WizFi630S User Manual

(Version 1.1.0)

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Document Revision History

Date	Revision	Changes
2019-09-09	1.0	Release
2019-11-13	1.1	Typo correction

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1. Summary of this guide

This guide provides the information needed to configure, use, and update the WizFi630S on the WizFi630S-EVB. It is intended for software developers and system integrators who are embedding this product into their designs.

1.1 Included chapters

- Product overview: Main features of the WizFi630S and an Evaluation broad
- Operation mode
- Configuration methods: Instruction for accessing methods, Web manager and CLI
- Network setting: Instruction for configuring network using Web Manager and CLI method
- System setting: Introduction for adding new software and updating new firmware

2. Product overview

WizFi630S is a gateway module that include the UART protocol and TCP/IP protocol into IEEE802.11 b/g/n wireless LAN protocol. WizFi630S enables a device with serial interface to connect to LAN or WLAN for remotely control, measuring, and administration. WizFi630S can also work as an IP router because of its internally embedded switch.
WizFi630S uses interfaces like Serial(UART), LAN, Wi-Fi(WLAN) to perform functions such as Serial(UART)-To-Wi-Fi, Serial-To-Ethernet, Ethernet-To-Wi-Fi. Users can connect to WizFi630S's internal web server or use serial commands for simple Wi-Fi settings; not only serial devices but 8/16/32 bit micro controllers can also use UART for simple Wi-Fi settings.
WizFi630S can significantly reduce the processes for wireless module design, testing, and certification. Therefore, WizFi630S can be the best solution for users who lack wireless network experience.
WizFi630S follows the 802.11b/g/n standard and support up to 150Mbps speed in wireless interface.
WizFi630S provides a test board, pc software, and documents so that anyone can develop a wireless solution.

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2.1 Product Features

- WizFi630A Pin compatible
- 580MHz Clock
- 16-bit DDR2 128Mbytes SRAM, 32Mbytes SPI Flash
- Complies with IEEE802.11b/g/n.
- Gateway/AP(Bridge)/AP-Client/Client(Station)/Ad-hoc Mode , WDS/Repeater supports
- 1T1R RF Interface (2.4G only)
- Physical link rate up to 150Mpbs
- Built-in 3 Ethernet Ports
- 2 Serial Ports supports
- Working as Wi-Fi Router
- WEP 64/128bit, WPA/WPA2-PSK TKIP, AES
- Router and Firewall function supports

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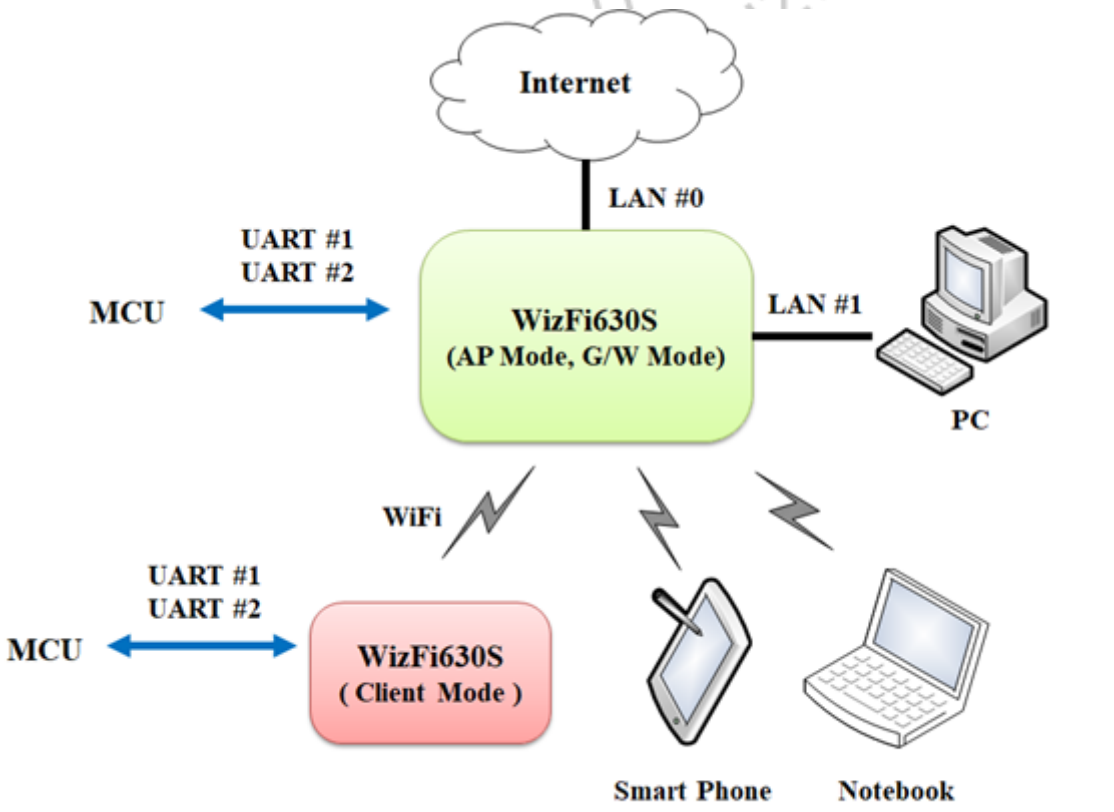

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2.2 Wireless Features

Type	Description
Wireless Standard	IEEE802.11b/g/n
Frequency Range	802.11b: 2412 ~2462 MHz 802.11g: 2412 ~2462 MHz 802.11n HT20: 2412 ~2462 MHz 802.11n HT40: 2422 ~2452 MHz
Operating Channels	802.11b: 11 Channels 802.11g: 11 Channels 802.11n HT20: 11 Channels 802.11n HT40: 7 Channels
Output Power (Tolerance(+/-1dBm))	802.11b: 11dBm@1Mbps 802.11g: 10dBm@6Mbps 802.11n HT20: 9.5dBm@MCS0 802.11n HT40: 7dBm@MCS0
Receive Sensitivity	802.11b: -48dBm@4% PER
Data Rates	802.11b: 1,2,5.5,11Mbps 802.11g: 6,9,12,18,24,36,48,54Mbps 802.11n: 29.5,86.5,115,130,144,150Mbps
Modulation Type	802.11b: DSS(CCK, QPSK, BPSK) 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) 802.11n HT20: OFDM(64QAM, 16QAM, QPSK, BPSK) 802.11n HT40: OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna	u.FL (EVB : 1T1R 3.77dBi)
Encryption	64/128Bit WEP, WPA, WPA2, TKIP, AES, WAPI

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2.3 HW Features

Type	Description
Interface	**Serial port** : 2 EA (optional 3EA) **LAN port** : 3 EA **USB 2.0 Host** : 1 EA **I2S** : 1EA **I2C** : 1EA **PWM** : 4EA
	U.FL(wireless)
Temperature	Operating: -25℃~+80℃
Humidity	TBD
Serial	Baud Rate : 115200(default)
	Stop bits: 1, 2
	Parity: None, Odd, Even
	Flow Control: Not supported
Input Power	DC 3.3V / 1A
Power Consumption	TBD
Dimension	33mm X 43mm X 3mm
Weight	

