



# **Installation Guide for Linux**

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# Ubuntu 16.04 LTS

## 1. Development Environment

The development environment in Ubuntu is required as follows:

Development Environment	
OS	Ubuntu 16.04 LTS
Kernel version	4.13.0-36-generic
Gcc version	5.4.0

## 2. Compile the Driver

### 2.1. Compilation tool and kernel sources

Before you compile the driver, please make sure you have the correct compile tool and kernel sources. In Ubuntu 16.04 LTS, we can install compile tool gcc by command “apt-get install gcc”

```
$ apt-get install gcc
```

Note: We recommend you install the same version tool to compile the driver.

For example:

```
ubuntu@ubuntu:~$ cat /proc/version
Linux version 4.13.0-36-generic (build@lgw01-amd64-033) (gcc version 5.4.0 2016
0609 (Ubuntu 5.4.0-6ubuntu1~16.04.9)) #40~16.04.1-Ubuntu SMP Fri Feb 16 23:25:58
UTC 2018
ubuntu@ubuntu:~$
```

According to the command “cat /proc/version”, you could see your Ubuntu 16.04 LTS system is compiled by gcc5.4.0. By default, gcc5.4.0 is already installed in Ubuntu 16.04 LTS, you could use gcc5.4.0 to compile the driver directly.

Generally, compatible kernel headers are already built in Ubuntu 16.04 LTS, so you don't need to separately download and compile the kernel sources. However, if no related kernel headers are integrated in your system, please install the kernel sources first.

### 2.2. Compile the Driver

Use Terminal to go to the driver directory and run the following commands to compile the driver.

```
$ make clean
$ make
```

After compiling, you can see a *name of the chip.ko* file is stored in the directory of the driver.

### 3. Load the Driver

Here we show the 88x2bu.ko wireless driver loading process as an example. Run the following command to load the driver.

```
$ sudo cp 88x2bu.ko /lib/modules/[kernel version]/kernel/drivers/net/wireless/ #[kernel version] is the directory name of the system kernel version
$ sudo depmod -a
$ sudo modprobe 88x2bu.ko
```

Or directly use insmod to load the driver.

```
$ sudo insmod 88x2bu.ko
```

After loading the driver, run the following command to check if the driver is successfully loaded.

```
$ lsmod
```

## Mint 18.03

### 1. Development Environment

The development environment in Mint is required as follows:

Development Environment	
OS	Mint 18.03
Kernel version	4.10.0-38-generic
Gcc version	5.4.0

### 2. Compile the Driver

#### 2.1. Compilation tool and kernel sources

Before you compile the driver, please make sure you have the correct compile tool and kernel sources. In Mint, we can install compile tool gcc by command “apt-get install gcc”

```
$ apt-get install gcc
```

Note: We recommend you install the same version tool to compile the driver.

For example:

```
who@who-B85M-D3V-A ~ $ cat /proc/version
Linux version 4.10.0-38-generic (buildd@lgw01-amd64-059) (gcc version 5.4.0 2016
0609 (Ubuntu 5.4.0-6ubuntu1~16.04.4) ) #42~16.04.1-Ubuntu SMP Tue Oct 10 16:32:2
0 UTC 2017
who@who-B85M-D3V-A ~ $
```

According to the command “`cat /proc/version`”, you could see your Mint system is compiled by gcc5.4.0, so we should use gcc5.4.0 to compile the driver.

Generally, compatible kernel headers are already built in Mint, so you don't need to separately download and compile the kernel sources. However, if no related kernel headers are integrated in your system, please install the kernel sources first.

## 2.2. Compile the Driver

Use Terminal to go to the driver directory and run the following commands to compile the driver.

```
$ make clean
$ make
```

After compiling, you can see a *name of the chip.ko* file is stored in the directory of the driver.

## 3. Load the Driver

Here we show the 88x2bu.ko wireless driver loading process as an example. Run the following command to load the driver.

```
$ sudo cp 88x2bu.ko /lib/modules/[kernel version]/kernel/drivers/net/wireless/
$ sudo depmod -a
$ sudo modprobe 88x2bu
```

Or directly use insmod to load the driver.

```
$ sudo insmod 88x2bu.ko
```

After loading the driver, run the following command to check if the driver is successfully loaded.

```
$ lsmod
```

# Raspberry Pi3

## 1. Development Environment

The development environment in Raspberry Pi 3 is required as follows

Development Environment	
OS	6.3.0-18-rpi-deb9u1
Kernel version	4.9.80-v7
Hardware version of development board	Raspberry Pi 3 Model B

## 2. Compile the Driver

Before you compile the driver, please make sure you have the correct compile tool and kernel sources.

