

[Realtek RF MP Tool Guidelines]

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Change History

version	Date	Remarks
V14	2015/06/05	Add 3.7 Quickly to RF MP TX/Rx CMD Use Example
V15	2015/07/08	Revised Bandwidth Setting of description, and get PHY status for Rx Test.
V16	2015/07/28	Correct the Channel Bandwidth CMD sequence by RF of suggestion.
V17	2015/08/19	Add explain How to Switch Repeater set RF PATH MAIN/AUX
V18	2015/10/19	Add remind for leave power save before write fake efuse map.
V19	2016/03/09	<ol style="list-style-type: none">1. Only support the rtwpriv tool with realtek driver.2. Revise the how to write efuse map example cmds.

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[1. Features]

The following steps demonstrate Realtek Wireless Adapter Mass Production Linux Tool. This is a simple install guide, Use the Linux proprietary tools “rtwpriv” by Realtek provide, and do get/set the I/O control with WLAN driver.

[2. Software Package] - To check have the Component .tar.gz files.

1. Driver source - rtXXX_linux_MP_vX.X.X.tar.gz
2. Wireless tool Source -(If want to use for Android system) - Android_wireless_tools.tar
3. Documents
 - LinuxDriver_MP_Rtwpriv_UserGuide.doc

[3. Quick Start Guide]

[3.1. Build Driver module]

Note: Use su/sudo su for root authentication with following command.

1. Unzip Driver source folder -
 - # tar -xvzf rtlXXX_linux_MP_linux_vx.x.x.tar.gz
2. Change to the driver source code directory-
 - # cd rtlXXX_linux_MP__linux_vx.x.x
3. To choose interface for 8723A WiFi Driver.
 - # chmod 777 make_drv
 - # ./make_drv
 - # input 1 or 2 for 8723AS/8723AU

4. Config compiles Setting-

Edit the "Makefile", and modify the line 21 "CONFIG_MP_INCLUDED = n" to "CONFIG_MP_INCLUDED = y"

If your target platform is the platform you're compiling the driver,
Maybe you don't need to change any setting.
Otherwise, you need to do some configuration manually,
Like a cross compiler and kernel source tree directory.

Ex.

```
ARCH := arm
```

```
CROSS_COMPILE := arm-none-linux-gnueabi-
```

```
KSRC := /usr/src/linux-2.6.34.1
```

5. Do the Compile the driver source code -

```
# make
```

If nothing goes wrong, the driver "8xxx.ko" will be generated.

If there're still some problems or need more detail to compile driver guide,
Please check normal driver package for more reference.

3.2 Build Android wireless tools

3.2.1 rtwprivfor MP APK GUI Tool

The Realtek Android MP apk tool need to use the proprietary rtwprivtool, please first to execute the adb push the rtwpriv to the android system.

In the RtkWiFiTest_Package_For_Customer package more detailed information on readme.txt.

Q. How to build rtwprivtool?

A.

[Linux]

Just "make", and you will get an executable file "rtwpriv".

[Android - Speradtrum platform]

Step 1. To puts the rtwprivdirectory to idh. code/external/.

Step 2. In root directory (idh.code/), run "./mk sp6820gb u adr external/rtwpriv/".

Step 3. The binary is installed on "out/target/product/hsdroid/system/bin/rtwpriv".

3.3 1. Config for RTL8812AU PA/LNA/RFE Type Setting.

If the RTL8812AU was empty of efuse, Please make sure your board type and PA/LNA of HW Layout.

You must force the driver use external or internal PA/LNA before the insert driver module.

