

USER MANUAL

(NZC-WS35 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.

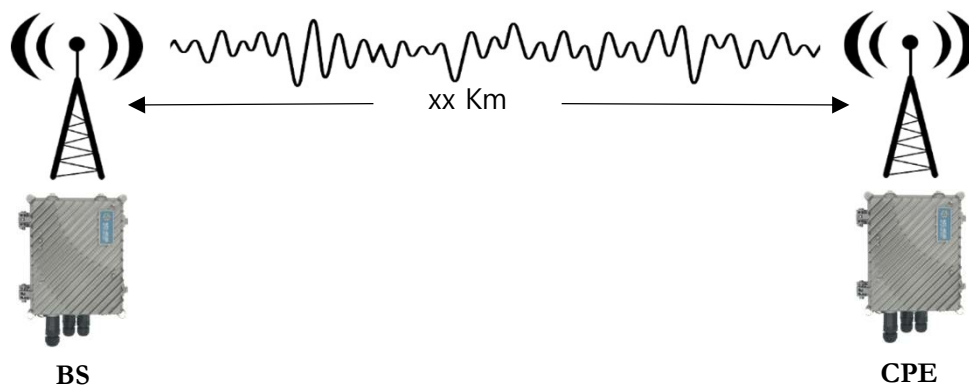
- (1) Height above average terrain (HAAT). Below 602 MHz, antenna shall not exceed 250 meters or 500 meters in less congested areas. All other bands not to exceeds 250 meters. The HAAT is calculated by the White Space database (§73.684(d)). For HAAT greater than 250 meters the following (2)-(7) procedures 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-WS35 manages all the security features, traffic scheduling, and Quality of Service(QoS) functions of NZIA's TVWS Wireless TCP/IP CPE. NZC-WS35 provides fully configurable TVWS wireless CPE/BS features. NZC-WS35 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

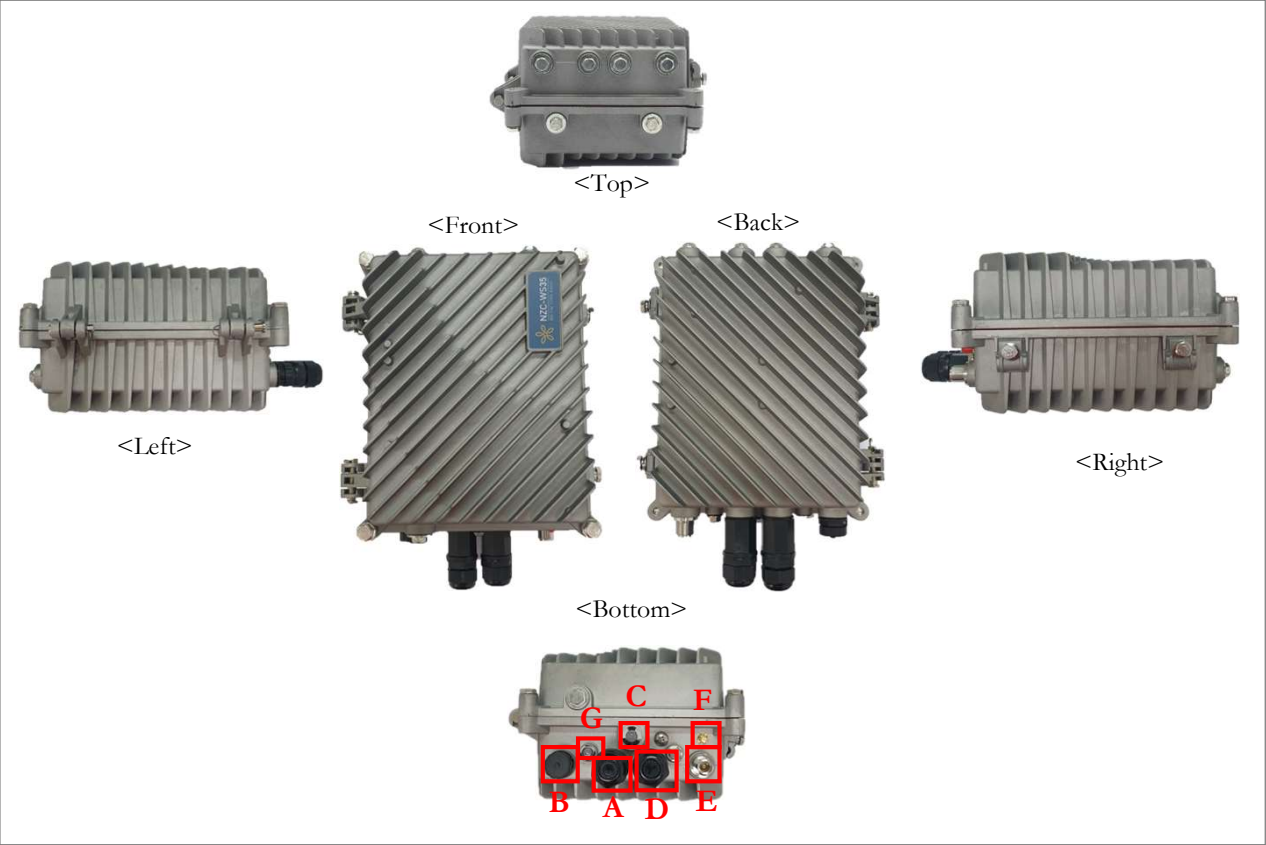
Model Name	NZC-WS35
Model Type	TVWS CPE/BS
Tx Power	Max. 30dBm(1W)
RF Band	UHF Low-Band : 14~35 Channels (470 ~ 602MHz)
	UHF High-Band : 39~44 Channels (620 ~ 656MHz)
	UHF High-Band : 47~51 Channels (668 ~ 698MHz)
Antenna Info	N-Type External SISO Sectoral, omni directional, YaGi, LP
Capability	LOS/NLOS 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
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	68W, 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	232 * 252 * 145(W*H*D)(mm)
Weight	4.0KG

II Device

Package contents

NZC-WS35 device, Antenna, Antenna cable, Power cable

Device layout



- A.WAN

B. Power

C. LED

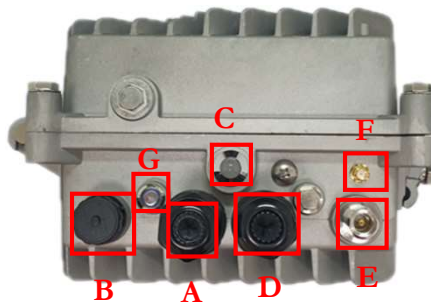
D. LAN

E. Antenna

F. GPS

G. Factory Reset

Useage



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

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.

```
C:\User: >ipconfig

Windows IP Configuration

Wireless LAN adapter 로컬 영역 연결* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 
Wireless LAN adapter 로컬 영역 연결* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 
Ethernet adapter 이더넷:

    Connection-specific DNS Suffix  . : lan
    Link-local IPv6 Address . . . . . : %16
    IPv4 Address. . . . . : 192.168.200.151
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.200.254
```

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.

NZC-WSIMX6ULL20 TVWS CPE

Authorization Required
Please enter your username and password.

1

Username

root

Password

2

Login

Reset

Powered by ROZY Master (3ffdacf976)

3. This screen shows up if logging in successfully.

NZC-WSIMX6ULL20 Status ▾ System ▾ Network ▾ Logout TVWS BS **AUTO REFRESH ON**

Status

System

Hostname	NZC-WSIMX6ULL20
Kernel Version	4.14.61
Local Time	Tue May 23 09:35:48 2023
Uptime	0h 11m 28s
Load Average	2.31, 2.84, 1.94

Memory

Total Available	419868 kB / 511996 kB (82%)
Free	419700 kB / 511996 kB (81%)
Buffered	168 kB / 511996 kB (0%)

Network

IPv4 Upstream

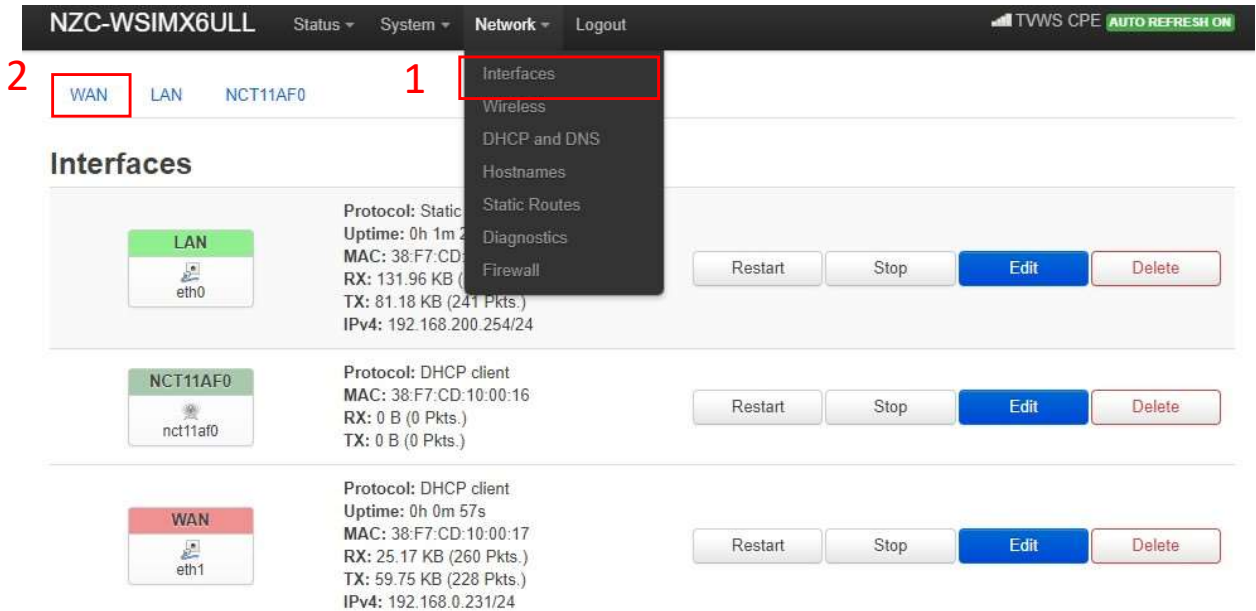
Protocol: DHCP client
Address: 192.168.0.212
Netmask: 255.255.255.0
Gateway: 192.168.0.254
DNS 1: 192.168.0.254
Expires: 23h 49m 16s
Connected: 0h 10m 44s
Device: Ethernet Adapter: "eth1"
MAC-Address: 38:F7:CD:10:00:AD

