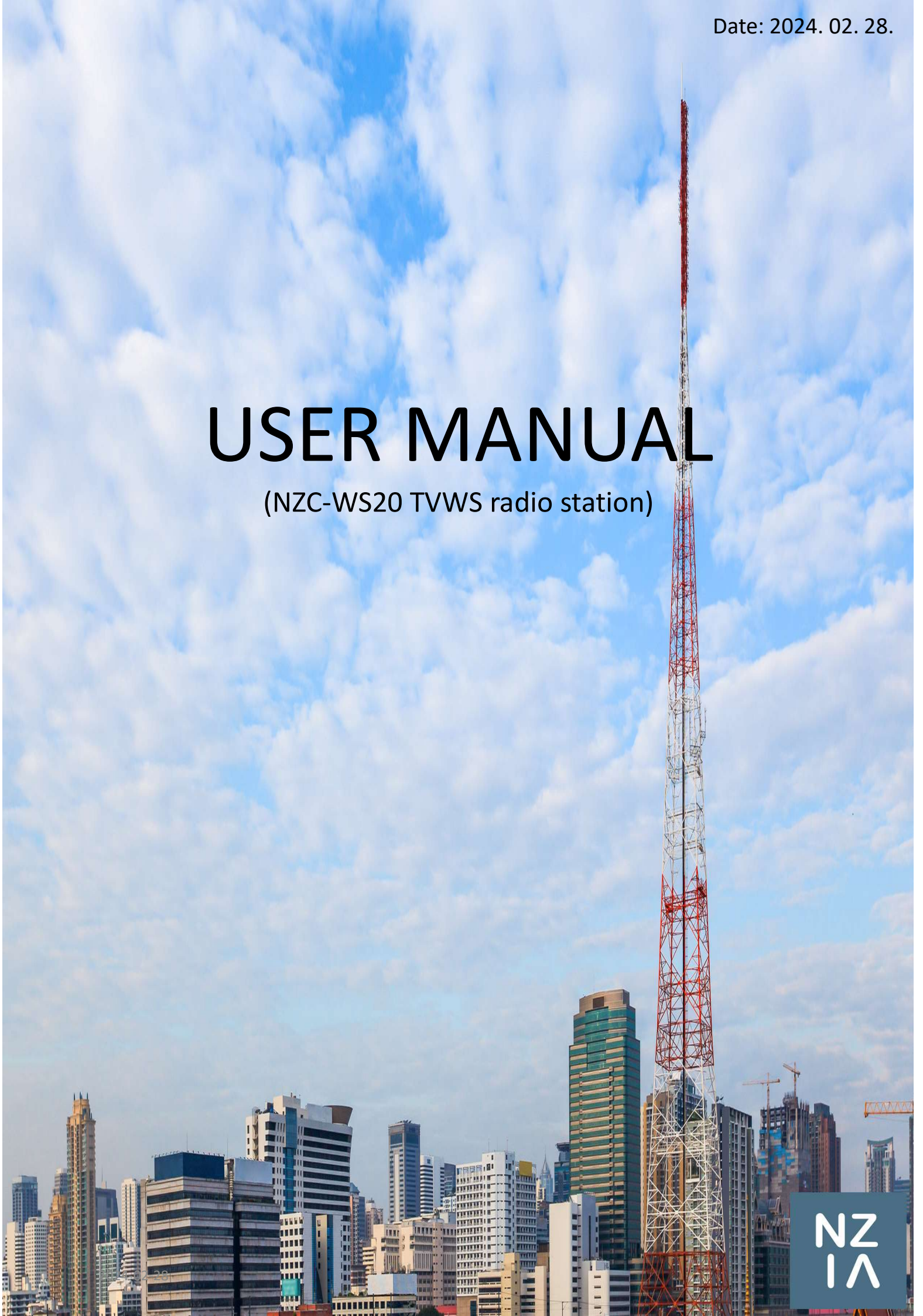
Date: 2024. 02. 28.

USER MANUAL

(NZC-WS20 TVWS radio station)



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Service center

Do not connect power before connecting the antenna to the equipment

Before installing the Equipment, you should check and follow the instructions below.

(1) Height above average terrain (HAAT). Below 602 MHz, antenna shall not exceed 250 meters or 500 meters in less congested areas. All other bands not to exceeds 250 meters. The HAAT is calculated by the White Space database (§73.684(d)). For HAAT greater than 250 meters the following (2)-(7) procedures below are required:

(2) The installing party must contact a White Space database, identify all TV broadcast station contours that would be potentially affected by operation at the planned HAAT and EIRP.

(3) Notification -The installing party must notify each of these licensees and provide geographic coordinates, relevant technical parameters and contact information.

(4) Start operations, No earlier than four calendar days after the notification in paragraph (g)(1)(ii)(B) above

(5) Upon request, the installing party must provide affected licensee the time periods of operations.

(6) Conduct a new notification if increasing its power level, moving more than 100 meters horizontally from its location, or making an increase in the HAAT or EIRP that results in an increase in the minimum required separation distances from co-channel or adjacent channel TV station contours.

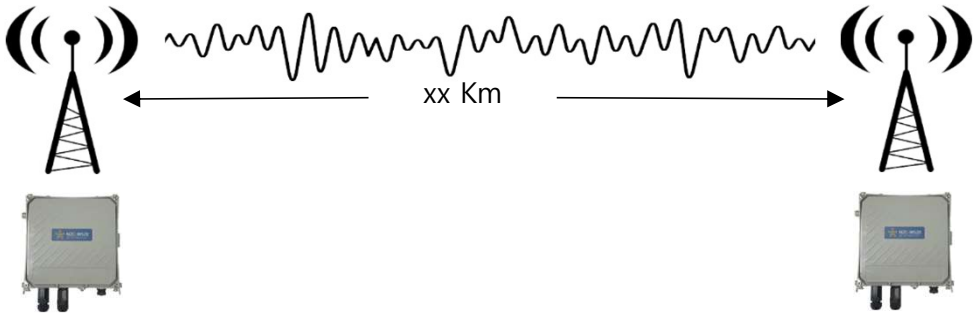
(7) All notifications required by this section must be in written form (including email).
To be kept by the White Space device operator for its records and supplied to the Commission upon request.

Ⅰ Product descriptions

Summary

NZC-WS20 manages all the security features, traffic scheduling, and Quality of Service(QoS) functions of NZIA's TVWS Wireless TCP/IP CPE. NZC-WS20 provides fully configurable TVWS wireless CPE/BS features. NZC-WS20 provides Powerful processing capabilities to reliably transport any traffic between the CPE/BS and multiple remote devices.

Applications



TVWS communication equipment that provides long-distance/wide-range communication services using unlicensed section frequencies.

Features and benefit

- Fully supports 802.11af TVWS Standard.
- Reliably supports all types of network devices.
- Utilizes unlicensed RF Frequency.
- Provides high throughput for concurrent transport of M2M/IoT services telemetry and remote control of data, video, and voice services.
- Ultra long-distance communication.
- Extensive coverage of communication.
- Over-the-air monitoring, configuration, and software keyed features enable upgrades without physical access
- NMS support.

Specifications

Model Name	NZC-WS20
Model Type	TVWS CPE/BS
Tx Power	Max. 20dBm(100mW)
RF Band	473 ~ 698MHz
Antenna Info	N-Type External SISO Sectoral, omni directional, YaGi, LP
Capability	LOS/NLOS Software-defined CPE/BS
Wireless QoS	Auto link distance ranging, optimal channel selection, DFS
NMS	Support SNMP v2/3
Transmission	OFDM, high-rejection Tx/Rx filtering, AFD
Throughput	Max. 26.7Mbps(MCS9)
Channel Bandwidth	6MHz
Modulation	BPSK to 256QAM
Max. Range	20Km(With NZC-WS35)
Security	Management Encryption : TLS, AES-256, SHA-1 Authentication: AES-128/256
Network Feature	DHCP, NMS
Latency	<10ms(RSSI -60dBm under)
QoS	Supported
Location & Timing	Built-in GPS
Power	36W, High-protected Surge SMPS
Temperature	-30 to 60 °C
Connections	10/100 Ethernet(RJ-45), GPS, free-volt Power
Surge Protection	Built-in Surge
Dimensions	230 * 230 * 105(W*H*D)(mm)
Weight	3.0KG

Ⅱ Device

Package contents

NZC-WS20 device, Antenna, Antenna cable, Power cable

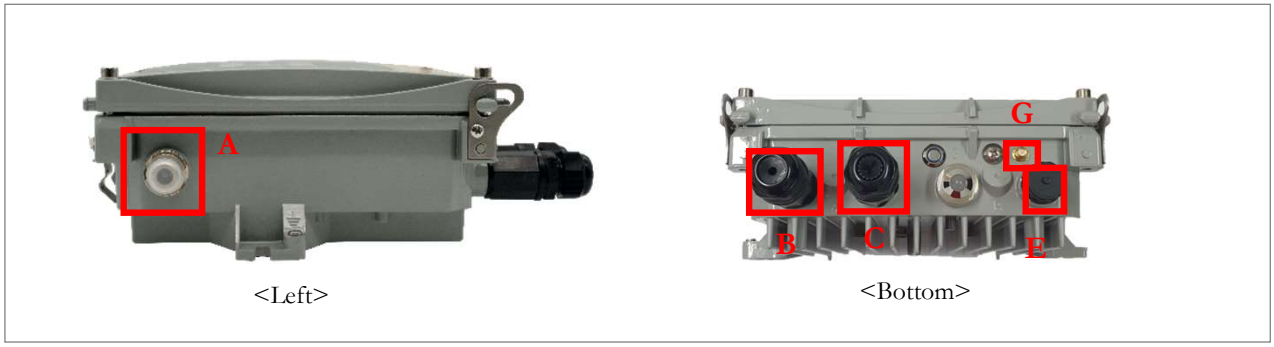
Device layout

A. Antenna **B. WAN** **C. LAN**

D. LED **E. Power** **F. Factory Reset**

G. GPS

Useage



1. Connect the Antenna cable to N-female Port(A)
2. Connect the Power cable to Power port(E)
3. Connect the internet ethernet cable to WAN port(B)
4. Connect the device ethernet cable to LAN port(C)
5. Connect the GPS antenna to GPS port(G)

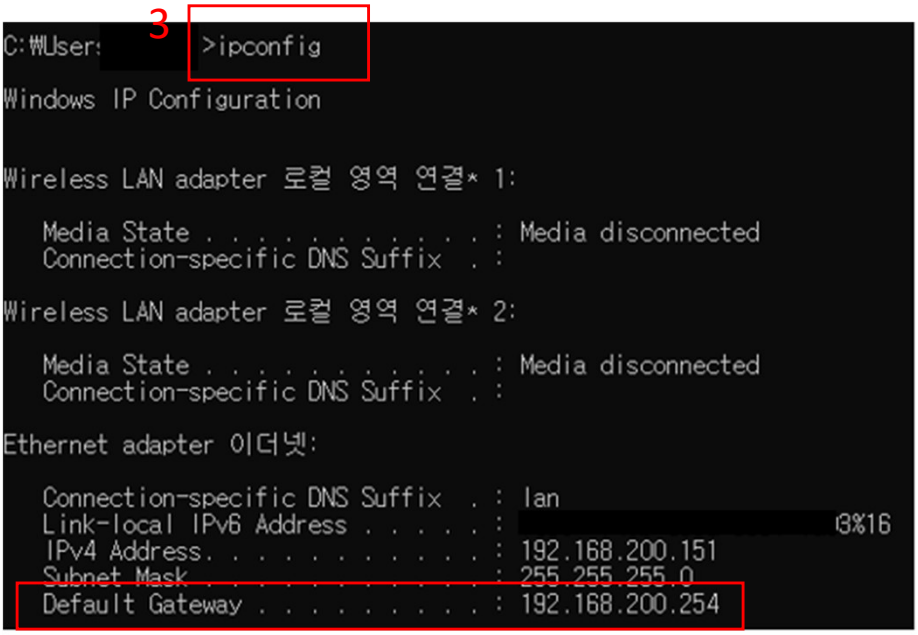
LED indicator

Status	CPE	BS
Power ON	Red ON	Red ON
Jump to kernel	Yellow ON	Yellow ON
Boot complete	Green ON	Green ON
Channel Scanning	Yellow Blink every 1 second	
Connected	Green ON	
Beacon out (Tx power > 0 dBm)		(Normal) Green Blink every 1 second. (Error) Yellow Blink every 1 second.
Update(USB/OTA)	Red Blink every 1 second	Red blink every 1 second

Ⅲ Connect Web & Login

Step 1. Connect Web

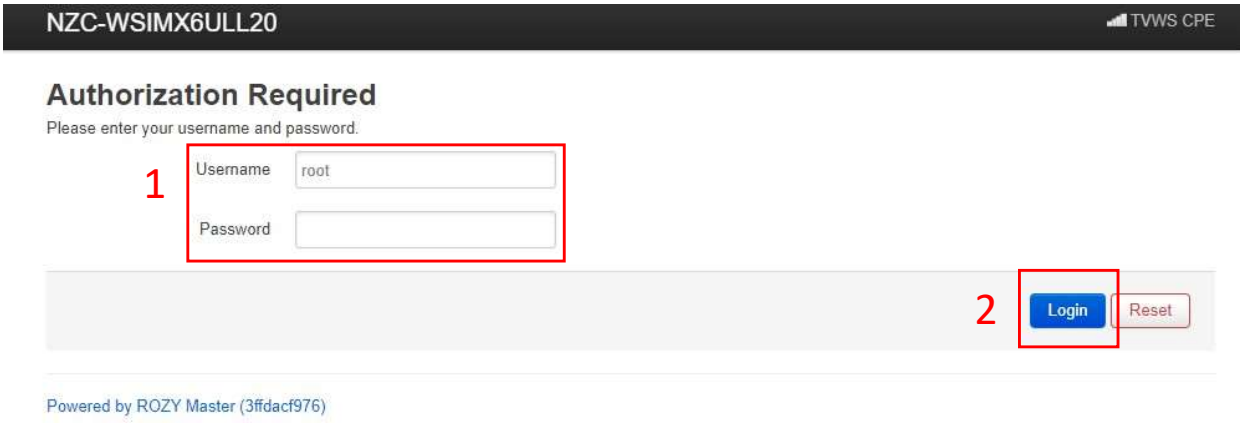
1. Connect LAN port and PC with a LAN cable.
2. Use DHCP mode to set PC IP.
3. User can use the ipconfig command at the command prompt, when checking the ethernet gateway IP address.



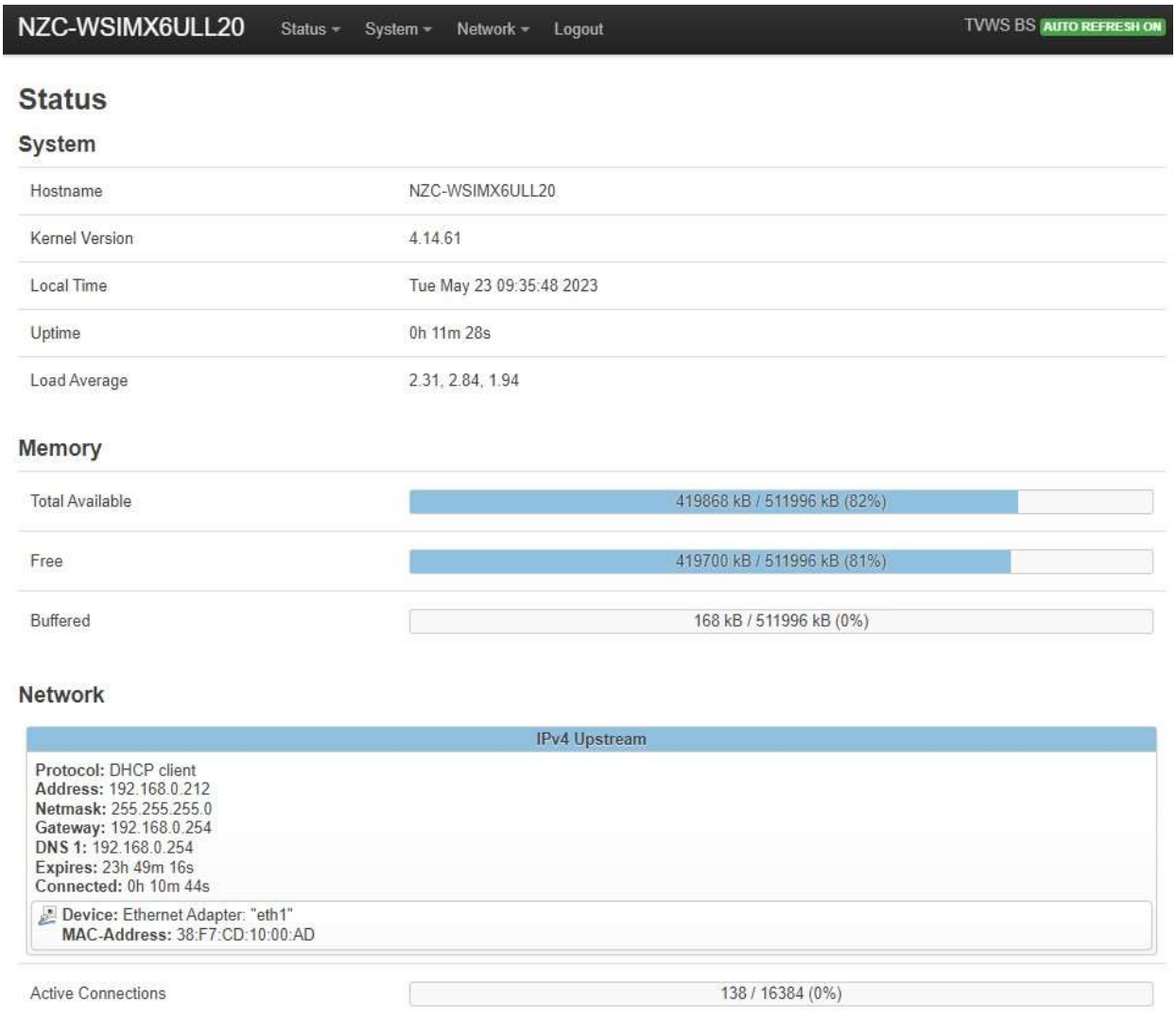
4. Enter ethernet default gateway IP (ex: 10.1.1.254) in the address bar.

