Radicom Research, Inc.

Designer's Guide for the

WiFiHU52

(USB WiFi Adapter Series)

WiFiHU52E

WiFiHU52E-T

RoHS Compliant

Dec 12, 2024

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Introduction to the WiFiHU52 to USB Products

The Radicom Research WiFiHU52 series is a secure WiFi module that easily adds connectivity to virtually any processor-based device. The module is IEEE802.11 b/g/n/ac™ 1T1R WLAN with USB 2.0 interface.

With reliable transmissions, this USB Wireless Ethernet (WLAN) device has extended transmission and receiving ranges with good minimum sensitivity. For legacy compatibility, Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK) and OFDM baseband processing are included to support all IEEE 802.11a, 802.11b and 802.11g data rates. The compatible coding rate of 1/2, 2/3, 3/4, and 5/6 provides up to 433.3Mbps.

The WiFiHU52 family supports fast receiver Automatic Gain Control (AGC) with synchronous and asynchronous control loops among antennas, antenna diversity functions, and adaptive transmit power control functions to obtain better performance in the analog portions of the transceiver.

The WiFiHU52 series feature Soft AP support. It can turn your Internet connected PC or Laptop into a WiFi Wireless Access Point. So any nearby WiFi devices such as iPhone, iPod, PDA, can connect to the Internet through your sharing.

The WiFiHU52 protects the host with compliance of WPA/WEP/WEP2 security protocols. The module is power efficient.

Features

- Designed to meet IEEE 802.11a/b/g/n/ac compatible WLAN
- Extended temperature available
- Support 2.4GHz and 5Ghz band channels
- Support 802.11ac 1x1,Wave-2 compliant
- Maximum PHY data rate up to 86.7Mbps using 20MHz bandwidth, 200Mbps using 40MHz bandwidth, and 433.3Mbps using 80MHz bandwidth.
- Backward compatible with 802.11a/b/g devices while operating at 802.11n data rates
- Backward compatible with 802.11a/n devices while operating at 802.11ac data rates.
- USB 2.0 hot swappable interface
- Compatible with USB2.0 host controllers
- Fast receiver Automatic Gain Control (AGC)
- WiFi security using WEP, WPA and WPA2

- 2 U.FL TX/RX antenna ports
- Use carry board to support single antenna
- LED output for visual monitoring of link and activity
- Support Windows Win7. Win10.Win11
- Support Linux

Approvals

- FCC/IC/CE certified
- SAR
- RoHS 3 Compliant

We have done WiFi-related certification. If the customer uses the Bluetooth part by himself, it may involve violation of local and SIG laws and regulations. Radicom will not be responsible for it and will be excluded from the warranty

WiFiHU52 Ratings

Ratings @ 25° C

Table 1 Ratings table

Parameter	Min	Typical	Max	Units
Operating Temperature	-40	-	85	ºC
Relative Humidity (non-condensing)	5	-	95	%
USB Voltage Requirement	4.75	5	5.25	VDC
Power Consumption	395(2.4G/5G) 420(ac)			mW
Current Consumption	79(2.4G/5G) 84(ac)			mA

Physical Description

Table 2 Physical specification table

WiFiHU52E Module Size & Weight	1.41” x 2.65” x 1.04” (35.8 x 67.4 x 26.4mm) 30.37g
WiFiHU52E-T Module Size & Weight	1.41” x 9.34” x 1.04” (35.8 x 237.4 x 26.4mm) 41.72g

Ordering Information

Table 3 Product information table

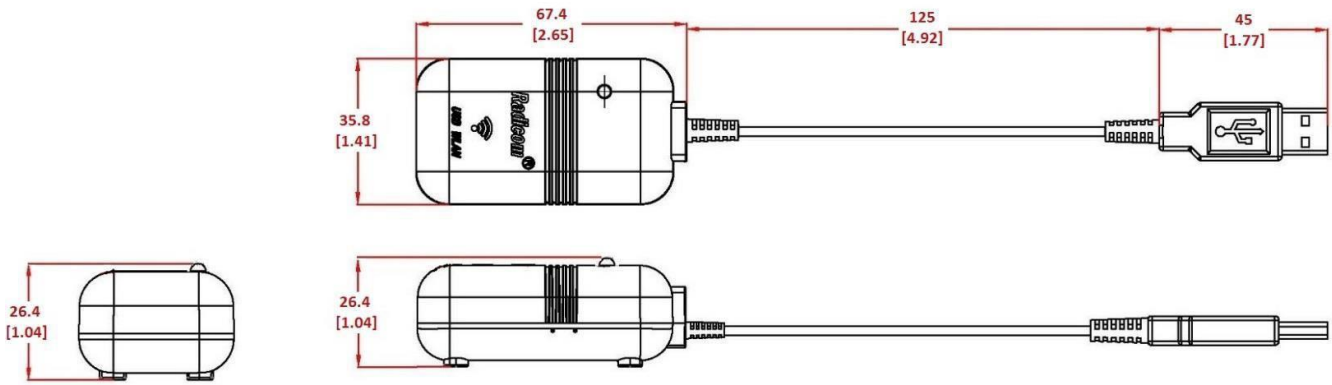
Model Number	Description
WiFiHU52E	WiFi module in Plastic Enclosure with embedded on-board antennas and mini USB A connector.
WiFiHU52E-T	WiFi module in Plastic Enclosure with embedded on-board antennas with pig tail USB A type cable.

Connecting the WiFiHU52E or WiFiHU52E-T to Your System

Prior to connecting the WiFiHU52 to a Windows, the drivers should be installed. The WiFiHU52E or WiFiHU52E-T are designed for easy connection to any standard USB Port and wireless network. Connect one end of the USB cable into the USB connector on the WiFiHU52E or WiFiHU52E-T and the other into any available USB receptacle on your computer. The WiFiHU52E or WiFiHU52E-T “Hot Swap-able” interface allows you to plug or unplug the even when the computer is on. If using Windows, load the provided drivers. The WiFiHU52E or WiFiHU52E-T is now ready for use.

WiFiHU52E and WiFiHU52E-T Mechanical Diagram

TopView: Unit: mm [inch]



※**Note:** WiFiHU52E does not have USB pigtail

WiFiHU52 Regulatory Domain Channels

Country		Channels	
2G	5G	2G	5G
US 2G	US_5G	1~11	36~48,149~165
Worldwide 13	Europe 5G	1~13	36~48
Japan 2G	Japan 5G	1~13,14	36~48
Worldwide 13	Korea 5G	1~13	36~48, 149~165
Worldwide 13	US w/o DFS Channels	1~13	36~48, 149~165
Worldwide 13	India, Mexico	1~13	36~48, 52~64,149~165
Worldwide 13	Venezuela	1~13	36~48, 52~64,149~161
Worldwide 13	China	1~13	149~165
Worldwide 13	Israel	1~13	36~48, 52~64
US 2G	US/Canada	1~11	36~48,149~165
Worldwide 13	Australia, New Zealand	1~13	36~48, 149~165
Worldwide 13	Russia	1~13	36~48, 149~165
Japan 2G	Japan(W52,W53)	1~13,14	36~48, 52~64
US 2G	Taiwan	1~11	149~165
US 2G	Taiwan w/o DFS	1~11	149~165
Global domain	5G_NULL	1~13	NA
Europe 2G	Europe 5G w/o DFS	1~13	36~48
US 2G	US w/o DFS	1~11	36~48, 149~165
US 2G	Taiwan 5G w/o DFS, band4 only	1~11	149~165
Worldwide 13	Australia, New Zealand	Ch1~13	Ch36~48, Ch149~165 (o/w Weather radar)
US 2G	Latin America	1~11	Ch149~161
Worldwide 13	US_5G	1~13	36~48, 149~165

WiFiHU52 USB Quick Start Guide

This chapter is shown how to quick start WiFiHU52 under Windows and Linux system. WiFiHU52 supports WiFi (2.4G, 5G). Under Windows 7, user needs to manual install WiFi driver. Under Linux system, user need to manual install WiFi.

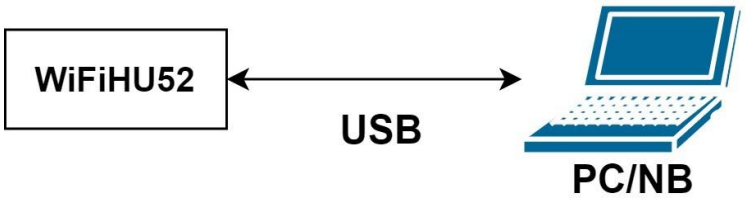


Figure 1 Setup WiFiHU52 test environment

1. For Windows 7 system

Under Windows 7 system, WiFi need to manual install driver. Follow as below steps to install and check driver.

※Note: In this example, Windows version is “Windows 7 Enterprise x32”

1.1 WiFi

Follow as below steps to install driver WiFi of WiFiHU52.

Step 1: Driver: Please contact the manufacturer for driver software.

Step 2: Decompress driver “.zip” file, and execute”Setup.exe” installshield.

