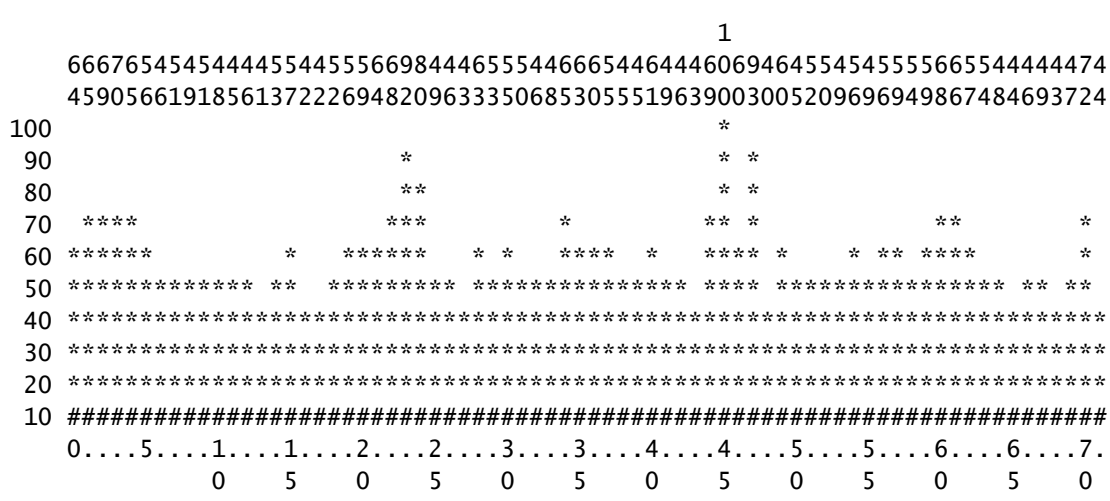
使用此命令可显示过去60秒、60分钟和72小时的CPU使用情况。请务必检查平均CPU使用率(#)和峰值(*)。

```
switch# show processes cpu history

    1  131         12     1 1  1      1 2       1         1  1
    19538893345657760739353537677586750729487765356435345614554
6
100
```







show process cpu detail <pid>命令

此命令（在版本6.2中添加）显示属于特定PID的所有线程的CPU使用率信息。

```
switch# show processes cpu sorted | grep cli
 3965        23734     17872   1328    0.0%    0.1%   0.7%   -    clis
 4024         3047      1256   2426    0.0%    0.0%   0.0%   -    diagclient
 4094          787       258   3052    0.0%    0.0%   0.0%   -    cardclient
 4728          227       209   1088    0.0%    0.0%   0.0%   -    port_client
 4729         1351       499   2708    0.0%    0.0%   0.0%   -    statsclient
 4730         2765       550   5028    0.0%    0.0%   0.0%   -    xbar_client

switch# show processes cpu sorted | grep clis
 3965        23734     17872   1328    0.0%    0.1%   0.7%   -    clis
switch# show process cpu detailed 3965

CPU utilization for five seconds: 3%/3%; one minute: 0%; five minutes: 1%
PID    Runtime(ms)  Invoked   uSecs  5Sec    1Min    5Min    TTY  Process
-----  -----------  --------  -----  ------  ------  ------  ---  -----------
 3965        23734     17873   1327    0.0%    0.1%   0.6%   -    clis
 4227           45       334    135    0.0%    0.0%   0.0%   -    clis:clis-cli-t
 4228           24       153    162    0.0%    0.0%   0.0%   -    clis:clis-nvdb-
 4760           75       224    335    0.0%    0.0%   0.0%   -    clis:clis-seria

switch# show processes cpu sorted | grep netstack
 4133          353       892    395    0.0%    0.0%   0.0%   -    netstack
switch# show process cpu detailed 4133

CPU utilization for five seconds: 5%/5%; one minute: 1%; five minutes: 1%
PID    Runtime(ms)  Invoked   uSecs  5Sec    1Min    5Min    TTY  Process
-----  -----------  --------  -----  ------  ------  ------  ---  -----------
 4133          353       892    395    0.0%    0.0%   0.0%   -    netstack
 4145          322      6492     49    0.0%    0.0%   0.0%   -    netstack:active
 4151          239       247    971    0.0%    0.0%   0.0%   -    netstack:ip-sys
 4153            0         3    162    0.0%    0.0%   0.0%   -    netstack:mplsda
 4155            2         3    717    0.0%    0.0%   0.0%   -    netstack:mplsct
 4163            0         2    240    0.0%    0.0%   0.0%   -    netstack:ipv6-d
 4164           97       957    101    0.0%    0.0%   0.0%   -    netstack:netsta
 4166           15       628     25    0.0%    0.0%   0.0%   -    netstack:ip-sys
 4167            0         3    224    0.0%    0.0%   0.0%   -    netstack:ip-pm-
 4170            1        12    154    0.0%    0.0%   0.0%   -    netstack:ip-uri
 4171            9        30    323    0.0%    0.0%   0.0%   -    netstack:ip-ipc
 4173            0         5    167    0.0%    0.0%   0.0%   -    netstack:ip-ipc
 4175            0         2    305    0.0%    0.0%   0.0%   -    netstack:ip-ret
 4176           12         7   1838    0.0%    0.0%   0.0%   -    netstack:ip-ppf
 4178            4        15    289    0.0%    0.0%   0.0%   -    netstack:ipv6-c
 4179           41       445     93    0.0%    0.0%   0.0%   -    netstack:disp
 4180            0         6     98    0.0%    0.0%   0.0%   -    netstack:worker
 4181           33       501     66    0.0%    0.0%   0.0%   -    netstack:worker
 4182            0         2    232    0.0%    0.0%   0.0%   -    netstack:worker
 4183            0         2    227    0.0%    0.0%   0.0%   -    netstack:worker
 4184            0         3    152    0.0%    0.0%   0.0%   -    netstack:worker
 4185            0         2    278    0.0%    0.0%   0.0%   -    netstack:worker
 4186            0         2    254    0.0%    0.0%   0.0%   -    netstack:worker
 4187            0         3    168    0.0%    0.0%   0.0%   -    netstack:worker
 4188            0         2    266    0.0%    0.0%   0.0%   -    netstack:worker
 4189            0         2    248    0.0%    0.0%   0.0%   -    netstack:worker
 4190            0         2    254    0.0%    0.0%   0.0%   -    netstack:worker
 4191            0         3    201    0.0%    0.0%   0.0%   -    netstack:worker
 4192            0         2    258    0.0%    0.0%   0.0%   -    netstack:worker
 4193            0         7    111    0.0%    0.0%   0.0%   -    netstack:worker
 4194            0         8     78    0.0%    0.0%   0.0%   -    netstack:worker
 4195            0         2    313    0.0%    0.0%   0.0%   -    netstack:worker
 4196           15       632     23    0.0%    0.0%   0.0%   -    netstack:ptacti
 4197            0         5    120    0.0%    0.0%   0.0%   -    netstack:tcp_ip
 4198            4        11    390    0.0%    0.0%   0.0%   -    netstack:ipv6-m
```

```
4199            0         3    240    0.0%    0.0%    0.0%    -    netstack:ipv6-c
4200            0         1    561    0.0%    0.0%    0.0%    -    netstack:ipv6-c
4201            0         3    246    0.0%    0.0%    0.0%    -    netstack:icmpv6
4513            0         5    112    0.0%    0.0%    0.0%    -    netstack:ipv6-m
4514            0         2    291    0.0%    0.0%    0.0%    -    netstack:ipv6-m
```

