88W8997 Software Access Point Application

1. **Hardware**

- i.MX8MM-EVK(LPDDR4 version)
- AW-CM276MA-PUR (Azurewave module based on 88W8997)

2. **Software**

- **Host**

  ubuntu 20.04 LTS

- **Linux bsp version**

  L5.4.70_2.3.0 imx-image-multimedia image.

- **Driver version**

  PCIE-WLAN-UART-BT-8997-LNX_6_1_55-IMX8-16.92.21.p84.4-16.92.21.p84.4-MM6X16423.P6-GPL

- **Target Application**
  - Mobile-->**uap0+eth0** -->external AP-->Internet
  - Mobile-->**uap0+ mlan0**-->external AP-->Internet

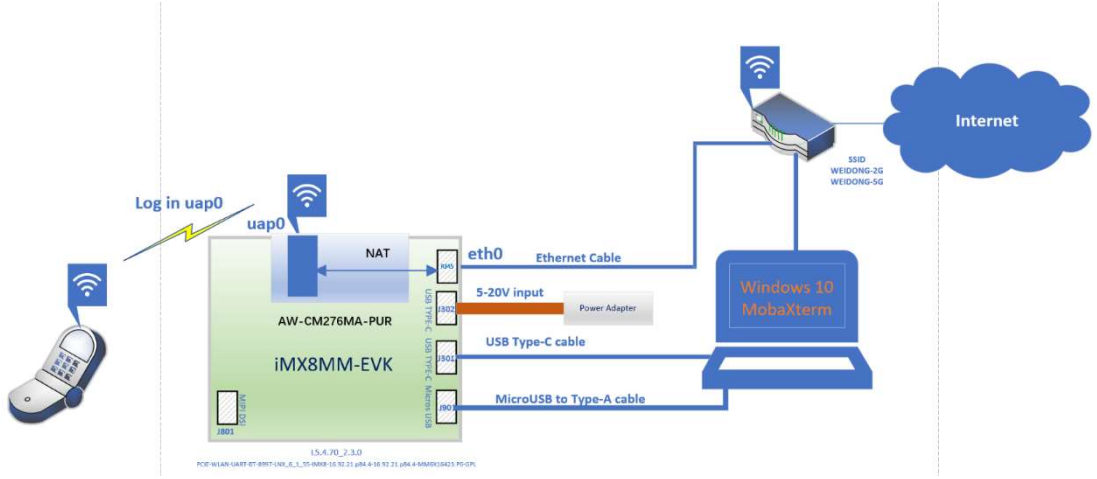


Figure 1 uap0 & eth0

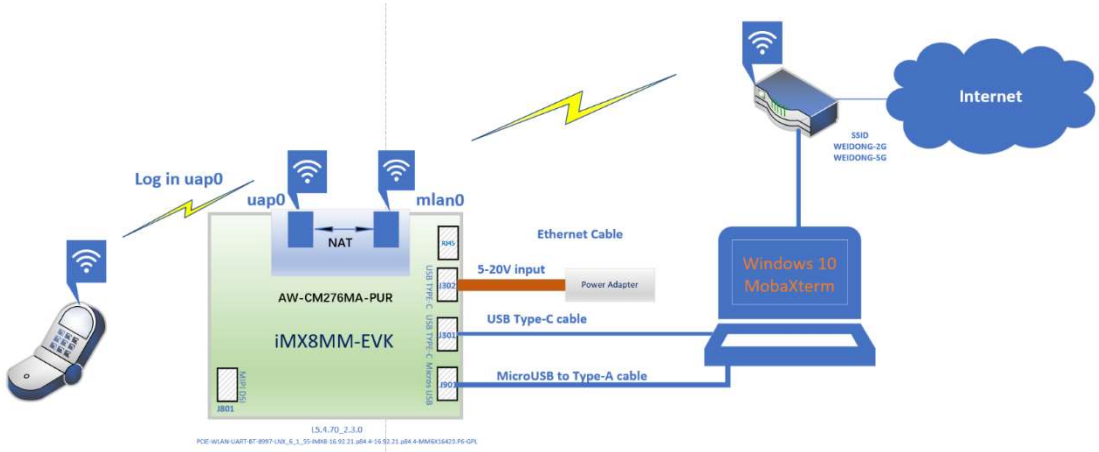


Figure 1 uap0 & mlan0

3. Preparation

- Downloading L5.4.70_2.3.0 Demo Image from NXP website

https://www.nxp.com/design/design-center/software/embedded-software/i-mx-software/embedded-linux-for-i-mx-applications-processors:IMXLINUX

- Downloading Demo image to eMMC on i.MX8MM-EVK using uuu tool
- Downloading L5.4.70_2.3.0 linux kernel source code and build it

git clone https://github.com/nxp-imx/linux-imx.git -b imx_5.4.70_2.3.0

- Downloading WiFi Mass Market driver and build it

https://www.nxp.com/products/wireless-connectivity/wi-fi-plus-bluetooth-plus-802-15-4/2-4-5-ghz-dual-band-2x2-wi-fi-5-802-11ac-plus-bluetooth-5-3-solution:88W8997?SAMLart=ST-AAF0E3YJDJej%2BJVBprc7Vu5rkUdez1wZD42ZEFzlEbkH8pjgPLKwTvmx#myDocument

- Generic_PCIE-WLAN-UART-BT-8997-LNX_6_1_55-IMX8-16.92.21.p84.4-16.92.21.p84.4-MM6X16423.P6-GPL

