AOS8无线运维常规操作，常见问题总结及讨论

aruba NETWORKS an HP company

内容

- 无线网络运行状态查询
  - 无线网络总体状态查询
  - 控制器硬件运行状态查询
  - AP硬件运行状态查询
  - 无线用户接入状态查询

- 无线网络故障诊断方法
  - 常见故障信息的搜集
  - 常见故障原因的诊断

无线网络总体状态查询

管理页面自动进入到Managed Network>Dashboard->Performance菜单，且从总体上展示无线网络中所有无线终端和无线AP的当前运行现状，并通过颜色和数字来区分不同等级质量的无线终端数和AP数量。

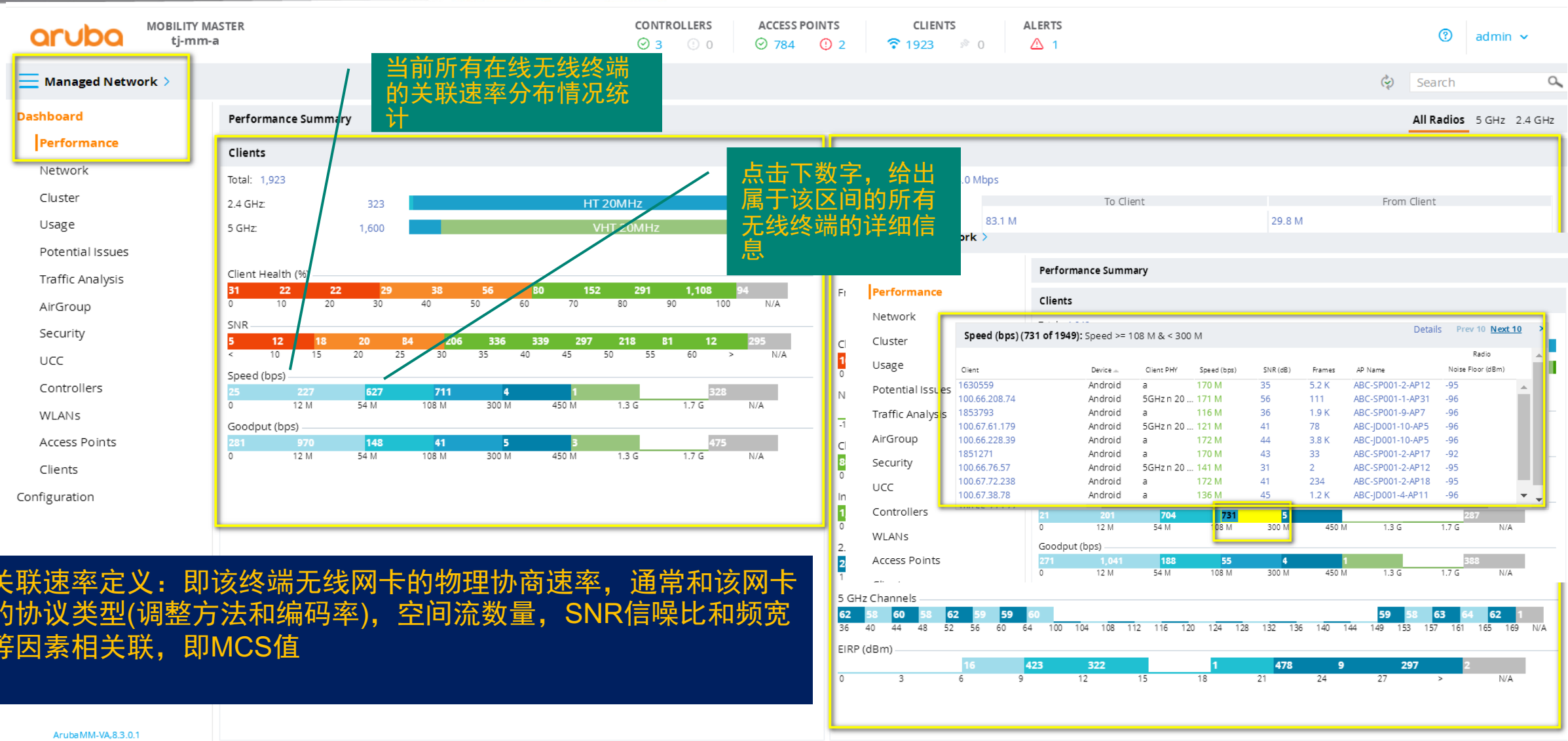
无线网络总体状态查询

健康度定义：从AP到客户端传输一个数据包，理想的空中传输时间和实际传输消耗的空中时间的比例，采用百分比为单位，该百分比即为健康度。理想的空中传输时间是假设该终端当前的关联最高数据速率传输且无重传，通常百分比在0-30%为差-红色，30-60%为中等-橙色，60-100%为正常-绿色，这些值是实时动态的，同时随着终端位置的变化，该值也会随时动态的变化）

无线网络总体状态查询

信噪比定义：AP上感知到的无线终端的信噪比，即信号和底噪的比值，反映终端的信号强度值，采用dB为单位，通常0-15为差-红色，15-30为中等-橙色，30以上为正常-绿色)。该值越大，表示在同一个底噪环境中，终端和AP的距离越近，信号越强。

无线网络总体状态查询



关联速率定义：即该终端无线网卡的物理协商速率，通常和该网卡的协议类型(调整方法和编码率)，空间流数量，SNR信噪比和频宽等因素相关联，即MCS值

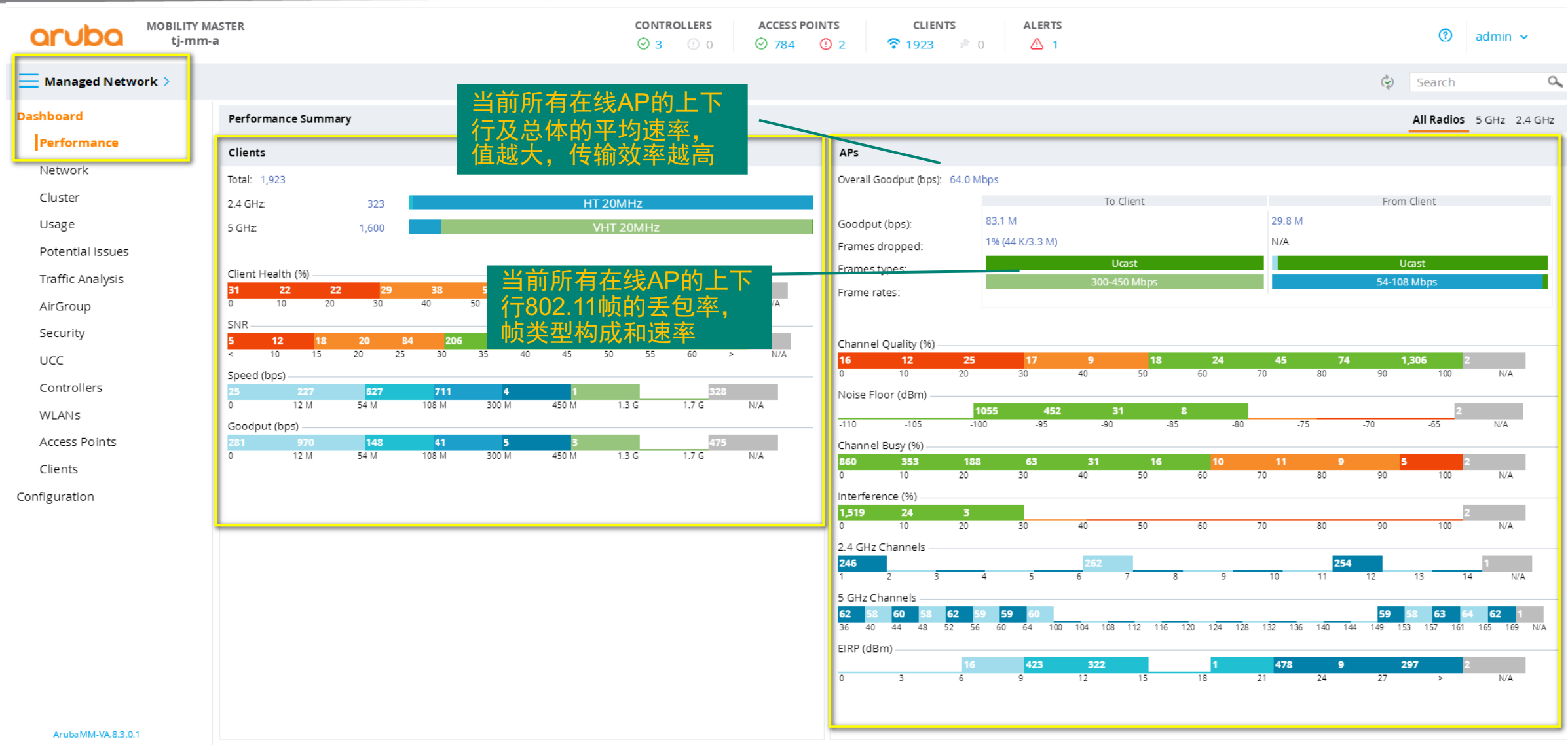
无线网络总体状态查询

平均速率定义：假如有1000个1500字节的帧在网络中传输，那么平均速率的算法为
•50% of frames are transmitted successfully at MCS index 11 at 108 Mbps.
•25% of the frames were dropped in the 1st attempt at 108 Mbps but were successfully transmitted using MCS index 3 at 54 Mbps in the second attempt.
•The remaining 25% are dropped in both the attempts.

实际平均速率的计算公式: The total bits transmitted(整个传输的数据比特)/ the total air time(整个消耗的空口时间).

举例: (500 * 1500 + 250 * 1500) * 8 / (total air time for 50% frames + total air time for 25 % frames retransmitted + total air time for 25% dropped frames) = 40.5 Mbps.

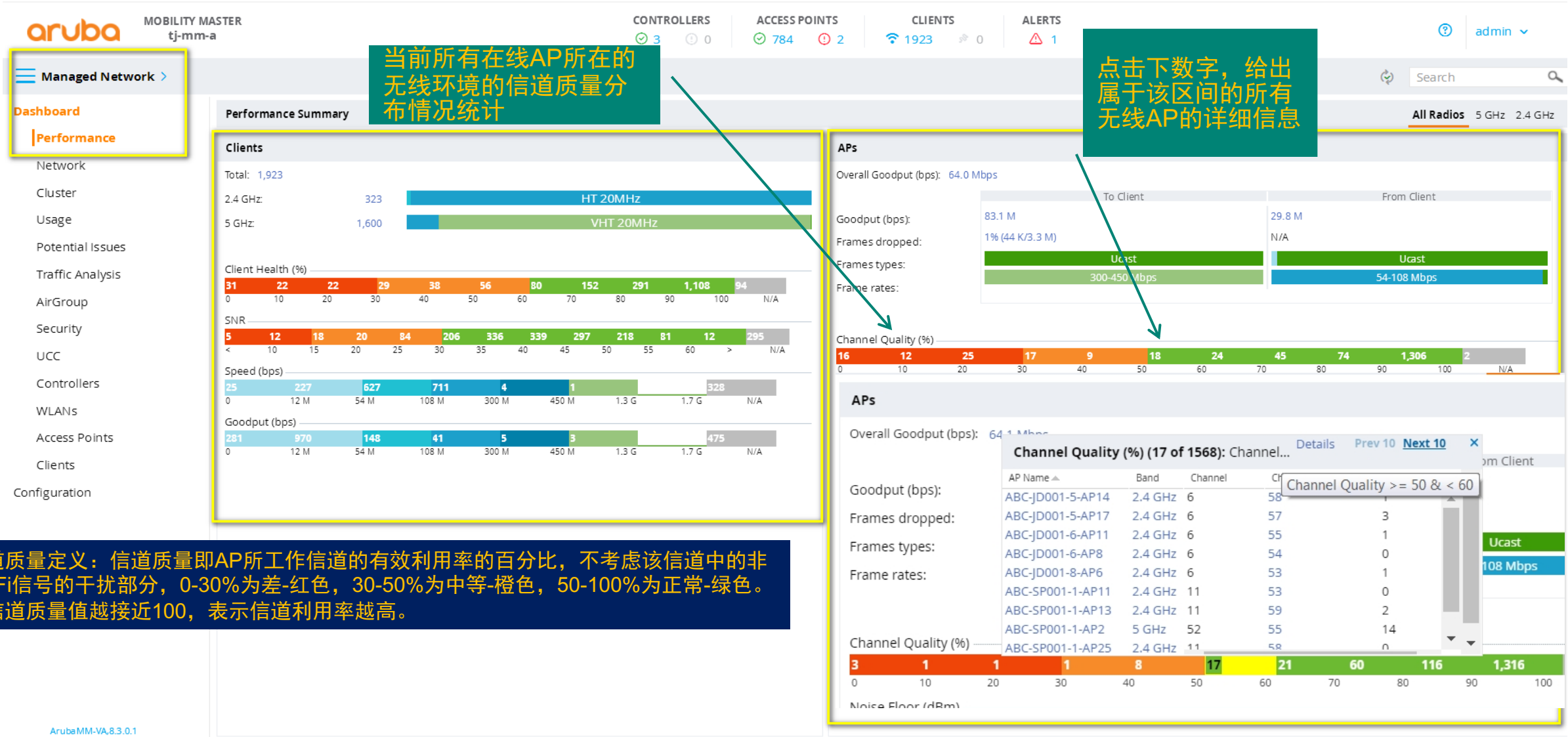
无线网络总体状态查询



当前所有在线AP的上下行及总体的平均速率，值越大，传输效率越高

当前所有在线AP的上下行802.11帧的丢包率，帧类型构成和速率

无线网络总体状态查询



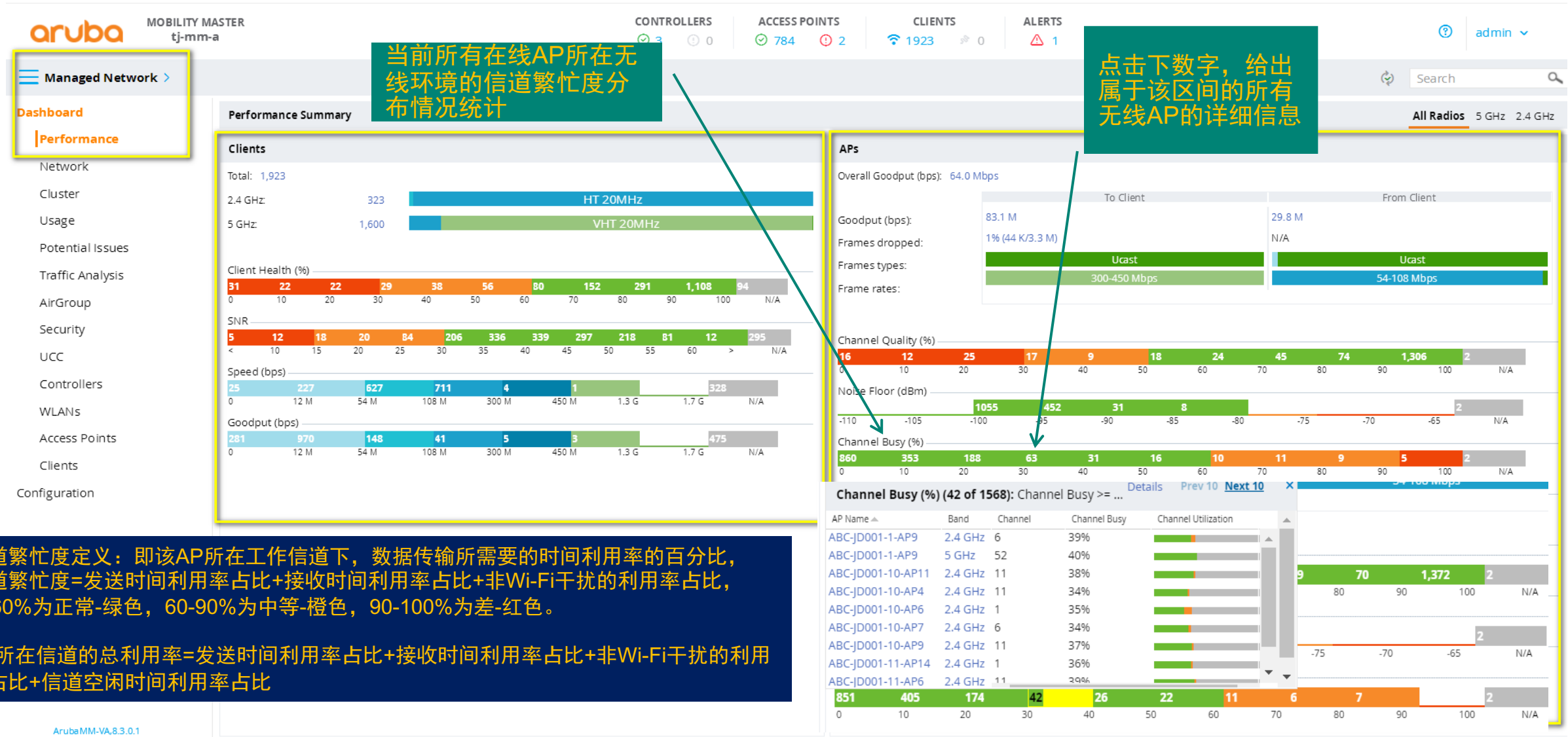
信道质量定义：信道质量即AP所工作信道的有效利用率的百分比，不考虑该信道中的非Wi-Fi信号的干扰部分，0-30%为差-红色，30-50%为中等-橙色，50-100%为正常-绿色。该信道质量值越接近100，表示信道利用率越高。