Step 2. Login

1. Enter the Username and Password below.
   *Username: root
   *Password: admin1234!@#$
2. Click "*Login*" button.



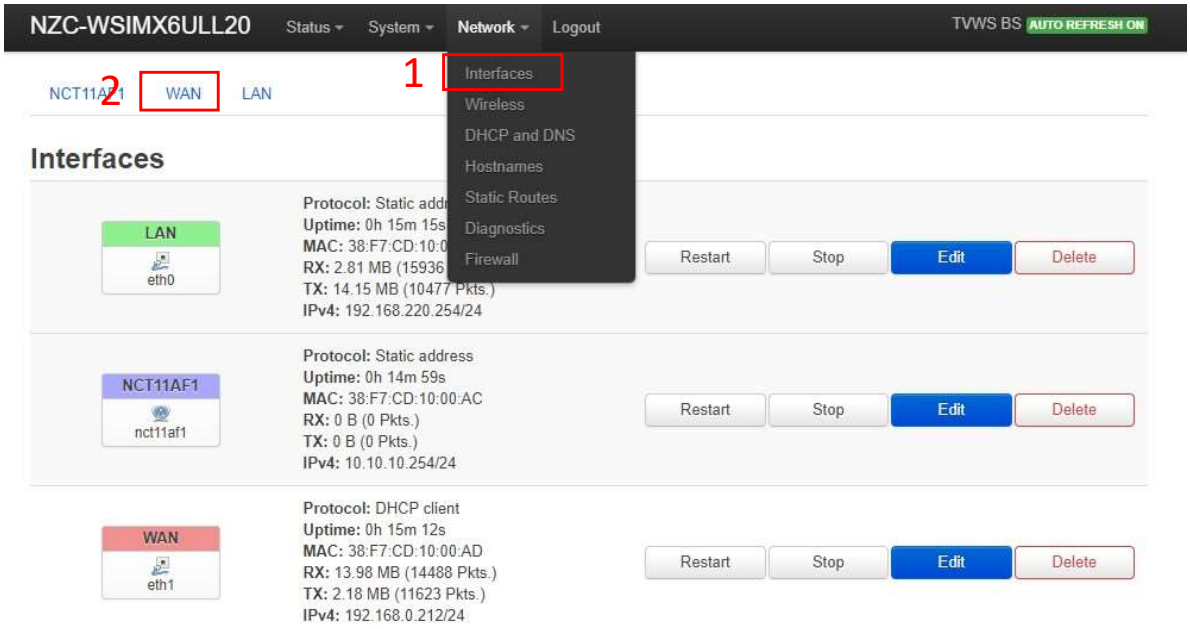
3. This screen shows up if logging in successfully.



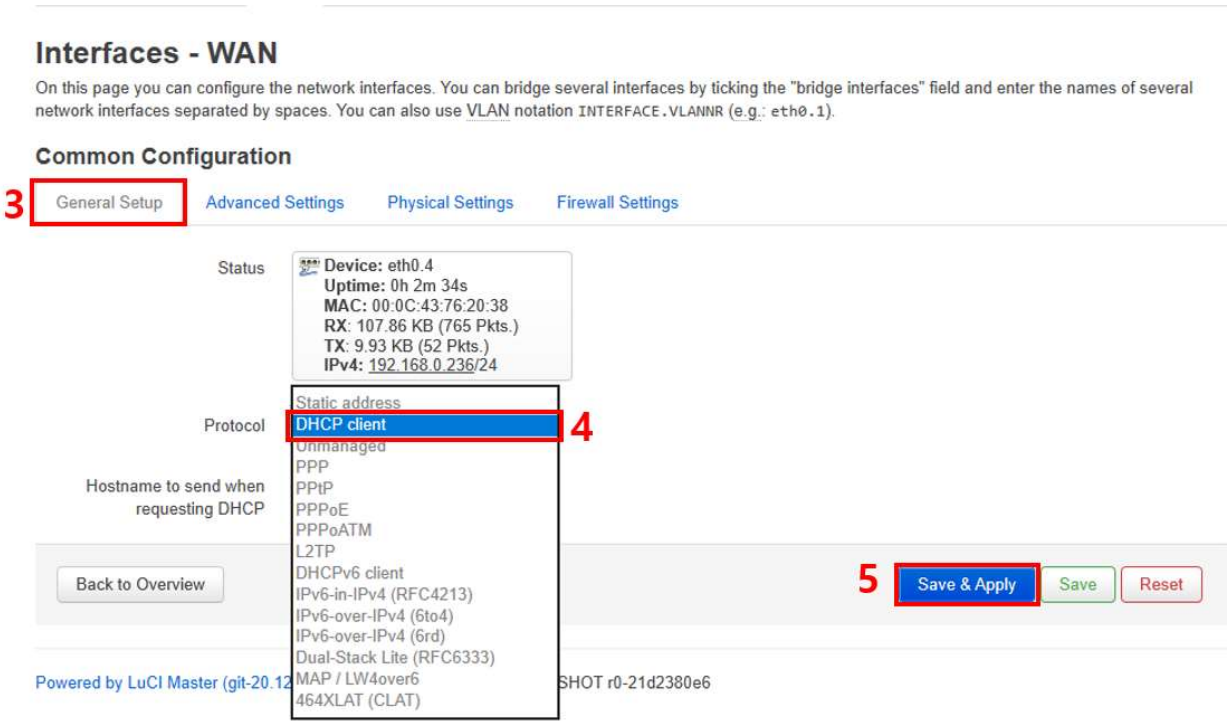
IV BS(AP) Settings

Step1. WAN(Wide Area Network) interface Setting

1. Click “*Network->Interfaces*” menu
2. Click “*WAN*” tab on the menu

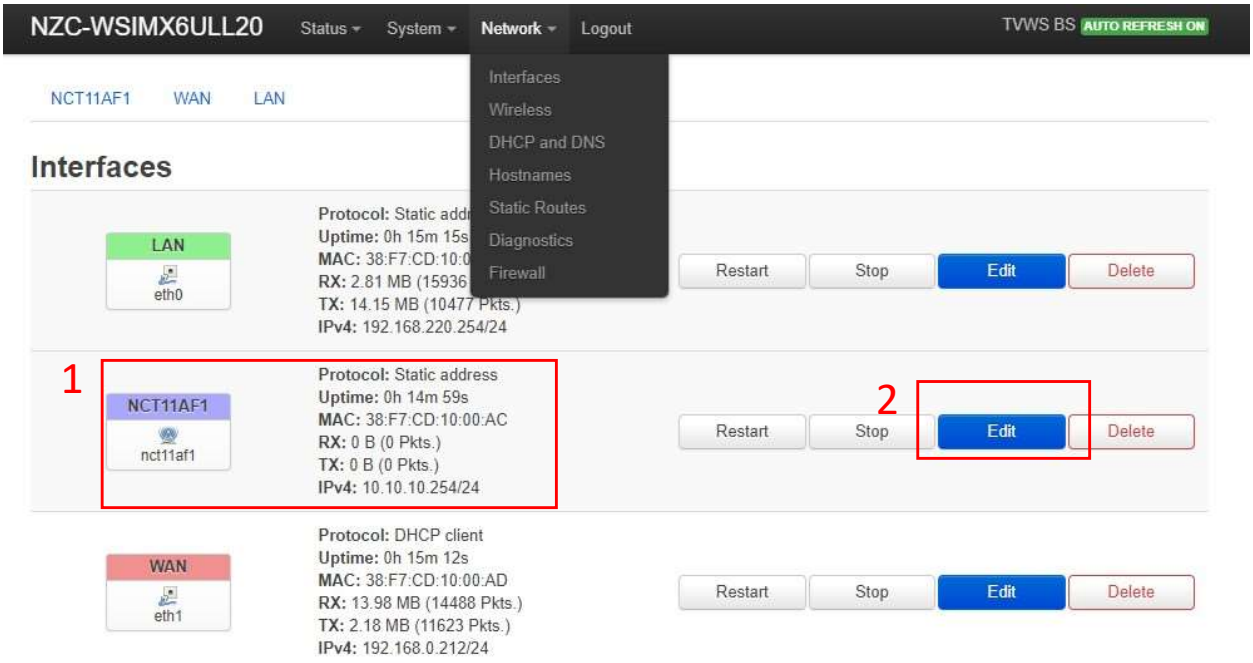


3. Select “*General Setup ->Protocol*” menu.
4. Select DHCP client
5. Click “*Save* & *Apply*” button.

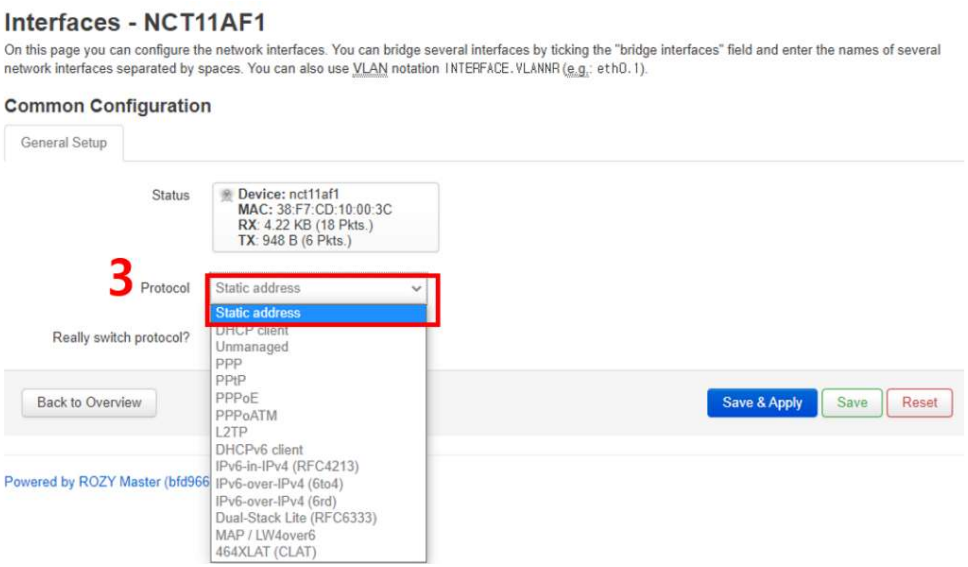


Step2. LAN(Local Area Network) Setting

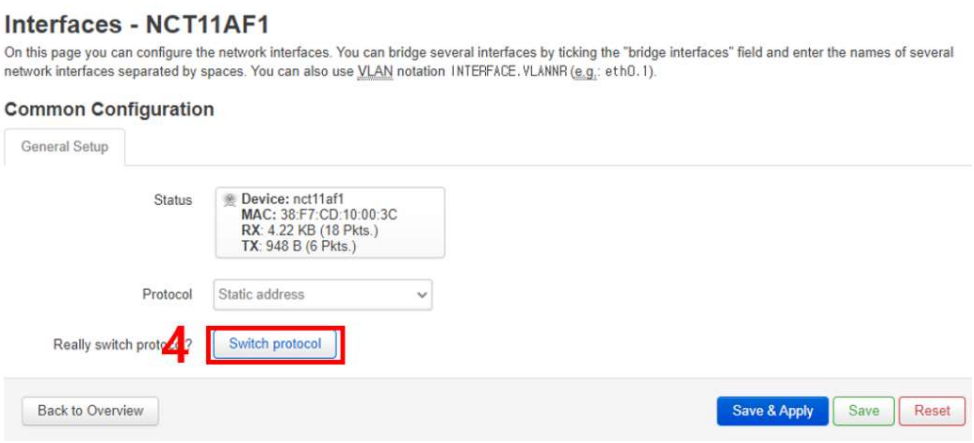
1. Find NCT11AF includes Mac address.
2. Click "*Edit*" button.



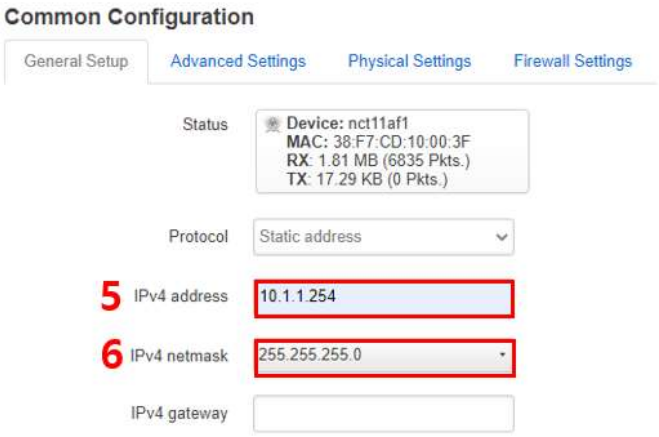
3. If Protocol is not "*Static address*", Change Protocol to "*Static address"*. If already set up to "*static address*", jump to 5.



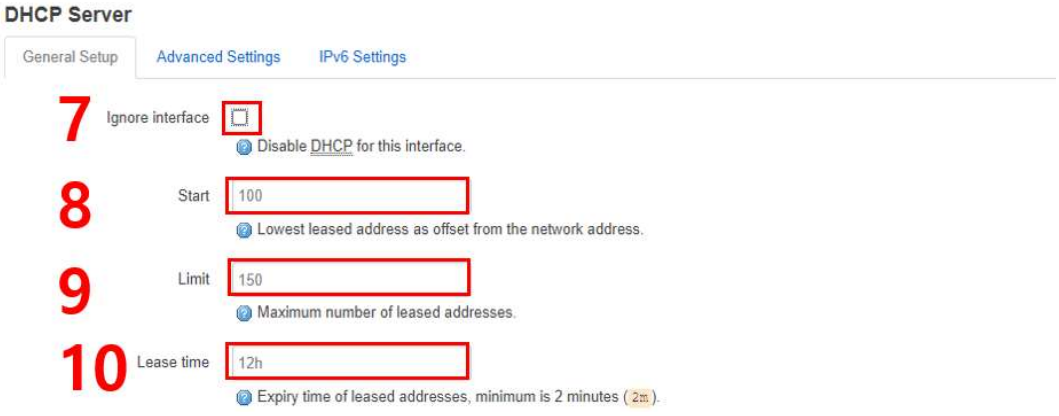
4. Once Protocol is changed to “*Static address*”, Click “*Switch Protocol*” button.



