

802.11ac无线吞吐量测试和验证指南

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Introduction

本文将描述测试着重802.11ac的接入点的无线吞吐量方式，并且预计的什么吞吐量在特定情况。

Prerequisites

Requirements

本文假设一个已经作用的设置用802.11ac已经产生客户端连接的接入点(APs)

Components Used

本文的信息集中于802.11ac技术和速度。

与Wave1技术的Cisco APs：

3700系列

2700系列

1700系列

1570系列

与Wave2技术的Cisco APs：

4800系列

3800系列

2800系列

1850系列

1830系列

1560系列

1540系列

了解

802.11ac可以细分到两个标准：Wave1和Wave2：

	802.11n	802.11n	802.11ac Wave 1	802.11ac Wave2	802.11ac
		IEEE Specification	Today	WFA Certification Process Continues	IEEE Specification
Band	2.4 GHz & 5 GHz	2.4 GHz & 5 GHz	5 GHz	5 GHz	5 GHz
MIMO	Single User (SU)	Single User (SU)	Single User (SU)	Multi User (MU)	Multi User (MU)
PHY Rate	450 Mbps	600 Mbps	1.3 Gbps	2.34 Gbps - 3.47 Gbps	6.9 Gbps
Channel Width	20 or 40 MHz	20 or 40 MHz	20, 40, 80 MHz	20, 40, 80, 80-80, 160 MHz	20, 40, 80, 80-80, 160 MHz
Modulation	64 QAM	64 QAM	256 QAM	256 QAM	256 QAM
Spatial Streams	3	4	3	3-4	8
MAC Throughput*	293 Mbps	390 Mbps	845 Mbps	1.52 Gbps - 2.26 Gbps	4.49 Gbps

* Assuming a 65% MAC efficiency with highest MCS

802.11ac Wave1：支持至1.3 Gbps在3空间的流的数据速率与80兆赫信道接合。

802.11ac Wave2：支持至3.47 Gbps在4空间的流的数据速率与160兆赫信道接合。这些编号是从标准的仅理论上的编号，区别根据特定AP数据表将适用。

802.11ac在数据速率没有直接地被定义加速，但是相当是10调制编码方案(MCS 0到MCS 9)的组合，从20mhz (1条信道)的信道宽度范围对160Mhz (8条信道)，一定数量空间的流(典型地1到4)。短或长的卫兵间隔(GI)在对此的10%修改附近也将添加。这是评估在Mbps的一datarate的表，当认识所有那些要素时：

空间的流	VHT MCS 索引	调制	编码费率	20兆赫 数据速率(Mb/s)		40兆赫 数据速率(Mb/s)		80兆赫 数据速率(Mb/s)		160兆赫/80+8 赫 数据速率 (Mb/s)	
				800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI	800ns GI	400ns GI
1	0	BPSK	1/2	6.5	7.2	13.5	15.0	29.3	32.5	58.5	65.0
	1	QPSK	1/2	13.0	14.4	27.0	30.0	58.5	65.0	117.0	130.0
	2	QPSK	3/4	19.5	21.7	40.5	45.0	87.8	97.5	175.5	195.0
	3	16-QAM	1/2	26.0	28.9	54.0	60.0	117.0	130.0	234.0	260.0
	4	16-QAM	3/4	39.0	43.3	81.0	90.0	175.5	195.0	351.0	390.0
	5	64-QAM	2/3	52.0	57.8	108.0	120.0	234.0	260.0	468.0	520.0
	6	64-QAM	3/4	58.5	65.0	121.5	135.0	263.3	292.5	526.5	585.0