ArubaMM-VA,8.3.0.1

无线网络总体状态查询

底噪定义：底噪即AP所在信道的周边环境的背景噪音强度，-110— -80dBm为正常-绿色，-80到-75dBm为中等-橙色，-75 到-65dBm为差-红色。该值为负值， AP的背景噪音强度越高（值越接近-65dBm），同等位置的无线终端接收到的AP信号强度越弱。一个正常的环境中，要求所有的AP底噪在-100-到-90左右。

无线网络总体状态查询



当前所有在线AP所在无线环境的信道繁忙度分布情况统计

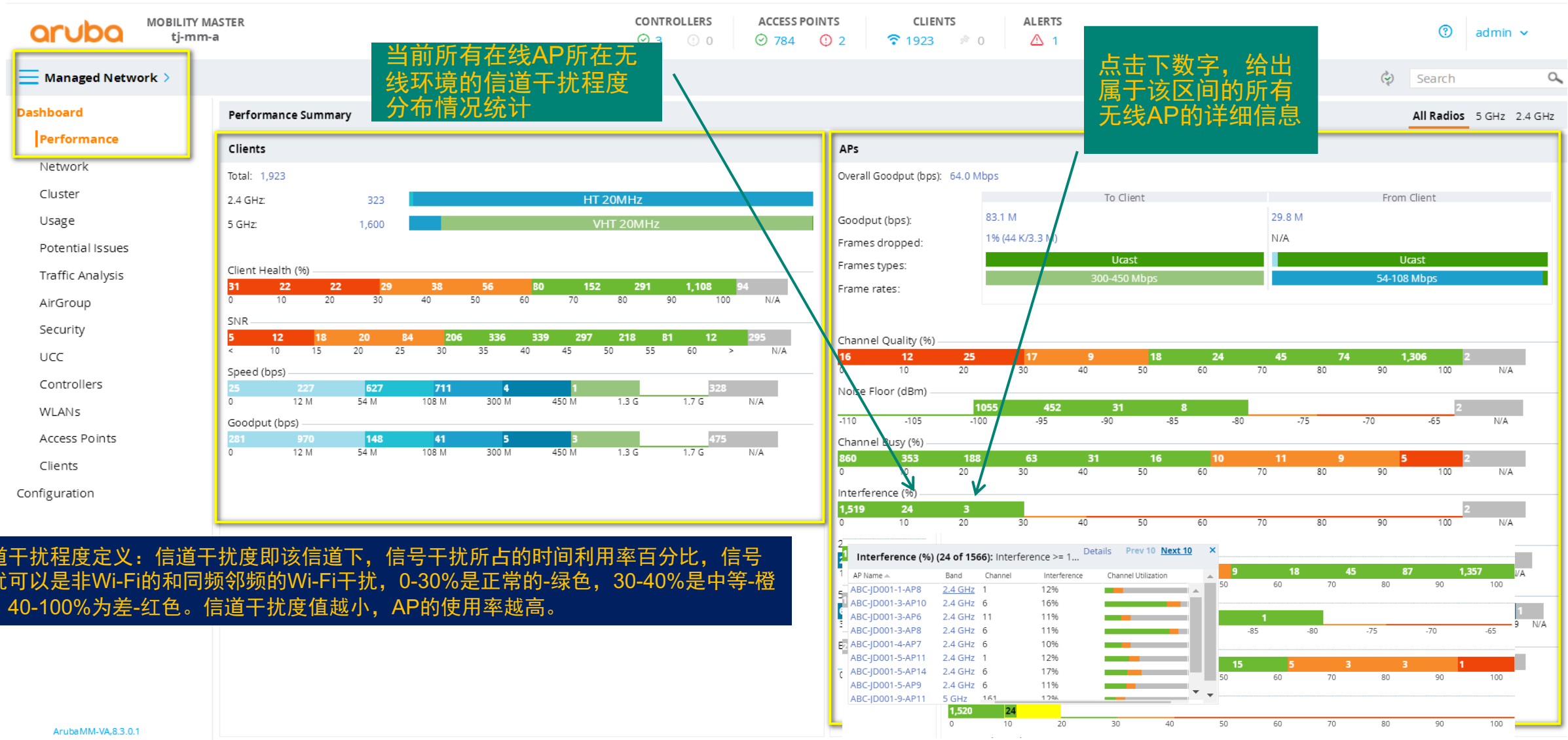
点击下数字，给出属于该区间的所有无线AP的详细信息

信道繁忙度定义：即该AP所在工作信道下，数据传输所需要的时间利用率的百分比，信道繁忙度=发送时间利用率占比+接收时间利用率占比+非Wi-Fi干扰的利用率占比，0-60%为正常-绿色，60-90%为中等-橙色，90-100%为差-红色。

AP所在信道的总利用率=发送时间利用率占比+接收时间利用率占比+非Wi-Fi干扰的利用率占比+信道空闲时间利用率占比

ArubaMM-VA,8.3.0.1

无线网络总体状态查询



信道干扰程度定义：信道干扰度即该信道下，信号干扰所占的时间利用率百分比，信号干扰可以是非Wi-Fi的和同频邻频的Wi-Fi干扰，0-30%是正常的-绿色，30-40%是中等-橙色，40-100%为差-红色。信道干扰度值越小，AP的使用率越高。

ArubaMM-VA,8.3.0.1

无线网络总体状态查询

当前所有在线AP的2.4G和5G radio的所在信道分布比例和当前EIRP情况统计

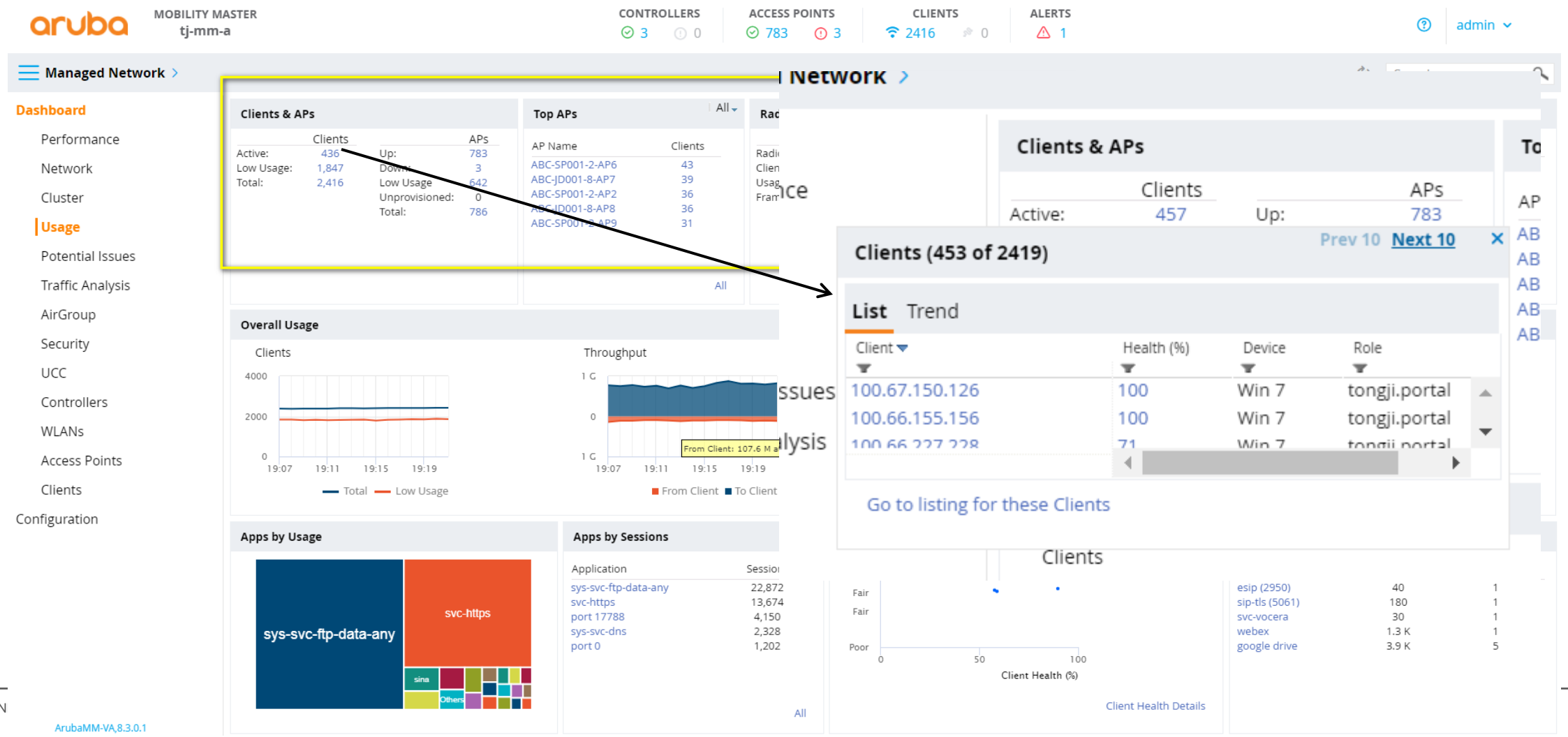
点击下数字，给出属于该区间的所有无线AP的详细信息

所有radio的信道分布：可以直接了解全网AP的工作信道分布情况，也可以了解全网的EIRP的分布情况。每个信道上的radio数量越是平均，越是表明整体无线网络的信道分布优良，充分利用每个信道资源。

ArubaMM-VA,8.3.0.1

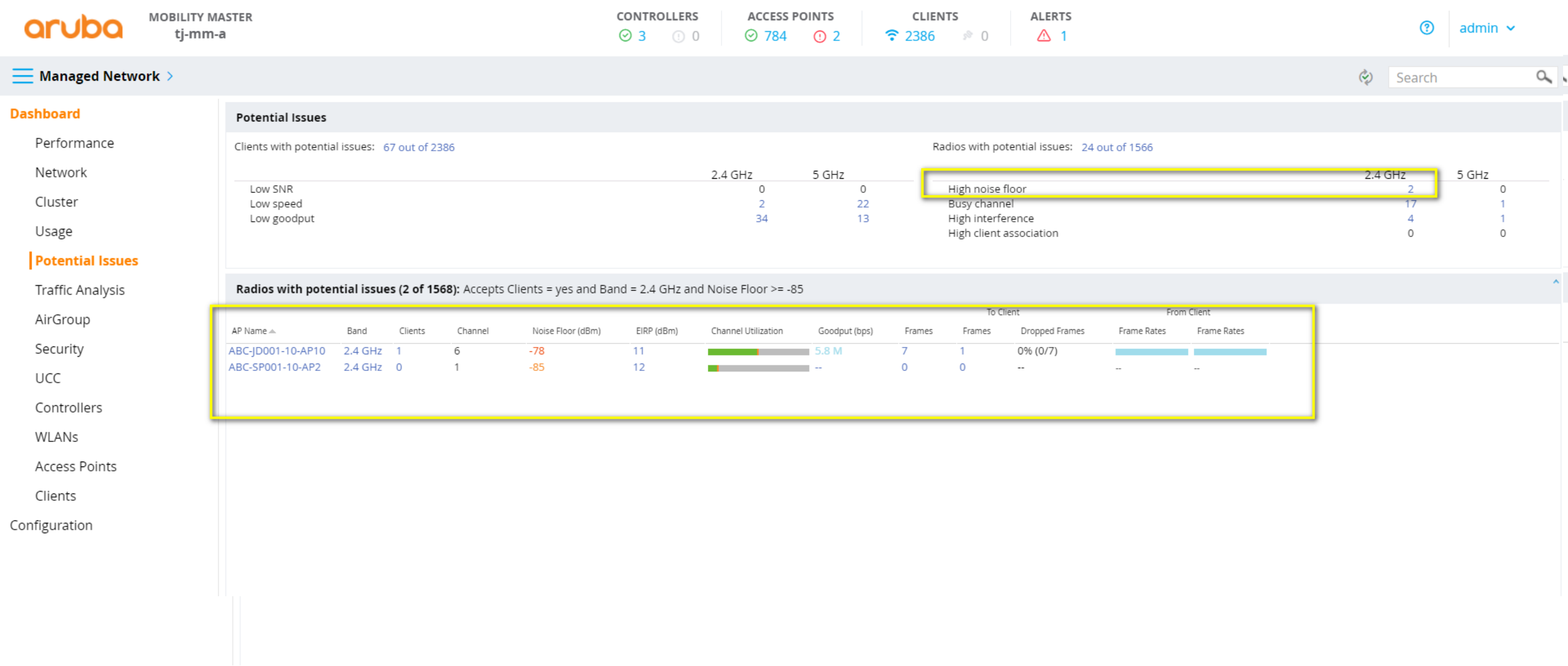
无线网络总体状态查询

点击Managed Network>Dashboard->Usage菜单，描述在短期（最近15分钟）内无线网络的利用率指标。可以查看活跃的和空闲的终端数分布，关联终端数最多的5个AP名称，2.4G和5G的终端比例和两个频段上的不同带宽利用率。所有无线网络的设备类型分布，整网的所有在线终端数和吞吐量趋势图，以及基于不同SSID信号的分别统计的在线终端数和吞吐量趋势图。



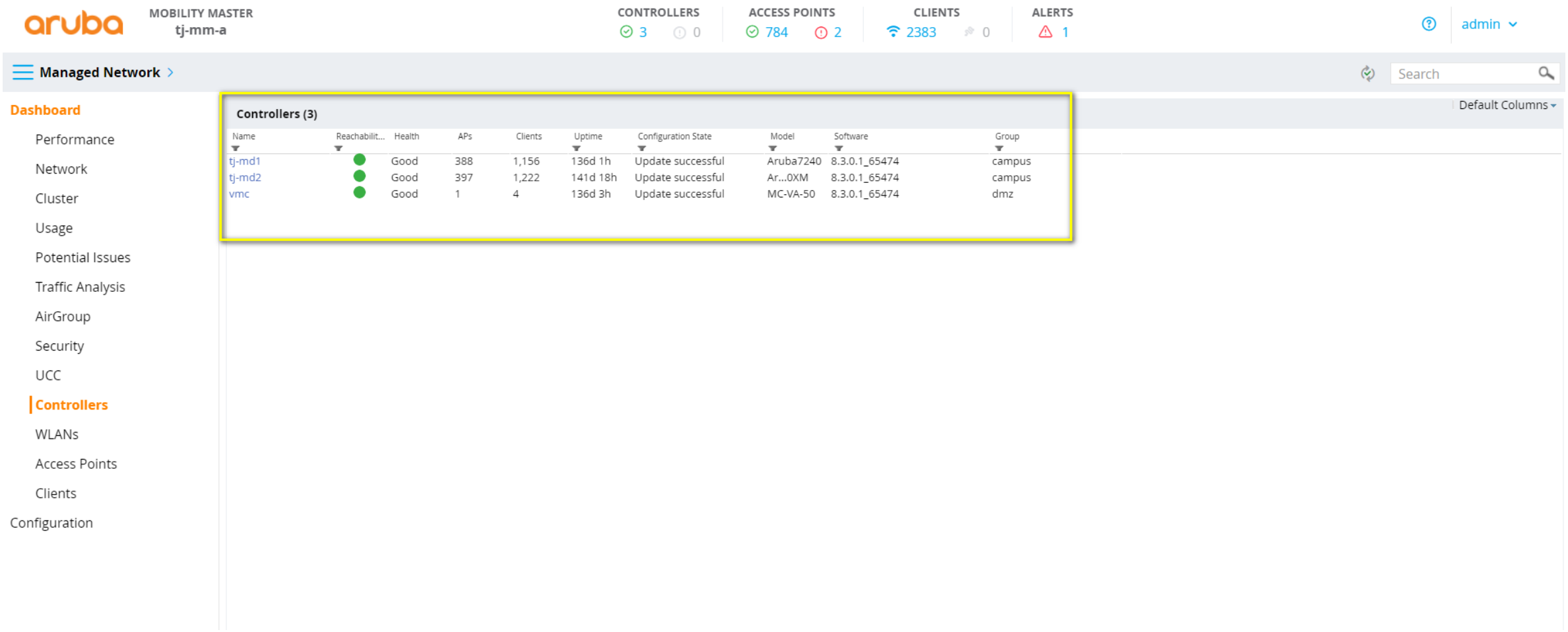
无线网络总体状态查询

点击Managed Network>Dashboard->Potential Issues菜单，描述网络中存在潜在性能问题的终端和AP信息，查看最高干扰率的，最高信道利用率的，最高底噪的，最多关联终端数的AP信息，可以快速定位到是哪颗AP。