For use 2G internal PA/LNA and 5G external PA/LNA,

Example CMD:

```
insmod 8812au.ko rtw_amplifier_type_2g=0 rtw_amplifier_type_5g=192
rtw_RFE_type=1
```

```
rtw_amplifier_type_2g= "BIT3:2G ext-PA, BIT4:2G ext-LNA"
```

```
rtw_amplifier_type_5g="BIT6:5G ext-PA, BIT7:5G ext-LNA"
```

```
ODM_BOARD_DEFAULT      = 0,    // The DEFAULT case.
```

```
ODM_BOARD_MINICARD     = BIT (0), // 0 = non-mini card, 1= mini card.
```

```
ODM_BOARD_SLIM         = BIT (1), // 0 = non-slim card, 1 = slim card
```

```
ODM_BOARD_BT           = BIT (2), // 0 = without BT card, 1 = with BT
```

```
ODM_BOARD_EXT_PA       = BIT (3), // 0 = no 2G ext-PA, 1 = existing 2G ext-PA
```

```
ODM_BOARD_EXT_LNA      = BIT (4), // 0 = no 2G ext-LNA, 1 = existing 2G ext-LNA
```

```
ODM_BOARD_EXT_TRSW     = BIT (5), // 0 = no ext-TRSW, 1 = existing ext-TRSW
```

```
ODM_BOARD_EXT_PA_5G    = BIT (6), // 0 = no 5G ext-PA, 1 = existing 5G ext-PA
```

```
ODM_BOARD_EXT_LNA_5G   = BIT (7), // 0 = no 5G ext-LNA, 1 = existing 5G ext-LNA
```

```
rtw_RFE_type =
```

01h : RFE is used "SW_LNA_PA, ex SKY85703" for APA_ALNA board type.

02h : RFE is used "SW_LNA, ex. SKY85601" for ALNA board type. (When efuse 0xCA[7]=1, the board type is ALNA)

03h : RFE is used "2G&5G SW+PA+LNA" , for PA_LNA board type. (When efuse 0xCA[7]=1, the board type is PA_LNA)

04h : RFE is used "SP3T" for DEFAULT board type

2. 8723BS-VQ0 serial Chipset of RF Antenna Config Method

The 8723BS-VQ0 Chipset was default the TX Antenna on PATH B,
We must to select the **PATH B** for TX using.

If you want to use the RtkWiFiTest. APK for MP Test TX, Please check the APK version
is “RtkWiFiTest_20140714A. apk”, This APK can select the Antenna B.

If your current version was wrong, please contact our Realtek FAE to get the right
version.

**P.S. Another approach is to use the command all the way to complete
the test.**

Realtek MP Test

Start TX

Antenna : ☐ A ☒ B ☐ C ☐ D

Channel : 1 - 2412 MHz - 2G

Bandwidth : 20 MHz

Data Rate : CCK - 1 Mbps

Preamble/GI : Long Preamble

Power Index A : 45

Power Index B : 0

TX Mode : Packet TX

Packet Counts : 0

Packet Length : 1500

Start Pwr Trk Start TX

Crystal Cap. : e.g., 5 (dec)

TX OK : 0

TX Fail : 0

Reset Counters

Show processing messages here.

3. Switch the extra RF I/O connector for MAIN/AUX

If there are two antenna cables connected to the card. One main antenna and one auxiliary antenna.

It's an extra RF I/O connector location is provided (AUX, MAIN). The RF's auxiliary input can optionally be routed to this connector.

1. Switch Main command:

#rtwpriv wlan0 mp_setrfpath 1

2. Switch AUX command:

#rtwpriv wlan0 mp_setrfpath 0

[3.4 Manual for MP Use Example]

(Execute the following commands after the WLAN interface is normally open)

If you want to change the input parameter (rate 、 channel 、 txpower 、 bandwidth) or to continue the other MP test, please must first to input the command "**rtwpriv wlan0 mp_ctx stop**". And doesn't need to do the "mp_stop" command.

About Data Rate of input mapping range, please refer the doc

"rtwpriv_mp_settings_for_different_data_rate.xls" for setting data rate.

TX Parameter Setting & Test CMD Flow (1~8):

Please take note of the red mark word, it needed to be input.