### 2.1. Compile Kernel source

Here we illustrate the instructions for local building to compile the driver for Linux.

#### 2.1.1. Download and Install Tools

Note: Before local building, make sure your raspberrypi system is connected to the internet.

Install Git, bc and other related tools.

```
$ sudo apt-get install git bc
```

#### 2.1.2. Get Kernel source

Click the following links to download raspberrypi kernel source and other related tools.

```
https://github.com/raspberrypi/linux
```

```
https://github.com/raspberrypi/tools
```

Before local building, make sure if you need to update the kernel. If your adapter supports the current kernel version, you don't need to update the kernel, and just download the kernel sources of this version. If you have to update the kernel, choose the kernel sources of the desired version. Here we download the version 4.9 kernel sources.

Create Linux-src directory in the local user's root directory to store kernel sources. If you have installed Git, you can use Git to obtain Linux kernel sources from Github; if you directly download the .zip file, use the following jar command to decompress this file.

```
$ sudo jar -xf XXX.zip
```

Note: It is recommended not to use the *unzip* software to decompress the .zip file.

#### 2.1.3. Modify Kernel

Run the following commands to modify Linux kernel. You can also modify the kernel according to your demands.

```
$ cd linux /* go the directory of kernel sources */  
$ KERNEL=kernel7  
$ make bcm2709_defconfig
```

Note: The instructions for Raspberry Pi3 and other versions of Raspberry are slightly different, for details of other versions, please refer to the instructions on Raspberry official website.

#### 2.1.4. Compile the Kernel

Run the following commands to compile and install the kernel and related device tree. It

may take a few minutes.

```
$ make -j4 zImage modules dtbs
$ sudo make modules_install
$ sudo cp arch/arm/boot/dts/*.dtb /boot/
$ sudo cp arch/arm/boot/dts/overlays/*.dtb* /boot/overlays/
$ sudo cp arch/arm/boot/dts/overlays/README /boot/overlays/
$ sudo cp arch/arm/boot/zImage /boot/$KERNEL.img
```

Note: “-j4” refers to using *Raspberry Pi3 and 4* to compile to accelerate the compilation process.

Power off the development board of Raspberry Pi3 and then run the following command to confirm the kernel version.

```
$ uname -a
or
$ cat /proc/version
```

## 2.2. Compile the Driver Source

Go to the driver’s directory, open the Makefile file to support Raspberry Pi3. By default, the CONFIG\_PLATFORM\_I386\_PC macro is enabled. Set the value for CONFIG\_PLATFORM\_BCM2709 to y, and set the value for CONFIG\_PLATFORM\_I386\_PC to n.

```
CONFIG_PLATFORM_BCM2709 = y
CONFIG_PLATFORM_I386_PC = n
CONFIG_PLATFORM_ANDROID_X86 = n
```

After setting the parameters, use Terminal to go to the directory in which the driver source file is stored. Run the following commands to compile the driver.

```
$ make clean
$ make
```

## 3. Load the Driver

Here we show the 8192eu.ko wireless driver loading process as an example. Run the following command to load the driver.

```
$ sudo cp 8192eu.ko /lib/modules/[kernel version]/kernel/drivers/net/wireless/
$ sudo depmod -a
$ sudo modprobe 8192eu
```

Or directly use insmod to load the driver.

```
$ sudo insmod 8192eu.ko
```

After loading the driver, run the following command to check if the driver is successfully loaded.



```
$ lsmod
```

# Kali 2018.1

## 1. Development Environment

The development environment in Kali 2018.1 is required as follows.

Development Environment	
OS	Kali 2018.1
Kernel Source Version	4.14.0-kali3-amd64

## 2. Compile the Driver

### 2.1. Install the Kernel Header File

Before compiling the driver in Kali 2018, make sure you have installed and compiled the right Linux header file. Follow the instructions to install and compile the Linux header file.