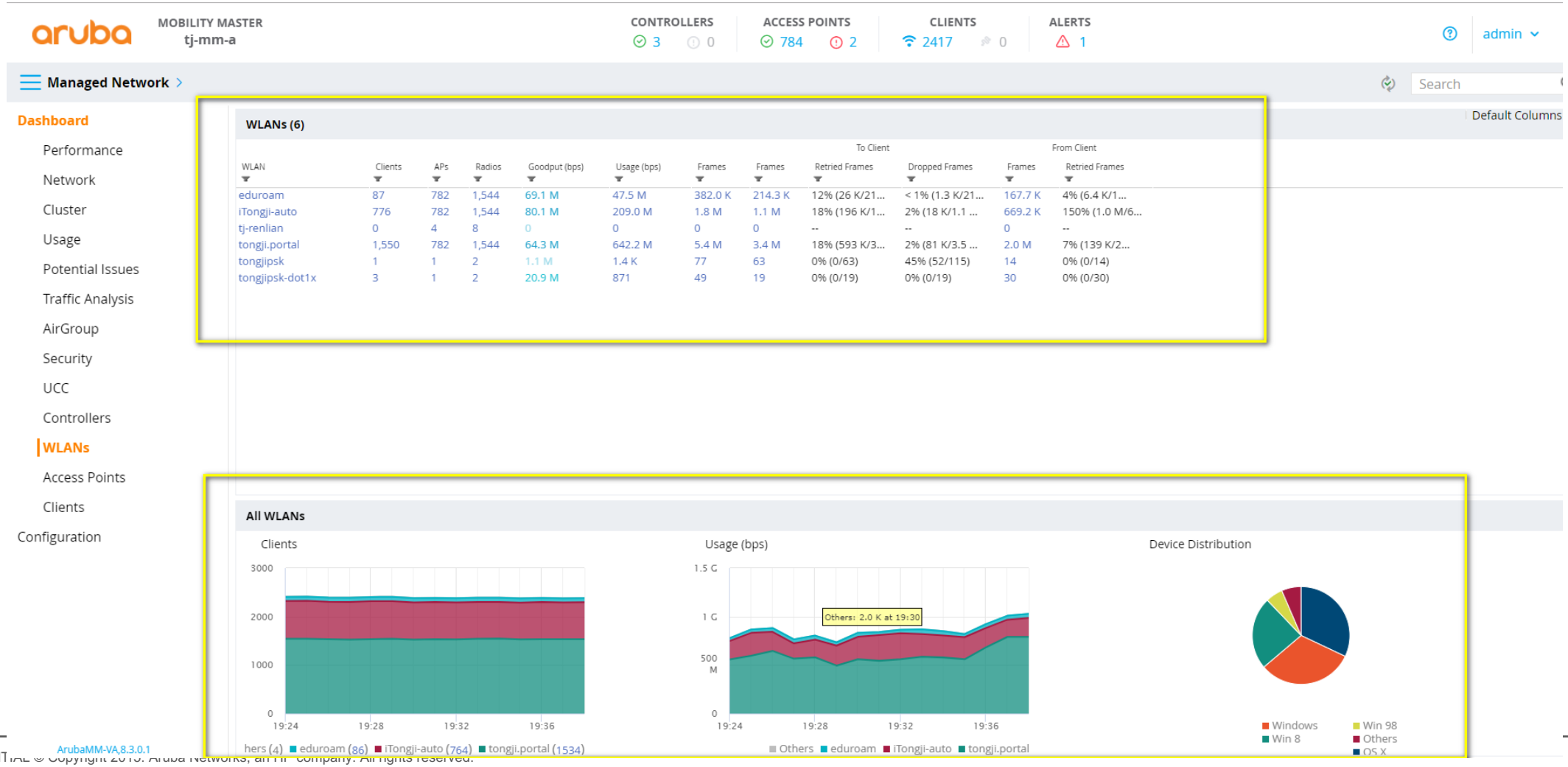
无线网络总体状态查询

点击Managed Network>Dashboard->Controllers菜单，描述网络中每台控制器当前的运行时间，健康状态，每台控制器上终结的AP数量，终结的用户数量以及每台控制器的当前版本和所在的路径信息（mm上的管理节点）。



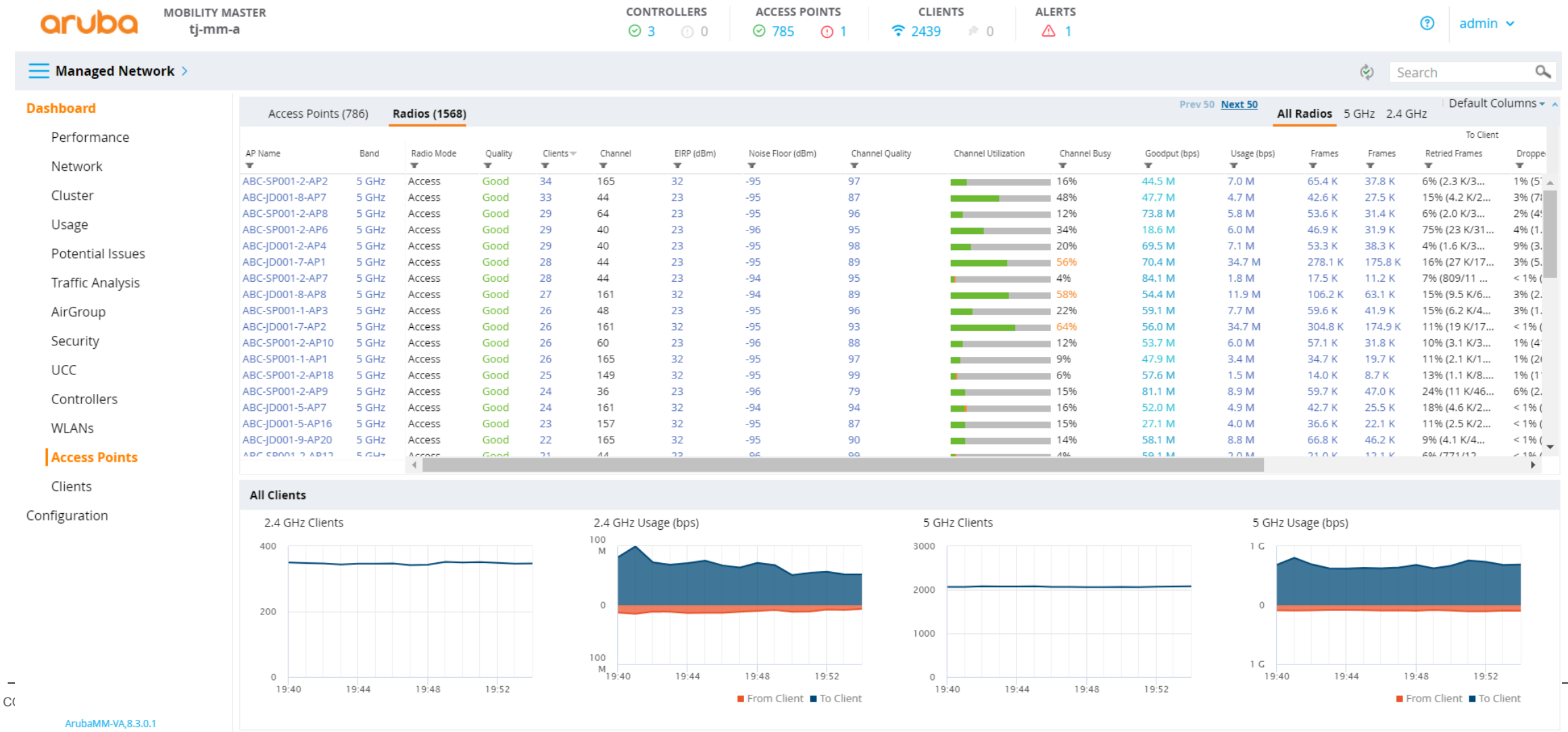
无线网络总体状态查询

点击Managed Network>Dashboard->WLANs菜单，描述网络中各个不同无线信号业务的统计信息，包括每个信号的关联用户数，AP数，radio数，平均速率，最近1分钟的AP平均速率，整个传输的数据帧，成功传输的数据帧重传帧比例等等



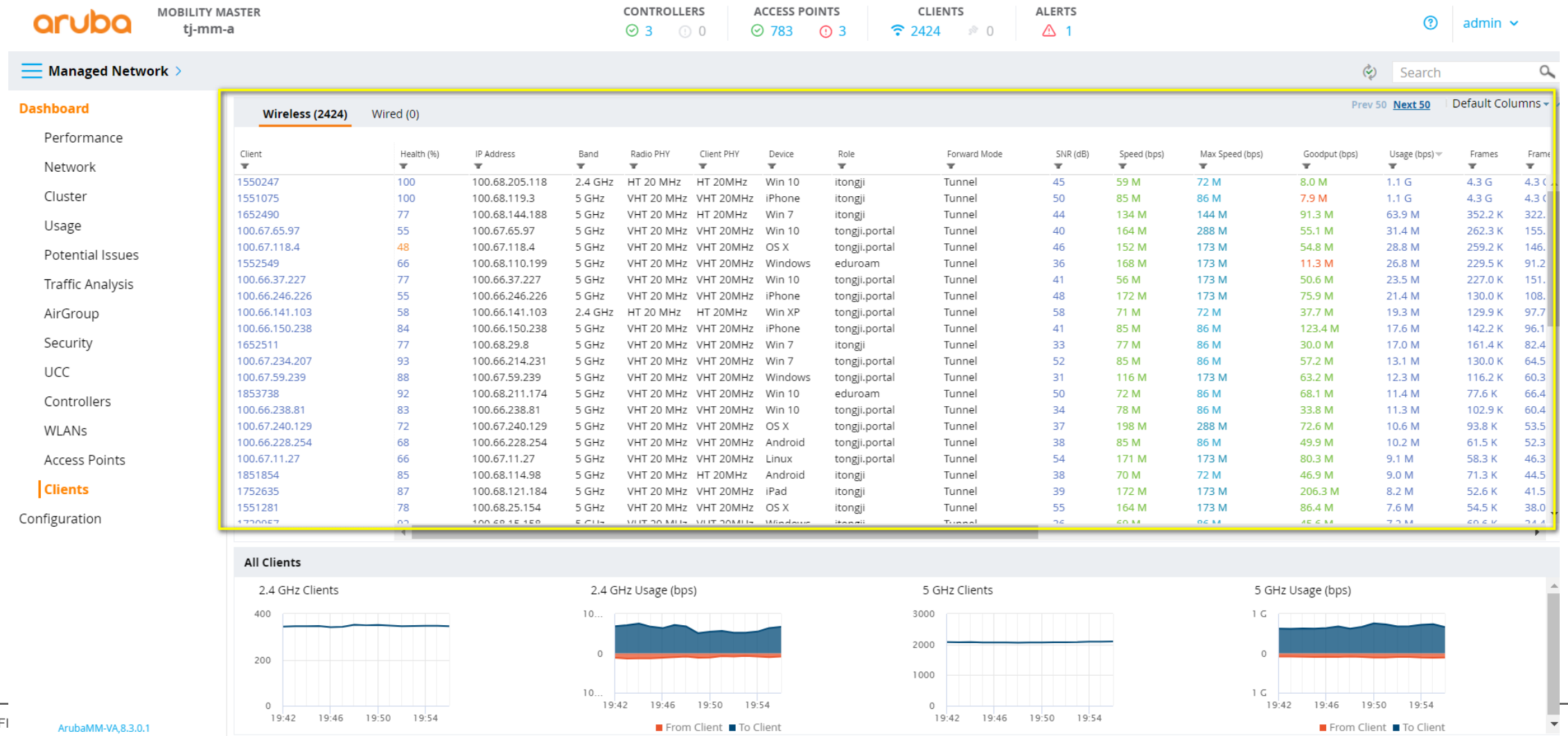
无线网络总体状态查询

点击Managed Network>Dashboard->Access Points菜单，描述网络中每个AP的详细信息，包括在线时长，AP型号，所在group名称，IP地址，当前关联终端数，所在信道，EIRP发送功率，底噪，信道质量，信道利用率，信道繁忙度等等



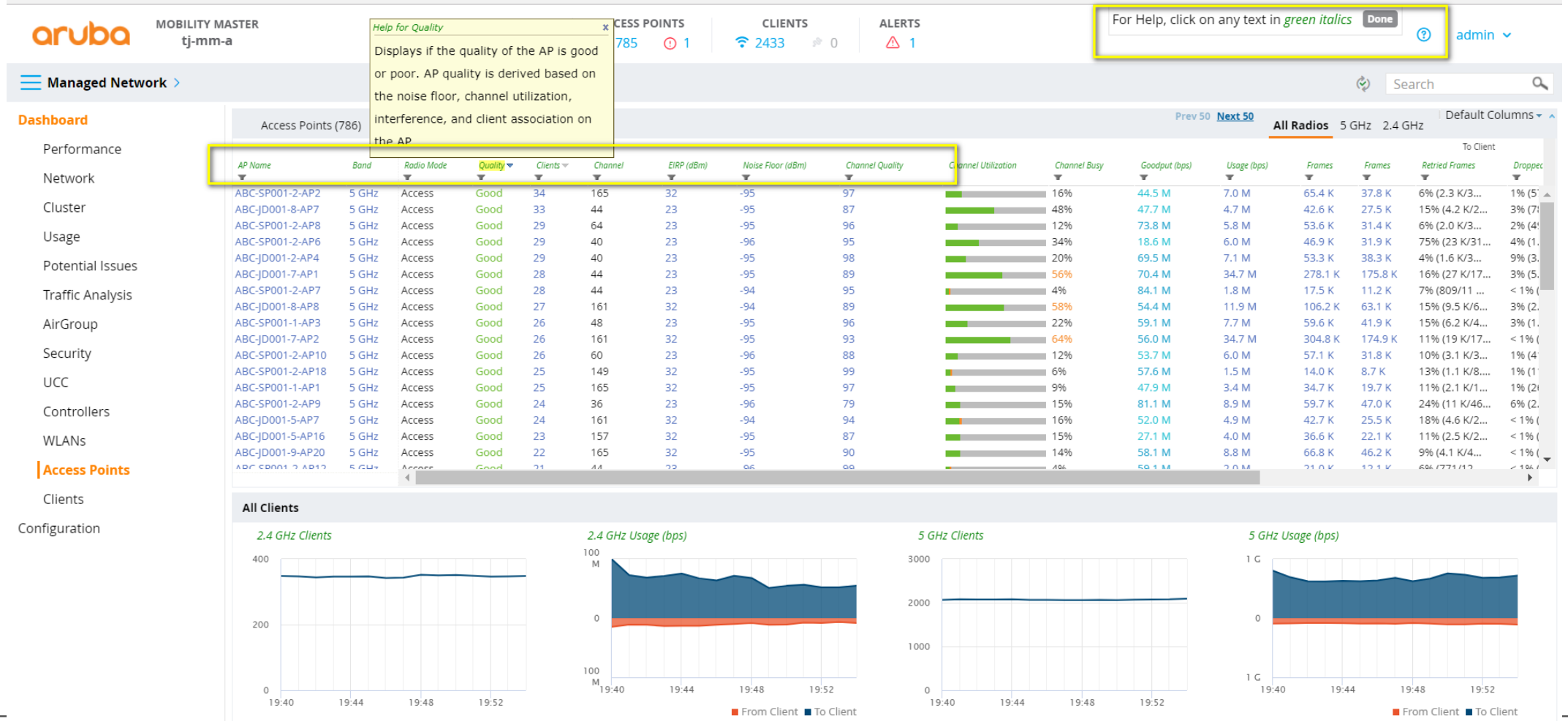
无线网络总体状态查询

点击Managed Network>Dashboard->Clients菜单，描述网络中每个无线终端的详细信息，包括终端的认证账号，IP地址，健康度，所在频段和频宽，设备类型，终端的用户角色，SNR值，关联速率，实际速率，带宽利用率等等



无线网络总体状态查询

点击Managed Network>Dashboard->xx 左边任何一个菜单，点击右上角的？ 按钮，即可以进入到help帮助提示， 只要有绿色字样的地方，鼠标放在该字样的上面，自动会出现内容提示。



控制器硬件运行状态查询

在控制器CLI界面输入”show switchinfo”可以读取控制器当前运行状态数据，其中包括控制器运行版本、在线运行时长、前一次启动原因、启动配置文件名、启动系统分区号、软件模块健康状态等信息。

(tj-md1) *#show switchinfo　（其实在AOS8.x下，如果#号前面有*的提示符，表示目前系统有内部的crash信息，需要联系tac查看）

Hostname is tj-md1
Console Baudrate: 9600
Location not configured
System Time:Mon Nov 26 18:55:06 CST 2018

Aruba Operating System Software.
ArubaOS (MODEL: Aruba7240), Version 8.3.0.1 （当前运行版本）
Website: http://www.arubanetworks.com
(c) Copyright 2018 Hewlett Packard Enterprise Development LP.
Compiled on 2018-06-23 at 05:24:44 UTC (build 65474) by p4build

ROM: System Bootstrap, Version CPBoot 1.2.4.0 (build 49898)
Built: 2015-05-05 07:46:55
Built by: p4build@re_client_49898

Switch uptime is 130 days 47 minutes 2 seconds （当前控制器的在线时长）
Reboot Cause: User reboot (Intent:cause:register 78:86:50:2) （上一次重启原因）
Supervisor Card
Processor (XLP432 Rev B2 (Secure Boot) , 1500 MHz) with 7382M bytes of memory.
32K bytes of non-volatile configuration memory.
7928M bytes of Supervisor Card system flash.