- Copying built result & firmware to board

- **bin_wlan** directory

config	2024/3/20 16:34	File folder	
wifidirect	2024/3/20 16:33	File folder	
load	2024/3/20 16:33	File	1 KB
mlan.ko	2024/3/20 16:33	KO File	826 KB
mlan2040coex	2024/3/20 16:33	File	37 KB
mlanevent	2024/3/20 16:33	Application	59 KB
mlanutl	2024/3/20 16:33	File	428 KB
mlanwls	2024/3/20 16:33	File	147 KB
moal.ko	2024/3/20 16:33	KO File	1,536 KB
README	2024/3/20 16:33	File	47 KB
README_MLAN	2024/3/20 16:33	File	222 KB
README_MLANWLS	2024/3/20 16:33	File	7 KB
README_RBC	2024/3/20 16:33	File	5 KB
README_UAP	2024/3/20 16:33	File	112 KB
README_WIFIDIRECT	2024/3/20 16:33	File	14 KB
uaputl	2024/3/20 16:33	Application	331 KB
unload	2024/3/20 16:33	File	1 KB
wifidirectutl	2024/3/20 16:33	File	127 KB

- **FwImage** directory in source code

Name	Date modified	Type	Size
pcie8997_wlan_v4.bin	2024/3/20 16:31	BIN File	429 KB
pcieuart8997_combo_v4.bin	2024/3/20 16:31	BIN File	609 KB
uartuart8997_bt_v4.bin	2024/3/20 16:31	BIN File	180 KB

- Confirming them on board

```
root@imx8mmevk:~# ls
FwImage  bin_wlan
root@imx8mmevk:~# ls FwImage/
pcie8997_wlan_v4.bin  pcieuart8997_combo_v4.bin  uartuart8997_bt_v4.bin
root@imx8mmevk:~# ls bin_wlan/
README       README_MLANWLS  README_UAP         config  mlan.ko       mlanevent.exe  mlanwls  uaputl.exe  wifidirect
README_MLAN  README_RBC      README_WIFIDIRECT  load    mlan2040coex  mlanutl        moal.ko  unload      wifidirectutl
root@imx8mmevk:~#
```

