Connect to WiFi network from command line in Linux

blackmoreops.com/2014/09/18/connect-to-wifi-network-from-command-line-in-linux/

How many of you failed to connect to WiFi network in Linux? Did you bumped into issues like the followings in different forums, discussion page, blogs? I am sure everyone did at some point. Following list shows just the results from Page 1 of a Google search result with “Unable to connect to WiFi network in Linux” keywords.

1. Cannot connect to wifi at home after upgrade to ubuntu 14.04
2. Arch Linux not connecting to Wifi anymore
3. I can’t connect to my wifi
4. Cannot connect to WiFi
5. Ubuntu 13.04 can detect wi-fi but can’t connect
6. Unable to connect to wireless network ath9k
7. Crazy! I can see wireless network but can’t connect
8. Unable to connect to Wifi Access point in Debian 7
9. Unable to connect Wireless

Following guide explains how you can connect to a WiFi network in Linux from command Line. This guide will take you through the steps for connecting to a WPA/WPA2 WiFi network. In case you’ve only got wired connection only, you can use this guide to setup DHCP or static IP address from command line in Linux.

Contents

WiFi network from command line – Required tools

Following tools are required to connect to WiFi network in Linux from command line

1. wpa_supplicant
2. iw
3. ip
4. ping

Before we jump into technical jargons let's just quickly go over each item at a time.

Linux WPA/WPA2/IEEE 802.1X Supplicant

wpa_supplicant is a WPA Supplicant for Linux, BSD, Mac OS X, and Windows with support for WPA and WPA2 (IEEE 802.11i / RSN). It is suitable for both desktop/laptop computers and embedded systems. Supplicant is the IEEE 802.1X/WPA component that is used in the client stations. It implements key negotiation with a WPA Authenticator and it controls the roaming and IEEE 802.11 authentication/association of the wlan driver.

iw – Linux Wireless

iw is a new nl80211 based CLI configuration utility for wireless devices. It supports all new drivers that have been added to the kernel recently. The old tool iwconfing, which uses Wireless Extensions interface, is deprecated and it's strongly recommended to switch to iw and nl80211.

ip – ip program in Linux

ip is used to show / manipulate routing, devices, policy routing and tunnels. It is used for enabling/disabling devices and it helps you to find general networking informations. ip was written by Alexey N. Kuznetsov and added in Linux 2.2. Use `man ip` to see full help/man page.

ping

Good old ping For every ping, there shall be a pong …. ping-pong – ping-pong – ping-pong … that should explain it.

BTW `man ping` helps too …

Step 1: Find available WiFi adapters – WiFi network from command line

This actually help .. I mean you need to know your WiFi device name before you go an connect to a WiFi network. So just use the following command that will list all the connected WiFi adapters in your Linux machines.

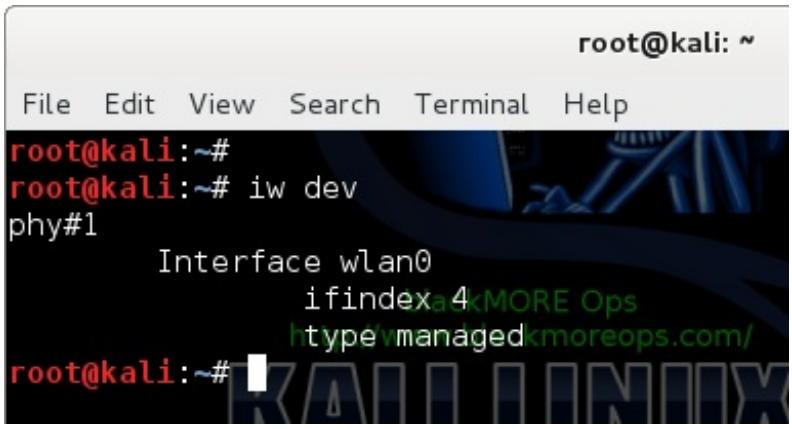
```
root@kali:~# iw dev
phy#1
    Interface wlan0
        ifindex 4
        type
managed
root@kali:~#
```

Let me explain the output:

This system has 1 physical WiFi adapters.