注意：所有流程信息均基于NX-OS中的流程。在NX-OS中，所有线程共享由任何其他线程分配的内存，因此不可能显示每个线程的信息。

show system internal processes cpu命令

此命令与Linux中的top命令等效，后者可实时查看处理器活动。

```
switch# show system internal processes cpu

top - 23:51:41 up 51 min, 3 users, load average: 0.56, 0.49, 0.46
Tasks: 433 total, 1 running, 431 sleeping, 0 stopped, 1 zombie
Cpu(s): 5.9%us, 7.8%sy, 0.0%ni, 81.9%id, 3.6%wa, 0.1%hi, 0.6%si, 0.0%st
Mem: 8245436k total, 3531776k used, 4713660k free, 5360k buffers
Swap: 0k total, 0k used, 0k free, 1458188k cached

PID USER PR NI VIRT RES SHR S %CPU %MEM TIME+ COMMAND
3589 svc-isan 25 5 112m 8864 4572 S 5.7 0.1 0:21.60 stats_client
10881 sjlan 20 0 3732 1648 1140 R 3.8 0.0 0:00.04 top
26 root 20 0 0 0 0 S 1.9 0.0 1:07.07 kide/1
3280 root -2 0 101m 6104 3680 S 1.9 0.1 0:32.57 octopus
3570 root 20 0 123m 19m 6456 S 1.9 0.2 0:06.07 diag_port_lb
5151 root 20 0 205m 45m 9.8m S 1.9 0.6 0:02.61 netstack
1 root 20 0 1988 604 524 S 0.0 0.0 0:03.75 init
2 root 15 -5 0 0 0 S 0.0 0.0 0:00.00 kthreadd
3 root RT -5 0 0 0 S 0.0 0.0 0:00.00 migration/0
4 root 15 -5 0 0 0 S 0.0 0.0 0:00.61 ksoftirqd/0
5 root -2 -5 0 0 0 S 0.0 0.0 0:00.06 watchdog/0
6 root RT -5 0 0 0 S 0.0 0.0 0:00.00 migration/1
7 root 15 -5 0 0 0 S 0.0 0.0 0:04.80 ksoftirqd/1
```

字段	描述
PID	进程 ID
用户	负责进程的用户的名称
公共关系	分配给进程的优先级
NI	此过程的出色价值
VIRT	进程使用的虚拟内存量
RES	进程使用的物理RAM大小（其驻留大小）（千字节）
SHR	进程使用的共享内存量
S	进程的状态。可能的值包括： • D -不间断睡眠

	• R -正在运行 • S -睡眠 • T -已跟踪或已停止 • Z -僵尸
%CPU	进程使用的CPU时间的百分比
%MEM	进程使用的可用物理RAM的百分比
TIME+	自进程启动以来已消耗的CPU时间总量
命令	为启动进程而输入的命令的名称

