

This document had described the way to inform the wpa\_supplicant to do the WiFi connection by using the wpa\_cli. The wpa\_supplicant had supported all kinds of security connections and WPS defined in the 802.11 specification. So, we suggest use the wpa\_supplicant to do the WiFi connection rather than the iwconfig wireless tool.

## (A) Start WPA\_SUPPLICANT

### 1. compile wpa\_supplicant

```
#cd wpa_supplicant
#make
```

### 2. If compile fail like this:

```
...
...
../src/drivers/driver_nl80211.c:19:31: fatal error: netlink/genl/genl.h: No such file
#include <netlink/genl/genl.h>
      ^
compilation terminated.
make: *** [../src/drivers/driver_nl80211.o] Error 1
```

Try to find which library contains the missing file by:

```
#sudo apt-file search /netlink/genl/genl.h
```

If lost libnl, install the library:

```
# sudo apt-get install libnl-dev
or
# sudo apt-get install libnl-3-dev
```

Base on your libnl version to modify .config  
For libnl-1.x:

```
LIBNL=<path to install the libnl>
CFLAGS += -I$(LIBNL)/include
LIBS += -L$(LIBNL)/lib
```

For libnl-3.x:

```
LIBNL=<path to install the libnl>
CFLAGS += -I$(LIBNL)/include/libnl3
LIBS += -L$(LIBNL)/lib
CONFIG_LIBNL20=y
CONFIG_LIBNL32=y
```

p.s. Version 3.x need add both flag (CONFIG\_LIBNL20=y and CONFIG\_LIBNL32=y)

For WPA3-SAE:

File: .config

```
CONFIG_TLS=openssl
CONFIG_IEEE80211W=y
CONFIG_SAE=y
```

Re-compile wpa\_supplicant

```
# make
```

3. Start wpa\_supplicant

- i. Run wpa\_supplicant in background:

If cfg80211:

```
# wpa_supplicant -Dnl80211 -iwlan0 -c ../../wpa_0_8.conf -B
```

Or wireless extensions:

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

- ii. Run wpa\_supplicant in background with debug message (This may affect the performance, only used in debug purpose.)

If cfg80211:

```
# wpa_supplicant -Dnl80211 -iwlan0 -c ../../wpa_0_8.conf -dd &
```

Or wireless extension:

```
# wpa_supplicant -Dwext -iwlan0 -c ../../wpa_0_8.conf -dd &
```

- iii. If rtk driver ver >= v5.9 and will use WiFi Direct, please add below parameter to wpa\_0\_8.conf

```
p2p_no_group_iface=1
```

- iv. If STA(wlan0) + P2P(wlan1) concurrent mode will be used, please use concurrent\_mode\_wpa\_0\_8.conf and concurrent\_mode\_p2p\_hostapd.conf. Extra parameters are set in these config files

**concurrent\_mode\_wpa\_0\_8.conf**

```
p2p_disabled=1
```

**concurrent\_mode\_p2p\_hostapd.conf.**

```
p2p_no_group_iface=1
```

You can start wpa\_supplicant with command

```
# wpa_supplicant -Dnl80211 -iwlan0 -c ../../concurrent_mode_wpa_0_8.conf -dd \
-N -i wlan1 -D nl80211 -c ../../concurrent_mode_p2p_hostapd.conf -dd &
```

## (B) WPA\_CLI commands

1. Scanning AP and See Results

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

2. Connect to AP

a. OPEN

```
# 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 ""dlink""  
# wpa_cli -p/var/run/wpa_supplicant set_network 0 key_mgmt NONE  
# wpa_cli -p/var/run/wpa_supplicant select_network 0
```

b. 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 ""dlink""  
# 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
```

c. WEP40 with shared key mode

```
# 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 ""dlink""  
# 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
```

d. WEP104 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 ""dlink""  
# 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
```

e. WEP104 with shared key mode

```
# 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 ""dlink""  
# 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
```

(1) If wep key is ASCII type, use the following cmd:

For WEP40

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

For WEP104

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

(2) WEP key index is X from 0 to 3, change X for other key index and select it.

```
# 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
```

f. TKIP and 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 ""dlink""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 key_mgmt WPA-PSK
# wpa_cli -p/var/run/wpa_supplicant set_network 0 psk ""12345678""
# wpa_cli -p/var/run/wpa_supplicant select_network 0
```

g. WPA3-SAE Mode (MFPC=1, MFPR=1)

```
# 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 ""dlink""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 key_mgmt SAE
# wpa_cli -p/var/run/wpa_supplicant set_network 0 psk ""12345678""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 ieee80211w 2
# wpa_cli -p/var/run/wpa_supplicant select_network 0
```

h. WPA3-SAE Transition Mode (MFPC=1, MFPR=0)

```
# 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 ""dlink""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 key_mgmt SAE WPA-PSK
# wpa_cli -p/var/run/wpa_supplicant set_network 0 psk ""12345678""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 ieee80211w 1
# wpa_cli -p/var/run/wpa_supplicant select_network 0
```

3. Ad-hoc mode

a. OPEN

```
# wpa_cli -p/var/run/wpa_supplicant scan
# wpa_cli -p/var/run/wpa_supplicant scan_results
# wpa_cli -p/var/run/wpa_supplicant remove_network 0
# wpa_cli -p/var/run/wpa_supplicant ap_scan 2
# wpa_cli -p/var/run/wpa_supplicant add_network
# wpa_cli -p/var/run/wpa_supplicant set_network 0 ssid ""Adhoc_test""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 mode 1
# wpa_cli -p/var/run/wpa_supplicant set_network 0 key_mgmt NONE
# wpa_cli -p/var/run/wpa_supplicant set_network 0 frequency 2412
# wpa_cli -p/var/run/wpa_supplicant select_network 0
```

#frequency is to set the channel frequency for Ad-hoc master.

b. WEP40

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