#### 2.1.1. Update the Software Source

Run the following commands to update the software source and related tools.

```
$ sudo apt-get clean
$ sudo apt-get update
$ sudo apt-get upgrade
```

#### 2.1.2. Install the Kernel Header File

1) Method 1: Run the following command to install the kernel header file.

```
$ sudo apt-get install linux-headers-$(uname -r)
```

After running this command, the system will automatically find the matched kernel header file to download and install it. If the Kali server is updated, you may not find the specific file, in this case, you can manually download and install the header file.

```
Err:1 http://http.kali.org/kali kali-rolling/main amd64 linux-compiler-gcc-7-x86 amd64 4.14.13-1kali1
404 Not Found [IP: 192.99.200.113 80]
Err:2 http://http.kali.org/kali kali-rolling/main amd64 linux-headers-4.14.0-kali3-common all 4.14.13-1kali1
404 Not Found [IP: 192.99.200.113 80]
Err:3 http://http.kali.org/kali kali-rolling/main amd64 linux-kbuild-4.14 amd64 4.14.13-1kali1
404 Not Found [IP: 192.99.200.113 80]
Err:4 http://http.kali.org/kali kali-rolling/main amd64 linux-headers-4.14.0-kali3-amd64 amd64 4.14.13-1kali1
404 Not Found [IP: 192.99.200.113 80]
E: Failed to fetch http://http.kali.org/kali/pool/main/l/linux/linux-compiler-gcc-7-x86_4.14.13-1kali1_amd64.deb 404 Not Found [IP: 192.99.200.113
]
E: Failed to fetch http://http.kali.org/kali/pool/main/l/linux/linux-headers-4.14.0-kali3-common_4.14.13-1kali1_all.deb 404 Not Found [IP: 192.99.2
]
E: Failed to fetch http://http.kali.org/kali/pool/main/l/linux/linux-kbuild-4.14_4.14.13-1kali1_amd64.deb 404 Not Found [IP: 192.99.200.113 80]
E: Failed to fetch http://http.kali.org/kali/pool/main/l/linux/linux-headers-4.14.0-kali3-amd64_4.14.13-1kali1_amd64.deb 404 Not Found [IP: 192.99.
]
E: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?
```

2) Method 2: Manually Download and Compile to Install

Find the matched kernel header file in the download source of your Kali software.

Click the following link to go to the official website to download Linux header file and related tools.

```
http://http.kali.org/kali/pool/main/l/linux
```

- Check the system version of Kali

```
$ uname -r
```

The system version we used here is shown as below.

```
root@kali:/home/kali# uname -r 4.14.0-kali3-amd64
```

- Download and compile linux-kbuild

In the Kali download links, find the linux-kbuild file of your system. Here we choose linux-kbuild-4.14\_4.14.17-1kali\_amd64.deb as an example.

<a href="#">linux-kbuild-4.14-dbgSYM_4.14.17-1kali1_amd64.deb</a>	2018-02-16 12:48 609K
<a href="#">linux-kbuild-4.14-dbgSYM_4.14.17-1kali1_arm64.deb</a>	2018-02-16 12:16 627K
<a href="#">linux-kbuild-4.14-dbgSYM_4.14.17-1kali1_armel.deb</a>	2018-02-16 17:40 599K
<a href="#">linux-kbuild-4.14-dbgSYM_4.14.17-1kali1_armhf.deb</a>	2018-02-16 18:54 593K
<a href="#">linux-kbuild-4.14-dbgSYM_4.14.17-1kali1_i386.deb</a>	2018-02-16 12:54 562K
<a href="#">linux-kbuild-4.14_4.14.17-1kali1_amd64.deb</a>	2018-02-16 12:48 743K
<a href="#">linux-kbuild-4.14_4.14.17-1kali1_arm64.deb</a>	2018-02-16 12:16 720K
<a href="#">linux-kbuild-4.14_4.14.17-1kali1_armel.deb</a>	2018-02-16 17:40 722K
<a href="#">linux-kbuild-4.14_4.14.17-1kali1_armhf.deb</a>	2018-02-16 18:54 724K

After downloading the file, use Terminal to go to the directory and run the following command to install the file.

```
$ sudo dpkg -i linux-kbuild-4.14_4.14.17-1kali_amd64.deb
```

- Download and compile linux-header-common

In the Kali download links, find the linux-header-common file of your system. Here we choose linux-header-4.14.0-kali3-common\_4.14.17-1kali\_all.deb as an example.

