AP6214A_WiFi_User_Guide

V1.2 2017.08.30

Contents

1. Wi-Fi Driver and Kernel Configuration

1. Check Environment

Step 1. Check OS version: Ubuntu 16.04.2 (see Figure 1)

```
$ lsb_release -a
```

Link: http://ftp.ubuntu-tw.org/mirror/ubuntu-releases/16.04.2/ubuntu-16.04.2-desktop-amd64.iso

Step 2. Check kernel version: 4.8.0 (see Figure 1)

```
$ uname -a
```

```
aaeon@aaeon-UP-CHT01:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 16.04.2 LTS
Release:        16.04
Codename:       xenial
aaeon@aaeon-UP-CHT01:~$ uname -a
Linux aaeon-UP-CHT01 4.8.0-58-generic #63~16.04.1-Ubuntu SMP Mon Jun 26 18:08:51 UTC 2017 x86_64 x86_64 x86_64 GNU/Linux
```

Figure 1: Ubuntu Environment

2. Update Wi-Fi firmware

Step 1. Copy ap6214a_wifi_driver.zip to home path and unzip it

```
$ unzip ap6214a_wifi_driver.zip
```

```
aaeon@aaeon-UP-CHCR1:~$ ls
ap6214a_wifi_driver.zip  Desktop  Documents  Downloads  examples.desktop  Music  Pictures  Public  Templates  Videos
aaeon@aaeon-UP-CHCR1:~$ unzip ap6214a_wifi_driver.zip
Archive:  ap6214a_wifi_driver.zip
   creating: ap6214a_wifi_driver/
  inflating: ap6214a_wifi_driver/AP6214A_WiFi_User_Guide.pdf
   creating: ap6214a_wifi_driver/config/
  inflating: ap6214a_wifi_driver/config/dhcpd.conf
  inflating: ap6214a_wifi_driver/config/hostapd.conf
  inflating: ap6214a_wifi_driver/config/interfaces
  inflating: ap6214a_wifi_driver/config/isc-dhcp-server
  inflating: ap6214a_wifi_driver/config/sysctl.conf
   creating: ap6214a_wifi_driver/firmware/
  inflating: ap6214a_wifi_driver/firmware/brcmfmac43430-sdio.bin
  inflating: ap6214a_wifi_driver/firmware/brcmfmac43430-sdio.txt
```

Step 2. Copy firmware of AP6214A to /lib/firmware/brcm/

```
$ sudo cp ap6214a_wifi_driver/firmware/brcmfmac43430-sdio.* /lib/firmware/brcm/
```

```
aaeon@aaeon-UP-CHCR1:~$
aaeon@aaeon-UP-CHCR1:~$ sudo cp ap6214a_wifi_driver/firmware/brcmfmac43430-sdio.* /lib/firmware/brcm/
```

Step 3. Reboot system

```
$ sudo reboot
```

Step 4. Check Wi-Fi device

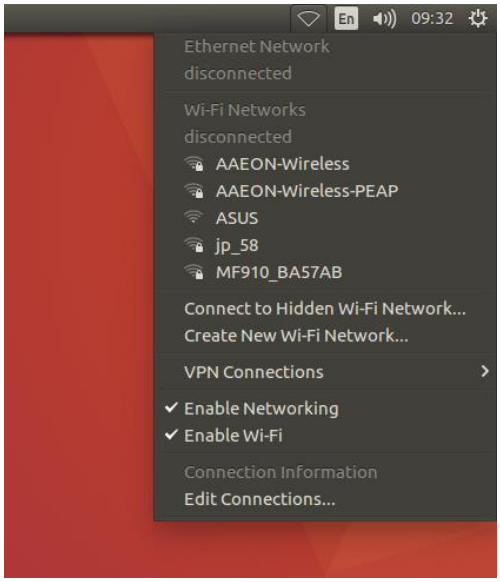
```
$ ifconfig -a
```

```
wlan0     Link encap:Ethernet  HWaddr b0:f1:ec:1f:bf:b8
          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)
```

2. Station Mode Operation

1. Connect to Wi-Fi network

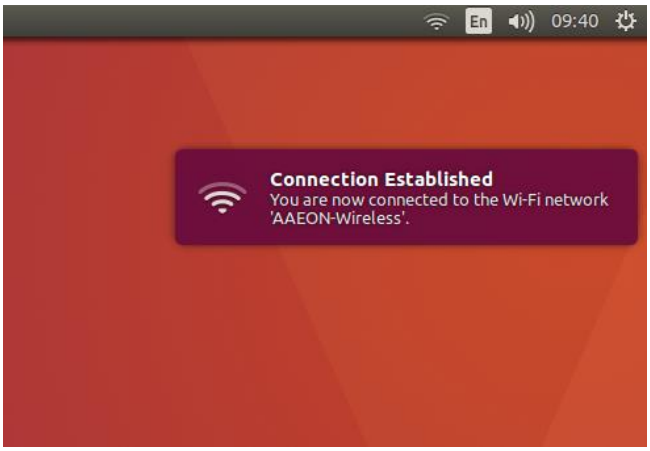
Step 1. Click the Wi-Fi item.