	7	64-QAM	5/6	65.0	72.2	135.0	150.0	292.5	325.0	585.0	650.0
	8	256-QAM	3/4	78.0	86.7	162.0	180.0	351.0	390.0	702.0	780.0
	9	256-QAM	5/6	n/a	n/a	180.0	200.0	390.0	433.3	780.0	866.7
2	0	BPSK	1/2	13.0	14.4	27.0	30.0	58.5	65.0	117.0	130.0
	1	QPSK	1/2	26.0	28.9	54.0	60.0	117.0	130.0	234.0	260.0
	2	QPSK	3/4	39.0	43.3	81.0	90.0	175.5	195.0	351.0	390.0
	3	16-QAM	1/2	52.0	57.8	108.0	120.0	234.0	260.0	468.0	520.0
	4	16-QAM	3/4	78.0	86.7	162.0	180.0	351.0	390.0	702.0	780.0
	5	64-QAM	2/3	104.0	115.6	216.0	240.0	468.0	520.0	936.0	1040.0
	6	64-QAM	3/4	117.0	130.0	243.0	270.0	526.5	585.0	1053.0	1170.0
	7	64-QAM	5/6	130.0	144.4	270.0	300.0	585.0	650.0	1170.0	1300.0
	8	256-QAM	3/4	156.0	173.3	324.0	360.0	702.0	780.0	1404.0	1560.0
	9	256-QAM	5/6	n/a	n/a	360.0	400.0	780.0	866.7	1560.0	1733.3
3	0	BPSK	1/2	19.5	21.7	40.5	45.0	87.8	97.5	175.5	195.0
	1	QPSK	1/2	39.0	43.3	81.0	90.0	175.0	195.0	351.0	390.0
	2	QPSK	3/4	58.5	65.0	121.5	135.0	263.0	292.5	526.5	585.0
	3	16-QAM	1/2	78.0	86.7	162.0	180.0	351.0	390.0	702.0	780.0
	4	16-QAM	3/4	117.0	130.0	243.0	270.0	526.5	585.0	1053.0	1170.0
	5	64-QAM	2/3	156.0	173.3	324.0	360.0	702.0	780.0	1404.0	1560.0
	6	64-QAM	3/4	175.5	195.0	364.5	405.0	n/a	n/a	1579.5	1755.0
	7	64-QAM	5/6	195.0	216.7	405.0	450.0	877.5	975.0	1755.0	1950.0
	8	256-QAM	3/4	234.0	260.0	486.0	540.0	1053.0	1170.0	2106.0	2340.0
	9	256-QAM	5/6	260.0	288.9	540.0	600.0	1170.0	1300.0	n/a	n/a
4	0	BPSK	1/2	26.0	28.9	54.0	60.0	117.0	130.0	234.0	260.0
	1	QPSK	1/2	52.0	57.8	108.0	120.0	234.0	260.0	468.0	520.0
	2	QPSK	3/4	78.0	86.7	162.0	180.0	351.0	390.0	702.0	780.0
	3	16-QAM	1/2	104.0	115.6	216.0	240.0	468.0	520.0	936.0	1040.0
	4	16-QAM	3/4	156.0	173.3	324.0	360.0	702.0	780.0	1404.0	1560.0
	5	64-QAM	2/3	208.0	231.1	432.0	480.0	936.0	1040.0	1872.0	2080.0
	6	64-QAM	3/4	234.0	260.0	486.0	540.0	1053.0	1170.0	2106.0	2340.0
	7	64-QAM	5/6	260.0	288.9	540.0	600.0	1170.0	1300.0	2340.0	2600.0
	8	256-QAM	3/4	312.0	346.7	648.0	720.0	1404.0	1560.0	2808.0	3120.0
	9	256-QAM	5/6	n/a	n/a	720.0	800.0	1560.0	1733.3	3120.0	3466.7
	9	256-QAM	5/6	n/a	n/a	1440.0	1600.0	3120.0	3466.7	6240.0	6933.3

Note: 数据速率与期望的可达成的吞吐量不是相等的。这跟的802.11标准有关的本质有很多管理开销(管理帧，争用、冲突，确认，...) 并且它能取决于链路SNR、RSSI和其他重要因素。

注意无线是共享环境，这意味着相当数量客户端被联络到AP共享在彼此之间的有效吞吐量。在那顶部，更多客户端意味着更多争用和不可避免地更多冲突。当客户端的数量增加，覆盖信元的efficiency激烈地将减少。