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2.4 SW Features

Software features related to OpenWRT features

Type	Description
Operation Mode	Access Point(Bridge), Client(Station), AP-Client
Wireless	Radio Enable/Disable
	SSID Hidden
	Multi SSID
	Rate Control
	TX Power Control
	Beacon Interval

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	DTIM Period
	Fragment Length
Protocol	TCP, UDP, ARP, ICMP, DHCP, PPPoE, HTTP
Security	WEP 64/128bit
	WPA/WPA2-PSK
	MAC Address Filtering / Limiting
Network	Port Forwading(UDP and/or TCP)
	DHCP Client / Server
	WDS(Wireless Distribution System) Support
	NAT
	VLAN
Management	Administrator ID / PWD
	Station & AP Association Information
	SSH(Secure Shell) Support
	Web based Configuration / Serial Command Configuration
	Upgrade through WEB UI
Serial To Wi-Fi	2 Serial Port supports

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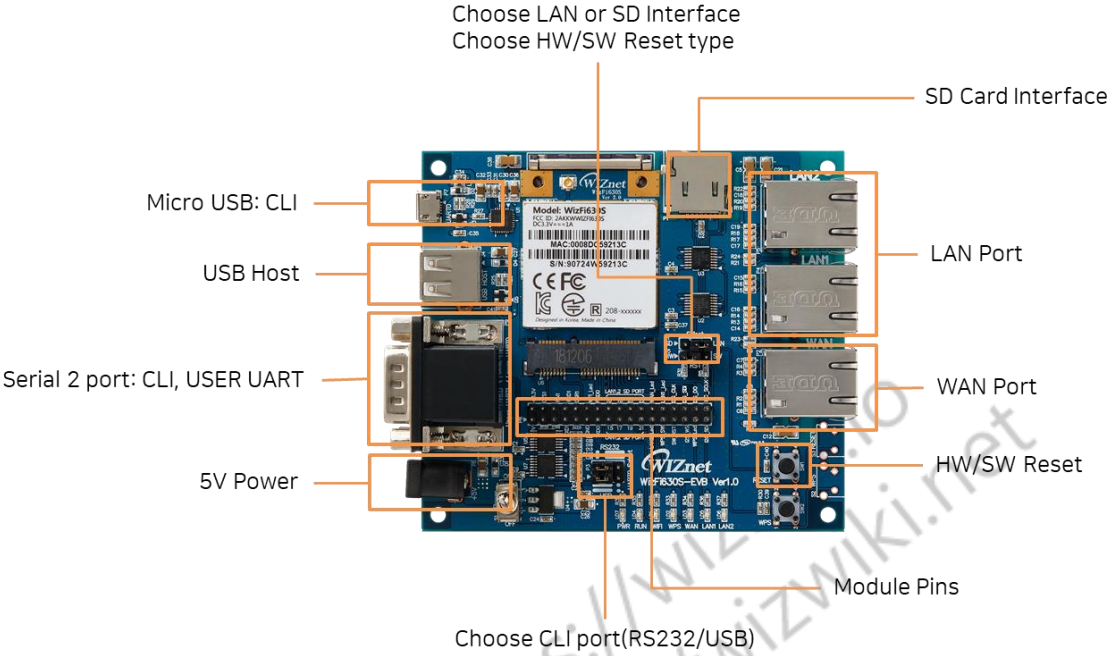
2.5 Evaluation Board



User have to prepare below parts their own to use WizFi630S and WizFi630S-EVB.

Power source & serial command line	Wireless	Ethernet

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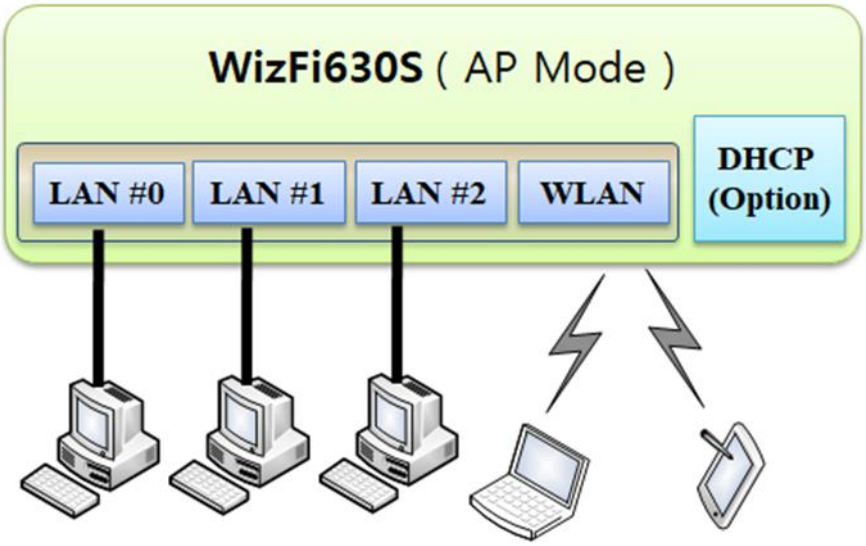
3. Operation Mode

3.1 Access Point

In this mode, all Ethernet ports and the wireless interface are bridged together. Wired/Wireless interface has the same IP address space with its top mesh. DHCP Server function is disabled and WizFi630S does not assign an IP. Wireless (LAN Port included) sending periodic Broadcast Packet to Station and maintains a connection with Station



3.2 Gateway

When operating in router mode, interfaces are separated into WAN I/F (Internet Network), LAN I/F (Sub Private Network: 192.168.16.xxx), and Wireless I/F (Sub Private Network: 192.168.16.xxx). Port#0 will be assigned to the WAN Port. WizFi630S periodically sends Broadcast Packet to Sub-LAN (LAN Port included) and maintains connection with Station

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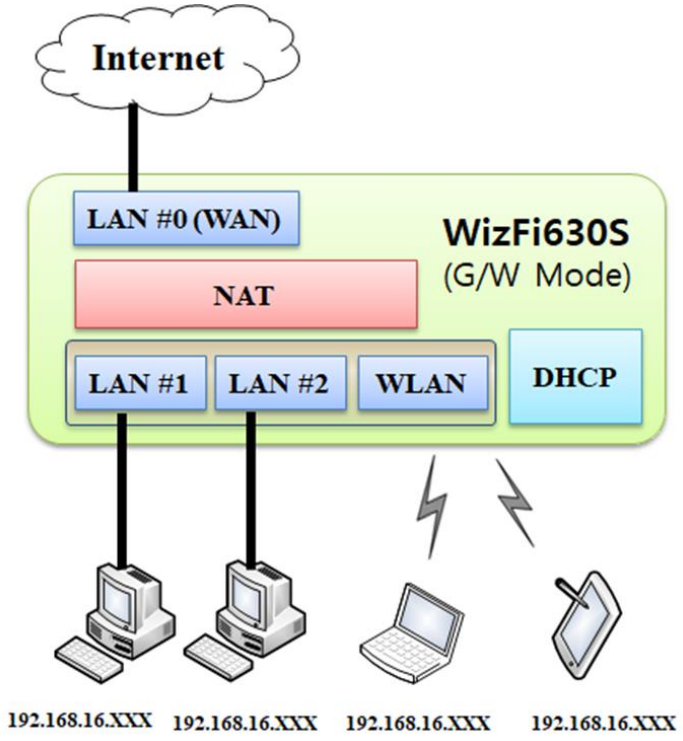

3.3 Client (Station)

Wireless I/F is assigned as WAN Port and all Ethernet Ports are bound to LAN Port. Set the profile and the WizFi630S is automatically connected to the AP when re-booting in the future. Devices that are connected through the LAN port are assigned a private IP. WizFi630S periodically sends PING Packet to AP Gateway and maintains connection with AP.

