MT7986 Airtime Management Introduction & User Guide

Version History

Version	Date	Author (Optional)	Description
1.0	2019.10.4	Nelson chang	Official release

Outline

❑ Airtime Management (ATM)

➢ Airtime Fairness (ATF)

➢ Weighted Airtime Fairness (WATF)

➢ Airtime Control (ATC) & Throughput Control (TPC)

Station Round Robin —— ATF & WATF

ATM

BSS Round Robin

ATC

TPC
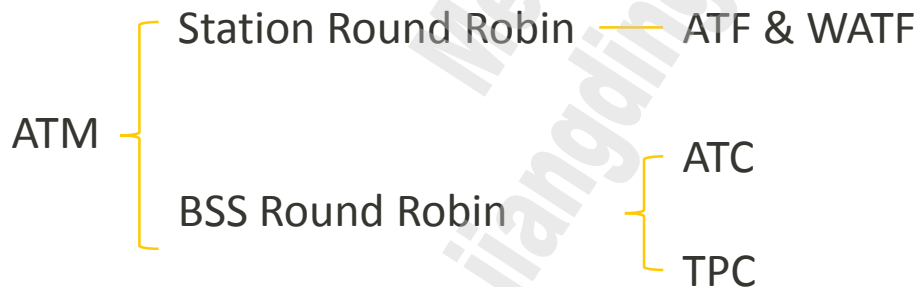
Airtime Fairness (ATF)

Introduction to ATF

❑ **ATF means "Airtime Fairness".**

❑ **Station airtime fairness works in the same WMM AC in a group by using DWRR.**

- To make all stations have the same airtime usage in the same WMM AC.

- To avoid that the slow client use too much airtime and decrease the total throughput.

❑ **In other words, we change station's Tx packet schedule to achieve airtime fairness among stations.**
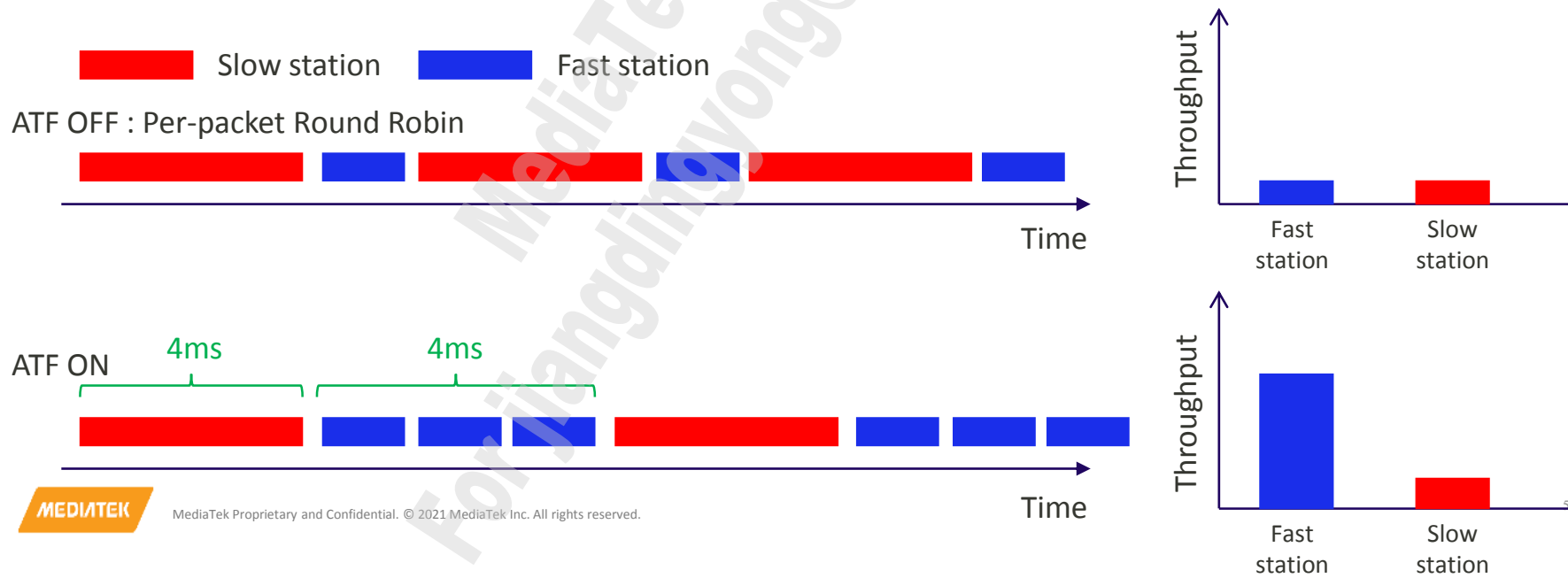
Normal Startup – Profile/Config

☐ **CONFIG_VOW_SUPPORT=y（ default on)**

☐ **Profile location**

- **/etc/wireless/mediatek/mt7986.dbdc.b0.dat(for Band0)**
- **/etc/wireless/mediatek/mt7915.dbdc.b1.dat(for Band1)**

☐ **Key parameters in profile (default on)**

- **ATF ON**

  ▪ **VOW_Airtime_Fairness_En=1**

- **ATF OFF**

  • **VOW_Airtime_Fairness_En=0**

Runtime Config -command

❑ **Turn ON ATF by command :**

iwpriv ra0 set vow_airtime_fairness_en=1

iwpriv ra0 set vow_dwrr_max_wait_time=64

❑ **Turn OFF ATF by command :**

iwpriv ra0 set vow_airtime_fairness_en=0

iwpriv ra0 set vow_dwrr_max_wait_time=1

Note 1: please make sure vow_dwrr_max_wait_time=1 when ATF disable.

Runtime Config - UI

☐ **Turn ON/OFF ATF by WebUI:**

Device Configurations - MT7915.1.1

Basic   Advanced   HE_MU   WDS   VoW   Power Boost   Others

Air-time Fairness (ATF)

This allows you to control how the stations assiciated with a SSID share the air-time. So it is a sort of QoS scheme for wireless stations.

There are 2 modes available:

1. All stations share air-time equally.
2. Stations will be divide into several groups, and we cab assign different air-time ration to those groups.

❎ Disable ATF

1. Click the button to turn ON/OFF ATF

Air-time Control (ATC)

When you have multiple SSID enabled, this allows you to control how these SSIDs share airtime. So this is a sort of QoS scheme for SSID.