- Copying files of FW to /lib/firmware/nxp

cp FwImage/* /lib/firmware/nxp/

- Replacing old driver binary files with new mlan.ko & moal.ko

cp bin_wlan/*.ko /lib/modules/5.4.70-2.3.0+g4f2631b022d8/kernel/drivers/net/wireless/nxp/mxm_wifiex/wlan_src/

- Checking /lib/firmware/nxp/wifi_mod_para.conf

  Use nano to open the file, and find pcie8997 node, change it like below:

```
PCIE8997 = {
        cfg80211_wext=0xf
        wfd_name=p2p
        max_vir_bss=1
        cal_data_cfg=none
        drv_mode=3
        ps_mode=2
        auto_ds=2
        host_mlme=1
        fw_name=nxp/pcieuart8997_combo_v4.bin
}
```

4. Configurations

(1) /etc/wpa_supplicant.conf (for STA)

```
ctrl_interface=/var/run/wpa_supplicant
update_config=1
freq_list=2412 2417 2422 2427 2432 2437 2442 2447 2452 2457 2462 2467 2472
network={
        ssid="WEIDONG-2G"
        psk="Apple_20220801"
        proto=RSN
        key_mgmt=WPA-PSK
        pairwise=CCMP TKIP
        group=CCMP TKIP
}
```

(2) /etc/hostapd.conf (For uAP)

```
ctrl_interface=/var/run/hostapd
interface=uap0
driver=nl80211
ssid=8997-uap0_2G
hw_mode=g
channel=1
max_num_sta=10
auth_algs=1
beacon_int=100
dtim_period=1
wmm_enabled=1
ignore_broadcast_ssid=0
wpa_key_mgmt=WPA-PSK
wpa=2
rsn_pairwise=CCMP
wpa_passphrase=123456789
own_ip_addr=192.168.6.1
```

(3) /etc/systemd/network/hostapd.network

```
# If the file can't be found in the directory, use touch command to create it.
# add these lines to the file.
[Match]
Name=uap0
[Network]
Address=192.168.6.1/24
DHCPServer=yes
```

(4) /lib/systemd/system/hostapd.service

```
root@imx8mmevk:~# nano /lib/systemd/system/hostapd.service
BindsTo=sys-subsystem-net-devices-uap0.device
After=sys-subsystem-net-devices-uap0.device
After=enable-wifi.service
root@imx8mmevk:~#    systemctl --system daemon-reload
```

(5) /etc/systemd/system/enable-wifi.service

```
root@imx8mmevk:~# nano /etc/systemd/system/enable-wifi.service
[Unit]
Description=Enable wifi
BindsTo=sys-subsystem-net-devices-uap0.device
After=sys-subsystem-net-devices-uap0.device
[Service]
Type=oneshot
ExecStart=/usr/sbin/connmanctl enable wifi
#ExecStop=/usr/sbin/ifconfig uap0 down
RemainAfterExit=yes
[Install]
WantedBy=multi-user.target
```

(6) /etc/sysctl.conf

```
root@imx8mmevk:~# nano /etc/sysctl.conf

net.ipv4.ip_forward=1
net.ipv6.conf.all.forwarding=1

Save & Exit
root@imx8mmevk:~# sysctl -p (check if net.ipv4.ip_forward is valid)

[note]
# cat /proc/sys/net/ipv4/ip_forward    (check if net.ipv4.ip_forward is valid)
# echo 1 >/proc/sys/net/ipv4/ip_forward    (enable it manually)
Or
# sysctl -w net.ipv4.ip_forward=1
```