{#seconds} | no-more选项允许每#seconds自动执行一次命令，直到输入Ctrl-C。这是输出示例：：

<#root>

```
switch# show system internal processes cpu

5 | no-more


top - 17:31:12 up 4 days, 18:31,  3 users,  load average: 0.52, 0.40, 0.32
Tasks: 449 total,   3 running, 446 sleeping,   0 stopped,   0 zombie
Cpu(s):  3.5%us,  4.5%sy,  0.0%ni, 91.2%id,  0.1%wa,  0.1%hi,  0.5%si,  0.0%st
Mem:   8245436k total,  4192740k used,  4052696k free,    27644k buffers
Swap:        0k total,        0k used,        0k free,  1919612k cached
  PID USER      PR  NI  VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
 2908 root      20   0  112m 8516 5516 S  7.5  0.1 264:44.25 pfm
31487 sjlan     20   0  3732 1652 1140 R  5.6  0.0   0:00.05 top
 3059 svc-isan  20   0 80288 7536 4440 S  3.8  0.1  65:44.59 diagmgr
 3192 root      20   0  334m  47m  11m S  1.9  0.6  25:36.52 netstack
 3578 svc-isan  20   0  118m  13m 6952 S  1.9  0.2  24:57.36 stp
 5119 svc-isan  20   0  139m  14m 7028 S  1.9  0.2   3:48.60 urib
 5151 root      20   0  209m  46m  11m S  1.9  0.6  38:53.39 netstack
 5402 svc-isan  20   0  117m  15m 9140 S  1.9  0.2  36:07.13 stp
 6175 svc-isan  20   0  118m  16m 9580 S  1.9  0.2  47:09.41 stp
    1 root      20   0  1988  604  524 S  0.0  0.0   0:06.51 init
    2 root      15  -5     0    0    0 S  0.0  0.0   0:00.00 kthreadd
    3 root      RT  -5     0    0    0 S  0.0  0.0   0:00.08 migration/0
    4 root      15  -5     0    0    0 S  0.0  0.0   1:07.77 ksoftirqd/0

top - 17:31:18 up 4 days, 18:31,  3 users,  load average: 0.48, 0.39, 0.32
Tasks: 449 total,   1 running, 448 sleeping,   0 stopped,   0 zombie
Cpu(s):  3.5%us,  4.5%sy,  0.0%ni, 91.2%id,  0.1%wa,  0.1%hi,  0.5%si,  0.0%st
Mem:   8245436k total,  4192592k used,  4052844k free,    27644k buffers
Swap:        0k total,        0k used,        0k free,  1919612k cached

  PID USER      PR  NI  VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
 2908 root      20   0  112m 8516 5516 S  7.5  0.1 264:44.47 pfm
31490 sjlan     20   0  3732 1656 1140 R  3.8  0.0   0:00.04 top
    1 root      20   0  1988  604  524 S  0.0  0.0   0:06.51 init
    2 root      15  -5     0    0    0 S  0.0  0.0   0:00.00 kthreadd
    3 root      RT  -5     0    0    0 S  0.0  0.0   0:00.08 migration/0
    4 root      15  -5     0    0    0 S  0.0  0.0   1:07.77 ksoftirqd/0
    5 root      -2  -5     0    0    0 S  0.0  0.0   0:13.74 watchdog/0
    6 root      RT  -5     0    0    0 S  0.0  0.0   0:00.10 migration/1
    7 root      15  -5     0    0    0 S  0.0  0.0   0:54.47 ksoftirqd/1
    8 root      -2  -5     0    0    0 S  0.0  0.0   0:00.20 watchdog/1
    9 root      15  -5     0    0    0 S  0.0  0.0   0:02.94 events/0
```

```
   10 root      15  -5     0    0    0 S  0.0  0.0   0:02.58 events/1
   11 root      15  -5     0    0    0 S  0.0  0.0   0:00.00 khelper
top - 17:31:23 up 4 days, 18:31,  3 users,  load average: 0.44, 0.39, 0.32
Tasks: 449 total,   1 running, 448 sleeping,   0 stopped,   0 zombie
Cpu(s):  3.5%us,  4.5%sy,  0.0%ni, 91.2%id,  0.1%wa,  0.1%hi,  0.5%si,  0.0%st
Mem:   8245436k total,  4192584k used,  4052852k free,    27644k buffers
Swap:        0k total,        0k used,        0k free,  1919612k cached

  PID USER      PR  NI  VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
31493 sjlan     20   0  3732 1656 1140 R  3.8  0.0   0:00.04 top
 5004 svc-isan  20   0  118m  13m 6852 S  1.9  0.2  41:35.81 stp
10337 svc-isan  20   0  133m  11m 7948 S  1.9  0.1   1:42.81 mcecm
    1 root      20   0  1988  604  524 S  0.0  0.0   0:06.51 init
    2 root      15  -5     0    0    0 S  0.0  0.0   0:00.00 kthreadd
    3 root      RT  -5     0    0    0 S  0.0  0.0   0:00.08 migration/0
    4 root      15  -5     0    0    0 S  0.0  0.0   1:07.77 ksoftirqd/0
    5 root      -2  -5     0    0    0 S  0.0  0.0   0:13.74 watchdog/0
    6 root      RT  -5     0    0    0 S  0.0  0.0   0:00.10 migration/1
    7 root      15  -5     0    0    0 S  0.0  0.0   0:54.47 ksoftirqd/1
    8 root      -2  -5     0    0    0 S  0.0  0.0   0:00.20 watchdog/1
    9 root      15  -5     0    0    0 S  0.0  0.0   0:02.94 events/0

   10 root      15  -5     0    0    0 S  0.0  0.0   0:02.58 events/1
top - 17:31:29 up 4 days, 18:31,  3 users,  load average: 0.41, 0.38, 0.32
Tasks: 449 total,   1 running, 448 sleeping,   0 stopped,   0 zombie
Cpu(s):  3.5%us,  4.5%sy,  0.0%ni, 91.2%id,  0.1%wa,  0.1%hi,  0.5%si,  0.0%st
Mem:   8245436k total,  4192708k used,  4052728k free,    27644k buffers
Swap:        0k total,        0k used,        0k free,  1919616k cached
```

show system internal sysmgr service pid <pid>命令

使用此命令可以按PID显示进程/服务的其他详细信息，例如重新启动时间、崩溃状态和当前状态。

```
switch# show system internal processes cpu
top - 17:37:26 up 4 days, 18:37,  3 users,  load average: 0.16, 0.35, 0.33
Tasks: 450 total,   2 running, 448 sleeping,   0 stopped,   0 zombie
Cpu(s):  3.5%us,  4.5%sy,  0.0%ni, 91.2%id,  0.1%wa,  0.1%hi,  0.5%si,  0.0%st
Mem:   8245436k total,  4193248k used,  4052188k free,    27668k buffers
Swap:        0k total,        0k used,        0k free,  1919664k cached
  PID USER      PR  NI  VIRT  RES  SHR S %CPU %MEM    TIME+  COMMAND
 2908 root      20   0  112m 8516 5516 S  7.5  0.1 264:58.67 pfm
31710 sjlan     20   0  3732 1656 1140 R  3.8  0.0   0:00.04 top
 3192 root      20   0  334m  47m  11m S  1.9  0.6  25:38.39 netstack
 3578 svc-isan  20   0  118m  13m 6952 S  1.9  0.2  24:59.08 stp
 5151 root      20   0  209m  46m  11m S  1.9  0.6  38:55.52 netstack
 5402 svc-isan  20   0  117m  15m 9140 S  1.9  0.2  36:09.08 stp
 5751 root      20   0  209m  46m  10m S  1.9  0.6  41:20.58 netstack
 6098 svc-isan  20   0  151m  15m 6188 S  1.9  0.2   3:58.40 mrib
 6175 svc-isan  20   0  118m  16m 9580 S  1.9  0.2  47:12.00 stp
    1 root      20   0  1988  604  524 S  0.0  0.0   0:06.52 init
    2 root      15  -5     0    0    0 S  0.0  0.0   0:00.00 kthreadd
    3 root      RT  -5     0    0    0 S  0.0  0.0   0:00.08 migration/0
    4 root      15  -5     0    0    0 S  0.0  0.0   1:07.83 ksoftirqd/0

switch# show system internal sysmgr service pid 2908
Service "Platform Manager" ("platform", 5):
        UUID = 0x18, PID = 2908, SAP = 39
```

```
State: SRV_STATE_HANDSHAKED (entered at time Mon Oct 15 23:03:45 2012).
Restart count: 1
Time of last restart: Mon Oct 15 23:03:44 2012.
The service never crashed since the last reboot.
Tag = N/A
Plugin ID: 0
```

示例EEM脚本

这是一个捕获间歇性高CPU使用率的示例脚本。使用的值以及发出的命令可以根据要求进行修改：

```
event manager applet HIGH-CPU
 event snmp oid 1.3.6.1.4.1.9.9.109.1.1.1.1.6.1 get-type exact entry-op ge
    entry-val 80 exit-val 30 poll-interval 5
 action 1.0 syslog msg High CPU hit $_event_pub_time
 action 2.0 cli enable
 action 3.0 cli show clock >> bootflash:high-cpu.txt
 action 4.0 cli show processes cpu sort >> bootflash:high-cpu.txt
```

