HUAWEI eKit

Huawei MiniFTTH Solution

User Guide

Issue	01
Date	2025-09-25

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Contents

1 About This Document

Purpose

This document describes the application scenarios, service configuration, and troubleshooting of the Huawei MiniFTTH solution.

Intended Audience

The intended audience of this product description are as follows:

- Deployment Configuration Engineer
- Network Maintenance Engineer

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Optical and Electrical Modules

You are advised to use the optical and electrical modules matching the device. The optical modules of other Huawei devices or third-party vendors are not tested to match the device. As a result, such optical modules may not work properly.

Device Dimensions

All device dimensions described in this document are designed dimensions and do not include dimension tolerances. In the process of component manufacturing, the actual size may deviate due to factors such as processing or measurement errors.

Device Figures

The figures in this document are for reference only. The actual appearances of devices, components, and modules prevail.

Configuration Examples

The networking diagrams, data planning, and operation procedures in this document are typical configuration examples designed for customers to understand and use the products. They cannot be used as templates. Before configuring services, plan data and configure services based on actual service requirements.

IP Address and MAC Address Usage

IP addresses and MAC addresses are used in the product documentation to describe features and configuration examples. Unless otherwise specified, IP addresses and MAC addresses are examples only, and do not refer to any actual device.

User Interfaces

This document serves only as a usage guide. The user interface (UI) content (such as CLI command format, command output, web UI, and NMS UI) is compiled based on lab devices. This document provides general guidance, but may not cover all application scenarios of all product models and versions. Due to reasons such as version upgrade, device model difference, and configuration file difference, the content provided in this document may be different with the actual UIs. This document does not elaborate on the differences in the preceding situations. The actual UIs prevail.

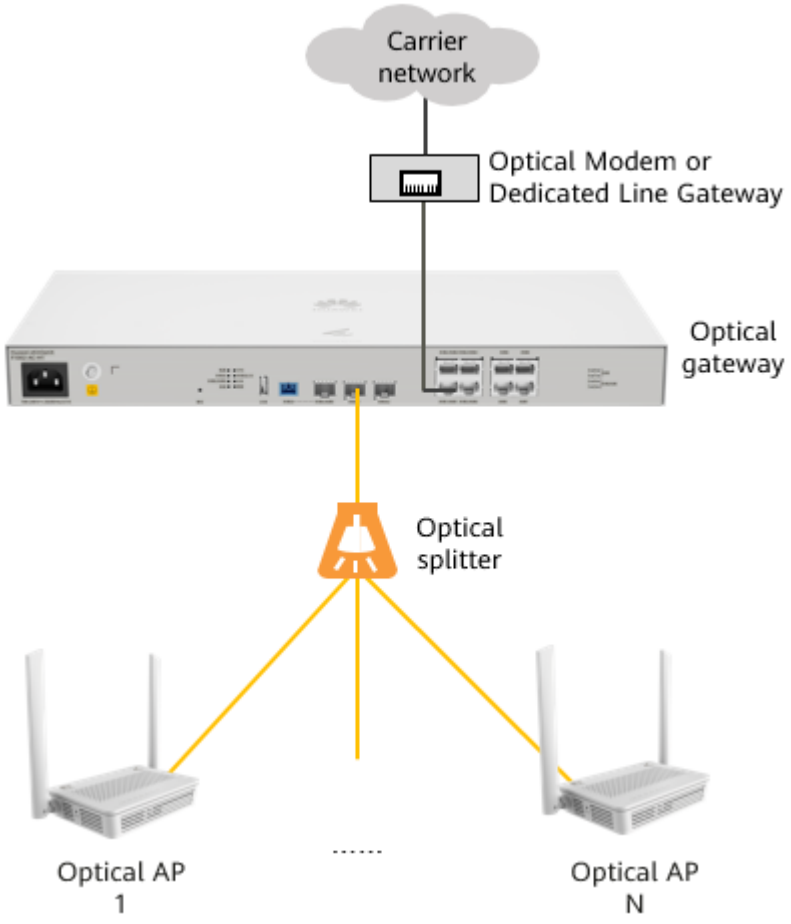
Change History

Issue	Date	Description
01	2025-09-25	This is officially released for the first time.

2 MiniFTTH Solution Overview

What is MiniFTTH?

The MiniFTTH solution is illustrated as follows: the optical gateway connects to the operator's network upstream, and the combination of the optical gateway, ODN, and optical AP forms a full optical network. The optical gateway serves as the unified exit point for the full optical network, while the optical AP provides users with wired access and Wi-Fi access services.



Related Product

Table 2-1 MiniFTTH Related Products

Product	Specifications
Optical gateway F1002-AC-H1	 • NNI: 1 × XGS-PON/XG-PON(BOB) or 1 × GE/10 GE(SFP) (WAN/LAN multiplexing) + 4 ×GE(WAN/LAN multiplexing) • UNI: 4 × GE + 4×GE (WAN/LAN multiplexing) + 1 × 10 GE/ GE(SFP)(WAN/LAN multiplexing)+ 2 × GPON/XGS-PON & GPON Combo(SFP)+ 1 × USB3.0 • Power supply: AC For more information, please click on **F1002-AC-H1 Datasheet**
Optical AP FS500D-12-2G	 • NNI: 1 × GPON • UNI: 2 × GE + 2.4GHz&5GHz Wi-Fi 5 • Power supply: DC power adapter For more information, please click on **FS500D-12-2G Datasheet**
Optical AP FS600D-30-4G	 • NNI: 1 × GPON • UNI: 4 × GE + 2.4GHz&5GHz Wi-Fi 6 • Power supply: DC power adapter For more information, please click on **FS600D-30-4G Datasheet**

3 Installation and Depolyment Guide

- F1002-AC-H1 Installation Guide

  Click to watch the video: **(Video) F1002-AC-H1 Installation Guide (19-Inch Cabinet Scenario)**

  Installation Guide: **F1002-AC-H1 Quick Start**
- FS500D-12-2G Installation Guide

  For product installation guide, Indicator light information, please click on **FS500D-12-2G Quick Start**
- FS600D-30-4G Installation Guide

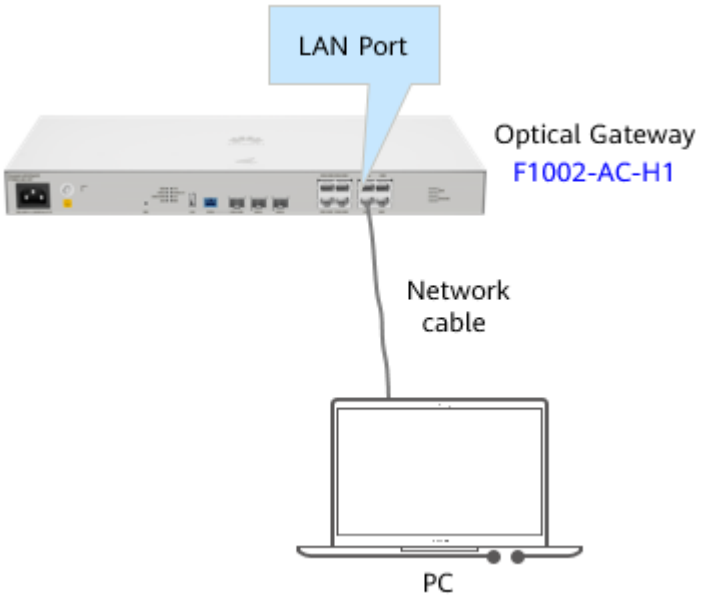
  For product installation guide, Indicator light information, please click on **FS600D-30-4G Quick Start**

4 Configuring the Local Login Web UI

F1002-AC-H1 is used as an example. Other devices can refer to this step, with the difference being the management IP address of the device.

Configuration Steps

Step 1 Connect the LAN port of the optical gateway to the network port of your personal computer using an Ethernet cable.



NOTE

The device defaults to disabling "WAN-side HTTPS access control." If the LAN port is configured as an uplink port, local access to the WEB interface through the LAN port set as an uplink port will be unavailable, and any connected WEB interface will be interrupted.

Step 2 Set the IP address of the computer to be in the same subnet as the management IP address of the optical gateway.

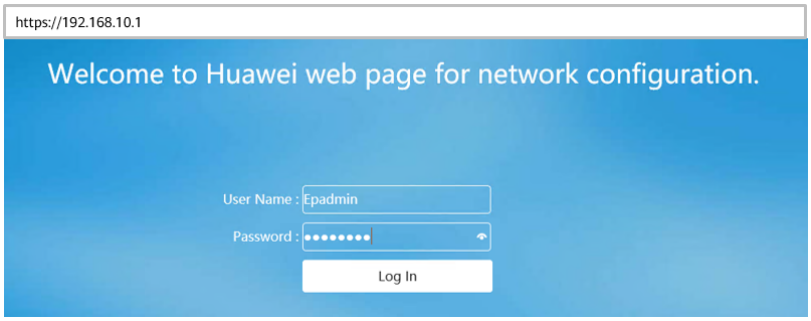
For example, the default management IP address and subnet mask for the F1002-AC-H1 optical gateway are: 192.168.10.1/255.255.248.0. You can set the PC's IP address to: 192.168.10.100/255.255.248.0.

NOTE

The default factory settings for the management IP address of the optical gateway F1002-AC-H1 can also be obtained from the nameplate on the bottom of the product.

Step 3 Log in to the web configuration interface.

1. Enter http://192.168.10.1 in the address box of the browser. (192.168. 10.1 is the default management IP address of the F1002-AC-H1) and press Enter to switch to the login page. As shown in the following figure.



2. Enter the user name and password in the login window. (For the initial user name and password, see the product nameplate.) After the account is verified, you can access the web configuration page.

NOTICE

To ensure account security, change the initial password of the administrator account after logging in to the WebUI using the initial user name and password.

----End

5 (Optional) Configuring the Optical Gateway Access Mode

The access mode of the optical gateway refers to the upstream port mode and downstream optical port mode.

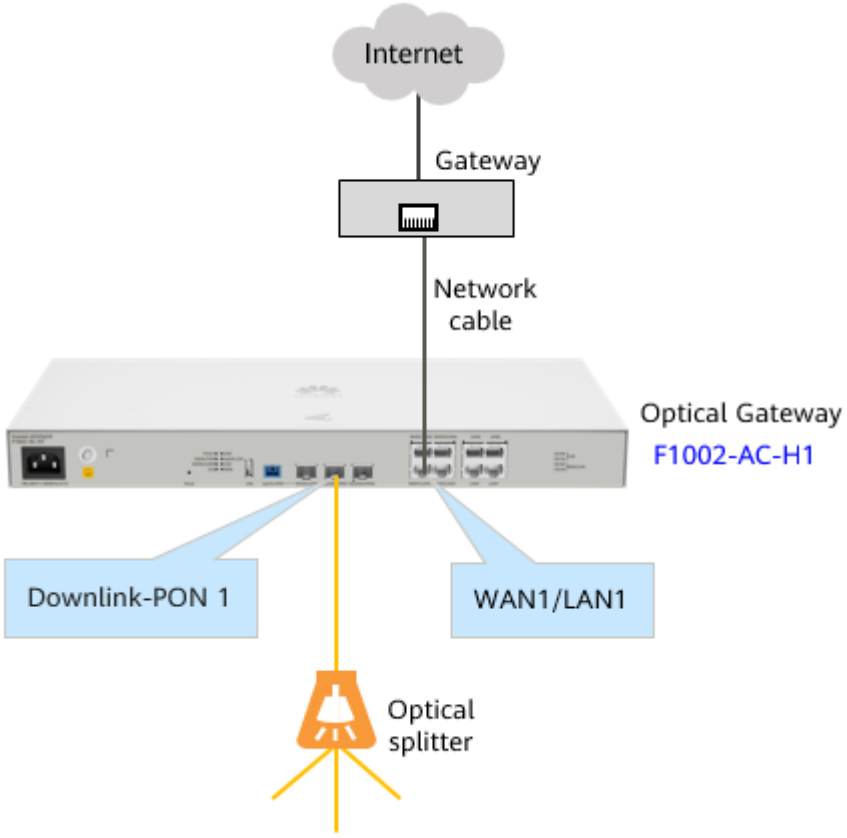
By default, the LAN upstream port of the optical gateway is "WAN1/LAN1" and the default downstream PON is "GPON"

If the default values are used, this configuration step can be skipped.