<a href="#">linux-headers-4.14.0-kali3-common-rt_4.14.17-1kali1_all.deb</a>	2018-02-16 12:47 5.7M
<a href="#">linux-headers-4.14.0-kali3-common_4.14.17-1kali1_all.deb</a>	2018-02-16 12:47 7.5M
<a href="#">linux-headers-4.14.0-kali3-marvell_4.14.17-1kali1_armel.deb</a>	2018-02-16 17:40 345K
<a href="#">linux-headers-4.14.0-kali3-rt-686-pae_4.14.17-1kali1_i386.deb</a>	2018-02-16 12:53 450K
<a href="#">linux-headers-4.14.0-kali3-rt-amd64_4.14.17-1kali1_amd64.deb</a>	2018-02-16 12:47 453K
<a href="#">linux-headers-4.15.0-kali1-686-pae_4.15.4-1kali1_i386.deb</a>	2018-02-23 10:22 450K
<a href="#">linux-headers-4.15.0-kali1-686_4.15.4-1kali1_i386.deb</a>	2018-02-23 10:22 450K

After downloading the file, use Terminal to go to the directory and run the following command to install the file.

```
$ sudo dpkg -i linux-header-4.14.0-kali3-amd64_4.14.17-1kali_amd64.deb
```

Run the following command to check if the kernel header file is successfully installed.

```
$ dpkg-query -s linux-headers-$(uname -r)
```

After the linux-header is successfully installed, run the following command to display the

detailed linux-header information.

```
root@kali:~/home/kali# sudo dpkg-query -s linux-headers-$(uname -r)
Package: linux-headers-4.14.0-kali3-amd64 |kali|_arm + Other Locations
Status: install ok unpacked
Priority: optional
Section: kernel
Installed-Size: 4322
Maintainer: Kali Developers <devel@kali.org>
Architecture: amd64
Source: linux-headers-4.14.0-kali3-all-amd64
Version: 4.14.17-1kali1
Depends: linux-headers-4.14.0-kali3-common (= 4.14.17-1kali1), linux-kbuild-4.14 (>= 4.14.12-2-), linux-compiler-gcc-7-x86 (>= 4.14.17-1-),
Description: Header files for Linux 4.14.0-kali3-amd64
This package provides the architecture-specific kernel header files for Linux kernel 4.14.0-kali3-amd64, generally used for building out-of-tree kernel modules. These files are going to be installed into /usr/src/linux-headers-4.14.0-kali3-amd64, and can be used for building modules that load into the kernel provided by the linux-image-4.14.0-kali3-amd64 package.
Homepage: https://www.kernel.org/
```

Check the `/lib/modules/<kernel-version>/` directory and you will see a `build` link file.

```
root@kali:~/home/kali# ls -l /lib/modules/4.14.0-kali3-amd64/
total 158184
lrwxrwxrwx 1 root root 41 Feb 16 03:38 build -> /usr/src/linux-headers-4.14.0-kali3-amd64
drwxr-xr-x 12 root root 4096 Apr 10 23:22 kernel
drwxrwxr-x 24 root root 4096 Nov 12 13:46 linux-stable-4.14
-rwxr-xr-x 1 root root 157647725 Apr 11 22:54 linux-stable-4.14.tar.gz
-rw-r--r-- 1 root root 1056336 Apr 19 20:55 modules.alias
-rw-r--r-- 1 root root 1006117 Apr 19 20:55 modules.alias.bin
-rw-r--r-- 1 root root 4106 Jan 8 10:09 modules.builtin
-rw-r--r-- 1 root root 5626 Apr 19 20:55 modules.builtin.bin
-rw-r--r-- 1 root root 398797 Apr 19 20:55 modules.dep
-rw-r--r-- 1 root root 550106 Apr 19 20:55 modules.dep.bin
-rw-r--r-- 1 root root 434 Apr 19 20:55 modules.devname
-rw-r--r-- 1 root root 133414 Jan 8 10:09 modules.order
-rw-r--r-- 1 root root 772 Apr 19 20:55 modules.softdep
-rw-r--r-- 1 root root 508979 Apr 19 20:55 modules.symbols
-rw-r--r-- 1 root root 628638 Apr 19 20:55 modules.symbols.bin
lrwxrwxrwx 1 root root 42 Feb 16 03:38 source -> /usr/src/linux-headers-4.14.0-kali3-common
root@kali:~/home/kali#
```

### 2.1.3. Compile Driver Source

Use Terminal to go to the driver directory. Run the following commands to compile the driver.

```
$ make clean
$ make
```

After compiling, you can see a *name of the chip.ko* file is stored in the directory of the driver.