Config ID: 501 （启动时，加载的配置文件名称，实际是由MM推送过来）
Boot Partition: PARTITION 1 （启动时，所使用的分区）

控制器硬件运行状态查询

VLAN1 is up line protocol is up
Hardware is CPU Interface, Interface address is 00:1A:1E:03:04:10 (bia 00:1A:1E:03:04:10)
Description: 802.1Q VLAN

IPv6 Router Advertisements are disabled
Routing interface is enable, Forwarding mode is enable
Directed broadcast is disabled, BCMC Optimization disabled ProxyARP disabled Suppress ARP enable
Encapsulation 802, loopback not set
MTU 1500 bytes
Last clearing of "show interface" counters 130 day 0 hr 47 min 2 sec
link status last changed 4 day 3 hr 19 min 30 sec
Proxy Arp is disabled for the Interface

switchrole:MD （当前控制器的角色）
masterip:192.168.134.18 （指向的MM的VIP地址）
IKE PSK: 619c93b74d18311069cb470433530aece03c15c9b4c85525
Configuration unchanged since last save
AP Crash information available.
No controller crash information available.**（当前系统是否存在crash信息，如果是no，表示没有。 如果是 crash information available ，表示当前系统存在crash信息，需要进一步处理）**

Reboot Cause: User reboot (Intent:cause:register 78:86:50:2)

控制器硬件运行状态查询

如果此时发现有Crash信息，我们可以通过下面的CLI过程，将系统中的Crash信息保存为文件，并存在本地flash闪存中，接着再通过ftp协议将该crash文件传输到本地电脑上，便于分析和查看，并可以将该文件发给Aruba TAC做进一步分析和处理。相关CLI操作如下：

```
(tj-md1) #tar crash
(tj-md1) #dir
-rw-r--r--    1 root     root         6710 Jan  5 05:38 AUDITTRAIL-HISTORY.log
-rw-r--r--    1 root     root      23006710 Jan  5 05:38  crash.tar  （自动生成crash文件，并保存在本地的flash中）
-rw-r--r--    1 root     root           58 Jan 11 04:24 crash.tar_md5sum.txt
-rw-r--r--    1 root     root        86928 Jan 11 04:40 default.cfg
-rw-r--r--    1 root     root         9007 Jun 27  2013 default.cfg.2013-06-27_22-11-20
-rw-r--r--    1 root     root         9275 Jun 28  2013 default.cfg.2013-06-28_06-23-34
-rw-r--r--    1 root     root         9339 Mar 18  2014 default.cfg.2014-03-18_05-56-38
-rw-r--r--    1 root     root        10984 Mar 18  2014 default.cfg.2014-03-18_05-59-48
-rw-r--r--    1 root     root         9007 Mar 18  2014 default.cfg.2014-03-18_13-23-44
-rw-r--r--    1 root     root         8457 Mar 18  2014 default.cfg.2014-03-18_13-32-13
-rw-r--r--    1 root     root        18826 Mar 21  2014 default.cfg.2014-03-21_02-07-26
-rw-r--r--    1 root     root        73574 Nov 29  2016 default.cfg.2016-11-29_11-45-10
-rw-r--r--    1 root     root        73643 Jan  5  2017 default.cfg.2017-01-05_16-34-14
-rw-r--r--    2 root     root        79031 Apr 25  2017 default.cfg.2017-04-25_01-30-04
-rw-r--r--    1 root     root        87103 Jan 10 06:58 default.cfg_writemem_2018-01-10_06-58-35
-rw-r--r--    1 root     root        87029 Jan 11 00:37 default.cfg_writemem_2018-01-11_00-37-30
-rw-r--r--    1 root     root        87029 Jan 11 00:40 default.cfg_writemem_2018-01-11_00-40-17
-rw-r--r--    1 root     root        86990 Jan 11 00:40 default.cfg_writemem_2018-01-11_00-40-44
-rw-r--r--    1 root     root        87000 Jan 11 04:39 default.cfg_writemem_2018-01-11_04-39-59
drwxr-xr-x    4 root     root         1024 Jan  5 05:41 fieldCerts
-rw-r--r--    2 root     root        79031 Apr 25  2017 original.cfg
drwx------    2 root     root         1024 Nov 29  2016 tpm
(tj-md1) #copy flash: crash.tar ftp: 1.1.1.1 admin 123456  （我们通过copy 命令，将crash文件复制出来到本地电脑，然后联系TAC分析处理）
```

控制器硬件运行状态查询

在控制器CLI界面输入”show cpuload”可以读取控制器CPU负载数据。

(tj-md1) #show cpuload
user 50.9%, system 9.2%, idle 39.9%
注意：idle为空闲量，要求空闲的百分比不能持续低于30%下，也就是说最近5分钟时间内，不能一直持续空闲量低于30%。

下面的CLI可以查看每个进程所占用的CPU和内存资源情况，可以直接了解是哪个进程占用过多的CPU和内存

```
(tj-md1) #show cpuload current
Collecting System Statistics. This may take around 5 seconds.
top2 - 15:17:22 up 134 days, 18:21,  0 users,  load average: 0.15, 0.12, 0.09
Tasks: 178 total,   1 running, 177 sleeping,   0 stopped,   0 zombie
Cpu(s):  1.6%us,  3.8%sy,   0.0%ni,  94.2%id,  0.0%wa,  0.0%hi,  0.5%si,  0.0%st
Mem:   5170880k total,   3255360k used,  1915520k free,    80960k buffers
Swap:  2621312k total,        0k used,  2621312k free,   880128k cached
  PID USER      PR  NI  VIRT  RES  SHR S  %CPU  %MEM    TIME+  COMMAND
 4173 root      20   0 73472  10m 5568 S   17  0.2  16645:32 hwMon
 4107 root      20   0  527m 333m 112m S   11  6.6  16729:32 stm
 4185 root      20   0 51456  12m 6272 S    3  0.2   1101:19 trapd
 4370 root      20   0  240m 131m  61m S    3  2.6   2887:18 arm
 4104 root      10 -10  299m 125m  57m S    2  2.5   1287:47 auth
 3917 root      20   0  154m  16m 3968 S    2  0.3 943:28.36 mysqld
 3965 root      20   0  157m 112m 7168 S    1  2.2   1516:25 wms
 3927 root      20   0  454m 149m  12m S    1  3.0   1951:37 fpapps
27524 root      20   0  4544 3072 1856 R    1  0.1   0:00.05 top2
 4263 root      20   0  634m 371m  16m S    1  7.3 183:25.33 fw_visibility
```

控制器硬件运行状态查询

在控制器上查看当前AC上所有进程的当前工作状态（用于查看是否有进程处于死机状态）

```
(tj-md1)  #show process monitor statistics
Process Monitoring Action:Log Message
Process Monitor Statistics
--------------------------
Name                    State          Restarts Allowed  Restarts  Timeout Value  Timeout Chances  Time Started
----                    -----          ----------------  --------  -------------  ---------------  ------------
/mswitch/bin/dbstart    PROCESS_RUNNING  8                 0         240            5                Fri Jan  5 05:41:30 2018
/mswitch/bin/packet_filter  PROCESS_RUNNING  -             0         240            5                Fri Jan  5 05:41:31 2018
/mswitch/bin/certmgr    PROCESS_RUNNING  -                0         240            5                Fri Jan  5 05:41:31 2018
/mswitch/bin/cryptoPOST  PROCESS_RUNNING  8               0         240            5                Fri Jan  5 05:41:31 2018
/mswitch/bin/sbConsoled  PROCESS_RUNNING  8               0         240            5                Fri Jan  5 05:41:32 2018
/mswitch/bin/gsmmgr     PROCESS_RUNNING  8                0         240            5                Fri Jan  5 05:41:32 2018
/mswitch/bin/pubsub     PROCESS_RUNNING  8                0         240            5                Fri Jan  5 05:41:32 2018
/mswitch/bin/cfgm       PROCESS_RUNNING  8                0         240            5                Fri Jan  5 05:41:32 2018
/mswitch/bin/syslogdwrap  PROCESS_RUNNING  8              0         240            5                Fri Jan  5 05:41:32 2018
```

如果发现某进程状态出现stop，我们可以针对单个进程进行restart，看看是否恢复工作。
如果恢复后，又很快出现stop，请尽快联系TAC进行分析。

```
(tj-md1)  #process restart    /mswitch/bin/httpd
```

控制器硬件运行状态查询

在控制器CLI界面输入”show memory”可以读取控制器内存负载数据。
注意：要求5分钟时间内，内存的Free空闲量不能持续低于30M。

```
(tj-md1)  #show memory
Memory (Kb): total: 1541032, used: 386280, free: 1154752
```

在控制器CLI界面输入”show storage”可以读取控制器存储空间负载数据。
注意：使用率Use%不能超过80%。

```
(tj-md1) *#show storage
Filesystem            Size      Used Available Use% Mounted on
/dev/usb/flash3       1.5G    268.1M      1.2G  18% /flash
/dev/usb/flash4       5.6G    656.8M      4.7G  12% /flash1
```

控制器硬件运行状态查询

在控制器CLI界面输入”show inventory”可以查看当前控制器上CPU温度，风扇以及电源模块工作状态。

```
(tj-md1) *#show inventory
Supervisor Card slot          : 0
System Serial#                : CX0002729 (Date:02/26/16)
CPU Card Serial#              : AG08044840 (Date:02/25/16)
CPU Card Assembly#            : 2010153H
CPU Card Revision             : (Rev:08.00)
Interface Card Serial#        : AG04003082 (Date:02/25/16)
Interface Card Assembly#      : 2010085E
Interface Card Revision       : (Rev:04.00)
SC Model#                     : Aruba7240
HW MAC Addr                   : 00:1a:1e:03:04:10 to
00:1a:1e:03:04:17
CPLD Version                  : (Rev: 3.0)
Power Supply 0                : Present          : Yes
                              : 12V OK           : Yes
                              : Fan OK           : Yes
                              : Aruba Model No   : 2510057
                              : Vendor & Model No : QCS DCJ3501-01P
                              : Serial No        : QCS1552217B
                              : MFG Date         : 12/24/15
                              : Output 1 Config  : 12V 350W
                              : Input Min        : 90V AC
                              : Input Max        : 264V AC
                              : VCC9             0.90V sense 0.926 V
Power Supply 1                : Present          : Yes
                              : 12V OK           : Yes
                              : Fan OK           : Yes
                              : Aruba Model No   : 2510057
                              : Vendor & Model No : QCS DCJ3501-01P
                              : Serial No        : QCS155221FE
                              : MFG Date         : 12/24/15
                              : Output 1 Config  : 12V 350W
                              : Input Min        : 90V AC
                              : Input Max        : 264V AC
Main Board Temperatures       :
                              : U24 - Local Temp     30 C (shadow of XLP heatsink)
                              : Q1  - Remote 1 Temp  35 C (shadow of VRM, VDD_CPU)
                              : Q2  - Remote 2 Temp  33 C (shadow of VRM, VDD_SOC)
                              : U44 - Local Temp     24 C (shadow of DPI connector)
                              : U29  - Remote 1 Temp  34 C (XLP die temperature)
                              : Q36  - Remote 2 Temp  26 C (shadow of 98X1422)
                              : J2  - DDR A Temp     22 C (DDR3 A temp)
                              : J4  - DDR B Temp     25 C (DDR3 B temp)
                              : J1  - DDR C Temp     22 C (DDR3 C temp)
                              : J3  - DDR D Temp     26 C (DDR3 D temp)
                              : Port 0 Temp          148 C (1G PHY temp)
                              : Port 1 Temp          148 C (1G PHY temp)
                              : Port 2 Temp          27 C (10G PHY temp)
                              : Port 5 Temp          26 C (10G PHY temp)
Interface Board Temperatures  :
                              : U21 - Local Temp     27 C (shadow of port 1 RJ45)
                              : Q4 - Remote 1 Temp   25 C (shadow of 88E1543)
                              : Q3 - Remote 2 Temp   33 C (shadow of 88X2140)
```

控制器硬件运行状态查询

```
Fan  0                    : 9060 rpm (5.473 V),Speed Low
Fan  1                    : 8946 rpm (5.473 V),Speed Low
Fan  2                    : 9123 rpm (5.517 V),Speed Low
Fan  3                    : 8926 rpm (5.473 V),Speed Low
Main Board Voltages       :
ispPAC_POWR1014A_A        :
                    : 1V2              1.20V sense 1.220 V
                    : VDD SOC          1.050V sense 1.042 V
                    : VCC IOBD 1V5     1.50V sense 1.528 V
                    : DDR3BD_VTT       0.75V sense 0.754 V
                    : VCC 1A           1.00V sense 1.024 V
                    : IV8_DIGITAL      1.80V sense 1.854 V
                    : 3V3_MAIN         3.30V sense 3.384 V
                    : VCC1             1.00V sense 1.026 V
                    : VCC25            2.50V sense 2.526 V
                    : 3V3 SB           3.30V sense 3.354 V
ispPAC_POWR1014A_B        :
                    : VDD              1.081V sense 1.084 V
                    : VCC IOAC 1V5     1.50V sense 1.532 V
                    : DDR3AC_VTT       0.75V sense 0.758 V
                    : VDD_SRAM         1.00V sense 1.048 V
                    : VCC1B            1.00V sense 1.030 V
                    : 1V8_ANALOG       1.80V sense 1.872 V
                    : 1V8              1.80V sense 1.858 V
                    : VDDIO12_XAUI     1.20V sense 1.200 V
                    : 5V               5.00V sense 4.998 V
```

```
Interface Board Voltages  :
ispPAC_POWR6AT6           :
                    : VCC33            3.30V sense 3.378 V
                    : VCC 18           1.80V sense 1.854 V
                    : VCC1             1.00V sense 1.022 V
                    : VCC12            1.20V sense 1.224 V
                    : VCC12-DVDD       1.20V sense 1.208 V
```

控制器硬件运行状态查询

在控制器CLI界面输入”show user-table summary”可以查看当前控制器上所有关联用户数的统计信息，包括采用的是IPv4还是IPv6，采用的是那种认证方式等。

```
(SZ-CX-AC-28.MAN.OAW6000) #show user-table summary
ipv4 wired Users: 0
        mac auth: 0
        dot1x: 0
        captiveportal: 0
        vpn: 0
        via: 0
        other: 0
ipv4 wireless Users: 1311
        mac auth: 19
        dot1x: 0
        captiveportal: 171
        vpn: 0
        via: 0
        other: 1121
ipv6 wired Users: 0
        mac auth: 0
        dot1x: 0
        captiveportal: 0
        vpn: 0
        via: 0
        other: 0
ipv6 wireless Users: 0
        mac auth: 0
        dot1x: 0
        captiveportal: 0
        vpn: 0
        via: 0
        other: 0
Unique Users: 881  Total Users: 1311
ipv4 PSK: 0
ipv4 static-WEP: 0
ipv4 open-system: 754

ipv6 PSK: 0
ipv6 static-WEP: 0
ipv6 open-system: 0
```

控制器硬件运行状态查询

在控制器CLI界面输入”show log all | include ERR ”可以查看当前控制器上当前的系统日志和基于关键字ERR的过滤查询。

在控制器CLI界面输入”show log errorlog all ”可以查看当前控制器上当前一些错误日志。

如果发生了设备无法解决的问题，在设备重启之前，我们需要尽快搜集下面的信息，然后该日志文件会自动存储在本地的flash中，等设备重启后，通过ftp协议将相关文件传输到本地电脑保存，并尽快联系Aruba技术支持人员。