(7) /etc/udhcpd.conf

```
root@imx8mmevk:~# nano /etc/udhcpd.conf
# The start and end of the IP lease block
start 192.168.6.2
end 192.168.6.24
interface uap0                                  #default: eth0
max_leases 20                                   #default: 254
remaining yes                                   #default: yes
auto_time 7200                                  #default: 7200 (2 hours)
decline_time 3600                               #default: 3600 (1 hour)
conflict_time 3600                              #default: 3600 (1 hour)
offer_time 60                                   #default: 60 (1 minute)
min_lease 60                                    #defult: 60
lease_file /etc/udhcpd.leases
opt dns 165.114.52.147 165.114.89.4 192.168.1.1     #external dns server
option subnet 255.255.255.0
opt router 192.168.6.1                           # uap0 IP
option domain local
option lease 864000

Save & Exit

root@imx8mmevk:~# touch /etc/udhcpd.leases
```

(8) Configurations For NAT between uap0 & eth0

```
# iptables -t nat -A POSTROUTING -o eth0 -j MASQUERADE
# iptables -A FORWARD -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
# iptables -A FORWARD -i uap0 -o eth0 -j ACCEPT
# iptables-save > /etc/iptables/iptables.rules
```

[note]

The file /lib/systemd/system/iptables.service should be like below, if the file can't be find in the directory, create it, please! And add following lines to the file.

```
[Unit]
Description=Packet Filtering Framework
Before=network-pre.target
Wants=network-pre.target
[Service]
Type=oneshot
ExecStart=/usr/sbin/iptables-restore /etc/iptables/iptables.rules
ExecReload=/usr/sbin/iptables-restore /etc/iptables/iptables.rules
RemainAfterExit=yes
```

(9) Enabling iptables

```
# systemctl --system daemon-reload
# systemctl enable iptables
```

(10) Configuring main.conf for connman.service

```
# cd /etc/
# mkdir connman
# nano main.conf
 Add the line to the file
==================================
[General]
NetworkInterfaceBlacklist=wfd0,uap0,p2p0,muap0,mwfd0,p2p1
==================================
Save & Exit
```

(11) Loading WiFi driver

```
root@imx8mmevk:~# modprobe moal mod_para=nxp/wifi_mod_para.conf
[ 6548.170820] mlan: loading out-of-tree module taints kernel.
[ 6548.218431] wlan: Loading MWLAN driver
[ 6548.222756] wlan: Register to Bus Driver...
[ 6548.227163] wlan_pcie 0000:01:00.0: enabling device (0000 -> 0002)
[ 6548.233482] PCI memory map Virt0: 00000000645e562a PCI memory map Virt2: 00000000e012f827
[ 6548.241690] Attach moal handle ops, card interface type: 0x204
[ 6548.247548] rps set to 0 from module param
[ 6548.253345] PCIE8997: init module param from usr cfg
[ 6548.258378] card_type: PCIE8997, config block: 0
[ 6548.263016] cfg80211_wext=0xf
[ 6548.266000] wfd_name=p2p
[ 6548.268533] max_vir_bss=1
[ 6548.271183] cal_data_cfg=none
[ 6548.274169] drv_mode = 3
[ 6548.276716] ps_mode = 2
[ 6548.279162] auto_ds = 2
[ 6548.281637] host_mlme=enable
[ 6548.284519] fw_name=nxp/pcieuart8997_combo_v4.bin
[ 6548.289286] rx_work=1 cpu_num=4
[ 6548.292429] Enable moal_recv_amsdu_packet
[ 6548.296468] Attach mlan adapter operations.card_type is 0x204.
[ 6548.304666] Request firmware: nxp/pcieuart8997_combo_v4.bin
[ 6548.906666] FW download over, size 622824 bytes
[ 6549.609293] WLAN FW is active
[ 6549.612269] on_time is 6549723676194
[ 6549.655277] FW country code WW does not match with US
[ 6549.661096] fw_cap_info=0x587c7fa3, dev_cap_mask=0xffffffff
[ 6549.666691] max_p2p_conn = 8, max_sta_conn = 8
[ 6549.680825] Register NXP 802.11 Adapter mlan0
[ 6549.686037] wlan: uap%d set max_mtu 2000
[ 6549.691766] Register NXP 802.11 Adapter uap0
[ 6549.696994] wlan: version = PCIE8997--16.92.21.p84.4-MM6X16423.p6-(FP92)
[ 6549.704812] wlan: Register to Bus Driver Done
[ 6549.709278] wlan: Driver loaded successfully
root@imx8mmevk:~#
```

```
root@imx8mmevk:~# ifconfig -a
eth0      Link encap:Ethernet  HWaddr 00:04:9f:07:29:84
          BROADCAST MULTICAST DYNAMIC  MTU:1500  Metric:1
          RX packets:501 errors:0 dropped:0 overruns:0 frame:0
          TX packets:252 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:57278 (55.9 KiB)  TX bytes:17203 (16.7 KiB)

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:86 errors:0 dropped:0 overruns:0 frame:0
          TX packets:86 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:6592 (6.4 KiB)  TX bytes:6592 (6.4 KiB)

mlan0     Link encap:Ethernet  HWaddr 20:4e:f6:ba:fc:15
          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)

uap0      Link encap:Ethernet  HWaddr 22:4e:f6:ba:fd:15
          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@imx8mmevk:~#
```