There are 2 aspects you can control, If you enable both, the rules will merge togehter:

1. by Throughput Quota
2. by Airtime Ratio

Enable ATC

2. Click the button to save and apply the VOW setting
Note: It'll reload wifi profile setting

Apply to RX

a **By default, ATF and ATC only work for TX(transmit). This option will apply ATF and ATC to RX (receive).**

☑ Apply both ATC & ATF to RX

Save and Apply   Save   Reset

ATF Test Case (1/6)

❑ **Test Topology**

Fast Client
Mi4i
1x1 11AC
300Mbps@peak
RSSI: -50dBm
Role: as iperf server

WLAN

LAN

Giga LAN
Role: as iperf client

DUT
i.e. MT7615

Slow Client
Intel N 6205
2x2 11N
50Mbps@peak
RSSI: -90dBm (remove antenna)
Role: as iperf server

WLAN

iperf_client.rar

❑ **iperf command**

Server: iperf -s -i 1 -u

Client: iperf -c 10.10.10.xxx -i 1 -t 60 -b 300M

Note: 300M means the peak throughput of Fast Client. If your use 2x2 11AC, and the peak throughput of Fast Client is 400Mbps, please modify it to "-b 400M"

ATF Test Case (2/6)

❑ **Step 1: enable ATF by command,**

   # iwpriv ra0 set vow_dwrr_max_wait_time=64

   # iwpriv ra0 set vow_airtime_fairness_en=1

❑ **Step 2: run iperf for 60s with 2 UDP traffic from LAN to 2 wireless clients**

❑ **Step 3: record the throughput of two clients respectively**

❑ **Step 4: disable ATF by command,**

   # iwpriv ra0 set vow_dwrr_max_wait_time=1

   # iwpriv ra0 set vow_airtime_fairness_en=0

❑ **Step 5: run iperf for 60s with 2 UDP traffic from LAN to 2 wireless clients**

❑ **Step 6: record the throughput of two clients respectively**

❑ **Step 7: compare the throughput of ATF enable and disable**

ATF Test Case (3/6)

❑ **Test result of throughput**

2G	AC68 (Fast/Near)		Intel6300 (Slow/Far)	
	Near		Far	
	DL	Airtime%	DL	Airtime%
7915ATM- Vow ON Single	112		88	
7915ATM- Vow ON together	55	49.11%	43	45.45%
7915ATM- Vow OFF Single	112		86	
7915ATM- Vow OFF together	19	16.96%	39	75.76%

ATF Test Case (4/6)

❑ **Test result of console log with debug information, by command**

iwpriv ra0 set vow_monitor_sta=2

iwpriv ra0 set vow_show_sta=2

iwpriv ra0 set vow_dvt_en=1

ATF_conosle_log.rar

iwpriv ra0 set vow_show_en=1

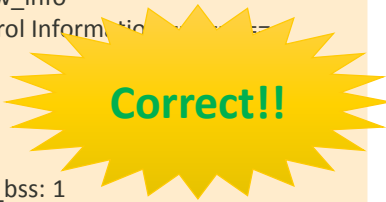| ATF Enable	ATF Disable
Fast Client AirTime Ratio = 535754/(535754+538333) = **49.8%** Slow Client AirTime Ratio = 538333/(535754+538333) = **50.1%**	Fast Client AirTime Ratio = 355762/(355762+782280) = **31.2%** Slow Client AirTime Ratio = 782280/(355762+782280) = **68.7%**
[Mon Apr 17 15:20:17.638 2017] sta0: tx -> 4489, rx -> 0, vow_idx 18 [Mon Apr 17 15:20:17.647 2017] sta0: addr 0:0, Mode 0, MCS 0, vow_idx 18 [Mon Apr 17 15:20:17.655 2017] sta1: tx -> 535754, rx -> 0, vow_idx 18 [Mon Apr 17 15:20:17.662 2017] sta1: addr b0:2f, Mode 4, MCS 9, vow_idx 18 [Mon Apr 17 15:20:17.671 2017] sta2: tx -> 538333, rx -> 324, vow_idx 18 [Mon Apr 17 15:20:17.680 2017] sta2: addr e8:30, Mode 2, MCS 3, vow_idx 18 [Mon Apr 17 15:20:17.688 2017] Total Airtime: 1078900 [Mon Apr 17 15:20:17.690 2017] sta1: tx cnt -> 0/0, tx fail -> 0/0, vow_idx 18 [Mon Apr 17 15:20:17.703 2017] sta2: tx cnt -> 0/0, tx fail -> 0/0, vow_idx 18 [Mon Apr 17 15:20:17.708 2017] BSS0: tx byte -> 24046598, rx byte -> 135 [Mon Apr 17 15:20:17.717 2017] free count 1107243 [Mon Apr 17 15:20:17.718 2017] AMPU count 426 [Mon Apr 17 15:20:17.723 2017] nonwifi: 31, obss: 302. [Mon Apr 17 15:20:17.727 2017] STA1 AC1: tail/head fid = 0xe0a/0xedf, pkt cnt = 10c [Mon Apr 17 15:20:17.737 2017] STA2 AC1: tail/head fid = 0xfff/0xfff, pkt cnt = 0	[Mon Apr 17 15:22:18.612 2017] sta0: tx -> 4037, rx -> 0, vow_idx 5 [Mon Apr 17 15:22:18.620 2017] sta0: addr 0:0, Mode 0, MCS 0, vow_idx 5 [Mon Apr 17 15:22:18.629 2017] sta1: tx -> 355762, rx -> 0, vow_idx 5 [Mon Apr 17 15:22:18.637 2017] sta1: addr b0:2f, Mode 4, MCS 9, vow_idx 5 [Mon Apr 17 15:22:18.646 2017] sta2: tx -> 782280, rx -> 219, vow_idx 5 [Mon Apr 17 15:22:18.656 2017] sta2: addr e8:30, Mode 2, MCS 3, vow_idx 5 [Mon Apr 17 15:22:18.658 2017] Total Airtime: 1142298 [Mon Apr 17 15:22:18.668 2017] sta1: tx cnt -> 129/0, tx fail -> 0/0, vow_idx 5 [Mon Apr 17 15:22:18.675 2017] sta2: tx cnt -> 31/0, tx fail -> 0/0, vow_idx 5 [Mon Apr 17 15:22:18.682 2017] BSS0: tx byte -> 16174571, rx byte -> 103 [Mon Apr 17 15:22:18.691 2017] free count 1100416 [Mon Apr 17 15:22:18.691 2017] AMPU count 331 [Mon Apr 17 15:22:18.698 2017] nonwifi: 103, obss: 1612. [Mon Apr 17 15:22:18.703 2017] STA1 AC1: tail/head fid = 0x265/0x35d, pkt cnt = 4a5

ATF Test Case (5/6)

❑ **Note 1: please make sure <u>vow_dwrr_max_wait_time=1</u> when ATF disable.**

Otherwise the throughput will be similar between ATF Enable and Disable.