注意：必须定义“exit-val”。 当脚本收集数据时，会增加CPU利用率。exit-val的值可确保脚本不会在无限循环中运行。

进程或流量导致CPU使用率较高

监控CPU使用率时，没有进程与中断CPU使用率(如在Cisco IOS®软件平台上)。确定CPU使用率较高原因的一种快速方法是使用show system internal processes cpu命令。通常，流量触发的高CPU使用率会导致Netstack以及其他功能和进程（如地址解析协议[ARP]和互联网组管理协议[IGMP]）运行率较高。

进程导致高CPU使用率

根据导致高CPU使用率的进程和问题，可能需要捕获特定命令。以下部分介绍有用的方法。

show system internal <feature> mem-stats/memstats | 大命令中

使用此命令可显示进程的内存分配；使用“in Grand”选项可监控总内存。内存泄漏可能导致进程出现行为异常，从而导致CPU使用率较高。

Ethanalyzer

使用Ethanalyzer监控到CPU的流量。

调试命令

> 注意：使用debug命令之前，请参阅有关Debug命令的重要信息。在生产交换机上明智地使用debug命令，以避免服务中断。

请尽可能使用debug logfile命令将输出定向到指定文件，并避免锁定会话以填满syslog。以下是调试简单网络管理协议(SNMP)的示例：

```
switch# debug logfile snmpdebug
switch# debug snmp  all
switch# show debug logfile snmpdebug
2012 Oct 17 23:53:25.905914 snmpd: SDWRAP message Successfully processed
2012 Oct 17 23:53:25.906162 snmpd: Src: 0x00000501/23852  Dst: 0x00000501/28  ID
   : 0x006E3C9B  Size: 276 [REQ] Opc: 182 (MTS_OPC_DEBUG_WRAP_MSG) RR: 0x006E3C9B
   HA_SEQNO: 0x00000000  TS: 0x10ADFFA1666FC  REJ:0  SYNC:0  OPTIONS:0x0
2012 Oct 17 23:53:25.906208 snmpd: 01 00 00 00 E7 03 00 00 00 00 00 00 00 00 00 00
2012 Oct 17 23:53:25.906225 snmpd: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
2012 Oct 17 23:53:25.906239 snmpd: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
2012 Oct 17 23:53:25.906255 snmpd: FF FF FF FF 2F 64 65 76 2F 70 74 73 2F 30 00 00
2012 Oct 17 23:53:25.906271 snmpd: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

switch# show log last 10
2012 Oct 17 17:51:06 SITE1-AGG1 %ETHPORT-5-IF_TX_FLOW_CONTROL: Interface
   Ethernet10/10, operational Transmit Flow Control state changed to off
2012 Oct 17 17:51:09 SITE1-AGG1 %ETH_PORT_CHANNEL-5-PORT_SUSPENDED:
   Ethernet10/10: Ethernet10/10 is suspended
2012 Oct 17 17:51:51 SITE1-AGG1 last message repeated 1 time
2012 Oct 17 17:51:51 SITE1-AGG1 %ETHPORT-5-IF_DOWN_LINK_FAILURE:
   Interface Ethernet10/10 is down (Link failure)
2012 Oct 17 17:51:52 SITE1-AGG1 %ETHPORT-5-SPEED: Interface Ethernet10/10,
   operational speed changed to 10 Gbps
2012 Oct 17 17:51:52 SITE1-AGG1 %ETHPORT-5-IF_DUPLEX: Interface
   Ethernet10/10, operational duplex mode changed to Full
2012 Oct 17 17:51:52 SITE1-AGG1 %ETHPORT-5-IF_RX_FLOW_CONTROL: Interface
   Ethernet10/10, operational Receive Flow Control state changed to off
2012 Oct 17 17:51:52 SITE1-AGG1 %ETHPORT-5-IF_TX_FLOW_CONTROL: Interface
   Ethernet10/10, operational Transmit Flow Control state changed to off
2012 Oct 17 17:51:55 SITE1-AGG1 %ETH_PORT_CHANNEL-5-PORT_UP: port-channel11:
   Ethernet10/10 is up
2012 Oct 17 17:51:56 SITE1-AGG1 %ETHPORT-5-IF_UP: Interface Ethernet10/10
   is up in mode trunk
```

请尽可能使用debug-filter 命令，以最小化生产系统上的输出。例如，数据包丢失会导致单向链路检测(UDLD)空响应：

```
switch# debug logfile test size 1000000
switch# debug-filter pktmgr direction inbound
switch# debug-filter pktmgr dest-mac 0100.0ccc.cccc
switch# debug pktmgr client uuid 376
switch# debug pktmgr frame
switch# debug pktmgr pkt-errors

switch# debug-filter ?
  fabricpath  Debug fabricpath events
```

```
ip          IP events
ipv6        IPv6 events
l2pt        L2 Protocol Tunneling events
mpls        MPLS events
pktmgr      Pm debug-filter
routing     Routing events
```

流量导致高CPU使用率

当流量导致CPU使用率较高时，请使用以下工具：

- Ethanalyzer - 监控与CPU之间的流量类型。
- Configuration -检查交换机/接口/功能配置
- CoPP/硬件速率限制器 -确保CoPP和HWRL已正确配置。有时，CPU不会运行太高，因为它受到CoPP和速率限制器的保护。检查CoPP和HWRL，查看某些流量/数据包是否存在丢包现象。

> 注意：CoPP和HWRL都只能从默认虚拟设备环境(VDC)中使用。它们由每个单独的I/O模块实施。来自多个模块的聚合流量仍然会给CPU带来沉重负担。

高CPU使用率的根本原因分析

网络中断可以通过用户干预解决，也可以自行恢复（用户可自行恢复）。如果您怀疑高CPU使用率导致网络中断，请使用以下指南调查原因。

症状

CPU使用率高的症状包括控制平面不稳定、控制平面故障导致的数据平面连接问题、热待机路由器协议(HSRP)/RP抖动等协议抖动、UDLD错误禁用、生成树协议(STP)故障以及其他连接问题。