(12) Configuring uap0 IP address

```
root@imx8mmevk:~# ifconfig uap0 192.168.6.1 netmask 255.255.255.0 up
```

(13) Starting DHCP Service

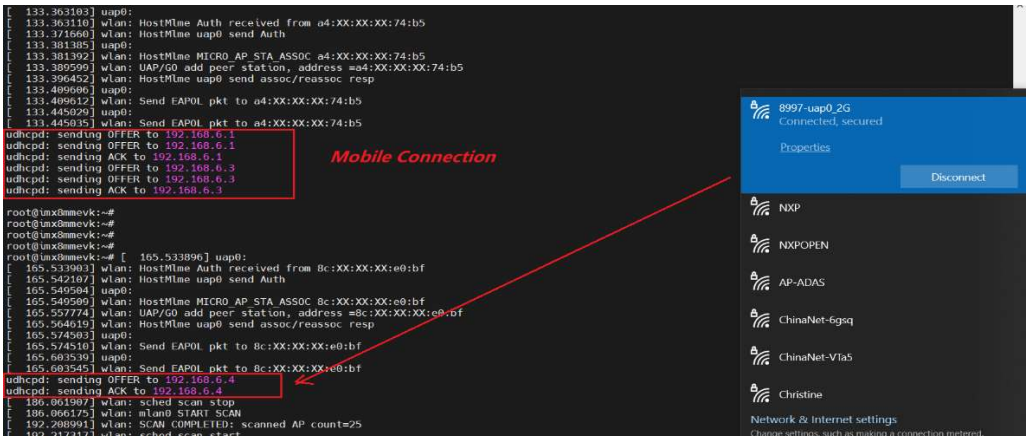
```
root@imx8mmevk:~# udhcpd -S /etc/udhcpd.conf -f &
```

(14) Starting WiFi & services

```
root@imx8mmevk:~# systemctl enable hostapd
root@imx8mmevk:~# systemctl start hostapd
root@imx8mmevk:~# systemctl daemon-reload
root@imx8mmevk:~# systemctl enable enable-wifi.service
```

```
root@imx8mmevk:~# systemctl enable hostapd
Created symlink /etc/systemd/system/multi-user.target.wants/hostapd.service -> /lib/systemd/system/hostapd.service.
root@imx8mmevk:~# systemctl start hostapd
[ 3274.954006] wlan: Starting AP
[ 3274.958251] CMD_RESP: cmd 0x121 error, result=0x2
[ 3274.962982] IOCTL failed: 0000000014b706d7 id=0x200000, sub_id=0x200024 action=2, status_code=0x2
[ 3274.971860] Get multi-channel policy failed
[ 3274.976690] fw doesn't support 11ax
[ 3274.992418] wlan: AP started
[ 3274.995506] IPv6: ADDRCONF(NETDEV_CHANGE): uap0: link becomes ready
[ 3275.004875] Set AC=3, txop=47 cwmin=3, cwmax=7 aifs=1
[ 3275.012061] Set AC=2, txop=94 cwmin=7, cwmax=15 aifs=1
[ 3275.019365] Set AC=0, txop=0 cwmin=15, cwmax=63 aifs=3
[ 3275.026513] Set AC=1, txop=0 cwmin=15, cwmax=1023 aifs=7
root@imx8mmevk:~# systemctl daemon-reload
root@imx8mmevk:~# systemctl enable enable-wifi.service
Created symlink /etc/systemd/system/multi-user.target.wants/enable-wifi.service -> /etc/systemd/system/enable-wifi.service.
root@imx8mmevk:~#
```