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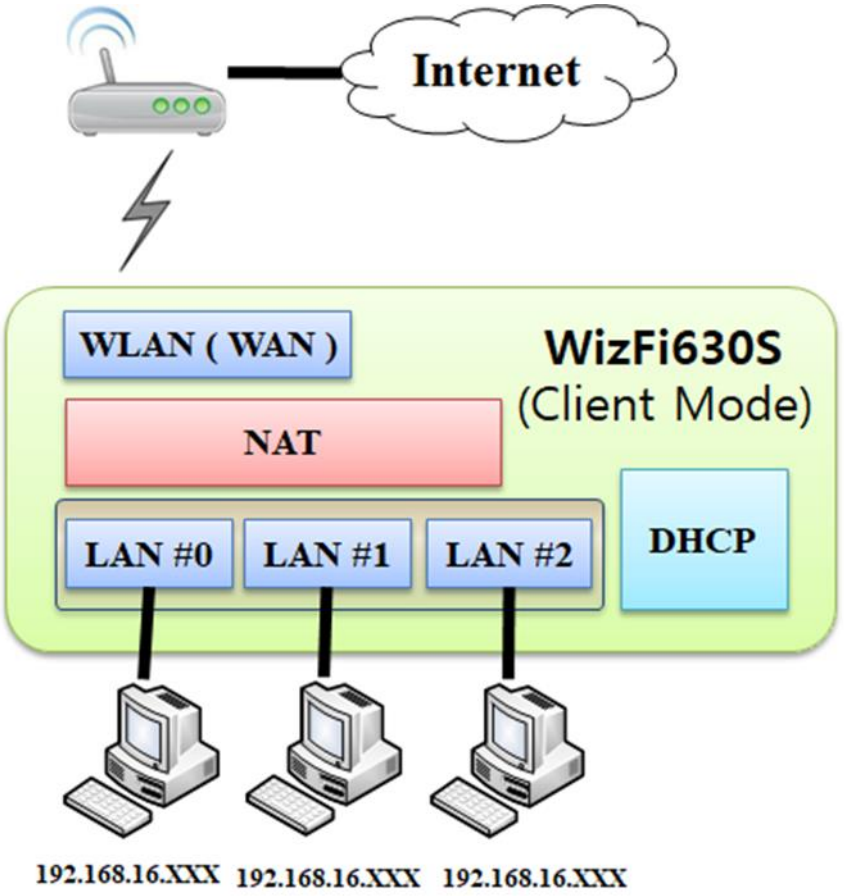

3.4 AP-Client mode

Wireless I/F is assigned as WAN Port and all Ethernet Ports are bound to LAN Port. This mode is similar to Station mode, however the difference is that the Wireless I/F will operate as client with AP simultaneously. WizFi630S periodically sends Broadcast Packet to Sub-LAN (LAN Port included) and maintains connection with Station.

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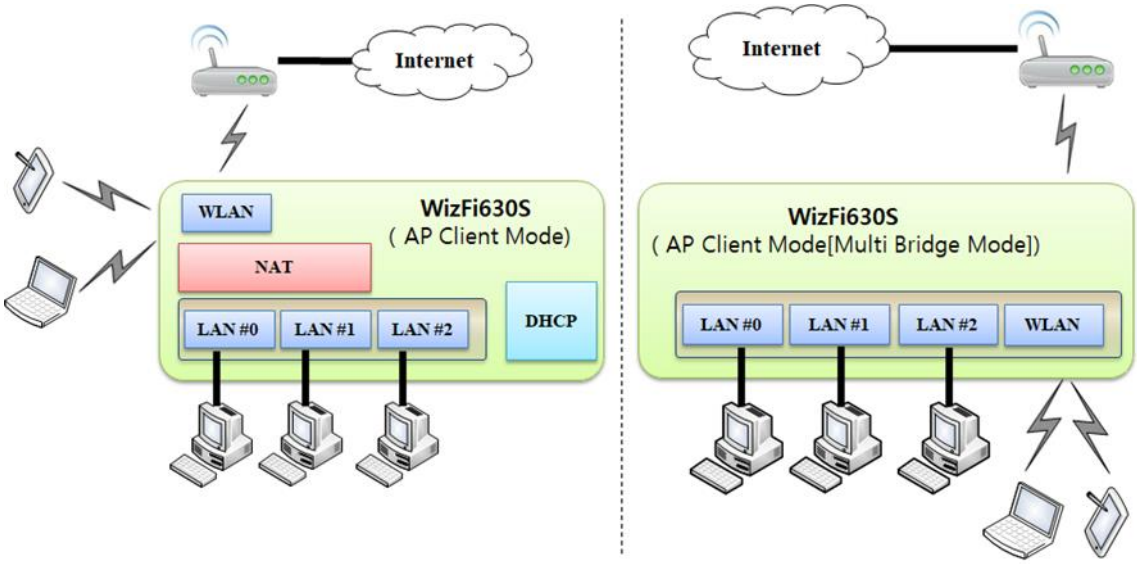

4. Configuration Methods

There are 2 basic methods for logging into the WizFi630S module and setting up the operating modes and other configurable settings.

- **Web Manager**: View and configure all settings easily through a web browser.
- **Command Mode**: There are a few methods for accessing Command Mode (CLI). making a SSH connection, or connecting a PC or other host running a terminal emulation program to the unit's serial port.

4.1 Configuration using Web Manager

To use the Web Manager of WizFi630S, a network connection must be established between the PC and the module. There are two ways to connect to the network.

- **Wireless**: PC is connected to WizFi630S AP using Wi-Fi
- **Wired**: Connect the WizFi630S-EVB's Ethernet interface to the same network as your PC.

After connecting between the devices, you can access the Web Manager using a standard web browser.