Networking Scenario

In this example:

- The upstream method of the optical gateway is LAN uplink, connected to the operator's optical modem or other network devices via an Ethernet cable.
- The upstream port of the optical gateway is "WAN1/LAN1";
- The downstream port of the optical gateway connects to the optical AP after being linked with a splitter, and the downstream PON port is "Downlink-PON 1" in GPON mode;



NOTE

Data planning is provided as an example, please refer to specific data for actual service configuration.

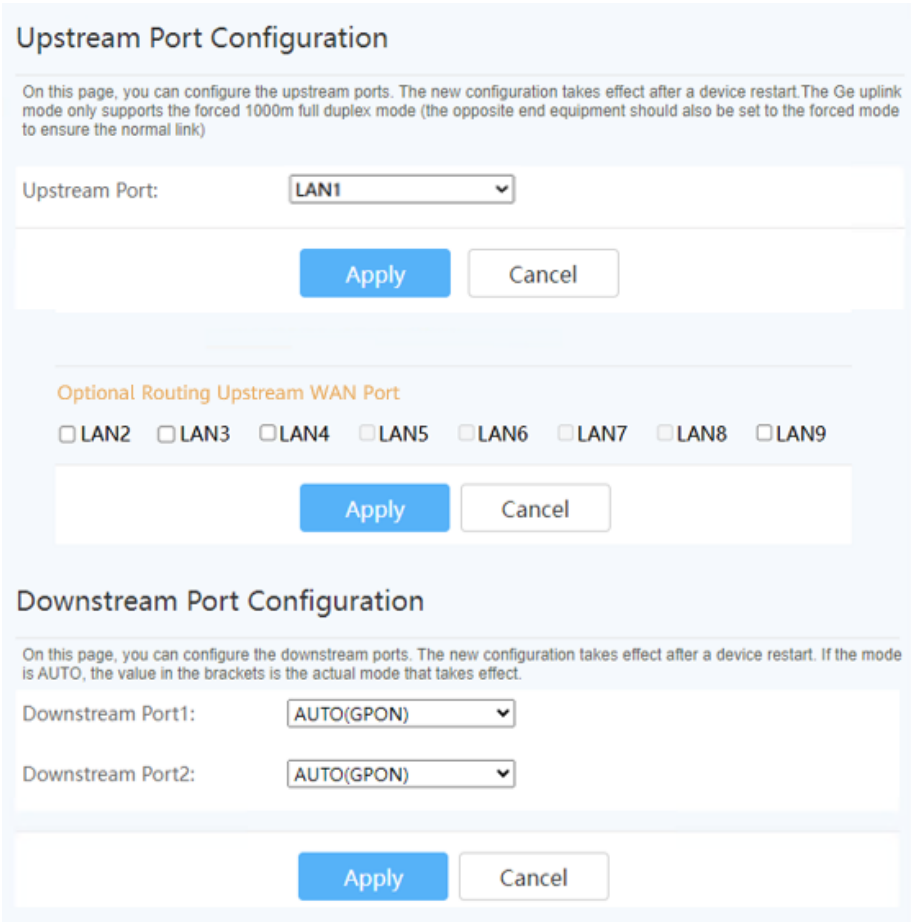
Configuration Steps

Step 1 Set the access mode, including upstream port and downstream optical port.

In the navigation tree on the left, choose **Advanced** > **Maintenance Diagnosis** > **Access Mode**, On the right information panel, configure the uplink port and downlink optical port according to the data plan.

NOTE

Selecting "LAN1" for the uplink port indicates that the uplink port mode is LAN uplink, with LAN1 port used by default. You can also choose other LAN ports.



After completing the configuration, click "Apply."

Step 2 The configuration of the optical gateway's uplink port mode and downlink optical port mode is now complete.

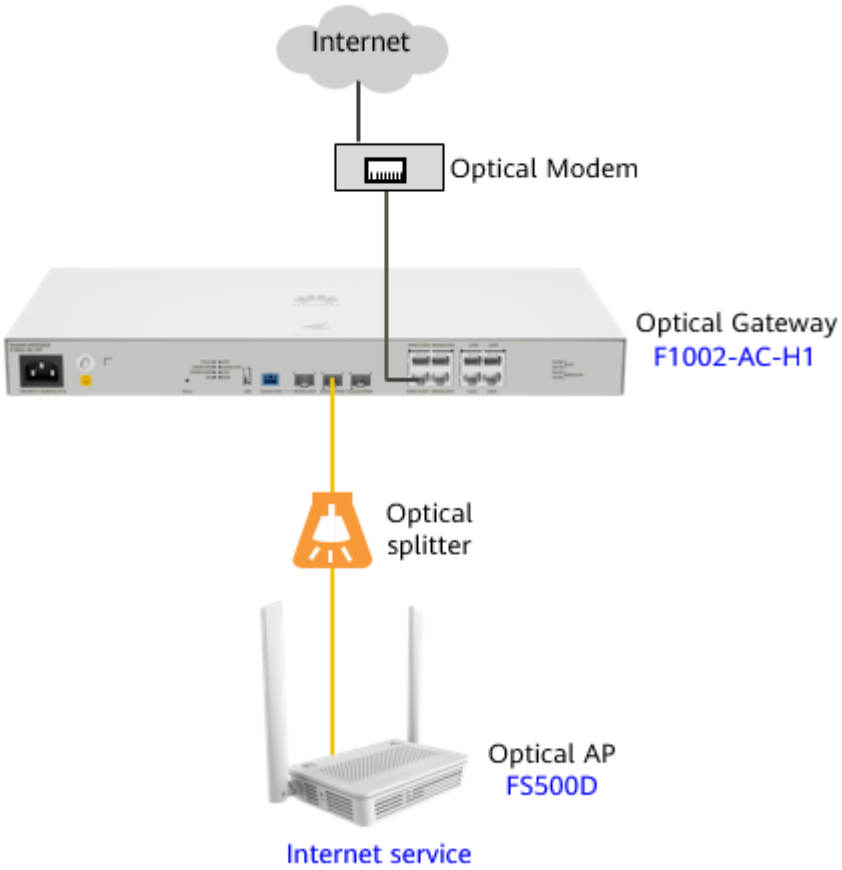
----End

6 Configuring the Wi-Fi Service (IPoE, No Service VLAN)

Networking Scenario

This scenario is shown in the following figure:

- The optical gateway uses the LAN upstream mode.
- The optical AP access the Internet in IPoE mode.
- Optical AP does not use service VLAN.
- The AP provides Wi-Fi and Ethernet access to the Internet.



Configuration Process

Table 6-1 Configuration Process

Operating equipment	Configuration Item	Description
Optical Gateway	Configuring Route WAN	This WAN is used to establish an internet service connection between the optical gateway and the optical modem.
	Configuring the WAN for the optical AP internet service	This WAN is used to establish an internet service connection between the optical AP and the optical gateway.
Optical AP	Configuring the Wi-Fi SSID	Set parameters such as 2.4G and 5G Wi-Fi SSIDs and passwords.

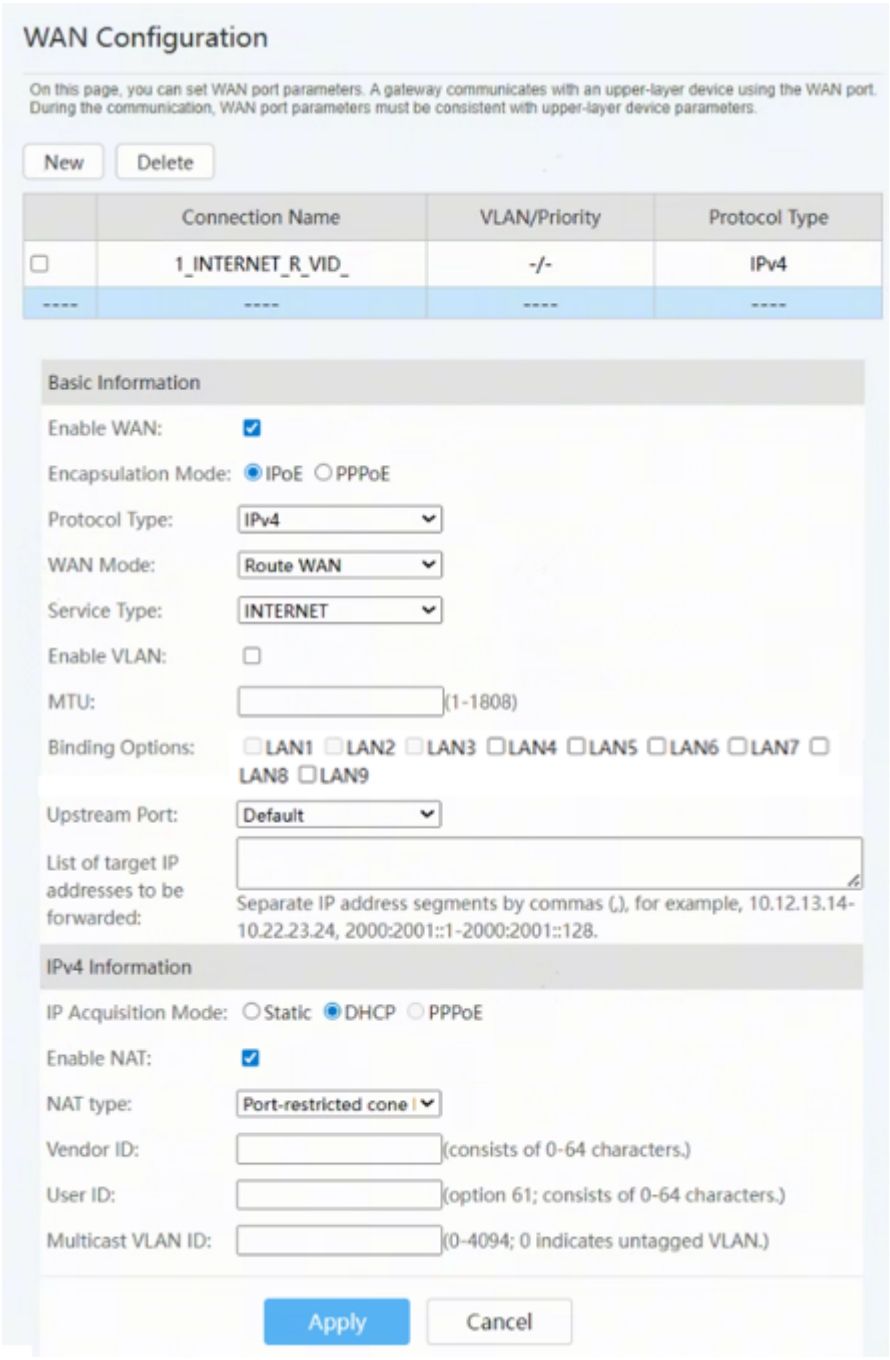
Configure on the Optical Gateway F1002-AC-H1

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

Step 2 Configuring the Route WAN.

