MT793X IoT SDK

for Wi-Fi Test Tool Manual

Version: 1.2.1

Release date: 2022-07-27

Version History

Version	Date	Description
1.0	2021-07-01	Official release
1.1	2021-12-22	Add phase 2 priority 1 test command
1.2	2022-07-07	Add phase 2 priority 2 test command
1.2.1	2022-07-27	Remove some unused commands in examples

Table of Contents

1 Initialize the DUT into Test Mode

Please follow the steps below to initialize the DUT (device under test) into test mode and start TX/RX test.

1.1 Enable the WLAN Interface

Initialize Wi-Fi:

wifi on

1.2 Enter Test Mode

The Wi-Fi Test Tool is a command line tool for Wi-Fi hardware test requirement. It supports 802.11 a/b/g/n/ac and ax protocols. Before you start to test, you need to enable user test mode. You can use the following command to enter Wi-Fi test mode:

wifitest -O

2 How to Use Wi-Fi Test Tool Commands

You can find all Wi-Fi Test Tool command definitions and some brief examples in this chapter. Please search for TX /RX /EEPROM Related/Calibration Related Commands or others catalogs first and check the detailed description below.

2.1 TX/RX Common Commands

2.1.1 Channel Number

Command: -c
Description: Set channel number.
Definition (value range, 2.4G [1~14]/5G [36/40/44/48/52/56/60/64/100/…/161/165]

- **wifitest -c 1**: Channel 1
- **wifitest -c 36**: Channel 36

Note: Channels 73 to 94 in Channel Group 3 are not legal channels.

2.1.2 Set Channel Bandwidth for a/b/g/n Modes (Deprecated)

Command: -B
Description: Set channel bandwidth for 802.11a/b/g/n modes.
Definition:

- **wifitest -B 0**: Bandwidth 20
- **wifitest -B 1**: Bandwidth 40
- **wifitest -B 2**: Bandwidth 80

Note:

- -B option will be deprecated after wifitest version 1.9.1
- -B option has the same effect as the -b option after wifitest version 1.9.1

2.1.3 Set Channel Bandwidth for a/b/g/n/ac/ax Modes

Command: -b
Description: Set channel bandwidth for 802.11a/b/g/n/ac/ax modes.
Definition:

- **wifitest -b 0**: Bandwidth 20
- **wifitest -b 1**: Bandwidth 40
- **wifitest -b 2**: Bandwidth 80

2.1.4 Set TX/RX Test Period

Command: -S

Description: Set TX/RX test period in seconds.

Definition:

- **wifitest -S 0**: unlimited packets
- **wifitest -S 10**: transmit/receive packets for 10 seconds.

Note:

➢ For unlimited RX, you can use wifitest -T to stop RX and use wifitest -q 11 to retrieve RX data

2.2 TX Commands

Wi-Fi Test Tool commands are combinable. Take the TX commands for example:

wifitest -t 2 -c 100 -b 2 -Y 2 -N 7 -i 30 -S 0 -n 0 -p 17 -y 3 -# 2

- TX mode: select 11ac mode (-t 2)
- Channel: select CH100 (-c 100)
- Channel bandwidth: select 80MHz (-b 2)
- Data bandwidth: select 80MHz (-Y 2)
- Data rate: select MCS7 (-N 7)
- Packets interval: select 30 (-i 30)
- Packets transmit time: select unlimited (-S 0)
- Packets count: select unlimited (-n 0)
- TX power: select 17 dBm (-p 17)
- Antenna: select both TX0 and TX1(-y 3)
- Stream number: select MIMO 2 Stream (-# 2)

You can find more detailed description of the TX commands in the following sections.

2.2.1 Set TX Test Mode

Command: -t

Description: Set TX test mode for 802.11a/b/g modes or 802.11 n/ac/ax modes.

Definition:

- **wifitest -t 0**: a/b/g mode
- **wifitest -t 1**: n mode
- **wifitest -t 2**: ac mode
- **wifitest -t 3**: ax mode

2.2.2 Set Data Bandwidth

Command: -Y

Description: Set data bandwidth.

Definition:

- **wifitest -Y 0**: Bandwidth 20
- **wifitest -Y 1**: Bandwidth 40
- **wifitest -Y 2**: Bandwidth 80

Note: The data bandwidth is always the same as channel bandwidth.

2.2.3 Set Legacy Rate Code

Command: -R

Description: Set legacy rate code for a/b/g modes

Definition:

- **wifitest -R 1**: 1M (CCK)
- **wifitest -R 2**: 2M (CCK)
- **wifitest -R 3**: 5.5M (CCK)
- **wifitest -R 4**: 6M
- **wifitest -R 5**: 9M
- **wifitest -R 6**: 11M (CCK)
- **wifitest -R 7**: 12M
- **wifitest -R 8**: 18M
- **wifitest -R 9**: 24M
- **wifitest -R 10**: 36M
- **wifitest -R 11**: 48M
- **wifitest -R 12**: 54M

2.2.4 Set HT/VHT Rate Code

Command: -N

Description: Set MCS rate for n/ac.

Definition (Value range [0~15/32]):

- **wifitest -N 0**: MCS0
- **wifitest -N 7**: MCS7
- **wifitest -N 8**: MCS8
- **wifitest -N 9**: MCS9
- **wifitest -N 32**: MCS32

2.2.5 Set Frame Burst Interval

Command: -i

Description: Set SIFS interval.

Definition:

- **wifitest -i 30**

2.2.6 Set TX Test Packet Number

Command: -n

Description: Set TX test packet number.

Definition:

- **wifitest -n 0**: unlimited packets
- **wifitest -n 1000**: transmit 1000 packets

2.2.7 Set Preamble

Command: -s

Description: Set preamble.

Definition:

- **wifitest -s 0**: short preamble
- **wifitest -s 1**: long preamble

2.2.8 Set TX Power

Command: -p

Description: Set Wi-Fi TX power or measured Bluetooth TX power in Wi-Fi RX mode.

Definition: (Resolution: 0.5dB/step):

- **wifitest -p 17**: Set 17 dBm TX power.

Note:

1. If you use -t with -p command, it means Wi-Fi is in TX mode and the Wi-Fi TX power is the value you enter. For example, if you want Wi-Fi TX power to be -5 dBm, enter -p -5.
   - TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm
     - **wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0**
2. If you use -r with -p command, it means Wi-Fi is in RX mode and the measured Bluetooth Antenna TX power is the value you enter. For example, if the measured Bluetooth Antenna out power is -12.5dBm, enter -p -12.5.
   - RX channel 6, bandwidth 20, 1 second, RX0, Bluetooth TX power -12.5dBm
     - **wifitest -r -S 1 -c 6 -b 0 -Q 1 -p -12.5**

Note: For unlimited TX, you can use wifitest -T to stop TX and use wifitest -q 11 to access TX data

2.2.9 Set ABSpower

Command: -abspower

Description: Set Wi-Fi TX power without rate offset in Wi-Fi TX mode (Resolution: 0.5dB/step)

Value:

Wifitest --abspower 15: abs power = 15dBm

Note:

- If you use -t with --abspower command, it means Wi-Fi is in TX mode and the Wi-Fi absolute TX power without rate offset is the value you enter. For example, if you want get Wi-Fi TX power 5 dBm without rate offset, enter -- abspower 5.
    - TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, abspower 17 dbm
        - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 --abspower 17 -y 1 -Y 0

2.2.10 Set TX Path

Command: -y
Description: Set TX path
Definition:

- **wifitest -y 1**: TX0
- **wifitest -y 2**: TX1
- **wifitest -y 3**: TX0+TX1

2.2.11 Set Stream Number

Command: -#
Description: MIMO control, set stream number.
Definition:

- **wifitest -# 1**: one stream.
- **wifitest -# 2**: two streams.