```
# wpa_cli -p/var/run/wpa_supplicant remove_network 0
# wpa_cli -p/var/run/wpa_supplicant ap_scan 2
# wpa_cli -p/var/run/wpa_supplicant add_network
# wpa_cli -p/var/run/wpa_supplicant set_network 0 ssid ""Adhoc_test""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 mode 1
# 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 frequency 2412
# wpa_cli -p/var/run/wpa_supplicant select_network 0
```

c. WEP104

```
# wpa_cli -p/var/run/wpa_supplicant scan
# wpa_cli -p/var/run/wpa_supplicant scan_results
# wpa_cli -p/var/run/wpa_supplicant remove_network 0
# wpa_cli -p/var/run/wpa_supplicant ap_scan 2
# wpa_cli -p/var/run/wpa_supplicant add_network
# wpa_cli -p/var/run/wpa_supplicant set_network 0 ssid ""Adhoc_test""
# wpa_cli -p/var/run/wpa_supplicant set_network 0 mode 1
# 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 frequency 2412
# wpa_cli -p/var/run/wpa_supplicant select_network 0
```

4. Save the Current Connection AP configuration file

```
# wpa_cli -p/var/run/wpa_supplicant save_config
```

5. WPS Connection

(1) Push Button:

```
# wpa_cli -p/var/run/wpa_supplicant remove_network 0
# wpa_cli -p/var/run/wpa_supplicant wps_pbc any
```

(2) Pin Code:

```
# wpa_cli -p/var/run/wpa_supplicant remove_network 0
# wpa_cli -p/var/run/wpa_supplicant wps_pin any 12345670
```

Or

```
# wpa_cli -p/var/run/wpa_supplicant remove_network 0
# wpa_cli -p/var/run/wpa_supplicant wps_pin any
```

6. Get Current Status of wpa\_supplicant

```
# wpa_cli -p/var/run/wpa_supplicant status
```

7. Disable current network connection

```
# wpa_cli -p/var/run/wpa_supplicant disable_network 0
```

## (C) Using WPA\_SUPPLICANT by WPA\_CLI (Control interface commands)

1. Start **wpa\_cli** control interface:

```
# wpa_cli
```

2. **Commands:**

### PING

This command can be used to test whether wpa\_supplicant is replying to the control interface commands.

The expected reply is PONG if the connection is open and wpa\_supplicant is processing commands.

### STATUS

Request current status information. The output is a text block with each line in variable=value format. For example:

```
bssid=02:00:01:02:03:04  
ssid=test network  
pairwise_cipher=CCMP  
group_cipher=CCMP  
key_mgmt=WPA-PSK  
wpa_state=COMPLETED
```

### LIST\_NETWORKS

List configured networks.

network id / ssid / bssid / flags

0 example network any [CURRENT]

(note: fields are separated with tabs)

### SCAN

Request a new BSS scan.

### SCAN\_RESULTS

Get the latest scan results.

```
bssid / frequency / signal level / flags / ssid  
00:09:5b:95:e0:4e 2412 208 [WPA-PSK-CCMP] jkm private  
02:55:24:33:77:a3 2462 187 [WPA-PSK-TKIP] testing  
00:09:5b:95:e0:4f 2412 209 jkm guest
```

(note: fields are separated with tabs)

### ADD\_NETWORK

Add a new network. This command creates a new network with empty configuration. The new network is

disabled and once it has been configured it can be enabled with ENABLE\_NETWORK command.

ADD\_

NETWORK returns the **network id** of the new network or FAIL on failure

### SELECT\_NETWORK <network id>

Select a network (disable others). Network id can be received from the LIST\_NETWORKS command

output.

### **ENABLE\_NETWORK** <network id>

Enable a network. Network id can be received from the LIST\_NETWORKS command output.

### **DISABLE\_NETWORK** <network id>

Disable a network. Network id can be received from the LIST\_NETWORKS command output.

Special

network id **all** can be used to disable all network.

### **REMOVE\_NETWORK** <network id>

Remove a network. Network id can be received from the LIST\_NETWORKS command output.

Special

network id **all** can be used to remove all network.

### **SET\_NETWORK** <network id> <variable> <value>

Set network variables. Network id can be received from the LIST\_NETWORKS command output.

This command uses the same variables and data formats as the configuration file.

- ssid (network name, SSID)
- psk (WPA passphrase or pre-shared key)
- key\_mgmt (key management protocol, NONE, WPA-PSK, WPA-EAP)
- proto ( WPA WPA2)
- pairwise ( CCMP TKIP)
- group ( CCMP TKIP WEP40 WEP104)
- wep\_key0 ( set wep key for key index 0)
- wep\_tx\_keyidx ( select wep key index)
- frequency ( Channel frequency in megahertz (MHz) for IBSS )

### **GET\_NETWORK** <network id> <variable>

Get network variables. Network id can be received from the LIST\_NETWORKS command output.

### **SAVE\_CONFIG**

Save the current configuration.

### **AP\_SCAN** <ap\_scan value>

Change ap\_scan value: 0 = no scanning, 1 = wpa\_supplicant requests scans and uses scan results to select

the AP, 2 = wpa\_supplicant does not use scanning and just requests driver to associate and take care of AP selection