Step 2. Choose network you want to connect.

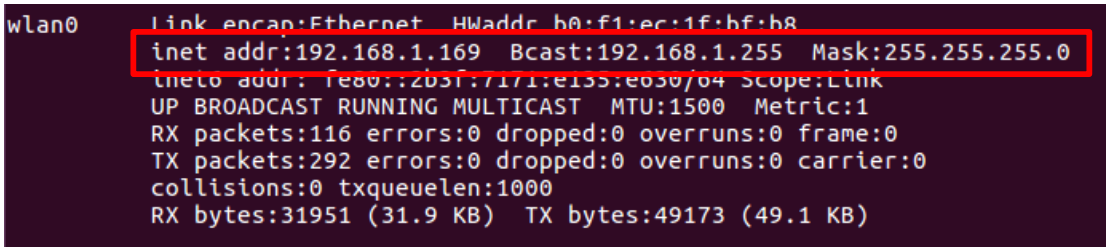
Step 3. Enter password.

Step 4. Check connect status.



Step 5. Check Wi-Fi device status.

```
$ ifconfig -a
```



Step 6. Network test.

```
$ ping 8.8.8.8
```

```
aaeon@aaeon-UP-CHCR1:~$ 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=41 time=591 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=41 time=172 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=41 time=465 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=41 time=109 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=41 time=73.4 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=41 time=119 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=41 time=43.5 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=41 time=26.5 ms
64 bytes from 8.8.8.8: icmp_seq=9 ttl=41 time=68.4 ms
64 bytes from 8.8.8.8: icmp_seq=10 ttl=41 time=34.0 ms
```

3. Soft-AP Mode Operation

1. Hardware configuration

Step 1. Plug Ethernet and check status.

$ ifconfig

```
aaeon@aaeon-UP-CHCR1:~$ ifconfig
enp4s0    Link encap:Ethernet  HWaddr 00:07:32:40:b8:9b
          inet addr:172.16.13.103  Bcast:172.16.13.255  Mask:255.255.255.0
          inet6 addr: fe80::f8:8be0:8486:2347/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:20744 errors:0 dropped:1 overruns:0 frame:0
          TX packets:882 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3568898 (3.5 MB)  TX bytes:97029 (97.0 KB)
```

Step 2. Disconnect Wi-Fi

$ sudo ifconfig wlan0 down
$ ifconfig

```
aaeon@aaeon-UP-CHCR1:~$ sudo ifconfig wlan0 down
[sudo] password for aaeon:
aaeon@aaeon-UP-CHCR1:~$ ifconfig
enp4s0    Link encap:Ethernet  HWaddr 00:07:32:40:b8:9b
          inet addr:172.16.13.103  Bcast:172.16.13.255  Mask:255.255.255.0
          inet6 addr: fe80::f8:8be0:8486:2347/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:21658 errors:0 dropped:1 overruns:0 frame:0
          TX packets:957 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:3665726 (3.6 MB)  TX bytes:108535 (108.5 KB)

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:1022 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1022 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:72504 (72.5 KB)  TX bytes:72504 (72.5 KB)
```

2. Setting network

Step 1. Setting virtual network and static IP address.

$ sudo gedit /etc/network/interfaces
(You can find the reference file from ap6214a_wifi_driver/config)