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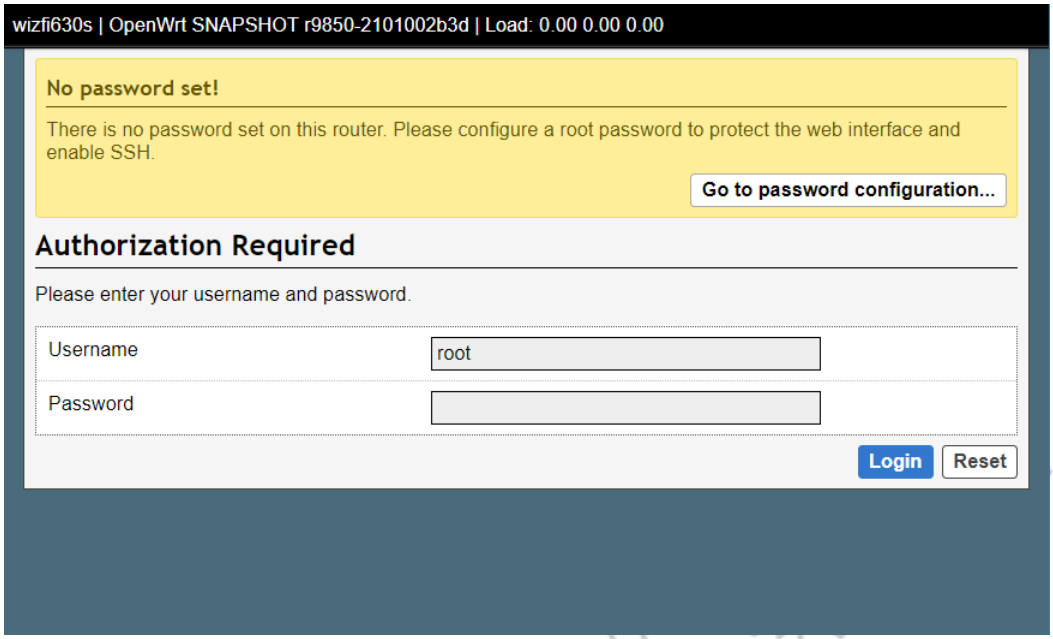
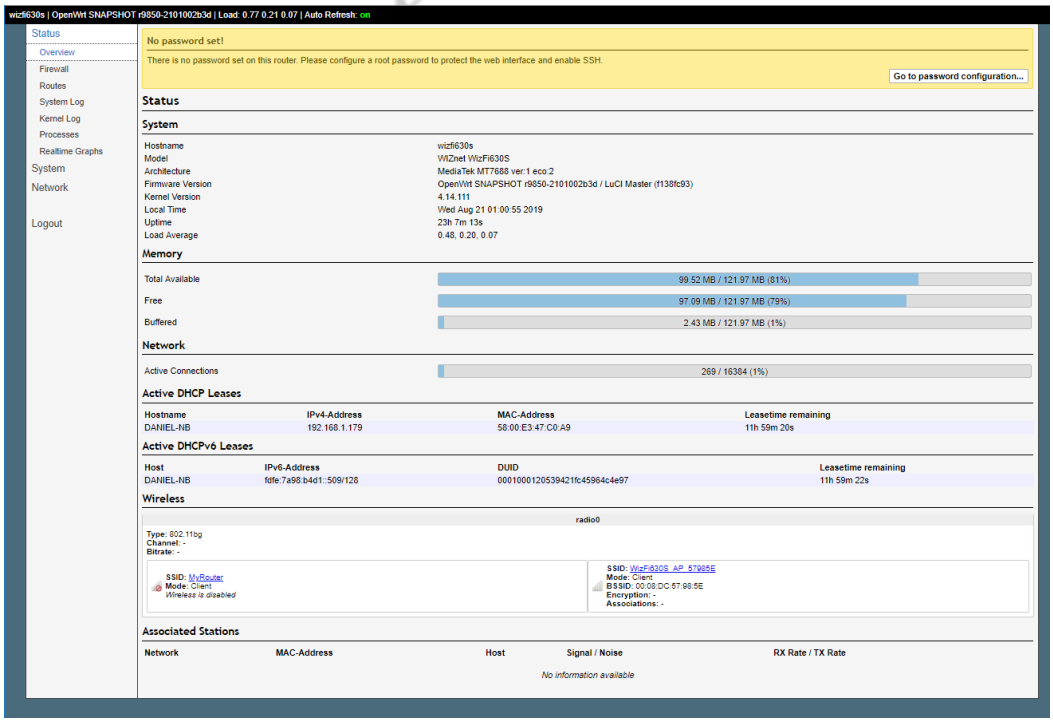
- If your PC get a IP address from the WizFi630S module, you can access to Web Manager page through 192.168.1.1 or http://wizfi630s/



The password is not set by default. Click Login without password to go to the setting screen, or click "Go to password configuration..." to set the password.

The initial screen is shown below. Through Web Manager, you can check the status of the device and make system and network related settings.



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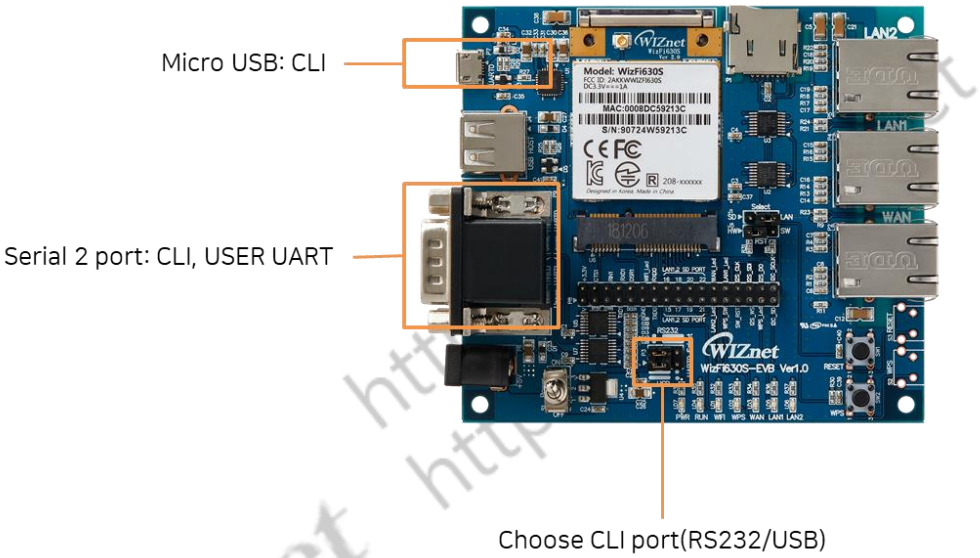
4.2 Configuration using Command mode

The Command Line Interface settings allow you to control how users connect to and interact with the command line of the WizFi630S module. It is possible to configure access SSH protocol, in addition to CLI options using Serial port.

To connect CLI to using Serial port. refer to the following image.



- **Default Baud rate**: 115200
- **Default Data size**: 8bit
- **Default Parity**: none
- **Default Flow control**: none (not supported)

After connecting between the devices, you can access the CLI using a terminal emulation program.