Now uap0 can be found by personal computer or mobile, below is connection to the uap0.



OK, Target 1 uap0+eth0 application is done.

Now Start Target 2 uap0+mlan0 application

(15) Target 2 uap0+mlan0 application

Here we still need previous steps for Target 1 application. for Target 2, we should remove ethernet cable, and **connect** mlan0 to external AP, then **add** new NAT to iptables.rules. We will use wpa_supplicant.conf file prepared at the beginning.

- **Configuring NAT between uap0 & mlan0**

```
# iptables -t nat -A POSTROUTING -o mlan0 -j MASQUERADE
# iptables -A FORWARD -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
# iptables -A FORWARD -i uap0 -o mlan0 -j ACCEPT
# iptables-save > /etc/iptables/iptables.rules

# systemctl --system daemon-reload
# systemctl enable iptables
# reboot
root@imx8mmevk:~# iptables -L -vn
Chain INPUT (policy ACCEPT 5551 packets, 432K bytes)
 pkts bytes target     prot opt in     out     source               destination

Chain FORWARD (policy ACCEPT 0 packets, 0 bytes)
 pkts bytes target     prot opt in     out     source               destination
14614   12M ACCEPT     all  --  *      *       0.0.0.0/0            0.0.0.0/0           ctstate RELATED,ESTABLISHED
    0     0 ACCEPT     all  --  uap0   eth0    0.0.0.0/0            0.0.0.0/0
    0     0 ACCEPT     all  --  *      *       0.0.0.0/0            0.0.0.0/0           ctstate RELATED,ESTABLISHED
  266 17306 ACCEPT     all  --  uap0   mlan0   0.0.0.0/0            0.0.0.0/0

Chain OUTPUT (policy ACCEPT 5322 packets, 404K bytes)
 pkts bytes target     prot opt in     out     source               destination
```

From the iptables list, we can see the configuration supports 2 NAT path:

① uap0---eth0

② uap0---mlan0

This is because we previously configured NAT between uap0 & eth0. So the NAT setting can support both paths.