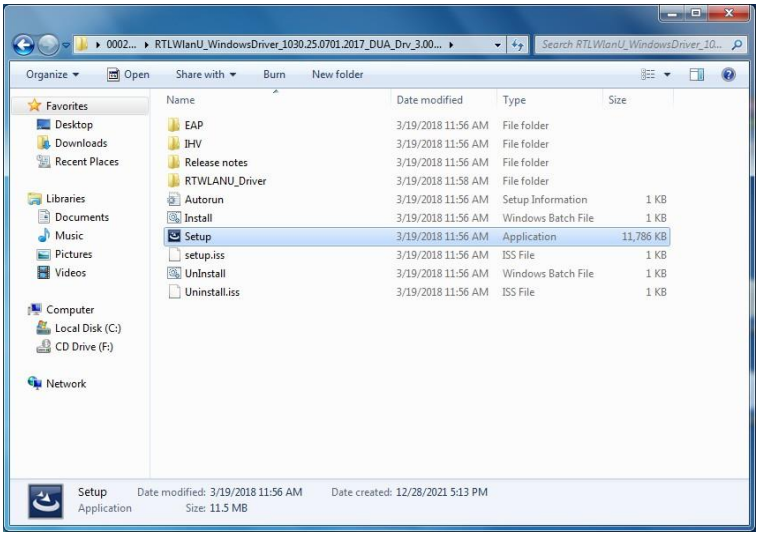


Figure 2 Execute “Setup” installshield

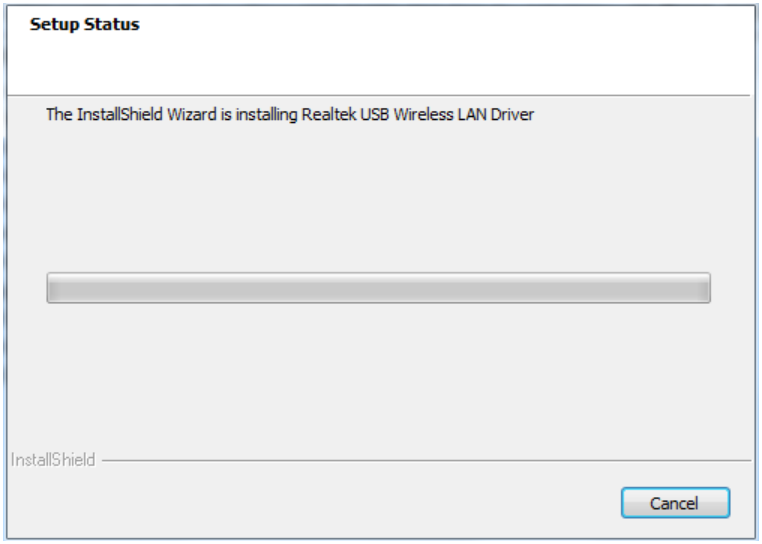


Figure 3 Installing WiFi driver

Step 3: Windows will now install the driver. This may take a few moments. After installing, select “yes, I want to restart my computer later” and click “Finish” button, The PC/NB will reboot.

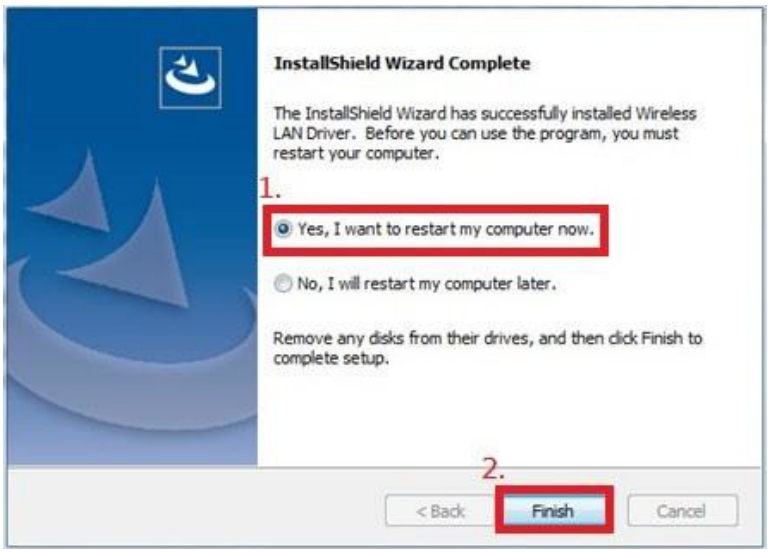


Figure 4 Complete to install WiFi driver

Step 4: Open "**Control Panel > Programs > Programs and Features**" and check if the driver is installed.

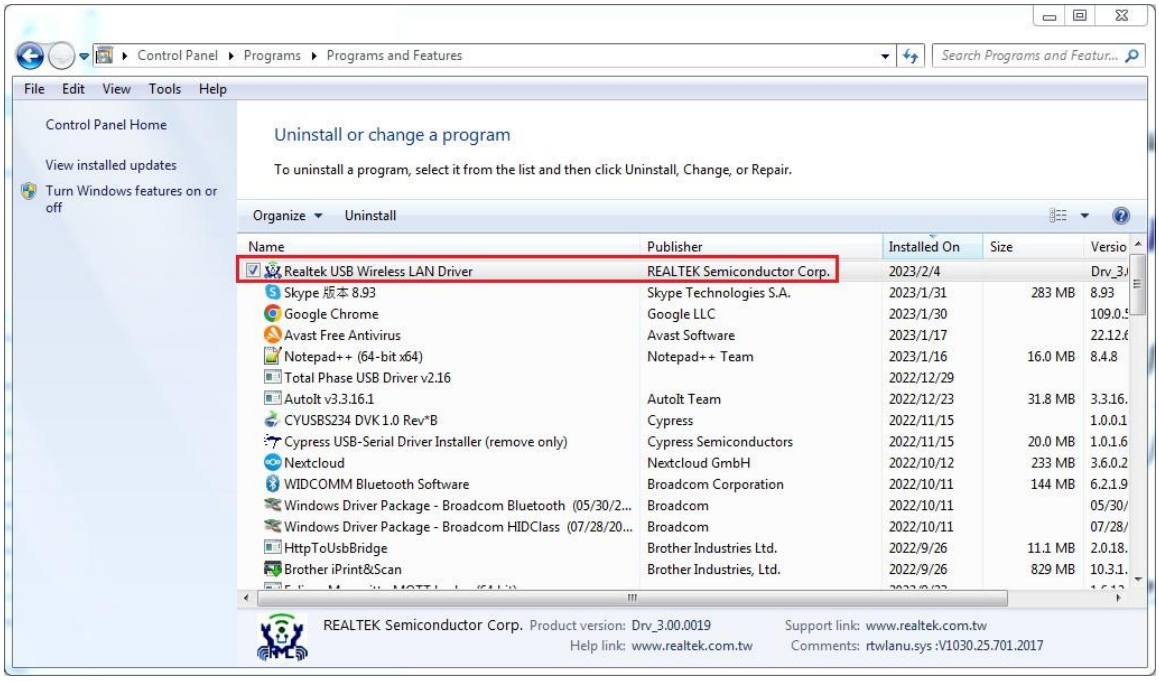


Figure 5 Initialize WiFi driver

Step 5: Open "**Control Panel**" > "**Network and Internet**" > "**Network Connections**" to check WiFiHU52 NIC (Network interface card).

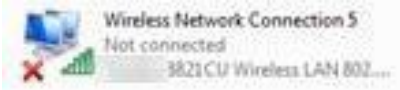


Figure 6 WiFiHU52 NIC

2. For Windows 10 system

Under Windows 10 system, WiFi driver is built-in from Windows 10. If WiFi driver is not found, please manual install WiFi driver. Follow as below steps to install and check driver.

※Note: In this example, Windows version is "Windows 10 Home Single Language x64"

2.1 WiFi

Follow as below steps to install driver and check WiFi of WiFiHU52.

Step 1: Plug-in WiFiHU52 USB to PC/NB.

Step 2: Right click "**Windows start menu**", and click "**Device Manager**"

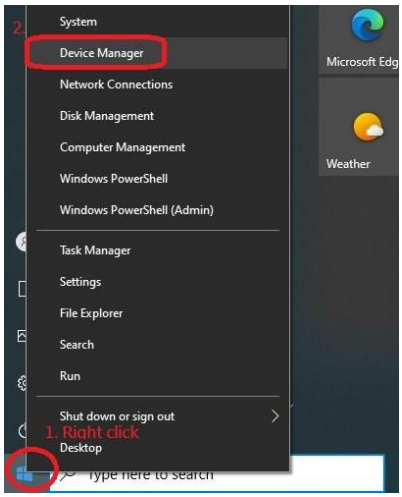


Figure 7 Device Manager

Step 3: Check WiFi driver. If WiFi driver is “unknow” state, please follow as below **step 3.1 to step 3.3** to manual install driver.