Note: In VHT MIMO, use -# 2 -y 3; create two duplicate paths, use -# 1 -y 3

2.2.12 Packet Length

Command: -l
Description: Set packet length
Definition:

- **Wifitest -l 1024:** packet length 1024

Note:

1. In 7933, 24 <= packet length <= 4095,
2. -l is lower case of L
3. If you do not set -l, the default packet length is 1024

2.2.13 Set Mixed Mode or Green Filed Mode

Command: -g

Description: Set mixed mode or green field mode.
Definition:

- **wifitest -g 0**: mixed mode
- **wifitest -g 1**: green field mode

2.2.14 Set 11Ax PPDU type

Command: --axmode
Description: Set 11ax PPDU type

Definition:

- **wifitest --axmode 0**: SU (single user)
- **wifitest --axmode 1:** ER (extended rate)
- **wifitest --axmode 2:** TB (trigger based)

Note:

- This option only works if TX mode is set to 3 (-t 3)
- Refer to more examples in section "TX Test Example"

2.2.15 Set Channel Band

Command: --chband
Description: Inform driver or firmware that the current channel number belongs to which band

Definition:

- **wifitest --chband 0**: 2.4G/5G (default value for backward compatible)
- **wifitest --chband 1:** reserved
- **wifitest --chband 2**: 6G

Note:

- For backward compatible, if this option is not applied, wifitest would set chband to 0 by default
- The "channel number + chband" options combination is the unique identifier for correct channel setting for 2.4G/5G and 6G
- All 6G channel related commands shall use this option with value 2 to take effect
- TX examples:
  - 2.4G channel 1 TX example:
    - **wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 --chband 0**
  - 6G channel 1 TX example:
    - **wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 --chband 2**
- RX example:
  - 2.4G channel 1 RX example:
    - **wifitest -r -c 1 -S 5 -Q 1 -b 0 --chband 0**
  - 6G channel 1 RX example

- **wifitest -r -c 1 -S 5 -Q 1 -b 0 --chband 2**

- Other examples:
  - 2.4G channel 1 TX power compensation:
    - **wifitest -c 6 -y 1 -W 0xC1**
    - **wifitest -c 6 -y 1 -W 0xC1** --chband 0
  - 6G channel 1 TX power compensation:
    - **wifitest -c 6 -y 1 -W 0xC1** --chband 2

2.2.16 Set 11Ax LTF and GI

Command: --ltf_gi

Description: Configure 11ax LTF and GI parameter

Definition:

- **wifitest --ltf_gi 0:** (LTF: 1x/GI: 0.8u)
- **wifitest --ltf_gi 1:** (LTF: 2x/GI: 0.8u)
- **wifitest --ltf_gi 2:** (LTF: 2x/GI: 1.6u)
- **wifitest --ltf_gi 3:** (LTF: 4x/GI: 3.2u)
- **wifitest --ltf_gi 4:** (LTF: 4x/GI: 0.8u)

Note:

"--ltf_gi" option shall work when TX mode is equal to 3 (-t 3)

2.2.17 Set Payload Rule

Command: --payload_rule

Description: Set the payload rule

Definition:

- **wifitest --payload_rule 0**: Normal
- **wifitest --payload_rule 1:** Repeat
- **wifitest --payload_rule 2:** Random

Note:

- For the setting of payload pattern, refer to 2.2.18

2.2.18 Set Payload Pattern

Command: --payload_pattern

Description: Set the payload pattern

Definition:

- **wifitest --payload_pattern 0xAA**: Set the payload pattern to 0xAA

2.3 RX Commands

Wi-Fi Test Tool commands are combinable. Take RX commands for example:

wifitest -r -S 5 -c 1 -Q 1 -b 0

Set RX0 5 seconds under channel 1, and bandwidth to 20.

- RX mode (-r)
- RX receiving time: select 5 seconds (-S 5)
- RX channel: select CH1 (-c 1)
- RX path: select RX0 (-Q 1)
- Channel bandwidth: select 20MHz (-b 0)

You can find more detailed descriptions of RX commands in the following sections.

2.3.1 Set RX Path

Command: -Q

Description: Set RX path.

Definition:

- **wifitest -Q 1**: RX0
- **wifitest -Q 2**: RX1
- **wifitest -Q 3**: RX0+RX1

2.3.2 Set MU RX STA ID

Command: --muaid

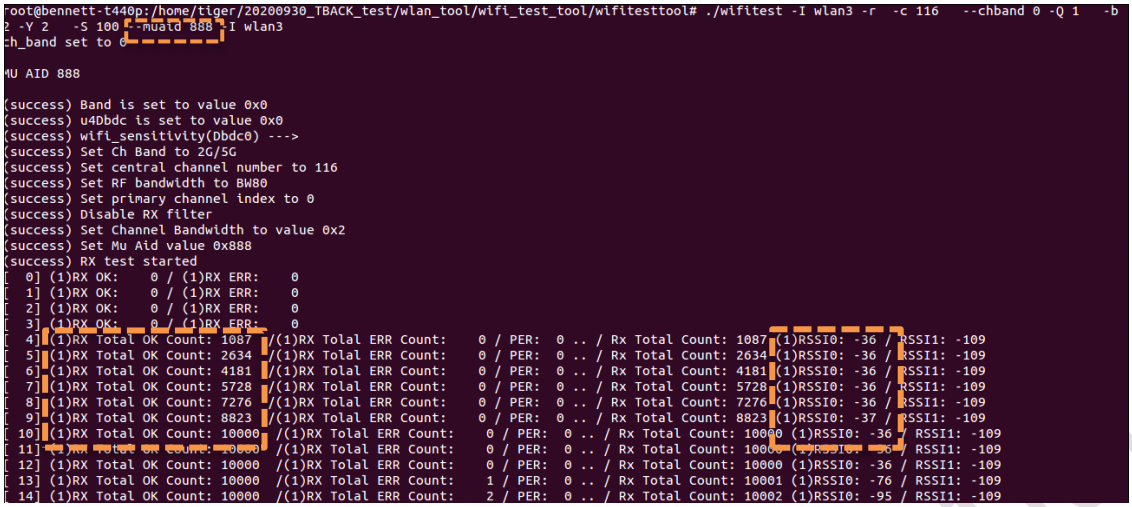
Description: Specify MU RX AID

Definition:

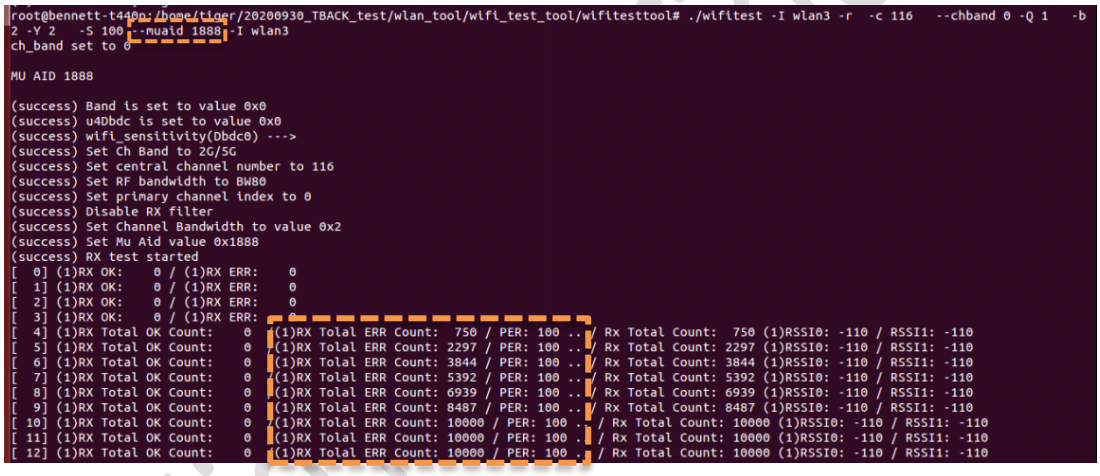
- **wifitest --muaid 888**

Note:

- Once MU AID is set correctly, you can see the “RX Total OK Count” increases and RSSI is displayed accordingly; otherwise, the RX packets are counted as “RX Total ERR Count”
- Correct MU_AID RX example:
  - “RX Total OK Count” increases correctly
  - RSSI is displayed correctly



- Wrong MU_AID example: in clean channel
  - “RX Total OK Count” does not increase
  - “RX Total ERR Count” increases instead



2.4 EEPROM Related Commands

2.4.1 Read EEPROM

Description:
Read the contents in EEPROM.bin.

Value:
wifitest -U [eeprom_address]

Example: Read eeprom.bin for field 0x58
wifitest -U 0x58

Note: To dump all eeprom.bim, please refer to 2.4.8

2.4.2 Write EEPROM

Description:
Write the contents in EEPROM.bin.

Value:
wifitest -u [eeprom_address] -v [value]

Example: Write eeprom.bin for field 0x58 with value 0x24
wifitest -u 0x58 -v 0x24

2.4.3 Read eFuse

Description:
Read eFuse contents.

Value:
wifitest -E [efuse_address]

Example: Read eFuse for the address, 0x58
wifitest -E 0x58

Note: To dump all eFuse data, please refer to 2.4.8

2.4.4 Write eFuse

Description:
Write eFuse contents.

Value:
wifitest -e [efuse address] -v [value]

Example: Write the eFuse field, 0x58, with the value, 0x24
wifitest -e 0x58 -v 0x24

2.4.5 Write EEPROM to eFuse

Description:
Write the whole eeprom.bin to eFuse.

Example:

wifitest - C -K 1

Note:
Need to add -C to -K

2.4.6 Send Buffer Mode Command

Description:
Send buffer mode command to firmware.

Example:
wifitest -J 1 //contents from eeprom.bin

Note:
This command must be used with the -C command for avoiding unnecessary troubles.
For example, wifitest -C -J 1 means open EEPROM.bin and save contents to internal buffer and set buffer mode to the firmware.

2.4.7 Check Free eFuse Block Number

Description:
Read eFuse free block number.

Value:
wifitest -Z

2.4.8 Dump All eFuse Contents

Description:
Dump all eFuse contents or eeprom.bin.

Value:
wifitest -H 1 //Dump all eFuse contents
wifitest -H 2 //Dump all eeprom.bin contents

2.5 Calibration Related Commands

2.5.1 Set Frequency Offset

Description:
Set frequency offset.

Example: Set frequency offset
wifitest -V 0x2E

Note: Frequency offset bit[7] (MSB) is valid bit; 1 / 0 = valid / non-valid

2.5.2 Set Channel Power Offset Compensation

Description:
Set the channel power offset compensation.

Value:
wifitest -W [channel power offset compensation]

Example:
a. **wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -S 5 -n 0 -p 17** // Set TX to the expected channel
b. **wifitest -c 6 -y 1 -W 0xC1**
// By setting the channel that has been set before and TX path to TX power offset compensation for 0xC1, you can map the EEPROM address for the expected channel

By setting the TX power offset compensation for 0xC1, you can map the EEPROM address for the expected channel

2.5.3 Write MAC Address

Description:
Write MAC address to eFuse fields.

Value:
wifitest -z "[B/W] [MAC address] "

Note: B: Bluetooth; W: Wi-Fi
Example:
wifitest -z "B 00:aa:b:cc:dd:ee" //Write Bluetooth MAC address
wifitest -z "W 00:11:22:33:44:55" //Write Wi-Fi MAC address

2.5.4 Set Frequency Offset Calibration Mode

Description:
Set frequency offset calibration mode to Frequency Offset mode or XTAL Trim Compensation mode.

Value:
wifitest -$ 0 //Set Frequency Offset mode to Frequency Offset mode

wifitest -$ 1 //Set Frequency Offset mode to XTAL Trim Compensation mode

Note: The command should be used with the Set Frequency Offset command -V . Refer to the Frequency Offset Calibration example in Section 4.4.

2.6 Other Commands

2.6.1 Set TSSI Mode

Description:
Enable or disable the TSSI function.

Value:
wifitest -q 24,[TSSI Mode]

Parameter:
[TSSI Mode]:
0: Disable the TSSI function.
1: Enable the TSSI function.

For example,
wifitest -q 24,1
// Set operation to 24 to enable TSSI mode, and the parameter is 1, which means the TSSI function is enabled.

2.6.2 Set Operation Mode

Description:
Set Operation mode. (Only support TSSI operation and Single tone TX now)

Value:
Wifitest -q [Operation],[Parameter1],[Parameter2],…

Parameter:
Operation:
SINGLE_TONE_TX = 22,
TSSI = 24
Parameter:
Depending on operation, there can be one or more parameters.

For example,
wifitest -q 24,0

// Set operation to 24 to enable the TSSI mode, and set the parameter to 0, which means the TSSI function is disabled.

wifitest -q 22 -* 0-0-10-10-10-10
// Set ToneBW to DC
// Set ToneType to single
// Set ToneRFGain to 10
// Set ToneDigitalGain to 10
// Set ToneDcOffsetI to 10
// Set ToneDcOffsetO to 10
// Set operation to 22 to enable Tone TX, and no operation parameter is set.