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```
U-Boot 1.1.3 (Aug  1 2019 - 11:25:14)

Board: Ralink APSoC DRAM:  128 MB
relocate_code Pointer at: 87fb8000
flash manufacture id: ef, device id 40 19
find flash: W25Q256FV
flash address mode: 4B
[WizFi630S] MAC: 00:08:dc:57:98:5e
============================================
Ralink UBoot Version: 4.3.0.0
--------------------------------------------
ASIC 7628_MP (Port5<->None)
DRAM component: 1024 Mbits DDR, width 16
DRAM bus: 16 bit
Total memory: 128 MBytes
Flash component: SPI Flash
Date:Aug  1 2019  Time:11:25:14
============================================
icache: sets:512, ways:4, linesz:32 ,total:65536
dcache: sets:256, ways:4, linesz:32 ,total:32768

 ##### The CPU freq = 580 MHZ ####
 estimate memory size =128 Mbytes
RESET MT7628 PHY!!!!!!
Please choose the operation:
   1: Load system code to SDRAM via TFTP.
   2: Load system code then write to Flash via TFTP.
   3: Boot system code via Flash (default).
   4: Entr boot command line interface.
   7: Load Boot Loader code then write to Flash via Serial.
   9: Load Boot Loader code then write to Flash via TFTP.
 0

3: System Boot system code via Flash.
## Booting image at bc050000 ...
   Image Name:   MIPS OpenWrt Linux-4.14.111
   Image Type:   MIPS Linux Kernel Image (lzma compressed)
   Data Size:    1583627 Bytes =  1.5 MB
   Load Address: 80000000
```

Then press Enter key to activate Serial CLI.

```
BusyBox v1.30.1 () built-in shell (ash)

  _______                     ________        __
 |       |.-----.-----.-----.|  |  |  |.----.|  |_
 |   -   ||  _  |  -__|     ||  |  |  ||   _||   _|
 |_______||   __|_____|__|__||________||__|  |____|
          |__| W I R E L E S S   F R E E D O M
 -----------------------------------------------------
 OpenWrt SNAPSHOT, r9850-2101002b3d
 -----------------------------------------------------
=== WARNING! =====================================
There is no root password defined on this device!
Use the "passwd" command to set up a new password
in order to prevent unauthorized SSH logins.
--------------------------------------------------
root@wizfi630s:/#
root@wizfi630s:/#
```

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5. Network Settings

The Network Settings show the status of the WizFi630S module's interface/link and lets you configure the settings on the device. Interface settings are related to the configuration of the IP and related protocols.

The WizFi630S module contains two interfaces. The Ethernet interface is called eth0, and the WLAN interface is called ra0, apcli0.

Some settings require a reboot to take effect.

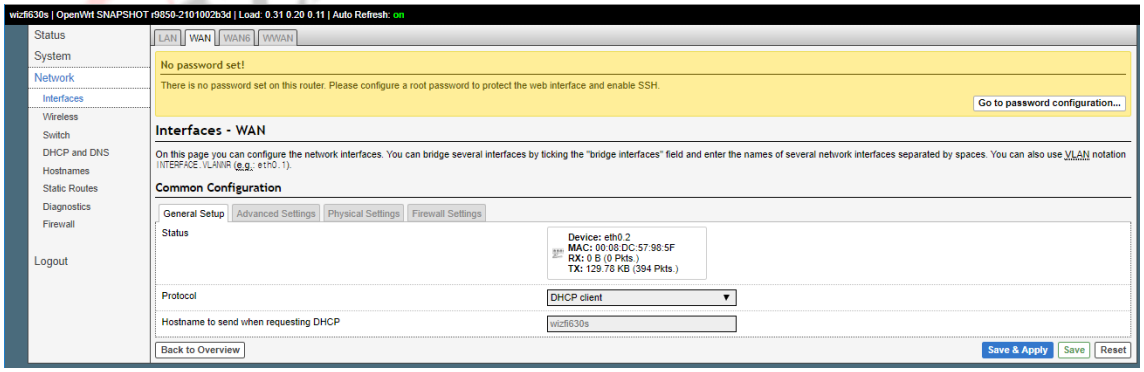
5.1 Interfaces

Sections of the interfaces declare logical networks serving as containers for IP address settings, aliases, routes, physical interface names they play a central role within the network configuration concept.

5.1.1 Web Manager

If WizFi630S connects to an existing network using the WAN port, configure it on the WAN tab.

If your Existing network supports DHCP Server, set "Protocol" to "DHCP Client" as shown below.



If the Existing network does not support DHCP Server or if you want to use defined IP address, set "Protocol" to "Static address" and enter the IP information of the Existing network as below.

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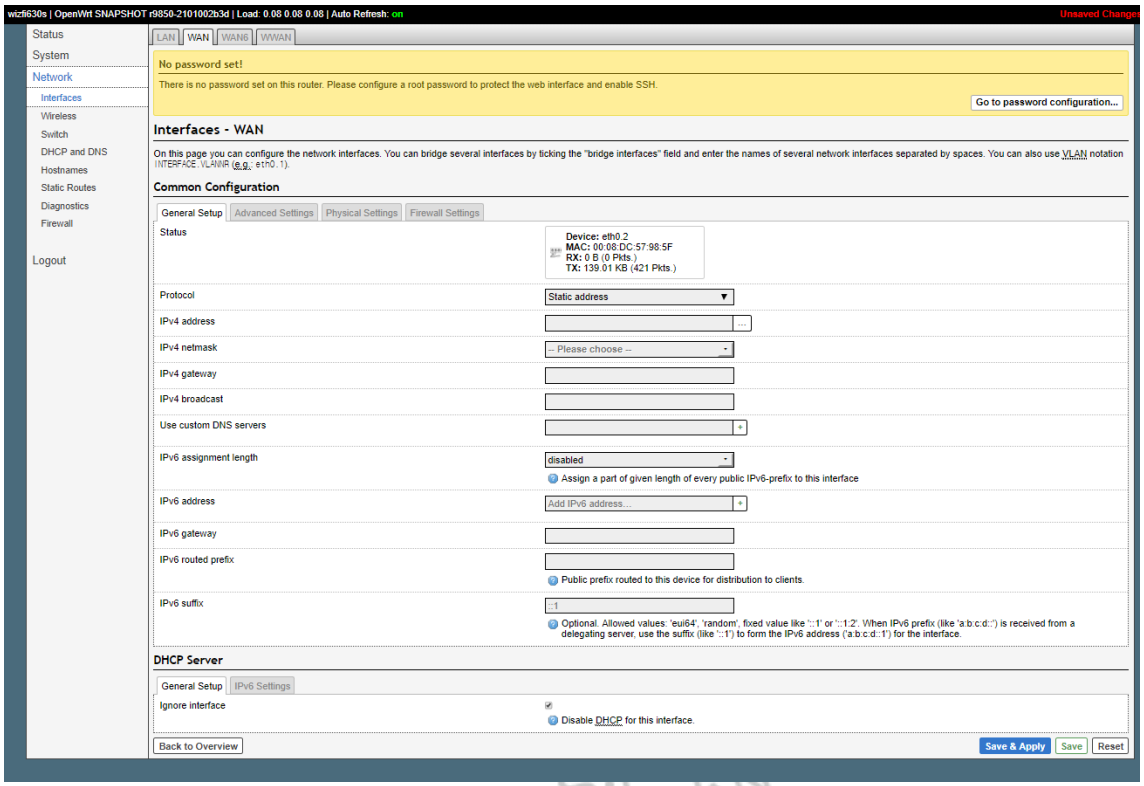

5.1.2 Command mode

to make the same we just did with Web Manager above, see below for more detailed explanation of the steps.

You can show what is set using command below.

uci show network.wan