在控制器CLI界面输入”tar log tech-support” 和” tar crash”（如果有crash信息）。

然后通过dir 来查看本地flash中存放的logs.tar和crash.tar文件，并通过ftp传输到本 地电脑。

(tj-md1) **#copy flash: crash.tar ftp: 1.1.1.1 admin 123456**

（我们通过copy 命令，将crash文件复制出来到本地电脑，然后联系TAC分析处理）

AP硬件运行状态查询

登录到MM控制器上，输入”show ap database long”命令，观察全网中所有的AP在线状态是否正常（即处于Up的状态，且没有Flag标志位），可以查看每颗AP的当前停靠控制器IP（switch ip）和备援的停靠控制器（standby IP）

```
(tj-mm-a) [mynode] #show ap database long

Mon Nov 26 20:40:36.339 2018

AP Database
-----------
Name               Group         AP Type  IP Address    Status              Flags  Switch IP    Standby IP   Wired MAC Address  Serial #    Port  FQLN  Outer IP  User
----               -----         -------  ----------    ------              -----  ---------    ----------   -----------------  --------    ----  ----  --------  ----
24:f2:7f:ca:7b:70  default       305      10.26.2.182   Down                       172.21.2.12  0.0.0.0      24:f2:7f:ca:7b:70  CNF3JSS07P        N/A   N/A
ABC-JD001-1-AP1    jd.tushuguan  305      10.26.17.213  Up 103d:11h:6m:51s         172.21.2.12  172.21.2.11  24:f2:7f:ca:7a:cc  CNF3JSS051        N/A   N/A
ABC-JD001-1-AP10   jd.tushuguan  325      10.26.18.67   Up 57d:20h:54m:51s         172.21.2.11  172.21.2.12  38:17:c3:c9:7e:a2  CNF7HN70ZF        N/A   N/A
ABC-JD001-1-AP11   jd.tushuguan  325      10.26.18.71   Up 57d:20h:54m:48s         172.21.2.11  172.21.2.12  38:17:c3:c9:7f:b0  CNF7HN713S        N/A   N/A
ABC-JD001-1-AP12   jd.tushuguan  305      10.26.18.66   Up 57d:20h:54m:22s         172.21.2.11  172.21.2.12  24:f2:7f:ca:7b:d6  CNF3JSS09B        N/A   N/A
ABC-JD001-1-AP13   jd.tushuguan  305      10.26.18.65   Up 57d:20h:54m:16s         172.21.2.11  172.21.2.12  24:f2:7f:ca:7c:8a  CNF3JSS0D7        N/A   N/A
ABC-JD001-1-AP14   jd.tushuguan  305      10.26.18.68   Up 57d:20h:54m:5s          172.21.2.11  172.21.2.12  24:f2:7f:ca:7b:f8  CNF3JSS09W        N/A   N/A
ABC-JD001-1-AP2    jd.tushuguan  325      10.26.24.212  Up 103d:11h:12m:22s        172.21.2.12  172.21.2.11  38:17:c3:c8:d2:66  CNF3HN71P3        N/A   N/A
ABC-JD001-1-AP3    jd.tushuguan  305      10.26.17.235  Up 89d:3h:41m:42s          172.21.2.12  172.21.2.11  24:f2:7f:ca:7a:d0  CNF3JSS053        N/A   N/A
ABC-JD001-1-AP4    jd.tushuguan  305      10.26.17.232  Up 103d:11h:4m:57s         172.21.2.11  172.21.2.12  24:f2:7f:ca:7c:14  CNF3JSS0BB        N/A   N/A
ABC-JD001-1-AP5    jd.tushuguan  305      10.26.17.234  Up 103d:11h:7m:0s          172.21.2.12  172.21.2.11  24:f2:7f:ca:7b:f2  CNF3JSS09S        N/A   N/A
ABC-JD001-1-AP6    jd.tushuguan  325      10.26.25.35   Up 57d:20h:56m:44s         172.21.2.12  172.21.2.11  38:17:c3:c8:d5:b6  CNF3HN723Q        N/A   N/A
ABC-JD001-1-AP7    jd.tushuguan  325      10.26.25.34   Up 57d:20h:56m:19s         172.21.2.12  172.21.2.11  38:17:c3:c8:dc:ea  CNF3HN732G        N/A   N/A
ABC-JD001-1-AP8    jd.tushuguan  325      10.26.25.47   Up 57d:20h:56m:44s         172.21.2.11  172.21.2.11  38:17:c3:c8:da:b6  CNF3HN72SC        N/A   N/A
ABC-JD001-1-AP9    jd.tushuguan  325      10.26.18.32   Up 57d:20h:56m:43s         172.21.2.12  172.21.2.11  38:17:c3:c8:d4:56  CNF3HN71Y3        N/A   N/A
ABC-JD001-10-AP1   jd.tushuguan  305      10.26.25.82   Up 89d:3h:39m:21s          172.21.2.11  172.21.2.12  24:f2:7f:ca:7c:28  CNF3JSS0BN        N/A   N/A
ABC-JD001-10-AP10  jd.tushuguan  325      10.26.17.230  Up 103d:11h:7m:10s         172.21.2.12  172.21.2.11  38:17:c3:c8:d0:ae  CNF3HN71G0        N/A   N/A
ABC-JD001-10-AP11  jd.tushuguan  325      10.26.18.5    Up 89d:3h:42m:10s          172.21.2.12  172.21.2.11  38:17:c3:c9:7b:0a  CNF7HN70HL        N/A   N/A
ABC-JD001-10-AP12  jd.tushuguan  325      10.26.17.239  Up 103d:11h:10m:10s        172.21.2.11  172.21.2.12  38:17:c3:c8:d0:8c  CNF3HN71FG        N/A   N/A
ABC-JD001-10-AP2   jd.tushuguan  325      10.26.25.123  Up 103d:11h:9m:39s         172.21.2.12  172.21.2.11  38:17:c3:c8:d0:9a  CNF3HN71FP        N/A   N/A
ABC-JD001-10-AP3   jd.tushuguan  325      10.26.25.66   Up 103d:11h:8m:57s         172.21.2.12  172.21.2.11  38:17:c3:c9:7b:e6  CNF7HN70M4        N/A   N/A
ABC-JD001-10-AP4   jd.tushuguan  325      10.26.18.122  Up 103d:11h:8m:51s         172.21.2.12  172.21.2.11  38:17:c3:c8:d3:6e  CNF3HN71TC        N/A   N/A
ABC-JD001-10-AP5   jd.tushuguan  325      10.26.18.138  Up 103d:11h:7m:36s         172.21.2.11  172.21.2.12  38:17:c3:c8:da:f0  CNF3HN72T9        N/A   N/A
ABC-JD001-10-AP6   jd.tushuguan  325      10.26.18.125  Up 103d:11h:8m:18s         172.21.2.12  172.21.2.11  38:17:c3:c8:d5:9e  CNF3HN723D        N/A   N/A
ABC-JD001-10-AP7   jd.tushuguan  325      10.26.25.99   Up 103d:11h:7m:19s         172.21.2.11  172.21.2.12  38:17:c3:c9:7c:ac  CNF7HN70QB        N/A   N/A
--More-- (q) quit (u) pageup (/) search (n) repeat
```

AP硬件运行状态查询

登录到每个MD设备上，输入”show ap active”命令，观察当前控制器中所有的AP工作状态是否正常。其中，
“Clients”为显示当前关联在每个AP的不同Radio上的终端数量
“Band Ch/EIRP/MaxEIRP”栏目下显示每个AP的当前工作信道、当前发信功率、允许的最大发信功率等参数

```
(tj-md1) *#show ap ac

Active AP Table
---------------
Name              Group          IP Address     AP Type  Flags  Uptime           Outer IP  Radio 0 Band Ch/EIRP/MaxEIRP/Clients  Radio 1 Band Ch/EIRP/MaxEIRP/Clients
----              -----          ----------     -------  -----  ------           --------  ------------------------------------  ------------------------------------
ABC-SP007-2-AP13  sp.xingzheng   10.26.12.29    305      daN    96d:0h:12m:56s   N/A       AP:5GHz-VHT:165/31.9/31.9/0           AP:2.4GHz-HT:6/10.0/20.0/0
ABC-SP008-4-AP18  sp.xingzheng   10.26.9.28     305      daN    96d:0h:13m:11s   N/A       AP:5GHz-VHT:165/31.9/31.9/0           AP:2.4GHz-HT:11/10.0/20.0/0
ABC-SP001-9-AP9   sp.tushuguan   10.26.2.52     305      daN    89d:3h:5m:26s    N/A       AP:5GHz-VHT:36/23.0/23.0/6            AP:2.4GHz-HT:1/12.0/20.0/1
ABC-SP001-1-AP6   sp.tushuguan   10.26.1.74     305      SdaN   129d:22h:52m:57s N/A       AP:5GHz-VHT:153/31.9/31.9/8           AP:2.4GHz-HT:11/11.0/20.0/0
ABC-SP001-2-AP8   sp.tushuguan   10.26.0.96     325      SAdaN  89d:3h:9m:50s    N/A       AP:5GHz-VHT:36/23.0/23.0/14           AP:2.4GHz-HT:11/12.0/20.0/5
ABC-SP001-10-AP5  sp.tushuguan   10.26.6.31     305      daN    10d:13h:25m:53s  N/A       AP:5GHz-VHT:48/23.0/23.0/0            AP:2.4GHz-HT:6/12.0/20.0/0
ABC-JD001-14-AP17 jd.tushuguan   10.26.18.119   325      AdaN   103d:10h:34m:1s  N/A       AP:5GHz-VHT:48/23.0/23.0/0            AP:2.4GHz-HT:11/12.0/20.0/0
ABC-JD016-2-AP7   jd.tiyuguan    10.26.18.152   325      SAdaN  78d:11h:34m:49s  N/A       AP:5GHz-VHT:149/32.9/32.9/1           AP:2.4GHz-HT:6/11.0/20.0/1
ABC-SP017-1-AP9   TEMPSSID       10.26.8.110    325      SAdaN  57d:4h:57m:30s   N/A       AP:5GHz-VHT:44/23.0/23.0/12           AP:2.4GHz-HT:1/11.0/20.0/2
ABC-JD001-10-AP10 jd.tushuguan   10.26.17.230   325      SAdaN  130d:1h:59m:44s  N/A       AP:5GHz-VHT:36/23.0/23.0/7            AP:2.4GHz-HT:6/11.0/20.0/0
ABC-SP001-8-AP6   sp.tushuguan   10.26.2.219    305      daN    10d:13h:26m:3s   N/A       AP:5GHz-VHT:161/31.9/31.9/1           AP:2.4GHz-HT:1/12.0/20.0/0
ABC-JD001-14-AP2  jd.tushuguan   10.26.25.88    305      SdaN   103d:10h:31m:20s N/A       AP:5GHz-VHT:161/31.9/31.9/1           AP:2.4GHz-HT:6/12.0/20.0/0
ABC-SP008-4-AP21  sp.xingzheng   10.26.9.27     305      daN    96d:0h:13m:9s    N/A       AP:5GHz-VHT:153/31.9/31.9/0           AP:2.4GHz-HT:11/9.0/20.0/0
ABC-SP001-9-AP10  sp.tushuguan   10.26.2.51     305      daN    89d:3h:5m:12s    N/A       AP:5GHz-VHT:44/23.0/23.0/5            AP:2.4GHz-HT:1/12.0/20.0/0
ABC-SP001-1-AP3   sp.tushuguan   10.26.0.103    325      AdaN   129d:22h:53m:23s N/A       AP:5GHz-VHT:44/23.0/23.0/15           AP:2.4GHz-HT:11/12.0/20.0/3
ABC-SP001-10-AP8  sp.tushuguan   10.26.6.24     305      daN    89d:3h:3m:31s    N/A       AP:5GHz-VHT:161/31.9/31.9/7           AP:2.4GHz-HT:11/12.0/20.0/2
ABC-JD001-11-AP5  jd.tushuguan   10.26.18.112   325      AdaN   103d:10h:34m:30s N/A       AP:5GHz-VHT:161/32.9/32.9/0           AP:2.4GHz-HT:11/11.0/20.0/0
ABC-SP001-6-AP8   sp.tushuguan   10.26.11.248   305      SdaN   10d:12h:11m:50s  N/A       AP:5GHz-VHT:157/31.9/31.9/11          AP:2.4GHz-HT:1/12.0/20.0/0
ABC-JD016-2-AP8   jd.tiyuguan    10.26.18.159   325      AdaN   78d:11h:35m:12s  N/A       AP:5GHz-VHT:64/23.0/23.0/1            AP:2.4GHz-HT:11/10.0/20.0/0
ABC-JD001-12-AP9  jd.tushuguan   10.26.17.225   325      AdaN   103d:10h:37m:36s N/A       AP:5GHz-VHT:149/32.9/32.9/0           AP:2.4GHz-HT:1/11.0/20.0/0
ABC-SP008-1-AP1   sp.xingzheng   10.26.8.222    305      daN    89d:3h:6m:55s    N/A       AP:5GHz-VHT:36/23.0/23.0/0            AP:2.4GHz-HT:6/10.0/20.0/0
ABC-SP007-3-AP15  sp.xingzheng   10.26.2.107    305      daN    89d:3h:8m:21s    N/A       AP:5GHz-VHT:44/23.0/23.0/0            AP:2.4GHz-HT:1/8.0/20.0/0
ABC-JD001-2-AP6   jd.tushuguan   10.26.24.248   325      AdaN   103d:10h:37m:10s N/A       AP:5GHz-VHT:56/23.0/23.0/2            AP:2.4GHz-HT:6/12.0/20.0/0
ABC-SP008-5-AP9   sp.xingzheng   10.26.9.38     305      daN    96d:0h:12m:55s   N/A       AP:5GHz-VHT:149/31.9/31.9/0           AP:2.4GHz-HT:1/10.0/20.0/0
ABC-SP066-2-AP4   sp.xuri        10.26.8.12     305      SdaN   89d:3h:8m:56s    N/A       AP:5GHz-VHT:149/31.9/31.9/3           AP:2.4GHz-HT:6/10.0/20.0/0
ABC-JD001-9-AP6   jd.tushuguan   10.26.25.101   325      AdaN   130d:1h:59m:44s  N/A       AP:5GHz-VHT:52/23.0/23.0/10           AP:2.4GHz-HT:6/9.0/20.0/1
ABC-SP008-1-AP7   sp.xingzheng   10.26.8.227    305      daN    89d:3h:8m:14s    N/A       AP:5GHz-VHT:161/31.9/31.9/1           AP:2.4GHz-HT:6/10.0/20.0/0
ABC-JD001-14-AP10 jd.tushuguan   10.26.25.61    305      daN    89d:3h:7m:53s    N/A       AP:5GHz-VHT:52/23.0/23.0/0            AP:2.4GHz-HT:11/12.0/20.0/0
ABC-SP065-1-AP26  sp.dalitang   10.26.1.159    334      AdaN   95d:10h:37m:53s  N/A       AP:5GHz-VHT:56/23.0/23.0/0            AP:2.4GHz-HT:11/12.0/15.7/0
--More-- (q) quit (u) pageup (/) search (n) repeat
```

AP硬件运行状态查询

登录到每个MD设备上，输入”show ap debug counters”命令，观察控制器中所有的AP健康状态是否正常。其中，若Bootstraps的数量远大于Reboots的数量，则AP与控制器之间的传输链路可能存在问题，导致AP和控制器之间失去GRE心跳。

```
(tj-md1) *#show ap debug counters

AP Counters
-----------
```

Name	Group	IP Address	Configs Sent	Configs Acked	AP Boots Sent	AP Boots Acked	Bootstraps (Total)	Reboots	Crash	Current License counter	Global License counter	GSM Info for AP
ABC-JD001-1-AP1	jd.tushuguan	10.26.17.213	0	0	0	0	3 (80)	38	N	1/0/0/0/1/0/0	6/5/0/0/6/5/0	42/1/1/1
ABC-JD001-1-AP10	jd.tushuguan	10.26.18.67	495	495	0	0	1 (106)	45	N	2/1/1/0/1/1/0	6/5/1/0/5/5/0	40/0/0/0
ABC-JD001-1-AP11	jd.tushuguan	10.26.18.71	495	495	0	0	1 (95)	42	N	2/1/1/0/1/1/0	6/5/1/0/5/5/0	40/0/0/0
ABC-JD001-1-AP12	jd.tushuguan	10.26.18.66	495	495	0	0	2 (95)	43	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-1-AP13	jd.tushuguan	10.26.18.65	495	495	0	0	1 (95)	43	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-1-AP14	jd.tushuguan	10.26.18.68	495	495	0	0	1 (93)	41	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-1-AP2	jd.tushuguan	10.26.24.212	0	0	0	0	3 (75)	35	N	1/0/0/0/1/0/0	1/0/0/0/1/0/0	42/1/1/1
ABC-JD001-1-AP3	jd.tushuguan	10.26.17.235	0	0	0	0	6 (92)	40	N	1/0/0/0/1/0/0	5/4/0/0/5/4/0	42/1/1/1
ABC-JD001-1-AP4	jd.tushuguan	10.26.17.232	495	495	0	0	3 (75)	34	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-1-AP5	jd.tushuguan	10.26.17.234	0	0	0	0	3 (74)	34	N	1/0/0/0/1/0/0	7/6/0/0/7/6/0	42/1/1/1
ABC-JD001-1-AP6	jd.tushuguan	10.26.25.35	0	0	0	0	2 (92)	40	N	1/0/0/0/1/0/0	2/1/0/0/2/1/0	42/1/1/1
ABC-JD001-1-AP7	jd.tushuguan	10.26.25.34	0	0	0	0	1 (93)	42	N	1/0/0/0/1/0/0	5/4/0/0/5/4/0	42/1/1/1
ABC-JD001-1-AP8	jd.tushuguan	10.26.25.47	0	0	0	0	2 (95)	43	N	1/0/0/0/1/0/0	1/0/0/0/1/0/0	42/1/1/1
ABC-JD001-1-AP9	jd.tushuguan	10.26.18.32	0	0	0	0	1 (92)	41	N	1/0/0/0/1/0/0	1/0/0/0/1/0/0	42/1/1/1
ABC-JD001-10-AP1	jd.tushuguan	10.26.25.82	495	495	0	0	6 (105)	42	N	2/1/1/0/1/1/0	5/4/1/0/4/4/0	40/0/0/0
ABC-JD001-10-AP10	jd.tushuguan	10.26.17.230	0	0	0	0	4 (77)	37	N	1/0/0/0/1/0/0	1/0/0/0/1/0/0	42/1/1/1
ABC-JD001-10-AP11	jd.tushuguan	10.26.18.5	0	0	0	0	6 (90)	39	N	1/0/0/0/1/0/0	4/3/0/0/4/3/0	42/1/1/1
ABC-JD001-10-AP12	jd.tushuguan	10.26.17.239	495	495	0	0	4 (79)	37	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-10-AP2	jd.tushuguan	10.26.25.123	0	0	0	0	3 (86)	35	N	1/0/0/0/1/0/0	1/0/0/0/1/0/0	42/1/1/1
ABC-JD001-10-AP3	jd.tushuguan	10.26.25.66	0	0	0	0	3 (83)	33	N	1/0/0/0/1/0/0	7/6/0/0/7/6/0	42/1/1/1
ABC-JD001-10-AP4	jd.tushuguan	10.26.18.122	0	0	0	0	4 (87)	35	N	1/0/0/0/1/0/0	4/3/0/0/4/3/0	42/1/1/1
ABC-JD001-10-AP5	jd.tushuguan	10.26.18.138	495	495	0	0	3 (87)	35	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-10-AP6	jd.tushuguan	10.26.18.125	0	0	0	0	4 (89)	37	N	1/0/0/0/1/0/0	4/3/0/0/4/3/0	42/1/1/1
ABC-JD001-10-AP7	jd.tushuguan	10.26.25.99	495	495	0	0	3 (84)	34	N	2/1/1/0/1/1/0	8/7/1/0/7/7/0	40/0/0/0
ABC-JD001-10-AP8	jd.tushuguan	10.26.17.254	0	0	0	0	3 (78)	37	N	1/0/0/0/1/0/0	1/0/0/0/1/0/0	42/1/1/1
ABC-JD001-10-AP9	jd.tushuguan	10.26.25.16	0	0	0	0	4 (79)	38	N	1/0/0/0/1/0/0	4/3/0/0/4/3/0	42/1/1/1
ABC-JD001-11-AP1	jd.tushuguan	10.26.18.141	0	0	0	0	3 (86)	34	N	1/0/0/0/1/0/0	7/6/0/0/7/6/0	42/1/1/1
ABC-JD001-11-AP10	jd.tushuguan	10.26.18.4	495	495	0	0	3 (76)	36	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-11-AP11	jd.tushuguan	10.26.17.243	495	495	0	0	3 (77)	35	N	2/1/1/0/1/1/0	8/7/2/1/6/6/0	40/0/0/0
ABC-JD001-11-AP12	jd.tushuguan	10.26.18.9	0	0	0	0	3 (74)	34	N	1/0/0/0/1/0/0	7/6/0/0/7/6/0	42/1/1/1
ABC-JD001-11-AP13	jd.tushuguan	10.26.25.30	495	495	0	0	4 (75)	35	N	2/1/1/0/1/1/0	2/1/1/0/1/1/0	40/0/0/0
ABC-JD001-11-AP14	jd.tushuguan	10.26.25.31	0	0	0	0	4 (75)	33	N	1/0/0/0/1/0/0	4/3/0/0/4/3/0	42/1/1/1