Add following: (see Figure 2)

auto wlan0
iface wlan0 inet static
address 192.168.2.1
netmask 255.255.255.0

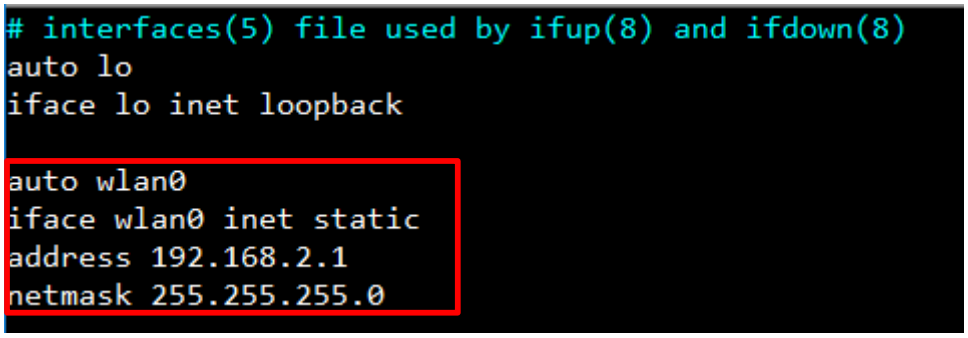
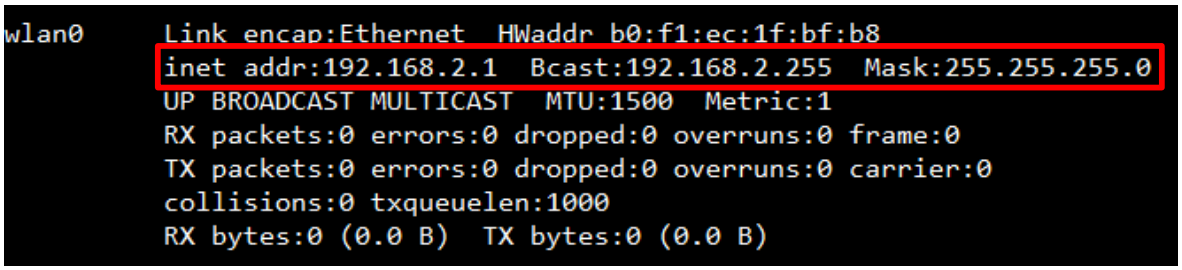


Figure 2: Soft-AP Setting

Step 2. Reboot system and check Wi-Fi device.

$ sudo reboot
$ ifconfig



3. Setting DHCP server

Step 1. Install DHCP server.

```
$ sudo apt-get install -y isc-dhcp-server
```

Step 2. Setting DHCP server.

```
$ sudo gedit /etc/dhcp/dhcpd.conf
```

(You can find the reference file from ap6214a_wifi_driver/config)

a. Mark global setting of domain name.

```
#option definitions common to all supported networks...
#option domain-name "example.org";
#option domain-name-servers ns1.example.org, ns2.example.org;
```

b. Set DHCP server to authoritative server.

```
# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
authoritative;
```

c. Setting internet subnet of server.

```
# A slightly different configuration for an internal subnet.
subnet 192.168.2.0 netmask 255.255.255.0 {
  range 192.168.2.10 192.168.2.50;
  option domain-name-servers 168.95.192.1, 168.95.1.1;
  option domain-name "local";
  option routers 192.168.2.1;
  option broadcast-address 192.168.2.255;
  default-lease-time 600;
  max-lease-time 7200;
}
```

Step 3. Setting interface of server.

```
$ sudo gedit /etc/default/isc-dhcp-server
```

(You can find the reference file from ap6214a_wifi_driver/config)

```
# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACES="wlan0"
```

Step 4. Restart DHCP server.

```
$ sudo service isc-dhcp-server restart
```

4. Packet forwarding

Step 1. Setting packet forwarding.

$ sudo gedit /etc/sysctl.conf

(You can find the reference file from ap6214a_wifi_driver/config)

```
# Uncomment the next line to enable packet forwarding for IPv4
net.ipv4.ip_forward=1
```

Step 2. Setting NAT.

$ sudo iptables -t nat -A POSTROUTING -o enp4s0 -j MASQUERADE

$ sudo iptables -A FORWARD -i enp4s0 -o wlan0 -m state --state RELATED,ESTABLISHED -j ACCEPT

$ sudo iptables -A FORWARD -i wlan0 -o enp4s0 -j ACCEPT

Step 3. Check NAT setting. (see Figure 3)

$ sudo iptables -t nat -S

$ sudo iptables -S

```
aaeon@aaeon-UP-CHCR1:~$ sudo iptables -t nat -S
-P PREROUTING ACCEPT
-P INPUT ACCEPT
-P OUTPUT ACCEPT
-P POSTROUTING ACCEPT
-A POSTROUTING -o enp4s0 -j MASQUERADE
aaeon@aaeon-UP-CHCR1:~$ sudo iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
-A FORWARD -i enp4s0 -o wlan0 -m state --state RELATED,ESTABLISHED -j ACCEPT
-A FORWARD -i wlan0 -o enp4s0 -j ACCEPT
```