Active Connections 138 / 16384 (0%)

IV BS(AP) Settings

Step1. WAN(Wide Area Network) interface Setting

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

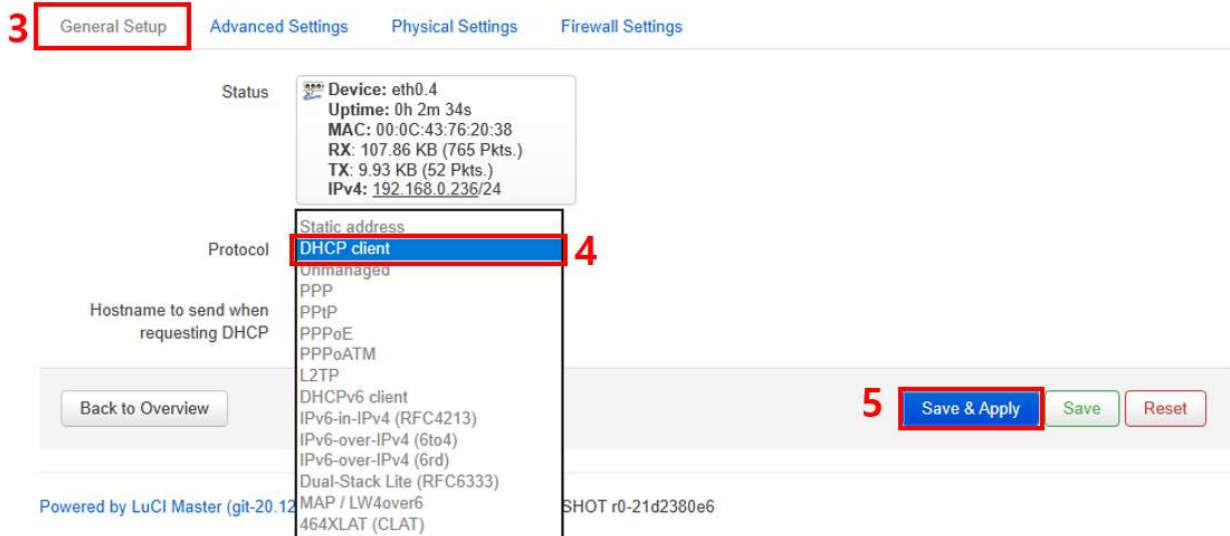


3. Select “General Setup” tap.
4. Select DHCP client
5. Click “Save & Apply” button.

Interfaces - WAN

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the “bridge interfaces” field and enter the names of several network interfaces separated by spaces. You can also use `VLAN` notation `INTERFACE.VLANNR` (e.g.: `eth0.1`).

Common Configuration



Step2. LAN(Local Area Network) Setting

1. Find NCT11AF includes Mac address.
2. Click “Edit” button.

The screenshot shows the network configuration page for NTC-WSIMX6ULL. The top navigation bar includes 'Status', 'System', 'Network', and 'Logout'. The 'Network' tab is active, showing a list of interfaces: LAN (eth0), NCT11AF0 (nct11af0), and WAN (eth1). The NCT11AF0 interface is highlighted with a red box and labeled '1'. Its details are: Protocol: DHCP client, Uptime: 0h 3m 28s, MAC: 38:F7:CD:10:00:18, RX: 186.44 KB (1026 Pkts.), TX: 247.49 KB (715 Pkts.), IPv4: 192.168.200.254/24. The 'Edit' button for NCT11AF0 is highlighted with a red box and labeled '2'. Other interfaces show their respective protocols and statistics.

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

Interfaces - NCT11AF0

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the “bridge interfaces” field and enter the names of several network interfaces separated by spaces. You can also use VLAN notation INTERFACE.VLANNR (e.g., eth0.1).

Common Configuration

General Setup

The screenshot shows the configuration page for NCT11AF0. The 'General Setup' tab is active. The 'Status' section shows: Device: nct11af0, Uptime: 0h 0m 51s, MAC: 38:F7:CD:10:00:16, RX: 0 B (0 Pkts.), TX: 0 B (0 Pkts.), IPv4: 10.1.1.254/24. The 'Protocol' dropdown menu is open, showing options: DHCP client, Static address (highlighted with a red box and labeled '3'), DHCP client, Unmanaged, Relay bridge, PPP, PPPoE, PPPoATM, L2TP, DHCPv6 client, IPv6-in-IPv4 (RFC4213), IPv6-over-IPv4 (6to4), IPv6-over-IPv4 (6rd), Dual-Stack Lite (RFC6333), MAP / LW4over6, and 464XLAT (CLAT). The 'Really switch protocol?' checkbox is checked. The 'DHCP Server' section is also visible, with 'General Setup' and 'Advanced Setup' tabs.

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

Interfaces - NCT11AF0

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the “bridge interfaces” field and enter the names of several network interfaces separated by spaces. You can also use VLAN notation INTERFACE.VLANNR (e.g.: eth0.1).

Common Configuration

General Setup

Status  Device: nct11af0
Uptime: 0h 2m 47s
MAC: 38:F7:CD:10:00:16
RX: 0 B (0 Pkts.)
TX: 0 B (0 Pkts.)
IPv4: 10.1.1.254/24

Protocol Static address

4 Really switch protocol? [Switch protocol](#)

[Back to Overview](#) [Save & Apply](#) [Save](#) [Reset](#)

5. Enter IPv4 address(10.1.1.254).

6. Enter IPv4 netmask(255.255.255.0).

Common Configuration

General Setup **Advanced Settings** Physical Settings Firewall Settings

Status  Device: nct11af0
Uptime: 0h 4m 13s
MAC: 38:F7:CD:10:00:16
RX: 0 B (0 Pkts.)
TX: 0 B (0 Pkts.)
IPv4: 10.1.1.254/24

Protocol Static address

5 IPv4 address 10.1.1.254

6 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.

DHCP Server

General Setup **Advanced Settings** IPv6 Settings

7 Ignore interface ☐  Disable DHCP for this interface.

8 Start 100  Lowest leased address as offset from the network address.

9 Limit 150  Maximum number of leased addresses.

10 Lease time 12h  Expiry time of leased addresses, minimum is 2 minutes (2m).

11. Please check the interface name on “Physical settings” tap. For example, Setting interface name is nct11af0 then physical settings tab’s interface is nct11af0.
12. Click “Save & Apply” button.

Interfaces - NCT11AF0

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the “bridge interfaces” field and enter the names of several network interfaces separated by spaces. You can also use VLAN notation INTERFACE.VLANNR (e.g.: eth0.1).

Common Configuration

General Setup **Advanced Settings** Physical Settings Firewall Settings

Bridge interfaces ☐

creates a bridge over specified interface(s)

Interface nct11af0

DHCP Server

General Setup **Advanced Settings** IPv6 Settings

Ignore interface ☐

Disable DHCP for this interface.

Start

Lowest leased address as offset from the network address.

Limit

Maximum number of leased addresses.

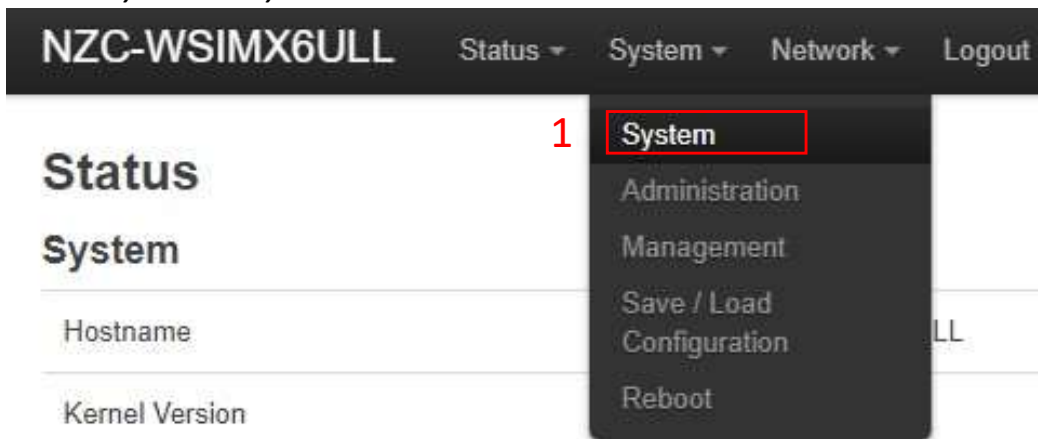
Lease time

Expiry time of leased addresses, minimum is 2 minutes (2m).