5. Enter IPv4 address(10.1.1.254).
6. Enter IPv4 netmask(255.255.255.0).

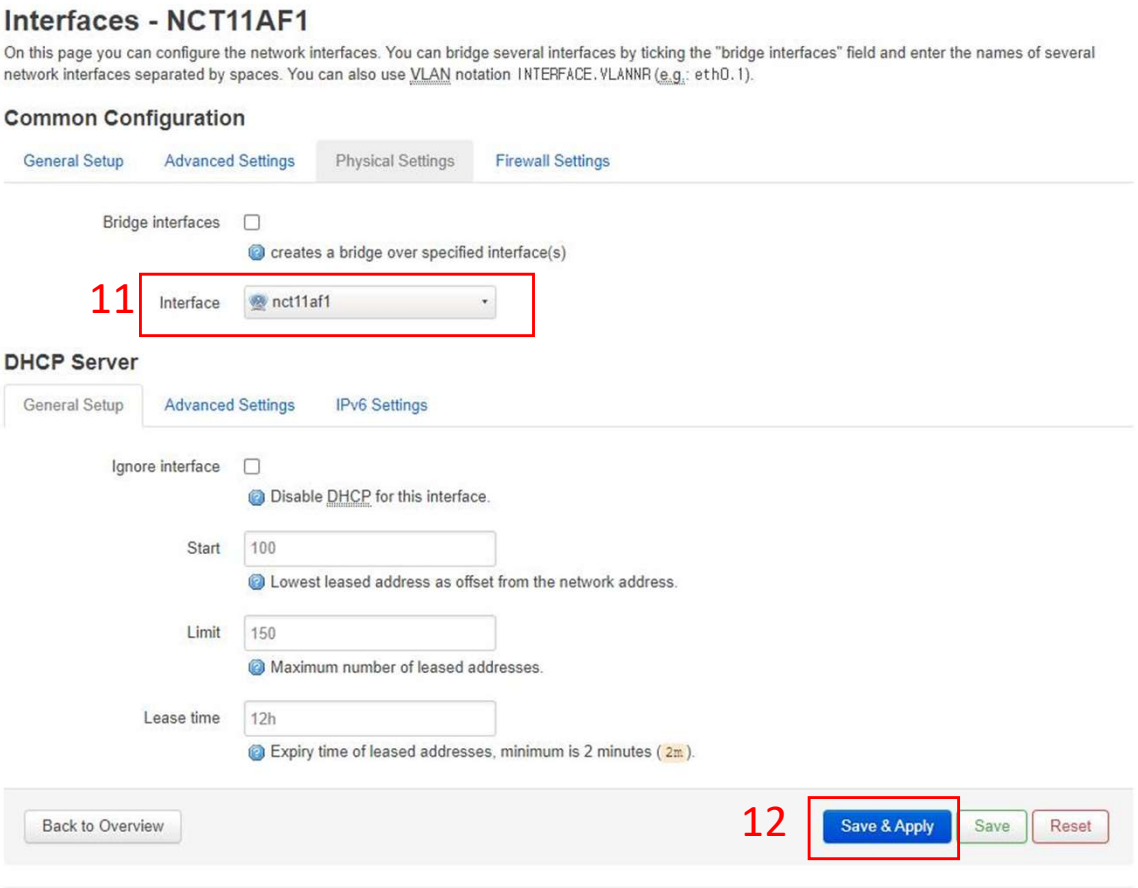


7. Uncheck the “Ignore Interface”.
8. Enter “100” into Start.
9. Enter “150” into Limit.
10. Enter “12h” into Lease time.



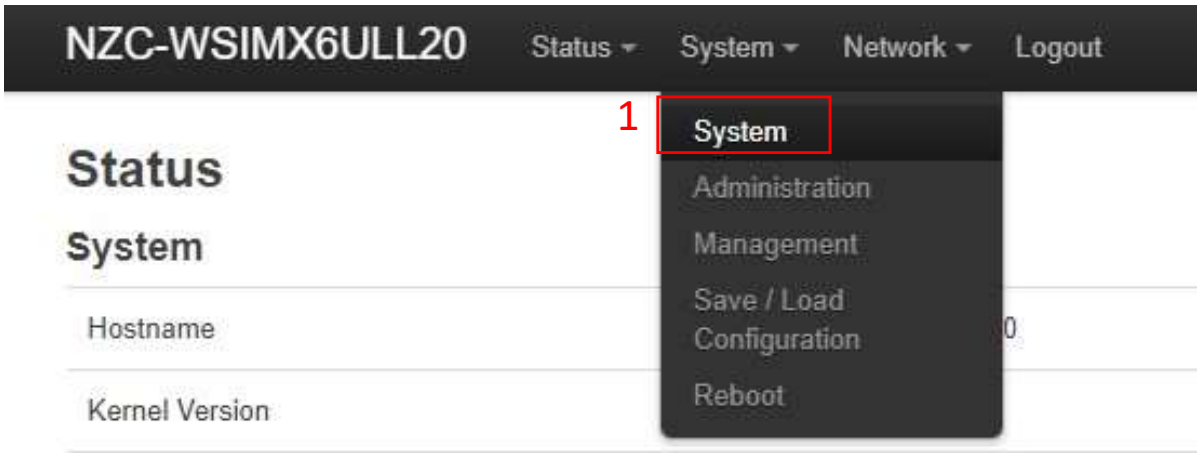
11. Please check the interface name on “*Physical settings*” tap. If setting NCT11AF1 interface, physical setting's interface is nct11af1.

12. Click “*Save & Apply*” button.

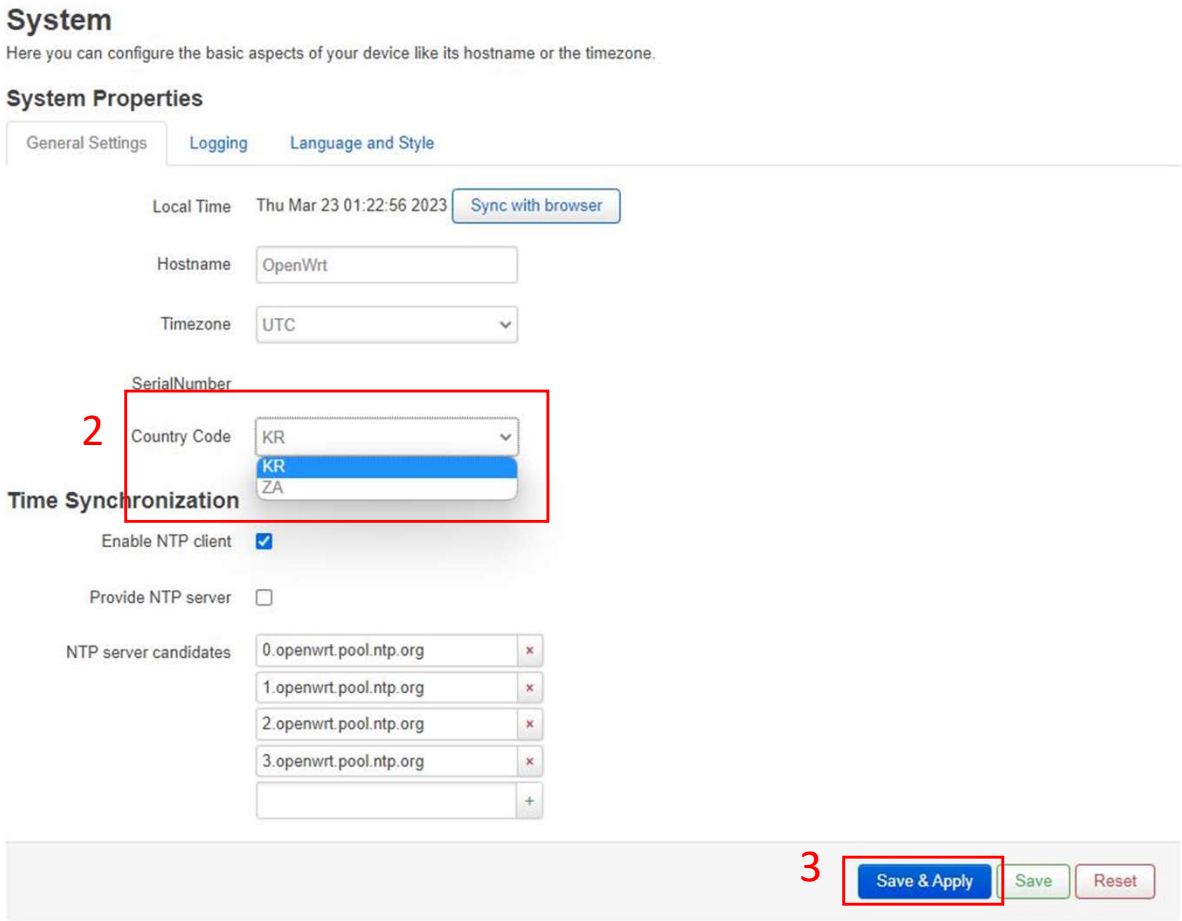


Step3. PAWS

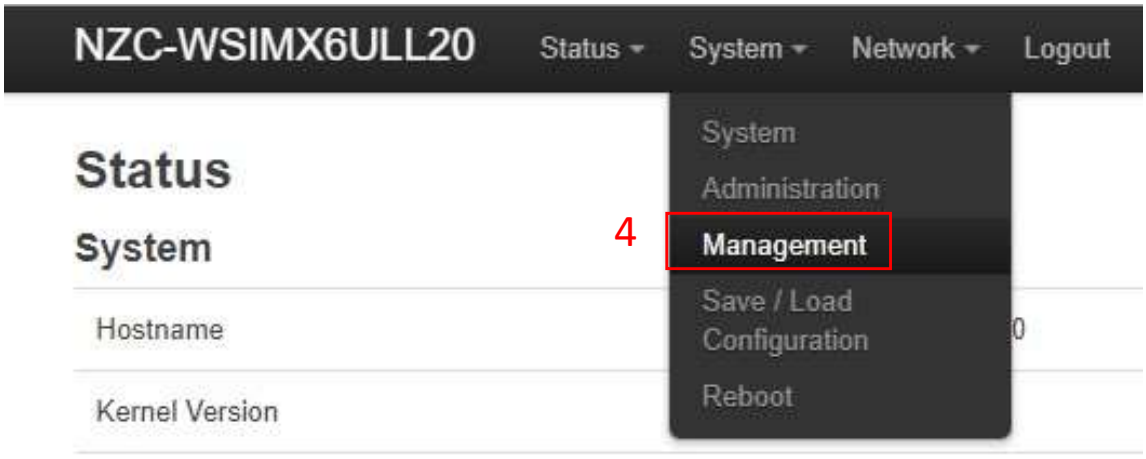
1. Click “*System -> System*” menu.



2. Select Country Code.
3. Click “*Save&Apply”* button.



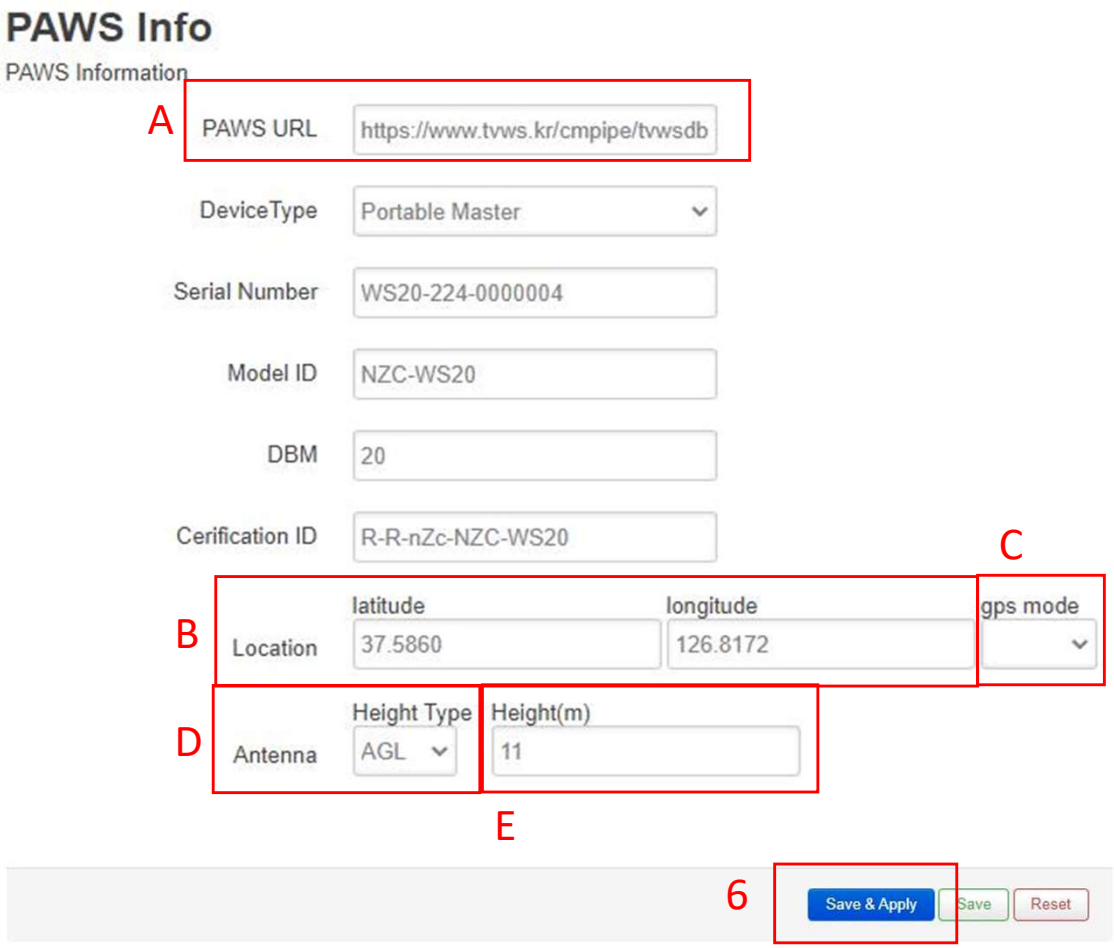
4. Click “*System -> Management*” menu.



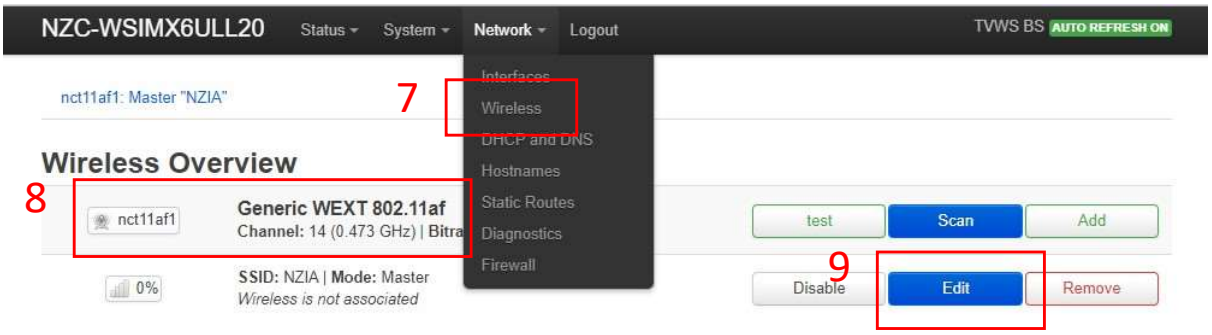
5. Depending on the country code, PAWS-related information is automatically entered in PAWS Info.

A. URL information is used, when connecting to Channel DB.
B. Latitude and longitude information.
C. Location setting method.(auto:automatic setting method/ manual: User input method)
D. Antenna type information.(ASML:on the sea/AGL: ground)
E. Antenna height information.

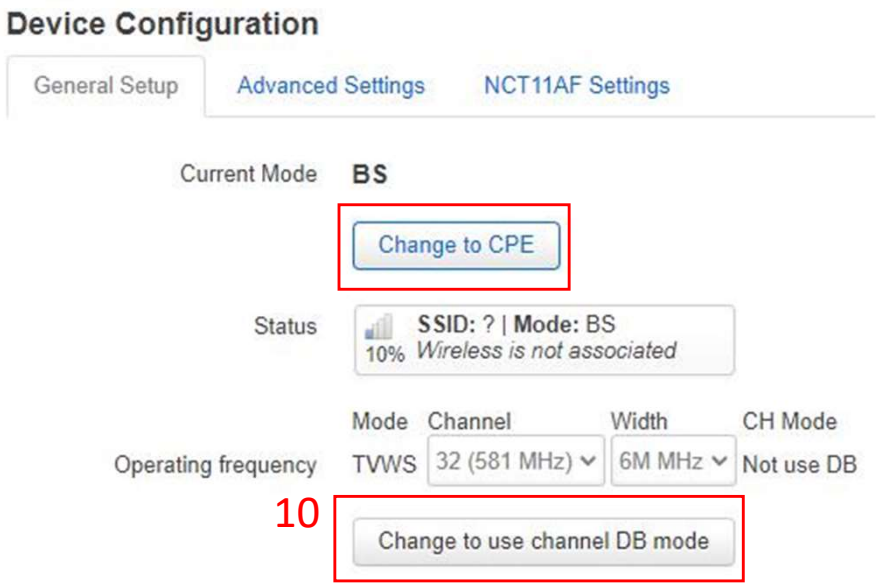
6. Click “*Save & Apply*” button.



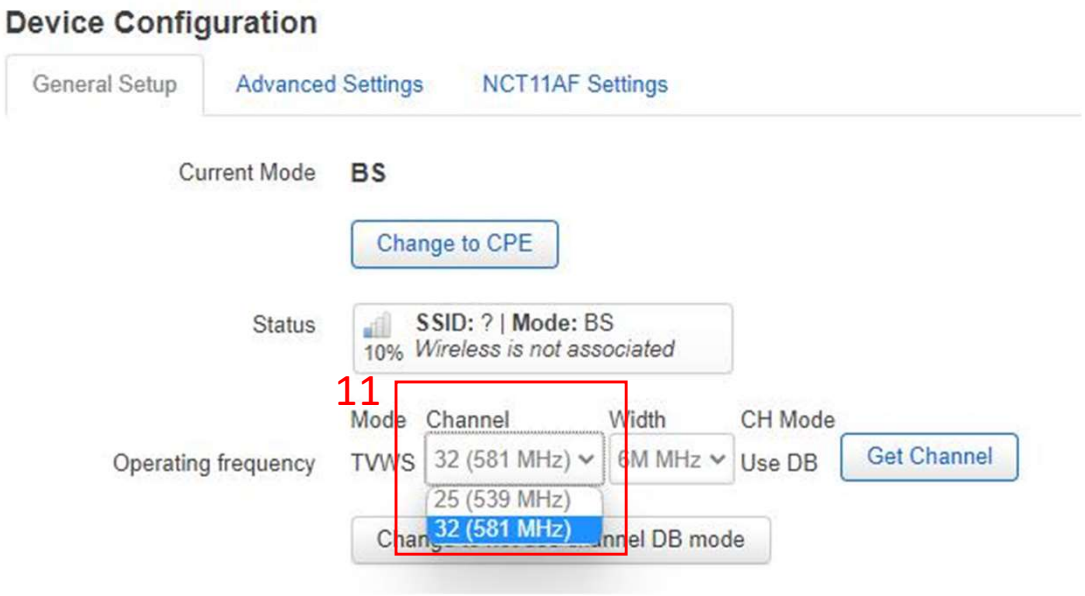
7. Click “*Network -> Wireless*” menu.
8. Select WEXT 802.11af interface or interface with Channel information.
9. Click “*Edit*” button.