In the navigation tree on the left, choose **Advanced** > **WAN**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

- Encapsulation Mode: IPoE
- Protocol Type: IPv4
- WAN Mode: Route WAN
- Service Type: INTERNET
- Other parameters: Default values



After configuration is completed, click "Apply".

Step 3 Configuring the WAN for the optical AP internet service.

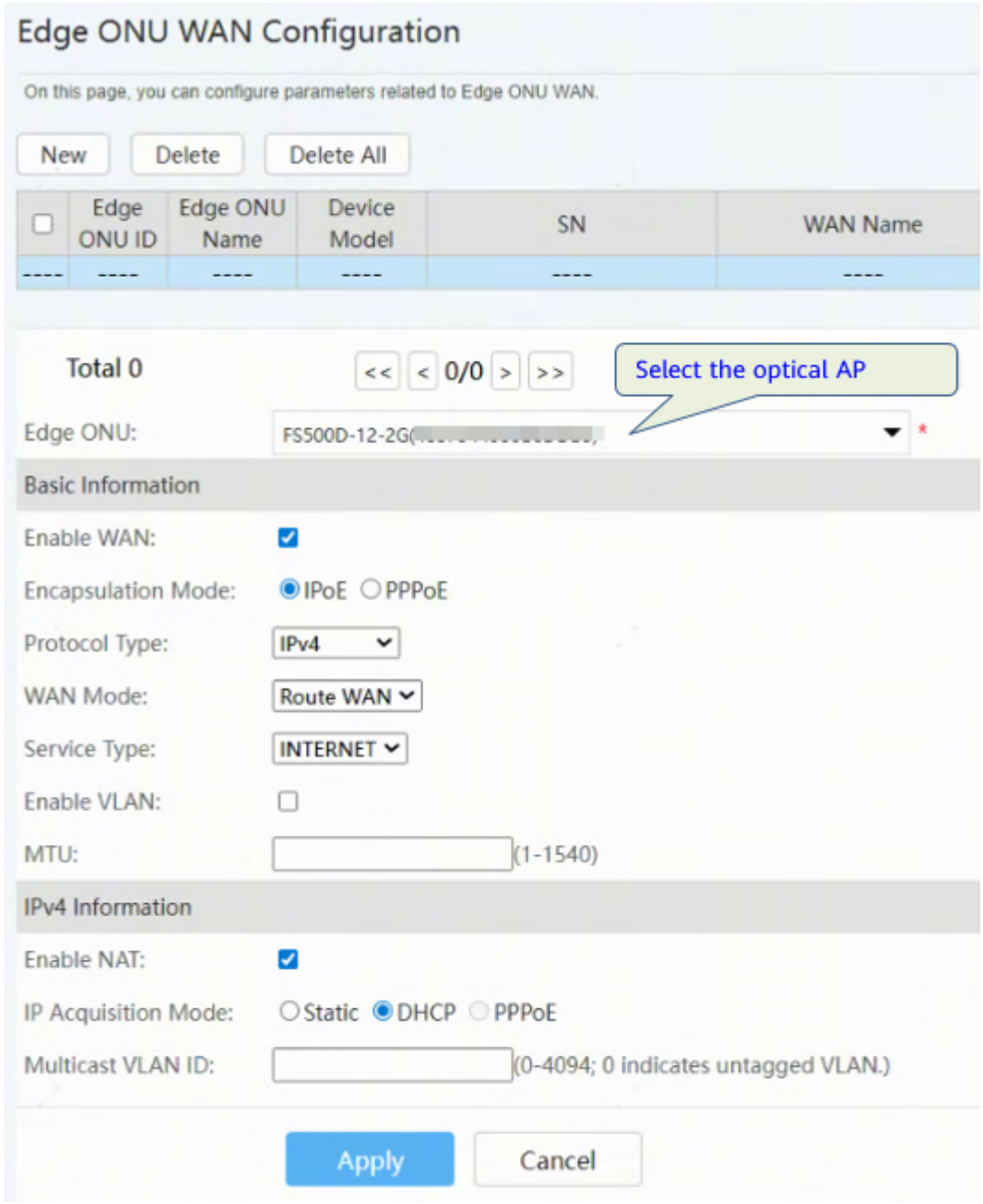
In the navigation tree on the left, choose **Advanced** > **Edge ONU WAN Configuration**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

- Service Type: INTERNET

  NOTE

  First, you need to select "Service Type: INTERNET." After that, you can set other parameters according to the data plan.

- Encapsulation Mode: IPoE
- Protocol Type: IPv4
- WAN Mode: Route WAN
- IP Acquisition Mode: DHCP
- Other parameters: Default values



After configuration is completed, click "Apply".

NOTE

After the configuration is completed, this WAN connection will be deployed from the optical gateway to the optical AP. You can log in to the web interface of the optical AP to view this WAN information and status.

----End

Configure on the Optical AP

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

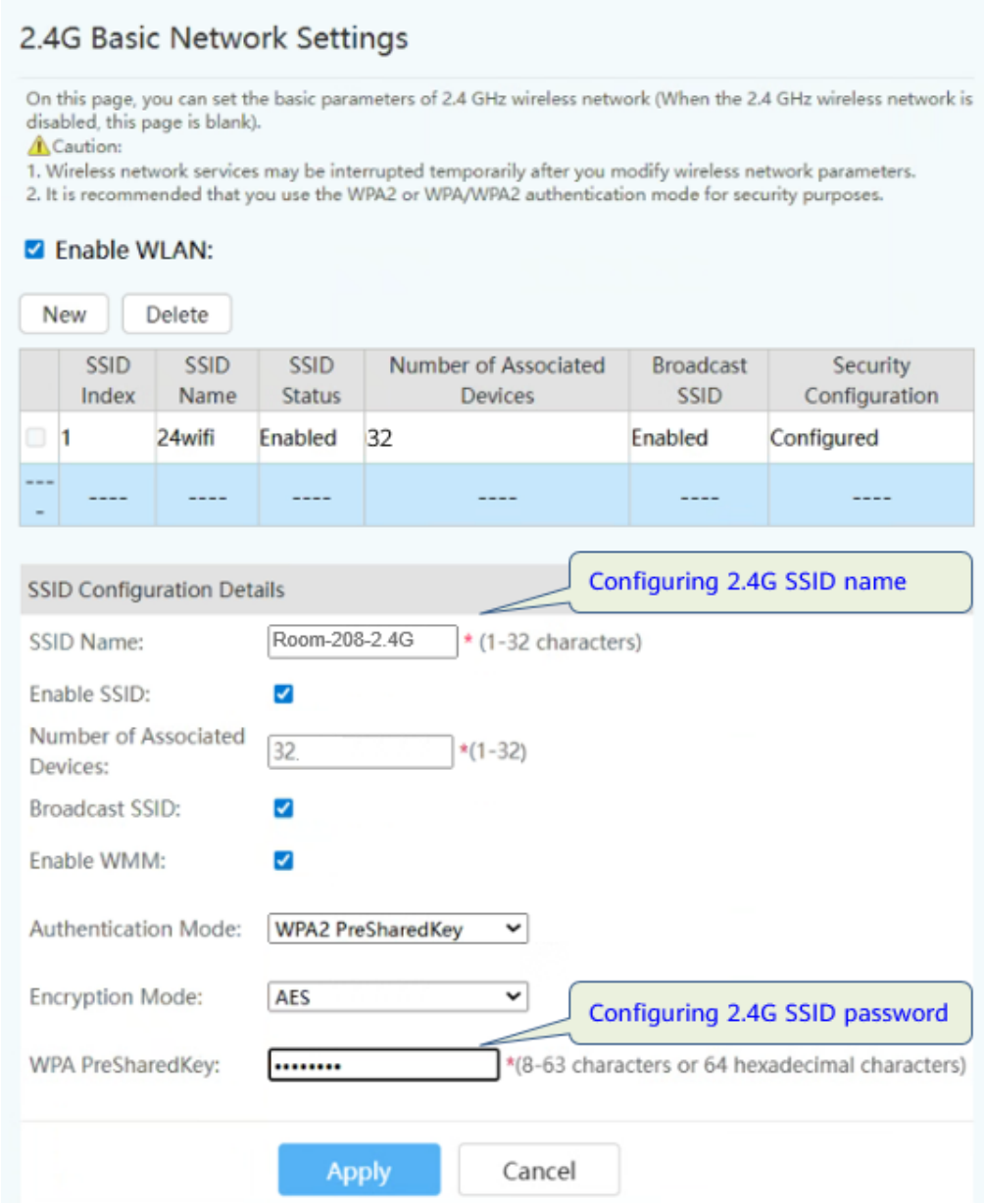
Step 2 Configuring the Wi-Fi SSID.

NOTE

Configure 2.4G and 5G spectrum Wi-Fi SSIDs according to actual needs.

1. Create a new 2.4G Wi-Fi SSID.

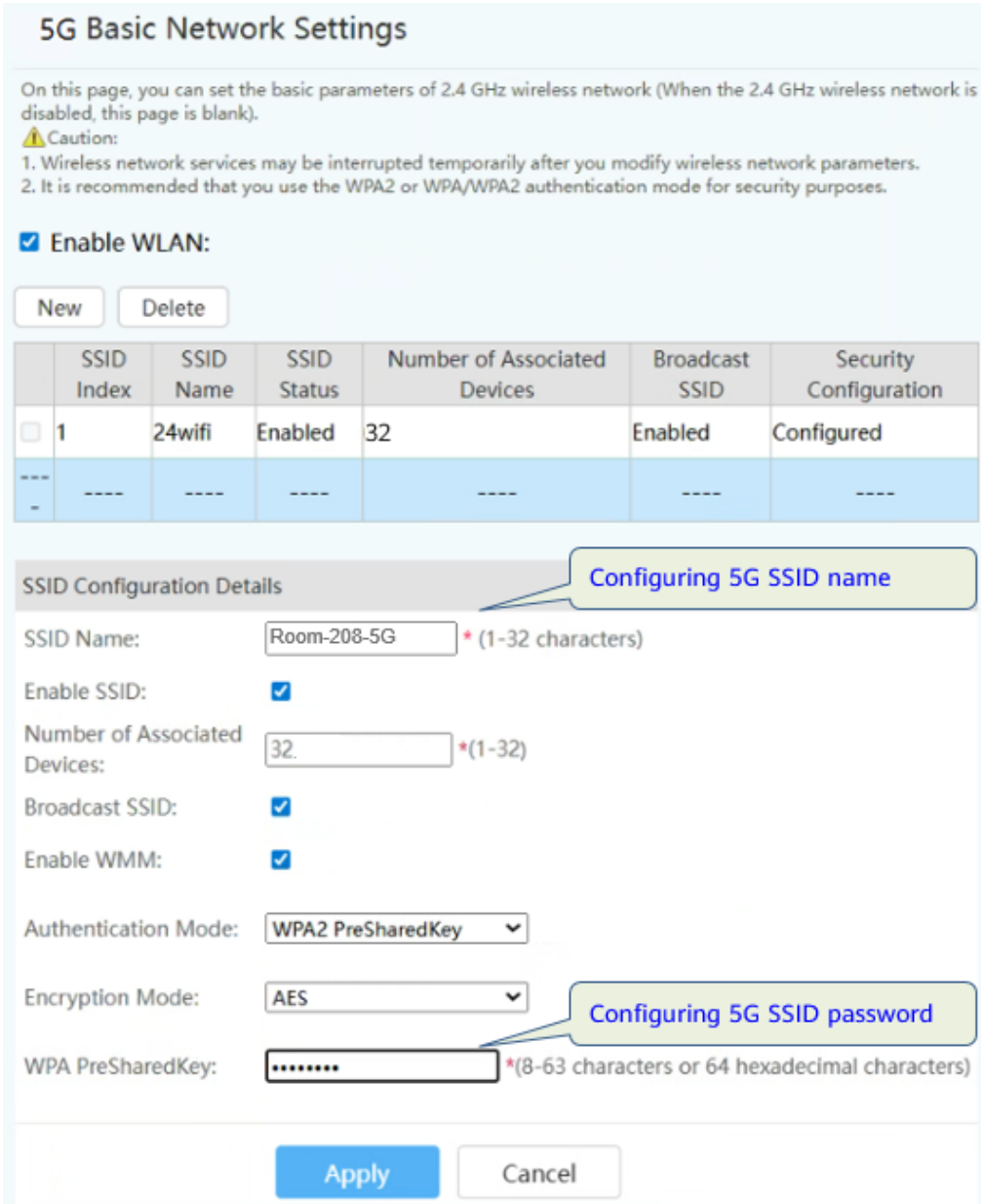
   In the navigation tree on the left, choose **Advanced** > **WLAN** > **2.4G Basic Network Settings**. In the pane on the right, click "New" to add a 2.4G Wi-Fi SSID, set parameters based on the data plan.