它是概测法：

期望的吞吐量=数据速率x 0.65

在我们的情况：

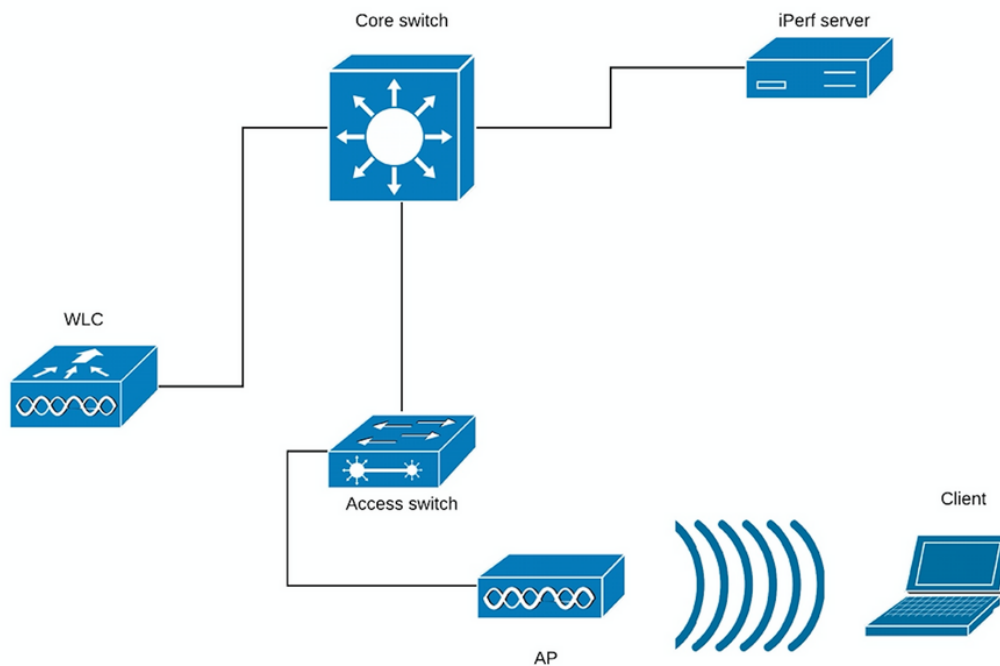
$780 \times 0.65 = 507$

吞吐量507 Mbps是什么我们在优良条件可能期待在有单个客户端的一个实验室。

测量

一般来说，当我们进行吞吐量测试时，我们能有两个方案：

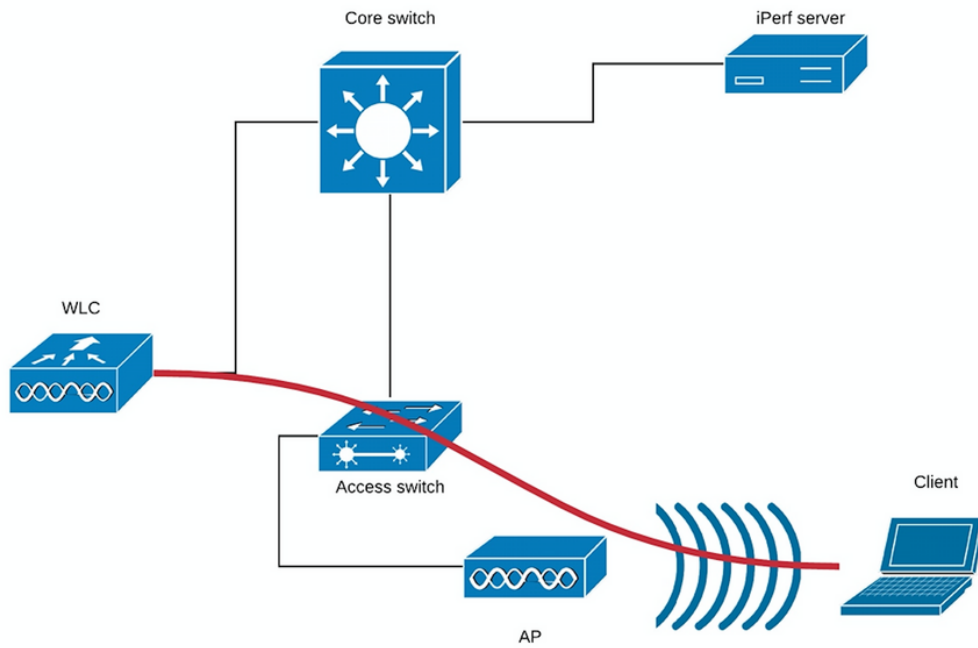
- APs在Flexconnect本地交换
 - APs在本地传送方式或Flexconnect中央交换
- 我们逐个将采取那些方案：



(图表1)