CPU历史记录

show processes cpu history命令

如果交换机未重新加载或未进行切换，请在中断的72小时内运行show processes cpu history命令，以查看事件发生时是否出现了高CPU使用率。

CoPP和HWRL

如果高CPU使用率是过去中断的根本原因，并且您怀疑中断是由网络流量触发的，则可以使用CoPP和HWRL（硬件速率限制器）来帮助识别流量的类型。

show policy-map interface control-plane命令

以下是show policy-map interface control-plane命令的示例输出：

```
switch# show policy-map interface control-plane
Control Plane

  service-policy  input: copp-system-p-policy-strict

    class-map copp-system-p-class-critical (match-any)
      match access-group name copp-system-p-acl-bgp
      match access-group name copp-system-p-acl-bgp6
      match access-group name copp-system-p-acl-igmp
      match access-group name copp-system-p-acl-msdp
      match access-group name copp-system-p-acl-ospf

      match access-group name copp-system-p-acl-pim
      match access-group name copp-system-p-acl-pim6
      match access-group name copp-system-p-acl-rip
      match access-group name copp-system-p-acl-rip6
      match access-group name copp-system-p-acl-vpc
      match access-group name copp-system-p-acl-eigrp
      match access-group name copp-system-p-acl-eigrp6
      match access-group name copp-system-p-acl-mac-l2pt
      match access-group name copp-system-p-acl-mpls-ldp
      match access-group name copp-system-p-acl-mpls-oam
      match access-group name copp-system-p-acl-ospf6
      match access-group name copp-system-p-acl-otv-as
      match access-group name copp-system-p-acl-mac-otv-isis
      match access-group name copp-system-p-acl-mpls-rsvp
      match access-group name copp-system-p-acl-mac-fabricpath-isis
      match protocol mpls router-alert
      match protocol mpls exp 6
      set cos 7
      police cir 39600 kbps , bc 250 ms
      module 1 :
        conformed 1108497274 bytes; action: transmit
        violated 0 bytes; action: drop

      module 3 :
        conformed 0 bytes; action: transmit
        violated 0 bytes; action: drop

      module 10 :
        conformed 0 bytes; action: transmit
.
.
.
```

show hardware rate-limiter mod <x>命令

以下是NX-OS版本6.1之前的show hardware rate-limiter mod 1命令的输出示例：

```
switch# show hardware rate-limiter mod 1

Units for Config: packets per second
Allowed, Dropped & Total: aggregated since last clear counters

Rate Limiter Class                      Parameters
```

```
------------------------------------------------------------
layer-3 mtu                             Config    : 500
                                        Allowed   : 0
                                        Dropped   : 0
                                        Total     : 0

layer-3 ttl                             Config    : 500
                                        Allowed   : 0
                                        Dropped   : 0
                                        Total     : 0

layer-3 control                         Config    : 10000
                                        Allowed   : 0
                                        Dropped   : 0
.
.
.
```

下面是NX-OS版本6.1或更高版本中show hardware rate-limiter mod 1命令的输出示例：

```
switch# show hardware rate-limiter mod 1
switch# show hardware rate-limiter module 1

Units for Config: packets per second
Allowed, Dropped & Total: aggregated since last clear counters

Module: 1
  R-L Class           Config           Allowed         Dropped             Total
 +------------------+--------+--------------+--------------+-----------------+
  L3 mtu                  500              0               0                 0
  L3 ttl                  500              0               0                 0
  L3 control            10000              0               0                 0
  L3 glean                100              0               0                 0
  L3 mcast dirconn       3000              0               0                 0
  L3 mcast loc-grp       3000              0               0                 0
  L3 mcast rpf-leak       500              0               0                 0
  L2 storm-ctrl       Disable
  access-list-log         100              0               0                 0
  copy                  30000              0               0                 0
  receive               30000          40583               0             40583
  L2 port-sec             500       20435006               0          20435006
  L2 mcast-snoop        10000              0               0                 0
  L2 vpc-low             4000              0               0                 0
  L2 l2pt                 500              0               0                 0
  f1 rl-1                4500                              0
  f1 rl-2                1000                              0
  f1 rl-3                1000                              0
  f1 rl-4                 100                              0
  f1 rl-5                1500                              0
  L2 vpc-peer-gw         5000              0               0                 0
  L2 lisp-map-cache      5000              0               0                 0
```

查找丢弃计数递增的任何类。找出超出所配置阈值的类是否正常。

带内驱动程序

show hardware internal cpu-mac inband [计数器 | 统计信息 | events]命令

使用此命令可检查CPU路径中的丢弃、XOFF流控制、最大CPU接收和发送速率等。

```
switch# show hardware internal cpu-mac inband stats
i82571 registers
=====================================================

RMON counters                              Rx                  Tx
---------------------+-------------------+--------------------
total packets                        70563313            139905960
good packets                         70563313            139905960
64 bytes packets                            0                    0
65-127 bytes packets                 66052368            135828505
128-255 bytes packets                 1424632              1327796
256-511 bytes packets                  280422               325220
512-1023 bytes packets                  17060                14480
1024-max bytes packets                2788831              2409959


broadcast packets                           0                    0
multicast packets                           0                    0
good octets (hi)                            0                    0
good octets (low)                18573099828          25929913975
total octets (hi)                           0                    0
total octets (low)               18573090123          25929922452
XON packets                                 0                    0
XOFF packets                                0                    0
     -------------> Pause Frame back to R2D2 when the traffic exceeds SUP limit
management packets                          0                    0

Interrupt counters
-------------------+--
Mine                57079706
Other               0
Assertions          57079706
Rx packet timer     9638
Rx absolute timer   0
Rx overrun          0
Rx descr min thresh 0
Tx packet timer     4189
Tx absolute timer   6476
Tx queue empty      0
Tx descr thresh low 0
txdw ..... 44983549
txqe ..... 2
lsc ..... 0
rxseq .... 0
rxdmt .... 213229
rxo ..... 0
rxt ..... 32433891
mdac ..... 0
rxcfg .... 0
gpi ..... 0

Error counters
```

```
--------------------------------+--
CRC errors ..................... 0
Alignment errors ............... 0
Symbol errors .................. 0
Sequence errors ................ 0
RX errors ...................... 0
Missed packets (FIFO overflow)   0
Single collisions .............. 0
Excessive collisions ........... 0
Multiple collisions ............ 0
Late collisions ................ 0
Collisions ..................... 0
Defers ......................... 0
Tx no CRS  ..................... 0
Carrier extension errors ....... 0

Rx length errors ............... 0
FC Rx unsupported .............. 0
Rx no buffers .................. 0  ----------------- no buffer
Rx undersize ................... 0
Rx fragments ................... 0
Rx oversize .................... 0
Rx jabbers ..................... 0
Rx management packets dropped .. 0
Tx TCP segmentation context .... 0
Tx TCP segmentation context fail 0

Throttle statistics
----------------------------+---------
Throttle interval ........... 2 * 100ms
Packet rate limit ........... 32000 pps
Rate limit reached counter .. 0
Tick counter ................ 2132276
Active ...................... 0
Rx packet rate (current/max)  169 / 610 pps  ----------------- Rx rate (current/max)
Tx packet rate (current/max)  429 / 926 pps

NAPI statistics
---------------+---------
Weight ......... 64
Poll scheduled . 57079706
Poll rescheduled 0
Poll invoked ... 117135124
Weight reached . 9
Tx packets ..... 139905960
Rx packets ..... 70563313
Rx congested ... 0
Rx redelivered . 0

qdisc stats:
---------------+---------
Tx queue depth . 1000
qlen ........... 0
packets ........ 139905960
bytes .......... 23411617016
drops .......... 0


Bahrain registers (cleared by chip reset only)
======================================================
revision           0x00000108
scratchpad         0xaaaaaaaa
```

```
MAC status         0x00000001
MAC SerDes synced  0x00000001
MAC status 2       0x000100f8
Auto-XOFF config   1
Auto-XOFF status   0

MAC counters                      MAC0 (R2D2)            MAC1 (CPU)
----------------------+---------------------+---------------------
                              Rx          Tx          Rx          Tx
----------------------+----------+----------+----------+----------
64 bytes packets               0           0           0           0
65-127 bytes packets     66907289   136682635   135828505    66052368
128-255 bytes packets      570131      473705     1327796     1424632
256-511 bytes packets      280003      325182      325220      280422
512-1023 bytes packets      17061       14482       14480       17060
1024-1518 bytes packets    623614      242009      241831      623569
1519-max bytes packets    2165215     2167947     2168128     2165262
----------------------+----------+----------+----------+----------
total packets            70563313   139905960   139905960    70563313
total bytes             405350248  2496404376   160120520  1393236630
----------------------+----------+----------+----------+----------
undersized packets             0                     0
fragmented packets             0                     0
FCS errors                     0                     0
----------------------+----------+----------+----------+----------
auto-XOFF state entered        0 times
auto-XOFF reset                0 times
XOFF packets auto-generated                0
XOFF packets                               0          0
XON  packets                   0                     0
----------------------+----------+----------+----------+----------
parity error                   0           0          0           0
fifo errors                    0                      0
overflow errors                                       0           0
----------------------+----------+----------+----------+----------
```