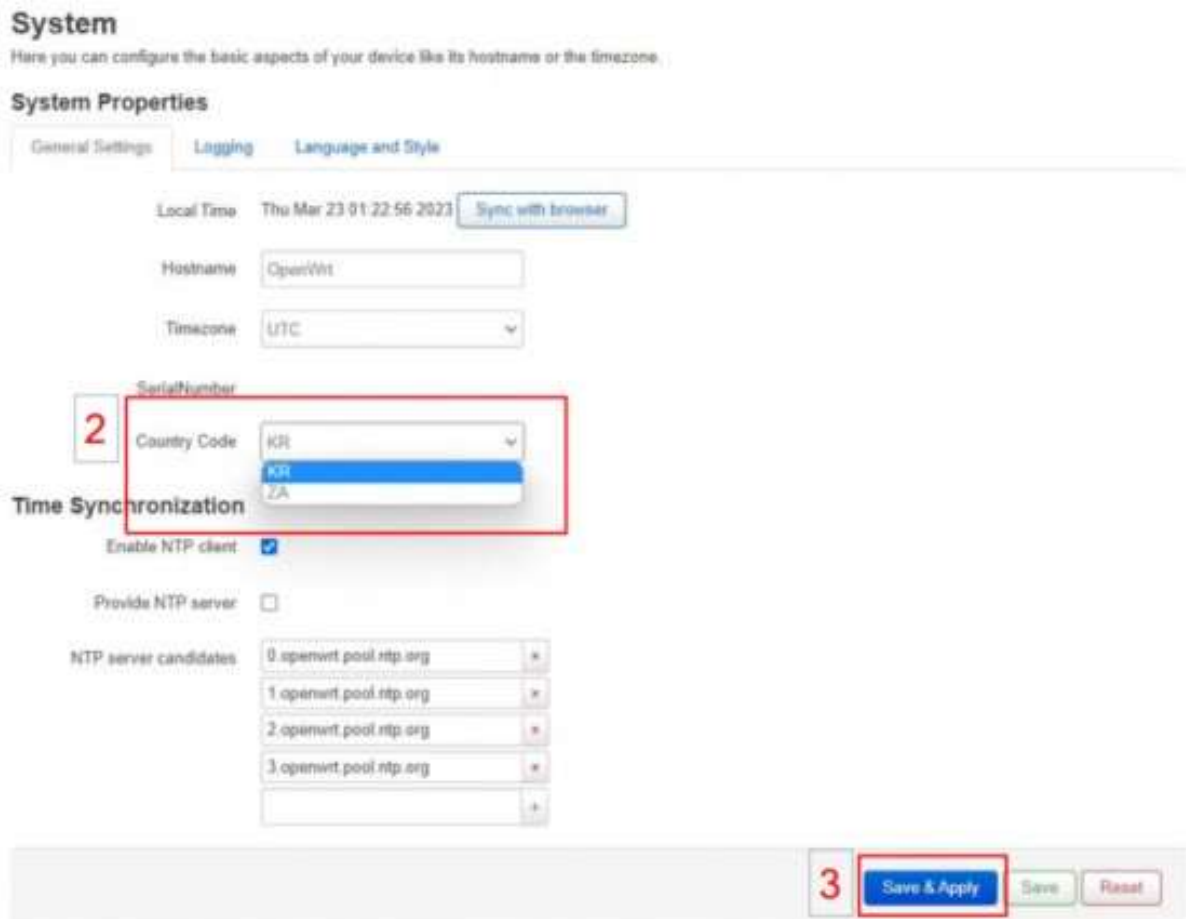
Back to Overview **Save & Apply** Save Reset

Step3. PAWS

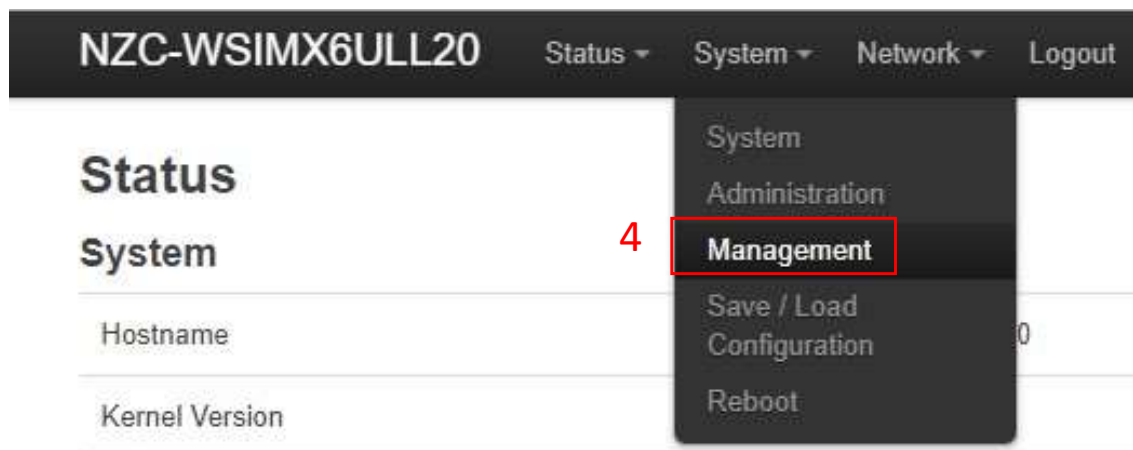
1. Click “System -> System” menu.



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.

PAWS Info

PAWS Information

A

PAWS URL

DeviceType

Serial Number

Model ID

DBM

Cerification ID

B

Location

latitude	longitude	gps mode
37.5860	126.8172	

C

D

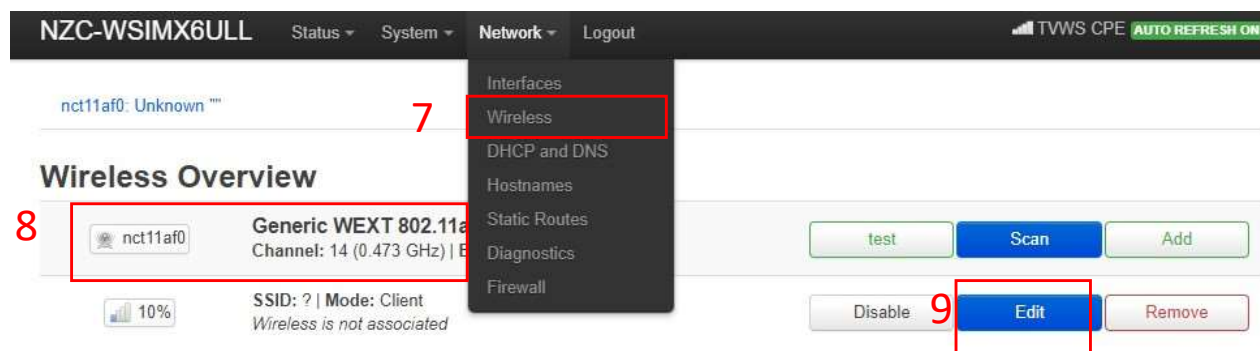
Antenna

Height Type	Height(m)
AGL	11

E

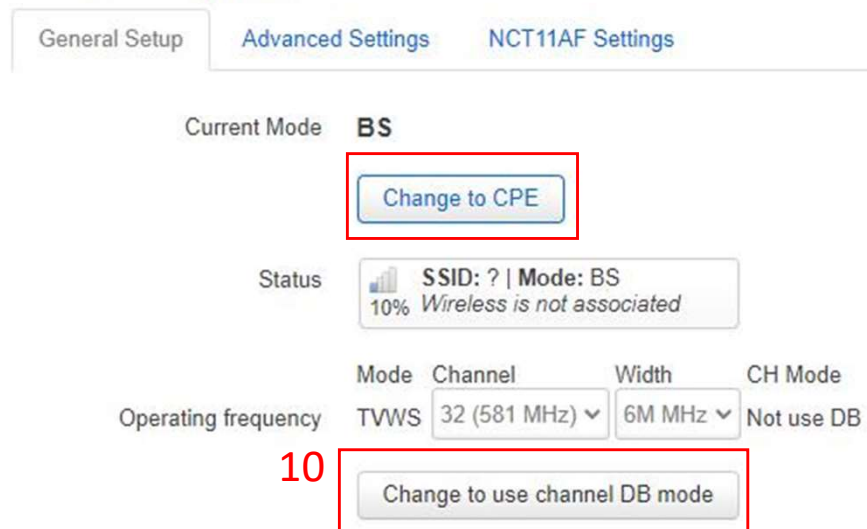
6

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.

Device Configuration



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.)

Device Configuration

General Setup

Advanced Settings

NCT11AF Settings

Current Mode **BS**

Change to CPE

Status

SSID: ? | Mode: BS
10% Wireless is not associated

Operating frequency

Mode

Channel

Width

CH Mode

TVWS

32 (581 MHz)

6M MHz

Use DB

Get Channel

25 (539 MHz)

32 (581 MHz)

Channel DB mode

12. Click "Save&Apply" button.

12

Save & Apply

Save

Reset

13. Click "OK" button.

10.1.1.254 says

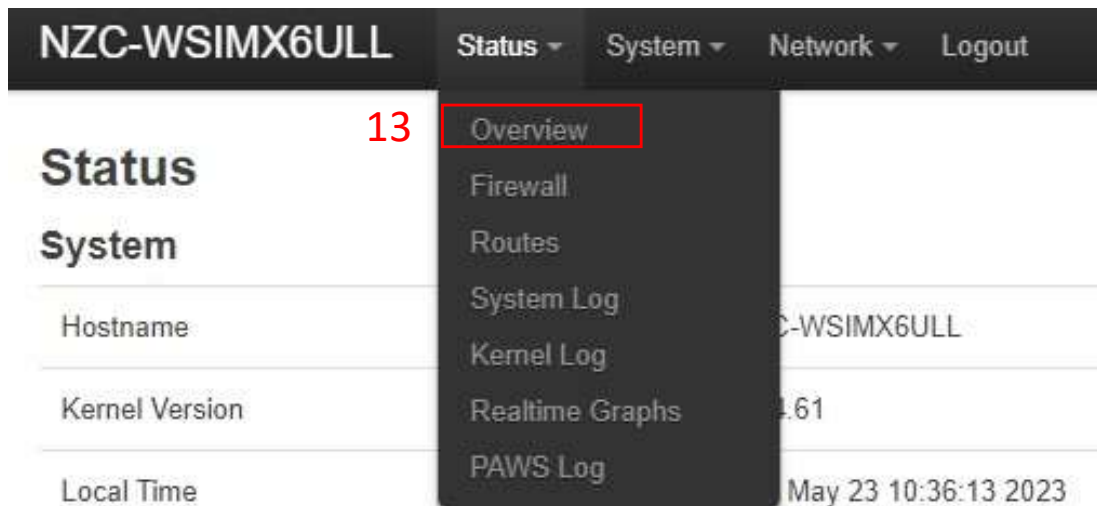
A reboot is required to apply the setting information.
Cancel to reboot later or click OK to reboot now.