在图表1的情况下我们假设APs在本地传送方式Flexconnect中央交换。

这意味着所有客户端的流量在WLC被封装到CAPWAP隧道并且被终止。

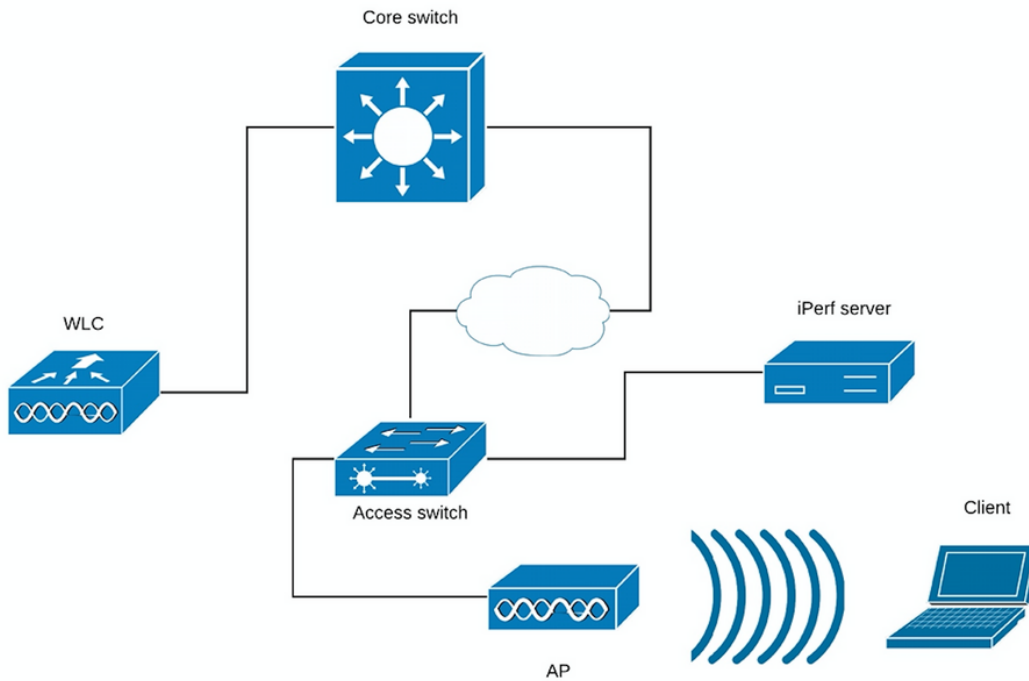


(图表2)

红线在图表2中显示从无线客户端的通信流。

iPerf服务器应该是一样接近尽可能数据流终接点，理想地说接通交换机和WLC一样和使用同样VLAN。

在Flexconnect本地交换机，客户端的流量在AP被终止的情况下，并且考虑应该设置iPerf服务器作为对无线客户端数据流终接点的close，您应该接通iPerf服务器到同一台交换机和插入AP的同样VLAN。在我们的情况这是接入交换机(图表3)。



(图表3)

iPerf测试可以细分到两个类别：上行和下行。

考虑iPerf服务器监听，并且iPerf客户端生成数据流，当iPerf服务器在纸的反面时，这认为上行测试。

无线客户端使用iPerf应用程序推进数据流到网络。

这被认为下行的下行测试反之亦然是，意味着iPerf服务器在无线客户端设置，并且iPerf客户端是在推进数据流的纸的反面对无线客户端，在此方案。

应该进行使用TCP和UDP，测试。您能使用以下命令执行测试：

```
iperf3 -s <- this command starts iPerf server
```

```
iperf3 -c SERVER_ADDRESS -u -b700M <- this command initiates UDP iPerf test with bandwidth of 700 Mbps
```

```
iperf3 -c SERVER_ADDRESS <- this command initiates a simple TCP iPerf test
```

```
iperf3 -c SERVER_ADDRESS -w WIDOW_SIZE -P NUM_OF_PARALLEL_TCP_STREAMS <- this commands initiates a more complex TCP iPerf test where you can adjust the window size as well the number of parallel TCP streams.
```

Please not that in this case you should consider the sum of all the streams as the result

iPerf3输出示例：

TCP iPerf3：

```
iperf3 -s <- this command starts iPerf server
```

`iperf3 -c SERVER_ADDRESS -u -b700M` <- this command initiates UDP iPerf test with bandwidth of 700 Mbps

`iperf3 -c SERVER_ADDRESS` <- this command initiates a simple TCP iPerf test

`iperf3 -c SERVER_ADDRESS -w WIDOW_SIZE -P NUM_OF_PARALLEL_TCP_STREAMS` <- this commands initiates a more complex TCP iPerf test where you can adjust the window size as well the number of parallel TCP streams.

Please not that in this case you should consider the sum of all the streams as the result

`iperf3 -s` <- this command starts iPerf server

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`iperf3 -c SERVER_ADDRESS -w WIDOW_SIZE -P NUM_OF_PARALLEL_TCP_STREAMS` <- this commands initiates a more complex TCP iPerf test where you can adjust the window size as well the number of parallel TCP streams.

Please not that in this case you should consider the sum of all the streams as the result

UDP iPerf3 :

iPerf某时行为不端和不产生在UDP测试的末端的平均带宽。

总结带宽为每秒钟由秒钟的编号然后分开它是可能的 :

`iperf3 -s` <- this command starts iPerf server

`iperf3 -c SERVER_ADDRESS -u -b700M` <- this command initiates UDP iPerf test with bandwidth of 700 Mbps

`iperf3 -c SERVER_ADDRESS` <- this command initiates a simple TCP iPerf test

`iperf3 -c SERVER_ADDRESS -w WIDOW_SIZE -P NUM_OF_PARALLEL_TCP_STREAMS` <- this commands initiates a more complex TCP iPerf test where you can adjust the window size as well the number of parallel TCP streams.