1. **Designated name:** phy#1
2. **Device names:** wlan0
3. **Interface Index:** 4. Usually as per connected ports (which can be an USB port).
4. **Type:** Managed. Type specifies the operational mode of the wireless devices. managed means the device is a WiFi station or client that connects to an access point.

Step 2: Check device status – WiFi network from command line



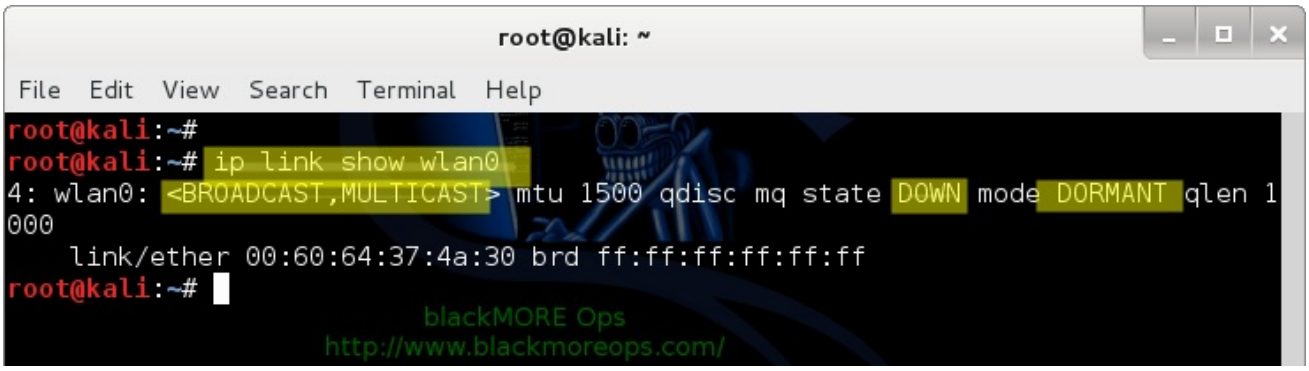
By this time many of you are thinking, why two network devices. The reason I am using two is because I would like to show how a connected and disconnected device looks like side by side. Next command will show you exactly that.

You can check that if the wireless device is up or not using the following command:

```
root@kali:~# ip link show wlan0
4: wlan0: <BROADCAST,MULTICAST> mtu 1500 qdisc mq state DOWN mode DORMANT
qlen 1000
    link/ether 00:60:64:37:4a:30 brd ff:ff:ff:ff:ff:ff
root@kali:~#
```

As you can already see, I got once interface (wlan0) as state UP and wlan1 as state DOWN.

Look for the word “UP” inside the brackets in the first line of the output.



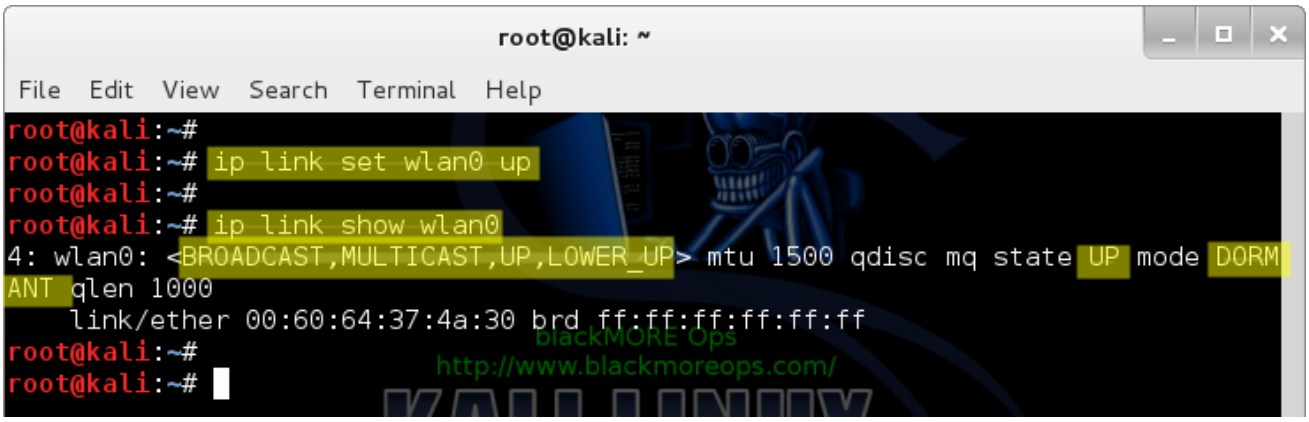
In the above example, *wlan1* is not UP. Execute the following command to