❑ **Check by command,**

 # iwpriv ra0 show vow_info

ATF Enable	ATF Disable But vow_dwrr_max_wait_time=64	ATF Disable vow_dwrr_max_wait_time=1
# iwpriv ra0 show vow_info ======= VOW Control Information ======= ATC Enbale: 0 **ATF Enbale: 1** WATF Enable: 0 en_bw_refill: 1 en_txop_no_change_bss: 1 dbdc0_search_rule: 1 dbdc1_search_rule: 1 refill_period: 5 ======= VOW Max Deficit Information ======= **VOW Max Deficit(unit 256us): 64** ======= VOW Quantum Information ======= Quantum ID 0 value(unit 256us): 6 Quantum ID 1 value(unit 256us): 12 Quantum ID 2 value(unit 256us): 16 Quantum ID 3 value(unit 256us): 20 #	# iwpriv ra0 show vow_info ======= VOW Control Information ======= ATC Enbale: 0 **ATF Enbale: 0** WATF Enable: 0 en_bw_refill: 1 en_txop_no_change_bss: 1 dbdc0_search_rule: 1 dbdc1_search_rule: 1 refill_period: 5 ======= VOW Max Deficit Information ======= **VOW Max Deficit(unit 256us): 64** ======= VOW Quantum Information ======= Quantum ID 0 value(unit 256us): 6 Quantum ID 1 value(unit 256us): 12 Quantum ID 2 value(unit 256us): 16 Quantum ID 3 value(unit 256us): 20 #	# iwpriv ra0 show vow_info ======= VOW Control Information ======= ATC Enbale: 0 **ATF Enbale: 0** WATF Enable: 0 en_bw_refill: 1 en_txop_no_change_bss: 1 dbdc0_search_rule: 1 dbdc1_search_rule: 1 refill_period: 5 ======= VOW Max Deficit Information ======= **VOW Max Deficit(unit 256us): 1** ======= VOW Quantum Information ======= Quantum ID 0 value(unit 256us): 6 Quantum ID 1 value(unit 256us): 12 Quantum ID 2 value(unit 256us): 16 Quantum ID 3 value(unit 256us): 20

Correct!!

ATF Test Case (6/6)

❑ **Note 2: <u>Tx cnt</u> and <u>pkt cnt</u> is the key debug information.**

<u>Tx cnt</u> suppose is balance when ATF enable.

If <u>pkt cnt</u> NOT always have cnt, please try UDP traffic. Because TCP have flow control, it will restrict traffic.

ATF Enable	ATF Disable
sta0: tx -> 23112, rx -> 0, vow_idx 11 sta0: addr 0:0, Mode 0, MCS 0, vow_idx 11 **sta1: tx -> 528956**, rx -> 0, vow_idx 11 sta1: addr 68:24, Mode 0, MCS 3, vow_idx 11 **sta2: tx -> 526415**, rx -> 93, vow_idx 11 sta2: addr e8:30, Mode 2, MCS 15, vow_idx 11 Total Airtime: 1078576 sta1: tx cnt -> 4/0, tx fail -> 0/0, vow_idx 11 sta2: tx cnt -> 168/0, tx fail -> 3/0, vow_idx 11 BSS0: tx byte -> 15722720, rx byte -> 80 free count 1107168 AMPU count 323 nonwifi: 145, obss: 0. STA1 AC1: tail/head fid = 0x55e/0xb49, **pkt cnt = 3c** STA2 AC1: tail/head fid = 0xf1b/0xcf0, **pkt cnt = 44d**	sta0: tx -> 25423, rx -> 0, vow_idx 15 sta0: addr 0:0, Mode 0, MCS 0, vow_idx 15 **sta1: tx -> 458289**, rx -> 0, vow_idx 15 sta1: addr 68:24, Mode 0, MCS 3, vow_idx 15 **sta2: tx -> 597204**, rx -> 0, vow_idx 15 sta2: addr e8:30, Mode 2, MCS 14, vow_idx 15 Total Airtime: 1080916 sta1: tx cnt -> 2/0, tx fail -> 0/0, vow_idx 15 sta2: tx cnt -> 225/0, tx fail -> 1/0, vow_idx 15 BSS0: tx byte -> 16838586, rx byte -> 0 free count 1107662 AMPU count 302 nonwifi: 149, obss: 0. STA1 AC1: tail/head fid = 0x270/0x8e9, **pkt cnt = 645** STA2 AC1: tail/head fid = 0xe01/0x633, **pkt cnt = 3f3**

Weighted Airtime Fairness (WATF)

Introduction to WATF

❑ **ATF means "Weighted Airtime Fairness".**

❑ **We divide Stations into 4 groups. In different group, we give the different airtime quantum.**

Level 0 – airtime quantum is 1ms.

Level 1 – airtime quantum is 2ms.

Level 2 – airtime quantum is 3ms.

Level 3 – airtime quantum is 4ms.

❑ **In WATF mode, we can service VIP station by setting it in high level group.**

❑ **The lowest level group can be use to "guest station".**

❑ **If you don't set MAC address in any level, we will use Level 0's airtime quantum by default.**

Normal Startup – Profile/Config

☐ **CONFIG_VOW_SUPPORT=y（ <u>default on</u>）**

☐ **Profile location**

- **/etc/wireless/mediatek/mt7986.dbdc.b0.dat(for Band0)**
- **/etc/wireless/mediatek/mt7915.dbdc.b1.dat(for Band1)**

☐ **Key parameters in profile (<u>default</u> <u>off</u>)**

- **WATF ON**
  - **VOW_WATF_En=1**
- **WATF OFF**
  - **VOW_WATF_En=0**

Runtime Config - command

❑ **Turn ON/OFF WATF by command :**

iwpriv ra0 set vow_watf_en=<1:Enable/0:Disable>

❑ **Note :**

WATF is one of ATF's configuration. So before enable WATF, you must enable ATF first !!!

How to Set WATF Configuration(1)

❑ **First, you must check ATF and WATF is enable.**

(iwpriv ra0 show vow_info)

```
# iwpriv ra0 set vow_watf_en=1
set_vow_watf_en: vow_watf_en is set to 1.
# iwpriv ra0 set vow_info
# iwpriv ra0 show vow_info
======== VOW Control Information ========
ATC Enbale: 0
ATF Enbale: 1
WATF Enable: 1
en_bw_refill: 1
en_txop_no_change_bss: 1
dbdc0_search_rule: 1
dbdc1_search_rule: 1
refill_period: 5
======== VOW Max Deficit Information ========
VOW Max Deficit(unit 256us): 64
======== VOW Quantum Information ========
Quantum ID 0 value(unit 256us): 6
Quantum ID 1 value(unit 256us): 12
Quantum ID 2 value(unit 256us): 16
Quantum ID 3 value(unit 256us): 20
```

Normal Startup – Profile/Config

☐ **Profile location**

- **/etc/wireless/mediatek/mt7986.dbdc.b0.dat(for Band0)**
- **/etc/wireless/mediatek/mt7915.dbdc.b1.dat(for Band1)**

☐ **Key parameters in profile (default on)**

- **VOW_WATF_Q_LV0=<0~4>**
- **VOW_WATF_Q_LV1=<1~8>**
- **VOW_WATF_Q_LV2=<2~12>**
- **VOW_WATF_Q_LV3=<3~16>**

Runtime Config - command

❑ **Next, set airtime quantum value.**

   iwpriv ra0 set vow_watf_q=<level>-<quantum> --unit 256us

   Ex: iwpriv ra0 set vow_watf_q=0-4

           iwpriv ra0 set vow_watf_q=1-8

       iwpriv ra0 set vow_watf_q=2-12

           iwpriv ra0 set vow_watf_q=3-16

```
# iwpriv ra0 show vow_info
======= VOW Control Information ========
ATC Enbale: 0
ATF Enbale: 1
WATF Enable: 1
en_bw_refill: 1
en_txop_no_change_bss: 1
dbdc0_search_rule: 1
dbdc1_search_rule: 1
refill_period: 5
======= VOW Max Deficit Information =======
VOW Max Deficit(unit 256us): 64
======= VOW Quantum Information ========
Quantum ID 0 value(unit 256us): 4
Quantum ID 1 value(unit 256us): 8
Quantum ID 2 value(unit 256us): 12
Quantum ID 3 value(unit 256us): 16
```

❑ **Note :**

Airtime Quantum Value is NOT suggested to modify for customer.