1.
#ifconfig wlan0 up // Enable Device for MP operation
2.
#rtwpriv wlan0 mp_start // Enter and switch to MP mode
3.
#rtwpriv wlan0 mp_bandwidth 40M=0,shortGI=0
//40M=0 is set 20M bandwidth mode and long GI, Example: To set 40M is 40M=1 、 20M is 40M=0 、 80M is 40M=2.
4. **#rtwpriv wlan0 mp_channel 1**
//Channel number as 2.4G: 1, 2, 3, 4~13 or 5G: 36~161 etc.
5.
#rtwpriv wlan0 mp_ant_tx a
//Selects Antenna A for the operation, if DUT have 2x2 antenna select antenna "a" or "b" and "ab" for operation.
6.
#rtwpriv wlan0 mp_rate 108
// set OFDM data rate to 54Mbps,
ex: CCK 1M = 2, CCK 5.5M = 11 ;OFDM 6M=12 、 54M = 108;
N Rate: MCS0 = 128, MCS1 = 129, MCS 2=130.... MCS15 = 143;
VHT Rate: MCS0 = 160, MCS 1=161, MCS 2=162 ~ MCS9 =169.

Or direct input the Data Rate of Name:

#rtwpriv wlan0 mp_rate 54M // set OFDM data rate to 54Mbps

1M 2M 5.5M 11M

6M 9M 12M 18M 24M 36M 48M 54M

HTMCS0 HTMCS1 HTMCS2 HTMCS3 HTMCS4 HTMCS5 HTMCS6 HTMCS7 HTMCS8

HTMCS9 HTMCS10 HTMCS11 HTMCS12 HTMCS13 HTMCS14 HTMCS15 HTMCS16

HTMCS17 HTMCS18 HTMCS19 HTMCS20 HTMCS21 HTMCS22 HTMCS23 HTMCS24

HTMCS25 HTMCS26 HTMCS27 HTMCS28 HTMCS29 HTMCS30 HTMCS31

VHT1MCS0 VHT1MCS1 VHT1MCS2 VHT1MCS3 VHT1MCS4 VHT1MCS5

VHT1MCS6 VHT1MCS7 VHT1MCS8 VHT1MCS9 VHT2MCS0 VHT2MCS1 VHT2MCS2

VHT2MCS3 VHT2MCS4 VHT2MCS5 VHT2MCS6 VHT2MCS7 VHT2MCS8 VHT2MCS9

VHT3MCS0 VHT3MCS1 VHT3MCS2 VHT3MCS3 VHT3MCS4 VHT3MCS5

VHT3MCS6 VHT3MCS7 VHT3MCS8 VHT3MCS9 VHT4MCS0 VHT4MCS1 VHT4MCS2

VHT4MCS3 VHT4MCS4 VHT4MCS5 VHT4MCS6 VHT4MCS7 VHT4MCS8 VHT4MCS9

7.

#rtwpriv wlan0 mp_txpower patha=44,pathb=44

//Set path A and path B TX power level, and the Range is 0~63.

If you want to get and use Efuse TX power index, please input advance the command "**rtwpriv wlan0 mp_get_txpower**", then use the return a value and fill in following orange field (**patha=44, pathb=44**).

This CMD is according to the before parameters (rate 、 channel 、 bandwidth).

8. Start TX Mode Test.

8-1 [Continuous TX testing]:

#rtwpriv wlan0 mp_ctx background // start continuous TX

8-2 [Continuous Packet TX testing]:

#rtwpriv wlan0 mp_ctx background,pkt // start continuous Packet TX

8-3 [Count Packet TX testing]:

#rtwpriv wlan0 mp_ctx count=%d,pkt

// "%d" is Number of packets TX, you can specify a number of count packets.

8-4 [Carrier suppression testing]:

```
#rtwpriv wlan0 mp_rate 22
// Carrier suppression only uses CCK Rate, ex: CCK 1M = 2, CCK 5.5M = 11;
#rtwpriv wlan0 mp_ctx background,cs
```

8.5 [Single Tone TX testing]:

```
#rtwpriv wlan0 mp_ctx background,stone
```

9.

```
#rtwpriv wlan0 mp_ctx stop //stop continuous Packet TX
```

If you want to change the input parameter (rate 、 channel 、 txpower 、 bandwidth),

Please must input advance the command "**rtwpriv wlan0 mp_ctx stop**".