10. Click “*Change to use channel DB mode*” button. If mode is not BS, click the “*Change to BS*” button.

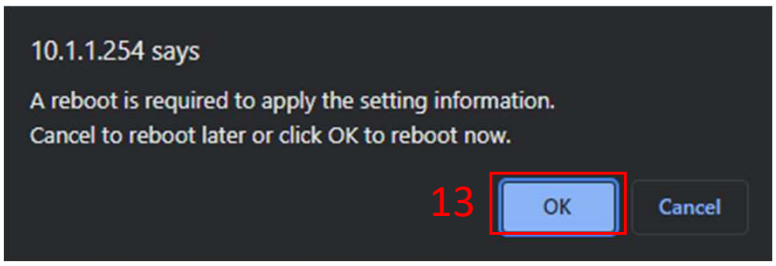


11. Select an available channel by click channel list.(Use DB mode offer available channel list. User can select one available channel from available channel list.)

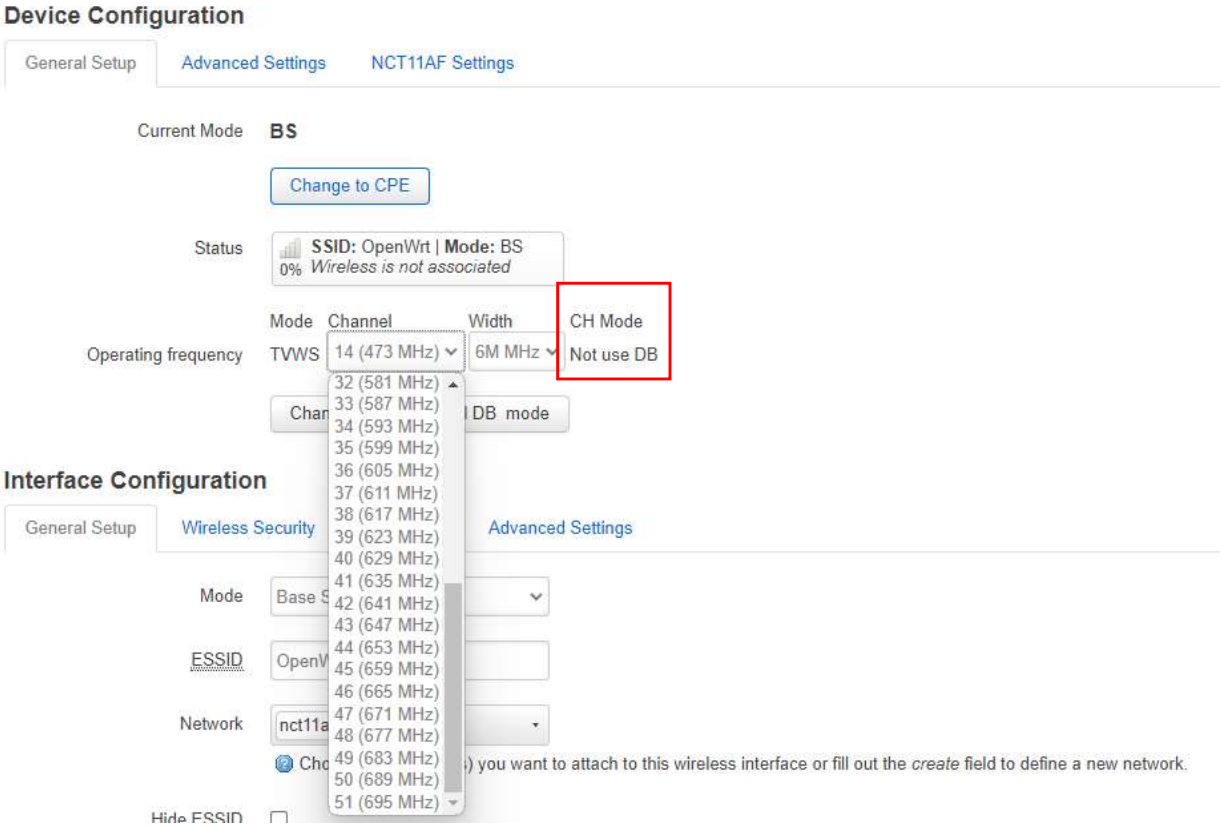


12. Click “*Save&Apply*” button.

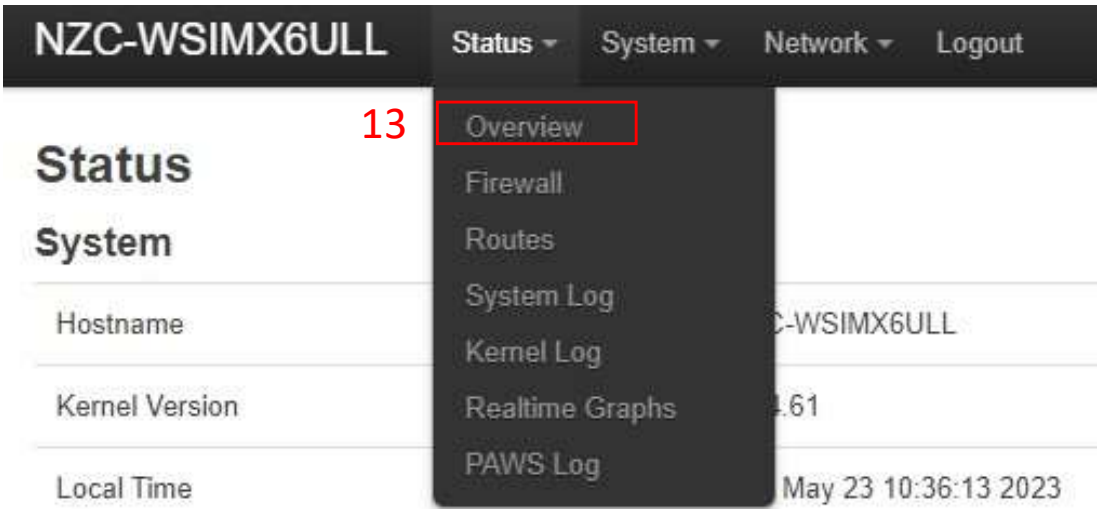
13. Click “OK” button.



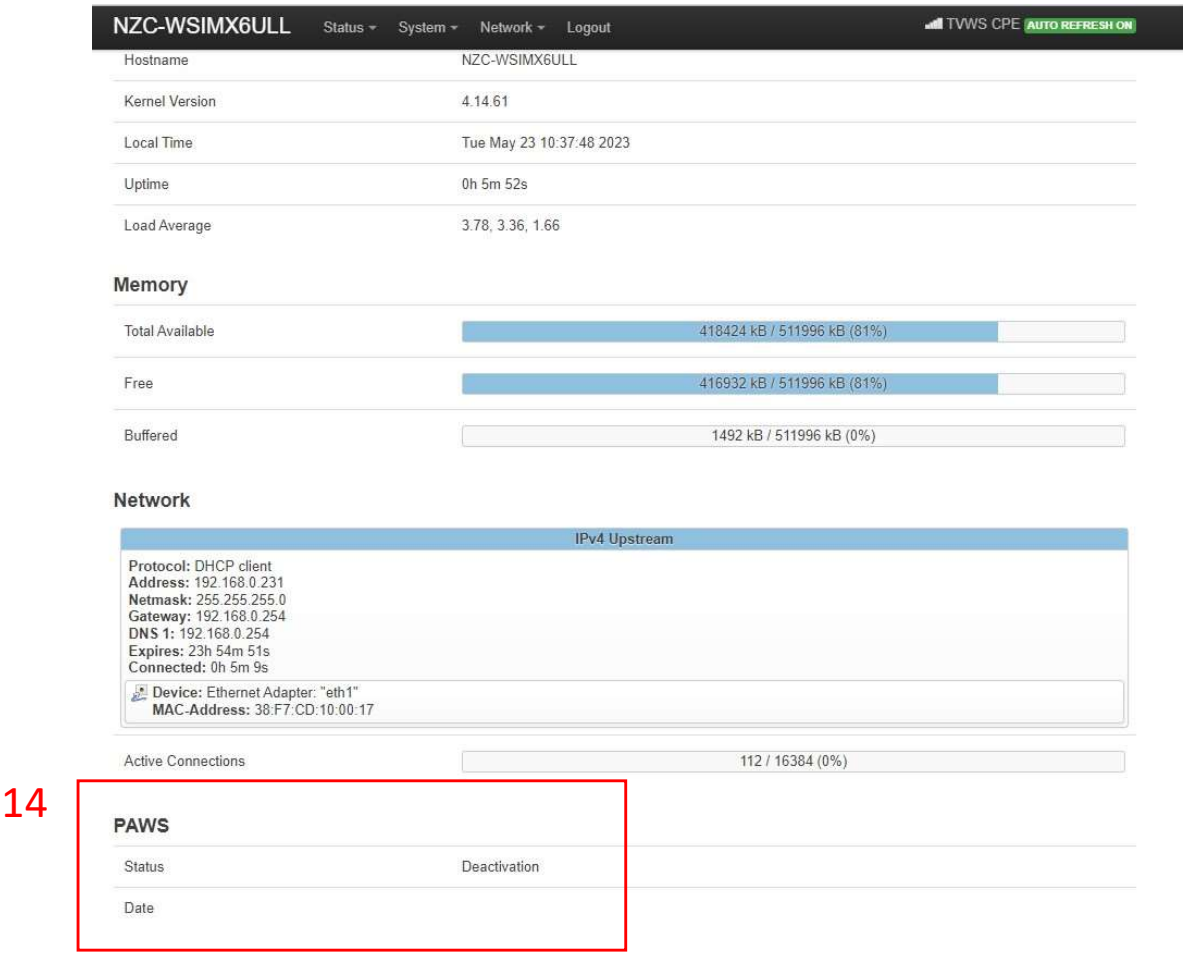
* User can select channel from total channel list in “Not use DB” mode.



13. Click “Status -> *Overview* ” menu.

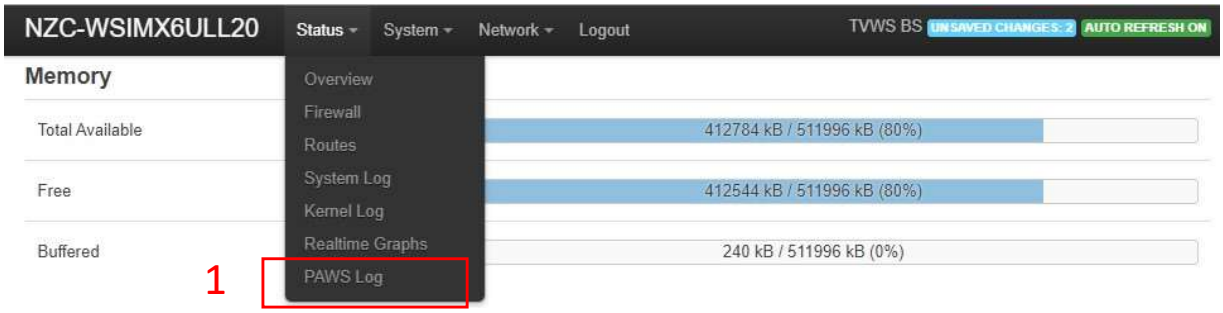


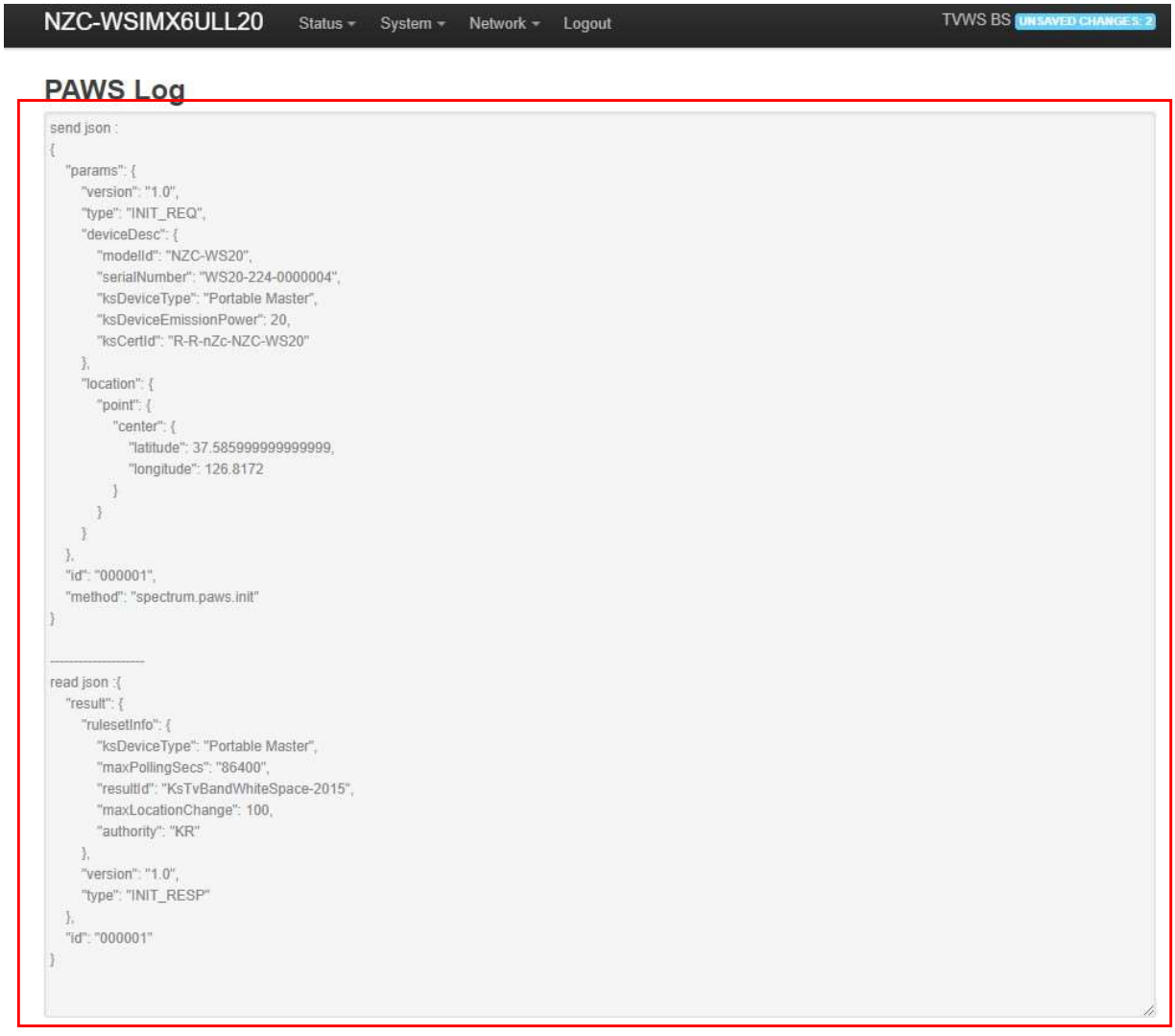
14. Selected channels can be adopted on PAWS area.(If PAWS setting adopted, status is Activation. If PAWS setting isn’t adopted, status is Deactivation.)



* PAWS log confirmation

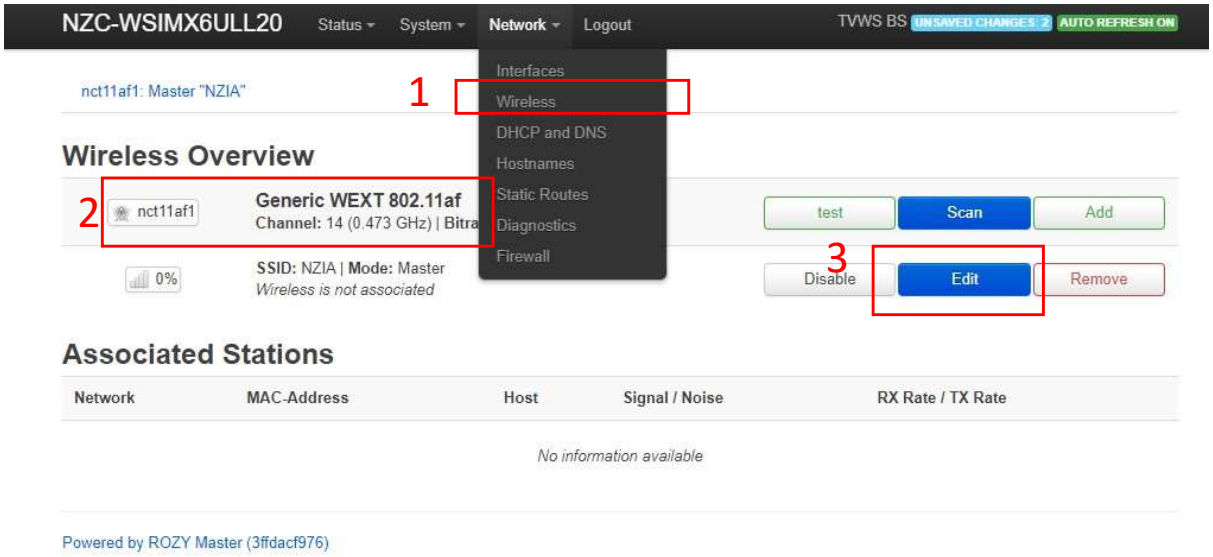
1. Select “Status -> *PAWS Log”* menu.
2. User can check PAWS log information when device and PAWS DB connected each other.