Please not that in this case you should consider the sum of all the streams as the result

Note: 预计iPerf结果将是轻微好在Flexconnect本地switching与中央交换方案比较。这是由事实造成的客户端的流量被封装到CAPWAP，添加更多开销到数据流，并且WLC一般来说作为瓶颈，因为它是所有无线客户端数据流的聚合点。预计UDP iPerf测试将产生更好导致一个干净的环境，因为它是最高效的转移方法，当连接是可靠的时。然而TCP，也许在大量分段的情况下赢取(当TCP调整MSS使用)时或不可靠的连接

.o

验证并且验证

为了检查以根据in命令WLC CLI，哪数据速率客户端被联络您需要发出：

```
(Cisco Controller) >show client detail 94:65:2d:d4:8c:d6
Client MAC Address..... 94:65:2d:d4:8c:d6
Client Username ..... N/A
AP MAC Address..... 00:81:c4:fb:a8:20
AP Name..... AIR-AP3802I-E-K9
```

AP radio slot Id..... 1
Client State..... Associated
Client User Group.....
Client NAC OOB State..... Access
Wireless LAN Id..... 2
Wireless LAN Network Name (SSID)..... speed-test-WLAN-avitosin
Wireless LAN Profile Name..... speed-test
Hotspot (802.11u)..... Not Supported
BSSID..... 00:81:c4:fb:a8:2e
Connected For 91 secs
Channel..... 52
IP Address..... 192.168.240.33
Gateway Address..... 192.168.240.1
Netmask..... 255.255.255.0
Association Id..... 1
Authentication Algorithm..... Open System
Reason Code..... 1
Status Code..... 0

--More-- or (q)uit

Session Timeout..... 1800
Client CCX version..... No CCX support
QoS Level..... Silver
Avg data Rate..... 0
Burst data Rate..... 0
Avg Real time data Rate..... 0
Burst Real Time data Rate..... 0
802.1P Priority Tag..... disabled
CTS Security Group Tag..... Not Applicable
KTS CAC Capability..... No
Qos Map Capability..... No
WMM Support..... Enabled
 APSD ACs..... BK BE VI VO
Current Rate..... m9 ss2
Supported Rates..... 12.0,18.0,24.0,36.0,48.0,
 54.0
Mobility State..... Local
Mobility Move Count..... 0
Security Policy Completed..... Yes
Policy Manager State..... RUN
Audit Session ID..... 0a3027a4000000105a9cd9ad
AAA Role Type..... none
Local Policy Applied..... none

--More-- or (q)uit

IPv4 ACL Name..... none
FlexConnect ACL Applied Status..... Unavailable
IPv4 ACL Applied Status..... Unavailable
IPv6 ACL Name..... none
IPv6 ACL Applied Status..... Unavailable
Layer2 ACL Name..... none
Layer2 ACL Applied Status..... Unavailable
mDNS Status..... Disabled
mDNS Profile Name..... none
No. of mDNS Services Advertised..... 0
Policy Type..... N/A
Encryption Cipher..... None
Protected Management Frame No
Management Frame Protection..... No
EAP Type..... Unknown
Interface..... vlan240
VLAN..... 240
Quarantine VLAN..... 0
Access VLAN..... 240

Local Bridging VLAN..... 240
Client Capabilities:
CF Pollable..... Not implemented
CF Poll Request..... Not implemented

--More-- or (q)uit
Short Preamble..... Not implemented
PBCC..... Not implemented
Channel Agility..... Not implemented
Listen Interval..... 1
Fast BSS Transition..... Not implemented
11v BSS Transition..... Implemented

Client Wifi Direct Capabilities:
WFD capable..... No
Manged WFD capable..... No
Cross Connection Capable..... No
Support Concurrent Operation..... No

Fast BSS Transition Details:

Client Statistics:
Number of Bytes Received..... 183844
Number of Bytes Sent..... 119182
Total Number of Bytes Sent..... 119182
Total Number of Bytes Recv..... 183844
Number of Bytes Sent (last 90s)..... 119182
Number of Bytes Recv (last 90s)..... 183844
Number of Packets Received..... 2536
Number of Packets Sent..... 249
Number of Interim-Update Sent..... 0
Number of EAP Id Request Msg Timeouts..... 0

--More-- or (q)uit
Number of EAP Id Request Msg Failures..... 0
Number of EAP Request Msg Timeouts..... 0
Number of EAP Request Msg Failures..... 0
Number of EAP Key Msg Timeouts..... 0
Number of EAP Key Msg Failures..... 0
Number of Data Retries..... 0
Number of RTS Retries..... 0
Number of Duplicate Received Packets..... 0
Number of Decrypt Failed Packets..... 0
Number of Mic Failed Packets..... 0
Number of Mic Missing Packets..... 0
Number of RA Packets Dropped..... 0
Number of Policy Errors..... 0
Radio Signal Strength Indicator..... -25 dBm
Signal to Noise Ratio..... 67 dB

Client Rate Limiting Statistics:
Number of Data Packets Received..... 0
Number of Data Rx Packets Dropped..... 0
Number of Data Bytes Received..... 0
Number of Data Rx Bytes Dropped..... 0
Number of Realtime Packets Received..... 0
Number of Realtime Rx Packets Dropped..... 0
Number of Realtime Bytes Received..... 0