Step 3: Bring up the WiFi interface – WiFi network from command line

Use the following command to bring up the WiFI interface

```
root@kali:~# ip link set wlan0
up
```

> *Note: If you're using Ubuntu, Linux Mint, CentOS, Fedora etc. use the command with 'sudo' prefix*



If you run the show link command again, you can tell that *wlan1* is now UP.

```
root@kali:~# ip link show wlan0
4: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP mode
DORMANT qlen 1000
    link/ether 00:60:64:37:4a:30 brd ff:ff:ff:ff:ff:ff
root@kali:~#
```

Step 4: Check the connection status – WiFi network from command line

You can check WiFi network connection status from command line using the following command

```
root@kali:~# iw wlan0
link
Not connected.
root@kali:~#
```

The above output shows that you are not connected to any network.

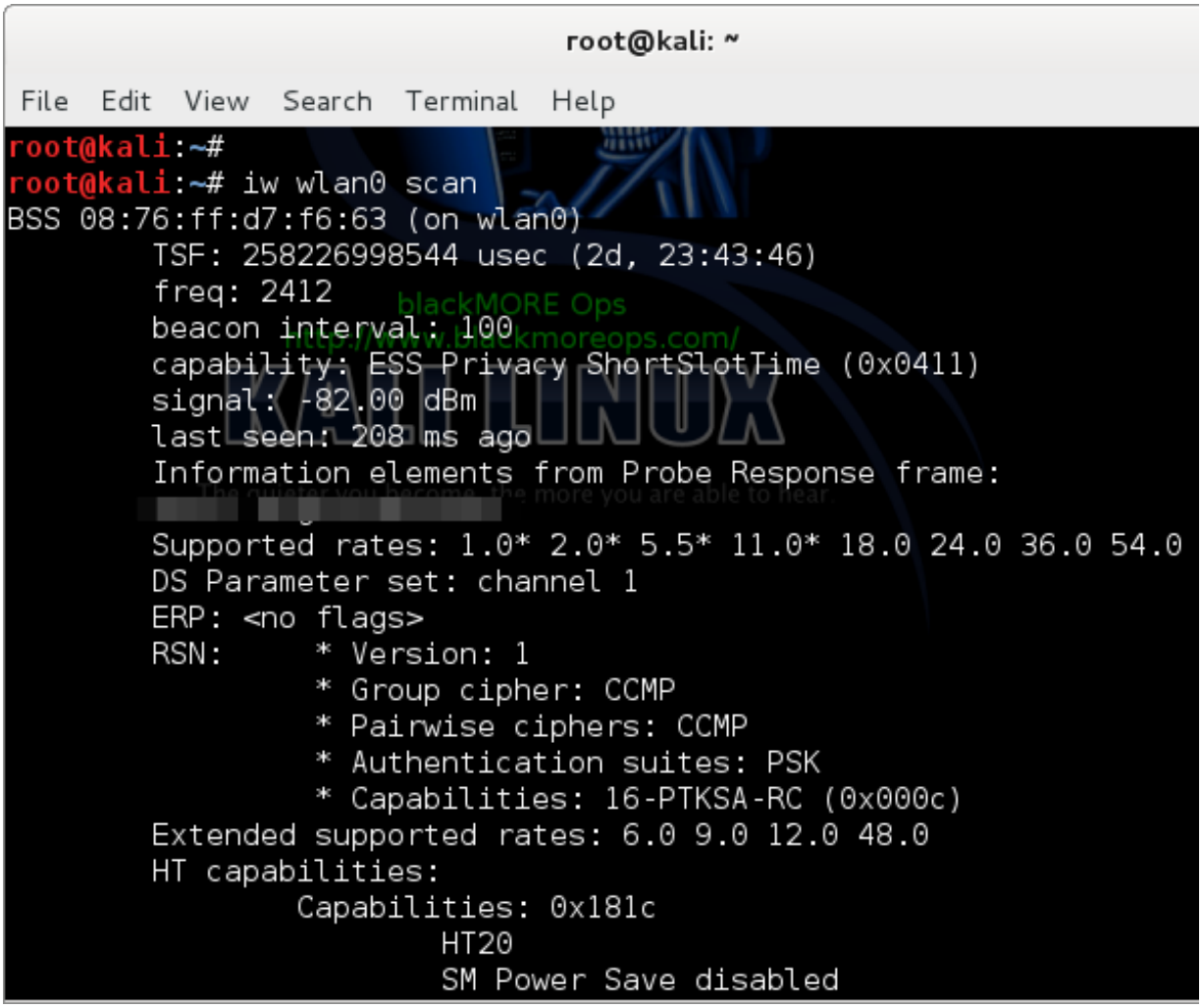
Step 5: Scan to find WiFi Network – WiFi network from command line