10.

```
#rtwpriv wlan0 mp_stop // exit MP mode
```

If you want to continue the MP test, don't do this command.

```
#ifconfig wlan0 down // close WLAN interface
```

3.5 Rx Test Mode:

a. [Air Rx testing]: "rtwpriv wlan0 mp_arx start"

```
#ifconfig wlan0 up // Enable Device for MP operation
#rtwpriv wlan0 mp_start // Enter MP mode
#rtwpriv wlan0 mp_bandwidth 40M=0,shortGI=0 //40M=0 is set 20M bandwidth mode
and long GI, Example: To set 40M is 40M=1 、 20M is 40M=0 、 80M is 40M=2.
#rtwpriv wlan0 mp_channel 1 // Set channel to 1, 2, 3, 4~13 etc.
#rtwpriv wlan0 mp_ant_rx a // Select antenna A for the operation, if
device has 2x2 antenna select antenna "a" or "b" and "ab" for operation.
#rtwpriv wlan0 mp_arx start // start air Rx testing.
#rtwpriv wlan0 mp_query // get the Driver of Rx statistics.
```

Note: If your Wlan Card of the interface was SDIO, We suggest to use the "rtwpriv wlan0 mp_arx phy" to get the Rx packet counts & statistics.

```
#rtwpriv wlan0 mp_arx stop or #rtwpriv wlan0 mp_reset_stats // Stop air Rx test and show
the Statistics / Reset TX and Rx Counter.
#rtwpriv wlan0 mp_stop // exit MP mode
#ifconfig wlan0 down // close WLAN interface
```

3.6 [Enable/Disable TX Power Tracking]:

```
#rtwpriv wlan0 mp_pwrctldm start #Enable the power tracking for TX.
#rtwpriv wlan0 mp_pwrctldm stop #Disable the power tracking for TX.
```

3.7 Quickly to RF MP TX/Rx CMD Use Example

This feature supporting depended on the driver version.

The Driver version must to over the v4.3.18 and revision number : 14317.

1. TX Test:

a.rtwpriv wlan0 mp_tx

ch=6,bw=0,rate=108,pwr=40,ant=0,tx=1

This instruction requires an input format is correct and there is in the order, will be able to successfully execute instructions, if you input error format, this CMD will return below MSG.

Please input correct format as below:

ch=6,bw=0,rate=108,pwr=40,ant=0,tx=1

[ch : BGN = <1~14> , A or AC = <36~165>]
[bw : Bandwidth: 0 = 20M, 1 = 40M, 2 = 80M]
[rate : CCK: 1 2 5.5 11M x 2 = < 2 4 11 22 >]
[OFDM: 6 9 12 18 24 36 48 54M x 2 = < 12 18 24 36 48 72 96 108 >
[HT 1S2SS MCS0 ~ MCS15 : < [MCS0]=128 ~ [MCS7]=135 ~
MCS15]=143
[HT 3SS MCS16 ~ MCS32 : < [MCS16]=144 ~ [MCS23]=151
~MCS32]=159 >
[VHT 1SS MCS0 ~ MCS9 : < [MCS0]=160 ~ [MCS9]=169 >
[txpower : 1~63 power index
[ant : <A = 1, B = 2, C = 4, D = 8> ,2T ex: AB=3 BC=6 CD=12
[txmode : < 0 = CONTINUOUS_TX,
1 = PACKET_TX, 2 = SINGLE_TONE_TX, 3 = CARRIER_SUPPRISSION_TX,
4 = SINGLE_CARRIER_TX >

To Stop the Tx Test.

b.rtwpriv wlan0 mp_tx stop

#To get the current Setting.

c.rtwpriv wlan0 mp_tx setting

#To Query the Tx counts.

d.rtwpriv wlan0 mp_query

2. Rx Test:

a.rtwpriv wlan0 mp_rx ch=1,bw=0,ant=0

This instruction requires an input format is correct and there is in the order, will be able to successfully execute instructions, if you input error format, this CMD will return below MSG.