## 3. Load the Driver

Here we show the 88x2bu.ko wireless driver loading process as an example. Run the following command to load the driver.

```
$ sudo cp 88x2bu.ko /lib/modules/[kernel version]/kernel/drivers/net/wireless/
$ sudo depmod -a
$ sudo modprobe 88x2bu
```

Or directly use `insmod` to load the driver.

```
$ sudo insmod 88x2bu.ko
```

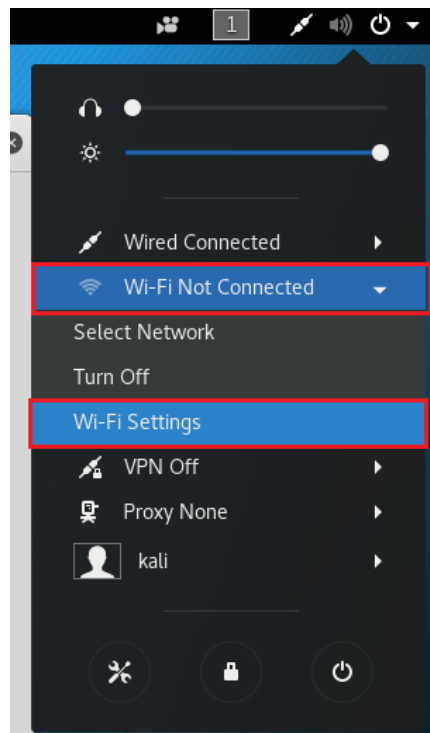
After loading the driver, run the following command to check if the driver is successfully loaded.