2.6.3 Read Software Version

Description:
Get software version

Value:
wifitest –version

2.6.4 Measure Power from eFuse/BufferMode Setting

Description:
Measure power from eFuse / BufferMode setting without -p / --abspower
Power is “eFuse/BufferMode channel power setting” + “rate offset”

Note:
If you have not used -p / --abspower after the device powers on, you can measure eFuse/BufferMode power setting without -p/--abspower

- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power is “eFuse/BufferMode channel power setting” + “rate offset”

wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -y 1 -Y 0

2.6.5 Open EEPROM File and Save Contents to Buffer

Description:
Open EEPROM file and save content to internal buffer.

Value:
wifitest -C

Note:

This command is used with the -J command for avoiding unnecessary troubles.
For example, wifitest -C -J 1 means open EEPROM.bin and save contents to internal buffer and set buffer mode to the firmware.

2.6.6 Read CR

Description:
Read CR value

Value:
wifitest -M [CR_address]

Example: Read CR for address 0x81021210
wifitest -M 0x81021210

Note:
RF CR needs to use 0x9990XXXX for WF0, 0x9991XXXX for WF1
Example:
Read RF CR 1030 WF0: **wifitest -M 0x99901030**

2.6.7 Write CR

Description:
Write CR contents.

Value:
wifitest -w [CR_address] -v [value]

Example: Write CR 0x81021210 with value 0x730470c0
wifitest -w 0x81021210 -v 0x730470c0

Note:
RF CR needs to use 0x9990XXXX for WF0, 0x9991XXXX for WF1
Example:
Write RF CR 1030 WF0 with value 0xacf0f1b0: wifitest -w 0x99901030 -v 0xacf0f1b0

2.6.8 Error Code Detection

a. Conflict command detection:
E.g. Write/Read eFuse together, Start/Stop TX together, --stoplimit/tx together etc.
b. Incomplete (meaningless) command detection:
E.g. wifitest -c without tx, wifitest -K without -C etc.

c. Bandwidth/modulation/channel error setting detection:

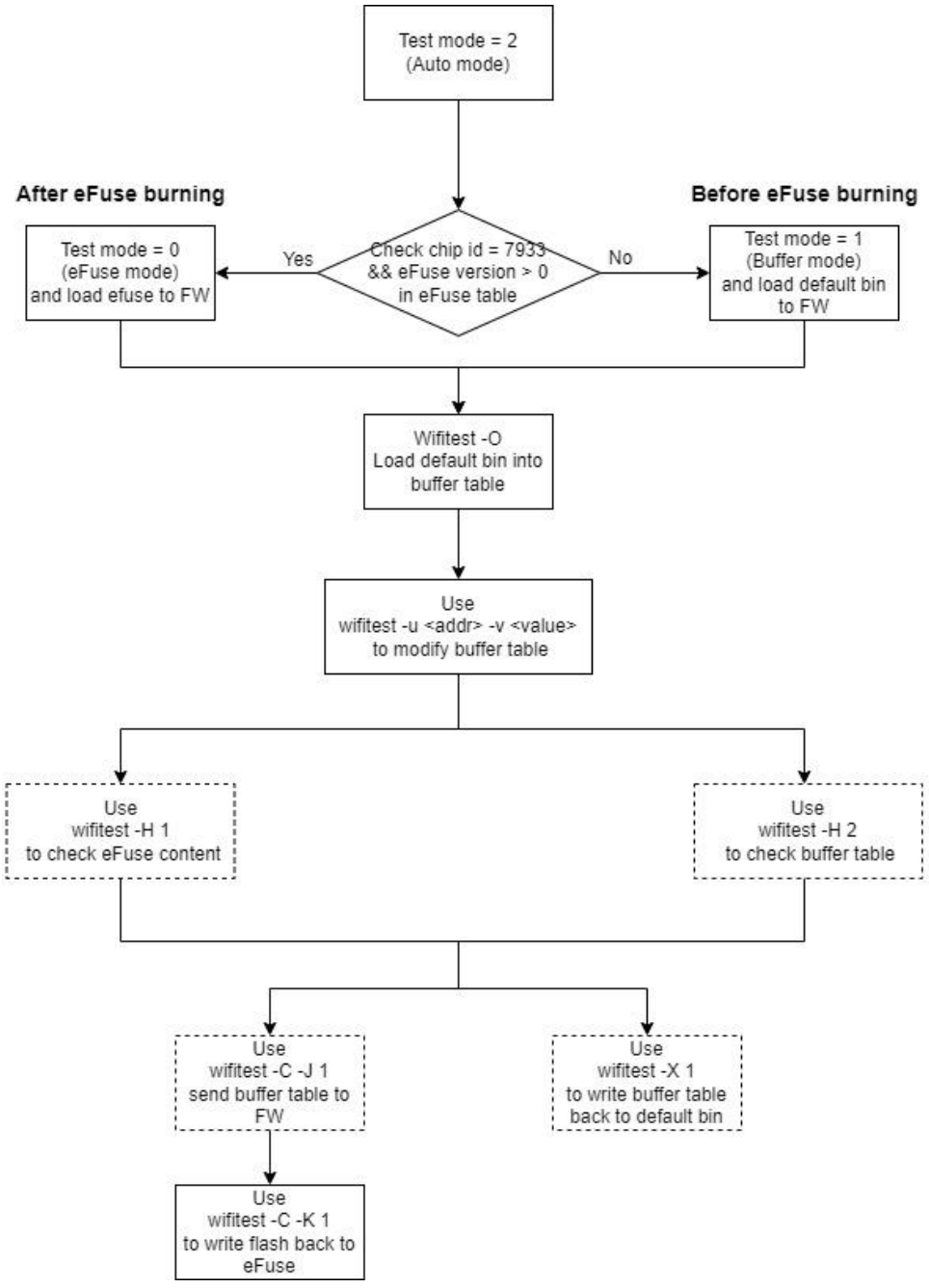
   E.g. set a/b/g modes with bandwidth 40up, Use illegal channel Group etc.

d. Write without value:

   E.g. wittiest -e/-u/-w [address] without -v [value]

3 Wi-Fi Test Tool Flow Chart

3.1 Whole Architecture



Note:

The dashed line represents optional.