13

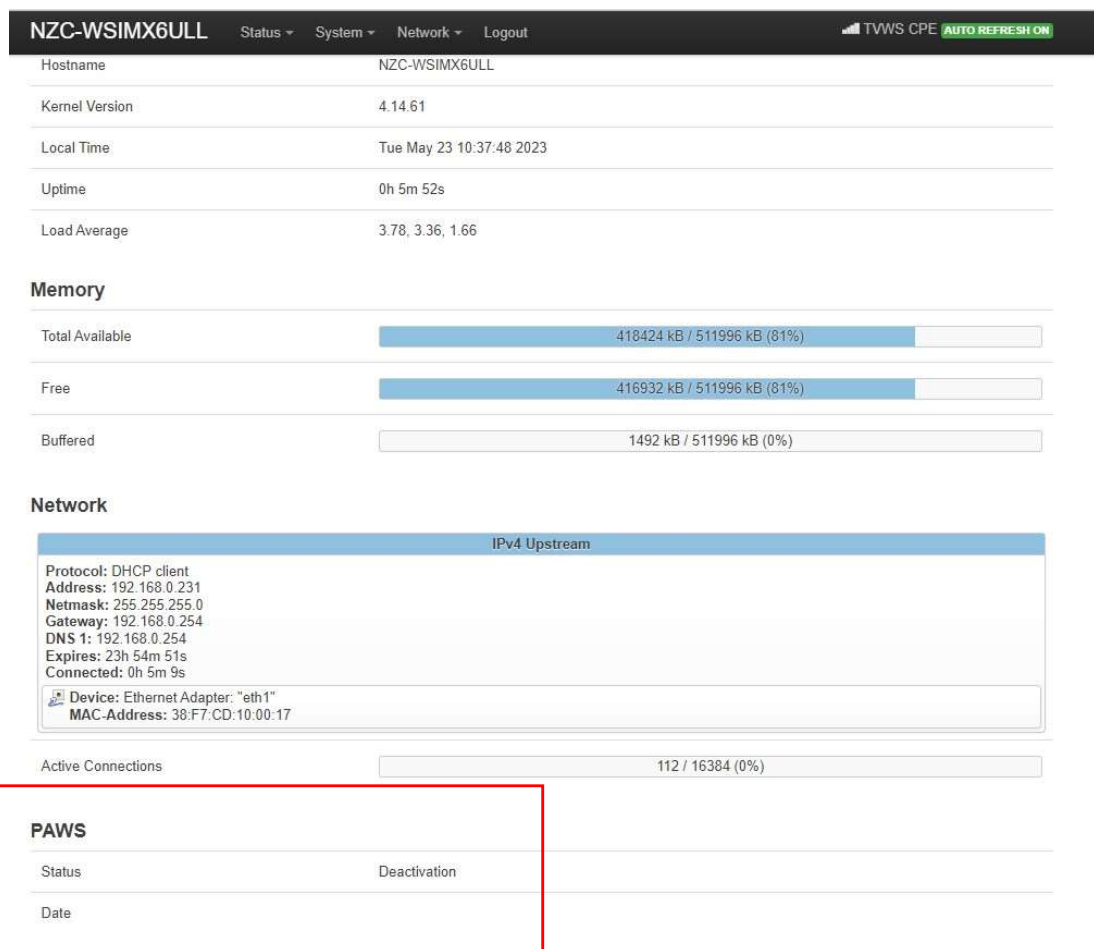
OK

Cancel

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.

The screenshot shows the top navigation bar of the NZC-WSIMX6ULL20 dashboard. The 'Status' menu is open, and 'PAWS Log' is highlighted with a red box. The dashboard also displays memory usage statistics: Total Available (412784 kB / 511996 kB (80%)), Free (412544 kB / 511996 kB (80%)), and Buffered (240 kB / 511996 kB (0%)).

Memory	Usage
Total Available	412784 kB / 511996 kB (80%)
Free	412544 kB / 511996 kB (80%)
Buffered	240 kB / 511996 kB (0%)

The screenshot shows the 'PAWS Log' interface. It displays two JSON objects: 'send json' and 'read json'. The 'send json' object represents a device initialization request, and the 'read json' object represents the corresponding response.

```
send json :
{
  "params": {
    "version": "1.0",
    "type": "INIT_REQ",
    "deviceDesc": {
      "modelId": "NZC-WS20",
      "serialNumber": "WS20-224-0000004",
      "ksDeviceType": "Portable Master",
      "ksDeviceEmissionPower": 20,
      "ksCertId": "R-R-nZc-NZC-WS20"
    },
    "location": {
      "point": {
        "center": {
          "latitude": 37.585999999999999,
          "longitude": 126.8172
        }
      }
    }
  },
  "id": "000001",
  "method": "spectrum.paws.init"
}

read json :
{
  "result": {
    "rulesetInfo": {
      "ksDeviceType": "Portable Master",
      "maxPollingSecs": "86400",
      "resultId": "KsTvBandWhiteSpace-2015",
      "maxLocationChange": 100,
      "authority": "KR"
    },
    "version": "1.0",
    "type": "INIT_RESP"
  },
  "id": "000001"
}
```

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.

The screenshot shows the NZC-WSIMX6ULL web interface. At the top, there is a navigation bar with 'Status', 'System', 'Network', and 'Logout' menus. The 'Network' menu is open, showing a list of options: 'Interfaces', 'Wireless', 'DHCP and DNS', 'Hostnames', 'Static Routes', 'Diagnostics', and 'Firewall'. A red box labeled '1' highlights the 'Wireless' option. Below the navigation bar, the 'Wireless Overview' section is visible. It shows a list of wireless interfaces. The first interface is 'nct11af0', which is highlighted with a red box labeled '2'. To the right of the interface name, it says 'Generic WEXT 802.11a' and 'Channel: 15 (0.479 GHz) | B'. Below this, there is a '10%' signal strength indicator and the text 'SSID: ? | Mode: Master' and 'Wireless is not associated'. To the right of the interface list, there are buttons: 'test', 'Scan', 'Add', 'Disable', 'Edit', and 'Remove'. The 'Edit' button is highlighted with a red box labeled '3'. Below the 'Wireless Overview' section, there is an 'Associated Stations' section with a table. The table has columns: 'Network', 'MAC-Address', 'Host', 'Signal / Noise', and 'RX Rate / TX Rate'. The table is currently empty, with the text 'No information available' below it. At the bottom of the page, it says 'Powered by ROZY Master (3ffdc976)'.

NZC-WSIMX6ULL Status System Network Logout TWWS CPE AUTO REFRESH ON

nct11af0: Unknown ""

Wireless Overview

2 nct11af0 Generic WEXT 802.11a Channel: 15 (0.479 GHz) | B

10% SSID: ? | Mode: Master Wireless is not associated

test Scan Add

Disable Edit Remove

Associated Stations

Network	MAC-Address	Host	Signal / Noise	RX Rate / TX Rate
No information available				

Powered by ROZY Master (3ffdc976)

4. Click “Change to BS”, it goes to BS mode in few seconds.

Device Configuration

General Setup

Advanced Settings

NCT11AF Settings

Current Mode CPE

4

Change to BS

Status

SSID: OpenWrt | Mode: CPE
0% Wireless is not associated

Mode Width

Operating frequency

TVWS

6M MHz

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

6. Select CH DB mode.

(Non CH DB mode provide static channel, CH DB mode provide PAWS server information.)

A) default mode is “Non use DB” mode.

B) For using PAWS, click “Change to use channel DB Mode”.

C) Once “use DB” mode is ready, you can see the “Get Channel” button. If you click the “Get channel” button, you can get channels from the PAWS server.

Device Configuration

General Setup

Advanced Settings

NCT11AF Settings

Current Mode BS

Change to CPE

Status

SSID: ? | Mode: BS
10% Wireless is not associated

5

A

Mode

Channel

Width

CH Mode

Operating frequency

TVWS

14 (473 MHz)

6M MHz

Not use DB

B

Change to use channel DB mode

C

	Mode	Channel	Width	CH Mode	
Operating frequency	TVWS	32 (581 MHz) ▼	6M MHz ▼	Use DB	Get Channel

D

Change to not use channel DB mode

- D) If you click “Change to not use channel DB mode”, will change to “Non use DB” mode.
 E) You can see all available channel list.

E

	Mode	Channel	Width	CH Mode	
Operating frequency	TVWS	32 (581 MHz) ▼	6M MHz ▼	Use DB	Get Channel

Char

32 (581 MHz) ▼

15 (479 MHz)
16 (485 MHz)
22 (521 MHz)
23 (527 MHz)

Change to not use channel DB mode

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

* error *

Unable to get channel information.