在NX-OS版本5.X之后，“events”是一个命令选项，提供达到每秒最大数据包接收(RX)或传输(TX) CPU速率的时间。此示例说明如何确定遇到CPU流量最后一个峰值时的时间：

```
switch# show hardware internal cpu-mac inband events

1) Event:TX_PPS_MAX, length:4, at 648617 usecs after Fri Oct 19 13:23:06 2012
    new maximum = 926


2) Event:TX_PPS_MAX, length:4, at 648622 usecs after Fri Oct 19 13:15:06 2012
    new maximum = 916


3) Event:TX_PPS_MAX, length:4, at 648612 usecs after Fri Oct 19 13:14:06 2012
    new maximum = 915


4) Event:TX_PPS_MAX, length:4, at 648625 usecs after Fri Oct 19 13:12:06 2012
    new maximum = 914
```

```
5) Event:TX_PPS_MAX, length:4, at 648626 usecs after Fri Oct 19 13:11:06 2012
    new maximum = 911


6) Event:TX_PPS_MAX, length:4, at 648620 usecs after Fri Oct 19 13:08:06 2012
    new maximum = 910
```

show system internal pktmgr internal vdc inband <int>命令

使用此命令确定传送到CPU的流量的来源。

```
switch# show system internal pktmgr internal vdc inband e1/5
Interface          Src Index     VDC ID    Packet rcvd
-----------------------------------------------------
Ethernet1/5          0xa1d          1          14640
```

Netstack/Pktmgr

Netstack是在Nexus 7000的用户空间中实施的完整IP堆栈。组件包括L2数据包管理器、ARP、邻接管理器、IPv4、互联网控制消息协议v4 (ICMPv4)、IPv6、ICMPv6、TCP/UDP和套接字库。当流向CPU的流量触发CPU使用率较高时，您经常会看到Netstack及其相应进程运行率较高。

show system inband queuing status命令

此示例说明如何显示正在使用的Netstack排队算法：

```
switch# show system inband queuing status
  Weighted Round Robin Algorithm
  Weights BPDU - 32, Q0 - 8, Q1 - 4, Q2 - 2 Q3 - 64
```

show system inband queuing statistics命令

此示例显示可内核加载模块(KLM)和用户空间进程中的计数器。

KLM是在默认VDC上运行并在带内和管理接口上运行的单个实例。KLM仅在将入口帧发送到正确的VDC Netstack以进行处理的入口数据包处理期间进入图片。

```
switch# show system inband queuing statistics
  Inband packets unmapped to a queue: 0
  Inband packets mapped to bpdu queue: 7732593
  Inband packets mapped to q0: 686667
  Inband packets mapped to q1: 0
  Inband packets mapped to q2: 0
```

```
  Inband packets mapped to q3: 20128
  In KLM packets mapped to bpdu: 7732593
  In KLM packets mapped to arp : 912
  In KLM packets mapped to q0  : 686667
  In KLM packets mapped to q1  : 0
  In KLM packets mapped to q2  : 0
  In KLM packets mapped to q3  : 20128
 In KLM packets mapped to veobc : 0
 Inband Queues:
  bpdu: recv 1554390, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 1
  (q0): recv 686667, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
  (q1): recv 0, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
  (q2): recv 0, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
  (q3): recv 20128, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
```