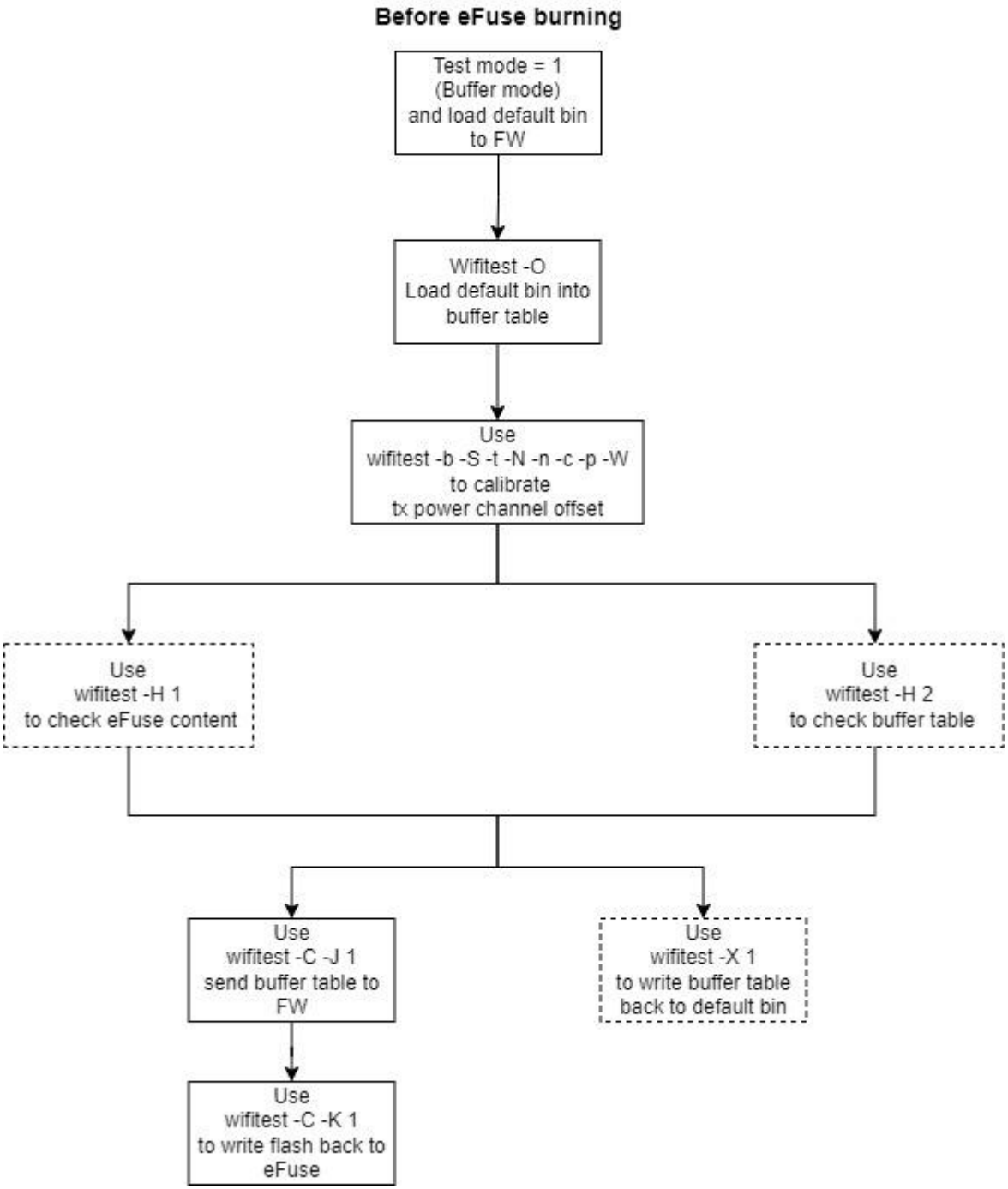
The default test mode is auto mode. Auto mode means that the final mode is determined by conditions.

Before burning content into eFuse, chip ID and eFuse version will be 0. The mode will be buffer mode.

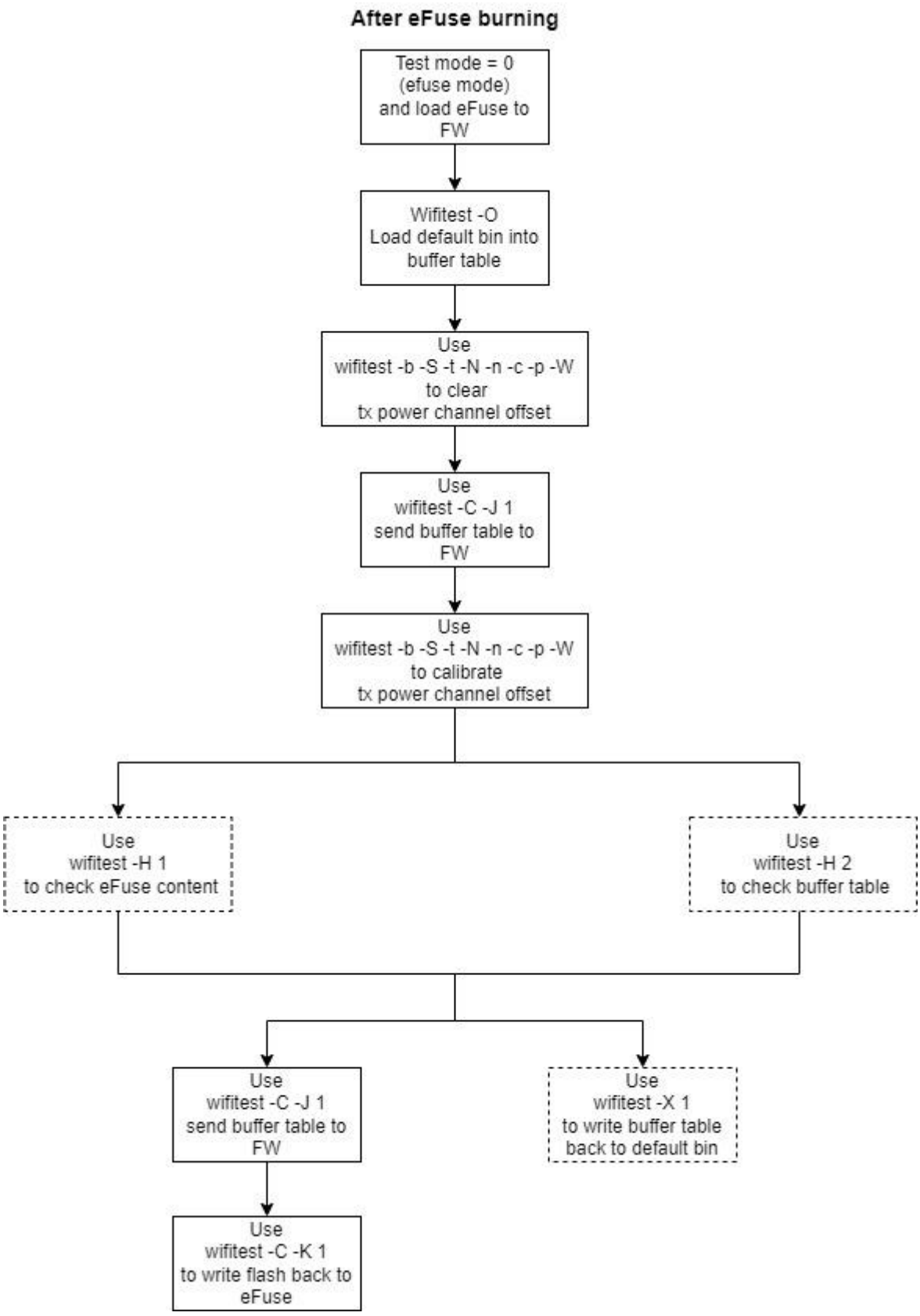
wifitest -z "W XX:XX:XX:XX:XX:XX" can write MAC address back to eFuse directly.