확인

7. Enter "ESSID".
8. Select "WSM-35" module.

Interface Configuration

[General Setup](#) [Wireless Security](#) [MAC-Filter](#) [Advanced Settings](#)

Mode

Base Station

7

ESSID

NZIA

Network

nct11af1: 

 Choose the network(s) you want to attach to this wireless interface or fill out the *create* field to define a new network.

Hide ESSID

☐

WMM Mode

☒

8

Module

WSM-35(1W)

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

Interface Configuration

9 **Wireless Security** | General Setup | MAC-Filter | Advanced Settings

10 Encryption: WPA2-PSK

Cipher: Force CCMP (AES)

11 Key:

802.11r Fast Transition ☐
ⓘ Enables fast roaming among access points that belong to the same Mobility Domain

802.11w Management Frame Protection: Disabled (default)
ⓘ Requires the 'full' version of wpa2/hostapd and support from the wifi driver (as of Feb 2017: ath9k and ath10k, in LEDE also mwlwifi and mt76)

Enable key reinstallation (KRACK) countermeasures ☐
ⓘ Complicates key reinstallation attacks on the client side by disabling retransmission of EAPOL-Key frames that are used to install keys. This workaround might cause interoperability issues and reduced robustness of key negotiation especially in environments with heavy traffic load.

Back to Overview

12 **Save & Apply** | Save | Reset

13. Click “OK” button.

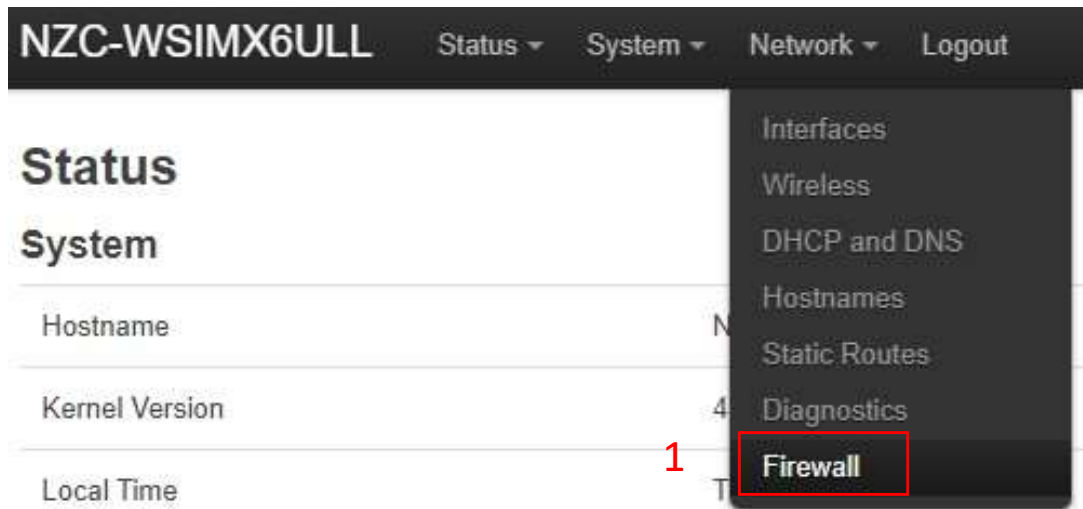
10.1.1.254 says

A reboot is required to apply the setting information.
Cancel to reboot later or click OK to reboot now.

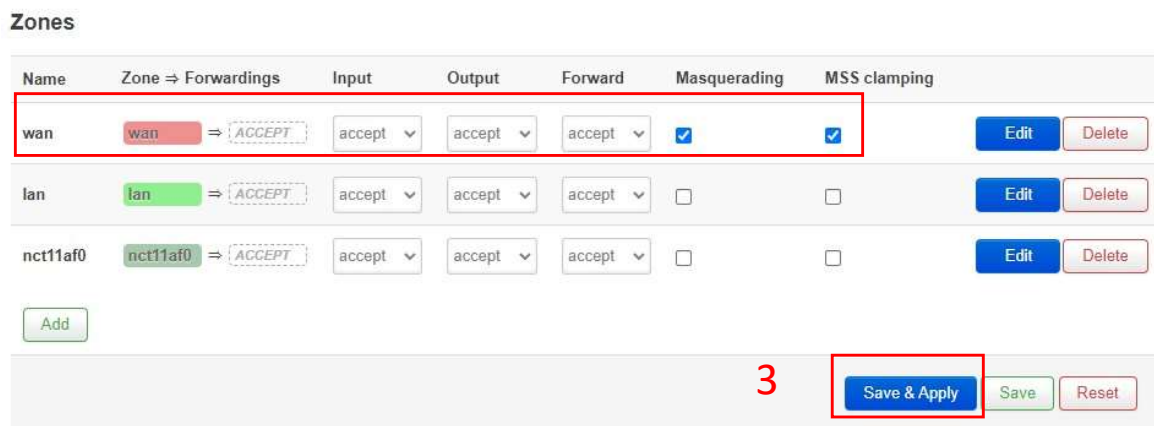
13 **OK** | Cancel

Step5. Masquerading

1. Click “Network -> Firewall” menu.

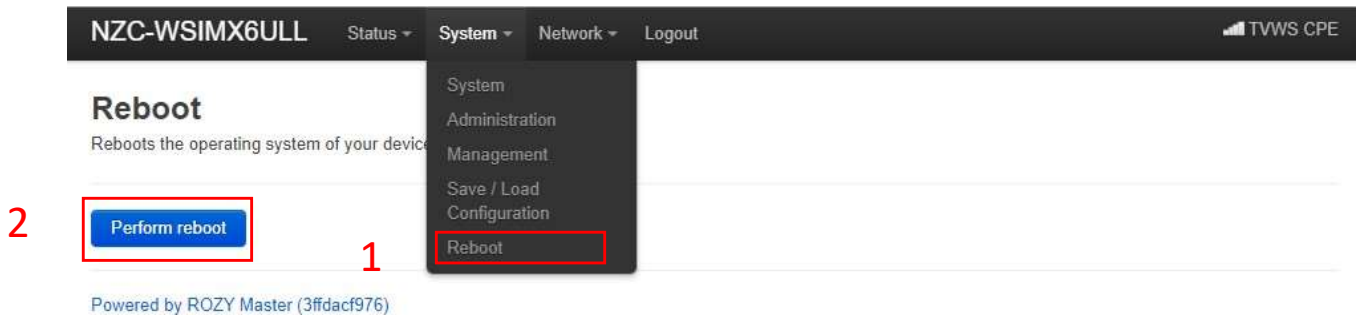


2. Check the box “Masquerading” and “MSS clamping” on WAN.
3. Click “Save & Apply” button.



Step6. 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 -> Interfaces” menu.
2. Find NCT11AF includes Mac address
3. Click “Edit” button.

The screenshot displays the web interface of the NZC-WSIMX6ULL device. The top navigation bar includes 'Status', 'System', 'Network', and 'Logout'. The 'Network' menu is expanded, showing 'Interfaces' as the selected option. Below the navigation bar, there are tabs for 'WAN', 'NCT11AF0', and 'LAN'. The 'Interfaces' section lists three interfaces: LAN (eth0), NCT11AF0 (nct11af0), and WAN (eth1). The NCT11AF0 interface is highlighted with a red box, and its 'Edit' button is also highlighted with a red box. The 'Edit' button is labeled with a red '3'. The 'NCT11AF0' tab is labeled with a red '2'. The 'Network' menu is labeled with a red '1'. Below the interface list, there is a section for 'Global network options' with a text input field for 'IPv6 ULA-Prefix' containing the value 'fdfa:e290:eb4c::/48'. At the bottom right, there are buttons for 'Save & Apply', 'Save', and 'Reset'. The footer text reads 'Powered by ROZY Master (3ffdacf976)'.

NZC-WSIMX6ULL Status System Network Logout TWWS CPE AUTO REFRESH ON

WAN NCT11AF0 LAN

Interfaces

Interface	Protocol	Uptime	MAC	RX	TX	IPv4	Actions
LAN (eth0)	Static	0h 2m 4s	38:F7:CD:10:00:16	318.57 KB	560.66 KB (1632 Pkts.)	192.168.200.254/24	Restart Stop Edit Delete
NCT11AF0 (nct11af0)	Static address	0h 2m 32s	38:F7:CD:10:00:16	0 B (0 Pkts.)	0 B (0 Pkts.)	10.1.1.254/24	Restart Stop Edit Delete
WAN (eth1)	DHCP client	0h 2m 40s	38:F7:CD:10:00:17	460.82 KB (1700 Pkts.)	218.28 KB (937 Pkts.)	192.168.0.231/24	Restart Stop Edit Delete

Add new interface...

Global network options

IPv6 ULA-Prefix

Save & Apply Save Reset

Powered by ROZY Master (3ffdacf976)

4. Setup the protocol to “DHCP client”.
5. Click “Switch Protocol”. If the Protocol is already set “DHCP client”, this button will be non-activate.
6. Click “Save & Apply” button.

The screenshot displays a network configuration interface. At the top, the 'General Setup' tab is active. Below it, a 'Status' box shows device information: Device: nct11af1, Uptime: 0h 16m 12s, MAC: 38:F7:CD:10:00:C3, RX: 0 B (0 Pkts.), TX: 0 B (0 Pkts.), and IPv4: 10.10.10.254/24. Below the status box, the 'Protocol' dropdown menu is set to 'DHCP client', highlighted with a red box and a red number '4'. Below the protocol dropdown, the 'Really switch protocol?' section contains a 'Switch protocol' button, also highlighted with a red box and a red number '5'. Below this, the 'DHCP Server' section is visible, with the 'General Setup' sub-tab active. It contains settings for 'Ignore interface' (unchecked), 'Start' (100), 'Limit' (150), and 'Lease time' (12h). At the bottom of the interface, there is a 'Back to Overview' button and a 'Save & Apply' button, which is highlighted with a red box and a red number '6'. Other buttons at the bottom include 'Save' and 'Reset'.