After configuration is completed, click "Apply".

2. Create a new 5G Wi-Fi SSID.

   In the navigation tree on the left, choose **Advanced** > **WLAN** > **5G Basic Network Settings**. In the pane on the right, check "New" to add a 5G Wi-Fi SSID, set parameters based on the data plan.



After configuration is completed, click "Apply".

Step 3 The configuration is complete, and the Wi-Fi service of the optical AP is now activated.

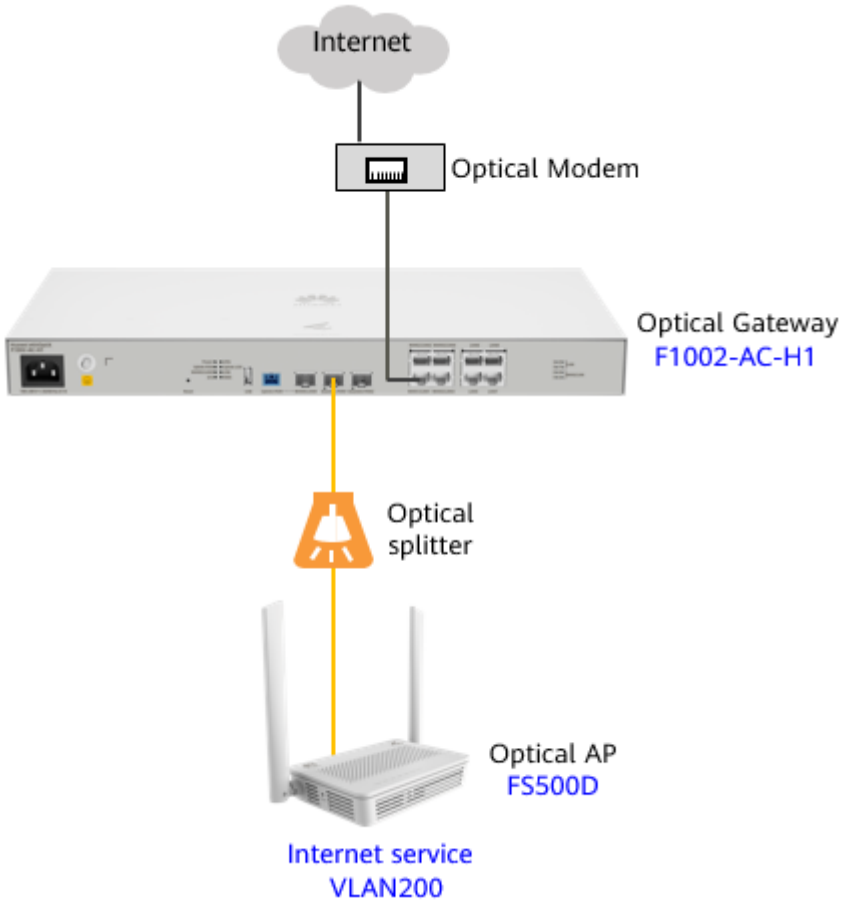
----End

7 Configuring the Wi-Fi Service (IPoE, with Service VLAN)

Networking Scenario

This scenario is shown in the following figure:

- The optical gateway uses the LAN upstream mode.
- The optical AP access the Internet in IPoE mode.
- Optical AP Internet service VLAN 200.
- The AP provides Wi-Fi and Ethernet access to the Internet.



Configuration process

Table 7-1 Configuration process

Operating equipment	Configuration Item	Description
Optical Gateway	Configuring Route WAN	This WAN is used to establish an internet service connection between the optical gateway and the optical modem.
	Configuring the WAN for the optical AP internet service	This WAN is used to establish an internet service connection between the optical AP and the optical gateway.
	Configuring VLAN binding for the optical AP	Bind the service VLAN to the egress VLAN.
Optical AP	Configuring the Wi-Fi SSID	Set parameters such as 2.4G and 5G Wi-Fi SSIDs and passwords.

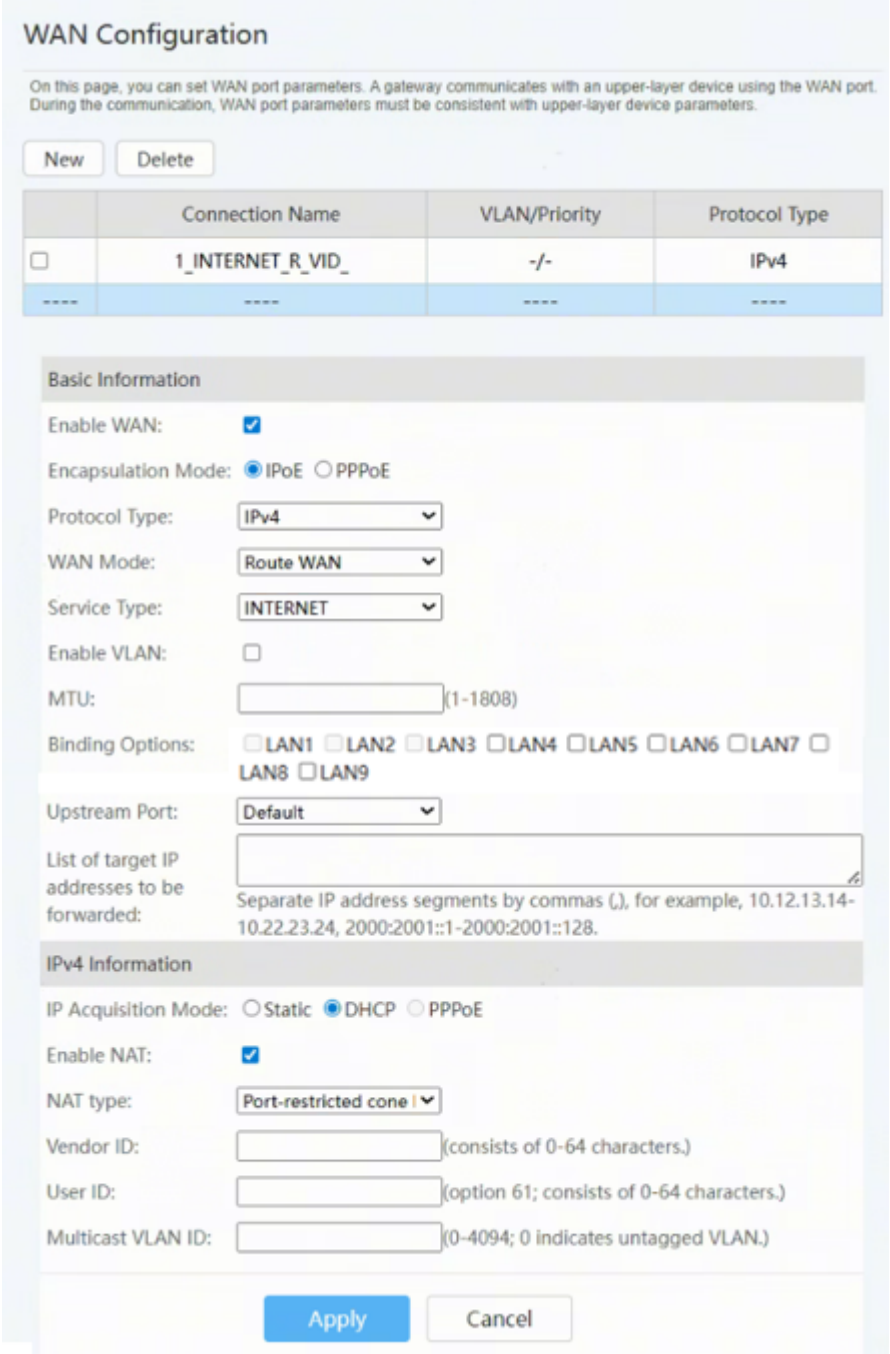
Configure on the Optical Gateway F1002-AC-H1

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

Step 2 Configuring the Route WAN.

In the navigation tree on the left, choose **Advanced** > **WAN**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

- Encapsulation Mode: IPoE
- Protocol Type: IPv4
- WAN Mode: Route WAN
- Service Type: INTERNET
- Other parameters: Default values



After configuration is completed, click "Apply".

Step 3 Configuring the WAN for the optical AP internet service.

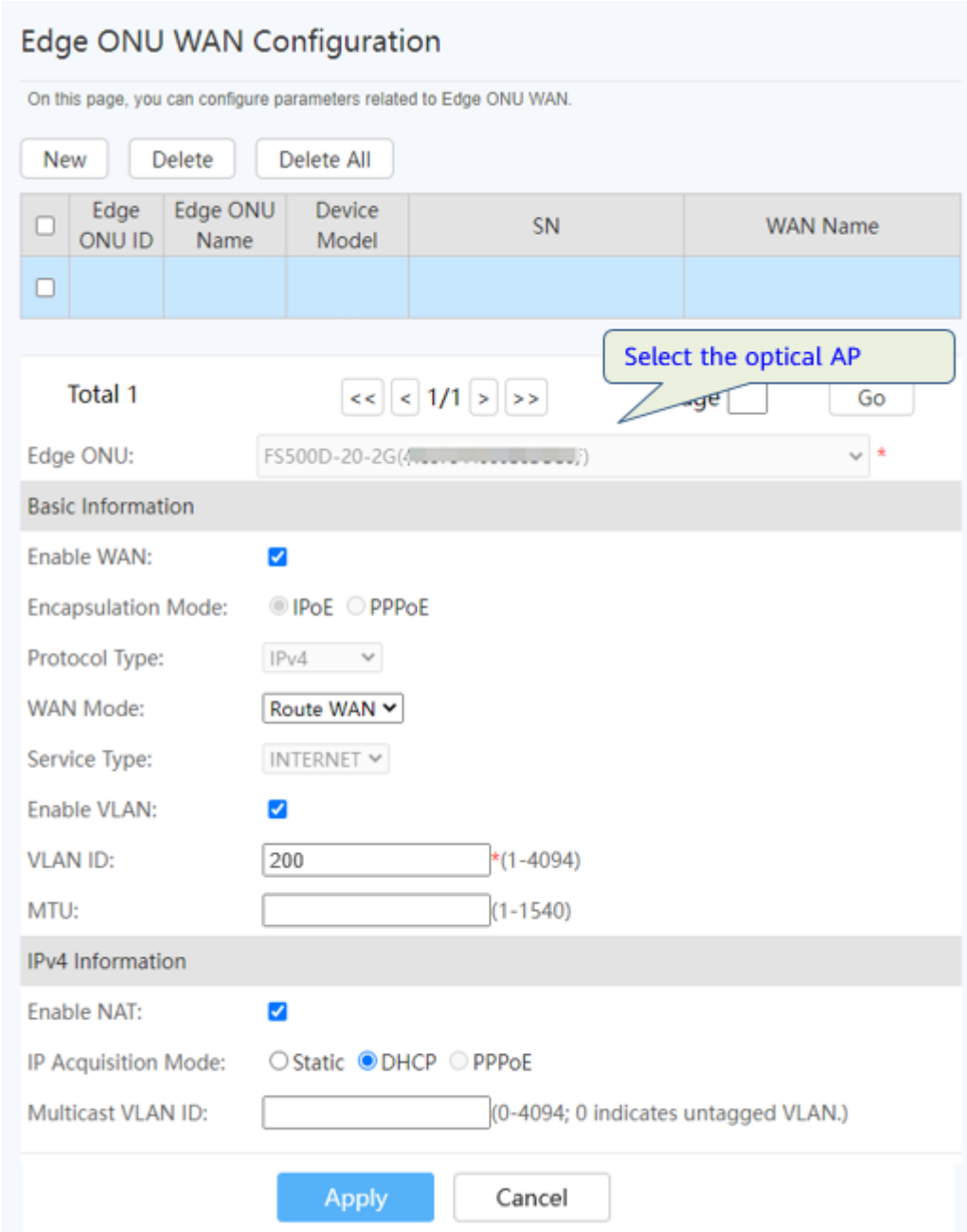
In the navigation tree on the left, choose **Advanced** > **Edge ONU WAN Configuration**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

- Service Type: INTERNET

  NOTE

  First, you need to select "Service Type: INTERNET." After that, you can set other parameters according to the data plan.