The buffer table modified by wifitest -u takes effect after calling wifitest -C -J 1

3.2 Example Process before eFuse Burning



3.3 Example Process after eFuse Burning



4 Wi-Fi Test Tool Command Examples

4.1 TX Test Example

[2.4G/5G]

- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dBm
  - **wifitest -t 1 -c 1 -N 7 -b 0 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0**

    - TX mode: select 11HT mode (-t 1)
    - Channel: select CH1 (-c 1)
    - Data rate: select MCS7 (-N 7)
    - Channel bandwidth: select 20MHz (-b 0)
    - Set Mixed mode (-g 0)
    - Data bandwidth: select 20MHz (-Y 0)
    - Random back off speed: select 30 (-i 30)
    - Packets transmit time: select 10 seconds (-S 10)
    - Packets count: select unlimited (-n 0)
    - TX power: select 17 dBm (-p 17)
    - Antenna: select TX0 (-y 1)

- TX channel 6, bandwidth 20, MCS7, TX0+TX1, 11n Long preamble, Packet unlimited, 10 seconds, power 17 dbm
  - **wifitest -t 1 -c 6 -N 7 -b 0 -Y 0 -g 0 -i 30 -S 10 -n 0 -p 17 -y 3**

- TX channel 6, bandwidth 20, MCS8, TX0+TX1, 11n Long preamble, Packet unlimited, 10 seconds, power 17 dbm
  - **wifitest -t 1 -c 6 -N 8 -b 0 -Y 0 -g 0 -i 30 -S 10 -n 0 -p 17 -y 3**
  - HT TX MIMO depends on rate. Rate higher than MCS8 means MIMO. So you must use the -y 3 command to turn on WF0/FW1

- TX channel 100, bandwidth 40, MCS7, TX1, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm
  - **wifitest -t 1 -c 100 -N 7 -b 1 -Y 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 2**

- TX channel 100, bandwidth 80, MCS0, TX0+TX1, Packet unlimited, 10 seconds, power 17 dbm, MIMO
  - **wifitest -t 2 -c 100 -N 0 -b 2 -Y 2 -i 30 -S 10 -n 0 -p 17 -y 3 -# 2**

- TX channel 100, bandwidth 80, MCS0, TX0+TX1, Packet unlimited, 10 seconds, power 17 dbm
  - **wifitest -t 2 -c 100 -N 0 -b 2 -Y 2 -i 30 -S 10 -n 0 -p 17 -y 3**
  - VHT TX with -y3 but without -# 2 means to duplicate two paths

[HE TX]

- 11ax SU TX, TX channel 100, MCS0, bandwidth 20, TX0+TX1, Packet unlimited, 10 seconds, power 17 dbm, LDPC enabled
  - **wifitest -t 3 --axmode 0 -c 100 -N 0 -b 0 -Y 0 -y 3 -n 0 -S 10 -p 17 -L**

- 11ax ER TX, TX channel 100, MCS0, bandwidth 80, TX1, Packet unlimited, 10 seconds, power 17 dbm, LDPC enabled
  - **wifitest -t 3 --axmode 1 -c 100 -N 0 -b 2 -Y 2 -y 2 -n 0 -S 10 -p 17**

- 11ax TB TX, TX channel 100, bandwidth 20, TX0, Packet unlimited, 100 seconds, power 18 dbm
  - **wifitest -t 3 --axmode 2 -c 100 -b 0 -Y 0 -y 1 -n 0 -S 100 -p 18**

[6G TX]

- 11n TX 6G channel 6, bandwidth 20, MCS7, TX0+TX1, 11n Long preamble, Packet unlimited, 10 seconds, power 17 dbm
  - **wifitest -t 1 -c 6 -N 7 -b 0 -g 0 -i 30 -S 10 -n 0 -p 17 -y 3 -Y 0 --chband 2**

4.2 RX Test Example

[2.4G/5G]

- RX channel 1, bandwidth 20, 10 seconds, RX0
  - **wifitest -r -c 1 -b 0 -S 10 -Q 1**

- RX channel 6, bandwidth 40, 10 seconds, RX1
  - **wifitest -r -c 6 -b 1 -S 10 -Q 2**

- RX channel 100, bandwidth 80, 10 seconds, RX0 + RX1
  - **wifitest -r -c 100 -b 2 -S 10 -Q 3**

[MU_RX]

- RX MU packets, channel 100, bandwidth 20, 100 seconds, RX0, MUAID 888
  - **wifitest -r -c 100 -b 0 -S 100 -Q 1 --muaid 888**

[6G]

- RX 6G channel 1, bandwidth 20, 10 seconds, RX0
  - **wifitest -r -c 1 -b 0 -S 10 -Q 1 --chband 2**

4.3 TX Power Channel Offset Calibration

Before Verification Flow

1. Modify wifi.cfg for EfuseBufferModeCal to 0 before driver initialization
2. wifitest -O // enter test mode
3. wifitest -Z //check free block numbers

Channel Compensation Calibration Flow

4. wifitest -C -J 1 // Send buffer mode command to firmware
5. wifitest -t 0 -c [channel number] -R [legacy rate] -b [bandwidth] -s [preamble] -g [fixed [data bandwidth] -p [power_value] --chband [2.4G,5G/6G]
   // Set TX to the expected channel, and target power = power_value + rate offset. You can check the difference between output power and target power to decide compensation value
6. wifitest -c channel number -y [TX Path] -W [offset, example 0xC1] --chband [2.4G,5G/6G]
   // Set channel power offset compensation
7. Repeat Steps 5 and 6 until you finish calibrating the power of all channels

Final Stage

8. wifitest -C -K 1 // open eeprom.bin file and write eeprom.bin to the whole eFuse table
9. wifitest -O

// If you restart the system and bring up the Wi-Fi Test Tool again, you need to enter the test mode // first.

10. write MAC address for eFuse (Bluetooth and Wi-Fi)

wifitest -z “B 00:aa:b:cc:dd:ee” //Write Bluetooth MAC address

wifitest -z “W 00:11:22:33:44:55” //Write Wi-Fi MAC address

4.4 Frequency Offset Calibration

Before Verification Flow

1. Modify wifi.cfg for EfuseBufferModeCal to 0 before driver initialization
2. wifitest -O // enter test mode
3. wifitest -Z // check free block numbers

Note: Step 1 to Step 3 are the same as TX power Channel Offset Calibration example

Channel Compensation Calibration Flow

4. wifitest -C -J 1 // Open eeprom.bin and send buffer mode command to firmware
5. wifitest -t 0 -c [channel number] -R [legacy rate] -b [bandwidth] -s [preamble] -g [fixed [data bandwidth] // Set TX to the expected channel
6. wifitest -$ 0 -V 0xa3
   - Set frequency offset calibration mode to absolute mode.
   - Set frequency offset value to 0xa3.
   - Write 0xa3 to frequency offset address in eeprom.bin.
7. wifitest -$ 1 -V 0xa8
   - Set frequency offset calibration mode to compensation mode.
   - Set frequency offset value to 0xa8.
   - Write [value] to XTAL trim compensation address in eeprom.bin. (The value is compared to the default frequency offset address value in eeprom.bin)
8. Repeat Step 6 or 7 until you finish calibrating the power of all channels

Note: In Step 6, you cannot calibrate the value to over 64 or you will get an invalid value.