General Setup

Status

Device: nct11af1
Uptime: 0h 16m 12s
MAC: 38:F7:CD:10:00:C3
RX: 0 B (0 Pkts.)
TX: 0 B (0 Pkts.)
IPv4: 10.10.10.254/24

4 Protocol DHCP client

Really switch protocol? Switch protocol 5

DHCP Server

General Setup Advanced Settings IPv6 Settings

Ignore interface ☐

Disable DHCP for this interface.

Start 100
Lowest leased address as offset from the network address.

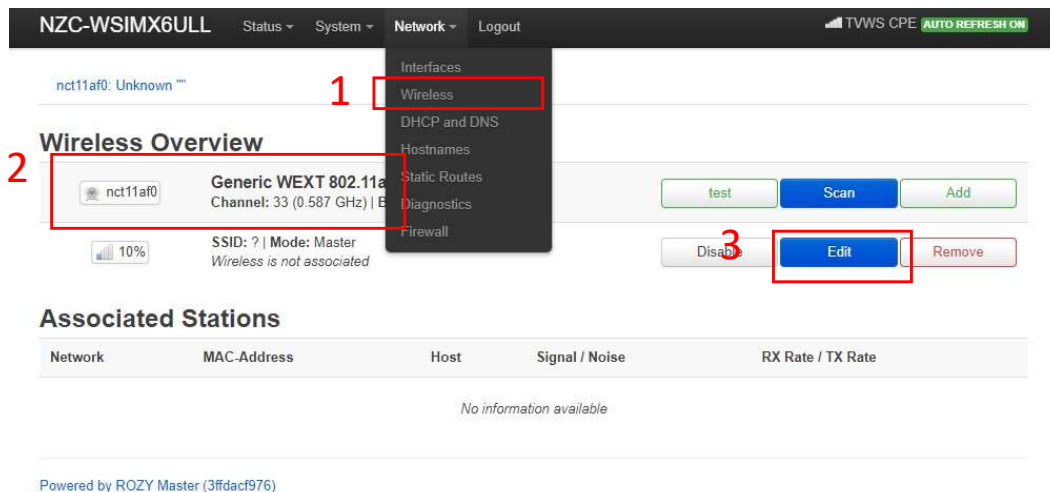
Limit 150
Maximum number of leased addresses.

Lease time 12h
Expiry time of leased addresses, minimum is 2 minutes (2m).

Back to Overview 6 Save & Apply Save Reset

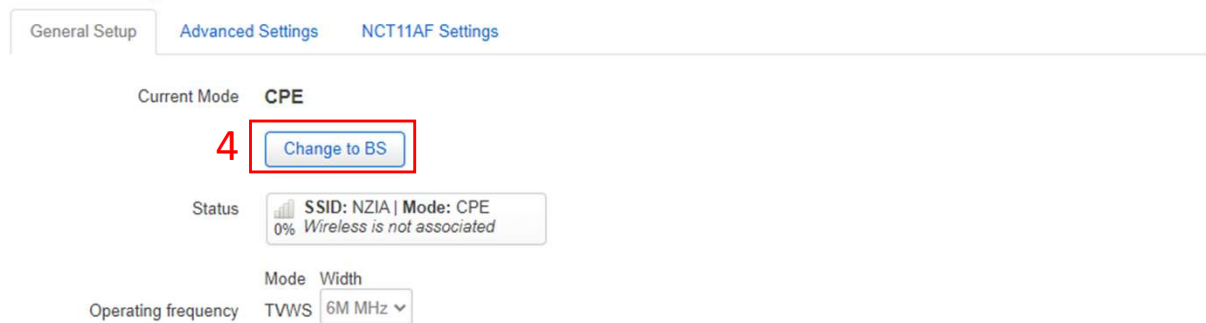
Step2. RF(Radio Frequency) Setting

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

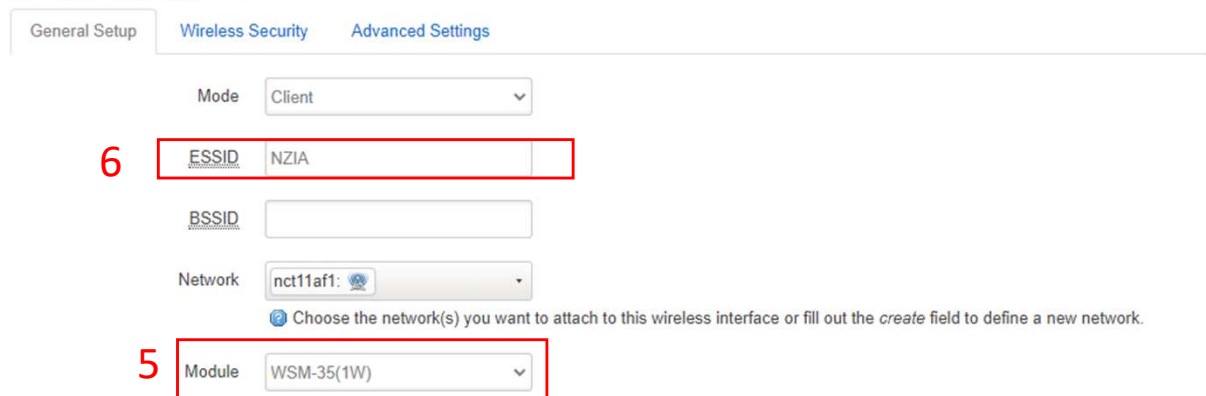


4. If not “CPE” mode, click “Change to CPE” button.
5. Select “WSM-35” on module tap.
6. Enter BS’s SSID in ESSID

Device Configuration



Interface Configuration



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.

Interface Configuration

7 **Wireless Security** Advanced Settings

8 Encryption WPA2-PSK
Cipher Force CCMP (AES)

9 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.)

Device Configuration

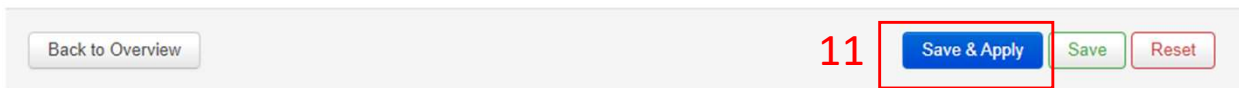
General Setup **Advanced Settings** NCT11AF Settings

MCS Auto

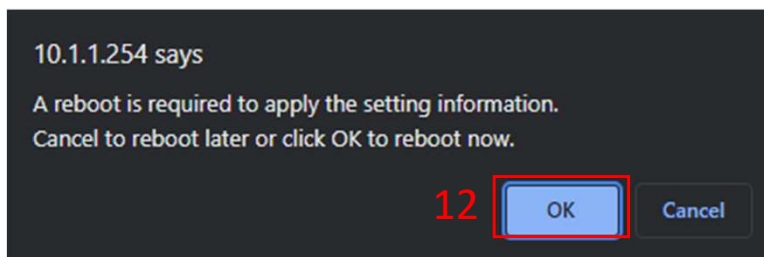
TX power adjustment 0

10 Range of scanning channel Start 14 ~ End 30

11. Click “Save&Apply” button.



12. Click “OK” button.



Step3. LAN interface Setting

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

The screenshot shows the web interface of the NZC-WSIMX6ULL device. The top navigation bar includes 'Status', 'System', 'Network', and 'Logout'. The 'Network' menu is expanded, showing options like 'Interfaces', 'Wireless', 'DHCP and DNS', 'Hostnames', 'Static Routes', 'Diagnostics', and 'Firewall'. The 'Interfaces' option is highlighted. Below the navigation bar, there are tabs for 'WAN', 'NCT11AF0', and 'LAN'. The 'LAN' tab is selected. The main content area displays the 'Interfaces' section with three entries: 'LAN' (eth0), 'NCT11AF0' (nct11af0), and 'WAN' (eth1). Each entry shows its protocol, uptime, MAC address, RX/TX statistics, and IPv4 address. The 'LAN' entry is highlighted in green, indicating it is the selected interface.

Interface	Protocol	Uptime	MAC	RX	TX	IPv4	Actions
LAN (eth0)	Static	0h 22m	38:F7:CD:10:00:16	1.93 MB (10 Pkts.)	10.64 MB (9539 Pkts.)	192.168.200.254/24	Restart Stop Edit Delete
NCT11AF0 (nct11af0)	DHCP client		38:F7:CD:10:00:16	0 B (0 Pkts.)	0 B (0 Pkts.)		Restart Stop Edit Delete
WAN (eth1)	DHCP client	0h 21m 57s	38:F7:CD:10:00:17	9.79 MB (13950 Pkts.)	1.44 MB (7455 Pkts.)	192.168.0.231/24	Restart Stop Edit Delete

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

General Setup
Advanced Settings
Physical Settings
Firewall Settings

Status

Device: eth0.1
Uptime: 1h 45m 4s
MAC: 00:0C:43:76:20:28
RX: 2.26 MB (14485 Pkts.)
TX: 3.18 MB (12646 Pkts.)
IPv4: 10.1.1.254/24

Protocol
Static address

IPv4 address
10.1.1.254
3

IPv4 netmask
255.255.255.0
4

IPv4 gateway

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”.