show system internal pktmgr internal vdc global-stats命令

此命令与前面的show system inband queuing statistics命令相似，并提供许多详细信息：

```
switch# show system internal pktmgr internal vdc global-stats

VDC KLM global statistics:
  Inband packets not mapped to a VDC: 0
  Inband diag packets received: 998222
  Weighted Round Robin Algorithm
  Weights BPDU - 32, Q0 - 8, Q1 - 4, Q2 - 2 Q3 - 64
  Inband packets unmapped to a queue: 0
  Inband packets mapped to bpdu queue: 7734430 (7734430)
  Inband packets mapped to q0: 686779 (686779)
  Inband packets mapped to q1: 0 (0)
  Inband packets mapped to q2: 0 (0)
  Inband packets mapped to q3: 20128 (20128)
  Pkt Size History : 2811395 for index 1
  Pkt Size History : 274508 for index 2
  Pkt Size History : 74284 for index 3
  Pkt Size History : 43401 for index 4
  Pkt Size History : 70915 for index 5
  Pkt Size History : 35602 for index 6
  Pkt Size History : 30085 for index 7
  Pkt Size History : 29408 for index 8
  Pkt Size History : 21221 for index 9
  Pkt Size History : 15683 for index 10
  Pkt Size History : 13212 for index 11
  Pkt Size History : 10646 for index 12
  Pkt Size History : 9290 for index 13
  Pkt Size History : 50298 for index 14
  Pkt Size History : 5473 for index 15
  Pkt Size History : 4871 for index 16
  Pkt Size History : 4687 for index 17
  Pkt Size History : 5507 for index 18
  Pkt Size History : 15416 for index 19
  Pkt Size History : 11333 for index 20
  Pkt Size History : 5478 for index 21
  Pkt Size History : 4281 for index 22
  Pkt Size History : 3543 for index 23
  Pkt Size History : 3059 for index 24
  Pkt Size History : 2228 for index 25
```

```
  Pkt Size History : 4390 for index 26
  Pkt Size History : 19892 for index 27
  Pkt Size History : 524 for index 28
  Pkt Size History : 478 for index 29
  Pkt Size History : 348 for index 30
  Pkt Size History : 447 for index 31
  Pkt Size History : 1545 for index 32
  Pkt Size History : 152 for index 33
  Pkt Size History : 105 for index 34
  Pkt Size History : 1424 for index 35
  Pkt Size History : 43 for index 36
  Pkt Size History : 60 for index 37
  Pkt Size History : 60 for index 38
  Pkt Size History : 46 for index 39
  Pkt Size History : 58 for index 40
  Pkt Size History : 829 for index 41
  Pkt Size History : 32 for index 42
  Pkt Size History : 26 for index 43
  Pkt Size History : 1965 for index 44
  Pkt Size History : 21 for index 45
  Pkt Size History : 1 for index 46
  Pkt Size History : 1 for index 48
  Pkt Size History : 1 for index 51
  Pkt Size History : 1 for index 52
  Pkt Size History : 1 for index 53
  Pkt Size History : 3 for index 55
 In KLM packets mapped to bpdu: 7734430
 In KLM packets mapped to arp : 912
 In KLM packets mapped to q0  : 686779
 In KLM packets mapped to q1  : 0
 In KLM packets mapped to q2  : 0
 In KLM packets mapped to q3  : 20128
 In KLM packets mapped to veobc : 0
 In KLM Queue Mapping (0 1 2 3 4)
 Data Available in FDs (0 0 0 0 0)
 Inband Queues:
  bpdu: recv 1556227, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 1
  (q0): recv 686779, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
  (q1): recv 0, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
  (q2): recv 0, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
  (q3): recv 20128, drop 0, congested 0 rcvbuf 2097152, sndbuf 262142 no drop 0
  Mgmt packets not mapped to a VDC: 227551
  Mgmt multicast packets dropped: 92365
  Mgmt multicast packets delivered: 0
  Mgmt packets broadcast to each VDC: 23119
  Mgmt debugging packets copied:  0
  Mgmt IPv6 multicast packets delivered:  0
  Mgmt IPv6 link-local packets delivered:  0
  Mgmt LLDP packets received: 0
```

show system internal pktmgr interface ethernet <int>命令

使用此命令可以查看来自接口的CPU传送流量的数据包速率以及流量类型（单播或组播）。

```
switch# show system internal pktmgr interface e1/5
Ethernet1/5, ordinal: 73
  SUP-traffic statistics: (sent/received)
```

```
    Packets: 63503 / 61491
    Bytes: 6571717 / 5840641
    Instant packet rate: 0 pps / 0 pps
    Packet rate limiter (Out/In): 0 pps / 0 pps
    Average packet rates(1min/5min/15min/EWMA):
    Packet statistics:
      Tx: Unicast 3198, Multicast 60302
          Broadcast 3
      Rx: Unicast 3195, Multicast 58294
          Broadcast 2
```

show system internal pktmgr client <uuid>命令

此命令显示向Packet Manager注册的应用（例如STP或思科发现协议[CDP]）以及这些应用发送和接收的数据包数量。

```
switch# show system internal pktmgr client
Client uuid: 268, 4 filters, pid 3127
  Filter 1: EthType 0x0806,
  Rx: 2650, Drop: 0
  Filter 2: EthType 0xfff0, Exc 8,
  Rx: 0, Drop: 0
  Filter 3: EthType 0x8841, Snap 34881,
  Rx: 0, Drop: 0
  Filter 4: EthType 0x0800, DstIf 0x150b0000, Excl. Any
  Rx: 0, Drop: 0
  Options: TO 0, Flags 0x18040, AppId 0, Epid 0
  Ctrl SAP: 278, Data SAP 337 (1)
  Total Rx: 2650, Drop: 0, Tx: 1669, Drop: 0
  Recirc Rx: 0, Drop: 0
  Rx pps Inst/Max: 0/20
  Tx pps Inst/Max: 0/5
  COS=0 Rx: 0, Tx: 0    COS=1 Rx: 912, Tx: 0
  COS=2 Rx: 0, Tx: 0    COS=3 Rx: 0, Tx: 0
  COS=4 Rx: 0, Tx: 0    COS=5 Rx: 0, Tx: 1669
  COS=6 Rx: 0, Tx: 0    COS=7 Rx: 1738, Tx: 0

Client uuid: 270, 1 filters, pid 3128
  Filter 1: EthType 0x86dd, DstIf 0x150b0000, Excl. Any
  Rx: 0, Drop: 0
  Options: TO 0, Flags 0x18040, AppId 0, Epid 0
  Ctrl SAP: 281, Data SAP 283 (1)
  Total Rx: 0, Drop: 0, Tx: 0, Drop: 0
  Recirc Rx: 0, Drop: 0
  Rx pps Inst/Max: 0/0
  Tx pps Inst/Max: 0/0
  COS=0 Rx: 0, Tx: 0    COS=1 Rx: 0, Tx: 0
  COS=2 Rx: 0, Tx: 0    COS=3 Rx: 0, Tx: 0
  COS=4 Rx: 0, Tx: 0    COS=5 Rx: 0, Tx: 0
  COS=6 Rx: 0, Tx: 0    COS=7 Rx: 0, Tx: 0
```