Final Stage

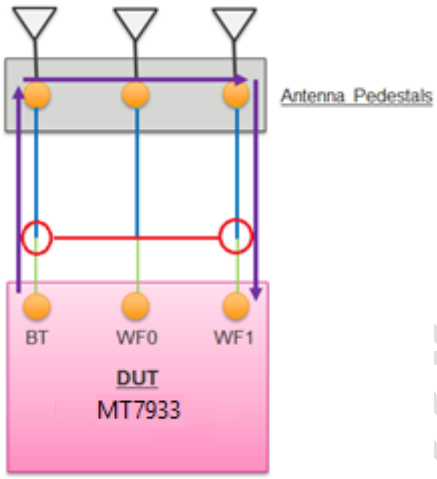
9. wifitest -C -K 1 // open eeprom.bin file and write eeprom.bin to the whole eFuse table
10. wifitest -O
// If you restart the system and bring up the Wi-Fi Test Tool again, you need to enter the test mode // first.
11. Write MAC address for eFuse (Bluetooth and Wi-Fi)
wifitest -z “B 00:aa:b:cc:dd:ee” //Write Bluetooth MAC address
wifitest -z “W 00:11:22:33:44:55” //Write Wi-Fi MAC address

Note: Step 9 to Step 11 are the same as TX power Channel Offset Calibration example

4.5 Auto Isolation Detection in RX Test

Description: Measure Bluetooth and Wi-Fi antenna isolation in WF RX Test.

Antenna Isolation = BT Antenna out power - WF Antenna in power, which means the isolation of BT antenna out power to WF antenna in power as indicated by the two red circles in the figure below.



There are two examples below:

- RX channel 6, bandwidth 20, 1 second, RX0
  - wifitest -r -S 1 -c 6 -b 0 -Q 2 --isodetect

```
root@asus-A8He:/home/asus/Documents/7668/wifitesttool# ./wifitest -r -n1 -c6 -B0 -Q2 -Y0 --isodetect
-I wlan218
(success) Set central channel number to 6
(success) Set bandwidth to BW20
(success) Disable RX filter
(success) Set Channel Bandwidth to value 0x0
(success) RX test started
BT Tx Power : -10.0 dBm
(success)Auto Isolation Value 21.5
[  0] (1)RX OK Count:    9  /(1)RX ERR Count:    6 / PER: 40 .. /Rx Current Total Count:   15 / Rx Tc
tal Count:    9 (1)RSSI0: -81 / RSSI1: -110
[  1] (1)RX OK Count:  382  /(1)RX ERR Count:  189 / PER: 33 .. /Rx Current Total Count:  571 / Rx Tc
tal Count:  391 (1)RSSI0: -44 / RSSI1: -110
```

  - BT TX power is -10.0 dBm; isolation value is 21.5 dB.
  - Use the default BT TX power setting as in Note (1).

- RX channel 6, bandwidth 20, 1 second, RX0, measured BT TX power = -12 dBm (Resolution: 0.5dB/step)
  - wifitest -r -S 1 -c 6 -b 0 -Q 2 --isodetect -p -12

```
root@asus-A8He:/home/asus/Documents/7668/wifitesttool# ./wifitest -r -n1 -c6 -B0
 -Q2 -Y0 --isodetect -I wlan218 -p-12
(success) Set central channel number to 6
(success) Set bandwidth to BW20
(success) Disable RX filter
(success) Set Channel Bandwidth to value 0x0
(success) RX test started
BT Tx Power : -12.0 dbm
(success)Auto Isolation Value 20.5
[  0] (1)RX OK Count:   14  /(1)RX ERR Count:    7 / PER: 33 .. /Rx Current Tota
l Count:   21 / Rx Total Count:   14 (1)RSSI0: -47 / RSSI1: -110
[  1] (1)RX OK Count:  336  /(1)RX ERR Count:  136 / PER: 28 .. /Rx Current Tota
l Count:  472 / Rx Total Count:  350 (1)RSSI0: -77 / RSSI1: -110
```

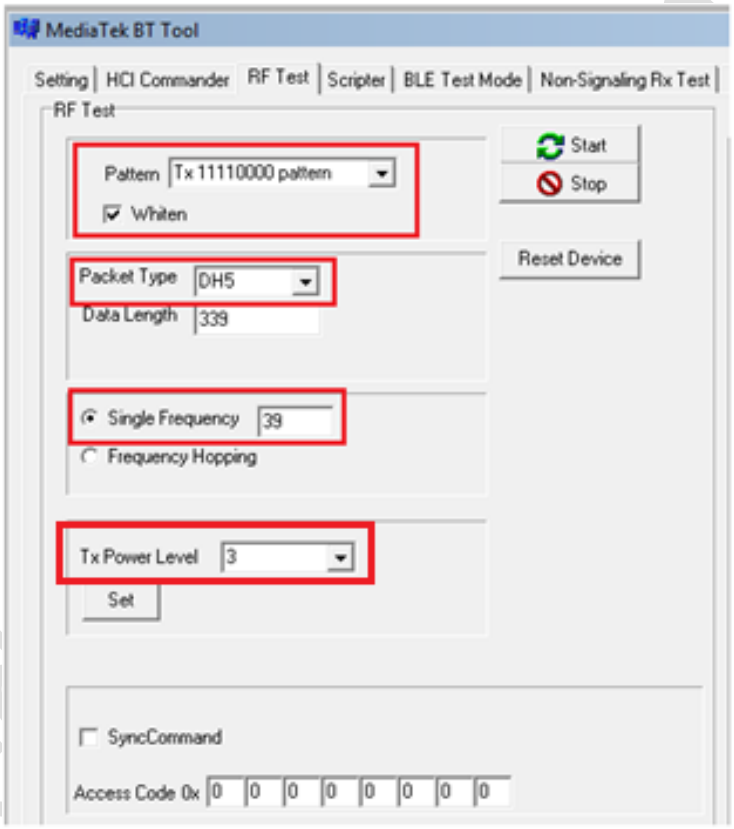
  - BT antenna out power is -12.0 dBm; isolation value is 20.5 dB.
  - Use measured BT TX power with the -p command.
  - Please check Notes (2) and (3).