(We always use the default value : Level 0 – 1ms, Level 1 – 2ms, Level 2 – 3ms, Level 3 – 4ms)

How to Set WATF – Pre Station Conf

❑ **Finally, you can enter/delete station's MAC address to/from any level.**

- iwpriv ra0 set vow_watf_add_entry=<level>-<Addr>

    Ex: iwpriv ra0 set vow_watf_add_entry=0-11:22:33:44:55:66

- iwpriv ra0 set vow_watf_del_entry=<Addr>

    Ex: iwpriv ra0 set vow_watf_del_entry=11:22:33:44:55:66

❑ **Profile location**

- /etc/wireless/mediatek/mt7986.dbdc.b0.dat (for Band0)

- /etc/wireless/mediatek/mt7986.dbdc.b1.dat (for Band1)

❑ **Key parameters in profile**

- VOW_WATF_MAC_LV0=11:22:33:44:55:66,aa:bb:cc:dd:ee:ff

- VOW_WATF_MAC_LV1=11:22:33:44:55:66,aa:bb:cc:dd:ee:ff

- VOW_WATF_MAC_LV2=11:22:33:44:55:66,aa:bb:cc:dd:ee:ff

- VOW_WATF_MAC_LV3=11:22:33:44:55:66,aa:bb:cc:dd:ee:ff

How to Set WATF Configuration(4)

❑ **You can check WATF station list by command :**

iwpriv ra0 show vow_watf_info

```
# iwpriv ra0 show vow_watf_info
======== WATF Information ========
vow_watf_en: 1
vow_watf_q_lv0: 4
vow_watf_q_lv1: 8
vow_watf_q_lv2: 12
vow_watf_q_lv3: 16
======== WATF LV0's MAC Address List ========
Entry 0: 11:22:33:44:55:66
======== WATF LV1's MAC Address List ========
======== WATF LV2's MAC Address List ========
======== WATF LV3's MAC Address List ========
```

Airtime Control (ATC) & Throughput (TPC)

Introduction to ATC & TPC

❑ **Use the "Group round robin"**

❑ **Airtime ratio control by group**

- Guarantee min airtime usage

- Limit the max airtime usage

❑ **Bandwidth(Throughput) control by group**

- Guarantee the min throughput

- Limit the max throughput

❑ **7915 supports 16 groups.**

❑ **BSS and Group is 1-to-1 mapping in 7915**
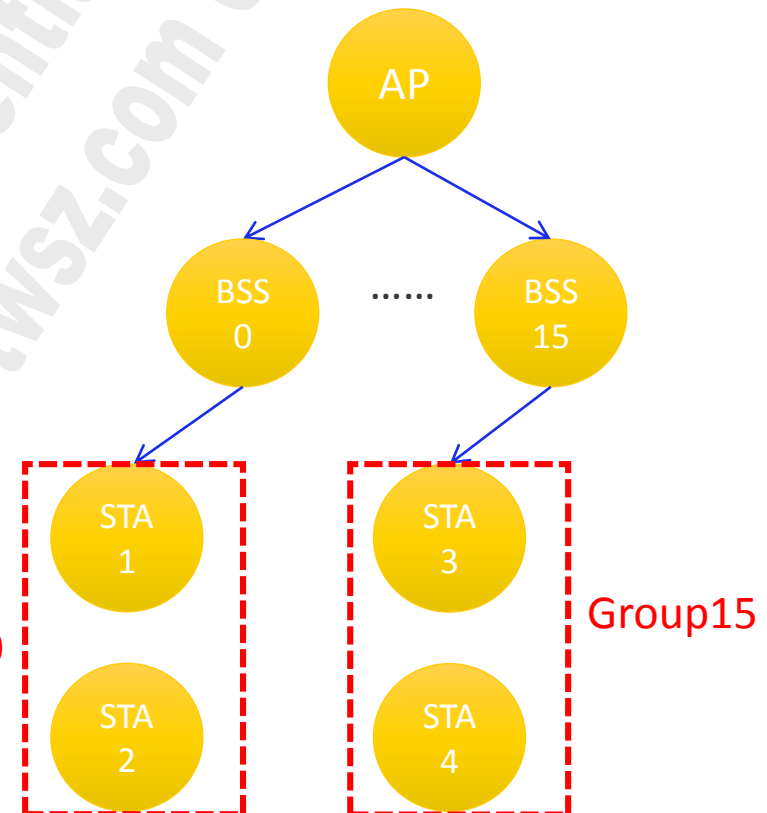
How to Turn ON/OFF ATC & TPC

❏ **Turn ON/OFF ATC by WebUI:**

Air-time Control (ATC)

When you have multiple SSID enabled, this allows you to control how these SSIDs share airtime. So this is a sort of QoS scheme for SSID.

There are 2 aspects you can control, If you enable both, the rules will merge togehter:

1. by Throughput Quota
2. by Airtime Ratio

Click the button to turn ON / OFF ATC

☒ Disable ATC

SSID	ATC	Min		Max	
MTK_AP22	☐ TP	100	Mbps	150	Mbps
	☑ AT	20	%	100	%
MTK_AP22_rai1	☐ TP	10	Mbps	300	Mbps
	☑ AT	50		50	%

ATC ON

Tput Control

Hierarchical switch
(You must turn on ATC before
you turn on the Tput/AT control)

Airtime Control

How to Configure ATC & TPC (1)

❑ **If you want to Airtime ratio control by group**

Example : Set SSID 0(ATC_Home_5G) Min/Max ratio = 80/100.

Air-time Control (ATC)

When you have multiple SSID enabled, this allows you to control how these SSIDs share airtime. So this is a sort of QoS scheme for SSID.

There are 2 aspects you can control, If you enable both, the rules will merge togehter:

1. by Throughput Quota
2. by Airtime Ratio

STEP.1
Enable Airtime ratio control

	Disable ATC

SSID	ATC		Min			Max	
ATC_Home_5G	☐	TP	0	Mbps		0	Mbps
	☑	AT	80	%		100	%
ATC_Hotspot_5G	☐	TP	0	Mbps		0	Mbps
	☑	AT	20	%		20	%

Apply to RX

a By default, ATF and ATC only work for TX(transmit). This option will apply ATF and ATC to RX (receive).