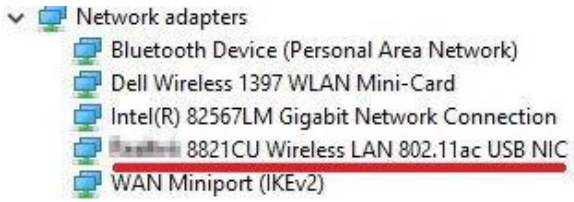


Figure 8 Check WiFi device

Step 3.1: Please contact the manufacturer for driver software.
Step 3.2: Decompress driver “.zip” file, and administrator execute”Setup.exe” installshield.

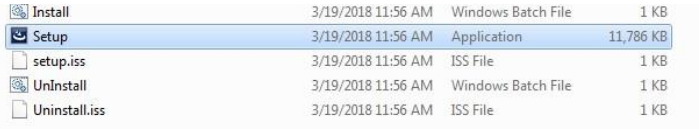


Figure 9 Execute “Setup” installshield

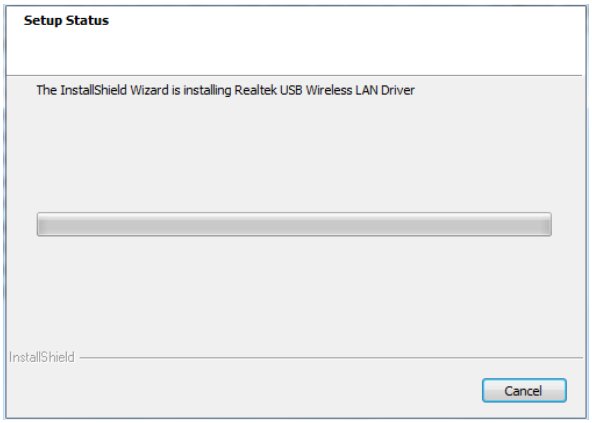


Figure 10 Installing WiFi driver

Step 3.3: Windows will now install the driver. This may take a few moments. After installing, select “yes, I want to restart my computer later” and click “Finish” button, The PC/NB will reboot.

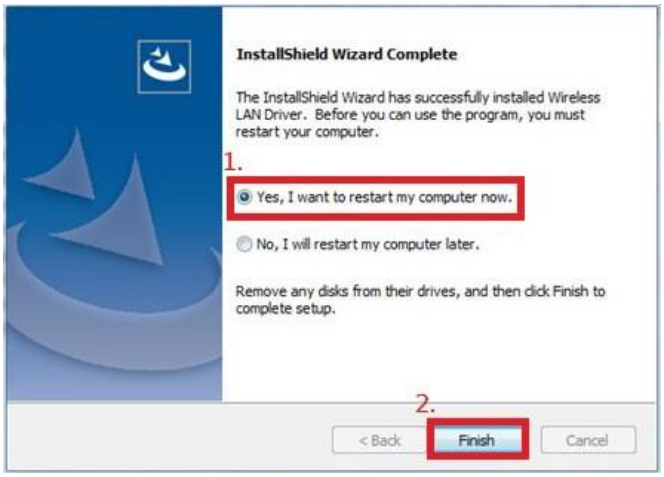
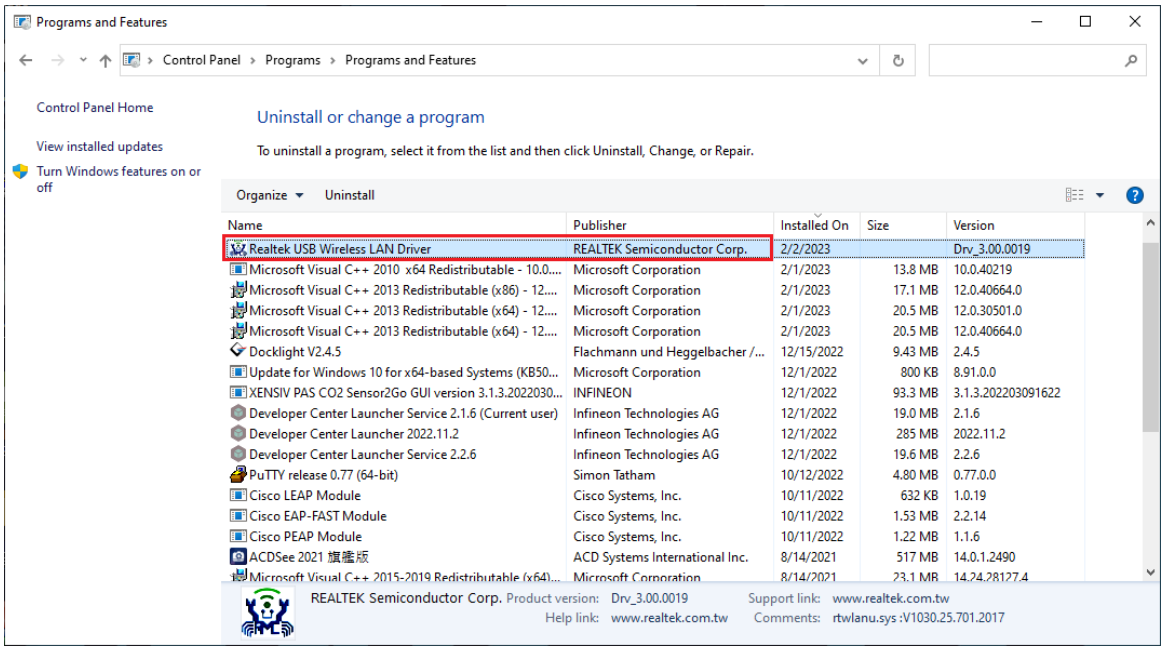


Figure 11 Complete to install WiFi driver

Step 3.4: Open "**Control Panel > Programs > Programs and Features**" and check if the driver is installed.



Step 4: Right click “**Windows start menu**”, and click “**Network Connections**”. Then click “**Change adapter options**”

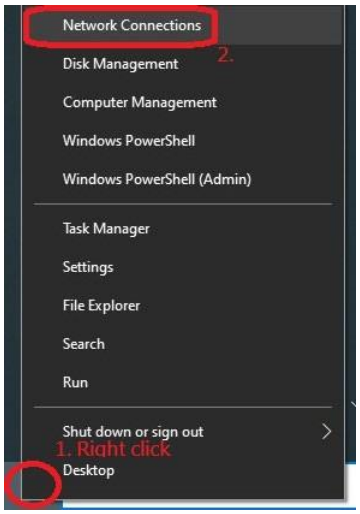


Figure 12 Network connections

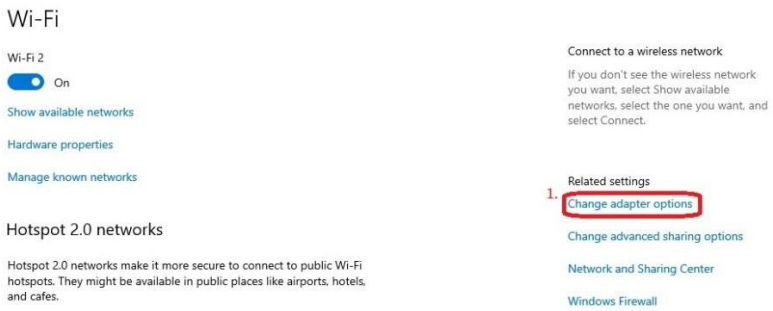


Figure 13 Change adapter options

Step 5: Check WiFi NIC of WiFiHU52.

Figure 14 Check WiFi NIC

3. For Windows 11 system

Under Windows 11 system, WiFi is built-in from Windows 11. Follow as below steps to check driver.

※Note: In this example, Windows version is “Windows 11 pro”

3.1 WiFi

Follow as below steps to check WiFi driver of WiFiHU52.

Step 1: Plug-in WiFiHU52 USB to PC/NB.

Step 2: Right click "**Windows start menu**", and click "**Device Manager**"

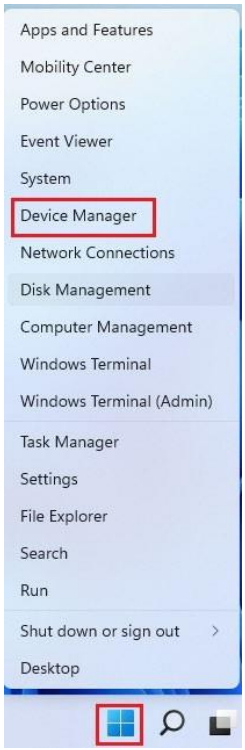


Figure 15 Device Manager

Step 3: Check WiFi driver.

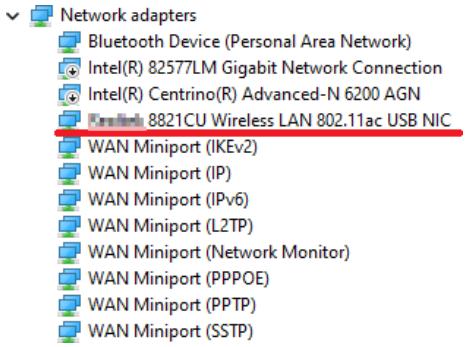


Figure 16 Check WiFi device

Step 4: Right click "**Windows start menu**", and click "**Network Connections**".