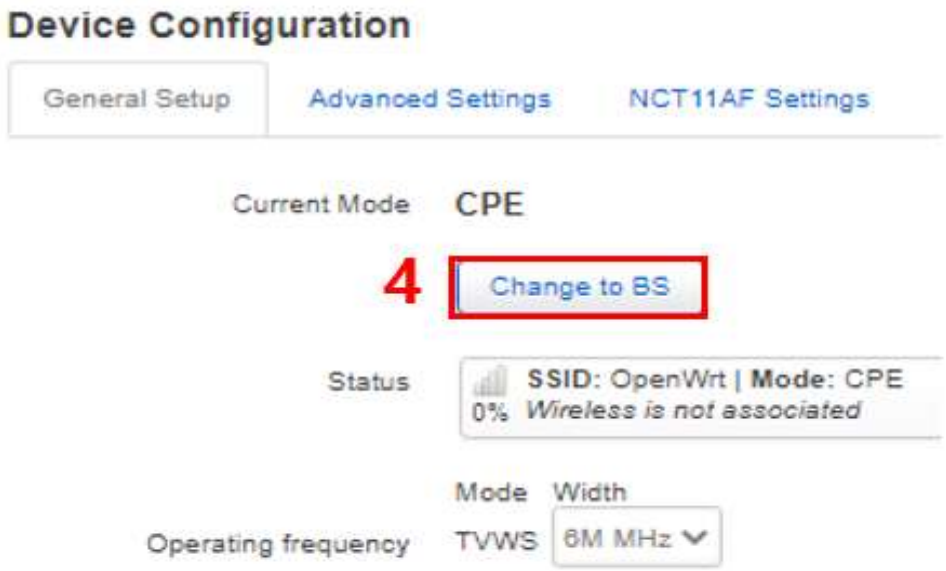


Step4. RF(Radio Frequency) Setting

1. Select “*Network -> Wireless”* menu.
2. Select WEXT 802.11af interface or interface with Channel information.
3. Click *“Edit”* button.



4. Click "*Change to BS*" button, it goes to BS mode in few seconds.



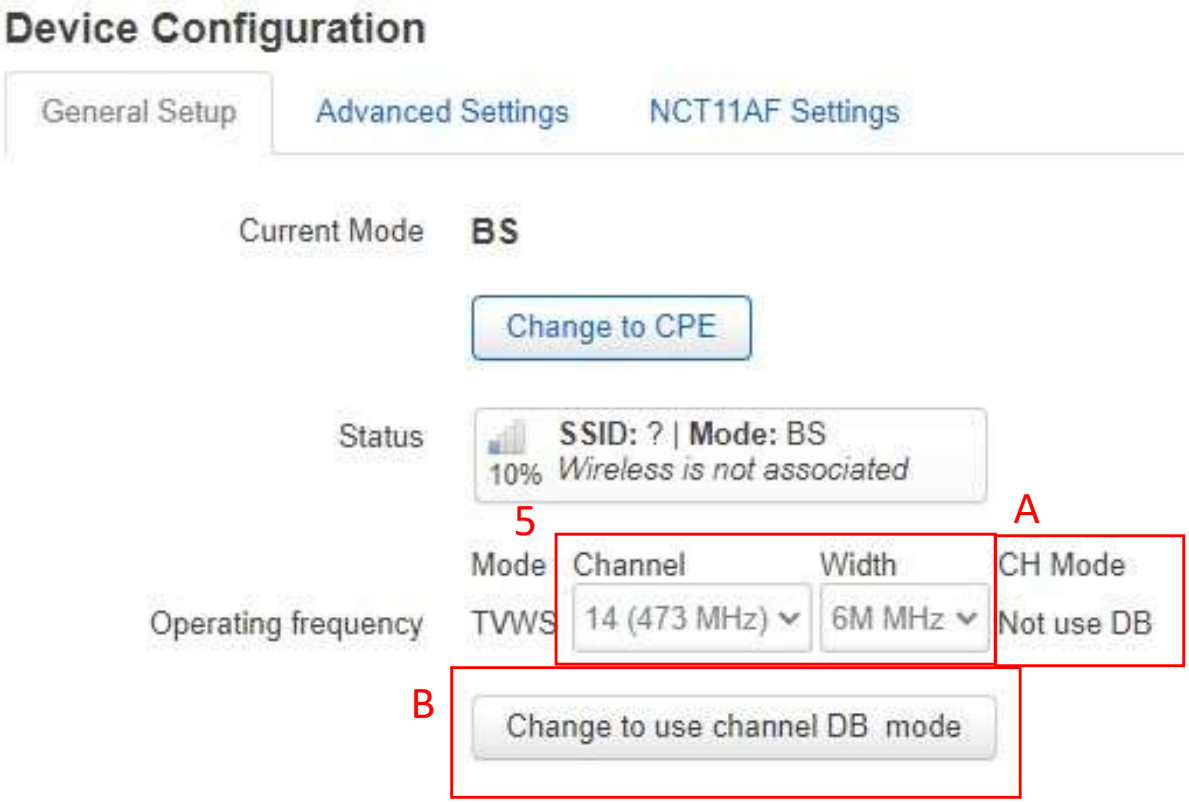
5. Select the band width. 6(FCC) or 8(CE). And select channel.

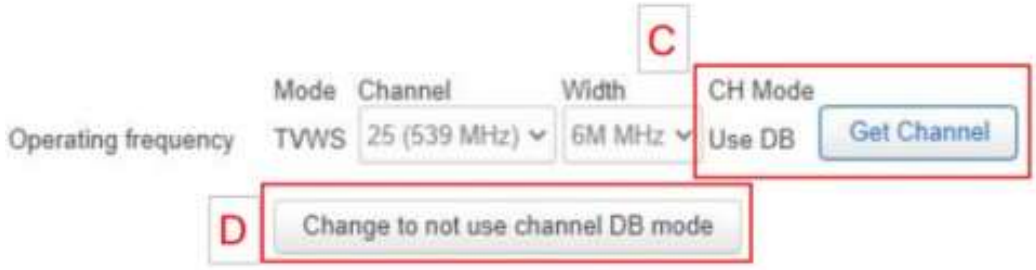
6. Select "*Not use DB*" mode.(Non CH DB mode provide static channel, CH DB mode provide PAWS server information)

A) default mode is "*Not use DB*" mode.

B) For using PAWS, click "*Change to use channel DB Mode*".

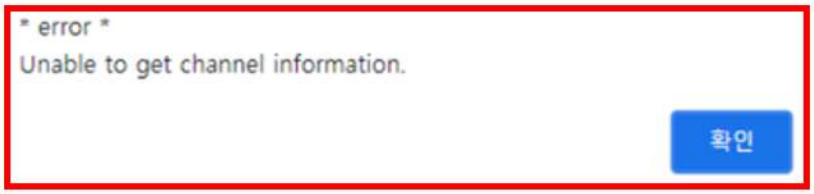
C) When select "*use DB mode*", you can see the "*Get Channel*" button. If you click the "*Get channel"* button, you can get channels from the server.



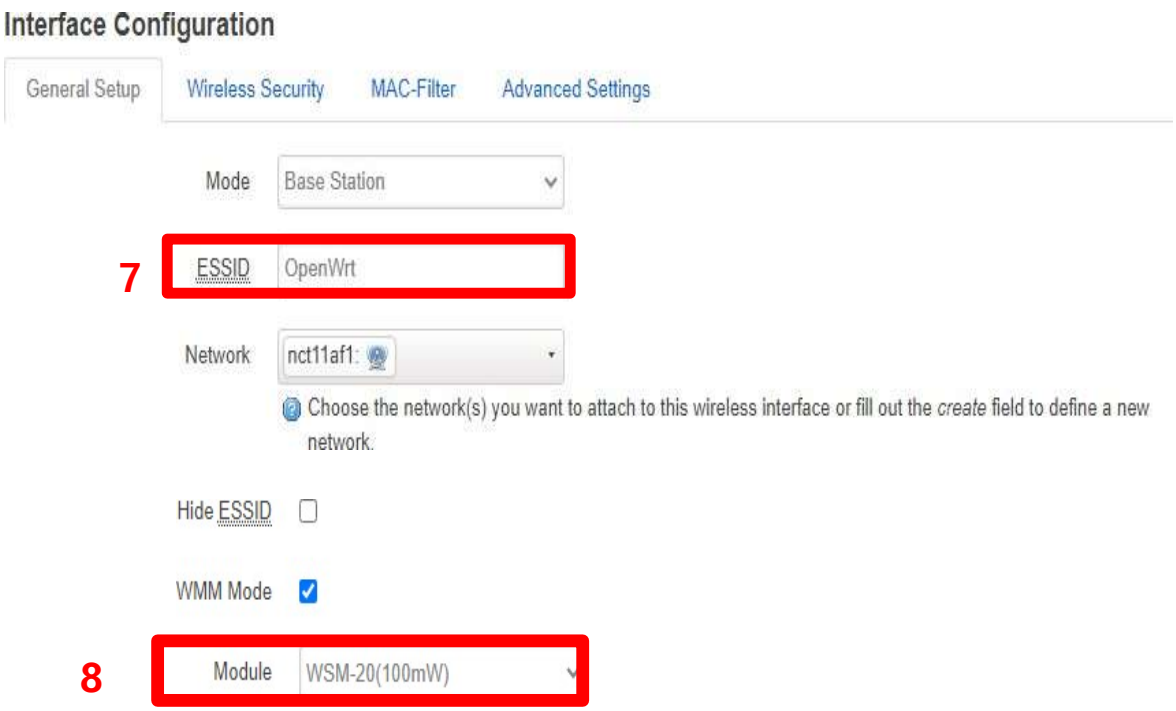


D) If you click "*Change to not use channel DB"* mode,
CH mode will change to "*Not use DB"* mode.
E) You can find available channel list at Use DB mode.

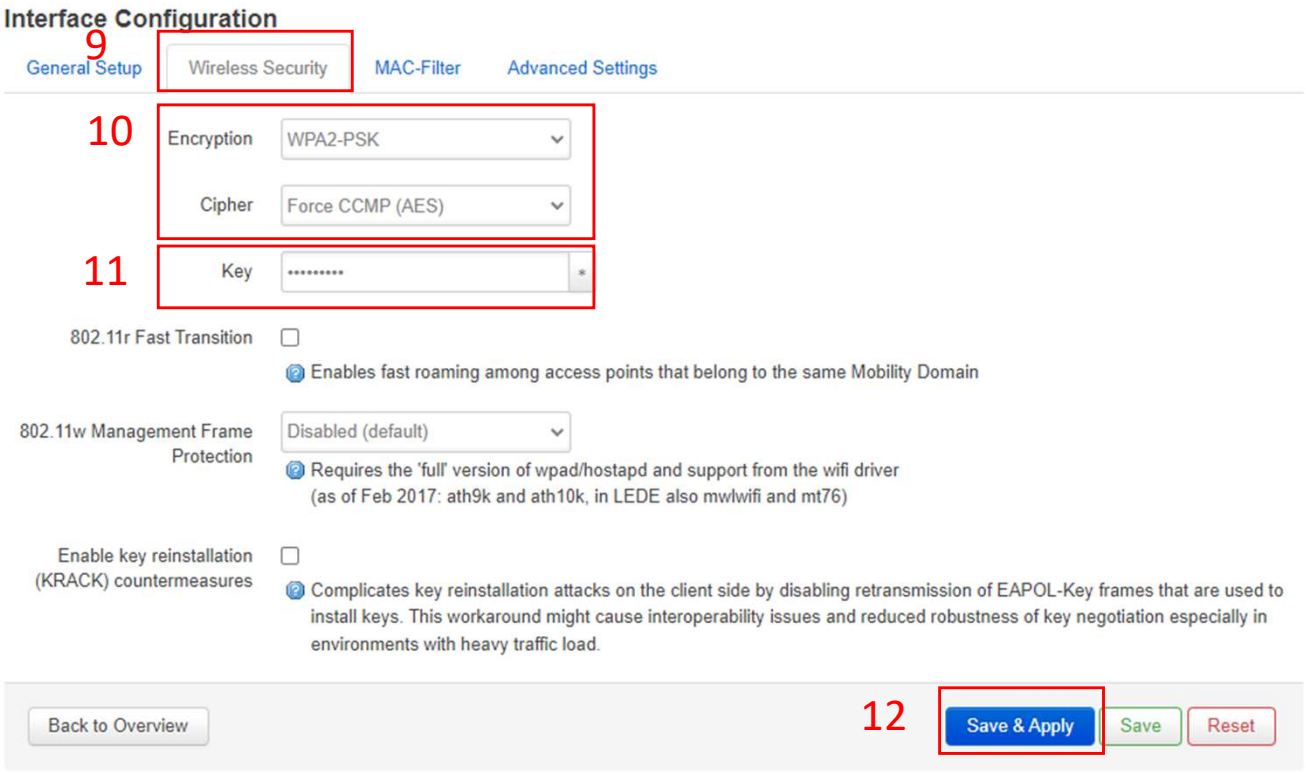
* If you cannot receive channel list from PAWS server,Error massage pops up on the screen.



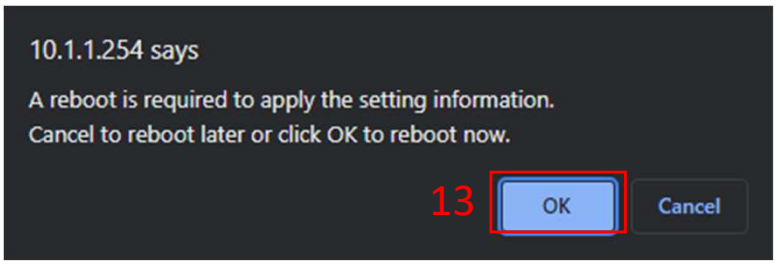
7. Enter “ESSID”.
8. Select “WSM-20” module.



9. Click “Wireless Security” tab.
10. Select “Encryption”, “Cipher” option.
11. Enter password in “key”
12. Click “Save&Apply” button.



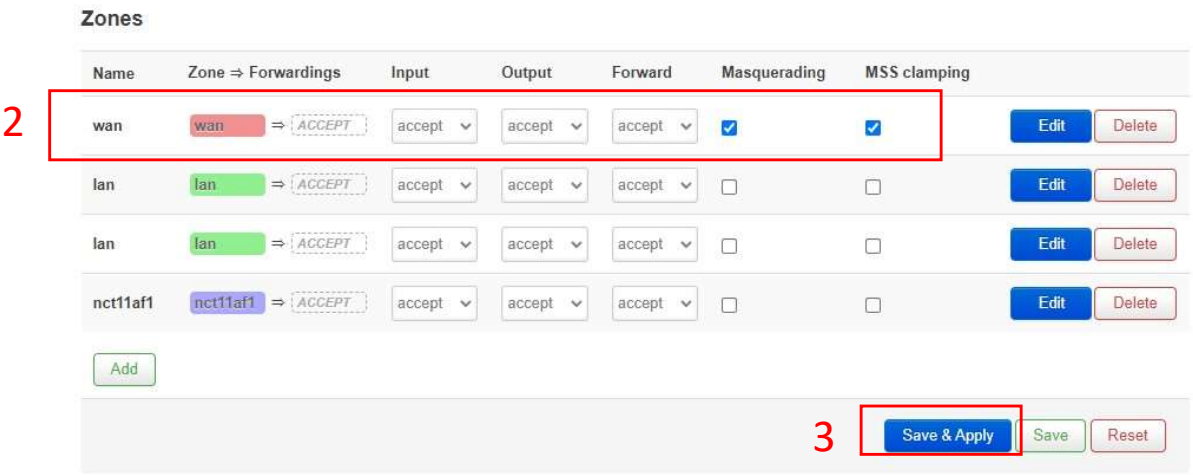
13. Click “*OK*” button.