- Encapsulation Mode: IPoE
- Protocol Type: IPv4
- WAN Mode: Route WAN
- Internet Service VLAN: 200
- IP Acquisition Method: DHCP
- Other Parameters: Default Values



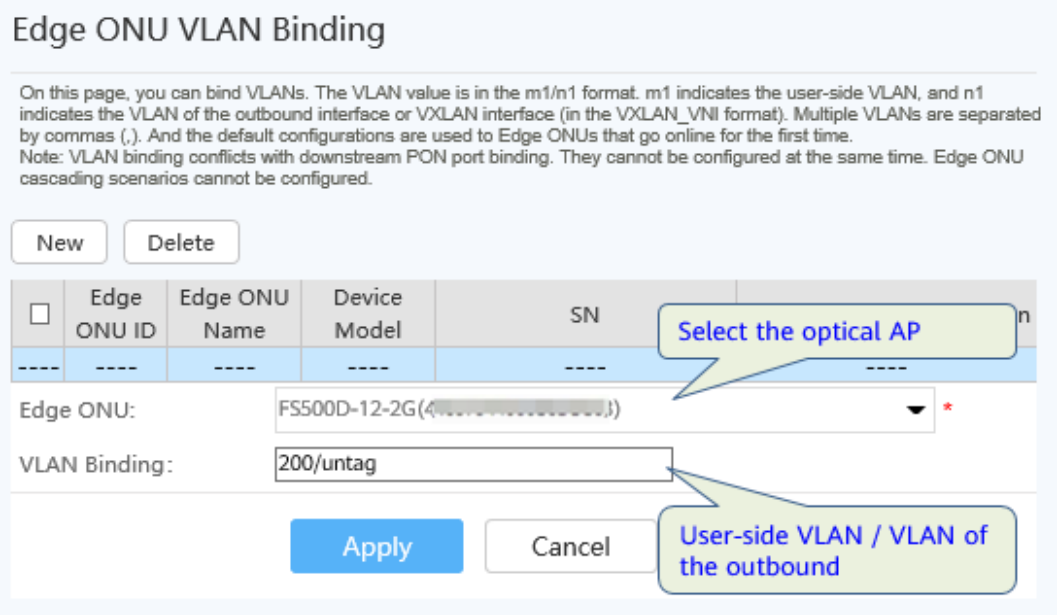
After configuration is completed, click "Apply".

NOTE

After the configuration is completed, this WAN connection will be deployed from the optical gateway to the optical AP. You can log in to the web interface of the optical AP to view this WAN information and status.

Step 4 Configuring VLAN binding for the optical AP.

In the navigation tree on the left, choose **Advanced** > **LAN** > **Edge ONU VLAN Binding**. In the pane on the right, click **New** to configure the VLAN binding.



After configuration is completed, click "Apply".

----End

Configure on the Optical AP

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

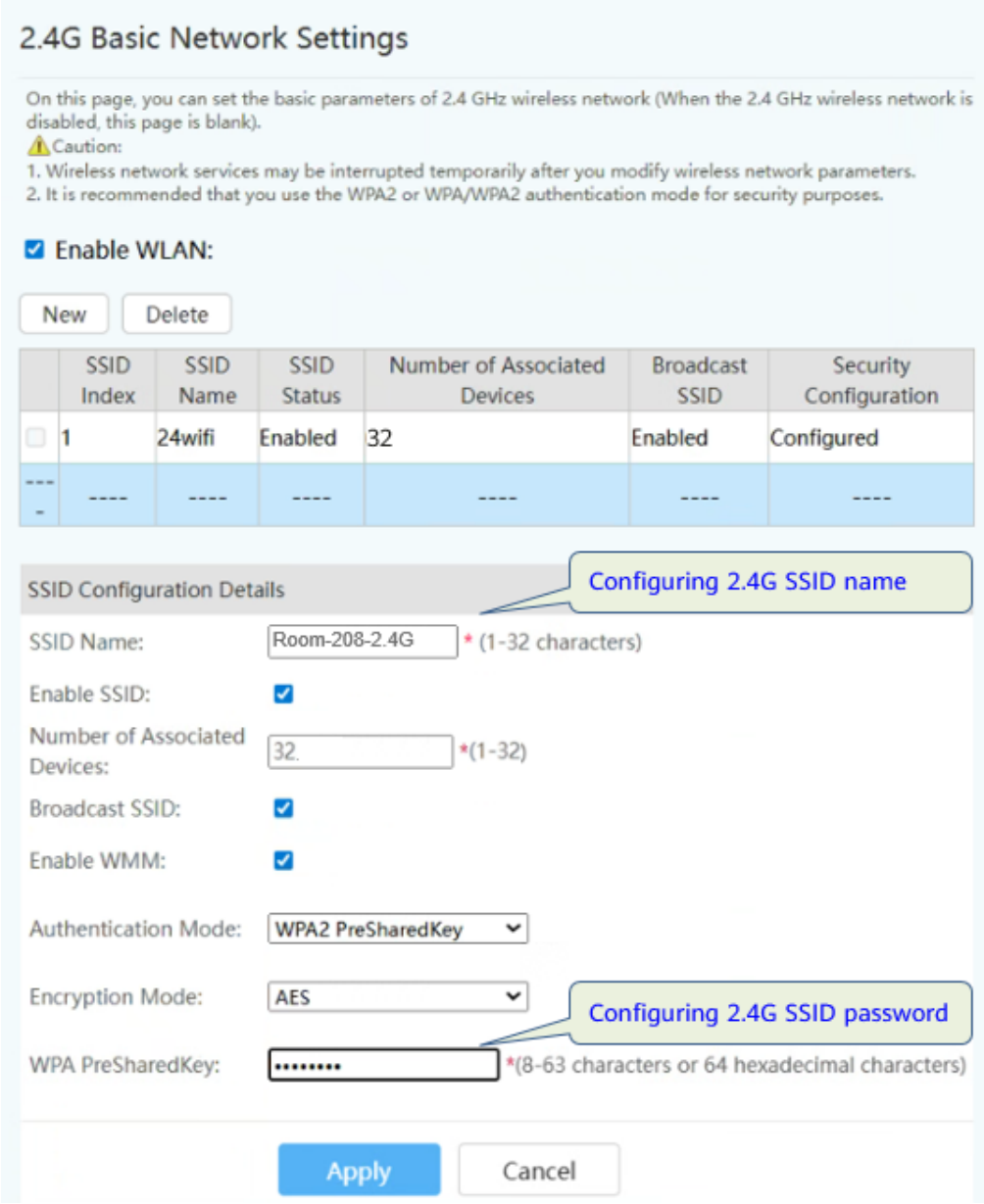
Step 2 Configuring the Wi-Fi SSID.

NOTE

Configure 2.4G and 5G spectrum Wi-Fi SSIDs according to actual needs.

1. Create a new 2.4G Wi-Fi SSID.

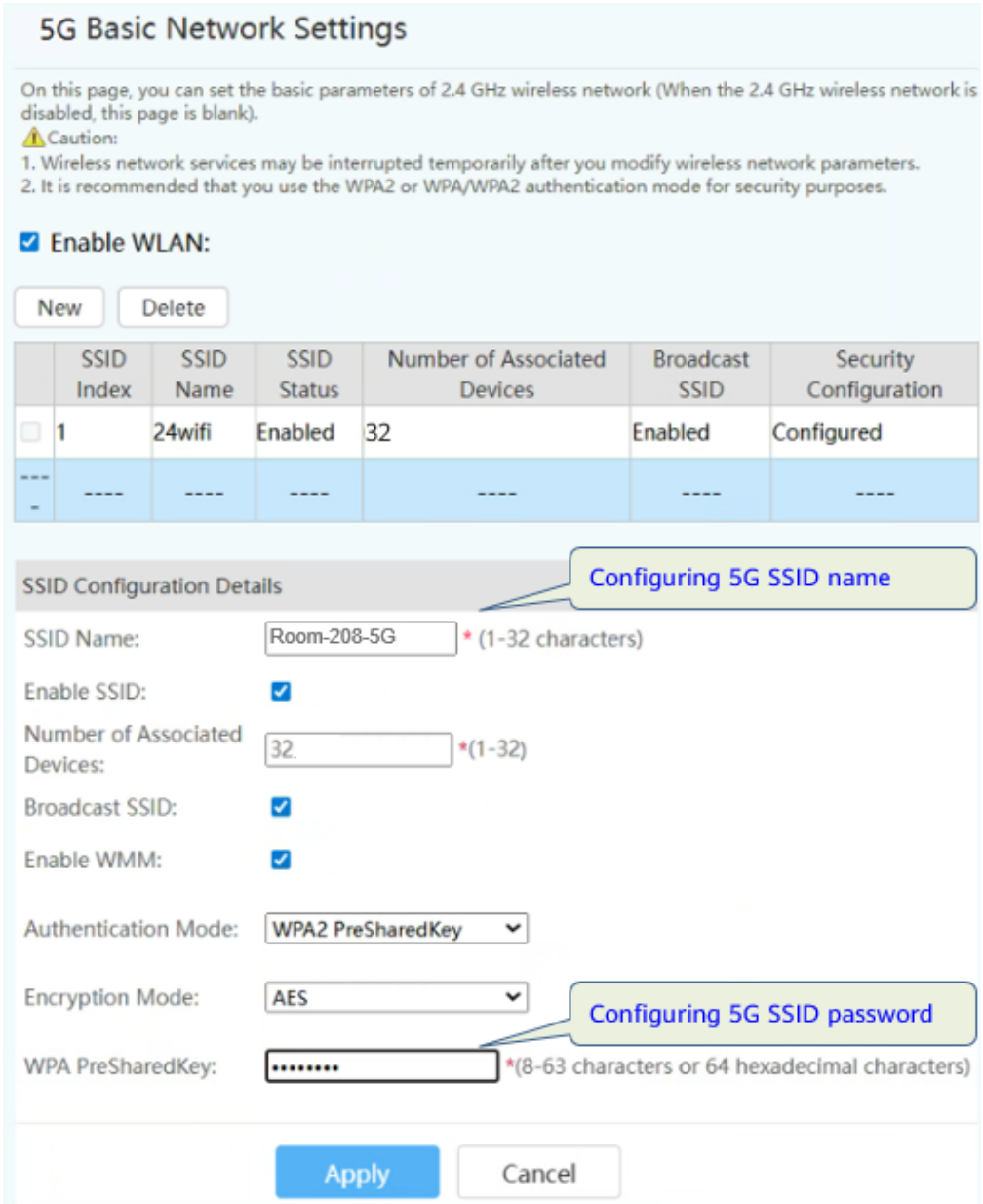
   In the navigation tree on the left, choose **Advanced** > **WLAN** > **2.4G Basic Network Settings**. In the pane on the right, click "New" to add a 2.4G Wi-Fi SSID, set parameters based on the data plan.