☑ Apply both ATC & ATF to RX

STEP.2
Set Min ratio & Max ratio
Check the AT box.

STEP.3
Save and Apply wifi setting.
Note: it will reload wifi profile

Save and Apply	Save	Reset

How to Configure ATC & TPC (2)

❑ **After setting airtme control by UI, the profile will be :**

VOW_BW_Ctrl=1 ← **After enable ATC control, you can control airtime/BW by group**

VOW_Group_Min_Ratio=80;20;0;0;0;0;0;0;0;0;0;0;0;0;0;0

← **SSID 0's Min airtime ratio set to 80%, SSID 1's Min airtime ratio set to 20%.**

VOW_Group_Max_Ratio=100;20;0;0;0;0;0;0;0;0;0;0;0;0;0;0

← **SSID 0's Max airtime ratio set to 100%, SSID 1's Max airtime ratio set to 20%.**

VOW_Airtime_Ctrl_En=1;1;0;0;0;0;0;0;0;0;0;0;0;0;0;0

← **SSID 0's Airtime control enable, SSID 2's Airtime control enable.**

How to Configure ATC & TPC (3)

❑ **Test Environment :**

Test Device	BSS ID	Baseline TP (Mbps)	Airtime Control TP (Mbps)	Airtime % = ATC TP/Baseline TP
Iphone	ATC_Home_5G	255.1	205.4	81%
HTC	ATC_Hotspot_5G	267.6	47.0	18%

- OTA

- Channel Num = 157

- Bandwidth = 80M

ixChariot Test
Script

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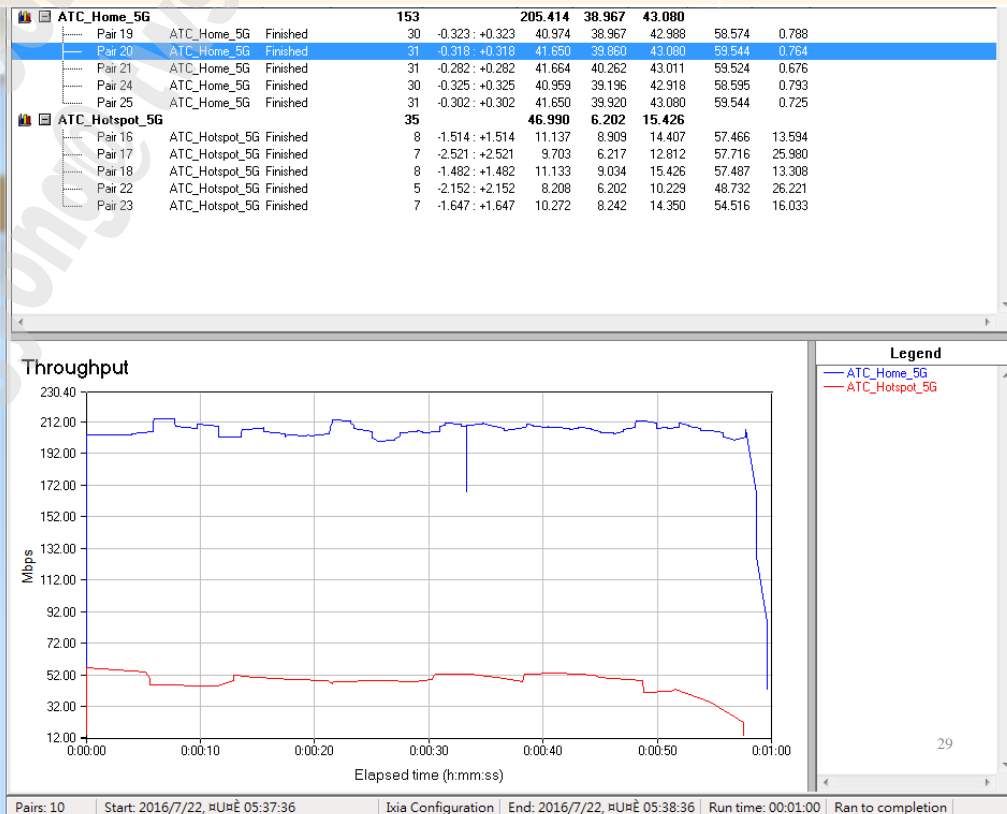
How to Configure ATC & TPC (4)

❑ **If you want to Bandwidth(Throughput) contorl by group**

   Example : Set SSID 0(ATC_Home_5G) Min/Max TP = 100Mbps.

Air-time Control (ATC)

When you have multiple SSID enabled, this allows you to control how these SSIDs share airtime. So this is a sort of QoS scheme for SSID.

There are 2 aspects you can control, If you enable both, the rules will merge togehter:

1. by Throughput Quota
2. by Airtime Ratio

STEP.1
Enable Airtime ratio control

❌ Disable ATC

SSID	ATC		Min			Max	
ATC_Home_5G	☑	TP	100		Mbps	100	Mbps
	☐	AT			%		%
ATC_Hotspot_5G	☑	TP	30		Mbps	30	Mbps
	☐	AT			%		%

STEP.2
Set Min TP & Max TP
Check the TP box.

Apply to RX

a By default, ATF and ATC only work for TX(transmit). This option will apply ATF and ATC to RX (receive).

☑ Apply both ATC & ATF to RX

STEP.3
Save and Apply wifi setting.
Note: it will reload wifi profile

Save and Apply   Save   Reset

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How to Configure ATC & TPC (5)

❑ **After setting BW control by UI, the profile will be :**

VOW_BW_Ctrl=1 ← **After enable ATC control, you can control airtime/BW by group**

VOW_Group_Min_Rate=100;30;0;0;0;0;0;0;0;0;0;0;0;0;0;0

← **SSID 0's Min rate set to 100Mbps, SSID 1's**

Min rate set to 30Mbps.

VOW_Group_Max_Rate=100;30;0;0;0;0;0;0;0;0;0;0;0;0;0;0

← **SSID 0's Max rate set to 100Mbps, SSID 1's**

Max rate set to 30Mbps.

VOW_Rate_Ctrl_En=1;1;0;0;0;0;0;0;0;0;0;0;0;0;0;0

← **SSID 0's Rate control enable, SSID 2's Rate**

control enable.

How to Configure ATC & TPC (6)

Test Environment:

- OTA

- Channel Num = 157
- Bandwidth = 80M
- Test Device :
  - Iphone 6
  - HTC M8

- Set SSID 0's Min Rate = 100Mbps.
  Set SSID 0's Max Rate = 100Mbps.