Scan to find out what WiFi network(s) are detected

```
root@kali:~# iw wlan0 scan
BSS 9c:97:26:de:12:37 (on wlan0)
    TSF: 5311608514951 usec (61d, 11:26:48)
    freq: 2462
    beacon interval: 100
    capability: ESS Privacy ShortSlotTime (0x0411)
    signal: -53.00 dBm
    last seen: 104 ms ago
    Information elements from Probe Response frame:
    SSID: blackMOREOps
    Supported rates: 1.0* 2.0* 5.5* 11.0* 18.0 24.0 36.0 54.0
    DS Parameter set: channel 11
    ERP: Barker_Preamble_Mode
    RSN:     * Version: 1
         * Group cipher: CCMP
         * Pairwise ciphers: CCMP
         * Authentication suites: PSK
         * Capabilities: 16-PTKSA-RC (0x000c)
    Extended supported rates: 6.0 9.0 12.0 48.0
---- truncated ----
```

The 2 important pieces of information from the above are the SSID and the security protocol (WPA/WPA2 vs WEP). The SSID from the above example is **blackMOREOps**. The security protocol is RSN, also commonly referred to as WPA2. The security protocol is important because it determines what tool you use to connect to the network.

— following image is a sample only —

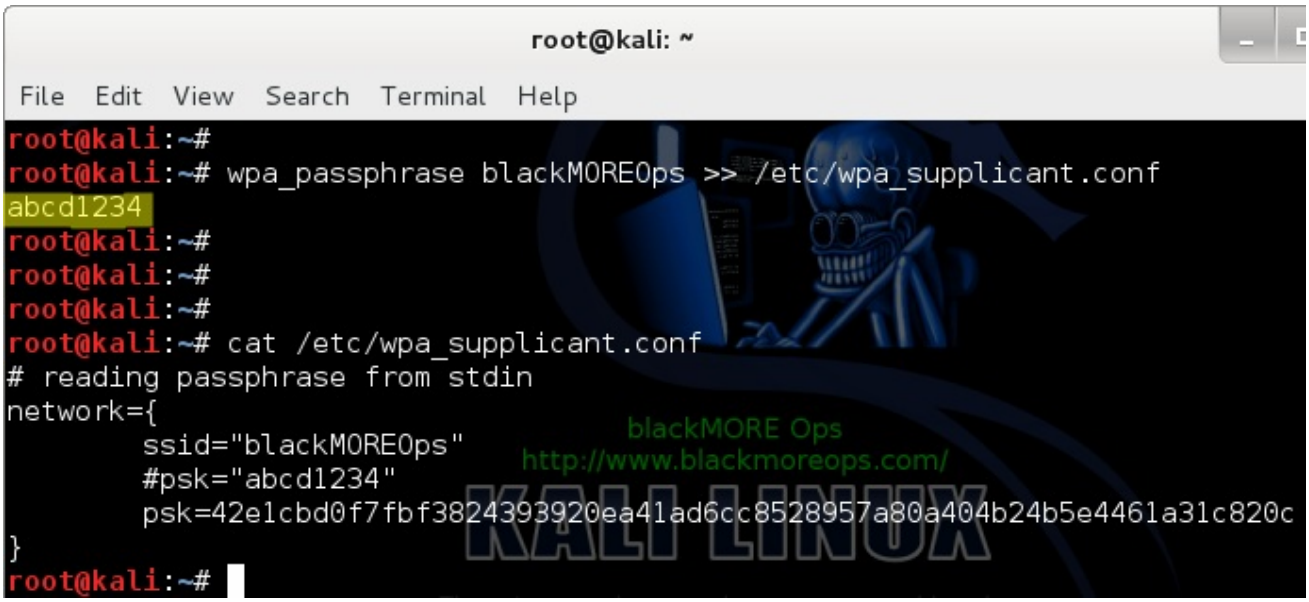