[ch : BGN = <1~14> , A or AC = <36~165>]

[bw : Bandwidth: 0 = 20M, 1 = 40M, 2 = 80M]

[ant : <A = 1, B = 2, C = 4, D = 8> ,2T ex: AB=3 BC=6 CD=12

#To get the Rx counts.

b.rtwpriv wlan0 mp_query or rtwpriv wlan0 mp_arx phy

[4. Efuse Read/Write Use Example]

Use example:

[4.1 WiFi efuse_get]

```
#rtwpriv wlan0 efuse_get realmap          // read from the driver for all efuse logic map.
#rtwpriv wlan0 efuse_get realraw          // read from the HW of Efuse all PHY map.
#rtwpriv wlan0 efuse_get mac              // read mac Address (Direct to use the cmd
for raed mac address from the efuse content)

#rtwpriv wlan0 efuse_get rmap,16,6        // fix offset: CMD, offset, byteCounts (Specified
a start of the efuse's logic address 0x16 offset and set the number of bytes for
reading the efuse content)

#rtwpriv wlan0 efuse_get wlrfkmap,16,6    // fix offset: cmd, offset, byteCounts
(Specified a start of the Efuse's logic 0x16 address offset and set the number of
bytes for reading the fake WiFi Efuse content)

#rtwpriv wlan0 efuse_get wlrfkmap         // read form WiFi fake for all Efuse logic map.
```

[4.2 WiFi efuse_set]

```
#rtwpriv wlan0 efuse_set wmap,16,00e04c871234 // CMD, offset, Data bytes [hex]
(Specified an offset address for write 6 byte data "0x00,0xe0,0x4c,0x87,0x12,0x34"
to the 0x16 start of the Efuse logic address)

#rtwpriv wlan0 efuse_set mac,00e04c871234 // CMD, Data bytes [hex] (Use
set Mac CMD to write 6 byte data "0x00,0xe0,0x4c,0x87,0x12,0x34" to the Efuse
content)

#rtwpriv wlan0 Efuse_set wlwfake,16,00e04c871234 // CMD, offset, Data bytes [hex]
(Specified an offset address for write 6 byte data "0x00,0xe0,0x4c,0x87,0x12,0x34"
to the 0x16 start of the Fake Efuse content address)
```

Note: Please first to leave normal mode, because the IPS Power save will clear the

fake Map data. You can use the command “mp_start” or “pm_set ips=0” to leave Power Saving.

```
#rtwpriv wlan0 efuse_set wldumpfake // Dump the WiFi HW of logic Efuse
MAP to Driver of Fake WiFi efuse Map.
#rtwpriv wlan0 efuse_set wlfk2map // Write to WiFi Fake of Efuse MAP
to HW WiFi logic Efuse Map.
```

If config the Driver to use the file Map, you can use the following CMD to read the current driver of logic map.

```
#rtwpriv wlan0 efuse_get drvmap // Read form current driver of efuse logic
map.
```

a. Example CMDs for writing a fake efuse Map and use fake map write to the HW efuse Map:

Note: Please first to leave normal mode, because the IPS Power save will clear the fake Map data. You can use the command “mp_start” or “pm_set ips=0” to leave Power Saving.

b.

Write efuse data to driver fake map.

1. #rtwpriv wlan0 efuse_set wlwfake,00,00112233445566778899aabbccddeeff
2. #rtwpriv wlan0 efuse_set wlwfake,10,00112233445566778899aabbccddeeff
3. #rtwpriv wlan0 efuse_set wlwfake,20,00112233445566778899aabbccddeeff
4. #rtwpriv wlan0 efuse_set wlwfake,20,00112233445566778899aabbccddeeff
-
5. #rtwpriv wlan0 efuse_set wlwfake,c0,00112233445566778899aabbccddeeff

After loading you wants, then read the driver fake map for verify and confirm it.

6. #rtwpriv wlan0 efuse_get wlrfkmap

Do write fake Map to HW physical efuse.

7. #rtwpriv wlan0 efuse_set wlfk2map

Read HW current efuse Map to compare with your target MAP.

8. #rtwpriv wlan0 efuse_get realmap

c. Another way to read Linux EFUSE file MAP load to driver CMD.

Attention:

This function had a limited with the driver version number, "rtl8xxx_WiFi_linux_v4.X.X_12561",

Must to exceed the "12561" driver serial number.

Note: Please first to leave normal mode, because the IPS Power save will clear the fake Map data. You can use the command "mp_start" or "pm_set ips=0" to leave Power Saving.