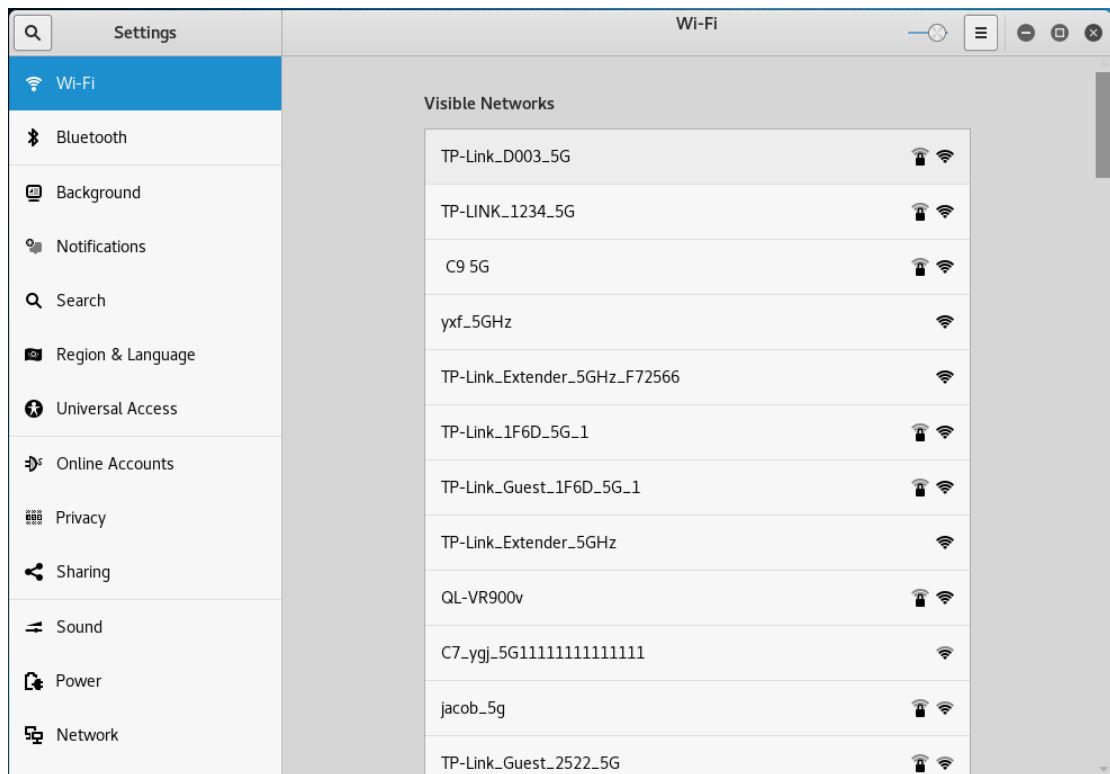
```
$ lsmod
```

## Use the Graphical Interface

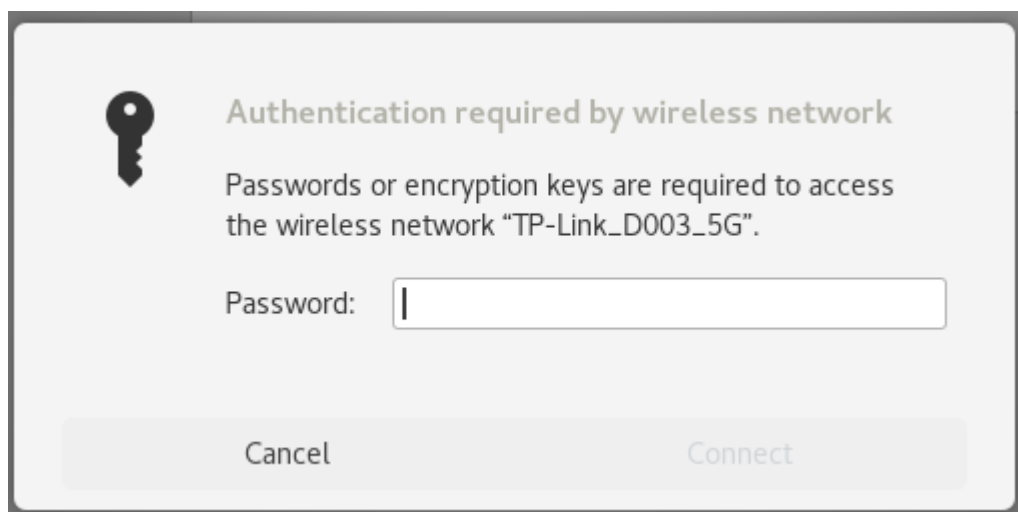
Ubuntu, Mint, Raspberry Pi and Kali all provide friendly graphical interface. After the adapter driver is successfully installed, you can use the graphical interface to manage your wireless settings. The interfaces for different system version are slightly different and here we use the interfaces for Kali 2018.1 as an example for illustration.

1. After successfully loading the driver, you will see a network connection icon in the task bar. Choose Wi-Fi Not Connected > Wi-Fi Settings to display the available wireless networks.