Step6. Masquerading

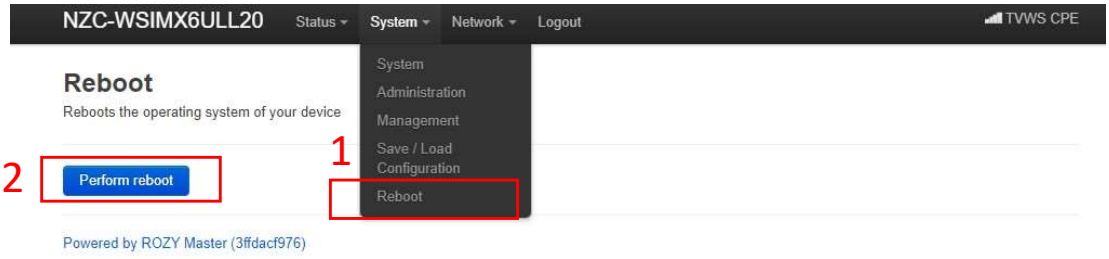
1. Click “N*etwork -> Firewall*” menu.

2. Check the box “*Masquerading*” and “*MSS clam*ping” on WAN.
3. Click “*Save & Apply*” button.



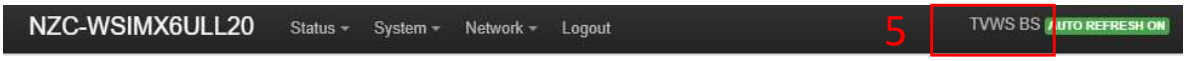
Step7. Reboot System

1. Select “*System -> Reboot*” menu.
2. Click “*Perform reboot*” button.



3. Reboot will progress
4. After device reboots, user can see the login screen again.

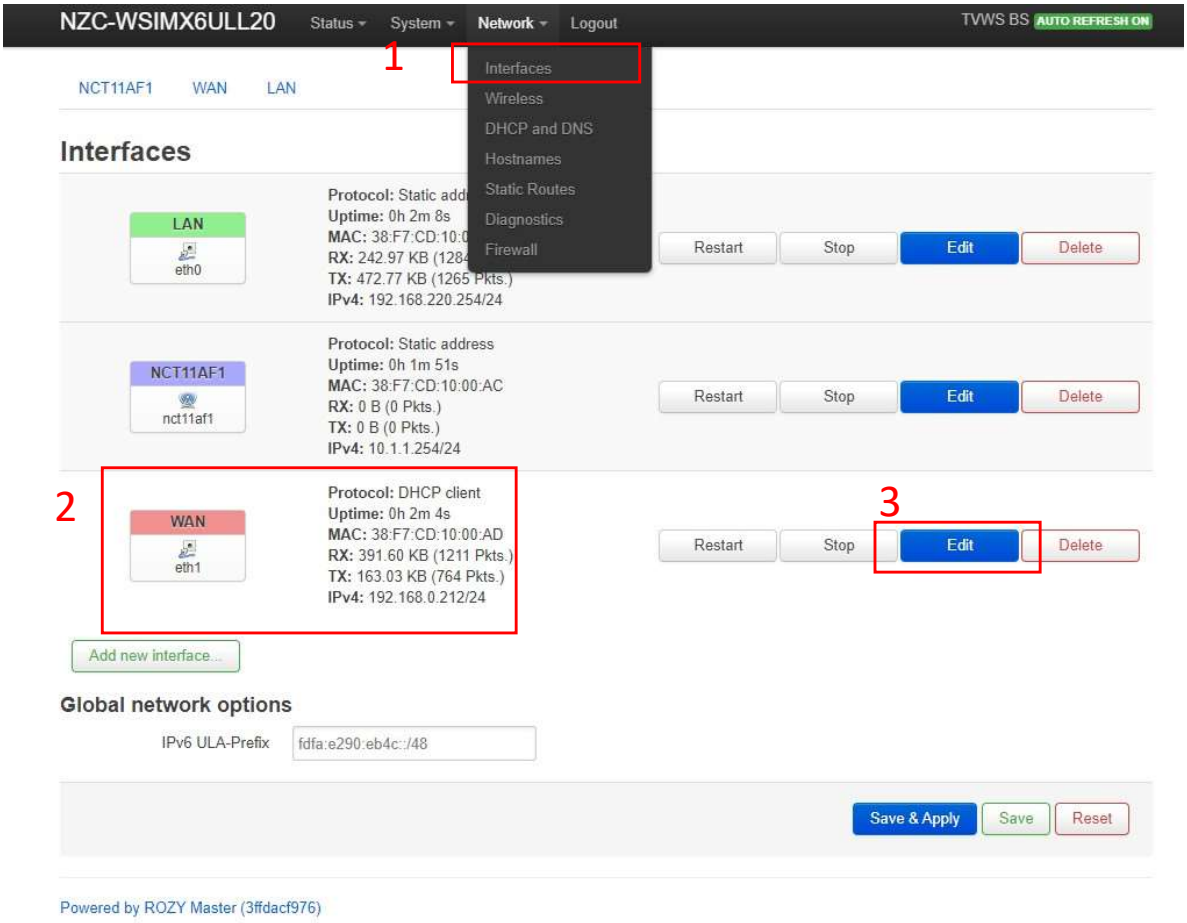
5. After rebooting, check the TVWS MODE first.



V CPE(STA) Settings

Step1. WAN(Wide Area Network) Setting

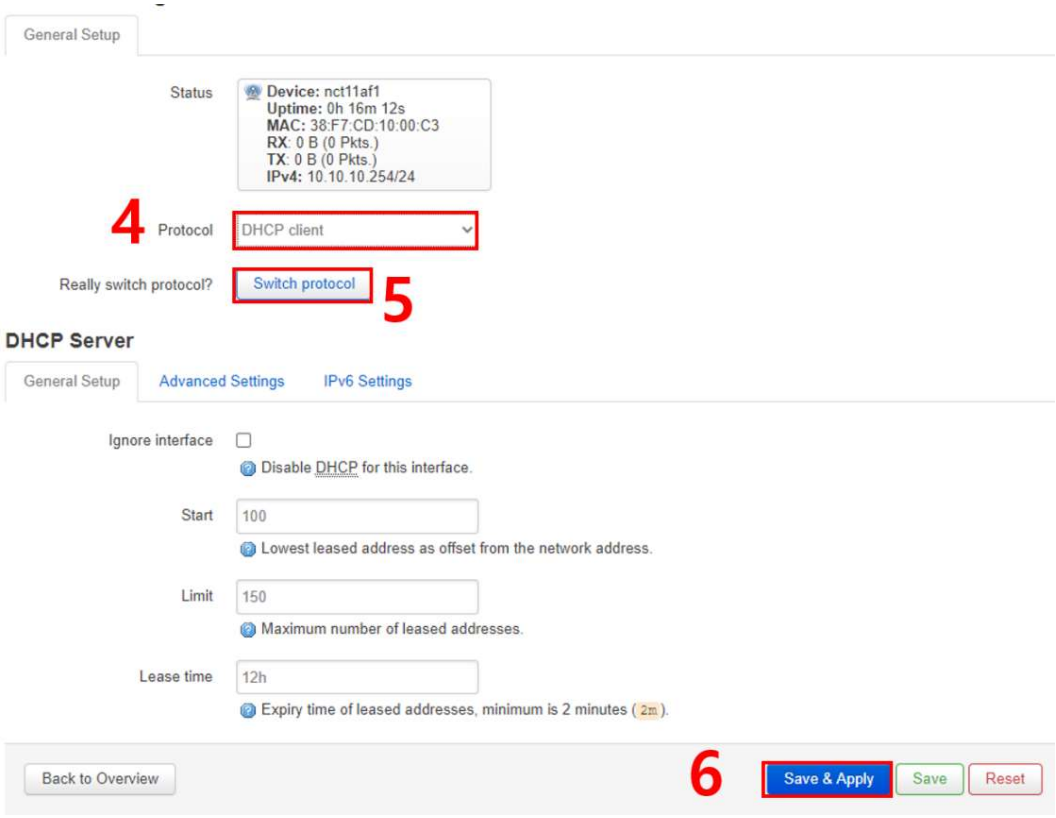
1. Select “*Network -> Inter*faces” menu.
2. Find WAN includes Mac address.
3. Click “*Edit*” button.



4. Setup the protocol to “DHCP client”.

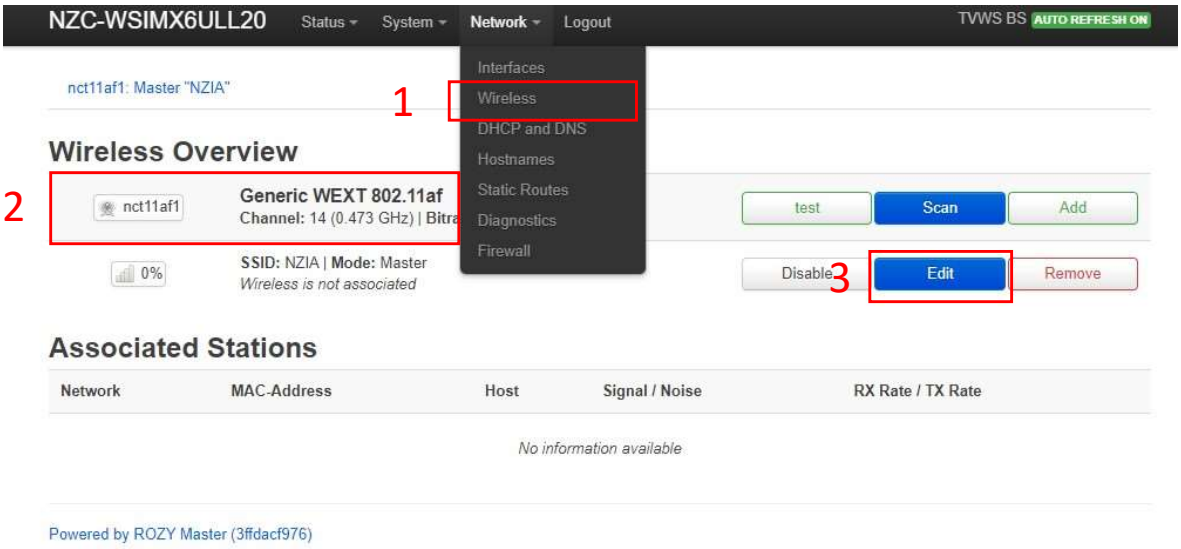
5. Click “*Switch Protocol*” button. If the Protocol is already set “*DHCP client*”, this button will be non-activate.

6. Click “*Save & Apply*”

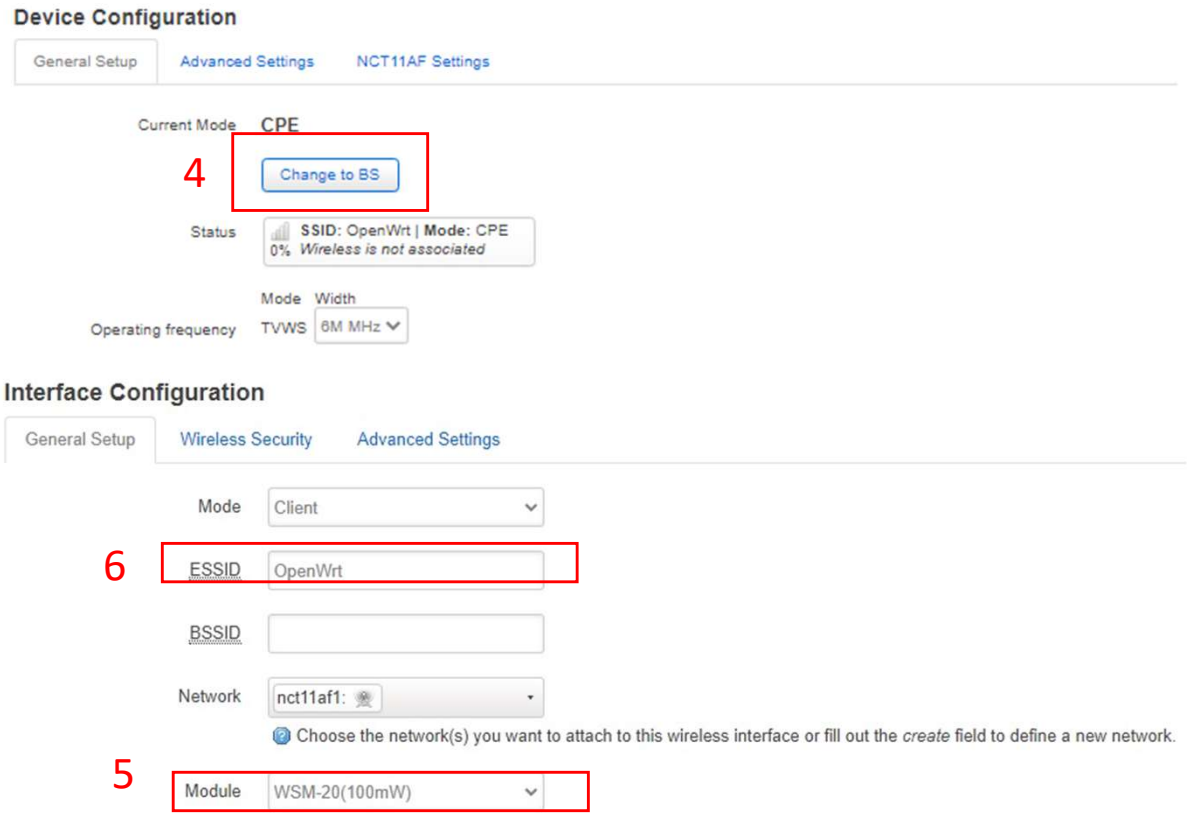


Step2. RF(Radio Frequency) Setting

1. Select "*Network->Wireless*" menu
2. Select WEXT 802.11af interface or interface with Channel information.
3. Click "*Edit*" button.



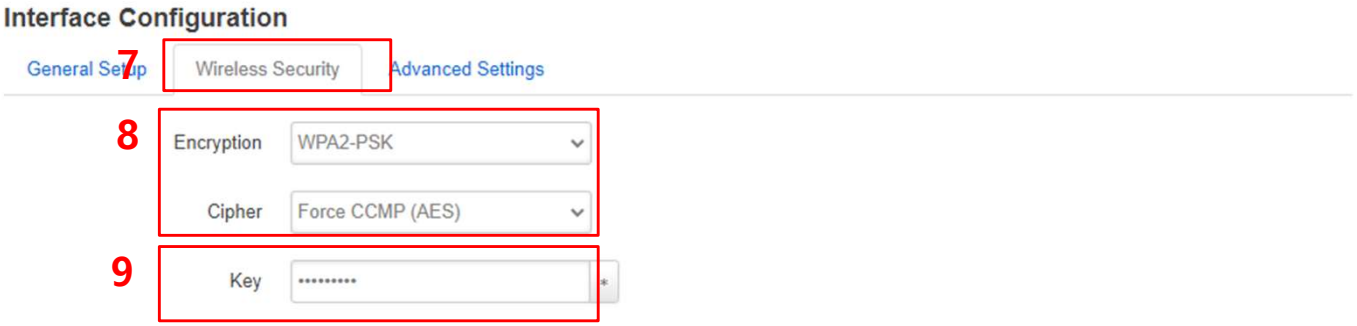
4. If not "*CPE mode*", click "*Change to CPE*".
5. Select "*WSM-20*" on module tap.
6. Enter BS's SSID in ESSID



7. Click "*Wireless Security*" tab.

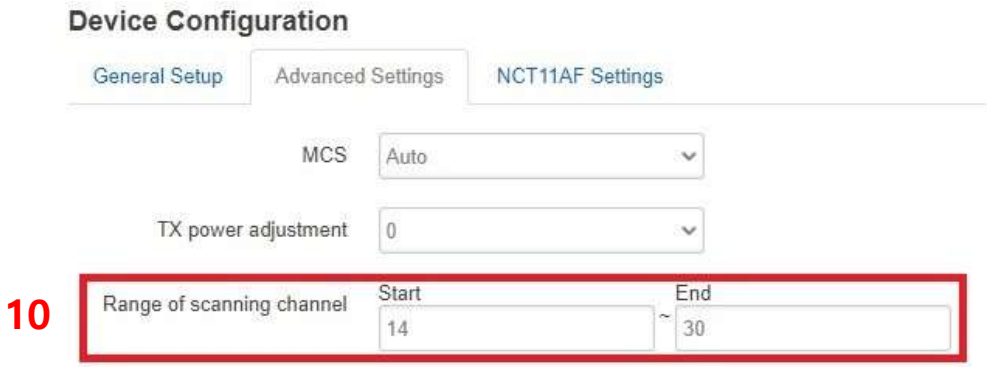
8. Select Encryption, Cipher option like BS.(If BS Cipher is Force CCMP (AES), CPE Cipher is Force CCMP(AES)).

9.Enter BS's password in Key.