Note

1) If you do not use the measured BT antenna out power via the -p command, by default the tool sets the BT TX power according to your eFuse address setting.
   - BT TX Power: level 3 (by default -6 dBm)
   - eFuse Address
     - 0x383h (For more details, please check eFuse content)
       - Field [4:5] : Sub-Level of BR TX Power control and 1dB per step.
       - Field [6:7] : BR and EDR Power Mode selection
   - The default BT Antenna TX power is:
     - BT TX Power level 3 - [Sub-level Power] + [BR or EDR table] - [Front-end loss]
     - E.g. sub-level 1, BR and EDR Power Mode = 1, front-end loss = 1dB
       - BT TX power = -6 -1 + 0 - 1 = -8 dBm

- E.g. sub-level 0, BR and EDR Power Mode = 0, front-end loss = 1dB
  - BT TX power = -6 -0 + 3 - 1 = -4 dBm

2) If you use the measured BT antenna out power via the -p command, the antenna isolation is the BT Antenna out power you enter minus WF Antenna in power. (Resolution: 0.5dB/step)
3) How to measure BT Antenna out power (with MediaTek BT Tool)?
   - Step 1. Use boots and enter RF Test
   - Step 2. Set BT Non-signaling TX
     - Pattern: TX 11110000 pattern
     - Packet Type: DH5
     - Single Frequency: W-Fi Central Frequency + 4MHz (e.g. Wi-Fi@CH6(2437MHz), BT Frequency: 2441 MHz). Set BT Single Frequency to 2441-2402 = 39
     - TX Power Level: 3



   - Step 3. Use CBT to measure BT antenna TX power.
4) How to measure BT Antenna out power (with boots)?
   - Use the same configuration as introduced above, but use boots:
     - ./boots -c reset
     - ./boots -c pwrlvl 3
     - ./boots -c rft -p 09 -c 39 -t 0f

4.6 Continuous Wave TX

Description: Continuous Wave TX.

The command is the same as TX Test example, but with continuous wave TX command -m.

- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to Normal mode
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 0
- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to OFDM STF
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 1
- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to OFDM LF
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 2
- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to Payload OFDM CCK
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 3
- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to CCK PI // 2
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 4
- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to CCK
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 5
- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to DEBUG MODE
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 6
- TX channel 1, bandwidth 20, MCS7, TX0, 11n, Long preamble, Packet unlimited, 10 seconds, power 17 dbm, Continuous wave mode set to DPD CAL
  - wifitest -t 1 -c 1 -N 7 -b 0 -s 1 -g 0 -i 30 -S 10 -n 0 -p 17 -y 1 -Y 0 -m 7

4.7 FFT Example

- FFT channel 6, RX0, bandwidth 20
  - wifitest --fft -c 6 -Q 1 -b 0 -Y 0

  Output file: freq_pwr_ch6_bw20_wf0.csv

- FFT channel 36, RX1, bandwidth 40
  - wifitest --fft -c 36 -Q 2 -b 1 -Y 1

  Output file: freq_pwr_ch36_bw40_wf1.csv

- FFT channel 149, RX0 + RX1, bandwidth 80
  - wifitest --fft -c 149 -Q 3 -b 2 -Y 2

Output file: freq_pwr_ch149_bw80_wf0.csv, freq_pwr_ch149_bw80_wf1.csv

PHY	TX Command	Description
b	wifitest -t 0 -c 6 -R 6 -b 0 -s 0 -g 0 -i 30 -S 0 -n 0 --abspower 21.5 -y 1 -Y 0 -# 1	11b, Ch6, CCK-11, BW20 TX0, 21.5dBm
a/g	wifitest -t 0 -c 6 -R 12 -b 0 -s 1 -g 0 -i 30 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1	11a/g, Ch6, OFDM-54 BW20, TX0, 15dBm
n	wifitest -t 1 -c 6 -N 7 -b 0 -s 0 -g 0 -i 30 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1	11n 2.4G , Ch6, MCS7 BW20, TX0, 15dBm
n	wifitest -t 1 -c 100 -N 7 -b 0 -s 0 -g 0 -i 30 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1	11n 5G , Ch100, MCS7 BW20, TX0, 15dBm
ac	wifitest -t 2 -c 6 -N 8 -b 0 -s 0 -g 0 -i 30 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1	11ac , Ch6, MCS8 BW20, TX0, 15dBm
ac	wifitest -t 2 -c 100 -N 8 -b 0 -s 0 -g 0 -i 30 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1	11ac , Ch100, MCS8 BW20, TX0, 15dBm
ax	wifitest -t 3 --axmode 0 -c 6 -b 0 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1	11ax 2.4G , Ch6, MCS8 BW20, TX0, 15dBm, SU
ax	wifitest -t 3 --axmode 0 -c 100 -b 0 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1 --ltf_gi 1	11ax 5G , Ch100, MCS8 BW20, TX0, 15dBm, SU (LTF:2x/gi:0.8u)
ax	wifitest -t 3 --axmode 0 -c 13 -N 8 -b 0 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1 --chband 2 --ltf_gi 1	11ax 6G , Ch13, MCS8 BW20, TX0, 15dBm, SU (LTF:2x/gi:0.8u)
0		
ax	wifitest -t 3 --axmode 2 --ltf_gi 2 -c 100 -b 0 -S 0 -n 0 --abspower 15 -y 1 -Y 0 -# 1 --ru_param "1-0-4-1011-0-37-0-1-1-1-32-0-1"	11ax 2.4G/5G/6G, Ch100 MCS8, BW20, TX0 15dBm, partial RU
	RX Command	Description
all	wifitest -r -c 120 -b 0 -S 0 -Q 1	11a/b/g/n/ac, SU, BW20 Ch120

ax	wifitest -r -c 120 -b 0 -S 0 -Q 1 --muaid 888	11ax, MU, Ch100, BW20
all	wifitest -q 11	Calculate RX OK count

Command				Note
	Description	Command Number	Description	
-c	Channel setting	6	channel 6	
-b	Set channel bandwidth for a/b/g/n/ mode	1	BW20	
-y		1	TX0	
-#		1	one stream	
-t		0	a/b/g mode	
		1	n mode	
		2	ac mode	
		3	ax mode	
-Y		0	BW20	
-R	Legacy rate code	0~12	CCK1M~54M	wifitest -R 1:1M(CCK) wifitest -R 2:2M(CCK) wifitest -R 3:5.5M(CCK) wifitest -R 4:6M wifitest -R 5:9M wifitest -R 6:11M(CCK) wifitest -R 7:12M wifitest -R 8:18M wifitest -R 9:24M wifitest -R 10:36M wifitest -R 11:48M wifitest -R 12:54M
-N	HT/VHT/SU rate code	0~9	MCS0~MCS9	
-S	Tx/Rx test period	0	unlimited packets	
		10	tx/rx packets for 10 seconds	
-n	Tx test packet numer	0	unlimited packets	
		1000	tx 1000 packets	
-s	Set preamble	0	short	
		1	long	
-p	Set Tx power		Tx power(dBm) W/ rate offset 0.5/step	rate offset setting from EEPROM
--abspower	Set Tx power		Tx power(dBm) W/O rate offset 0.5/step	
-Q		0	RX0	
--chband		0	2.4G/5G	

	Set channel band	1	6G	
--axmode		0	SU	
		1	ER	
		2	RU	
--ltf_gi		0	(LTF:1x/gi:0.8u)	
		1	(LTF:2x/gi:0.8u)	
		2	(LTF:2x/gi:1.6u)	
		3	(LTF:4x/gi:3.2u)	
		4	(LTF:4x/gi:0.8u)	
--muaid		888	specify MU Rx AID	MTK:888
				Amazon:10

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