Figure 17 Network connections

Step 5: Click "**Network & internet**"

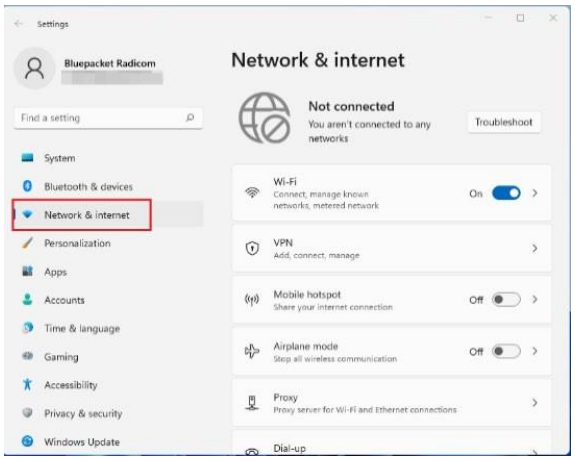


Figure 18 Network & internet

Step 6: Click "**Advanced network settings**"

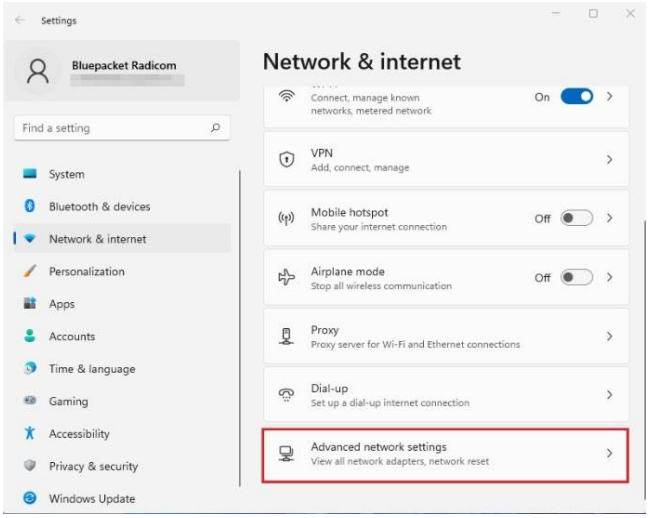


Figure 19 Advanced network settings

Step 7: Click "**More network adapter options**"

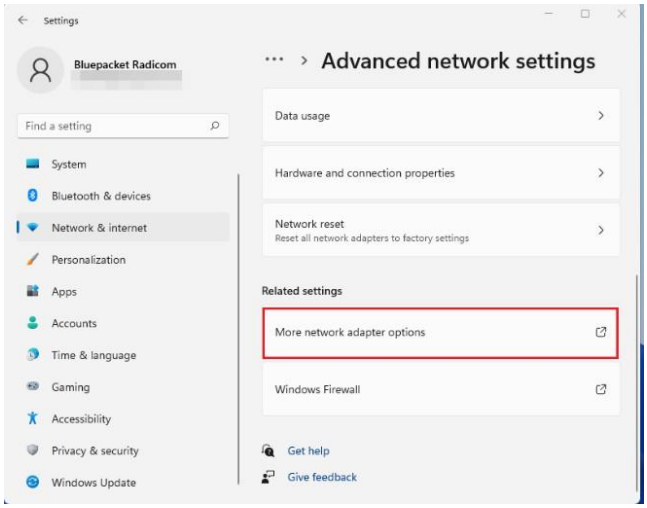


Figure 20 More network adapter options

Step 8: Check WiFi NIC of WiFiHU52

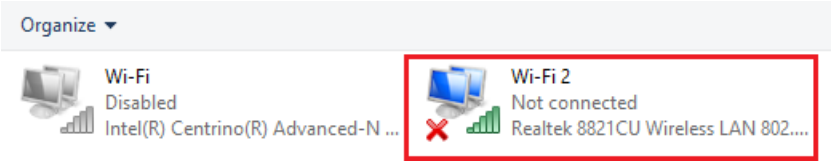


Figure 21 Check WiFi NIC

4. For Linux system

Under Linux system, WiFi needs to manual install driver.

※Note: In this example, Linux version is “Ubuntu 16.04 x64 (kernel 4.15.0-142-generic)”

4.1 WiFi

Follow as below steps to install and check driver WiFi of WiFiHU52.

Step 1: Open a terminal, type “**sudo apt-get update**” to update Ubuntu, and type “**sudo apt-get install dkms git**” to install “**dkms**” and “**git**”.

Step 2: Type “**sudo unzip rtl8821CU-master.zip**” to unzip the file, and type “**cd ./rtl8821CU-master**” to enter to rtl8821CU folder.

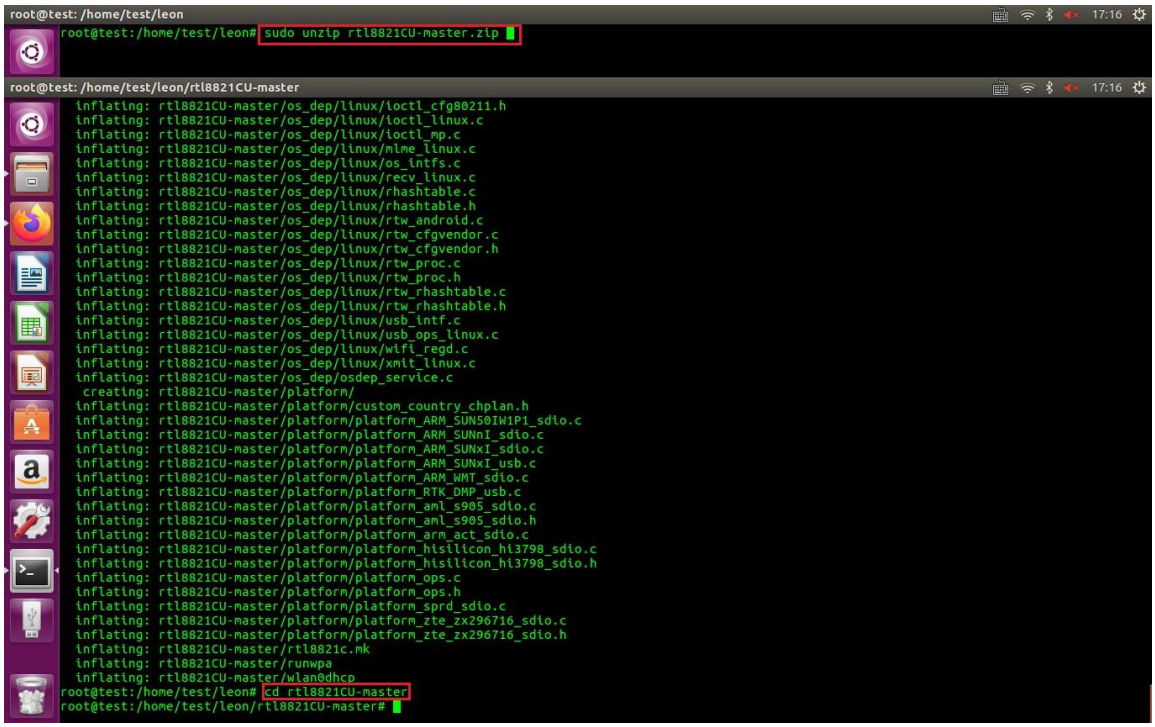


Figure 22 Unzip WiFiHU52 driver

Step 3: Type “**sudo ./dkms-install.sh**” to install driver.”

```
root@leon-HP-EliteBook-8440p:/home/leon/8821/rtl8821CU# ./dkms-install.sh
About to run dkms install steps...

Creating symlink /var/lib/dkms/rtl8821CU/5.4.1/source ->
                 /usr/src/rtl8821CU-5.4.1

DKMS: add completed.

Kernel preparation unnecessary for this kernel.  Skipping...

Building module:
cleaning build area....
'make' KVER=4.15.0-142-generic.........................................
cleaning build area....

DKMS: build completed.

8821cu:
Running module version sanity check.
 - Original module
   - No original module exists within this kernel
 - Installation
   - Installing to /lib/modules/4.15.0-142-generic/updates/dkms/

depmod....

DKMS: install completed.
Finished running dkms install steps.
root@leon-HP-EliteBook-8440p:/home/leon/8821/rtl8821CU#
```

Figure 23 Install script

Step 4: Plug-in WiFiHU52 USB to PC/NB, and Type "**lsmod |grep 8821cu**" to check WiFiHU52 driver to be mounted.

```
root@leon-HP-EliteBook-8440p:/home/leon/8821/rtl8821CU# lsmod |grep 8821cu
8821cu               2195456  0
cfg80211              634880  4 iwldvm,8821cu,iwlwifi,mac80211
root@leon-HP-EliteBook-8440p:/home/leon/8821/rtl8821CU#
```