- **Loading WiFi driver**

modprobe moal mod_para=nxp/wifi_mod_para.conf

- **Starting wpa_supplicant**

```
root@imx8mmevk:~# wpa_supplicant   -P /var/run/wpa_supplicant.mlan0.pid -i mlan0 -c /etc/wpa_supplicant.conf -Dnl80211 &
```

```
root@imx8mmevk:~# wpa_supplicant -P /var/run/wpa_supplicant.mlan0.pid -i mlan0 -c /etc/wpa_supplicant.conf -Dnl80211 &
[1] 594
Successfully initialized wpa_supplicant
root@imx8mmevk:~# rfkill: Cannot open RFKILL control device
mlan0: CTRL-EVENT-SCAN-FAILED ret=-16 retry=1
mlan0: CTRL-EVENT-SCAN-FAILED ret=-16 retry=1
mlan0: CTRL-EVENT-SCAN-FAILED ret=-16 retry=1
mlan0: CTRL-EVENT-SCAN-FAILED ret=-16 retry=1
[   89.044412] AppControl: Failed: Larger Duplicate Beacon (22), old = 329, new = 466, space = 335, left = 72
[   89.054128] wlan: SCAN COMPLETED: scanned AP count=39
[   89.199247] wlan: mlan0 START SCAN
[   90.657382] wlan: SCAN COMPLETED: scanned AP count=39
mlan0: SME: Trying to authenticat[   90.667201] wlan: HostMlme mlan0 send auth to bssid 34:XX:XX:XX:ef:2b
e with 34:f7:16:78:ef:2b (SSID='WEIDONG-2G' freq=2437 MHz)
[   90.683104] mlan0:
[   90.683111] wlan: HostMlme Auth received from 34:XX:XX:XX:ef:2b
mlan0: Trying to associate with 3[   90.694616] CMD_RESP: cmd 0x121 error, result=0x2
4:f7:16:78:ef:2b (SSID='WEIDONG-2[   90.701803] IOCTL failed: 00000000532eee0e id=0x200000, sub_id=0x200024 action=2, status_code=0x3
G' freq=2437 MHz)
[   90.713502] Get multi-channel policy failed
[   90.733175] wlan: HostMlme mlan0 Connected to bssid 34:XX:XX:XX:ef:2b successfully
mlan0: Associated with 34:f7:16:7[   90.742124] mlan0:
8:ef:2b
mlan0: CTRL-EVENT-SUBNET[   90.742130] wlan: Send EAPOL pkt to 34:XX:XX:XX:ef:2b
-STATUS-UPDATE status=0
mlan0: CTRL-EVENT-REGDOM-CHANGE init=COUNTRY_IE type=COUNTRY a[   90.760867] mlan0:
lpha2=CN
[   90.760873] wlan: Send EAPOL pkt to 34:XX:XX:XX:ef:2b
mlan0: WPA: Key negotiation compl[   90.776733] IPv6: ADDRCONF(NETDEV_CHANGE): mlan0: link becomes ready
eted with 34:f7:16:78:ef:2b [PTK=[   90.786430] woal_cfg80211_set_rekey_data return: gtk_rekey_offload is DISABLE
CCMP GTK=CCMP]
mlan0: CTRL-EVENT-CONNECTED - Connection to 34:f7:16:78:ef:2b completed [id=0 id_str=]
```

- **Getting IP address using udhcpc**

```
root@imx8mmevk:~# udhcpc -i mlan0
udhcpc: started, v1.31.0
udhcpc: sending discover
udhcpc: sending select for 192.168.1.101
udhcpc: lease of 192.168.1.101 obtained, lease time 7200
/etc/udhcpc.d/50default: Adding DNS 165.114.52.147
/etc/udhcpc.d/50default: Adding DNS 165.114.89.4
```

- ping 8.8.8.8

```
root@imx8mmevk:~# 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=50 time=269 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=50 time=298 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=50 time=69.8 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=50 time=86.2 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=50 time=103 ms
^X64 bytes from 8.8.8.8: icmp_seq=6 ttl=50 time=85.4 ms
```

So far mlan0 connection to external AP is OK. Let us configure uap0

- **Configuring uap0 IP address**

```
root@imx8mmevk:~# ifconfig uap0 192.168.6.1 netmask 255.255.255.0 up
```