Step 6: Generate a wpa/wpa2 configuration file – WiFi network from command line

Now we will generate a configuration file for *wpa_supplicant* that contains the pre-shared key (“passphrase“) for the WiFi network.

```
root@kali:~# wpa_passphrase blackMOREOps >>
/etc/wpa_supplicant.conf
abcd1234
root@kali:~#
(where 'abcd1234' was the Network password)
```

wpa_passphrase uses SSID as a string, that means you need to type in the passphrase for the WiFi network *blackMOREOps* after you run the command.



> *Note: If you’re using Ubuntu, Linux Mint, CentOS, Fedora etc. use the command with ‘sudo’ prefix*

wpa_passphrase will create the necessary configuration entries based on your input. Each new network will be added as a new configuration (it wont replace existing configurations) in the configurations file */etc/wpa_supplicant.conf*.

```
root@kali:~# cat /etc/wpa_supplicant.conf
# reading passphrase from stdin
network={
 ssid="blackMOREOps"
 #psk="abcd1234"
 psk=42e1cbd0f7fbf3824393920ea41ad6cc8528957a80a404b24b5e4461a31c820c
}
root@kali:~#
```

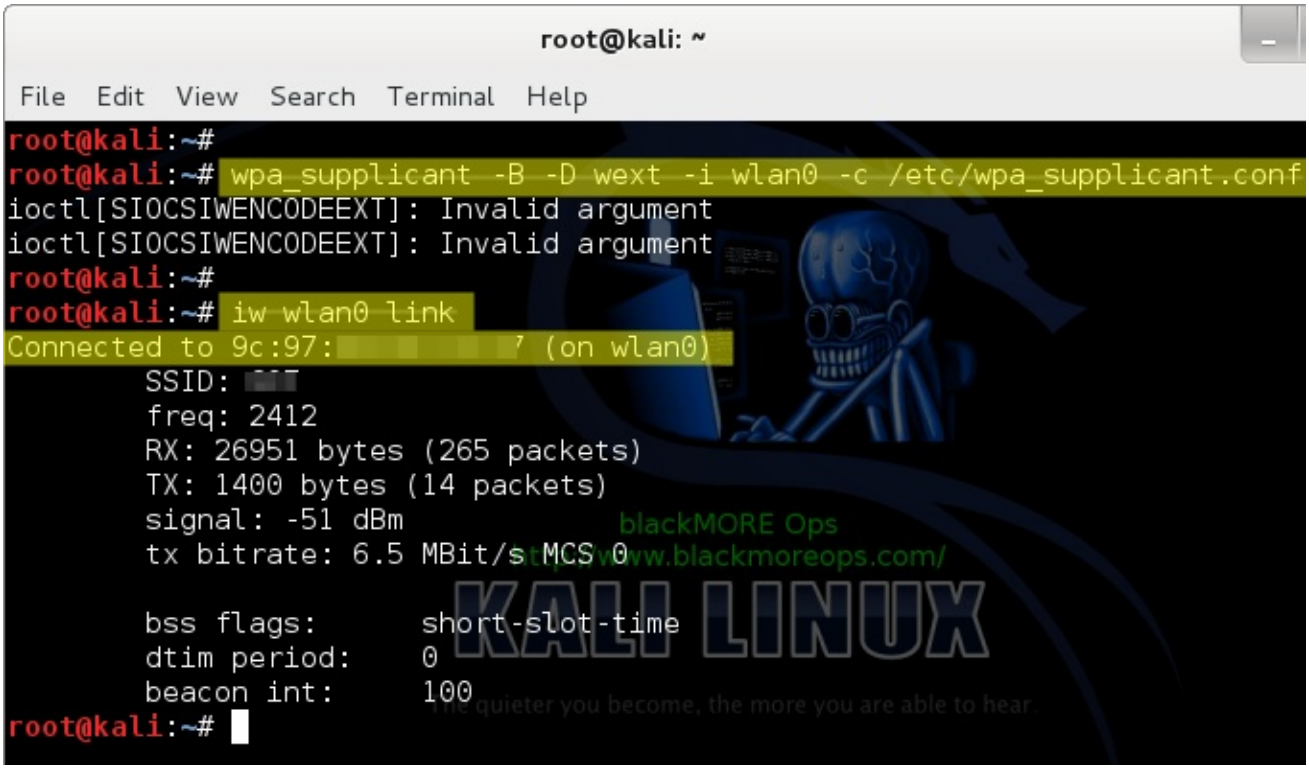
Step 7: Connect to WPA/WPA2 WiFi network – WiFi network from command line