--More-- or (q)uit
Number of Realtime Rx Bytes Dropped..... 0
Number of Data Packets Sent..... 0
Number of Data Tx Packets Dropped..... 0
Number of Data Bytes Sent..... 0
Number of Data Tx Bytes Dropped..... 0
Number of Realtime Packets Sent..... 0
Number of Realtime Tx Packets Dropped..... 0
Number of Realtime Bytes Sent..... 0

Number of Realtime Tx Bytes Dropped..... 0
Nearby AP Statistics:
DNS Server details:
DNS server IP 10.48.39.33
DNS server IP 0.0.0.0
Assisted Roaming Prediction List details:

Client Dhcp Required: False
Allowed (URL)IP Addresses

AVC Profile Name: none

您能看到此特定的客户端在以下费率被联络：

现行汇率..... m9 ss2

哪些意味着客户端使用在2空间的流(ss2)的MCS 9 (m9)索引

从“请显示客户端详细资料<MAC>”命令，它不是可能发现客户端是否在20/40/80兆赫信道接合被联络。

这直接地在AP可以执行：

Wave2 AP示例：

```
AIR-AP3802I-E-K9#show controllers dot11Radio 1 client 94:65:2D:D4:8C:D6
      mac radio vap aid state encr Maxrate is_wgb_wired      wgb_mac_addr
94:65:2D:D4:8C:D6      1 1 1 FWD OPEN MCS92SS      false 00:00:00:00:00:00
```

```
Configured rates for client 94:65:2D:D4:8C:D6
Legacy Rates(Mbps): 12 18 24 36 48 54
HT Rates(MCS):M0 M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15
VHT Rates: 1SS:M0-7 2SS:M0-9
HT:yes      VHT:yes      80MHz:yes      40MHz:yes      AMSDU:yes      AMSDU_long:yes
llw:no      MFP:no      llh:yes      encrypt_polocy: 1
_wmm_enabled:yes      qos_capable:yes      WME(11e):no      WMM_MIXED_MODE:no
short_preamble:no      short_slot_time:no      short_hdr:no      SM_dyn:yes
short_GI_20M:yes      short_GI_40M:yes      short_GI_80M:yes      LDPC:yes
is_wgb_wired:no      is_wgb:no
```

```
Additional info for client 94:65:2D:D4:8C:D6
RSSI: -25
PS : Legacy (Awake)
Tx Rate: 0 Kbps
Rx Rate: 0 Kbps
VHT_TXMAP: 0
CCX Ver: 0
```

```
Statistics for client 94:65:2D:D4:8C:D6
      mac      intf TxData TxMgmt TxUC TxBytes TxFail TxDcrd RxData RxMgmt RxBytes RxErr
TxRt   RxRt idle_counter stats_ago expiration
94:65:2D:D4:8C:D6 aprlv1      254      0 254 121390      0      0 2568      0 185511      0
585000 866700      300 2.492000      1640
```

```
Per TID packet statistics for client 94:65:2D:D4:8C:D6
Priority Rx Pkts Tx Pkts Rx(last 5 s) Tx (last 5 s) QID Tx Drops Tx Cur Qlimit
0      1424      146      17      3 136      0      0 4096
1      0      0      0      0 137      0      0 4096
2      0      0      0      0 138      0      0 4096
```

3	34	26	0	0	139	0	0	4096
4	0	0	0	0	140	0	0	4096
5	0	0	0	0	141	0	0	4096
6	0	0	0	0	142	0	0	4096
7	0	0	0	0	143	0	0	4096

在Wave1 AP的情况下您需要运行调试：

```
AIR-AP3802I-E-K9#show controllers dot11Radio 1 client 94:65:2D:D4:8C:D6
      mac radio vap aid state encr Maxrate is_wgb_wired      wgb_mac_addr
94:65:2D:D4:8C:D6      1 1 1 FWD OPEN MCS92SS                false 00:00:00:00:00:00
```