- Set SSID 1's Min Rate = 30Mbps.
  Set SSID 1's Max Rate = 30Mbps.

ixChariot Test Script

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How to Configure ATC & TPC (7)

❑ **If you want to Bandwidth(Throughput) control and airtime control by group**

Example : Set SSID 0(ATC_Home_5G) Min/Max TP = 100Mbps. Min/Max ratio = 80/100

Air-time Control (ATC)

When you have multiple SSID enabled, this allows you to control how these SSIDs share airtime. So this is a sort o

There are 2 aspects you can control, If you enable both, the rules will merge togehter:

1. by Throughput Quota
2. by Airtime Ratio

STEP.1
Enable Airtime ratio control

TP will be bounded for
min{Min Rate, Min Ratio}

❌ Disable ATC

SSID	ATC		Min		Max	
📶 ATC_Home_5G	☑	TP	100	Mbps	100	Mbps
	☑	AT	80	%	100	%
📶 ATC_Hotspot_5G	☑	TP	30	Mbps	30	Mbps
	☑	AT	20	%	20	%

Apply to RX

a By default, ATF and ATC only work for TX(transmit). This option will apply ATF and ATC to RX (receive).

☑ Apply both ATC & ATF to RX

STEP.2
Set Min TP/Ratio & Max TP/Ratio

STEP.3
Save and Apply wifi setting.
Note: it will reload wifi profile

Save and Apply	Save	Reset

How to Configure ATC & TPC (8)

Test Environment:

- OTA

- Channel Num = 157
- Bandwidth = 80M
- Test Device :
  - Iphone 6
  - HTC M8

ixChariot test script

- Set SSID 0's Min Rate = 100Mbps.
  Set SSID 0's Max Rate = 100Mbps.
  Set SSID 0's Min Ratio = 80.
  Set SSID 0's Max Ratio = 100.

- Set SSID 1's Min Rate = 30Mbps.
  Set SSID 1's Min Rate = 30Mbps.
  Set SSID 1's Min Ratio = 20.
  Set SSID 1's Max Ratio = 20.

TP will be bounded for min{Min Rate, Min Ratio}

C:\Users\MTK12578\Desktop\Airtime_Ctrl_test_1.tst

File   Edit   View   Run   Tools   Window   Help

ALL TCP SCR EP1 EP2 SQ PG PC   XIXIA

Test Setup | Throughput | Transaction Rate | Response Time | Raw Data Totals | Endpoint Configuration

Group		Pair Group Name	Run Status	Timing Records Completed	95% Confidence Interval	Average (Mbps)	Minimum (Mbps)	Maximum (Mbps)	Measured Time (sec)	Relative Precision
☐ SSID0				69		93.507	9.958	33.812		
	Pair 19	SSID0	Finished	15	-3.575 : +3.575	20.332	11.114	33.684	59.020	17.582
	Pair 20	SSID0	Finished	11	-2.844 : +2.844	15.551	9.958	27.778	56.589	18.290
	Pair 21	SSID0	Finished	14	-1.686 : +1.686	19.710	15.355	27.836	56.823	8.552
	Pair 24	SSID0	Finished	13	-2.078 : +2.078	19.308	12.696	22.727	53.863	10.763
	Pair 25	SSID0	Finished	16	-1.988 : +1.988	22.857	17.594	33.812	56.000	8.698
☐ SSID1				18		24.393	3.858	9.835		
	Pair 16	SSID1	Finished	4	-1.784 : +1.784	5.997	5.130	7.786	53.362	29.754
	Pair 17	SSID1	Finished	3	-2.696 : +2.696	4.777	3.858	6.081	50.244	56.447
	Pair 18	SSID1	Finished	3	-1.033 : +1.033	4.918	4.646	5.446	48.803	21.013
	Pair 22	SSID1	Finished	5	-1.474 : +1.474	8.251	6.941	9.835	48.478	17.870
	Pair 23	SSID1	Finished	3	-0.661 : +0.661	5.248	4.958	5.419	45.736	12.597

Iphone 6= min{100, 267*0.8}

HTC M8 = min{30, 282*0.2}

Throughput

Mbps: 115.25, 105.10, 95.10, 85.10, 75.10, 65.10, 55.10, 45.10, 35.10, 25.10, 15.10, 5.10

Elapsed time (h:mm:ss): 0:00:00, 0:00:10, 0:00:20, 0:00:30, 0:00:40, 0:00:50, 0:00:57

Legend: SSID0, SSID1

Pairs: 10 | Start: 2016/7/25, ¤U¤È 05:56:00 | Ixia Configuration | End: 2016/7/25, ¤U¤È 05:57:00 | Run time: 00:01:00 | Ran to completion

How to Configure ATC & TPC (9)

❑ **If you want to** **Bandwidth(Throughput) control and airtime control** **by group**

Example : Set SSID 0(ATC_Home_5G) Min/Max TP = 100Mbps. Min/Max ratio = 80/100

Set SSID 1(ATC_Hotspot_5G) Min/Max TP = **80Mbps****. Min/Max ratio = 20/20**

Air-time Control (ATC)

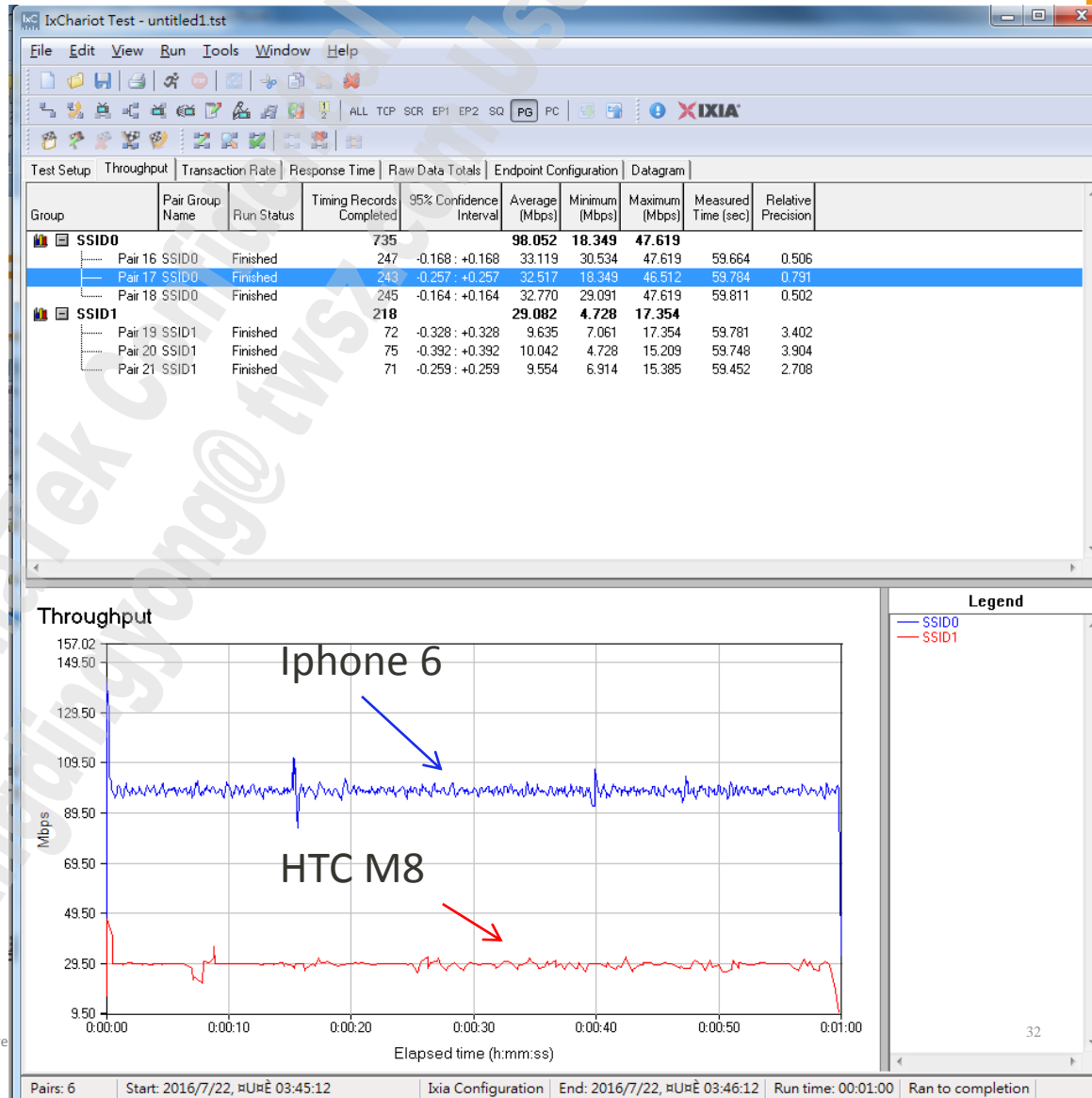When you have multiple SSID enabled, this allows you to control how these SSIDs share airtime. So this is a sor