Now that we have the configuration file, we can use it to connect to the WiFi network. We will be using *wpa_supplicant* to connect. Use the following command

```
root@kali:~# wpa_supplicant -B -D wext -i wlan0 -c
/etc/wpa_supplicant.conf
ioctl[SIOCSIWENCODEEXT]: Invalid argument
ioctl[SIOCSIWENCODEEXT]: Invalid argument
root@kali:~#
```

Where,

- -B means run *wpa_supplicant* in the background.
- -D specifies the wireless driver. *wext* is the generic driver.
- -c specifies the path for the configuration file.



Use the *iw* command to verify that you are indeed connected to the SSID.

```
root@kali:~# iw wlan0 link
Connected to 9c:97:00:aa:11:33 (on
wlan0)
    SSID: blackMOREOps
    freq: 2412
    RX: 26951 bytes (265 packets)
    TX: 1400 bytes (14 packets)
    signal: -51 dBm
    tx bitrate: 6.5 MBit/s MCS 0
    bss flags:    short-slot-time
    dtim period:    0
    beacon int:    100
```

Step 8: Get an IP using dhclient – WiFi network from command line

Until step 7, we've spent time connecting to the WiFi network. Now use dhclient to get an IP address by DHCP

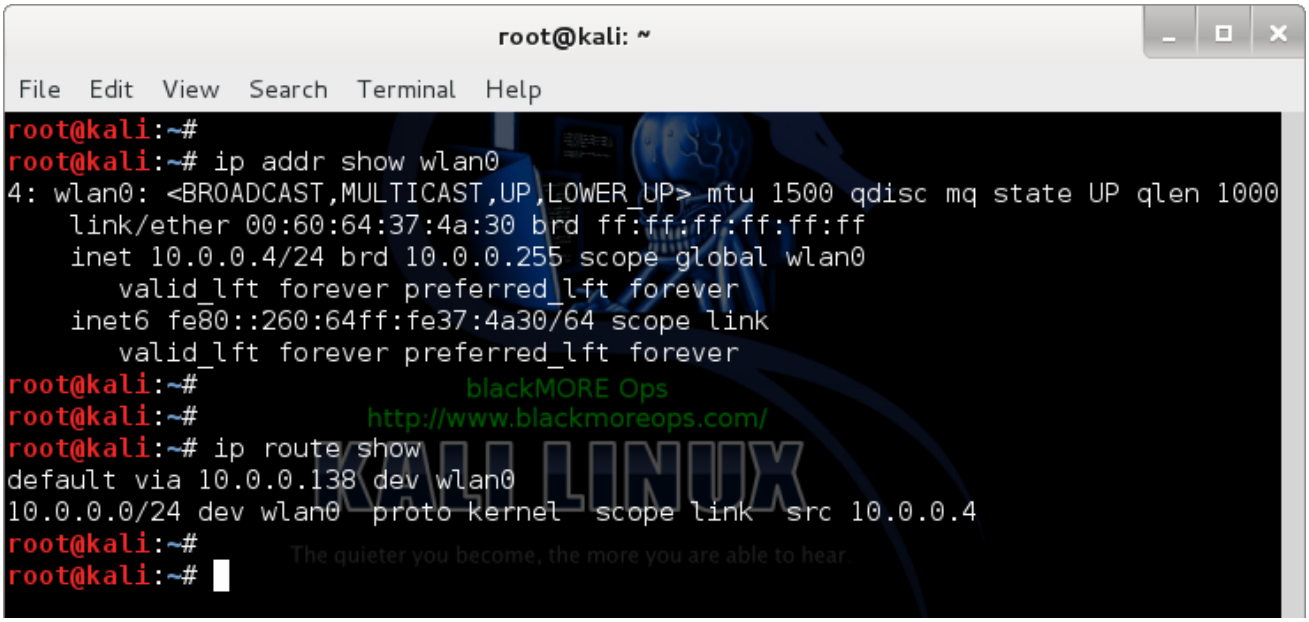
```
root@kali:~# dhclient wlan0
Reloading /etc/samba/smb.conf: smbd
only.
root@kali:~#
```