Figure 24 Check WiFiHU52 driver

Step 5: Plug-in WiFiHU52 USB to PC/NB, and Type "**ifconfig**" to check WiFiHU52 WiFi NIC.

```
root@leon-HP-EliteBook-8440p:/home/leon# ifconfig
enp0s25   Link encap:Ethernet  HWaddr [redacted]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:20 Memory:d4700000-d4720000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:1690 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1690 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:162044 (162.0 KB)  TX bytes:162044 (162.0 KB)

wlo1      Link encap:Ethernet  HWaddr [redacted]
          inet addr:192.168.1.104  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::e0e6:3422:3029:6961/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:191127 errors:0 dropped:0 overruns:0 frame:0
          TX packets:15850 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:50528554 (50.5 MB)  TX bytes:2448316 (2.4 MB)

wlxd48a3b6c7568 Link encap:Ethernet  HWaddr [redacted]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Figure 25 Check WiFiHU52 WiFi NIC

WiFiHU52 USB Linux SoftAP Installation

This section is for installing the WiFiHU52 to operate in SoftAP modem in Linux Ubuntu. **Please first refer to P.21 (WiFiHU52 Quick Start Guide, For Linux system) to install driver.**

This section is for installing the WiFiHU52 to operate in SoftAP modem in Ubuntu 16.04 with Kernel version 4.15.0. SoftAP setup environment to be following Figure 26. Follow as below steps to install SoftAP modem.

※Note-1: In this example, Linux version is "Ubuntu 16.04 x64 (kernel 4.15.0-142-generic)"

※Note-2: WiFiHU52 only supports Linux SoftAP.

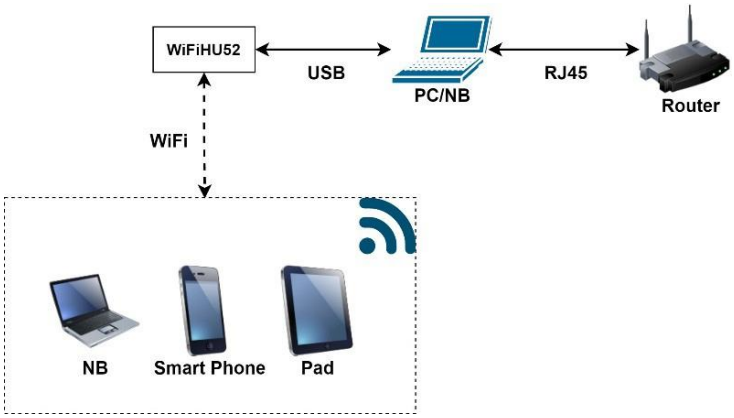


Figure 26 SoftAP setup environment

SoftAP setup flowchart is following Figure 27

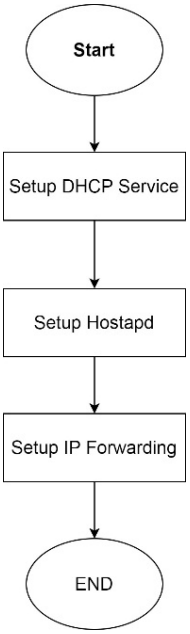


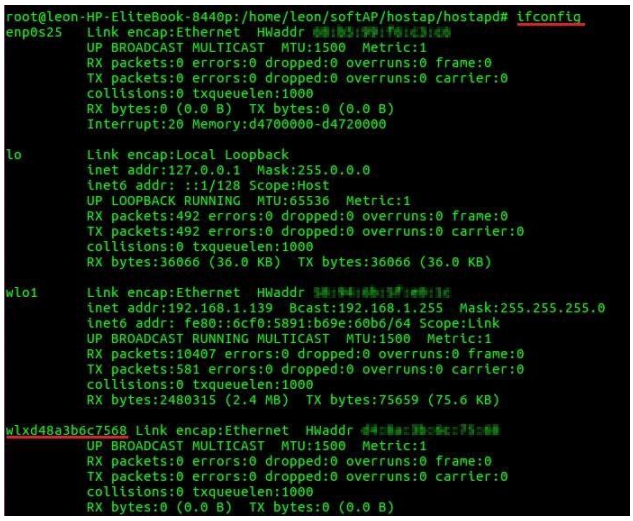
Figure 27 SoftAP setup flowchart

1. Install DCHP Server

Follow as below steps to install DHCP service.

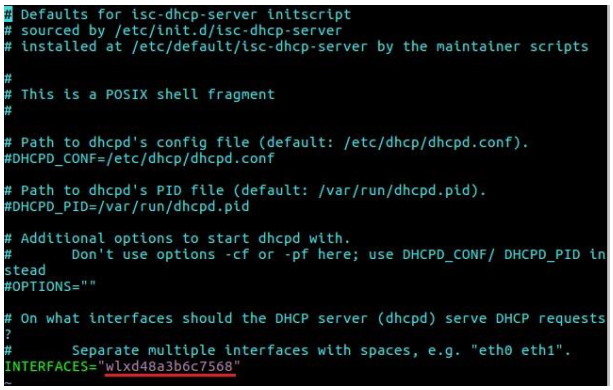
Step 1: Type "**apt-get install isc-dhcp-server**" to install dhcp server.

Step 2: Type "**vim /etc/default/isc-dhcp-server**" to edit WiFiHU52 NIC name. (Type "**ifconfig**" to check WiFiHU52 NIC name)



```
root@leon-HP-EliteBook-8440p:/home/leon/softAP/hostap/hostapd# ifconfig
enp0s25   Link encap:Ethernet  HWaddr [illegible]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:20 Memory:d4700000-d4720000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:492 errors:0 dropped:0 overruns:0 frame:0
          TX packets:492 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:36066 (36.0 KB)  TX bytes:36066 (36.0 KB)

wlo1      Link encap:Ethernet  HWaddr [illegible]
          inet addr:192.168.1.139  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::6cf0:5891:b69e:60b6/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:10407 errors:0 dropped:0 overruns:0 frame:0
          TX packets:581 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2480315 (2.4 MB)  TX bytes:75659 (75.6 KB)

wlxd48a3b6c7568 Link encap:Ethernet  HWaddr [illegible]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

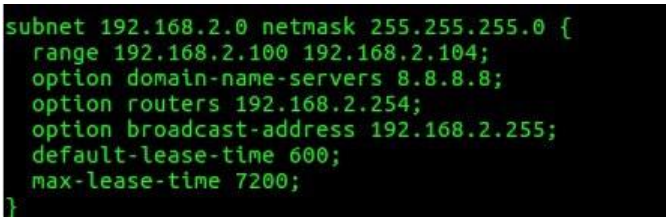
Figure 28 Check WiFiHU52 NIC name



```
# Defaults for isc-dhcp-server initscript
# sourced by /etc/init.d/isc-dhcp-server
# installed at /etc/default/isc-dhcp-server by the maintainer scripts

#
# This is a POSIX shell fragment
#

# Path to dhcpd's config file (default: /etc/dhcp/dhcpd.conf).
#DHCPD_CONF=/etc/dhcp/dhcpd.conf

# Path to dhcpd's PID file (default: /var/run/dhcpd.pid).
#DHCPD_PID=/var/run/dhcpd.pid

# Additional options to start dhcpd with.
#       Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID in
stead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpd) serve DHCP requests
?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACES="wlxd48a3b6c7568"
```

Figure 29 isc-dhcp-server

Step 3: Type "**vim /etc/dhcp/dhcpd.conf**" to add config in the end of file. Edit content is following Figure 30.



```
subnet 192.168.2.0 netmask 255.255.255.0 {
  range 192.168.2.100 192.168.2.104;
  option domain-name-servers 8.8.8.8;
  option routers 192.168.2.254;
  option broadcast-address 192.168.2.255;
  default-lease-time 600;
  max-lease-time 7200;
}
```

Figure 30 dhcpd.conf

Step 4: Type "**ifconfig**" to check others WiFi NIC. If there are others WiFi NIC turn on, please turn off them. (Command format of close: "**ifconfig <WiFi NIC name> down**")

```
root@leon-HP-EliteBook-8440p:/home/leon/softAP/hostap/hostapd# ifconfig
enp0s25   Link encap:Ethernet  HWaddr [redacted]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:20 Memory:d4700000-d4720000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:492 errors:0 dropped:0 overruns:0 frame:0
          TX packets:492 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:36066 (36.0 KB)  TX bytes:36066 (36.0 KB)

wlo1      Link encap:Ethernet  HWaddr [redacted]
          inet addr:192.168.1.139  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::6cf0:5891:b69e:60b6/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:10407 errors:0 dropped:0 overruns:0 frame:0
          TX packets:581 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2480315 (2.4 MB)  TX bytes:75659 (75.6 KB)

wlxd48a3b6c7568 Link encap:Ethernet  HWaddr [redacted]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

root@leon-HP-EliteBook-8440p:/home/leon/softAP/hostap/hostapd# ifconfig wlo1 down
```

Figure 31 Turn off others WiFi NIC

Step 5: Type "**ifconfig <WiFiHU52 NIC name> 192.168.2.254 up**" to setup WiFiHU52 NIC.

```
root@leon-HP-EliteBook-8440p:/home/leon/softAP/hostap/hostapd# ifconfig wlxd48a3b6c7568 192.168.2.254 up
root@leon-HP-EliteBook-8440p:/home/leon/softAP/hostap/hostapd# ifconfig
enp0s25   Link encap:Ethernet  HWaddr [redacted]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:20 Memory:d4700000-d4720000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:500 errors:0 dropped:0 overruns:0 frame:0
          TX packets:500 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:36562 (36.5 KB)  TX bytes:36562 (36.5 KB)

wlxd48a3b6c7568 Link encap:Ethernet  HWaddr [redacted]
          inet addr:192.168.2.254  Bcast:192.168.2.255  Mask:255.255.255.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Figure 32 Turn on WiFiHU52 NIC

Step 6: Type "**dhcpd**" to turn on DHCP service.
(If command happens "**Can't open /var/lib/dhcp/dhcpd.leases for append**" error message, please type "**chmod 777 /var/lib/dhcp/dhcpd.leases**" to change dhcp.leases permission, then type "**dhcpd**" again)

```
root@leon-HP-EliteBook-8440p:/home/leon/softAP/hostap/hostapd# dhcpd
Internet Systems Consortium DHCP Server 4.3.3
Copyright 2004-2015 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/
Config file: /etc/dhcp/dhcpd.conf
Database file: /var/lib/dhcp/dhcpd.leases
PID file: /var/run/dhcpd.pid
lease 10.5.5.26: no subnet.
Can't open /var/lib/dhcp/dhcpd.leases for append.