Usage:

Open efuse map file and loading to driver fake map.

1. #rtwpriv wlan0 efuse_file ../../efuse.map

After loading from your map, then read the driver fake map for verify and confirm MAP.

2. #rtwpriv wlan0 efuse_get wlrfkmap

Do write fake Map to HW physical efuse.

3. #rtwpriv wlan0 efuse_set wlfk2map

Read HW current efuse Map to compare with your target MAP.

4. #rtwpriv wlan0 efuse_get realmap

[4.4 BT Efuse Function] for COMBO IC (RTL8723A/B/C, RTL8821A)

[--> 4.4.1 BT Get Function <--]

```
#rtwpriv wlan0 efuse_get btmap      // read from HW BT of the front efuse logic map.
#rtwpriv wlan0 efuse_get btbmap     // read from HW BT of the back efuse logic map.
#rtwpriv wlan0 efuse_get btrmap,16,6 // fix offset :cmd,offset,byteCounts
(Specified BT start of the efuse's address and set the number of bytes for read from the BT efuse content)
```

```
#rtwpriv wlan0 efuse_get btffake    // read from fake BT of the front efuse logic map.
#rtwpriv wlan0 efuse_get btbfake    // read from fake BT of the back efuse logic map.
```

[--> 4.4.2 BT Set Function <--]

```
#rtwpriv wlan0 efuse_set btwmap,16,00e04c871234 // cmd,offset,Data bytes[hex]
( Specified a offset address for write 6 bytes data "0x00,0xe0,0x4c,0x87,0x12,0x34" to the 0x16 start of the efuse content address )
```

```
#rtwpriv wlan0 efuse_set btwfake,16,00e04c871234 // cmd,offset,Data bytes[hex]
( Specified a offset address for write 6 bytes data "0x00,0xe0,0x4c,0x87,0x12,0x34" to the 0x16 start of the Fake efuse content address )
```

```
#rtwpriv wlan0 efuse_set btdumpfake // Dump BT HW efuse to Fake BT efuse Map.
#rtwpriv wlan0 efuse_set btfk2map   // Wirte BT Fake efuse to HW BT efuse Map.
```

=====
[Efuse's spec].

If you want a clearer definition of reference, you can refer to the Efuse's spec
"AN_RTL8XXX_EEPROM_SPEC_Vxxxxxx.pdf"

=====

[4.5 How to Read Efuse File

Prepare procedures:

- **1. Edit the "Makefile" :**
 - CONFIG_EFUSE_CONFIG_FILE=y
 - Please first edit the Makfile before compiling the Driver, find out the "CONFIG_EFUSE_CONFIG_FILE=n" and change to y, then compile the driver source.
- **2. Prepare for efuse MAP directory and file:**
 - Prepare the Driver default read "A.Directory" Efuse map file and "B. Directory" Mac Address file.
 - Reference the **FileEfuseExample** folder.
 - **A. /system/etc/wifi/wifi_efuse.map**
 - Driver read from this file for initial efuse map.
 - **B. /data/wifimac.txt**
 - Driver read from this file for an initial wlan Mac address.
 - 3. You can use the Efuse CMD for reading current contents after the driver initial to read efuse file.
 - #rtwpriv wlan0 efuse_get drvmap.

5. Crystal Calibration: rtwpriv wlan0 mp_phypara xcap=26

MP uses CMD to fine tuning the Crystal Cap value, and CMD is " rtwpriv wlan0 mp_phypara xcap=%d".

We can continue to adjust for getting targeted value, then use the Efuse CMD write to HW efuse, "**rtwpriv wlan0 efuse_set wmap, b9, 20**"

8188EU example 0xB9 offset:

The "0xB9" is Crystal Calibration Efuse offset address, you can refer the IC Efuse spec document.

B9h Crystal Calibration XTAL_K Value

Bit [5:0], Xi=Xo Range 0~3F h.