```
root@wizfi630s:/# uci show network.wan
network.wan=interface
network.wan.ifname='eth0.2'
network.wan.proto='dhcp'
root@wizfi630s:/#
```

DHCP Client

1. type uci set network.wan.proto='dhcp' and press Enter
2. type uci commit && service network restart (this will save the changes and restart network interfaces)
3. now you can connect the network cable from the WizFi630S's WAN port to your existing

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network (the other router's LAN ports usually)

4. connect again to the WizFi630S at its new address as assigned from dhcp server

Static address

1. type uci set network.wan.proto='static' and press Enter
2. type uci set network.wan.ipaddr='ip-address-here' and press Enter
3. type uci set network.wan.netmask='subnet-mask-here' and press Enter
4. type uci commit && service network restart (this will save the changes and restart network interfaces)
5. now you can connect the network cable from the device's WAN port to your existing network (the other router's LAN ports usually)
6. connect again to the device at its new address as defined above

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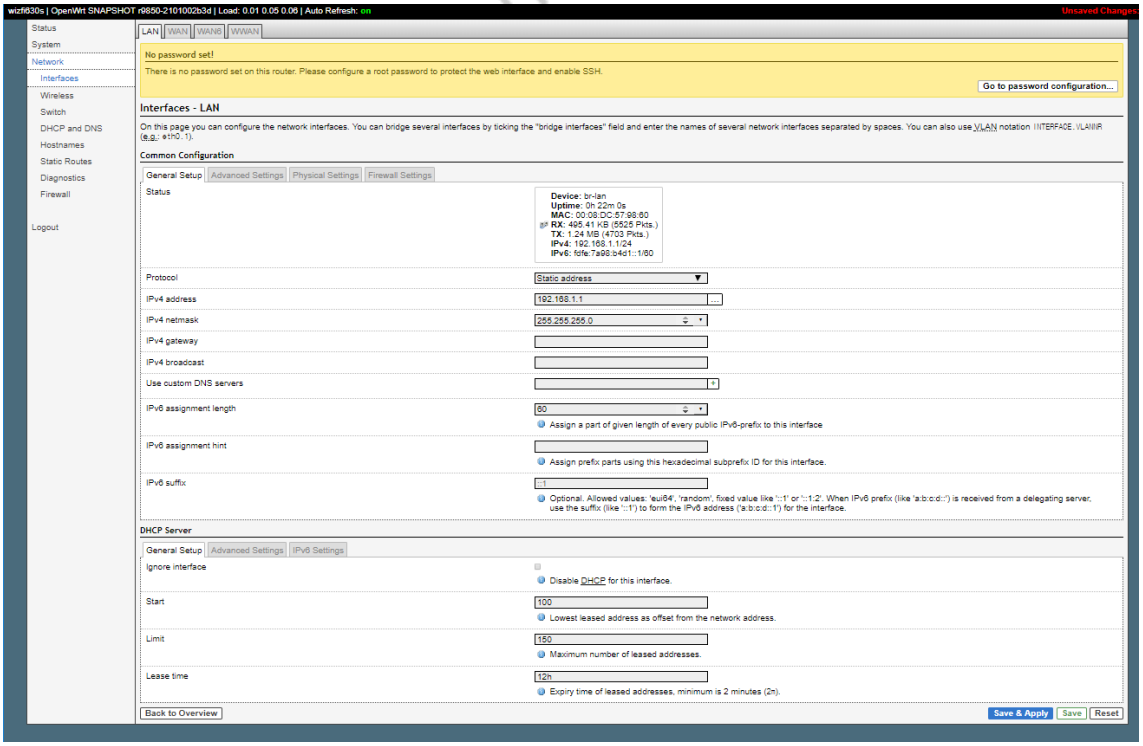
5.1.3 Other Tabs

Wi-Fi devices need to modify Interface-> LAN in order to connect to WizFi630S as Wired.

Also, in order for WizFi630S to connect wirelessly to the existing network, you need to set Interface-> WWAN.



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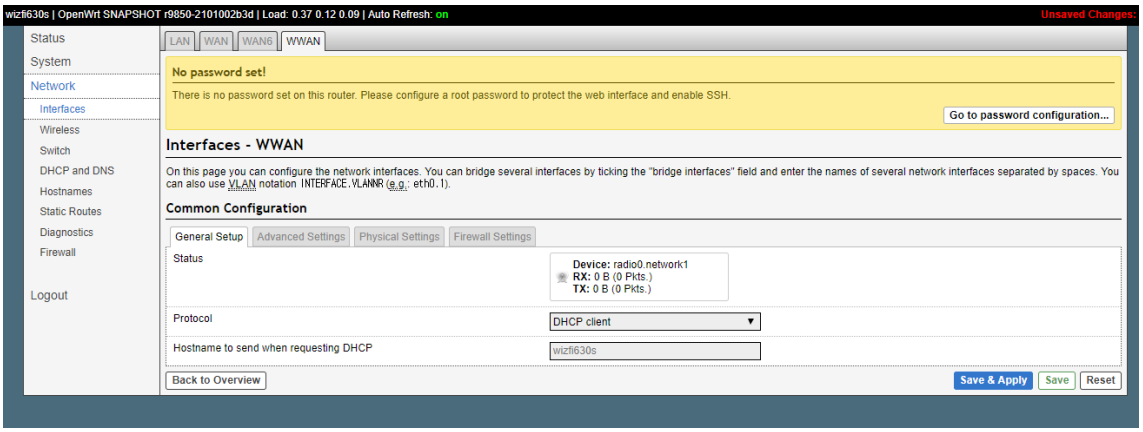