If you think you have received this message due to a bug rather
than a configuration issue please read the section on submitting
bugs on either our web page at www.isc.org or in the README file
before submitting a bug.  These pages explain the proper
process and the information we find helpful for debugging..

exiting.
```

Figure 33 dhcpd error message

```
root@leon-HP-EliteBook-8440p:/home/leon/softAP/hostap/hostapd# dhcpd
Internet Systems Consortium DHCP Server 4.3.3
Copyright 2004-2015 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/
Config file: /etc/dhcp/dhcpd.conf
Database file: /var/lib/dhcp/dhcpd.leases
PID file: /var/run/dhcpd.pid
Wrote 1 leases to leases file.
Listening on LPF/wlxd48a3b6c7568/d4:8a:3b:6c:75:68/192.168.2.0/24
Sending on   LPF/wlxd48a3b6c7568/d4:8a:3b:6c:75:68/192.168.2.0/24

No subnet declaration for enp0s25 (192.168.1.166).
** Ignoring requests on enp0s25.  If this is not what
   you want, please write a subnet declaration
   in your dhcpd.conf file for the network segment
   to which interface enp0s25 is attached. **

Sending on   Socket/fallback/fallback-net
```

Figure 34 dhcpd successful message

2. Install hostapd

Step 1: Open a terminal, type "**git clone git://w1.fi/srv/git/hostap.git**" to download hostapd software package.

Step 2: Type "**cd hostap/hostapd/**" to enter to hostapd folder, and type "**cp defconfig .config**" to copy a config file.

Step 3: Type "**vim .config**" to edit .config file, and remark "**#CONFIG_DRIVER_NL80211=y**" as below Figure 35.

```
# Driver interface for drivers using the nl80211 kernel interface
CONFIG_DRIVER_NL80211=y
```

Figure 35 .config

Step 4: Type "**apt-get install libssl-dev**", "**apt-get install libnl-3-dev**" and "**apt-get install libnl-genl-3-dev**" to install library.

Step 5: Type "**make**" and "**make install**" to install hostapd.

Step 6: Type "**cp hostapd.conf hostapd-minimal.conf**" to copy a config file, and type "**vim hostapd-minimal.conf**" to add config in the end of file. Edit content is following Figure 36.

```
interface=wlxd48a3b6c7568  WiFiHU52 NIC Name
driver=nl80211
ssid=WiFiHU52_AP   AP SSID
hw_mode=g
channel=1
macaddr_acl=0
auth_algs=1

ignore_broadcast_ssid=0
wpa=3
wpa_passphrase=12345678  WiFi Password
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP
```

Figure 36 hostapd-minimal.conf

Step 7: Type "**hostapd hostapd-minimal.conf**" to turn on SoftAP.

3. IP forwarding setup

Follow as below steps to setup IP forwarding.

Step 1: Check Ethernet NIC connects to an internet accessible AP router.

Step 2: Type "**echo 1 > /proc/sys/net/ipv4/ip_forward**" to set value of ip forward.

Step 3: Type "ifconfig" to check Ethernet NIC.

```
root@leon-HP-EliteBook-8440p:/home/leon# ifconfig
enp0s25   Link encap:Ethernet  HWaddr [redacted]
          inet addr:192.168.1.166  Bcast:192.168.1.255  Mask:255.255.2
5.0
          inet6 addr: fe80::3e3a:ff7f:caa:508d/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:28704 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1897 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3562903 (3.5 MB)  TX bytes:298644 (298.6 KB)
          Interrupt:20 Memory:d4700000-d4720000
```

Figure 37 Check Ethernet

Step 4: Type "**iptables -t nat -A POSTROUTING -o enp0s25 -j MASQUERADE**" to setup iptables rule. (iptables command format: "**iptables -t nat -A POSTROUTING -o <Ethernet NIC name> -j MASQUERADE**")

Step 5: Now, use a WiFi device to connect to SoftAP, and test Internet by "**ping 8.8.8.8**".

4. Connection test

Follow as below steps to test SoftAP connection by Android smart phone.

Step 1: Use smart phone to connect SoftAP.

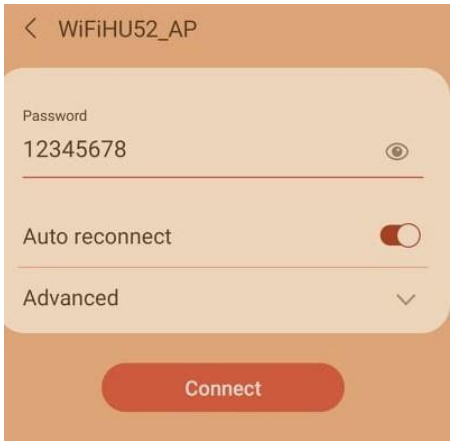


Figure 38 Connect to SoftAP

Step 2: Install their-party “**Ping**” application.

Figure 39 Install Ping application

Step 3: Execute “**ping 8.8.8.8**” by “**Ping**” application.

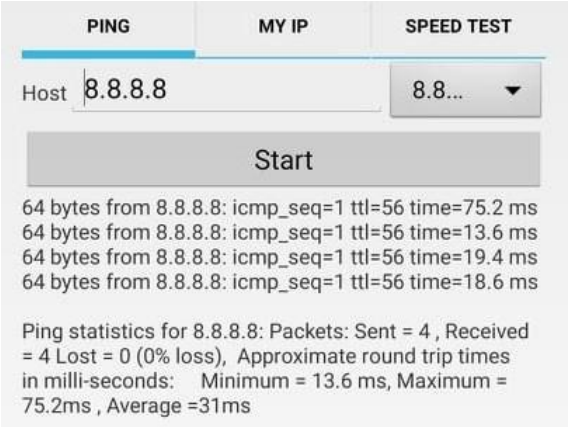


Figure 40 Ping test

WiFiHU52 Quick Test Guide

This chapter is shown how to quick test WiFi of WiFiHU52 under different system. These examples will test WiFi under Windows and Linux system. **Please first refer to P.12 (WiFiHU52 Quick Start Guide) to install driver.**

1. For Windows system

For WiFi, this example will be shown how to connect to AP router and check Internet network.

1.1 Test WiFi under Windows 7, Windows 10 and Windows 11

Follow as below steps to test WiFi of WiFiHU52. The test environment is following Figure 41.

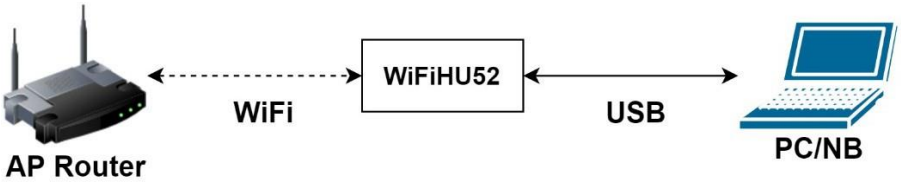


Figure 41 Test WiFi environment

※Note: In this example, Windows version is “Windows 7 Enterprise x32”

Step 1: Plug-in WiFiHU52 USB to PC/NB, then connect to an internet accessible AP router.

Figure 42 Connect to AP router

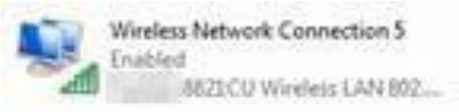


Figure 43 WiFi interface state

Step 2: Press “**Windows key**” + “**R**” to open search box, and type “**cmd**” in search box to open command line window.

Figure 44 Windows key

Step 3: Type “**ping 8.8.8.8**” to test connection.

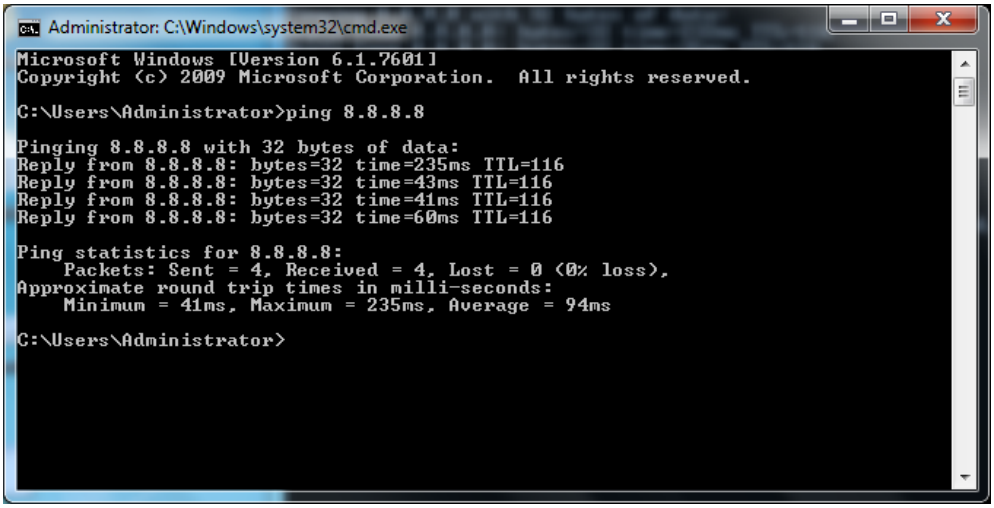


Figure 45 Ping test

2. For Linux system

For WiFi, this example will be shown how to connect to AP router and check Internet network.

2.1 Test WiFi under Ubuntu 16.04

Follow as below steps to test WiFi of WiFiHU52. The test environment is following Figure 46.

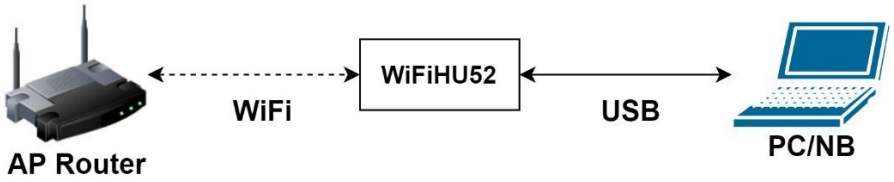
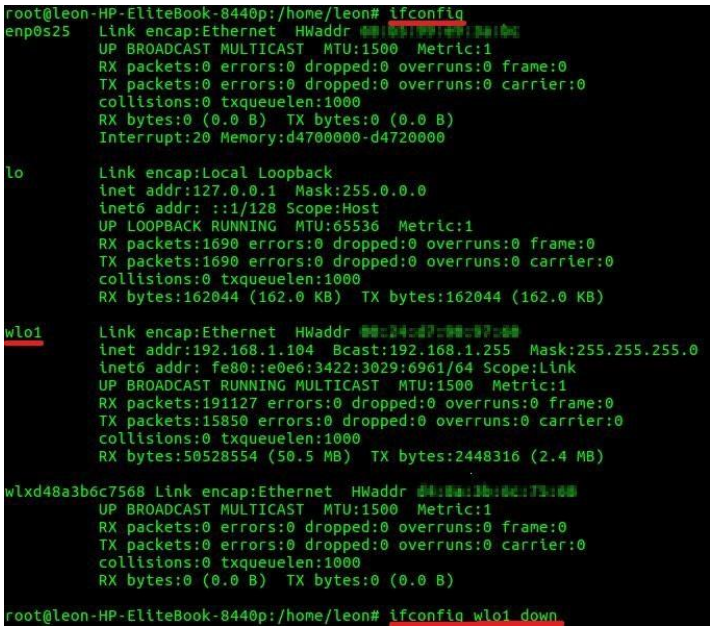


Figure 46 Test WiFi environment under Ubuntu 16.04 Linux

※Note: In this example, Linux version is "Ubuntu 16.04 x64 (kernel 4.15.0-142-generic)"

Step 1: Plug-in WiFiHU52 USB to PC/NB.

Step 2: Open a terminal, type "**ifconfig**" to check WiFi NIC. If there are others WiFi NIC, please type "**ifconfig <WiFi NIC name> down**" to close others. (For this sample, command is "**ifconfig wlo1 down**")