After configuration is completed, click "Apply".

2. Create a new 5G Wi-Fi SSID.

   In the navigation tree on the left, choose **Advanced** > **WLAN** > **5G Basic Network Settings**. In the pane on the right, check "New" to add a 5G Wi-Fi SSID, set parameters based on the data plan.



After configuration is completed, click "Apply".

Step 3 The configuration is complete, and the Wi-Fi service of the optical AP is now activated.

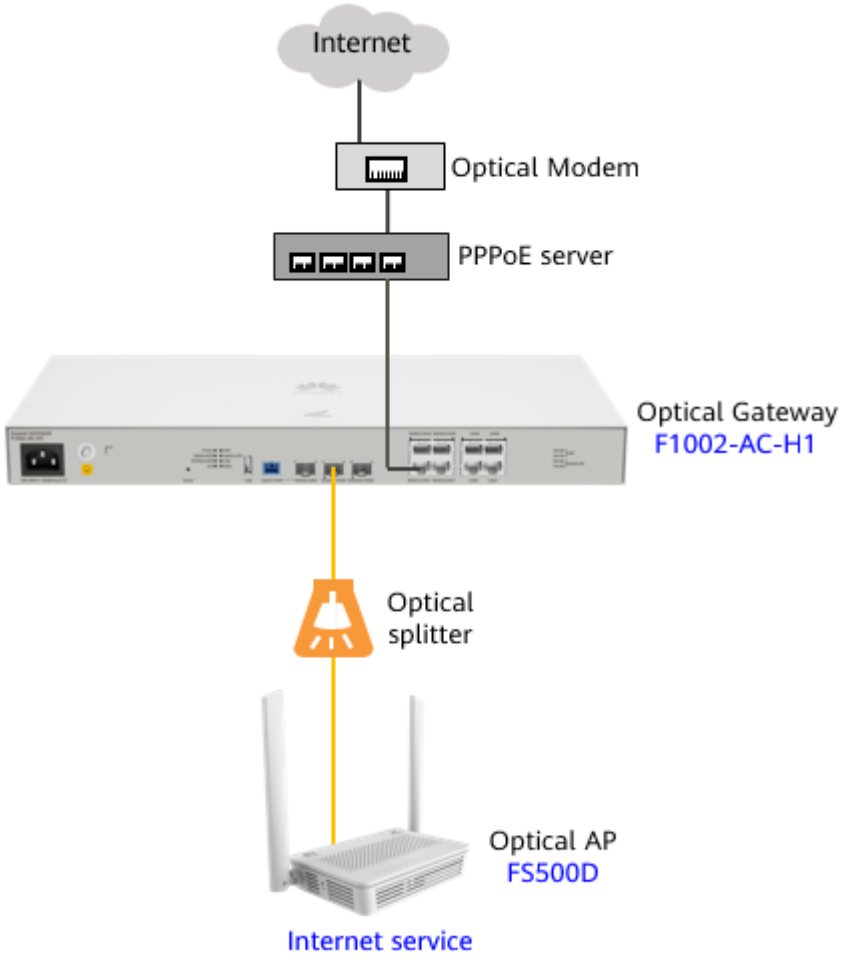
----End

8 Configuring the Wi-Fi Service (PPPoE, No Service VLAN)

Networking Scenario

This scenario is shown in the following figure:

- The optical gateway uses the LAN upstream mode.
- The optical gateway connects to the PPPoE server via an Ethernet cable, and the PPPoE server is connected to the operator's modem or gateway.
- The optical AP uses PPPoE for dial-up internet access, with dial-up authentication performed on the PPPoE server.
- The optical AP does not use service VLAN.
- The AP provides Wi-Fi and Ethernet access to the Internet.



Configuration process

Table 8-1 Configuration process

Operating equipment	Configuration Item	Description
Optical Gateway	Configuring Bridge WAN	This WAN is used to transparently transmit the optical gateway's internet access services to the upper-layer PPPoE server.
	Configuring the WAN for the optical AP internet service	This WAN is used to establish an internet service connection between the optical AP and the optical gateway.
Optical AP	Configuring the Wi-Fi SSID	Set parameters such as 2.4G and 5G Wi-Fi SSIDs and passwords.

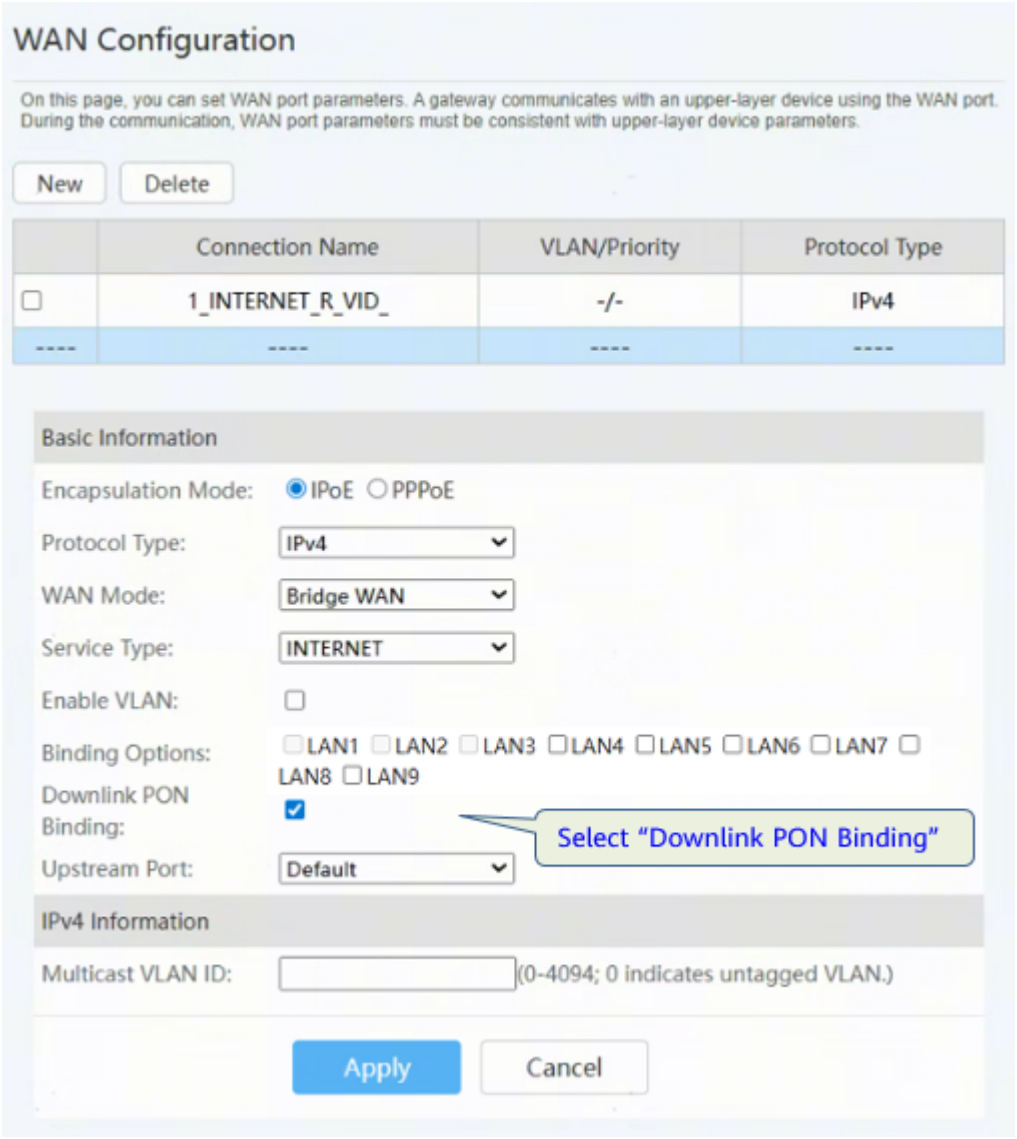
Configure on the Optical Gateway F1002-AC-H1

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

Step 2 Configure the Bridge WAN.

In the navigation tree on the left, choose **Advanced** > **WAN**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

- Encapsulation Mode: IPoE
- Protocol Type: IPv4
- WAN Mode: Bridge WAN
- Service Type: INTERNET
- Downstream PON Binding: Bind Downstream PON
- Other Parameters: Default Values



After configuration is completed, click "Apply".

NOTE

If the PPPoE server assigns a VLAN to the optical gateway, you need to check "Enable VLAN" and configure the "VLAN ID" when setting up this bridged WAN.

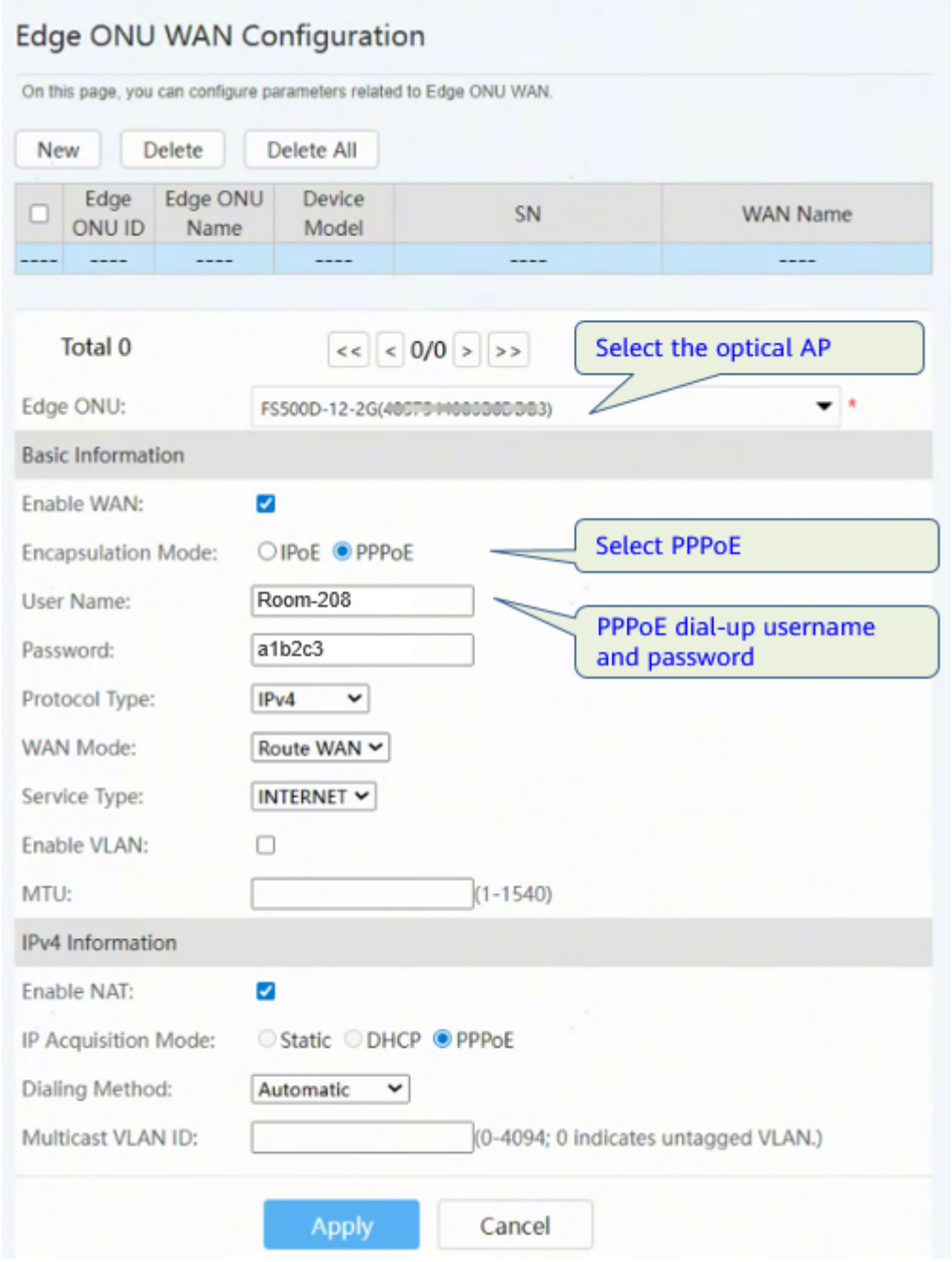
Step 3 Configuring the WAN for the optical AP internet service.