AP硬件运行状态查询

登录到每个MD设备上，输入” show ap debug system-status ap-name ABC-JD001-11-AP14 | begin "Power Status“ 命令,可以查看当前AP的供电状态

```
(tj-md1) [MDC] *#show ap debug system-status ap-name ABC-JD001-11-AP14 | begin "Power Status"
Power Status
------------
Item                          Value
----                          -----
Power Supply                  : POE-AT
LLDP Power                    : Successfully negotiated at 25.0W
Current Operational State     : No restrictions (Overridden by LLDP)

Bandwidth Contracts Information
-------------------------------
Received BWM Config:
--------------------
--------------------
        ACL                                                    DIR  Contract-ID PerUser UseCount Rate

Allocated Contracts:
--------------------
Contract-ID Rate       UseCount Available-Bytes Max-Bytes Policed-Bytes


NSS Crypto Engine state
-----------------------
--More-- (q) quit (u) pageup (/) search (n) repeat
```

无线用户接入状态查询

登录到MM控制器上，输入” show global-user-table list”命令，观察全网所有在线用户的状态信息，可以查看当前无线终端所停靠的UAC（Current Switch）。

```
(tj-mm-a) [mynode] #show global-user-table list

Mon Nov 26 20:43:50.223 2018

Global Users
------------
    IP              MAC             Name     Current switch  Role          Auth    AP name              Roaming   Essid          Bssid              Phy    Profile         Type
    ----------      ------------    ------   --------------  ----          ----    -------              -------   -----          -----              ---    -------         ----
10.0.0.16       88:2d:53:06:68:8b               202.120.166.48  tongjipsk             LinWeiDong-IAP-205H  Wireless  tongjipsk      b4:5d:50:59:62:e1  g-HT   tongjipsk       N/A
100.68.1.157    18:5e:0f:1d:ef:34  1630251      172.21.2.12     itongji       802.1x  ABC-SP001-7-AP10     Wireless  iTongji-auto   24:f2:7f:27:a2:b0  a-VHT  itongji         Win XP
100.66.21.105   84:78:8b:7d:44:59               172.21.2.11     tongji.portal         ABC-JD001-9-AP11     Wireless  tongji.portal  38:17:c3:17:ae:11  a-HT   tongji.portal   iPad
100.66.195.237  bc:a9:20:72:a4:dd               172.21.2.11     tongji.portal         ABC-SP001-1-AP29     Wireless  tongji.portal  38:17:c3:0d:28:f1  a-VHT  tongji.portal   iPhone
100.67.142.252  3c:f5:91:40:fb:41               172.21.2.12     tongji.portal         ABC-JD001-5-AP16     Wireless  tongji.portal  38:17:c3:0d:5b:d1  a-VHT  tongji.portal   Android
100.66.132.157  00:bb:3a:82:e7:cd               172.21.2.12     tongji.portal         ABC-JD001-2-AP7      Wireless  tongji.portal  38:17:c3:0d:36:11  a-HT   tongji.portal   Kindle
100.66.168.53   70:e7:2c:1b:48:fa               172.21.2.12     tongji.portal         ABC-SP001-8-AP2      Wireless  tongji.portal  24:f2:7f:27:b0:f1  a-HT   tongji.portal   iPad
100.67.67.124   60:21:01:38:93:73               172.21.2.11     tongji.portal         ABC-SP001-6-AP7      Wireless  tongji.portal  24:f2:7f:27:9c:31  a-VHT  tongji.portal   Android
100.66.241.57   bc:83:85:f1:be:63               172.21.2.12     tongji.portal         ABC-SP001-8-AP9      Wireless  tongji.portal  24:f2:7f:27:b2:31  a-VHT  tongji.portal   Win 10
100.67.0.58     d0:57:7b:0e:69:24               172.21.2.11     tongji.portal         ABC-JD001-7-AP2      Wireless  tongji.portal  38:17:c3:17:a7:31  a-VHT  tongji.portal   Win XP
100.66.218.173  68:07:15:6f:7f:7a               172.21.2.12     tongji.portal         ABC-JD001-8-AP9      Wireless  tongji.portal  38:17:c3:0d:17:11  a-VHT  tongji.portal   Win XP
100.68.41.182   8c:85:90:53:1e:5b  1750114      172.21.2.12     eduroam       802.1x  ABC-JD001-9-AP20     Wireless  eduroam        38:17:c3:17:aa:72  a-VHT  eduroam         OS X
100.68.168.33   00:5a:13:17:f3:bf  1452820      172.21.2.12     itongji       802.1x  ABC-JD001-10-AP12    Wireless  iTongji-auto   38:17:c3:0d:08:c0  g-HT   itongji         Android
100.66.121.218  7c:67:a2:76:91:e8               172.21.2.11     tongji.portal         ABC-JD001-9-AP9      Wireless  tongji.portal  38:17:c3:0d:0d:31  a-VHT  tongji.portal   Win 8
100.67.19.19    94:65:2d:fb:95:cb               172.21.2.12     tongji.portal         ABC-SP001-7-AP4      Wireless  tongji.portal  24:f2:7f:27:b0:91  a      tongji.portal   Linux
100.67.13.103   00:ec:0a:ff:a3:6b               172.21.2.12     tongji.portal         ABC-JD001-8-AP10     Wireless  tongji.portal  38:17:c3:17:aa:f1  a-VHT  tongji.portal   Linux
100.67.118.13   6c:b7:49:93:4e:ce               172.21.2.11     tongji.portal         ABC-JD001-6-AP6      Wireless  tongji.portal  38:17:c3:17:b1:c1  g-HT   tongji.portal   Android
100.68.40.135   00:b3:62:64:07:b9  1553264      172.21.2.12     itongji       802.1x  ABC-JD001-4-AP10     Wireless  iTongji-auto   38:17:c3:17:cc:90  a-VHT  itongji         iPhone
100.66.242.242  e0:ac:cb:75:82:52               172.21.2.12     tongji.portal         ABC-SP001-2-AP2      Wireless  tongji.portal  38:17:c3:17:a7:d1  a-VHT  tongji.portal   OS X
100.66.163.76   98:5f:d3:d3:7e:d4               172.21.2.12     tongji.portal         ABC-JD001-7-AP1      Wireless  tongji.portal  38:17:c3:0d:34:11  a-VHT  tongji.portal   Win 10
100.67.162.10   94:87:e0:25:39:f4               172.21.2.12     tongji.portal         ABC-SP001-7-AP8      Wireless  tongji.portal  24:f2:7f:27:c6:51  a-VHT  tongji.portal   Linux
100.67.191.68   40:a3:cc:bf:46:ef               172.21.2.12     tongji.portal         ABC-JD001-4-AP7      Wireless  tongji.portal  38:17:c3:0d:a3:f1  a-VHT  tongji.portal   Win XP
100.67.101.215  04:4f:4c:6d:3f:00               172.21.2.12     tongji.portal         ABC-JD001-4-AP4      Wireless  tongji.portal  38:17:c3:0d:23:d1  a-VHT  tongji.portal   Android
100.68.122.129  9c:b6:d0:b9:5c:45  1551305      172.21.2.11     itongji       802.1x  ABC-JD001-5-AP10     Wireless  iTongji-auto   38:17:c3:0c:a1:f0  a-VHT  itongji         Win 10
100.66.92.30    10:1c:0c:1b:63:a5               172.21.2.12     tongji.portal         ABC-JD001-2-AP17     Wireless  tongji.portal  38:17:c3:0d:a9:71  a-HT   tongji.portal   iPad
100.66.147.183  4c:66:41:47:0a:90               172.21.2.12     tongji.portal         ABC-SP001-2-AP4      Wireless  tongji.portal  38:17:c3:17:a8:71  a-VHT  tongji.portal   Android
100.66.64.37    34:08:bc:df:de:ba               172.21.2.11     tongji.portal         ABC-JD001-6-AP6      Wireless  tongji.portal  38:17:c3:17:b1:d1  a-VHT  tongji.portal   iPhone
100.67.243.1    28:c2:dd:27:c5:a3               172.21.2.11     tongji.portal         ABC-SP001-2-AP3      Wireless  tongji.portal  38:17:c3:0c:9a:21  g-HT   tongji.portal   Win 7
100.67.210.154  c8:3d:d4:91:41:6d               172.21.2.12     tongji.portal         ABC-JD001-3-AP4      Wireless  tongji.portal  38:17:c3:0d:5b:b1  a-VHT  tongji.portal   Windows
100.67.156.161  c8:ff:28:77:c4:1f               172.21.2.11     tongji.portal         ABC-JD001-2-AP14     Wireless  tongji.portal  38:17:c3:0d:5a:d1  a-VHT  tongji.portal   Windows
100.67.191.29   7c:67:a2:c3:a2:f8               172.21.2.12     tongji.portal         ABC-JD001-7-AP12     Wireless  tongji.portal  38:17:c3:0d:0e:51  a-VHT  tongji.portal   Windows
100.67.158.54   a0:18:28:18:9b:d2               172.21.2.11     tongji.portal         ABC-SP001-2-AP3      Wireless  tongji.portal  38:17:c3:0c:9a:31  a-VHT  tongji.portal   iPhone
--More-- (q) quit (u) pageup (/) search (n) repeat
```

无线用户接入状态查询

登录到每个MD控制器上，输入”show user-table”命令，观察该MD控制器中当前的无线用户列表。在列表中可以查询到用户的IP地址、MAC地址、username、认证方式、终端类型和关联的AP Name等。

```
(tj-md1) *#show user
This operation can take a while depending on number of users. Please be patient ....

Users
-----
    IP              MAC            Name                 Role          Age(d:h:m)  Auth    VPN link  AP name          Roaming   Essid/Bssid/Phy                          Profile       Forward mode  Type      Host Name  User Type
----------      ------------    ------               ----          ----------  ----    --------  -------          -------   ---------------                          -------       ------------  ----      ---------  ---------
100.68.229.83   7c:04:d0:29:09:e8  1553803              itongji       00:02:07    802.1x            ABC-SP001-2-AP14 Wireless  iTongji-auto/38:17:c3:0c:8b:f0/a-VHT     itongji       tunnel        iPhone               WIRELESS
100.68.33.1     d8:c7:71:22:71:67  1751421              itongji       00:00:43    802.1x            ABC-SP001-6-AP4  Wireless  iTongji-auto/24:f2:7f:27:c8:40/g-HT      itongji       tunnel        Android              WIRELESS
100.66.132.77   10:08:b1:1a:7c:19                       tongji.portal 00:01:38                  ABC-SP001-2-AP8  Wireless  tongji.portal/38:17:c3:0c:90:81/g-HT     tongji.portal tunnel        Win XP               WIRELESS
100.67.15.56    4c:34:88:ce:57:3e                       tongji.portal 00:02:30                  ABC-SP001-2-AP2  Wireless  tongji.portal/38:17:c3:17:a7:d1/a-VHT    tongji.portal tunnel        Win 10               WIRELESS
100.68.224.55   48:3b:38:41:9e:90  1552194              itongji       00:00:13    802.1x            ABC-JD001-8-AP8  Wireless  iTongji-auto/38:17:c3:17:aa:30/a-VHT     itongji       tunnel        iPhone               WIRELESS
100.66.211.40   b8:c1:11:19:b2:78                       tongji.portal 00:00:05                  ABC-JD001-10-AP6 Wireless  tongji.portal/38:17:c3:0d:59:f1/a-VHT    tongji.portal tunnel        iPhone               WIRELESS
100.68.41.45    dc:0c:5c:c3:60:7a  90063                itongji       00:02:12    802.1x            ABC-SP001-1-AP14 Wireless  iTongji-auto/38:17:c3:0c:9b:70/a-VHT     itongji       tunnel        iPhone               WIRELESS
100.66.37.97    9c:b6:d0:f3:20:db                       tongji.portal 00:01:07                  ABC-JD001-3-AP6  Wireless  tongji.portal/38:17:c3:0d:48:f1/a-VHT    tongji.portal tunnel        Win 10               WIRELESS
100.67.6.92     18:f1:d8:e5:e0:88                       tongji.portal 00:02:02                  ABC-SP001-2-AP15 Wireless  tongji.portal/38:17:c3:0c:83:b1/a-VHT    tongji.portal tunnel        iPhone               WIRELESS
100.66.35.227   3c:95:09:4d:48:85                       tongji.portal 00:01:00                  ABC-JD001-7-AP1  Wireless  tongji.portal/38:17:c3:0d:34:11/a-VHT    tongji.portal tunnel        Win XP               WIRELESS
100.66.94.200   e4:a7:c5:a3:b2:10                       tongji.portal 00:00:22                  ABC-SP001-10-AP9 Wireless  tongji.portal/24:f2:7f:27:e2:51/a-VHT    tongji.portal tunnel        Android              WIRELESS
100.66.127.6    00:28:f8:94:7d:3e                       tongji.portal 00:02:31                  ABC-SP001-9-AP3  Wireless  tongji.portal/24:f2:7f:27:af:91/a-VHT    tongji.portal tunnel        Windows              WIRELESS
100.66.107.76   94:a1:a2:0a:53:f3                       tongji.portal 00:01:44                  ABC-SP001-6-AP4  Wireless  tongji.portal/24:f2:7f:27:c8:51/a-HT     tongji.portal tunnel        Win XP               WIRELESS
100.68.226.153  6c:4d:73:6c:b5:cf  1553760              itongji       00:03:13    802.1x            ABC-SP001-2-AP3  Wireless  iTongji-auto/38:17:c3:0c:9a:30/a-VHT     itongji       tunnel        iPhone               WIRELESS
100.67.180.239  b8:ee:65:d1:b9:29                       tongji.portal 00:00:17                  ABC-JD001-9-AP8  Wireless  tongji.portal/38:17:c3:17:b3:21/g-HT     tongji.portal tunnel        Win 10               WIRELESS
100.67.205.232  08:d4:0c:bb:fc:06                       tongji.portal 00:06:58                  ABC-JD001-9-AP15 Wireless  tongji.portal/38:17:c3:17:af:d1/a-VHT    tongji.portal tunnel        Win 10               WIRELESS
100.67.78.185   40:e2:30:f3:32:cf                       tongji.portal 00:01:03                  ABC-JD001-2-AP14 Wireless  tongji.portal/38:17:c3:0d:5a:c1/g-HT     tongji.portal tunnel        Windows              WIRELESS
100.67.124.162  e8:b2:ac:71:52:e2                       tongji.portal 00:00:10                  ABC-SP001-7-AP5  Wireless  tongji.portal/24:f2:7f:27:c1:31/a-VHT    tongji.portal tunnel        iPad                 WIRELESS
100.68.221.213  f4:31:c3:9f:41:c3  1630137              itongji       00:01:44    802.1x            ABC-SP001-1-AP27 Wireless  iTongji-auto/38:17:c3:0d:1a:50/a-VHT     itongji       tunnel        Win XP               WIRELESS
100.66.116.134  d0:53:49:11:3b:bd                       tongji.portal 00:01:42                  ABC-JD001-3-AP10 Wireless  tongji.portal/38:17:c3:0d:31:21/g-HT     tongji.portal tunnel        Win XP               WIRELESS
100.67.31.11    f4:5c:89:a0:33:e3                       tongji.portal 00:00:21                  ABC-JD001-5-AP7  Wireless  tongji.portal/38:17:c3:17:a7:51/a-VHT    tongji.portal tunnel        OS X                 WIRELESS
100.66.250.128  48:8a:d2:5c:d2:b8                       tongji.portal 00:00:08                  ABC-JD016-2-AP7  Wireless  tongji.portal/38:17:c3:17:f7:61/g-HT     tongji.portal tunnel        Win 7                WIRELESS
100.68.166.54   dc:f0:90:a6:bc:8d  1753970              itongji       00:00:27    802.1x            ABC-JD001-1-AP13 Wireless  iTongji-auto/24:f2:7f:27:c8:b0/a-VHT     itongji       tunnel        Android              WIRELESS
100.67.114.205  64:5a:ed:1d:7a:2e                       tongji.portal 00:00:01                  ABC-SP065-1-AP27 Wireless  tongji.portal/a8:bd:27:cd:fd:f1/a-VHT    tongji.portal tunnel                       WIRELESS
100.66.20.23    94:87:e0:15:03:5a                       tongji.portal 00:00:09                  ABC-SP008-5-AP5  Wireless  tongji.portal/24:f2:7f:27:9f:11/a-VHT    tongji.portal tunnel        Linux                WIRELESS
100.66.92.167   dc:85:de:8f:b4:6a                       tongji.portal 00:01:26                  ABC-JD001-8-AP4  Wireless  tongji.portal/38:17:c3:17:d7:21/g-HT     tongji.portal tunnel        Win XP               WIRELESS
100.68.128.236  00:c2:c6:ee:b1:9b  1810945@tongji.edu.cn eduroam      00:01:48    802.1x            ABC-SP001-2-AP12 Wireless  eduroam/38:17:c3:0c:7e:32/a-VHT          eduroam       tunnel        Win 7                WIRELESS
100.67.54.98    bc:83:85:de:f0:67                       tongji.portal 00:01:58                  ABC-SP001-2-AP16 Wireless  tongji.portal/38:17:c3:0d:a3:71/a-VHT    tongji.portal tunnel        Windows              WIRELESS
100.68.17.63    dc:2b:2a:86:8e:35  1451009              itongji       00:00:42    802.1x            ABC-SP001-6-AP8  Wireless  iTongji-auto/24:f2:7f:27:99:d0/a-VHT     itongji       tunnel        iPhone               WIRELESS
100.67.24.0     e4:f8:9c:b3:1f:c3                       tongji.portal 00:01:09                  ABC-SP001-2-AP7  Wireless  tongji.portal/38:17:c3:0d:64:31/a-VHT    tongji.portal tunnel        Win 98               WIRELESS
100.68.127.193  f0:18:98:38:fb:c8  1653806              itongji       00:02:15    802.1x            ABC-SP001-2-AP3  Wireless  iTongji-auto/38:17:c3:0c:9a:30/a-VHT     itongji       tunnel        OS X                 WIRELESS
100.67.72.250   f4:31:c3:14:42:46                       tongji.portal 00:00:04                  ABC-SP001-2-AP4  Wireless  tongji.portal/38:17:c3:17:a8:71/a-VHT    tongji.portal tunnel                       WIRELESS
--More-- (q) quit (u) pageup (/) search (n) repeat
```