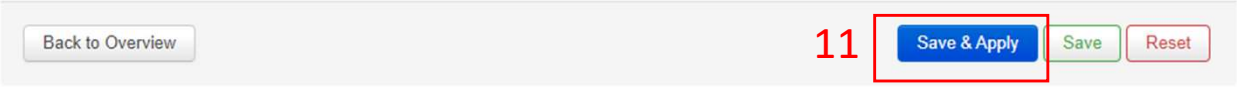


10. Select channel scan range on the "*Advanced settings*" tab.

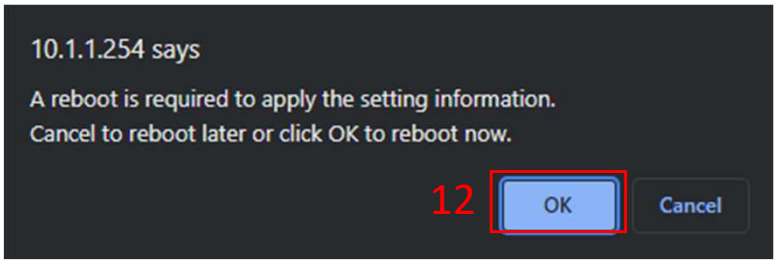
(User can enter scan range. If BS channel is 20, scanning channel can set value as follow. Start is 15. End is 25.)



11. Click “Save&Apply” button.

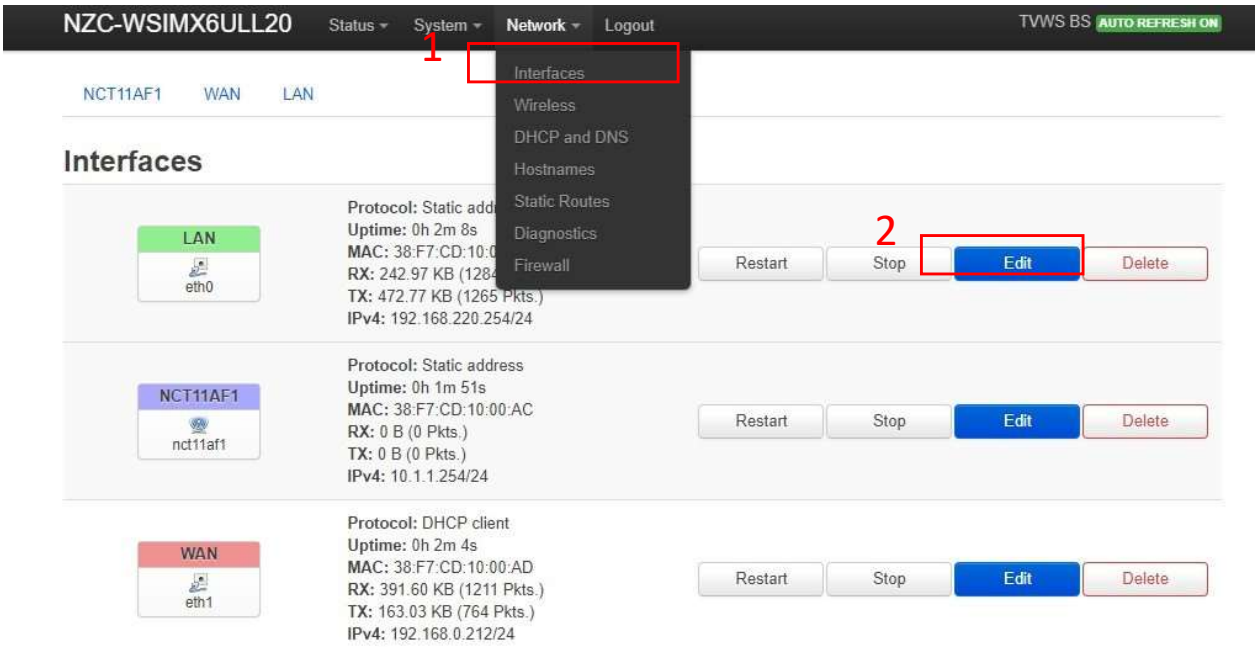


12. Click “*OK*” button.

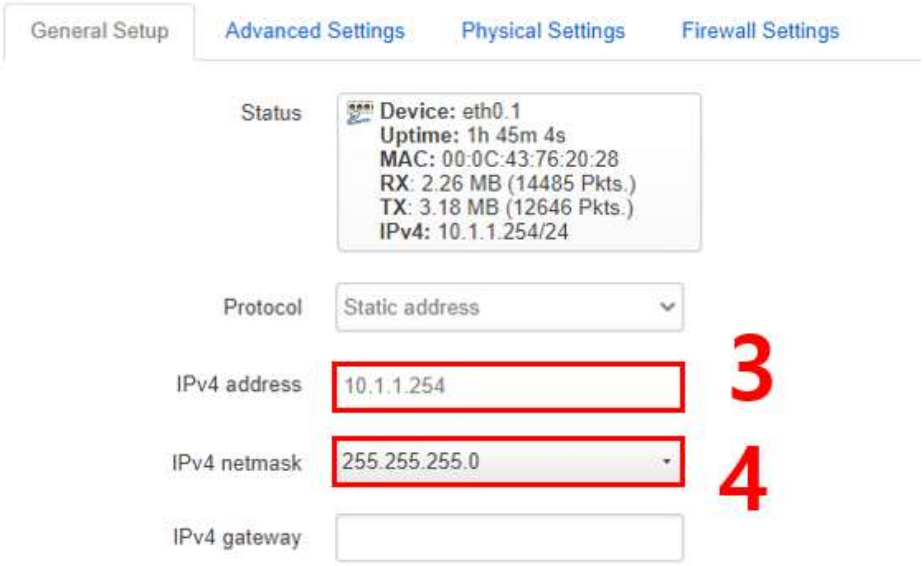


Step3. LAN interface Setting

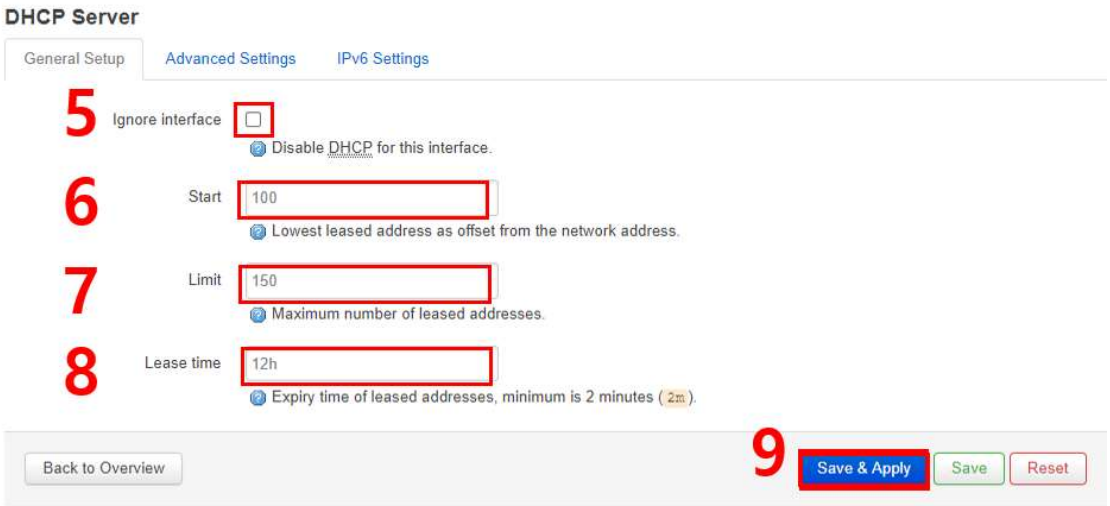
1. Select “*Network->Interfaces*” Menu.
2. Select “*LAN*” interface.



3. Setup IPv4 address(ex. 10.1.1.254)
4. Setup IPv4 netmask(ex.255.255.255.0)

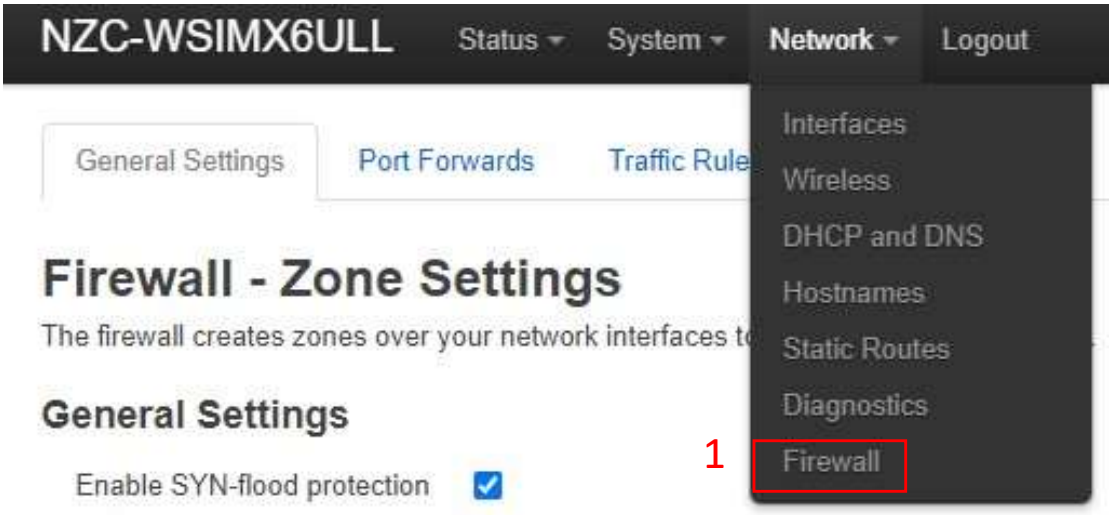


5. Uncheck the "*Ignore Interface*".
6. Setup "100" into Start.
7. Setup "150" into Limit.
8. Setup "12h" into Lease time.
9. Click "*Save & Apply*".

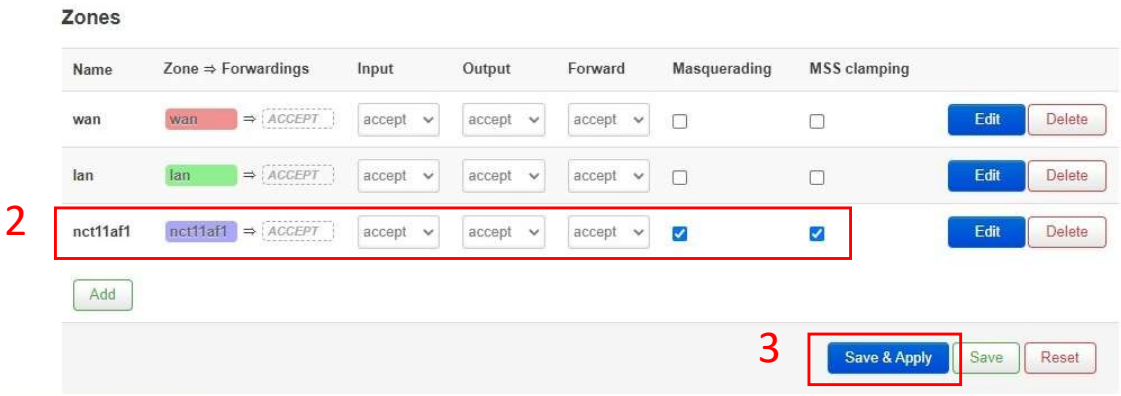


Step4. Masquerading

1. Select "*Network -> Firewall*" menu.

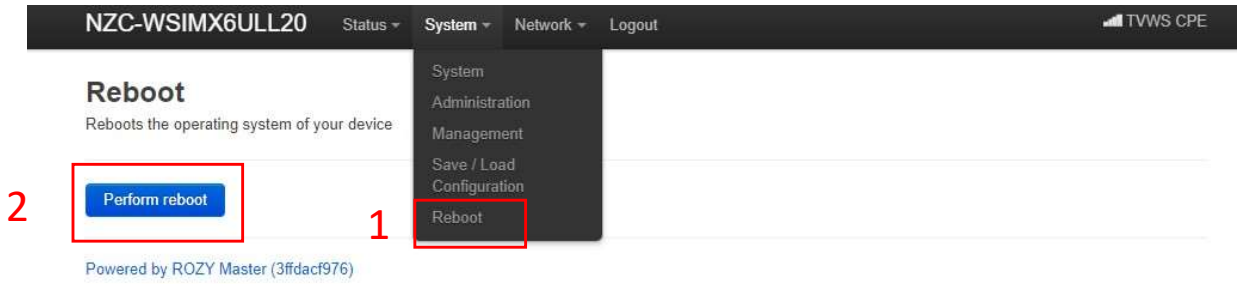


2. Check the "*Masquerading*" and "*MSS clamping*" to vailed nct11af interface.(ex. nct11af1).
3. Click "*Save & Apply*".



Step5. Reboot System

1. Select “*System -> Reboot*” menu.
2. Click “*Perform reboot*” button.

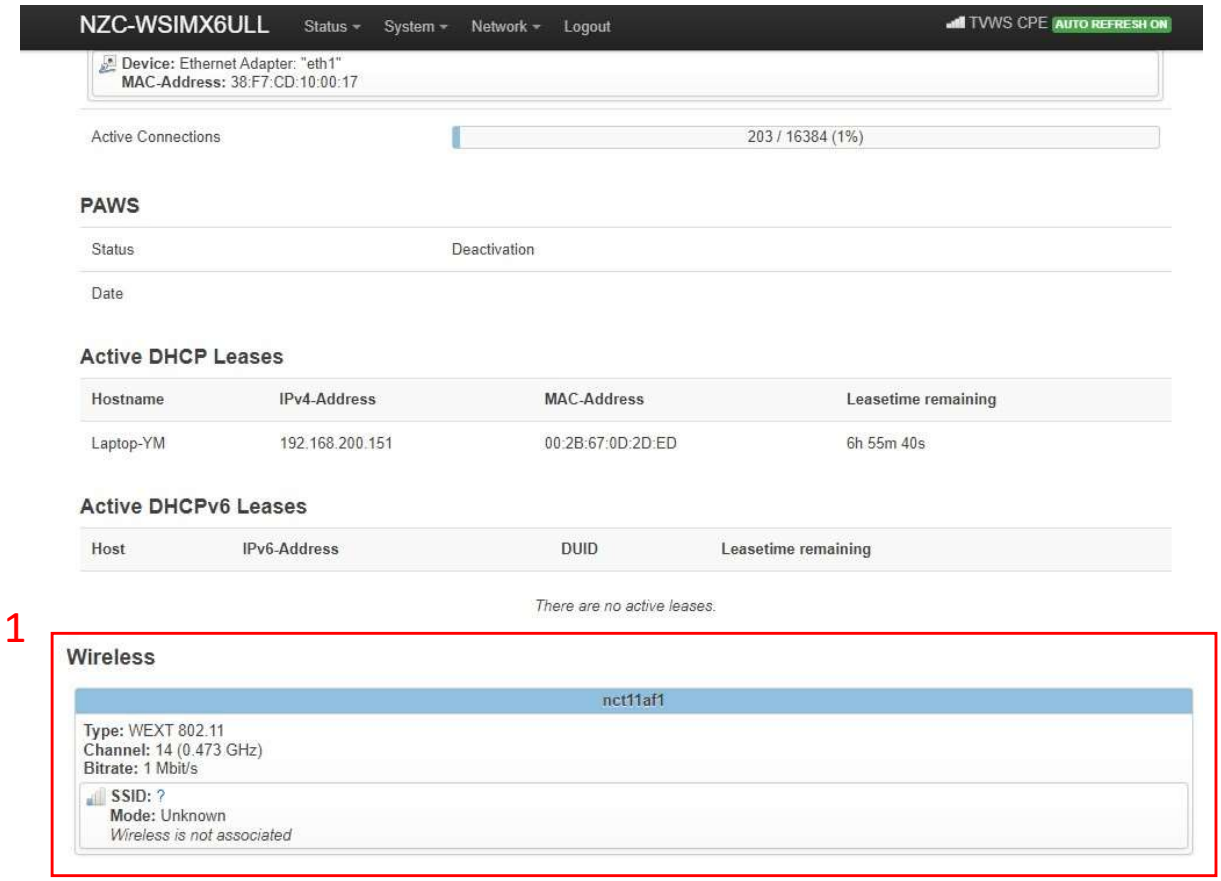


3. Reboot will progress
4. After device reboots, user can see the login screen again.

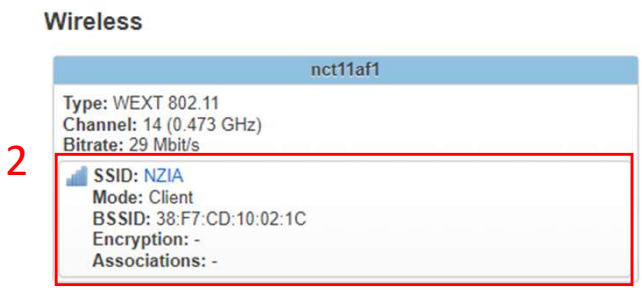
5. After rebooting, check the TVWS MODE first.