```
root@leon-HP-EliteBook-8440p:/home/leon# ifconfig
enp0s25   Link encap:Ethernet  HWaddr [redacted]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:20 Memory:d4700000-d4720000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:1690 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1690 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:162044 (162.0 KB)  TX bytes:162044 (162.0 KB)

wlo1      Link encap:Ethernet  HWaddr [redacted]
          inet addr:192.168.1.104  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::e0e6:3422:3029:6961/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:191127 errors:0 dropped:0 overruns:0 frame:0
          TX packets:15850 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:50528554 (50.5 MB)  TX bytes:2448316 (2.4 MB)

wlxd48a3b6c7568 Link encap:Ethernet  HWaddr [redacted]
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

root@leon-HP-EliteBook-8440p:/home/leon# ifconfig wlo1 down
```

Figure 47 Close others WiFi NIC

Step 3: Click “**System Settings**” icon, and click “**Network**”.

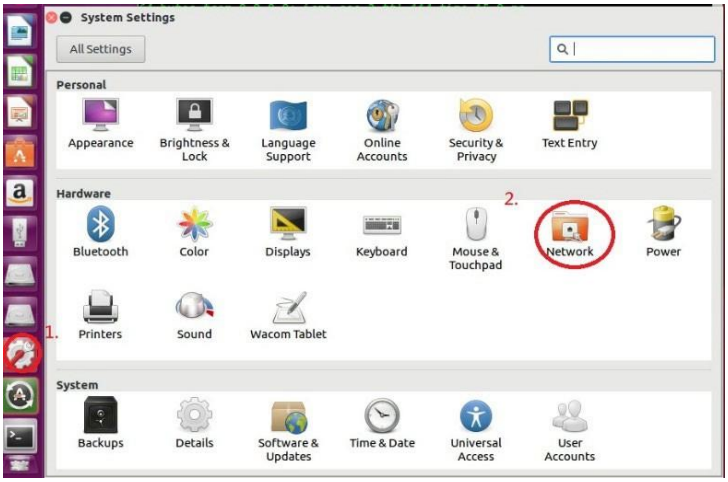


Figure 48 System settings

Step 4: Click “**Wireless**” and select AP router. Then type password, and click “**connect**”

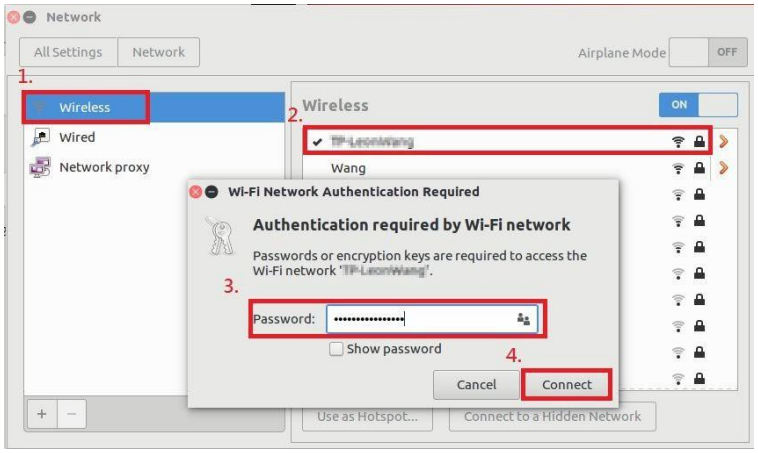
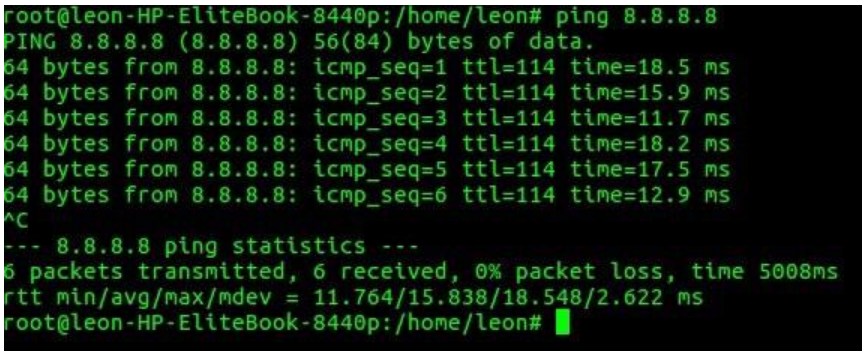


Figure 49 WiFi connection setting

Step 5: Type “ping 8.8.8.8” to test connection.

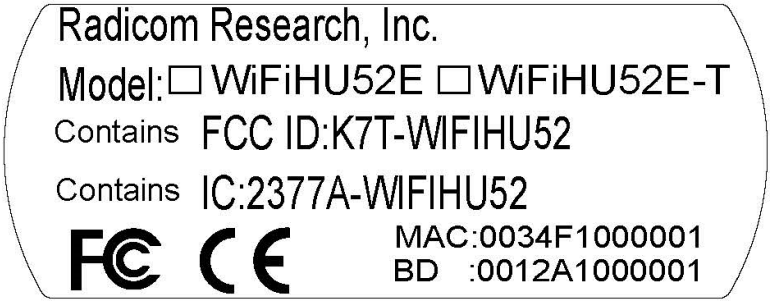