Bit [7:6]: reserved

FF h = 00 h
Default 20h

```
#insmod wlan.ko  
#ifconfig wlan0 up  
#rtwpriv wlan0 mp_start  
#rtwpriv wlan0 mp_setrfpath 0  
#rtwpriv wlan0 mp_ant_tx a  
#rtwpriv wlan0 mp_channel 7  
#rtwpriv wlan0 mp_txpower patha=42  
#rtwpriv wlan0 mp_phypara xcap=32 //init a adjust Crystal  
#rtwpriv wlan0 mp_ctx background,stone  
#rtwpriv wlan0 mp_phypara xcap=26 //to adjust Crystal and measure  
#rtwpriv wlan0 mp_phypara xcap=24 //to adjust Crystal and measure
```

Crystal Calibration Success! Find Crystal Index = 24

rtwpriv wlan0 efuse_set wmap,b9,18

CRYSTAL_CAL_STOP

```
#rtwpriv wlan0 mp_ctx stop
```

6. Read Thermometer : rtwpriv wlan0 mp_ther

1. Read Thermometer:

#rtwpriv wlan0 mp_ther

Return a value

2. Write the HW thermal value to HW efuse

#rtwpriv wlan0 mp_ther write

3. Use read Efuse CMD for verifying the value from thermal offset.

#rtwpriv wlan0 efuse_get rmap,(Efuse offset),1

7. [Verify Efuse TX power index]:

If you completed the calibration and write the power index to the EFUSE.

We provide the CMD "**rtwpriv wlan0 mp_get_txpower 0/1(path)**" for verifying EFUSE of power index.

You can refer the below CMD flow to verify the power index form the EFUSE.

You can reboot your system, or remove and then insert the wlan of driver module.

```
rmmod wlan.ko
```

```
insmod wlan.ko
```

```
#ifconfig wlan0 up // Enable Device for MP operation
#rtwpriv wlan0 mp_start // enter MP mode
#rtwpriv wlan0 mp_channel 1 // set the channel to 1. 2, 3, 4~13
etc.
#rtwpriv wlan0 mp_bandwidth 40M=0,shortGI=0 // set 20M mode and long GI,set 40M
is 40M=1 , set 80M= 2.
#rtwpriv wlan0 mp_ant_tx a //Select Antenna A for the operation, if
the device have 2x2 antenna select antenna "a" or "b" and "ab" for operation.

#rtwpriv wlan0 mp_rate 108 // set OFDM data rate to 54Mbps, ex:
CCK 1M = 2, CCK 5.5M = 11 ;OFDM 6M=12 、 54M = 108;
N Rate: MCS0 = 128, MCS1 = 129, MCS 2=130.... MCS15 = 143;
VHT Rate: MCS0 = 160, MCS 1=161, MCS 2=162 ~ MCS9 =169.
```

If you want to get and use Efuse TX power index, please input advance the command "**rtwpriv wlan0 mp_get_txpower 0/1**", and use the return value to fill in following orange field.

```
#rtwpriv wlan0 mp_txpower patha=44, pathb=44 //set path A and path B TX power
level, the Range is 0~63.
```

```
#rtwpriv wlan0 mp_ctx background,pkt // start continuous Packet TX
#rtwpriv wlan0 mp_ctx stop //stop continuous Packet TX
```

If you want to change the input parameter (rate 、 channel 、 txpower 、 bandwidth), please must input advance the command "**rtwpriv wlan0 mp_ctx stop**".

```
#rtwpriv wlan0 mp_stop // exit MP mode
```

If you want to continue the MP test, don't do this command.

```
#ifconfig wlan0 down // close WLAN interface
```

8. Enter To BT Test Link Mode: for combo IC (8723BS/BU)

```
#ifconfig wlan0 up //enable wlan interface
#rtwpriv wlan0 mp_start //enter MP mode
#rtwpriv wlan0 mp_setbt dlfw //Download BT path FW
#rtwpriv wlan0 mp_setbt testmode,01 //01 => enter to BT 2.0 TestMode, 02 => BT4.0
Direct Test mode, 03 => Connect Test Mode,00 =>
RF TxRx Test mode(non-link mode)
#rtwpriv wlan0 mp_setbt setgen,01 // leave BT TestMode, Reset HCI
#rtwpriv wlan0 mp_setbt down //rollback to Wifi MP Test.
```