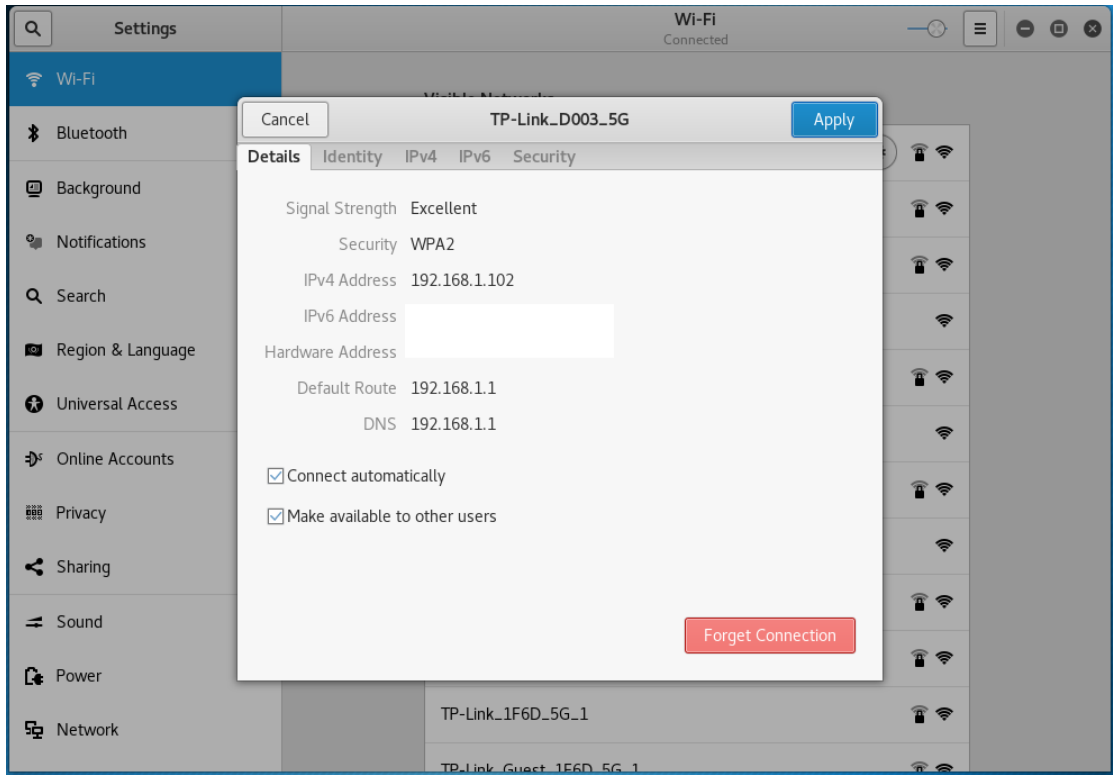




2. Select TP-Link\_D003\_5G and enter its password to connect to this network.



3. After connecting to this network, you can check its detailed wireless settings.



# Use the Command Line

You can use commands to manage your wireless setting in Linux. Here we use the interfaces for Kali 2018.1 as an example for illustration.

## 1. Identify the Device

Inert the USB wireless adapter, and run the following command to check if the adapter is identified.

```
$ lsusb
```

## 2. Create the Interface

Run the following command to check if the wireless network interface is created.

```
$ ifconfig
```

## 3. Change the Interface Status to Up

Check if the WLAN interface is *up*. If not, run the following command. Here we use *wlan1* as an example.

```
$ ifconfig wlan1 up
```

If it failed to change to *up*, run the following command to set the state again.

```
$ rfcill unblock wifi  
$ ifconfig wlan1 up
```

## 4. Start wpa\_supplicant in the background

Run the following command:

```
$ wpa_supplicant -Dnl80211 -iwlan1 -c ./wpa_0_8.conf -B
```

Note: *wpa\_0\_8.conf* is a file in the current driver directory, go to the driver directory when running the command.

If the command above is not effective, run the following command to end the *wpa\_supplicant* procedure and then run the above command again.

```
$ killall wpa_supplicant
```

If your Linux kernel does not support 802.11, run the following command.

```
$ wpa_supplicant -Dwext -iwlan0 -c ./wpa_0_8.conf -B
```

## 4.1. Scan Wireless Networks (SSID)

Run the following commands.

```
$ wpa_cli -p /var/run/wpa_supplicant scan
$ wpa_cli -p /var/run/wpa_supplicant scan_results
```

## 4.2. Connect to the AP

1) Open

Run the following commands

```
$ wpa_cli -p /var/run/wpa_supplicant remove_network 0
$ wpa_cli -p /var/run/wpa_supplicant ap_scan 1
$ wpa_cli -p /var/run/wpa_supplicant add_network
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 ssid "tplink" //tplink is the SSID
of the desired AP. The SSID is in double quotation marks and then as a whole
enclosed by single quotation marks.
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 key_mgmt NONE
$ wpa_cli -p /var/run/wpa_supplicant select_network 0
```

2) WEP40 with open system

```
$ wpa_cli -p /var/run/wpa_supplicant remove_network 0
$ wpa_cli -p /var/run/wpa_supplicant ap_scan 1
$ wpa_cli -p /var/run/wpa_supplicant add_network
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 ssid "tplink"
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 key_mgmt NONE
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_key0 1234567890
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_tx_keyidx 0
$ wpa_cli -p /var/run/wpa_supplicant select_network 0
```

3) WEP40 with shared key

```
$ wpa_cli -p /var/run/wpa_supplicant remove_network 0
$ wpa_cli -p /var/run/wpa_supplicant ap_scan 1
$ wpa_cli -p /var/run/wpa_supplicant add_network
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 ssid "tplink"
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 key_mgmt NONE
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_key0 1234567890
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_tx_keyidx 0
```



```
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 auth_alg SHARED
$ wpa_cli -p /var/run/wpa_supplicant select_network 0
```