In the navigation tree on the left, choose **Advanced** > **Edge ONU WAN Configuration**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

- Service Type: INTERNET

  NOTE

  First, you need to select "Service Type: INTERNET." After that, you can set other parameters according to the data plan.
- Encapsulation Type: PPPoE
- Username: Room-208
- Password: a1b2c3
- Protocol Type: IPv4
- WAN Type: Route WAN
- IP Address Acquisition Method: PPPoE
- Other parameters: Default values



After configuration is completed, click "Apply".

NOTE

After the configuration is completed, this WAN connection will be deployed from the optical gateway to the optical AP. You can log in to the web interface of the optical AP to view this WAN information and status.

----End

Configure on the Optical AP

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

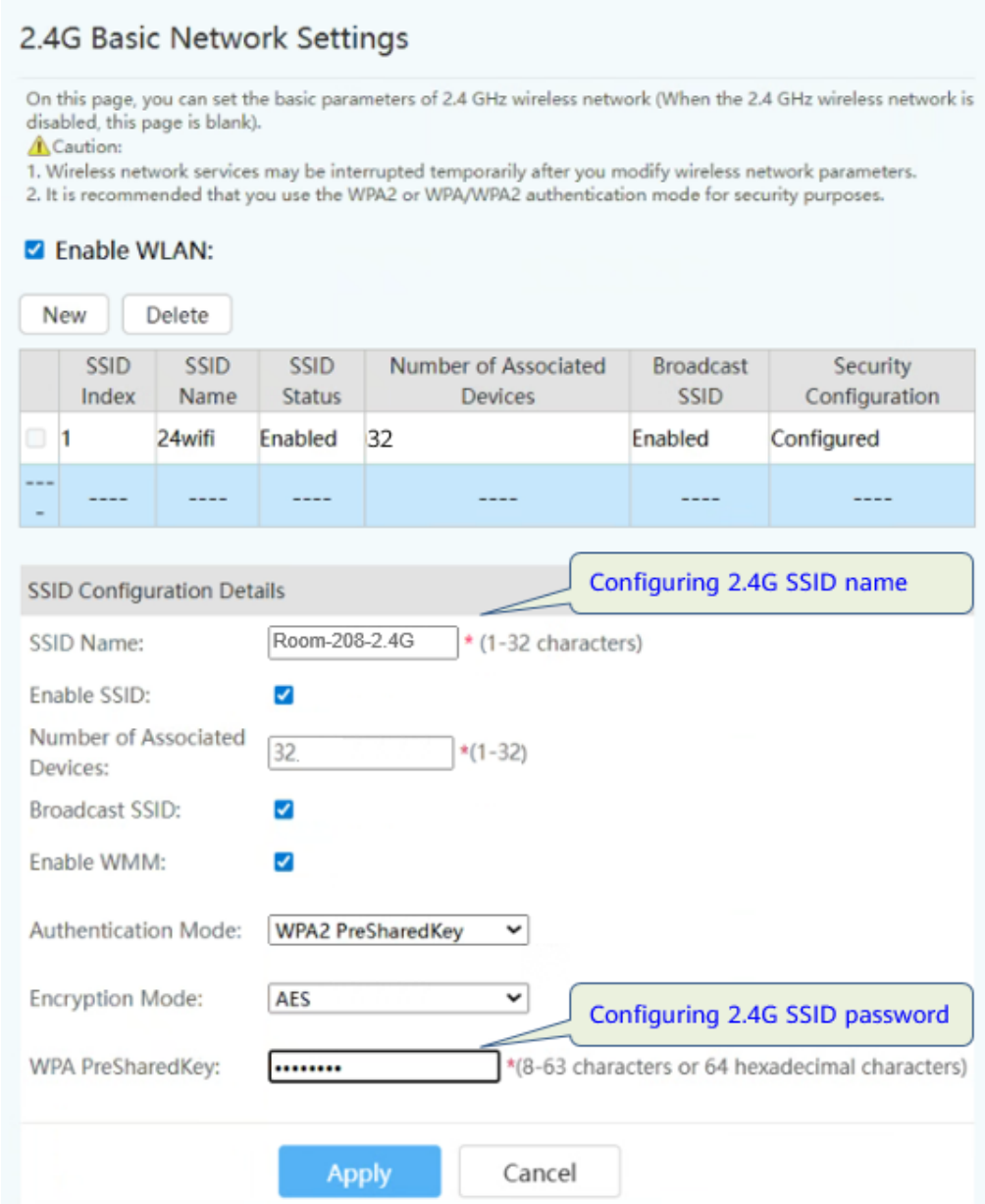
Step 2 Configuring the Wi-Fi SSID.

NOTE

Configure 2.4G and 5G spectrum Wi-Fi SSIDs according to actual needs.

1. Create a new 2.4G Wi-Fi SSID.

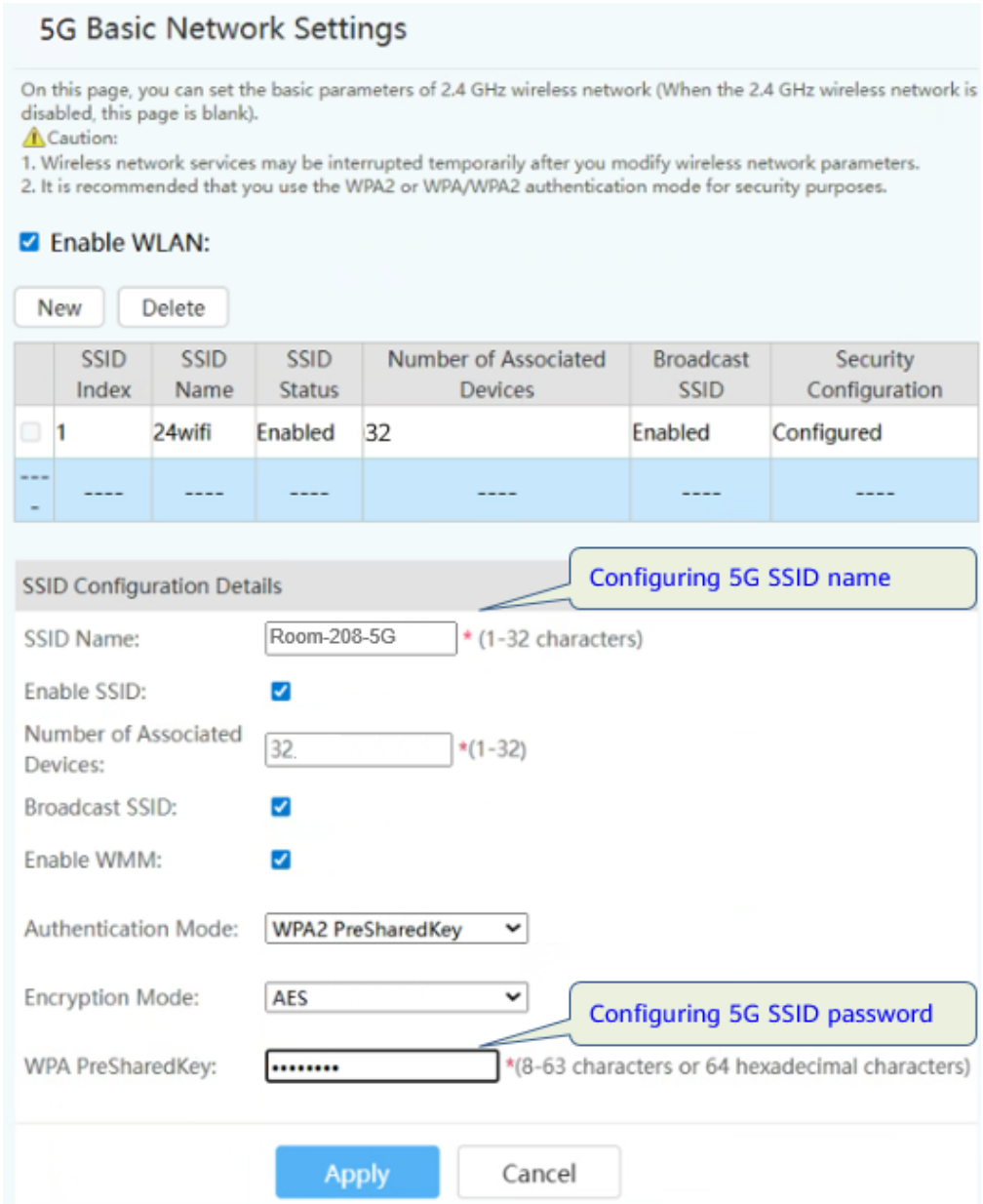
   In the navigation tree on the left, choose **Advanced** > **WLAN** > **2.4G Basic Network Settings**. In the pane on the right, click "New" to add a 2.4G Wi-Fi SSID, set parameters based on the data plan.



   After configuration is completed, click "Apply".

2. Create a new 5G Wi-Fi SSID.

   In the navigation tree on the left, choose **Advanced** > **WLAN** > **5G Basic Network Settings**. In the pane on the right, check "New" to add a 5G Wi-Fi SSID, set parameters based on the data plan.



After configuration is completed, click "Apply".

Step 3 The configuration is complete, and the Wi-Fi service of the optical AP is now activated.