DHCP Server
General Setup
Advanced Settings
IPv6 Settings

5
Ignore interface
☐
Disable DHCP for this interface.

6
Start
100
Lowest leased address as offset from the network address.

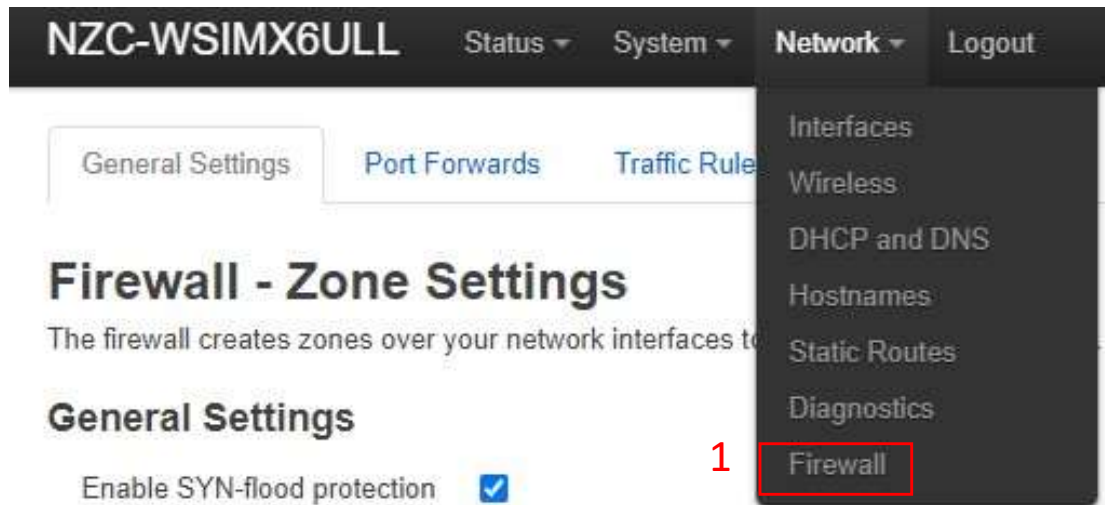
7
Limit
150
Maximum number of leased addresses.

8
Lease time
12h
Expiry time of leased addresses, minimum is 2 minutes (2m).

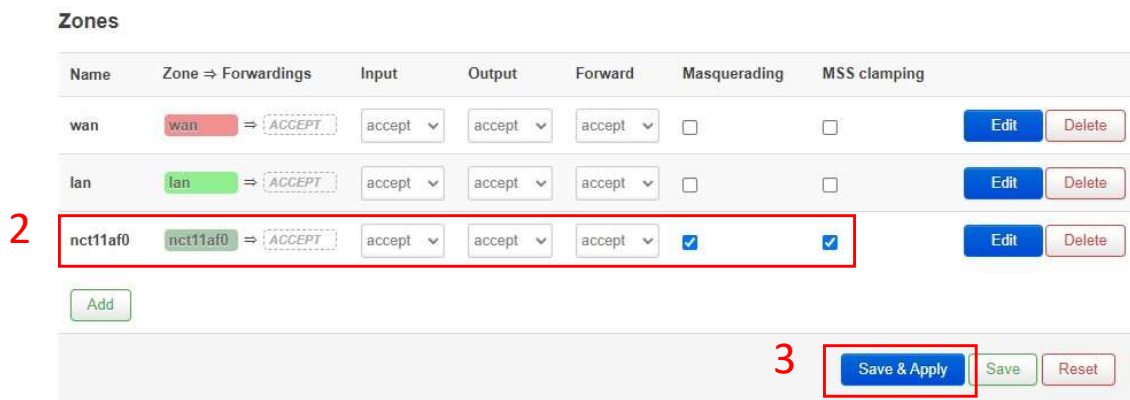
Back to Overview
9
Save & Apply
Save
Reset

Step4. Masquerading

1. Select “Network -> Firewall” menu.

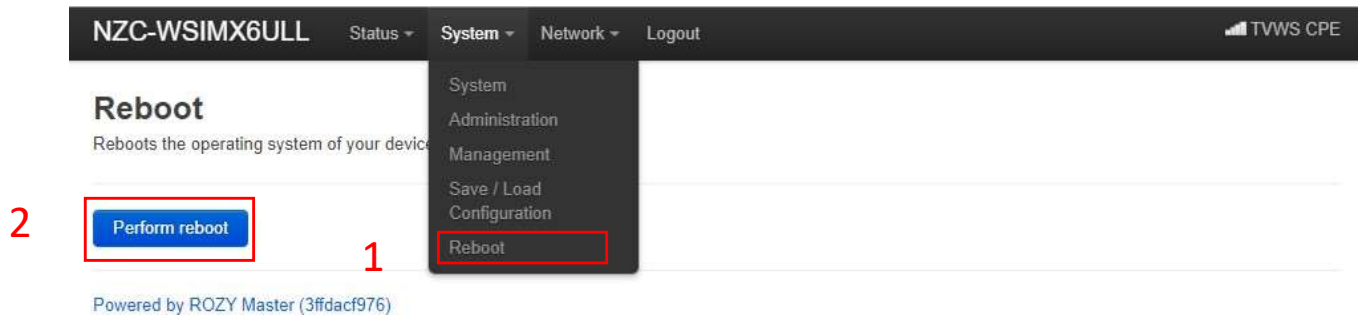


2. Check the “Masquerading” and “MSS clamping” to vailed nct11af interface.(ex. nct11af0).
3. Click “Save & Apply”.



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.

The screenshot shows the CPE Web UI for device NZC-WSIMX6ULL. The top navigation bar includes links for Status, System, Network, and Logout, along with a signal strength indicator and 'TWWS CPE' status. The main content area displays the following information:

- Device:** Ethernet Adapter: "eth1"
MAC-Address: 38:F7:CD:10:00:17
- Active Connections:** A progress bar showing 203 / 16384 (1%).
- PAWS:** A table with columns for Status and Deactivation, and a Date field.
- Active DHCP Leases:** A table with columns for Hostname, IPv4-Address, MAC-Address, and Leasetime remaining. One lease is listed for 'Laptop-YM' with IP 192.168.200.151 and MAC 00:2B:67:0D:2D:ED, with 6h 55m 40s remaining.
- Active DHCPv6 Leases:** A table with columns for Host, IPv6-Address, DUID, and Leasetime remaining. A message below states 'There are no active leases.'

1

The screenshot shows the 'Wireless' section for interface nct11af0. The status is 'Wireless is not associated'. The details shown are:

- Type: WEXT 802.11
- Channel: 14 (0.473 GHz)
- Bitrate: 1 Mbit/s
- SSID: ?
- Mode: Unknown

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

Wireless

The screenshot shows the 'Wireless' section for interface nct11af0, indicating a successful connection. The details shown are:

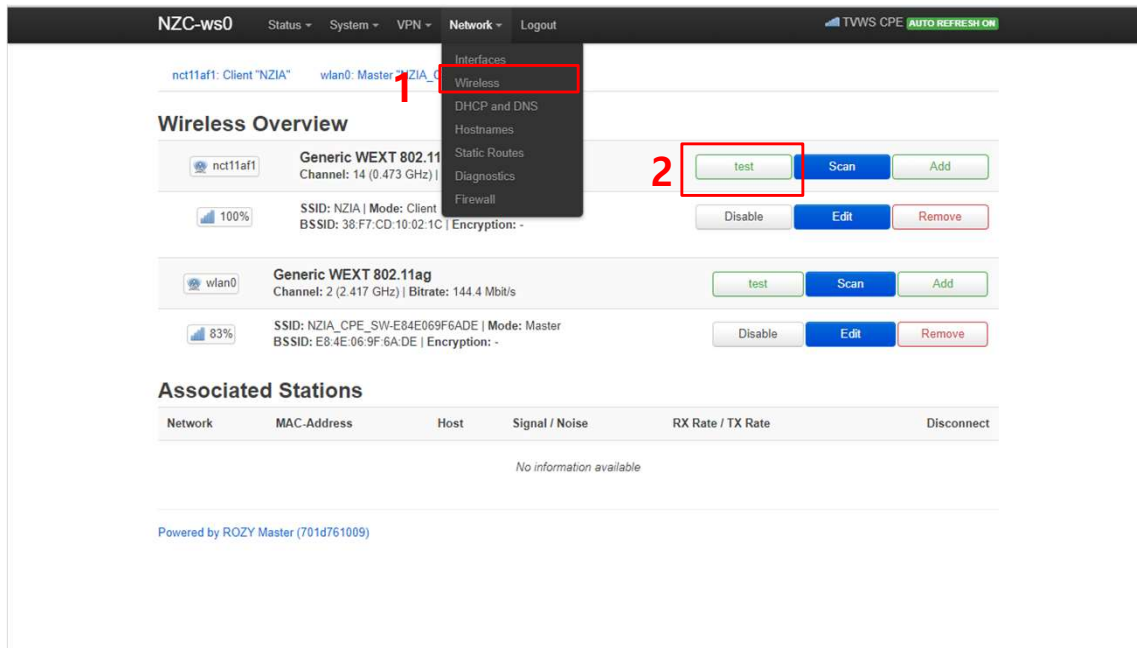
- Type: WEXT 802.11
- Channel: 14 (0.473 GHz)
- Bitrate: 29 Mbit/s
- SSID: NZIA
- Mode: Client
- BSSID: 38:F7:CD:10:02:1C
- Encryption: -
- Associations: -

2

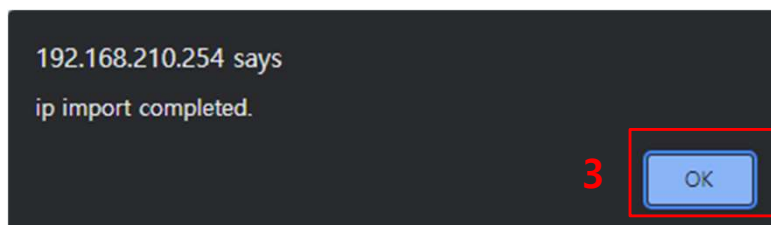
3. If the network is not connected. Follow the manual from the first page again.