无线用户接入状态查询

登录到每个MD控制器上，输入”show ap debug client-table ap-name <ap-name>”命令，可以查看某个AP下面的终端关联信息，包括连接速率、客户端信噪比等。

```
(tj-md1) *#show ap debug client-table ap-name ABC-JD001-1-AP14

Client Table
------------
MAC               ESSID         BSSID             Assoc_State  HT_State  AID  PS_State    UAPSD           Tx_Pkts  Rx_Pkts  PS_Qlen  Tx_Retries  Tx_Rate  Rx_Rate  Last_ACK_SNR  Last_Rx_SNR  TX_Chains  Tx_Timestamp              Rx_Ti
mestamp           MFP Status (C,R)  Idle time  Client health (C/R)
---               -----         -----             -----------  --------  ---  --------    -----           -------  -------  -------  ----------  -------  -------  ------------  -----------  ---------  ------------              -----
-------             ----------------  ---------  ------------------
d8:1d:72:95:c7:13  tongji.portal  24:f2:7f:27:bf:91  Associated   AvsEQ     0x2  Awake       (0,0,0,0,N/A,0)  445      1040     0        1048        6        13       7             8            3[0x7]     Mon Nov 26 20:40:51 2018  Mon N
ov 26 20:40:55 2018  (0,0)             437        100/59
1c:da:27:45:46:12  tongji.portal  24:f2:7f:27:bf:91  Associated   vsEb      0x1  Power-save  (0,0,0,0,N/A,0)  194      255      0        152         19       12       9             12           3[0x7]     Mon Nov 26 20:47:25 2018  Mon N
ov 26 20:47:57 2018  (0,0)             15         87/59
ac:a2:13:31:6a:8e  tongji.portal  24:f2:7f:27:bf:81  Associated   sbB       0x1  Power-save  (0,0,0,0,N/A,0)  2451     7186     0        984         26       52       48            44           2[0x3]     Mon Nov 26 20:47:59 2018  Mon N
ov 26 20:47:59 2018  (0,0)             13         89/83


Num of associated clients: 3
UAPSD:(VO,VI,BK,BE,Max SP,Q Len)
HT  Flags: A - LDPC Coding; W - 40MHz; S - Short GI 40; s - Short GI 20
         D - Delayed BA; G - Greenfield; R - Dynamic SM PS
         Q - Static SM PS; N - A-MPDU disabled; B - TX STBC
         b - RX STBC; M - Max A-MSDU; I - HT40 Intolerant; t turbo-rates (256-QAM)
VHT Flags: C - 160MHz/80+80MHz; c - 80MHz;  V - Short GI 160; v - Short GI 80
                E - Beamformee; e - Beamformer
HT_State shows client's original capabilities (not operational capabilities)
MFP Status: C - 1 if the station is MFP capable; R - 1 if the station has negotiated MFP
(tj-md1) *#
```

无线用户接入状态查询

输入 show user mac xxx，可以查看该终端的详细关联信息。

```
(tj-md1) *#show user mac 7c:04:d0:29:09:e8
This operation can take a while depending on number of users. Please be patient ....


Name: 1553803, IP: 100.68.229.83, MAC: 7c:04:d0:29:09:e8, Age: 00:02:49
Role: itongji (how: ROLE_DERIVATION_DOT1X), ACL: 79/0
Authentication: Yes, status: started, method: 802.1x, protocol: EAP-PEAP, server: srun
Authentication Servers: dot1x authserver: srun, mac authserver:
Bandwidth = No Limit
Bandwidth = No Limit
Role Derivation: ROLE_DERIVATION_DOT1X
VLAN Derivation: Default VLAN
Idle timeout (global): 300 seconds, Age: 00:00:00
Mobility state: Wireless, HA: Yes, Proxy ARP: No, Roaming: No Tunnel ID: 0 L3 Mob: 0
Flags: internal=0, trusted_ap=0, l3auth=0, mba=0, vpnflags=0, u_stm_ageout=1
Flags: innerip=0, outerip=0, vpn_outer_ind:0, download=1, wispr=0
IP User termcause: 0
phy_type: a-VHT-20, l3 reauth: 0, BW Contract: up:0 down:0, user-how: 1
Vlan default: 3021, Assigned: 3021, Current: 3021 vlan-how: 1 DP assigned vlan:0
Mobility Messages: L2=0, Move=0, Inter=0, Intra=0, Flags=0x0
SlotPort=0x2100, Port=0x112a3 (tunnel 4771)
Essid: iTongji-auto, Bssid: 38:17:c3:0c:8b:f0 AP name/group: ABC-SP001-2-AP14/sp.tushuguan Phy-type: a-VHT-20 Forward Mode: tunnel
AP IP: 10.26.1.83
RadAcct sessionID:15538037C04D02909E8-5BFBC5BA-11A2
RadAcct Traffic In 136745/15090951 Out 255895/321598555 (2:5673/0:0:230:17671,3:59287/0:0:4907:13403)
Timers: L3 reauth 0, mac reauth 0 (Reason: ), dot1x reauth 0 (Reason: )
Profiles AAA:itongji, dot1x:itongji, mac: CP:n/a def-role:'logon' via-auth-profile:''
ncfg flags udr 0, mac 0, dot1x 1, RADIUS interim accounting 1
IP Born: 1543226809 (Mon Nov 26 18:06:49 2018)
Core User Born: 1543226808 (Mon Nov 26 18:06:48 2018)
Upstream AP ID: 0, Downstream AP ID: 0
User Agent String: MTOPSDK/1.2.0 (iOS;12.0.1;Apple;iPhone)
HTTP based device-id info - Index: 46, Device: iPhone
Overall device-id info - Index: 6, Device: iPhone By: Auth-UA-Str
Max IPv4 users: 2
L3-Auth Session Timeout from RADIUS: 0
Mac-Auth Session Timeout Value from RADIUS: 0
Dot1x Session Timeout Value from RADIUS: 0
Dot1x Session Term-Action Value from RADIUS: Default
CaptivePortal Login-Page URL from RADIUS: N/A
Reauth-interval from role: 0
Number of reauthentication attempts: mac reauth 0, dot1x reauth 0
mac auth server: N/A, dot1x auth server: srun
Address is from DHCP: yes
ipuser_notify_action:NoAction/NoAction
Per-user-log pointer 0x309eb7fc (id 28939), num logs 44
RTTS disabled: rtts_throughput 101493 rtts_discard 0 rtts_reest 0 rtts_keepalive 0
Repkey-ready: 1, Repkey: 7, uuid: 001a1e0304100000003a36b0, bucket: 200 nasip 172.21.2.1
User added to cluster bucket-map: Yes

The phy column shows client's operational capabilities for current association

Flags: A: Active, B: Band Steerable, H: Hotspot(802.11u) client, K: 802.11K client, M: Mu beam formee, R: 802.11R client, W: WMM client, w: 802.11w client V: 802.11v BSS trans capable

PHY Details: HT   : High throughput;      20: 20MHz;  40: 40MHz; t: turbo-rates (256-QAM)
             VHT  : Very High throughput; 80: 80MHz; 160: 160MHz; 80p80: 80MHz + 80MHz
             <n>ss: <n> spatial streams
```

故障信息的搜集

收集故障的相关信息：

- 是否只发生在个别终端?
- 可能与终端网卡的驱动程序有关
- 是否只发生在某个地点?
- 可能与RF或者物理层故障相关
- 是否只发生在某组用户?
- 可能与Radius认证故障相关
- 是否只有某种应用收到影响?
- 可能与防火墙或服务器有关
- 是否只在特定时间段有影响?
- 可能与防火墙或服务器负载有关
- 网络和应用设置有什么变化?
- 真实反映网络和应用的变化，有助于快速定位故障

故障信息的搜集

- 无线网络由哪些设备组成？

无线控制器和AP的型号、版本，以及终端操作系统、无线网卡型号、驱动版本等信息

- 无线控制器与有线网络连接是否正常?

从控制器ping网关地址，观察是否正常

- Radius服务器是否能够正常工作?

用”aaa test-server mschap2 <radius-server> <username> <password>”测试Radius认证是否正常，并在Radius服务器上观察相应的日志信息

- DHCP服务器是否能够正常工作?

将控制器有线端口配置为用户VLAN，连接笔记本电脑，观察是否可以获得IP地址

- 无线控制器与无线AP之间是否通过防火墙?

检查防火墙策略是否允许无线控制器与无线AP之间通过以下端口/协议进行通信：

FTP (TCP port 21)
TFTP (UDP port 69)
NTP (UDP port 123).
SYSLOG (UDP port 514).
PAPI (UDP port 8211).
GRE (protocol 47).

故障信息的搜集

- 获取系统日志文件
  tar logs tech-support
  copy flash: logs.tar tftp: <external tftp server ip> logs.tar
- 获取软件故障文件
  tar crash
  copy flash: crash.tar tftp: <external tftp server ip> crash.tar
- 获取控制器flash备份文件
  backup flash
  copy flash: flashbackup.tar.gz tftp: <external tftp server ip> flashbackup.tar.gz
- 获取控制器当前配置备份文件
  copy running-config flash: default.cfg
  copy flash: default.cfg tftp: <external tftp server ip> backup-2xx.cfg
- 获取控制器当前授权备份文件
  license export license-backup.lic
  copy flash: license-backup.lic tftp: <external tftp server ip> license-backup.lic
- 获取当前控制器的所有在线和离线的AP信息
  Show ap database long / 记录所有的AP信息
- 获取当前控制器的内置数据库
  local-userdb export <filename> /保存控制器内置帐号到flash

故障原因的诊断

一般而言，AP无法正常启动的原因通常包括电源故障和网络故障两个方面。

- 电源供电故障

主要表现为AP电源指示灯或以太网端口指示灯显示异常，通常是我们的部分型号AP需要802.3at供电，而对端交换机确采用了802.3af供电，一方面需要PoE交换机开启LLDP协议，一方面需要PoE交换机强制供电为30W

- 网络故障

无法获得IP地址

未配置静态IP地址，或者无法通过DHCP获得IP地址，可以通过AP Console端口观察AP启动过程进行诊断。

无法发现无线控制器

AP不能通过静态配置，或者DHCP Option43、DNS以及ADP等方式获得控制器IP地址，将导致AP无法正常启动，可以通过AP Console端口观察AP启动过程进行诊断。

故障原因的诊断

- 无法与无线控制器正常通讯
  - PAPI（UDP 8211）
  - FTP/TFTP
  - GRE（Protocol IP 47）
  - SYSLOG
  - NTP

无线AP通过上述端口与控制器进行通讯，如果这些端口被阻挡也将导致无线AP无法正常启动，可以通过登录到每个MD控制器上，输入”show datapath session | include <AP_IP>”命令查看是否有上述会话到达控制器

```
(tj-md1) *#show datapath  session table  | include 10.26.18.66
172.21.2.11     10.26.18.66     17   8515  8211   0/0     0    0   0   pc0         17   1          224         FI              10
10.26.18.66     172.21.2.11     17   8211  8211   0/0     0    0   0   pc0         51   50         33475       FCI             10
172.21.2.11     10.26.18.66     17   8494  8211   0/0     0    0   0   pc0         a    2          544         FI              10
10.26.18.66     172.21.2.11     17   8211  8222   0/0     0    0   1   pc0         c    0          0           FYCI            10
172.21.2.11     10.26.18.66     47   0     0      0/0     6    56  0   pc0         a994 479767     154762048   F               24
10.26.18.66     172.21.2.11     47   0     0      0/0     0    40  0   pc0         a997 467816     54852236    FC              24
10.26.18.66     172.21.2.11     17   8211  8494   0/0     0    0   1   pc0         11   0          0           FYCI            10
10.26.18.66     172.21.2.11     17   8211  8515   0/0     0    0   2   pc0         20   0          0           FYCI            10
172.21.2.11     10.26.18.66     17   8211  8211   0/0     0    0   5   pc0         5a   0          0           FYI             10
172.21.2.11     10.26.18.66     17   8222  8211   0/0     0    0   0   pc0         13   2          268         FI              10
(tj-md1) *#
```

故障原因的诊断

- AP工作状态不稳定的可能原因

无线控制器和AP通过双向PAPI心跳报文监测通道的质量，当通道质量问题（如水晶头、网线、传输链路等）引起心跳报文丢失时，会导致AP信号丢失，甚至AP重新启动等故障现象。登录到每个MD控制器上，输入”show ap debug counter ap-name <ap-name>”可以查看AP的Bootstaps和Reboot次数，并进一步判断是否存在通道质量问题。

```
(tj-md1) *#show ap debug counters ap-name ABC-SP001-6-AP8

AP Counters
-----------
Name             Group         IP Address    Configs Sent  Configs Acked  AP Boots Sent  AP Boots Acked  Bootstraps (Total)  Reboots  Crash  Current License counter  Global License counter  GSM Info for AP
----             -----         ----------    ------------  -------------  -------------  --------------  ------------------  -------  -----  -----------------------  ----------------------  ---------------
ABC-SP001-6-AP8  sp.tushuguan  10.26.11.248  0             0              0              0               2          (86   )  67       N      1/0/0/0/1/0/0            1/0/0/0/1/0/0           42/1/1/1
(tj-md1) *#
```

故障原因的诊断

登录到每个MD设备上，输入” show ap debug system-status ap-name xxx”命令,可以查看之前的bootstrap（进程软重启）和reboot（硬件重启）的相关原因信息，从而可以确定为什么AP会出现重启？