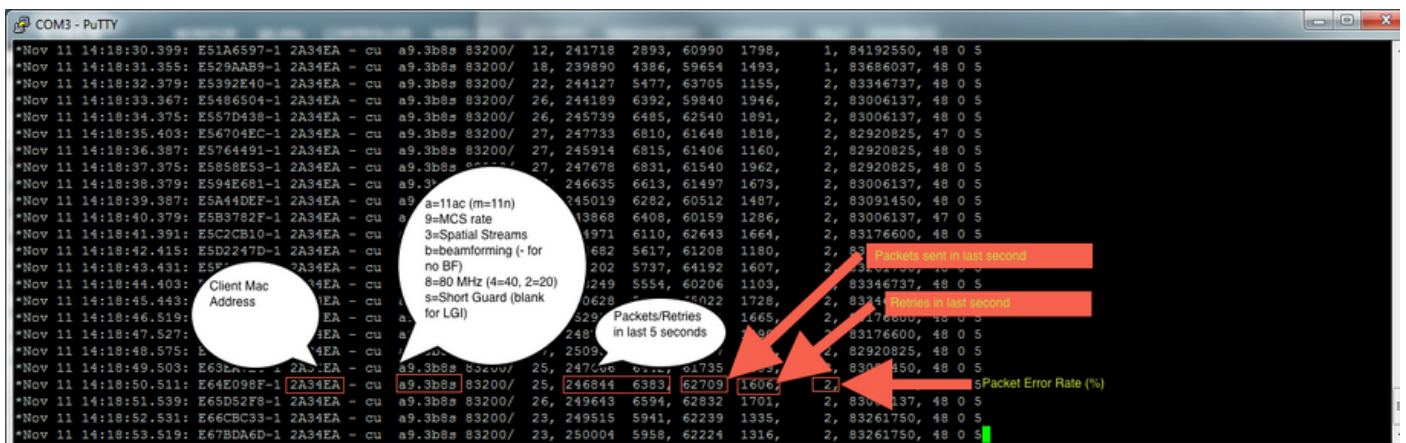
```
Configured rates for client 94:65:2D:D4:8C:D6
Legacy Rates(Mbps): 12 18 24 36 48 54
HT Rates(MCS):M0 M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15
VHT Rates: 1SS:M0-7 2SS:M0-9
HT:yes      VHT:yes      80MHz:yes      40MHz:yes      AMSDU:yes      AMSDU_long:yes
llw:no      MFP:no      llh:yes      encrypt_policy: 1
_wmm_enabled:yes      qos_capable:yes      WME(11e):no      WMM_MIXED_MODE:no
short_preamble:no      short_slot_time:no      short_hdr:no      SM_dyn:yes
short_GI_20M:yes      short_GI_40M:yes      short_GI_80M:yes      LDPC:yes
is_wgb_wired:no      is_wgb:no
```

```
Additional info for client 94:65:2D:D4:8C:D6
RSSI: -25
PS : Legacy (Awake)
Tx Rate: 0 Kbps
Rx Rate: 0 Kbps
VHT_TXMAP: 0
CCX Ver: 0
```

```
Statistics for client 94:65:2D:D4:8C:D6
      mac      intf TxData TxMgmt TxUC TxBytes TxFail TxDcrd RxData RxMgmt RxBytes RxErr
TxRt  RxRt idle_counter stats_ago expiration
94:65:2D:D4:8C:D6 aprlv1 254 0 254 121390 0 0 2568 0 185511 0
585000 866700 300 2.492000 1640
```

```
Per TID packet statistics for client 94:65:2D:D4:8C:D6
Priority Rx Pkts Tx Pkts Rx(last 5 s) Tx (last 5 s) QID Tx Drops Tx Cur Qlimit
0 1424 146 17 3 136 0 0 4096
1 0 0 0 0 137 0 0 4096
2 0 0 0 0 138 0 0 4096
3 34 26 0 0 139 0 0 4096
4 0 0 0 0 140 0 0 4096
5 0 0 0 0 141 0 0 4096
6 0 0 0 0 142 0 0 4096
7 0 0 0 0 143 0 0 4096
```

调试输出的含义可以在以下图片找到：



检查被连接的费率的最后一个选项是OTA捕获。在数据包的信息您能找到必要信息：

```
▼ 802.11 radio information
  PHY type: 802.11ac (8)
  Short GI: True
  Bandwidth: 80 MHz (4)
  STBC: Off
  TXOP_PS_NOT_ALLOWED: True
  Short GI Nsym disambiguation: False
  LDPC extra OFDM symbol: False
  Beamformed: False
  User 0: MCS 9
    MCS index: 9 (256-QAM 5/6)
    Spatial streams: 2
    Space-time streams: 2
    FEC: LDPC (1)
    Data rate: 866.7 Mb/s
  Group ID: 0
  Partial AID: 284
  Data rate: 866.7 Mb/s
  Channel: 36
  Frequency: 5180MHz
  Signal strength (dBm): -47dBm
  Noise level (dBm): -93dBm
  TSF timestamp: 3626993379
  ..... = Last part of an A-MPDU: False
  ..... = A-MPDU delimiter CRC error: False
  A-MPDU aggregate ID: 1070
  ▶ [Duration: 40us]
```