```
root@leon-HP-EliteBook-8440p:/home/leon# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=114 time=18.5 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=114 time=15.9 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=114 time=11.7 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=114 time=18.2 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=114 time=17.5 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=114 time=12.9 ms
^C
--- 8.8.8.8 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5008ms
rtt min/avg/max/mdev = 11.764/15.838/18.548/2.622 ms
root@leon-HP-EliteBook-8440p:/home/leon#
```

Figure 50 Test internet

FCC, IC, and CE Label Location and Module Model Identification

The WiFiHU52 module family is FCC Part 15 and IC (ISED Canada) certified. The WiFiHU52 is also CE marked. The modules are labeled with the WiFiHU52 module model number and FCC Part 15 ID, IC registration number and CE mark. The label can be found on top of the metal shielding on the WiFiHU52 module.



Important Regulatory Compliance and User Information

The final product with the modules installed needs to be tested for FCC Part 15, IC (RSS-Gen) and CE EMI/RFI compliance. Radicom certification documentation will help streamline the final product approval process. Contact Radicom for more information. To maintain compliance in the finished product, carefully follow guidelines in this section.

This device is intended only for OEM integrators under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna. As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with the module installed (for example, digital device emissions, PC peripheral requirements, etc).

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Host (End Product) Labeling Requirements

To maintain compliance, the end product hosting the WiFiHU52 module must be properly labeled to identify that this module is installed. The final end product must have a label located in a visible area

The label shall be securely affixed to a permanently attached part of the device, in a location where it is visible or easily accessible to the user, and shall not be readily detachable. The label shall be sufficiently durable to remain fully legible and intact on the device in all normal conditions of use throughout the device's expected lifetime. These requirements may be met either by a separate label or nameplate permanently attached to the device or by permanently imprinting or impressing the label directly onto the device. The label text shall be legible without the aid of magnification, but is not required to be larger than 8-point font size.

End User Information

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF Exposure compliance. The end user should NOT be provided any instructions on how to remove or install the device. The user's manual for end users must include the following information in a prominent location.

FCC RF Radiation Exposure Statement

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, When this device is operational, use only with the supplied, or recommended antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations. Changes or modifications not expressly approved by the manufacturer or party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

(1) This device may not cause harmful interference

(2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates and radiates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for assistance.*

ISED Canada compliance statement

This device complies with ISED Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and
(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Le présent appareil est conforme aux CNR d'ISDE Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et
(2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

La bande 5150–5250 MHz est réservée uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

Europe – RED Compliance Statement:

Hereby, Radicom Research Inc. declares that this equipment complies with the essential requirements and other relevant provisions of DIRECTIVE 2014/53/EU OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of April 16, 2014 on radio equipment and telecommunication terminal Equipment and the mutual recognition of their conformity (RED).

FCC:
RF exposure warning

This equipment must be installed and operated in accordance and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. The Dongle is authorized only when used in devices where the antenna is installed such that 5 mm is maintained between the antenna and users.

IC:
Radio Frequency (RF) Exposure Information
The radiated output power of the Wireless Device is below the Industry Canada (IC) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.
This device has also been evaluated and shown compliant with the IC RF Exposure limits under mobile exposure conditions.
The Dongle is authorized only when used in devices where the antenna is installed such that 5 mm is maintained between the antenna and users.

Informations concernant l'exposition aux fréquences radio (RF)
La puissance de sortie émise par l'appareil de sans fil est inférieure à la limite d'exposition aux fréquences radio d'Industry Canada (IC). Utilisez l'appareil de sans fil de façon à minimizer les contacts humains lors du fonctionnement normal.
Ce périphérique a également été évalué et démontré conforme aux limites d'exposition aux RF d'IC dans des conditions d'exposition à des appareils mobiles.
Le Dongle est autorisé uniquement lorsqu'il est utilisé dans des appareils où l'antenne est installée de telle sorte qu'un espace de 5 mm soit maintenu entre l'antenne et les utilisateurs.

The final end product must be labeled in a visible area with the following: "Contains FCC ID: K7T-WIFIHU52 and Contains IC: 2377A-WIFIHU52".

This radio transmitter IC: 2377A-WIFIHU52 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio IC: 2377A-WIFIHU52 a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

No.	Manufacturer	Part No.	Antenna Type	Peak Gain	
1	OneWave Electronic	WAN3216F245W36	Chip	2.4~2.5GHz	2.71dBi
2	OneWave Electronic	WAN3216FU58H05	Chip	5GHz	3.42dBi

CE Declaration of Conformity

For the following equipment:

Radicom Research, Inc WiFi Serial Modules
Model(s): WiFiHU52

are here with confirmed to comply with the requirements set out in the Council (European parliament) Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility of Radio and Telecom device (1999/5/CE). For the evaluation regarding this Directive, the following standards were applied:

ETSI EN300 328 V2.2.2
ETSI EN301 893 V2.1.1
ETSI 301 489-1 V2.2.3
ETSI 301 489-17 V3.2.4
EN/IEC 62311(2020)
EN IEC 62368-1(2020)

This equipment is marked with the CE and can be used throughout the European community.

France – 2.4GHz for Metropolitan France:
In all Metropolitan departments, wireless LAN frequencies can be used under the following conditions, either for public or private use:

Indoor use: maximum power (EIRP*) of 100 mW for the entire 2400-2483.5 MHz frequency band
Outdoor use: maximum power (EIRP*) of 100 mW for the 2400-2454 MHz band and with maximum power (EIRP*) of 10 mW for the 2454-2483 MHz band

This device is restricted to indoor use due to its operation in the 5.15 to 5.25 GHZ frequency range.

To ensure compliance with local regulations, be sure to select the country in which the end product is used.

Limited Warranty

Warranty Coverage and Duration

Radicom Research, Inc. ("RRI") warrants to the original purchaser its RRI-manufactured products ("Product") against defects in material and workmanship under normal use and service for a period of one year from the date of delivery. During the applicable warranty period, at no charge, RRI will, at its option, either repair, replace or refund the purchase price of this Product, provided it is returned in accordance with the terms of this warranty to RRI. Repair, at the option of RRI, may include the replacement of parts, boards or other components with functionally equivalent reconditioned or new parts, boards or other components. Replaced parts, boards or other components are warranted for the balance of the original applicable warranty period. All replaced items shall become the property of RRI.

RRI MAKES NO GUARANTEE OR WARRANTY THAT THE PRODUCT WILL PREVENT OCCURRENCES, OR THE CONSEQUENCES THEREOF, WHICH THE PRODUCT IS DESIGNED TO DETECT.

This expressed limited warranty is extended by RRI to the original end-user purchaser only, and is not assignable or transferable to any other party. This is the complete warranty for the Product manufactured by RRI, and RRI assumes no obligation or liability for additions or modifications to this warranty. In no case does RRI warrant the installation, maintenance or service of the Product. RRI is not responsible in any way for any ancillary equipment not furnished by RRI that is attached to or used in connection with the Product, or for operation of the Product with any ancillary equipment and all such equipment is expressly excluded from this warranty. Because of wide variations in topographical and atmospheric conditions, which may require availability of repeater stations or of particular radio frequencies, RRI assumes no liability for range, coverage or suitability of the Product for any particular application. Buyer acknowledges that RRI does not know a particular purpose for which buyer wants the Product, and that buyer is not relying on RRI's skill and judgment to select or furnish suitable goods.

What this Warranty does NOT Cover:

(a) Defects or damage resulting from use of the Product in other than its normal and customary manner.

(b) Defects or damage from misuse, accident or neglect.

(c) Defects of damage from improper testing, operation, maintenance, installation, alteration, modification or adjustment.

(d) Disassembly or repair of the Product in such a manner as to adversely affect performance or prevent adequate inspection and testing to verify any warranty claim.

(e) Any Product that has had its serial number or date code removed or made illegible.

How to Receive Warranty Service:

To obtain warranty service, contact RRI by phone (408) 383 9006 for RMA

Department and RMA (Return Merchandise Authorization) number. Deliver or send the Product, transportation and insurance prepaid to RRI, with the RMA number clearly marked on the outside of the package.

General Provision

This warranty sets forth the full extent of RRI's responsibilities regarding the Product. Repair, replacement or refund of the purchase price, at RRI's option, is the exclusive remedy. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESSED WARRANTIES. ANY APPLICABLE IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTY OF MERCHANTABILITY, ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. TO THE FULLEST EXTENT PERMITTED BY LAW, RRI DISCLAIMS ANY LIABILITY FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVING OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE OR FAILURE OF SUCH PRODUCT.

Contacting Radicom Research

If more information or technical support is needed, please contact us:

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