show system internal pktmgr stats命令

使用此命令可检查数据包是否到达入口路径中的数据包管理器，以及数据包管理器是否正在发送数据包。此命令还可以帮助您确定接收或传输路径中是否存在缓冲区问题。

```
switch# show system internal pktmgr stats
Route Processor Layer-2 frame statistics

  Inband driver: valid 1, state 0, rd-thr 1, wr-thr 0, Q-count 0
  Inband sent: 56441521, copy_drop: 0, ioctl_drop: 0,
     unavailable_buffer_hdr_drop: 0
  Inband standby_sent: 0
  Inband encap_drop: 0, linecard_down_drop: 0
  Inband sent by priority [0=11345585,5=164281,6=43280117,7=1651538]
  Inband max output queue depth 0
  Inband recv: 89226232, copy_drop: 0, ioctl_drop: 0,
     unavailable_buffer_hdr_drop: 0
  Inband decap_drop: 0, crc_drop: 0, recv by priority: [0=89226232]
  Inband bad_si 0, bad_if 0, if_down 0
  Inband last_bad_si 0, last_bad_if 0, bad_di 0
  Inband kernel recv 44438488, drop 0, rcvbuf 2097152, sndbuf 4194304

  Mgmt driver: valid 1, state 0, rd-thr 1, wr-thr 0, Q-count 0
  Mgmt sent: 971834, copy_drop: 0, ioctl_drop: 0,
     unavailable_buffer_hdr_drop: 0
  Mgmt standby_sent: 0
  Mgmt encap_drop: 0, linecard_down_drop: 0
  Mgmt sent by priority [0=925871,5=45963]
  Mgmt max output queue depth 0
  Mgmt recv: 1300932, copy_drop: 0, ioctl_drop: 0,
     unavailable_buffer_hdr_drop: 0
  Mgmt decap_drop: 0, crc_drop: 0, recv by priority: [0=1300932]
  Mgmt bad_si 0, bad_if 0, if_down 0
  Mgmt last_bad_si 0, last_bad_if 0, bad_di 0
  Mgmt kernel recv 1300932, drop 0, rcvbuf 2097152, sndbuf 2097152

  Inband2 driver: valid 0, state 1, rd-thr 0, wr-thr 0, Q-count 0

  No of packets passed by   PM Policy database         876452
  No of packets dropped by  PM Policy database         0
  No of packets bypassed by PM Policy database         424480
  No of packets dropped by  PM originating from kernel 0

  MBUFSK Tx: 57413355 pkts (requested 57413355 denied 0), 62236110 mbufs
         function invoked 57413355 denied 0/0 c/realloc 0/0
  MBUFSK Rx: 90527161 pkts, 90527421 mbufs (requested 2388154951 denied 0)
         function invoked 35132836

  Global input drops: bad-interface 0, bad-encap 0, failed-decap 0,
     no prot 42371
  recv_encaptype_err 0, recv_decap_err 0,  recv_mac_mismatch 0, recv_no_client 0
  recv_no_svi 0, recv_no_vlan 0,  recv_client_notreg 0, recv_enqueue_fail 0

  Global output drops:
  send_ifdown_fail 13, send_invalid_iod 0
  send_invalid_vlan 0, send_security_drop 0  send_loopback_drop 0,
     send_small_pkt_fail 0
  send_vsl_err 0, send_dce_err 0,send_enqueue_fail 0, send_alloc_fail 0

  DCE errors:
  misc_err 0, lookup_err 0, encap_err 0, decap_err 0
```

```
 Platform errors:
 generic_encap_err 0, encap_err 0, decap_err 0
 vlan_encap_err 0, vlan_decap_err 0

 DC3HDR errors:
 pkt_err 0, vlan_err 0, ifidx_err 0, portidx_err 0

 RECIRC errors:
 misc_err 0, lookup_err 0

 Lcache errors:
 init_err 0, timer_err 0

 Stats errors:
 misc_err 0, init_err 0, timer_err 0

 Client errors:
 alloc_err 0, pid_err 0, register_err 0,  unregister_err 0
 add_err 0, delete_err 0, update_err 0

 VDC errors:
 alloc_err 0, set_err 0, update_err 0

 Misc. errors:
 mts_err 0, mbuf_err 0, drop_exception 0
 invalid_drv_type 0, interface_err 0
 eth_output_err 0, gre_err 0 otv_err 0
 tunnel_6to4_err 0, mcec_err 0, invalid_gpc 0 invalid_ftag 0 invalid_l2_type :0
 register_err 0, unregister_err 0, invalid_args 0, file_open_err 0
 inband_err 0, vlan_err 0, pm_alloc_err 0, pm_ha_err 0, pm_init_err 0
 arp_init_err 0, rtm_init_err 0, am_init_err 0, ui_init_err 0, mpls_init_err 0,
    evc_init_err 0
 sdb_err 95670, sdb_init_err 0
 sysmgr_err 0, eth_span_err 0, buf_pool_err 0, feature_err 0
 uuid2client_err 16, dot1q_drop 0, nfcache_init_err 0

 Crossbar down drops : 0
 Exception packets: mtu-fail 0, icmp-redirect 0, icmp-unreach 0, ttl 0
                    options 0, rpf 0, two-mcast-rpf 0, l3-bridge-drop 0
                    mcast-next-hop 0, municast 0
                    drop 0, acl-redirect 0, acl-redir-arp 0, acl-redir-dhcp 0
                    sup-shim-pkt 229385   Pkts recvd with peergway SUP DI 0

 VPC Frame Statistics
 VPC Mgr reg state 1, im-ext-sdb-state 1
 Ingress BPDUs qualified for redirection 0
 Ingress BPDUs redirected to peer 0
 Egress BPDUs qualified for redirection 0
 Egress BPDUs dropped due to remote down 0
 Egress BPDUs redirected to peer 0
 Ingress pkts qualified for peergateway tunneling 0
 Ingress pkts tunneled to peer with peergateway conf 0
 Peer-gw pkts tunneled tx :
    From VPC+ leg 0, From VPC leg 0, From l2mp network 0
    From orphan port in VPC+ 0, from orphan port in VPC 0
    For ARP 0, IP 0, IPv6 0, unknown 0
 Total Tunneled packets received from peer 0
 Local delivery 0, Transmit down 0, peer-gw tunneled 0
Tunnel rx packets drop due to local vpc leg down 0
 Peer-gw pkts tunneled rx :
    From VPC+ leg 0, VPC leg 0, From l2mp network 0
```

```
     From orphan port in VPC+ 0, from orphan port in VPC 0
     For ARP 0, IP 0, IPv6 0, unknown 0

  Error Statistics
  VPC manager: uninit 0, library 0
  Tunnel (ingress): non-mct rx 0, bad hdr 0, badpkts 0, non gpc peer 0
  Tunnel (ingress): redirlooperror 0
  Tunnel (egress): in-bpdu 0, e-bpdu 0, peer-gw 0
  MBuf: alloc: 0, prepend: 0, pullup: 0
  Invalid filter: 0
  Peergw tunneling tx: invalid ftag 0, invalid swid 0
                       invalid iftype 0, invalid GPC of peer 0
  Peergw tunneling rx: invalid msg subtype 0, invalid GPC of core 0
                       invalid GPC of peer 0, invalid svi 0
   Unicast pkts which passed egress redirection check 0

statistics last reset 2w0d
```

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