Figure 3: NAT Setting

Step 4. Save NAT setting.

```
$ sudo sh -c "iptables-save > /etc/iptables.ipv4.nat"
$ sudo gedit /etc/network/interfaces
```

Add following:

```
up iptables-restore < /etc/iptables.ipv4.nat
```

(You can find the reference file from ap6214a_wifi_driver/config)

```
# interfaces(5) file used by ifup(8) and ifdown(8)
auto lo
iface lo inet loopback

auto wlan0
iface wlan0 inet static
address 192.168.2.1
netmask 255.255.255.0

up iptables-restore < /etc/iptables.ipv4.nat
```

5. Hostapd service

Step 1. Install hostapd service.

```
$ sudo apt-get install -y hostapd
```

Step 2. Add hostapd configuration file.

```
$ sudo gedit /etc/hostapd/hostapd.conf
```

(You can find the reference file from ap6214a_wifi_driver/config)

a. Open system without encryption

```
interface=wlan0
driver=nl80211
ssid=up_core
hw_mode=g
channel=6
macaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
```

b. WPA2-PSK authentication with AES encryption

```
interface=wlan0
driver=nl80211
ssid=up_core
hw_mode=g
channel=6
macaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
rsn_pairwise=CCMP
wpa_passphrase=12345678
```

Step 3. Set configuration file and hostapd will be started during system boot.

```
$ sudo gedit /etc/default/hostapd
```

(You can find the reference file from ap6214a_wifi_driver/config)

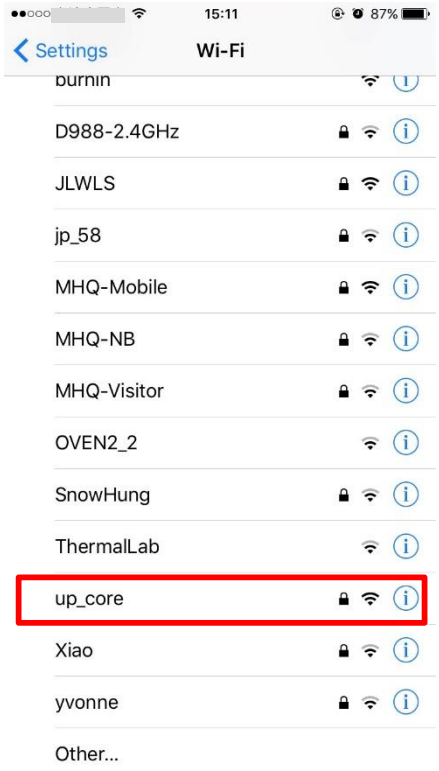
```
# Defaults for hostapd initscript
#
# See /usr/share/doc/hostapd/README.Debian for information about alternative
# methods of managing hostapd.
#
# Uncomment and set DAEMON_CONF to the absolute path of a hostapd configuration
# file and hostapd will be started during system boot. An example configuration
# file can be found at /usr/share/doc/hostapd/examples/hostapd.conf.gz
#
DAEMON_CONF="/etc/hostapd/hostapd.conf"
```

Step 4. Reboot system.

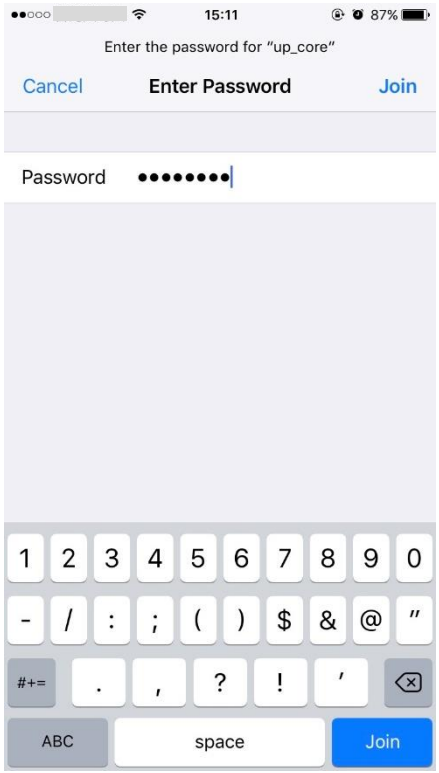
```
$ sudo reboot
```

6. Connect to Soft-AP

Step 1. Scan network through your phone.



Step 2. Join to “up_core” network and enter password.



Step 3. Success to connect “up_core” network.