通常AP和AC之间失去的是GRE和PAPI心跳，这些心跳的丢失大多问题集中在：AP和AC之间的网络通讯出现问题（有中间增加防火墙的acl阻止，有的是AP地址冲突导致，有的是PoE交换机的网络配置问题或者上联光纤端口或者跳线故障问题，有的是互联AP的网线老化或者水晶头故障等等），一旦心跳丢失，AP就会有进程软重启，导致现场的用户会出现瞬间的无线信号闪断问题。

```
(tj-md1) [MDC] *#show ap debug system-status ap-name ABC-JD001-1-AP3

Reboot Information
------------------
AP rebooted Wed Aug 29 16:58:59 HKT 2018; SAPD: Unable to contact switch: HELLO-TIMEOUT. Last rebootstrap reason: HELLO-TIMEOUT, 206 sec before: Last Ctrl msg: HELLO len=1447 dest=172.21.2.12 tries=10 seq=0
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Rebootstrap Information
-----------------------
Date       Time     Reason (Latest 10)
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
1969-12-31 16:05:08 Switching to LMS 172.21.2.10: HELLO-TIMEOUT. Last Ctrl message: HELLO len=1447 dest=172.21.2.12 tries=10 seq=0
1969-12-31 16:09:04 Switching to LMS 172.21.2.12: HELLO-TIMEOUT. Last Ctrl message: HELLO len=1447 dest=172.21.2.10 tries=10 seq=0
1969-12-31 16:13:16 Switching to LMS 172.21.2.10: HELLO-TIMEOUT. Last Ctrl message: HELLO len=1447 dest=172.21.2.12 tries=10 seq=0
1969-12-31 16:17:01 Switching to LMS 172.21.2.12: HELLO-TIMEOUT. Last Ctrl message: HELLO len=1447 dest=172.21.2.10 tries=10 seq=0
2018-08-29 17:28:03 Cluster rebootstrap: switching to LMS 172.21.2.12, Last Event: missed heartbeat to S-AAC when standby-activating


HA Failover Information
-----------------------
Date       Time     Reason (Latest 10)
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
(none found)

Cluster Failover Information
----------------------------
Date       Time     Reason (Latest 10)
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
2018-08-29 17:27:56 Delete A-AAC:172.21.2.12, cluster enabled=1. fail-over to 172.21.2.11, sby status=1

Recent Control Messages from AP to Controller
---------------------------------------------
Date       Time              Message Description
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------
Sun Dec  2 20:32:02 2018(62 secs ago): SENT REQ type=BW_REPORT len=106 peer=172.21.2.12 seq_num=20796 num_attempts=1 rtt=0 secs 040000006504000000007050A1A11EB040086672904000051 3C040000000104000000000400000003040000000002000400000000040000000400000000040
Sun Dec  2 20:31:49 2018(75 secs ago): SENT REQ type=BW_REPORT len=106 peer=172.21.2.12 seq_num=20795 num_attempts=1 rtt=0 secs 040000006504000000007050A1A11EB040086672904000051 3B040000000004000000180400000003040000000002000400000000040000000400000000040
Sun Dec  2 20:29:41 2018(203 secs ago): SENT REQ type=KEEPALIVE len=45 peer=172.21.2.12 seq_num=20794 num_attempts=1 rtt=0 secs 040000002804000000002050A1A11EB040086672904000051 3A045C03D03505FFFFF000050A1A1FFE0000000000


Rebootstrap LMS
---------------
(none found)
------------

Crash Information
-----------------
(none found)
-------------
--More-- (q) quit (u) pageup (/) search (n) repeat
```

故障原因的诊断

- 检测终端与AP的关联是否正常

登录到每个MD控制器上，输入”show ap debug client-table ap-name <ap-name>”命令可以查看某个AP下面的终端关联信息，包括终端是否处于节电模式（PS_State），
以及终端的上、下行速率（Tx_Rate和Rx_Rate），信噪比（SNR）和终端的空间流等。
一般而言，信噪比建议高于25dB。

```
(tj-md1) *#show ap debug client-table ap-name ABC-SP001-6-AP8

Client Table
------------
MAC               ESSID          BSSID              Assoc_State  HT_State  AID  PS_State    UAPSD           Tx_Pkts  Rx_Pkts  PS_Qlen  Tx_Retries  Tx_Rate  Rx_Rate  Last_ACK_SNR  Last_Rx_SNR  TX_Chains  Tx_Timestamp              Rx_Ti
mestamp             MFP Status (C,R)  Idle time  Client health (C/R)
---               -----          -----              -----------  --------  ---  --------    -----           -------  -------  -------  ----------  -------  -------  ------------  -----------  ---------  ------------              -----
-------             ----------------  ---------  ------------------
e8:b2:ac:00:0f:98  iTongji-auto   24:f2:7f:27:99:d0  Associated   AvsEe     0x1  Power-save  (0,0,0,0,N/A,0)  9635     33936    0        332         192      173      46            44           3[0x7]     Mon Nov 26 20:19:09 2018  Mon N
ov 26 20:19:08 2018  (0,0)             16         100/73
74:81:14:ac:2b:7b  iTongji-auto   24:f2:7f:27:99:d0  Associated   AvsEe     0x7  Power-save  (0,0,0,0,N/A,0)  298022   161363   0        14437       192      173      51            51           3[0x7]     Mon Nov 26 20:19:15 2018  Mon N
ov 26 20:19:20 2018  (0,0)             5          100/73
64:9a:be:26:81:43  iTongji-auto   24:f2:7f:27:99:d0  Associated   AvsEQ     0x3  Power-save  (0,0,0,0,N/A,0)  111686   70838    0        5673        96       86       39            35           3[0x7]     Mon Nov 26 20:19:17 2018  Mon N
ov 26 20:19:19 2018  (0,0)             6          100/73
b4:ae:2b:34:97:45  iTongji-auto   24:f2:7f:27:99:d0  Associated   AvsEBb    0x5  Power-save  (0,0,0,0,N/A,0)  49324    56781    0        5804        144      173      46            47           3[0x7]     Mon Nov 26 20:19:22 2018  Mon N
ov 26 20:19:22 2018  (0,0)             3          81/73
dc:2b:2a:86:8e:35  iTongji-auto   24:f2:7f:27:99:d0  Associated   AvsEe     0x2  Power-save  (0,0,0,0,N/A,0)  2643     3658     0        114         192      173      49            48           3[0x7]     Mon Nov 26 20:18:46 2018  Mon N
ov 26 20:18:45 2018  (0,0)             39         100/73
2c:20:0b:db:1a:df  iTongji-auto   24:f2:7f:27:99:d0  Associated   AvsE      0x8  Power-save  (0,0,0,0,N/A,0)  229215   91594    0        30497       96       86       36            35           3[0x7]     Mon Nov 26 20:19:22 2018  Mon N
ov 26 20:19:22 2018  (0,0)             3          73/73
48:bf:6b:d6:89:6c  iTongji-auto   24:f2:7f:27:99:d0  Associated   AvsEeM    0x6  Awake       (0,0,0,0,N/A,0)  10573    5969     0        433         192      173      48            40           3[0x7]     Mon Nov 26 20:19:22 2018  Mon N
ov 26 20:19:22 2018  (0,0)             3          100/73
34:ab:37:98:94:13  tongji.portal  24:f2:7f:27:99:d1  Associated   AvsEe     0x1  Power-save  (0,0,0,0,N/A,0)  1030371  343094   0        53787       192      173      60            60           3[0x7]     Mon Nov 26 20:19:19 2018  Mon N
ov 26 20:19:19 2018  (0,0)             6          98/73
c0:f2:fb:7a:0a:e2  tongji.portal  24:f2:7f:27:99:d1  Associated   GsbB      0x6  Power-save  (0,0,0,0,N/A,0)  6986     9886     0        414         144      144      54            52           3[0x7]     Mon Nov 26 20:19:21 2018  Mon N
ov 26 20:19:21 2018  (0,0)             4          98/73
e4:9a:dc:80:ef:95  tongji.portal  24:f2:7f:27:99:d1  Associated   AvsE      0x7  Power-save  (0,0,0,0,N/A,0)  52938    41341    0        4264        117      156      32            32           3[0x7]     Mon Nov 26 20:18:38 2018  Mon N
ov 26 20:18:37 2018  (0,0)             47         89/73
bc:9f:ef:8f:a8:03  tongji.portal  24:f2:7f:27:99:d1  Associated   AvsE      0x4  Power-save  (0,0,0,0,N/A,0)  145940   114125   0        6248        96       86       55            52           3[0x7]     Mon Nov 26 20:19:17 2018  Mon N
ov 26 20:19:17 2018  (0,0)             8          99/73
--More-- (q) quit (u) pageup (/) search (n) repeat
```

故障原因的诊断

- 查看用户是否被分配到正确的VLAN

登录到每个MD控制器上，输入”show datapath bridge | include mac-address”显示无线控制器的二层转发表，可以查看无线用户的MAC、VLAN以及从哪里学到等信息。

```
(tj-md1) *#show datapath bridge | include D0:D7:83:3F:2B:EC
D0:D7:83:3F:2B:EC  3021  3021          tunnel 4029          1
(tj-md1) *#
```

故障原因的诊断

- 查看用户的IP地址和角色是否正确

登录到每个MD控制器上，输入”show user-table ap-name xxx” 可以显示指定AP上的无线用户列表（三层），从中可以查看无线用户的IP地址、MAC地址、用户名、角色、在线时长、以及认证方式等信息。

```
(tj-md1) *#show user-table ap-name ABC-JD001-1-AP14

Users
-----
    IP              MAC           Name     Role          Age(d:h:m)  Auth  VPN link  AP name          Roaming   Essid/Bssid/Phy                    Profile       Forward mode  Type     Host Name  User Type
----------      ------------      ------   ----          ----------  ----  --------  -------          -------   ---------------                    -------       ------------  ----     ---------  ---------
100.66.145.153  f4:70:ab:d2:37:27           tongji.portal  00:01:32                ABC-JD001-1-AP14  Wireless  tongji.portal/24:f2:7f:27:bf:81/g-HT  tongji.portal  tunnel        Android             WIRELESS
100.67.108.226  48:6b:2c:cd:e9:be           tongji.portal  00:01:48                ABC-JD001-1-AP14  Wireless  tongji.portal/24:f2:7f:27:bf:91/a-HT  tongji.portal  tunnel        Android             WIRELESS

User Entries: 2/2
 Curr/Cum Alloc:1311/2380780 Free:975/2379469 Dyn:2286 AllocErr:0 FreeErr:0
(tj-md1) *#
```

故障原因的诊断

- 查看用户的防火墙会话是否正常

登录到每个MD控制器上，输入”show datapath session | include “ip_address”查看终端发起的会话是否正常通过控制器的防火墙策略。通过Flags标识符，可以查看用户会话是否被防火墙丢弃（Deny）。

```
(tj-md1) *#show datapath session  | include 100.66.145.153
47.100.26.227   100.66.145.153  6    8888  51918  0/0     0    0   12  tunnel 4164 5fe  7          398          C          23
100.66.145.153  58.205.196.26   6    45049 80     0/0     0    0   0   tunnel 4164 b    5          1497         C          19
100.66.145.153  115.25.211.99   6    54597 80     0/0     0    0   0   tunnel 4164 b    535        31521        C          19
100.66.145.153  58.205.196.26   6    54283 80     0/0     0    0   1   tunnel 4164 1c   7          2830         FC         19
106.15.219.161  100.66.145.153  6    443   40159  0/0     0    0   3   tunnel 4164 8ff  58         13377                   17
58.205.196.6    100.66.145.153  6    80    44107  0/0     0    0   0   tunnel 4164 1c   508        717932       F          18
100.66.145.153  120.92.98.14    6    59363 5222   0/0     0    0   7   tunnel 4164 10fe 49         4501         C          19
122.14.229.51   100.66.145.153  6    443   45076  0/0     0    0   1   tunnel 4164 10fe 113        9056                    27
120.92.98.14    100.66.145.153  6    5222  59363  0/0     0    0   7   tunnel 4164 10fe 39         3804                    25
100.66.145.153  203.119.215.163 6    48273 80     0/0     0    0   3   tunnel 4164 10fd 42         3626         C          19
100.66.145.153  47.100.26.227   6    51918 8888   0/0     0    0   13  tunnel 4164 5ff  12         731          C          19
58.205.196.26   100.66.145.153  6    80    54283  0/0     0    0   1   tunnel 4164 1c   6          1289         F          12
211.65.195.71   100.66.145.153  6    80    38298  0/0     0    0   1   tunnel 4164 49   4          490          F          20
115.25.211.99   100.66.145.153  6    80    39652  0/0     0    0   1   tunnel 4164 2d   1073       1512757      F          19
100.66.145.153  211.65.195.71   6    38298 80     0/0     0    0   1   tunnel 4164 49   5          1080         C          19
115.25.211.99   100.66.145.153  6    80    54597  0/0     0    0   1   tunnel 4164 f    553        782355       F          19
100.66.145.153  58.205.196.26   6    51149 80     0/0     0    0   1   tunnel 4164 15   6          2778         FC         19
100.66.145.153  58.205.196.6    6    44107 80     0/0     0    0   1   tunnel 4164 20   433        26430        C          19
100.66.145.153  106.15.219.161  6    40159 443    0/0     0    0   3   tunnel 4164 904  95         19502        C          19
58.205.196.26   100.66.145.153  6    80    45049  0/0     0    0   1   tunnel 4164 11   4          1207         F          12
100.66.145.153  115.25.211.99   6    39652 80     0/0     0    0   1   tunnel 4164 30   1011       58660        FC         19
58.205.196.26   100.66.145.153  6    80    51149  0/0     0    0   1   tunnel 4164 18   6          1289         F          12
100.66.145.153  121.51.8.105    6    47640 8080   0/0     0    0   9   tunnel 4164 1104 24         1576         C          19
--More-- (q) quit (u) pageup (/) search (n) repeat
```

故障原因的诊断

- 查看用户角色里所调用的防火墙策略是否正确的？

登录到每个MD控制器上，输入”show rights <role>”命令，可以显示指定角色的权限。

```
(tj-md1) *#show rights authenticated

Valid = 'Yes'
CleanedUp = 'No'
Derived Role = 'authenticated'
 Up BW:No Limit   Down BW:No Limit
 L2TP Pool = default-l2tp-pool
 PPTP Pool = default-pptp-pool
 Number of users referencing it = 0
 Periodic reauthentication: Disabled
 DPI Classification: Enabled
 Youtube education: Disabled
 Web Content Classification: Enabled
 IP-Classification Enforcement: Enabled
 ACL Number = 82/0
 Openflow: Enabled
 Max Sessions = 65535

 Check CP Profile for Accounting = TRUE

Application Exception List
--------------------------
Name  Type
----  ----

Application BW-Contract List
----------------------------
Name  Type  BW Contract  Id  Direction
----  ----  -----------  --  ---------

access-list List
----------------
Position  Name                       Type     Location
--------  ----                       ----     --------
1         global-sacl                session
2         apprf-authenticated-sacl   session
3         ra-guard                   session
4         allowall                   session
5         v6-allowall                session

global-sacl
-----------
Priority  Source  Destination  Service  Application  Action  TimeRange  Log  Expired  Queue  TOS  8021P  Blacklist  Mirror  DisScan  IPv4/6  Contract
--------  ------  -----------  -------  -----------  ------  ---------  ---  -------  -----  ---  -----  ---------  ------  -------  ------  --------
apprf-authenticated-sacl
------------------------
Priority  Source  Destination  Service  Application  Action  TimeRange  Log  Expired  Queue  TOS  8021P  Blacklist  Mirror  DisScan  IPv4/6  Contract
--------  ------  -----------  -------  -----------  ------  ---------  ---  -------  -----  ---  -----  ---------  ------  -------  ------  --------
ra-guard
--------
Priority  Source  Destination  Service          Application  Action  TimeRange  Log  Expired  Queue  TOS  8021P  Blacklist  Mirror  DisScan  IPv4/6  Contract
--------  ------  -----------  -------          -----------  ------  ---------  ---  -------  -----  ---  -----  ---------  ------  -------  ------  --------
1         user    any          icmpv6 rtr-adv               deny                            Low                                                 6
allowall
--------
Priority  Source  Destination  Service  Application  Action  TimeRange  Log  Expired  Queue  TOS  8021P  Blacklist  Mirror  DisScan  IPv4/6  Contract
--------  ------  -----------  -------  -----------  ------  ---------  ---  -------  -----  ---  -----  ---------  ------  -------  ------  --------
1         any     any          any                 permit                          Low                                                 4
2         any     any          any-v6              permit                          Low                                                 6
v6-allowall
-----------
Priority  Source  Destination  Service  Application  Action  TimeRange  Log  Expired  Queue  TOS  8021P  Blacklist  Mirror  DisScan  IPv4/6  Contract
--------  ------  -----------  -------  -----------  ------  ---------  ---  -------  -----  ---  -----  ---------  ------  -------  ------  --------
1         any     any          any-v6              permit                          Low                                                 6

Expired Policies (due to time constraints) = 0
(tj-md1) *#
```

THANK YOU

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