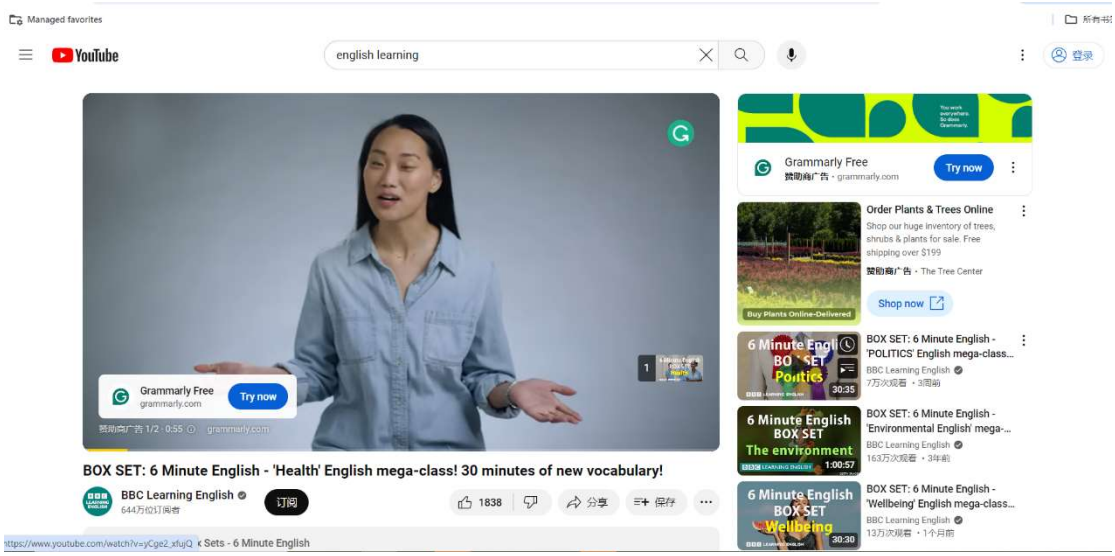
- **Starting DHCP Service**

```
root@imx8mmevk:~# udhcpd -S /etc/udhcpd.conf -f &
```

- **Starting WiFi & services**

```
root@imx8mmevk:~# systemctl enable hostapd
root@imx8mmevk:~# systemctl start hostapd
root@imx8mmevk:~# systemctl daemon-reload
root@imx8mmevk:~# systemctl enable enable-wifi.service
```

- **Watching a video from youtube**



OK, target 2 application done.

[Note]

In order to avoid modifying too many files, users can decompress configuration-files-driver-firmware-5.4.70.zip, and copy all files to board.

```
-rwxr-xr-x 1 root root    1790 Apr 24 05:41 configure.sh
-rw-r--r-- 1 root root     253 Apr 24 05:41 enable-wifi.service
-rw-r--r-- 1 root root     289 Apr 24 05:41 hostapd.conf
-rw-r--r-- 1 root root      66 Apr 24 05:41 hostapd.network
-rw-r--r-- 1 root root     382 Apr 24 05:41 hostapd.service
-rw-r--r-- 1 root root     312 Apr 24 05:41 iptables.service
-rw-r--r-- 1 root root      69 Apr 24 05:41 main.conf
-rw-r--r-- 1 root root  845768 Apr 24 05:41 mlan.ko
-rw-r--r-- 1 root root 1572232 Apr 24 05:41 moal.ko
-rw-r--r-- 1 root root  622824 Apr 24 05:41 pcieuart8997_combo_v4.bin
-rwxr-xr-x 1 root root     532 Apr 24 05:41 setup-uap0-eth0.sh
-rwxr-xr-x 1 root root     933 Apr 24 05:41 setup-uap0-mlan0.sh
-rw-r--r-- 1 root root    2163 Apr 24 05:41 sysctl.conf
-rw-r--r-- 1 root root     573 Apr 24 05:41 udhcpd.conf
-rw-r--r-- 1 root root    3587 Apr 24 05:41 wifi_mod_para.conf
-rw------- 1 root root     251 Apr 24 05:41 wpa_supplicant.conf
root@imx8mmevk:~#
```

Then run scripts below:

```
root@imx8mmevk:~# ./configure.sh
root@imx8mmevk:~# ./setup-uap0-mlan0.sh
If users want to use uap0 + eth0, connect ethernet cable to external router, then run the script.
root@imx8mmevk:~# ./setup-uap0-eth0.sh
```

configuration-files-driver-firmware-5.4.70.zip

Connectivity Team of NXP TIC
Weidong Sun
23-Apr-2024