5.2 Wireless

Sections of the Wireless declare logical networks serving as containers for wifi-device, wifi-interface. The wifi-device refer physical radio properties present on the system such as channel or country code. And the wifi-interface refer complete wireless configurations such as ssid, key, encryption

5.2.1 Web Manager

If you want to connect to an existing Wi-Fi network with wireless, refer to the WWAN interface in 5.1.

First, click "Enable" button on the "Wireless network is disabled" of Device Configuration-> General Setup tab to activate the Station Mode. The PC may be disconnected from the WizFi630S because the Network Interface of WizFi630S is restarted.

Enter the SSID of the Wi-Fi network to be connected to the ESSID in the Interface Configuration-> General Setup tab, and enter the security settings in the Interface Configuration-> Wireless Security tab.

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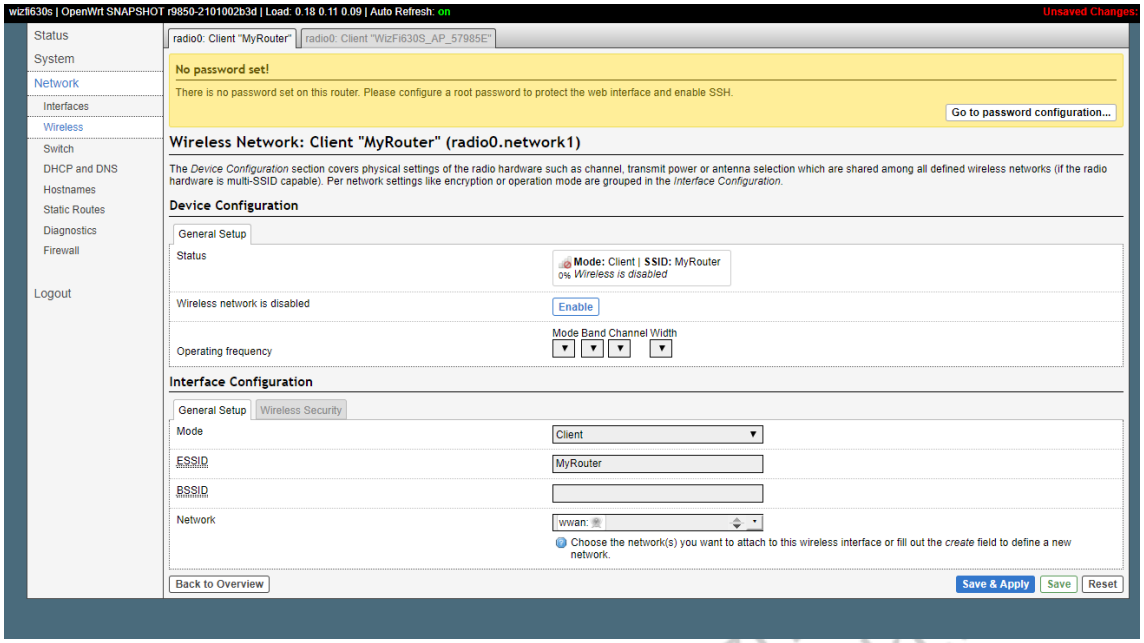
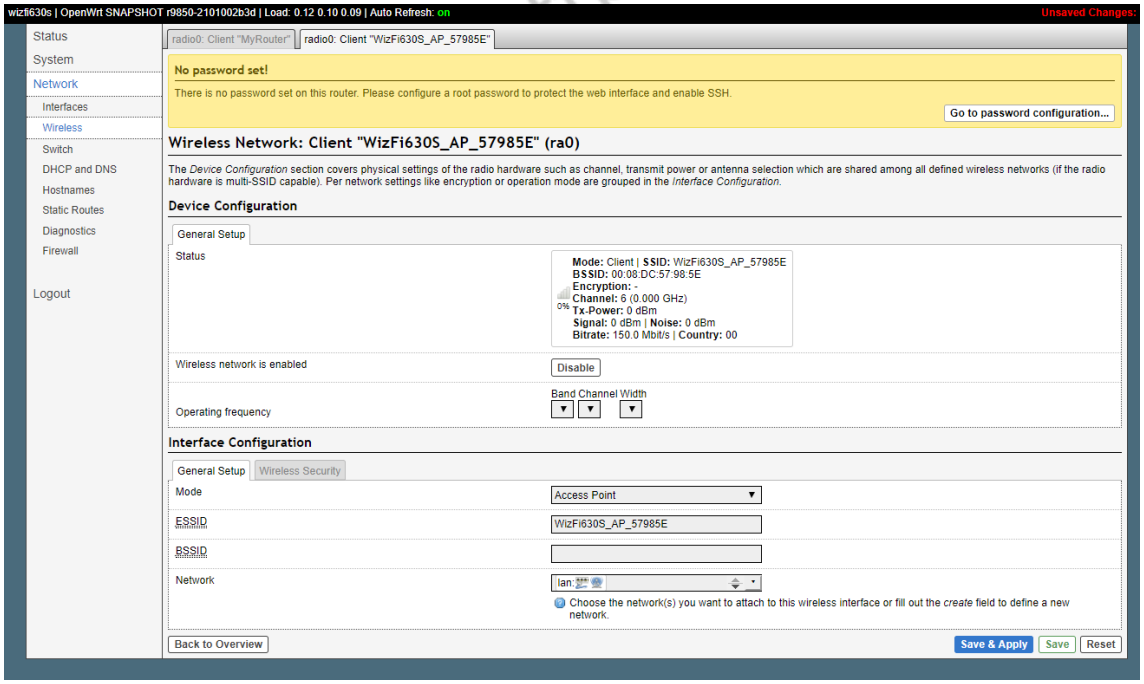


In the Wireless Network: Client In the "WizFi630S_AP_XXXXXX" (ra0) setting page, you can make settings for the AP mode of the WizFi630S. Basically, it operates in AP mode with SSID of "WizFi630S_AP_XXXXXX".



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5.2.2 Command mode

to make the same we just did with Web Manager above, see below for more detailed explanation of the steps.

You can show what is set using command below.

uci show wireless.sta