There are 2 aspects you can control, If you enable both, the rules will merge togehter:

1. by Throughput Quota
2. by Airtime Ratio

TP will be bounded for min{Min Rate, Min Ratio}

STEP.1
Enable Airtime ratio control

☒ Disable ATC

SSID	ATC		Min		Max	
ATC_Home_5G	☑	TP	100	Mbps	100	Mbps
	☑	AT	80	%	100	%
ATC_Hotspot_5G	☑	TP	80	Mbps	80	Mbps
	☑	AT	20	%	20	%

STEP.2
Set Min TP/Ratio & Max TP/Ratio

Apply to RX

a By default, ATF and ATC only work for TX(transmit). This option will apply ATF and ATC to RX (receive).

☑ Apply both ATC & ATF to RX

STEP.3
Save and Apply wifi setting.
Note: it will reload wifi profile

| Save and Apply | Save | Reset |

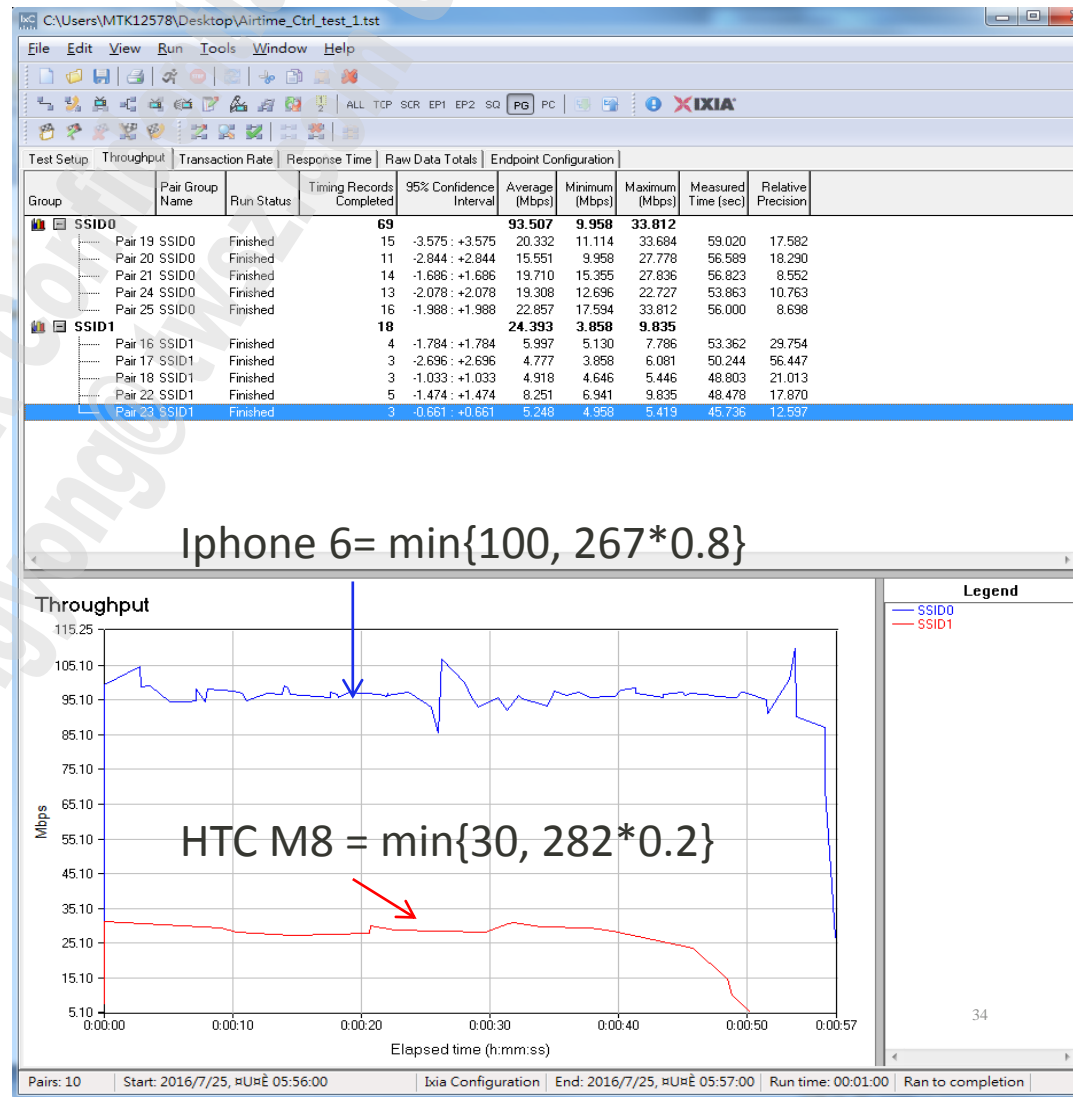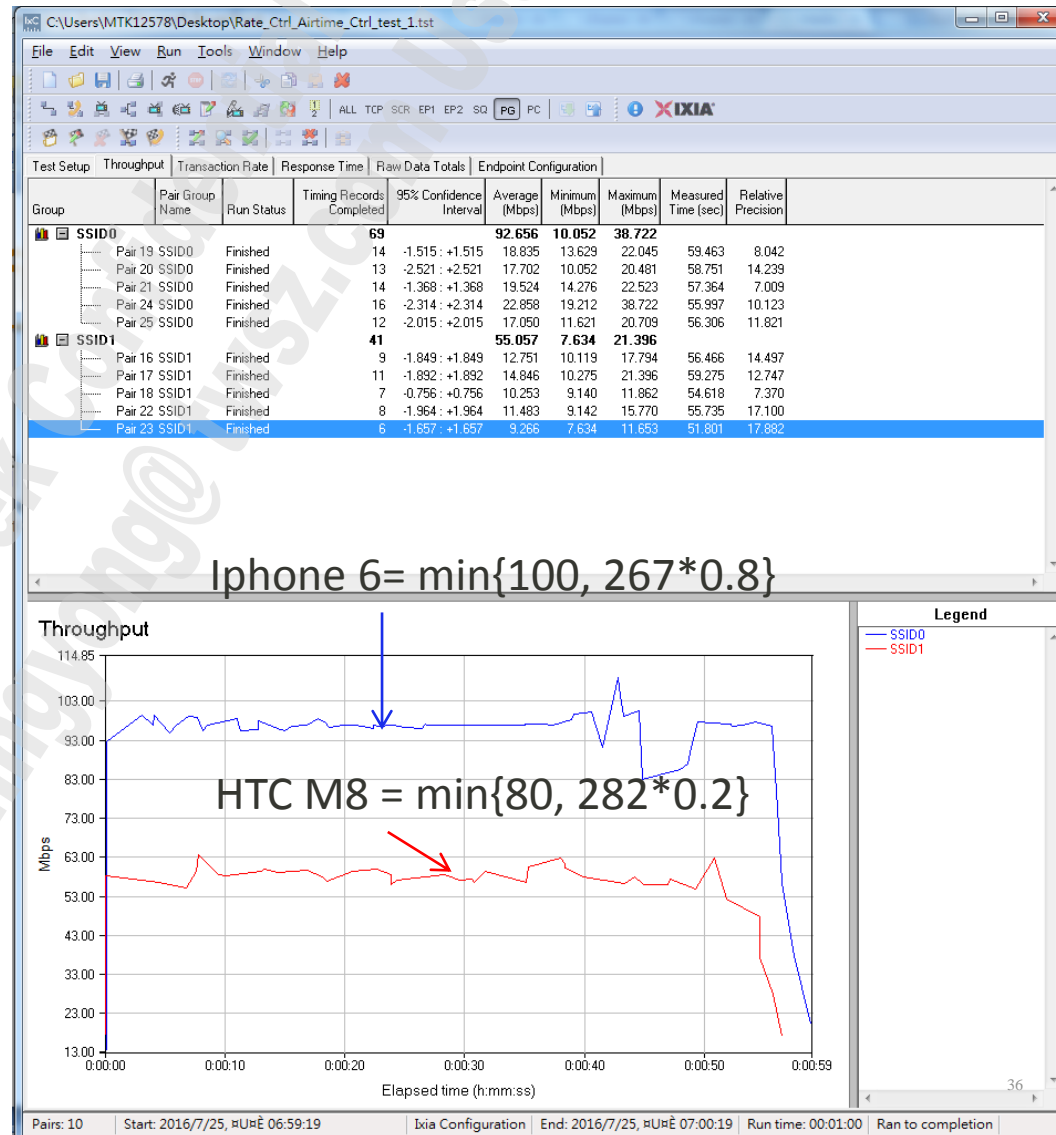# How to Configure ATC & TPC (10)