Step6. How to check TVWS connection

1. Check the front page of CPE Web UI. The front page is Overview of Status.



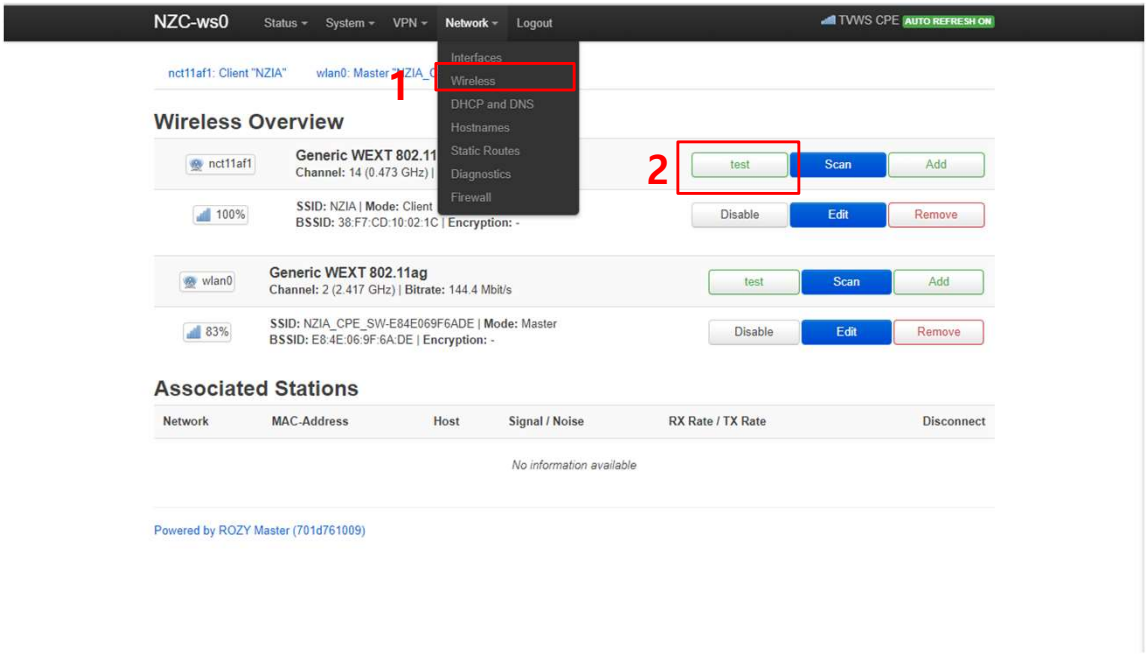
2. If the connection is success between CPE to BS, you can see the page below.



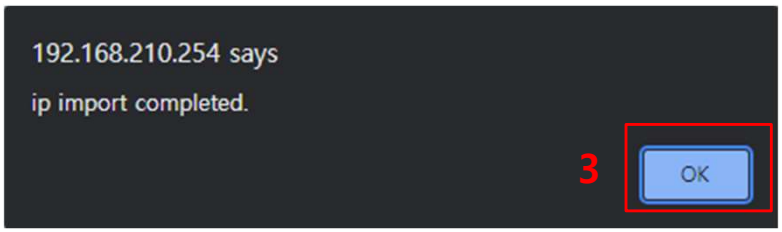
3. If the network is not connected. Please, follow the manual from the first step again.

Option1. Performance Test

1. Select “*Network -> Wireless*” menu.
2. Click “*test*” button.

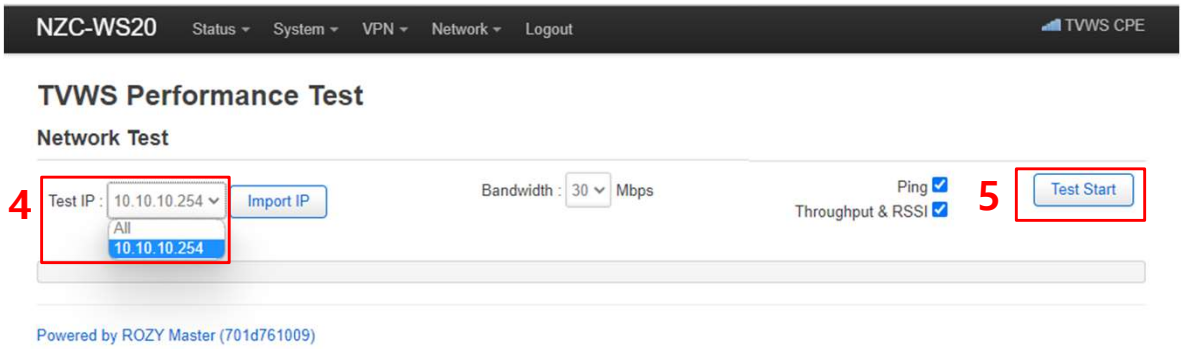


3. Click “*OK*” button.

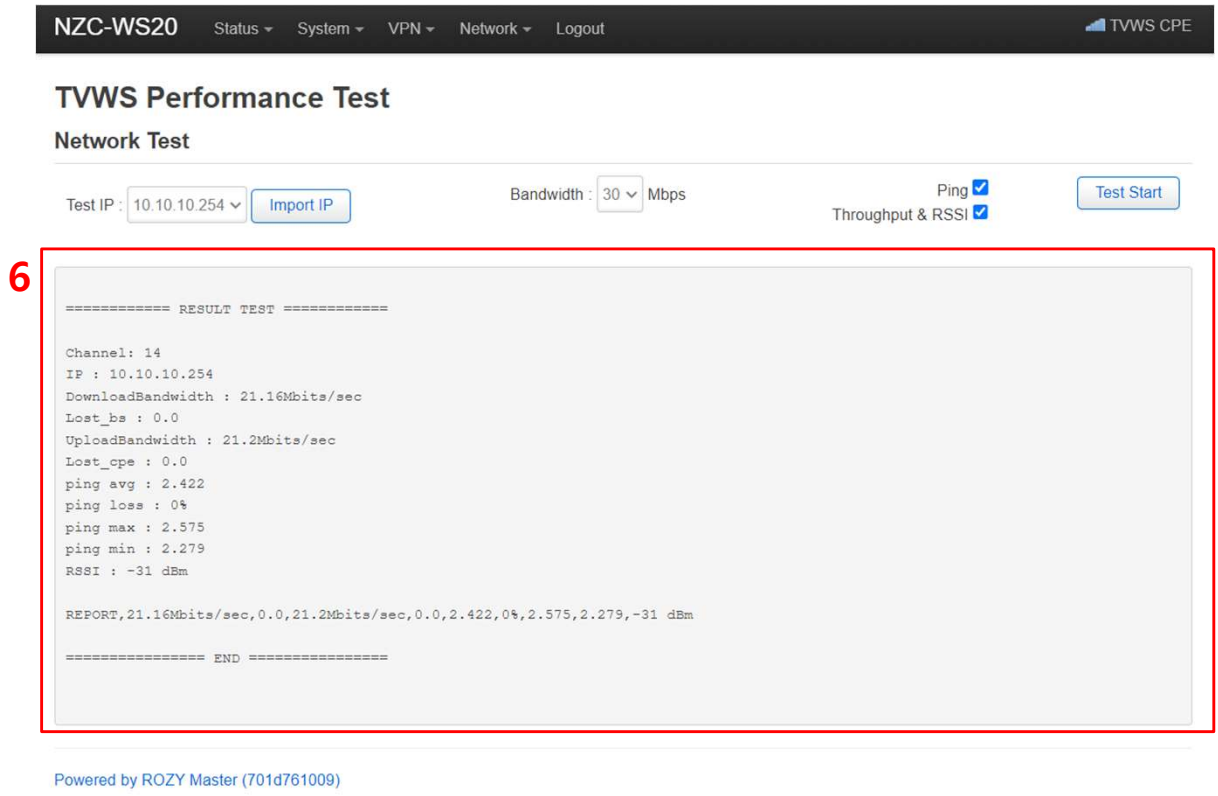


Option1. Performance Test

4. Select device IP at IP list.
5. Click "*Test Start*" button.



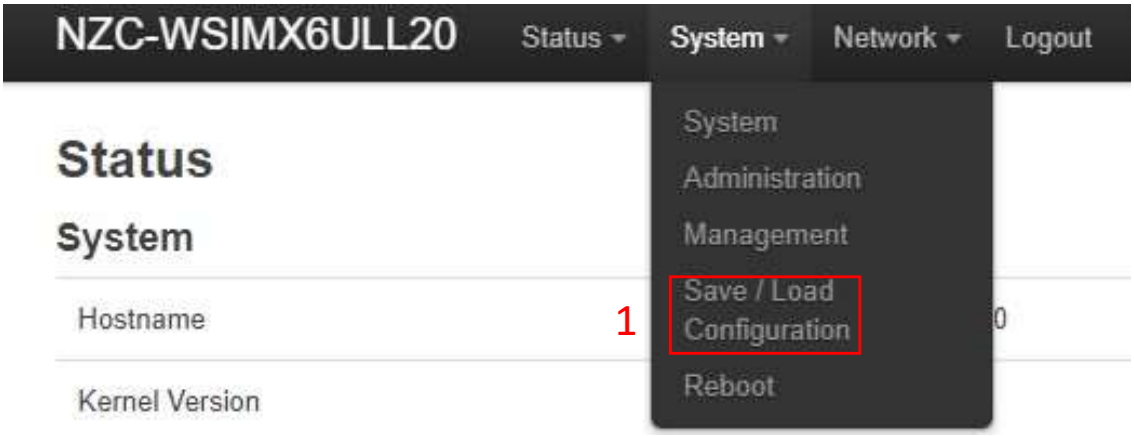
6. The result will print on red box, when test finish.

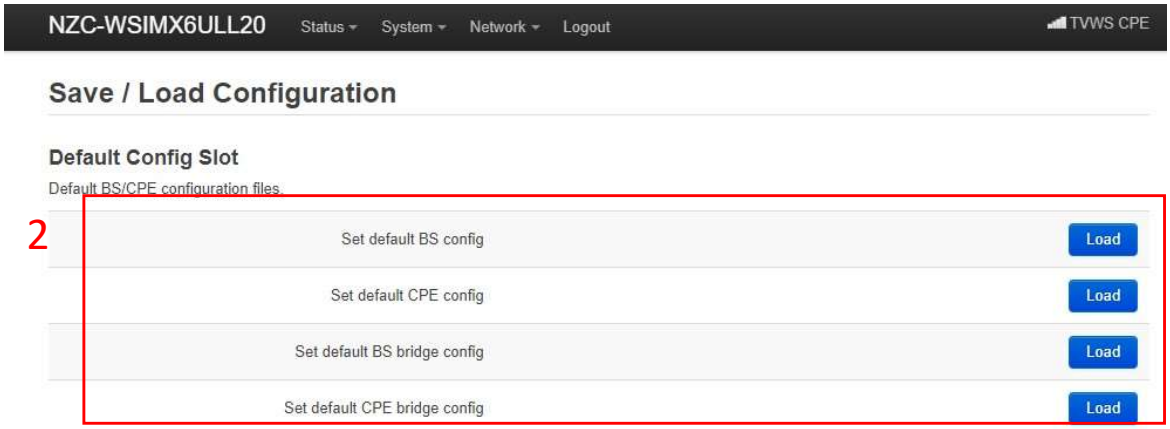


VI SAVE/LOAD Configuration

Step1. Default BS/CPE Configuration Setting

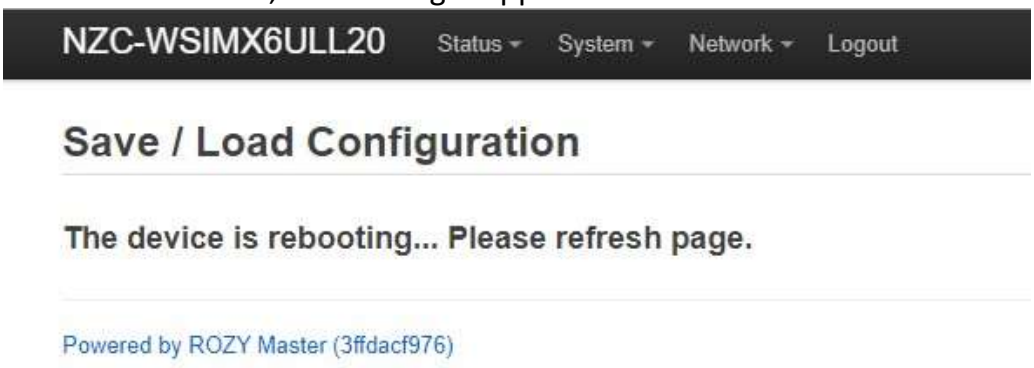
1. Select "*System -> Save/Load configuration*" menu.
2. Select default config slot and click load button





3. Click "*OK*" button.

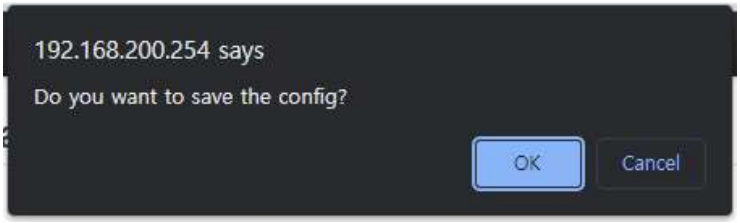
4. The device reboots, after config is applied.



Step2. Save Configuration

1. Click empty slot “*save*” button

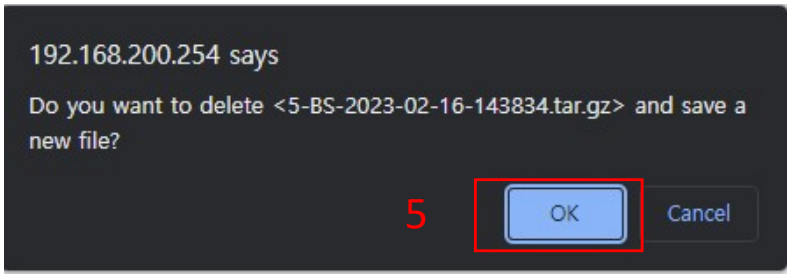
2. Click “OK” button.



3. Config added to the Slot.

4. Click “*save*” button of the config slot, previously saved config is deleted and a new one is saved.

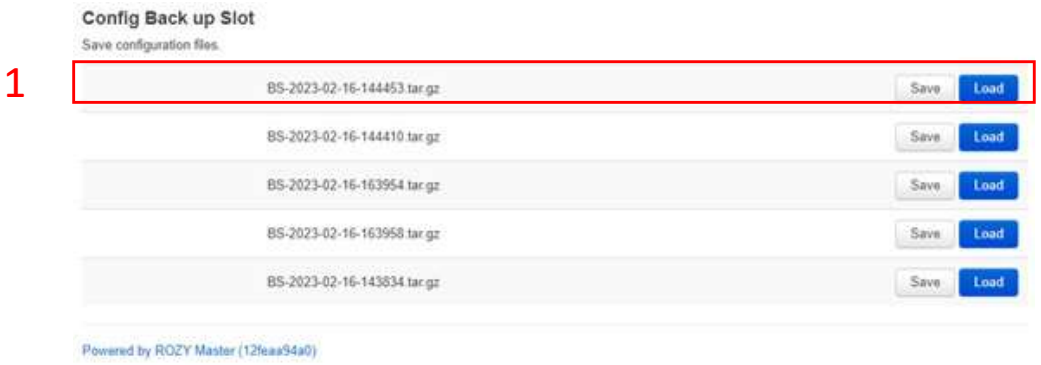
5. Click “*OK*” button.



6. User can find new file at deleted config back up slot.

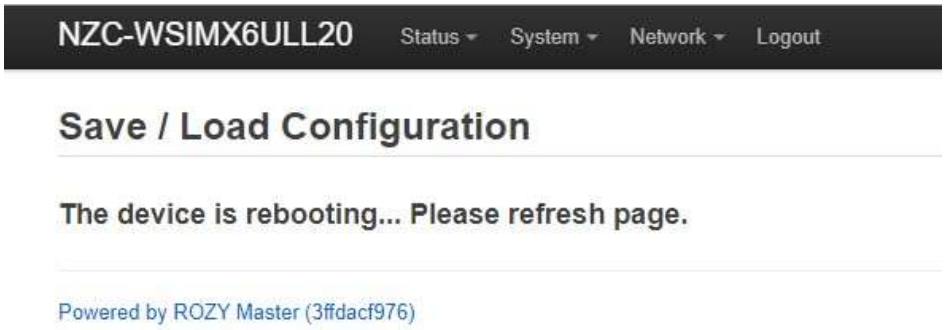
Step3. Load Configuration

1. Click "*load*" button at config slot. (User can use saved config file through load button)



2. Click "*OK*" button.

3. The device reboots, after config is applied.



Service center

Call Center : (+82) 02 851 3873
e-mail : info@nzia.kr

FCC COMPLIANCE STATEMENT

CAUTION: Changes or modifications not expressly approved could void your authority to use this equipment

This device complies with Part 15 of the FCC Rules. Operation to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC §15.105 Information to the user.

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 §15.706 Information to the user.

This equipment has been tested and found to comply with the rules for white space devices, pursuant to part 15 of the FCC rules. These rules are designed to provide reasonable protection against harmful interference. 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. 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:

(1) Reorient or relocate the receiving antenna.
(2) Increase the separation between the equipment and receiver.
(3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
(4) Consult the manufacturer, dealer or an experienced radio/TV technician for help.

FCC RF Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

Caution: Exposure to Radio Frequency Radiation

To comply with FCC RF exposure compliance requirements, for fixed configurations, a separation distance of at least 30cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.