```
root@wizfi630s:/# uci show wireless.sta
wireless.sta=wifi-iface
wireless.sta.device='radio0'
wireless.sta.mode='sta'
wireless.sta.network='wwan'
wireless.sta.ifname='apcli0'
wireless.sta.encryption='psk2'
wireless.sta.disabled='1'
wireless.sta.ssid='MyRouter'
wireless.sta.key='MyPassword'
root@wizfi630s:/#
```

uci show wireless.ap

```
root@wizfi630s:/# uci show wireless.ap
wireless.ap=wifi-iface
wireless.ap.mode='ap'
wireless.ap.network='lan'
wireless.ap.ifname='ra0'
wireless.ap.ssid='WizFi630S_AP_57985E'
wireless.ap.device='radio0'
wireless.ap.encryption='none'
wireless.ap.disabled='0'
root@wizfi630s:/#
```

Station Mode

1. type uci set wireless.sta.disabled='0' and press Enter
2. type uci set wireless.sta.ssid='ap-ssid-here' and press Enter
3. type uci set wireless.sta.key='ap-password-here' and press Enter
4. type uci set wireless.sta.encryption='encryption-type-here' and press Enter
5. type uci commit && service network restart (this will save the changes and restart network interfaces)
6. now you can connect your WizFi630S to your Wi-Fi network

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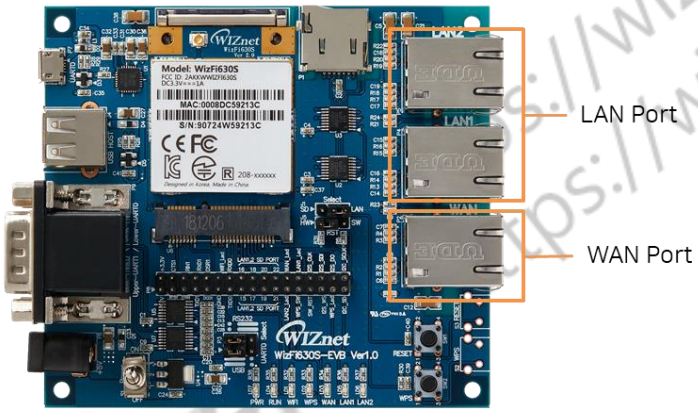
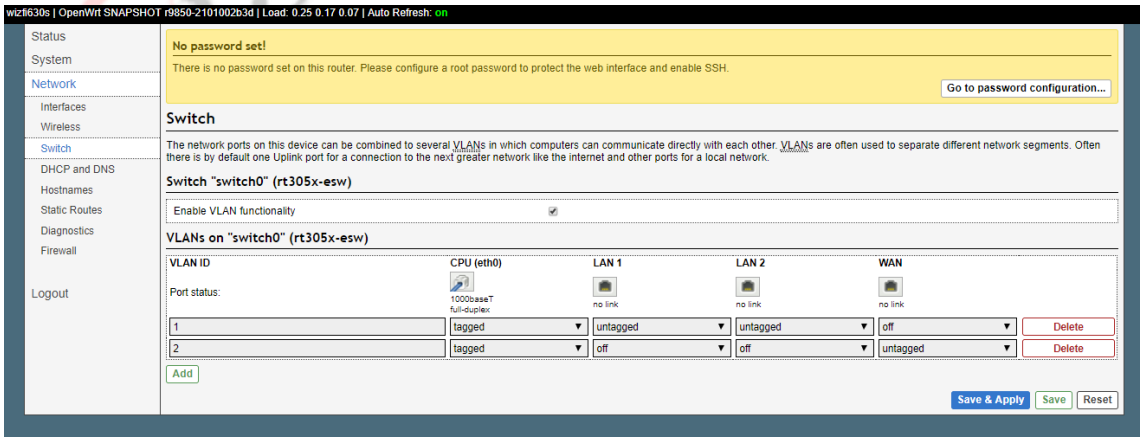
AP mode

1. type uci set wireless.ap.disabled='0' and press Enter
2. type uci set wireless.ap.ssid='ap-ssid-here' and press Enter
3. type uci set wireless.ap.key='ap-password-here' and press Enter
4. type uci set wireless.ap.encryption='encryption-type-here' and press Enter
5. type uci commit && service network restart (this will save the changes and restart network interfaces)
6. now you can connect your PC or Wi-Fi devices to the WizFi630S AP mode

5.3 Switch

WizFi630S supports 1-WAN port and 2-LAN port by default. And you can configure it





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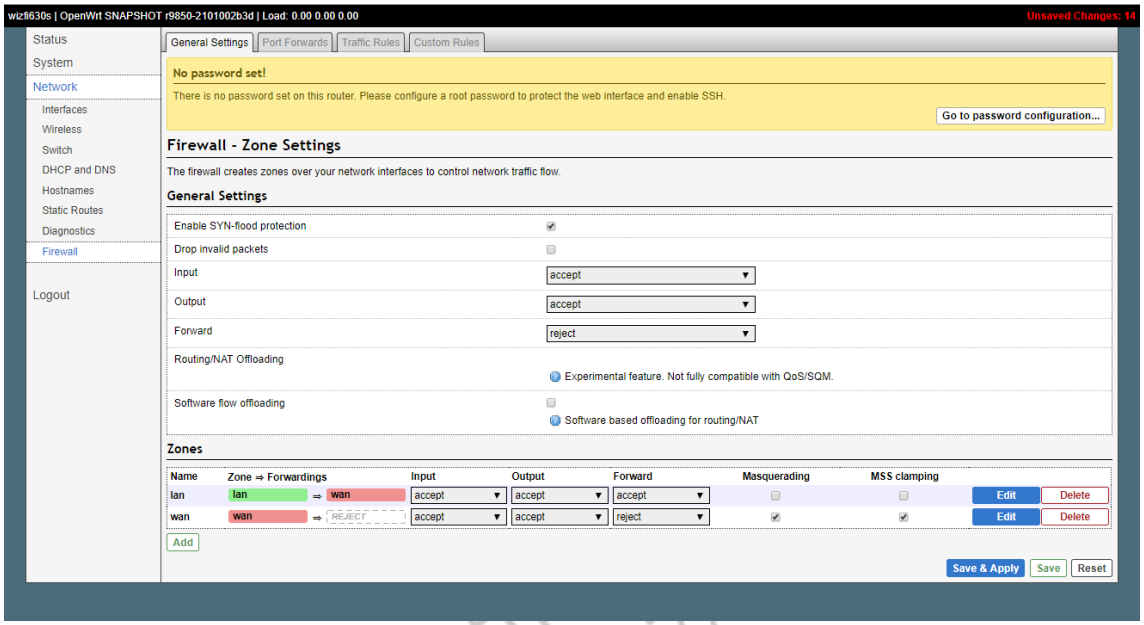
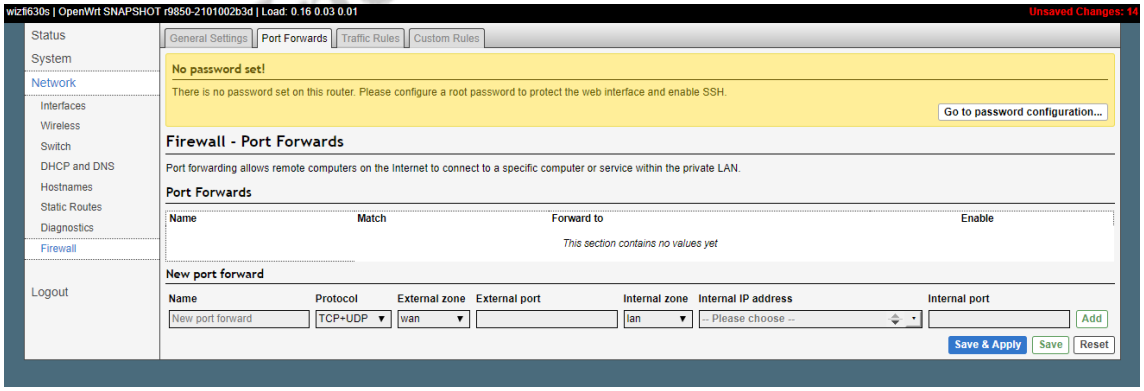
5.4 Firewall

Sections of the Firewall declare firewall zones for firewall rules to what is allowed to be forwarded across interfaces, which packets are allowed to be inputted to/outputted from, the WizFi630S itself.



In Port Forwards-> New port forward tab, you can configure port forwarding. After all the settings are completed, click "Save & Apply" to restart the Network Interface to activate the Port Forwarding function.



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6. STATEMENT

1.This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2.Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body

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Integration instructions for host product manufacturers according to KDB 996369 D03OEM Manual v01

2.2 List of applicable FCC rules

FCC Part 15 Subpart C 15.247 &15.209 &15.207.

2.3 Specific operational use conditions

The module can be used for mobile applications with a maximum 3.77dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

2.4 Limited module procedures

The device is a Single module and complies with the requirement of FCC Part 15.212.

2.5 Trace antenna designs

Not applicable, The module has its own antenna, and does n ’ t need a host sprinted board micro strip trace antenna etc

2.6 RF exposure considerations

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application The FCC ID of the module cannot be used on the final product In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization

2.7 Antennas

Antenna Specification are as follows:

Type of antenna: PCB Antenna

Gain of antenna: 3.77dBi Max.

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna;

The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a “ unique" antenna coupler

As long as the conditions above are met, further transmitter test will not be required

However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digitaldevice emissions, PC peripheral requirements, etc)

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating " Contains FCC ID: 2BQPH-WIZFI630S "with their finished product

2.9 Information on test modes and additional testing requirements

Host manufacturer must perform test of radiated & conducted emission and spurious emission, e.t.c according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 &15209 &15.207 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuit), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed

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