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.

NZC-WS20 Status System VPN Network Logout TVWS CPE

TVWS Performance Test

Network Test

4 Test IP: 10.10.10.254 v Import IP Bandwidth: 30 Mbps Ping ☒ Throughput & RSSI ☒ 5 Test Start

10.10.10.254

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

NZC-WS20 Status System VPN Network Logout TVWS CPE

TVWS Performance Test

Network Test

Test IP: 10.10.10.254 v Import IP Bandwidth: 30 Mbps Ping ☒ Throughput & RSSI ☒ Test Start

6

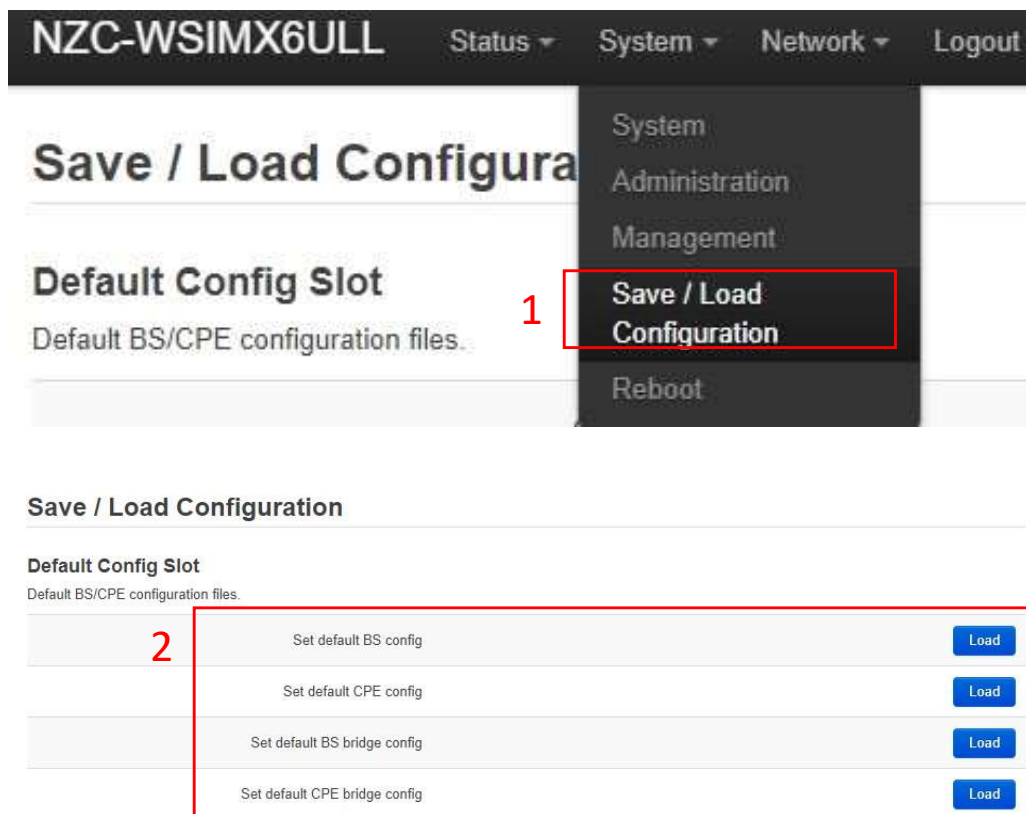
```
===== RESULT TEST =====  
  
Channel: 14  
IP : 10.10.10.254  
DownloadBandwidth : 21.16Mbps/sec  
Lost_bs : 0.0  
UploadBandwidth : 21.2Mbps/sec  
Lost_cpe : 0.0  
ping avg : 2.422  
ping loss : 0%  
ping max : 2.575  
ping min : 2.279  
RSSI : -31 dBm  
  
REPORT,21.16Mbps/sec,0.0,21.2Mbps/sec,0.0,2.422,0%,2.575,2.279,-31 dBm  
  
===== END =====
```

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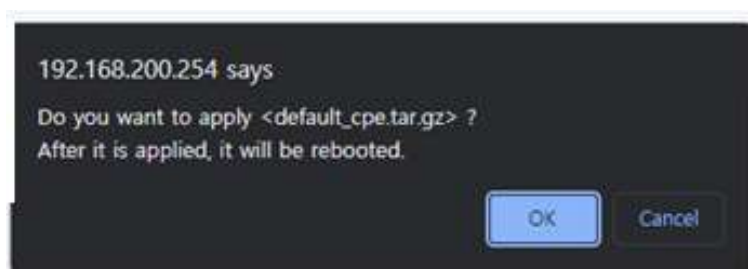
VI SAVE/LOAD Configuration

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.

Save / Load Configuration

The device is rebooting... Please refresh page.

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Step2. Save Configuration

1. Click empty slot “save” button

Config Back up Slot

Save configuration files.

1	[Empty Slot]	Save	Load
	[Empty Slot]	Save	Load
	[Empty Slot]	Save	Load
	[Empty Slot]	Save	Load
	[Empty Slot]	Save	Load

2. Click “Confirm” button.

192.168.200.254 says

Do you want to save the config?

OK Cancel

3. Config added to the Slot.

Config Back up Slot

Save configuration files.

3	CPE-2021-12-29-095456.tar.gz	Save	Load
	[Empty Slot]	Save	Load
	[Empty Slot]	Save	Load
	[Empty Slot]	Save	Load
	[Empty Slot]	Save	Load

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

Config Back up Slot
Save configuration files.

BS-2023-02-16-144453.tar.gz	Save	Load
BS-2023-02-16-144410.tar.gz	Save	Load
BS-2023-02-16-163954.tar.gz	Save	Load
BS-2023-02-16-163958.tar.gz	Save	Load
4 BS-2023-02-16-143834.tar.gz	Save	Load

5. Click “OK” button of popup windows.

192.168.200.254 says

Do you want to delete <5-BS-2023-02-16-143834.tar.gz> and save a new file?

5 OK Cancel

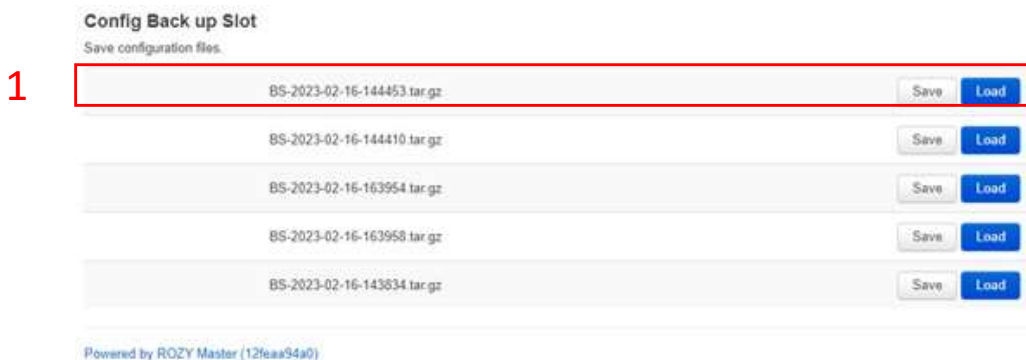
6. User can find new file at deleted config back up slot.

Config Back up Slot
Save configuration files.

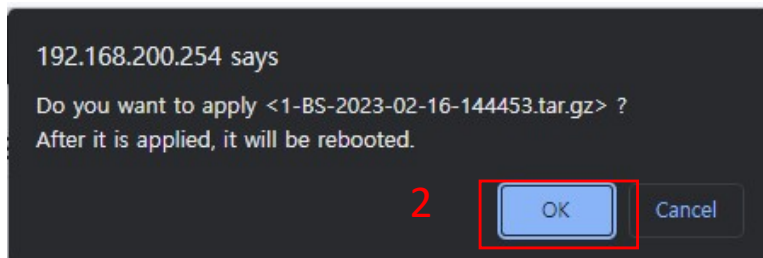
BS-2021-12-29-094047.tar.gz	Save	Load
BS-2021-12-29-094052.tar.gz	Save	Load
6 CPE-2021-12-28-174330.tar.gz	Save	Load
CPE-2021-12-28-181045.tar.gz	Save	Load
CPE-2021-12-29-094951.tar.gz	Save	Load

Step3. Load Configuration

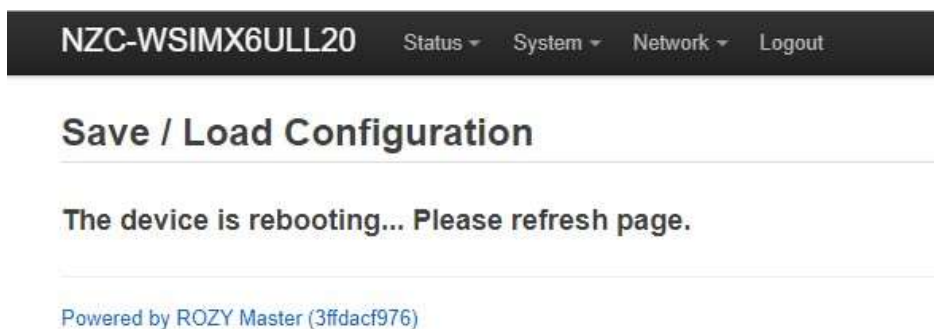
1. Click “load” button at config slot. (User can use saved config file through load button)



2. Click “OK” button.



3. The device reboots, after config is applied.



Service center



Call Center : (+82) 02 851 3878

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.