#### 4) WEP 104 with open system

```
$ wpa_cli -p /var/run/wpa_supplicant remove_network 0
$ wpa_cli -p /var/run/wpa_supplicant ap_scan 1
$ wpa_cli -p /var/run/wpa_supplicant add_network
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 ssid "tplink"
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 key_mgmt NONE
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_key0
12345678901234567890123456
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_tx_keyidx 0
$ wpa_cli -p /var/run/wpa_supplicant select_network 0
```

#### 5) WEP 104 with open system

```
$ wpa_cli -p /var/run/wpa_supplicant remove_network 0
$ wpa_cli -p /var/run/wpa_supplicant ap_scan 1
$ wpa_cli -p /var/run/wpa_supplicant add_network
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 ssid "tplink"
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 key_mgmt NONE
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_key0
12345678901234567890123456
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 wep_tx_keyidx 0
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 auth_alg SHARED
$ wpa_cli -p /var/run/wpa_supplicant select_network 0
```

#### Note:

If the WEP key is ASCII, run the following command:

```
#WEP40: wpa_cli -p/var/run/wpa_supplicant set_network 0 wep_key0 "12345"
```

```
#WEP104: wpa_cli -p/var/run/wpa_supplicant set_network 0 wep_key0
"1234567890123"
```

If the index for WEP key is 0-3, run the following command

```
#wpa_cli -p/var/run/wpa_supplicant set_network 0 wep_keyX
12345678901234567890123456
```

```
#wpa_cli -p/var/run/wpa_supplicant set_network 0 wep_tx_keyidx X
```

#### 6) TIKP/AES

```
$ wpa_cli -p /var/run/wpa_supplicant remove_network 0
$ wpa_cli -p /var/run/wpa_supplicant ap_scan 1
```

```
$ wpa_cli -p /var/run/wpa_supplicant add_network
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 ssid ""tplink""
$ wpa_cli -p /var/run/wpa_supplicant set_network 0 psk ""12345678""
$ wpa_cli -p /var/run/wpa_supplicant select_network 0
```

### 4.3. Enable DHCP client

Run the following command

```
$ dhclient wlan1
```

After running the command, the adapter will get an IP assigned by the AP. Then you can run the ping command to check if the wireless connection is successful.

```
root@kali:~/Documents/wpa_supplicant_hostapd# ifconfig
eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether 40:8d:5c:1b:34:28 txqueuelen 1000 (Ethernet)
    RX packets 9950 bytes 5963340 (5.6 MiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 7420 bytes 676707 (660.8 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 474 bytes 38286 (37.3 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 474 bytes 38286 (37.3 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.1.113 netmask 255.255.255.0 broadcast 192.168.1.255
    inet6 fe80::c0cc:8e6c:6977:cf24 prefixlen 64 scopeid 0x20<link>
    ether 50:3e:aa:44:65:51 txqueuelen 1000 (Ethernet)
    RX packets 118 bytes 14574 (14.2 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 103 bytes 11253 (10.9 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@kali:~/Documents/wpa_supplicant_hostapd# ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data:
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=1.24 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=1.45 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=64 time=1.00 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=64 time=1.08 ms
64 bytes from 192.168.1.1: icmp_seq=5 ttl=64 time=7.86 ms
^C
--- 192.168.1.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 1.001/2.530/7.867/2.672 ms
root@kali:~/Documents/wpa_supplicant_hostapd# route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default Archer.lan 0.0.0.0 UG 600 0 0 wlan0
192.168.1.0 0.0.0.0 255.255.255.0 U 600 0 0 wlan0
root@kali:~/Documents/wpa_supplicant_hostapd#
```

Note:

1. Run the commands under the root account.
2. If you use *ifconfig* command to confirm you have obtained the IP address and use *ping* command to confirm you wireless connection is successful, but the internet is still unavailable, you can run the following commands to change the default system

gateway to the router's LAN IP.

```
$ route del default wlan0 //Delete the default gateway of wlan0  
$ route add default gw 192.168.1.1 //Add the router's LAN IP as the default gateway.
```