You can use *ip or ifconfig* command to verify the IP address assigned by DHCP. The IP address is 10.0.0.4 from below.

```
root@kali:~# ip addr show wlan0
4: wlan0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen
1000
    link/ether 00:60:64:37:4a:30 brd ff:ff:ff:ff:ff:ff
    inet 10.0.0.4/24 brd 10.0.0.255 scope global wlan0
       valid_lft forever preferred_lft forever
    inet6 fe80::260:64ff:fe37:4a30/64 scope link
       valid_lft forever preferred_lft forever
root@kali:~#
(or)
root@kali:~# ifconfig wlan0
wlan0 Link encap:Ethernet HWaddr 00:60:64:37:4a:30
 inet addr:10.0.0.4 Bcast:10.0.0.255 Mask:255.255.255.0
 inet6 addr: fe80::260:64ff:fe37:4a30/64 Scope:Link
 UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
 RX packets:23868 errors:0 dropped:0 overruns:0 frame:0
 TX packets:23502 errors:0 dropped:0 overruns:0 carrier:0
 collisions:0 txqueuelen:1000
 RX bytes:22999066 (21.9 MiB) TX bytes:5776947 (5.5 MiB)
root@kali:~#
```

Add default routing rule.The last configuration step is to make sure that you have the proper routing rules.

```
root@kali:~# ip route show
default via 10.0.0.138 dev wlan0
10.0.0.0/24 dev wlan0  proto kernel  scope link  src
10.0.0.4
```



Step 9: Test connectivity – WiFi network from command line

Ping Google's IP to confirm network connection (or you can just browse?)

```
root@kali:~# 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_req=3 ttl=42 time=265 ms
64 bytes from 8.8.8.8: icmp_req=4 ttl=42 time=176 ms
64 bytes from 8.8.8.8: icmp_req=5 ttl=42 time=174 ms
64 bytes from 8.8.8.8: icmp_req=6 ttl=42 time=174 ms
^C
--- 8.8.8.8 ping statistics ---
6 packets transmitted, 4 received, 33% packet loss, time
5020ms
rtt min/avg/max/mdev = 174.353/197.683/265.456/39.134 ms
root@kali:~#
```

Conclusion

This is a very detailed and long guide. Here is a short summary of all the things you need to do in just few line.

```
root@kali:~# iw dev
root@kali:~# ip link set wlan0 up
root@kali:~# iw wlan0 scan
root@kali:~# wpa_passphrase blackMOREOps >>
/etc/wpa_supplicant.conf
root@kali:~# wpa_supplicant -i wlan0 -c /etc/wpa_supplicant.conf
root@kali:~# iw wlan0 link
root@kali:~# dhclient wlan0
root@kali:~# ping 8.8.8.8
(Where wlan0 is wifi adapter and blackMOREOps is SSID)
(Add Routing manually)
root@kali:~# ip route add default via 10.0.0.138 dev wlan0
```

At the end of it, you should be able to connect to WiFi network. Depending on the Linux distro you are using and how things go, your commands might be slightly different. Edit commands as required to

meet your needs.

Thanks for reading. Please share and tweet.