此OTA捕获用11ac macbook客户端获得。

就信息而论我们从WLC获得，并且AP，客户端在80兆赫信道接合的m9 ss2被连接+长期GI (800ns)，因此意味着我们能期待780 Mbps的数据速率。

Note: APs在嗅探器模式下不会在版本8.5.130前适当地记录11ac数据速率。或以后也将要求Wireshark 2.4.6适当地决定它。

Troubleshoot

在测试期间，万一不取得预期结果，有几个方式排除问题故障和在开TAC案例前收集必要信息。

throughput问题可以由以下导致：

- 客户端
- AP
- 有线路径(交换相关问题)
- WLC

客户端排除故障

- 第一步更新在无线客户端设备的驱动程序对新版本
- 第二步进行与有看到一个不同的无线适配器的客户端的iPerf测试是否取得同样结果

AP排除故障

也许有方案，当AP降低数据流时，或者某些帧或者行为不端。

为了获得关于此的更多见解，在空气(OTA)有需要的捕获+ AP连接孔的SPAN会话(在AP被连接)的交换机应该执行间距

OTA捕获在测试期间，并且应该执行SPAN，使用开放SSID为了能发现数据流通过对AP和数据流AP通过往客户端和恶习versa。

有此工作情况的几个已知Bug：

[CSCvg07438](#)：AP3800：低吞吐量由于在AP的信息包丢弃在被分段的和不可成片断的信息包

[CSCva58429](#)：Cisco 1532i AP：低吞吐量(FlexConnect本地交换+ EoGRE)

有线路径排除故障

也许有在交换机的一些问题，您需要检查相当数量在接口的丢包，并且在测试期间，如果那些增加。

设法使用在交换机的另一个端口连接AP或WLC。

另一个选项是接通客户端对同一台交换机(其中客户端终接点[AP/WLC]被连接到)和放置它对同样VLAN，然后运行测试配线对配线在同样VLAN发现是否有在有线路径的任何问题。

WLC排除故障

可以是WLC从客户端降低数据流(当APs在本地传送方式)时。

您在Flexconnect模式下能放AP和WLAN到本地交换，然后运行测试。

如果看到有在吞吐量上的重大的区别在本地传送方式(中央交换机)与Flexconnect本地交换机比较，并且那里是在交换机的没有问题被连接到WLC，则WLC很可能降低数据流。

要排除此故障请跟随行动方案：

- SPAN在WLC连接孔捕获(在交换机应该执行)

-在AP端口的SPAN捕获

-客户端的OTA捕获

-在WLC的跟随的调试：

```
AIR-AP3802I-E-K9#show controllers dot11Radio 1 client 94:65:2D:D4:8C:D6
      mac radio vap aid state encr Maxrate is_wgb_wired      wgb_mac_addr
94:65:2D:D4:8C:D6      1 1 1 FWD OPEN MCS92SS      false 00:00:00:00:00:00
```

```
Configured rates for client 94:65:2D:D4:8C:D6
```

```
Legacy Rates(Mbps): 12 18 24 36 48 54
```

```
HT Rates(MCS):M0 M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14 M15
```

```
VHT Rates: 1SS:M0-7 2SS:M0-9
```

```
HT:yes      VHT:yes      80MHz:yes      40MHz:yes      AMSDU:yes      AMSDU_long:yes
```

```
llw:no      MFP:no      llh:yes      encrypt_polocy: 1
```

```
_wmm_enabled:yes      qos_capable:yes      WME(11e):no      WMM_MIXED_MODE:no
```

```
short_preamble:no      short_slot_time:no      short_hdr:no      SM_dyn:yes
```

```
short_GI_20M:yes      short_GI_40M:yes      short_GI_80M:yes      LDPC:yes
```

```
is_wgb_wired:no      is_wgb:no
```

Additional info for client 94:65:2D:D4:8C:D6

RSSI: -25

PS : Legacy (Awake)

Tx Rate: 0 Kbps

Rx Rate: 0 Kbps

VHT_TXMAP: 0

CCX Ver: 0

Statistics for client 94:65:2D:D4:8C:D6

	mac	intf	TxData	TxMgmt	TxUC	TxBytes	TxFail	TxDcrd	RxData	RxMgmt	RxBytes	RxErr
TxRt	RxRt	idle_counter	stats_ago	expiration								
94:65:2D:D4:8C:D6	apr1v1		254	0	254	121390	0	0	2568	0	185511	0
585000	866700		300	2.492000		1640						

Per TID packet statistics for client 94:65:2D:D4:8C:D6

Priority	Rx Pkts	Tx Pkts	Rx(last 5 s)	Tx (last 5 s)	QID	Tx	Drops	Tx	Cur	Qlimit
0	1424	146		17	3	136	0	0	0	4096
1	0	0		0	0	137	0	0	0	4096
2	0	0		0	0	138	0	0	0	4096
3	34	26		0	0	139	0	0	0	4096
4	0	0		0	0	140	0	0	0	4096
5	0	0		0	0	141	0	0	0	4096
6	0	0		0	0	142	0	0	0	4096
7	0	0		0	0	143	0	0	0	4096

通过进行上述故障排除和提供结果给TAC，这加速了故障排除流程。