Test Environment:

- OTA

- Channel Num = 157
- Bandwidth = 80M
- Test Device :
  - Iphone 6
  - HTC M8

ixChariot test script

- Set SSID 0's Min Rate = 100Mbps.
  Set SSID 0's Max Rate = 100Mbps.
  Set SSID 0's Min Ratio = 80.
  Set SSID 0's Max Ratio = 100.

- Set SSID 1's Min Rate = 80Mbps.
  Set SSID 1's Min Rate = 80Mbps.
  Set SSID 1's Min Ratio = 20.
  Set SSID 1's Max Ratio = 20.

TP will be bounded for min{Min Rate, Min Ratio}

C:\Users\MTK12578\Desktop\Rate_Ctrl_Airtime_Ctrl_test_1.tst

File Edit View Run Tools Window Help

ALL TCP SCR EP1 EP2 SQ **PG** PC IXIA

Test Setup | Throughput | Transaction Rate | Response Time | Raw Data Totals | Endpoint Configuration

Group	Pair Group Name	Run Status	Timing Records Completed	95% Confidence Interval	Average (Mbps)	Minimum (Mbps)	Maximum (Mbps)	Measured Time (sec)	Relative Precision
SSID0			**69**		**92.656**	**10.052**	**38.722**		
	Pair 19 SSID0	Finished	14	-1.515 : +1.515	18.835	13.629	22.045	59.463	8.042
	Pair 20 SSID0	Finished	13	-2.521 : +2.521	17.702	10.052	20.481	58.751	14.239
	Pair 21 SSID0	Finished	14	-1.368 : +1.368	19.524	14.276	22.523	57.364	7.009
	Pair 24 SSID0	Finished	16	-2.314 : +2.314	22.858	19.212	38.722	55.997	10.123
	Pair 25 SSID0	Finished	12	-2.015 : +2.015	17.050	11.621	20.709	56.306	11.821
SSID1			**41**		**55.057**	**7.634**	**21.396**		
	Pair 16 SSID1	Finished	9	-1.849 : +1.849	12.751	10.119	17.794	56.466	14.497
	Pair 17 SSID1	Finished	11	-1.892 : +1.892	14.846	10.275	21.396	59.275	12.747
	Pair 18 SSID1	Finished	7	-0.756 : +0.756	10.253	9.140	11.862	54.618	7.370
	Pair 22 SSID1	Finished	8	-1.964 : +1.964	11.483	9.142	15.770	55.735	17.100
	Pair 23 SSID1	Finished	6	-1.657 : +1.657	9.266	7.634	11.653	51.801	17.882

Iphone 6= min{100, 267*0.8}

HTC M8 = min{80, 282*0.2}

Throughput

Legend
— SSID0
— SSID1

Mbps (y-axis): 114.85, 103.00, 93.00, 83.00, 73.00, 63.00, 53.00, 43.00, 33.00, 23.00, 13.00

Elapsed time (h:mm:ss): 0:00:00, 0:00:10, 0:00:20, 0:00:30, 0:00:40, 0:00:50, 0:00:59

Pairs: 10 | Start: 2016/7/25, ¤U¤È 06:59:19 | Ixia Configuration | End: 2016/7/25, ¤U¤È 07:00:19 | Run time: 00:01:00 | Ran to completion

everyday genius