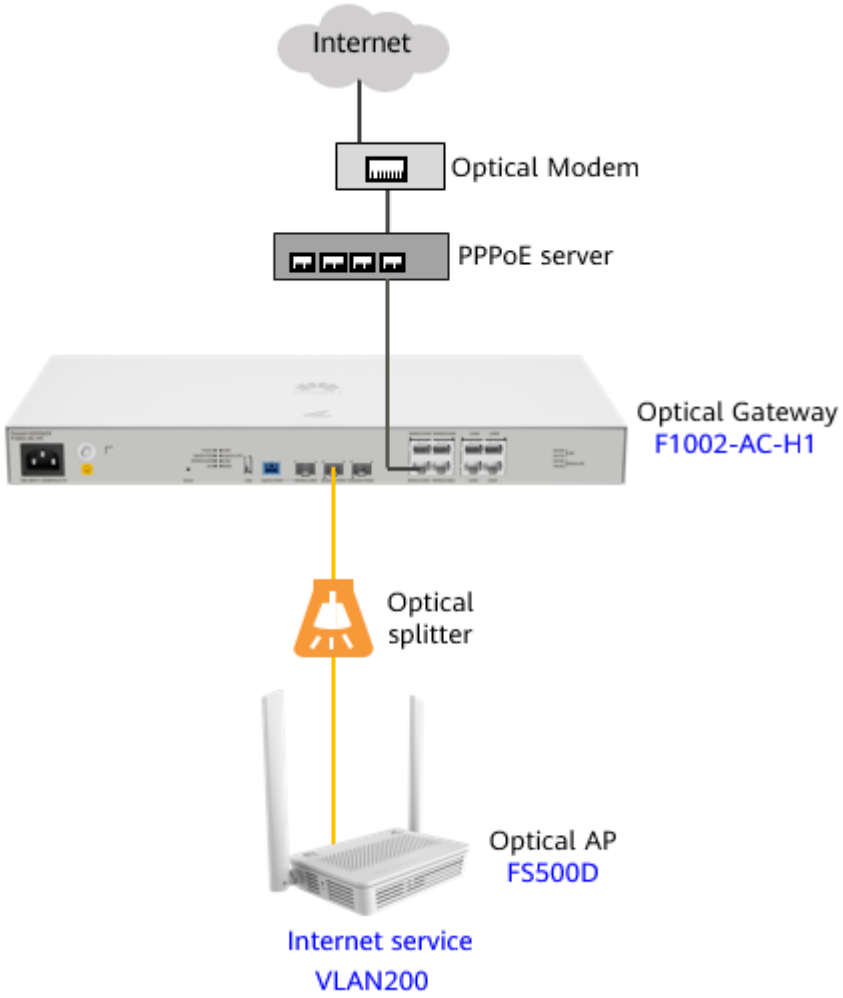
----End

9 Configuring the Wi-Fi Service (PPPoE, with Service VLAN)

Networking Scenario

This scenario is shown in the following figure:

- The optical gateway uses the LAN upstream mode.
- The optical gateway connects to the PPPoE server via an Ethernet cable, and the PPPoE server is connected to the operator's modem or gateway.
- The optical AP uses PPPoE for dial-up internet access, with dial-up authentication performed on the PPPoE server.
- Optical AP Internet service VLAN 200.
- The AP provides Wi-Fi and Ethernet access to the Internet.



Configuration process

Table 9-1 Configuration process

Operating equipment	Configuration Item	Description
Optical Gateway	Configuring Bridge WAN	This WAN is used to transparently transmit the optical gateway's internet access services to the upper-layer PPPoE server.
	Configuring the WAN for the optical AP internet service	This WAN is used to establish an internet service connection between the optical AP and the optical gateway.
	Configuring VLAN binding for the optical AP	Bind the service VLAN to the egress VLAN.

Operating equipment	Configuration Item	Description
Optical AP	Configuring the Wi-Fi SSID	Set parameters such as 2.4G and 5G Wi-Fi SSIDs and passwords.

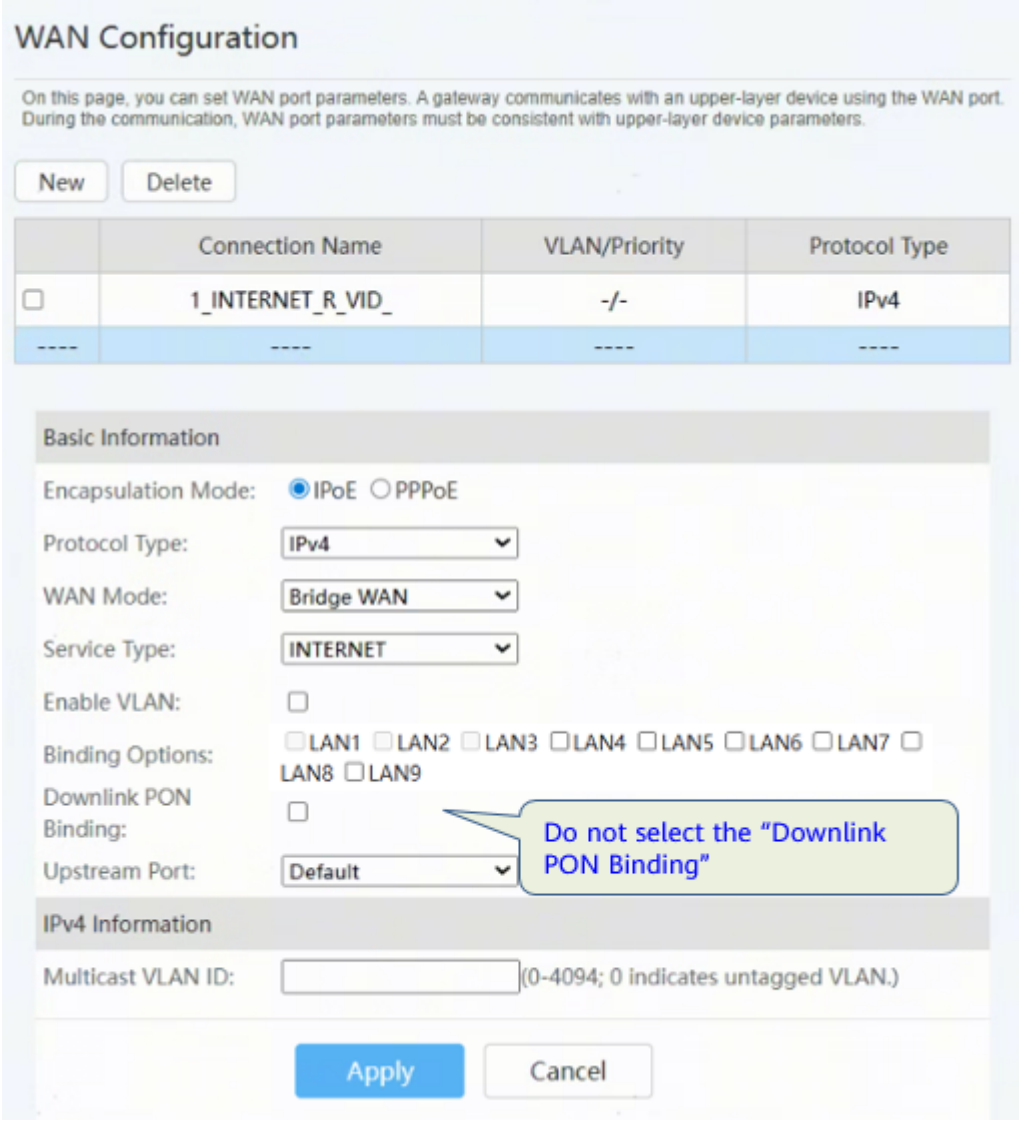
Configure on the Optical Gateway F1002-AC-H1

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

Step 2 Configure the Bridge WAN.

In the navigation tree on the left, choose **Advanced** > **WAN**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

- Encapsulation Mode: IPoE
- Protocol Type: IPv4
- WAN Mode: Bridge WAN
- Service Type: INTERNET
- Downstream PON Binding: NO
- Other Parameters: Default Values



After configuration is completed, click "Apply".

NOTE

If the PPPoE server assigns a VLAN to the optical gateway, you need to check "Enable VLAN" and configure the "VLAN ID" when setting up this bridged WAN.

Step 3 Configuring the WAN for the optical AP internet service.

In the navigation tree on the left, choose **Advanced** > **Edge ONU WAN Configuration**. In the pane on the right, click **New**. In the dialog box that is displayed, set parameters based on the data plan.

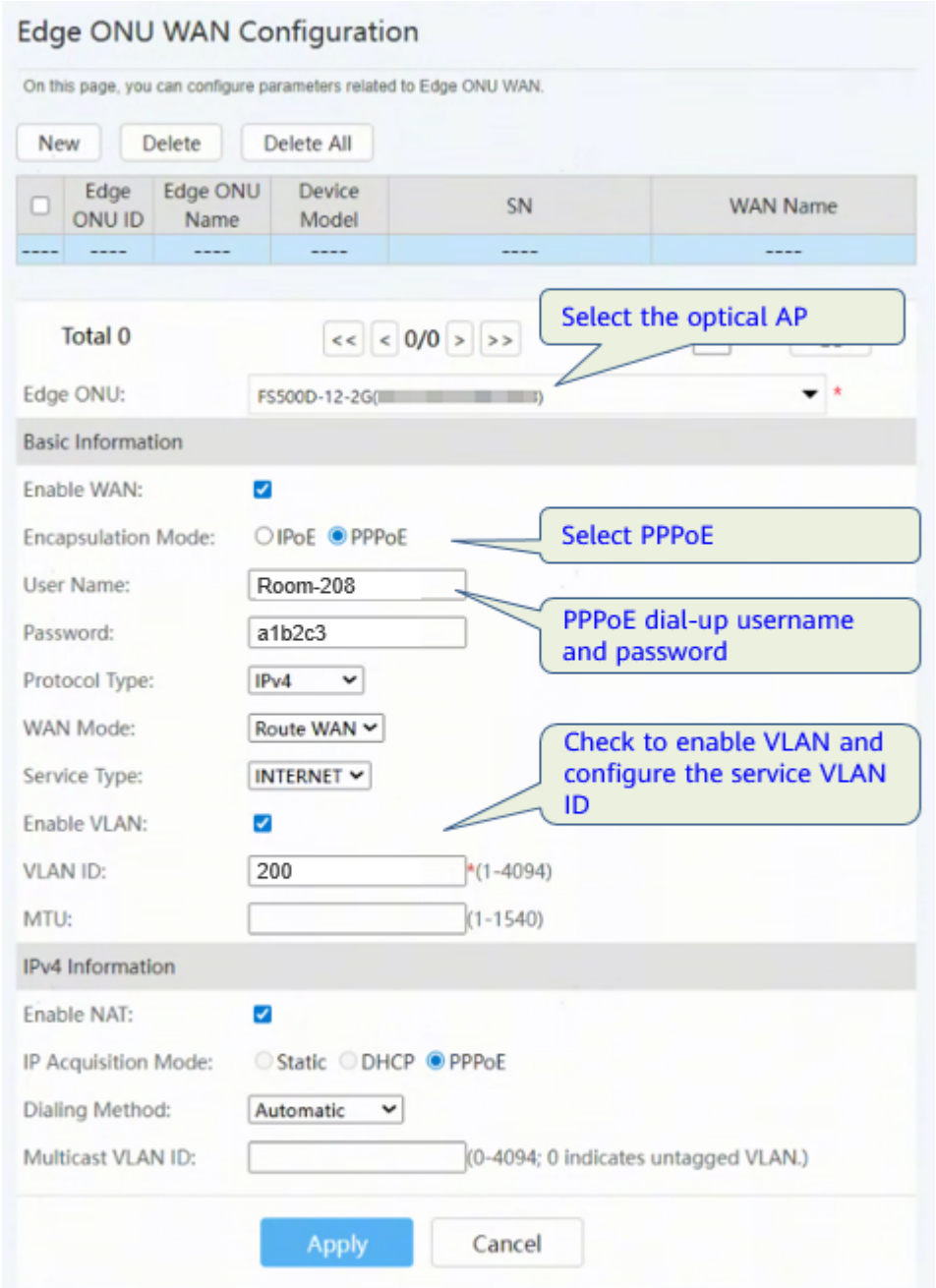
- Service Type: INTERNET

  NOTE

  First, you need to select "Service Type: INTERNET." After that, you can set other parameters according to the data plan.

- Encapsulation Type: PPPoE
- Username: Room-208

- Password: a1b2c3
- Protocol Type: IPv4
- WAN Type: Routed WAN
- Internet Service VLAN: 200
- IP Address Acquisition Method: PPPoE
- Other Parameters: Default Values



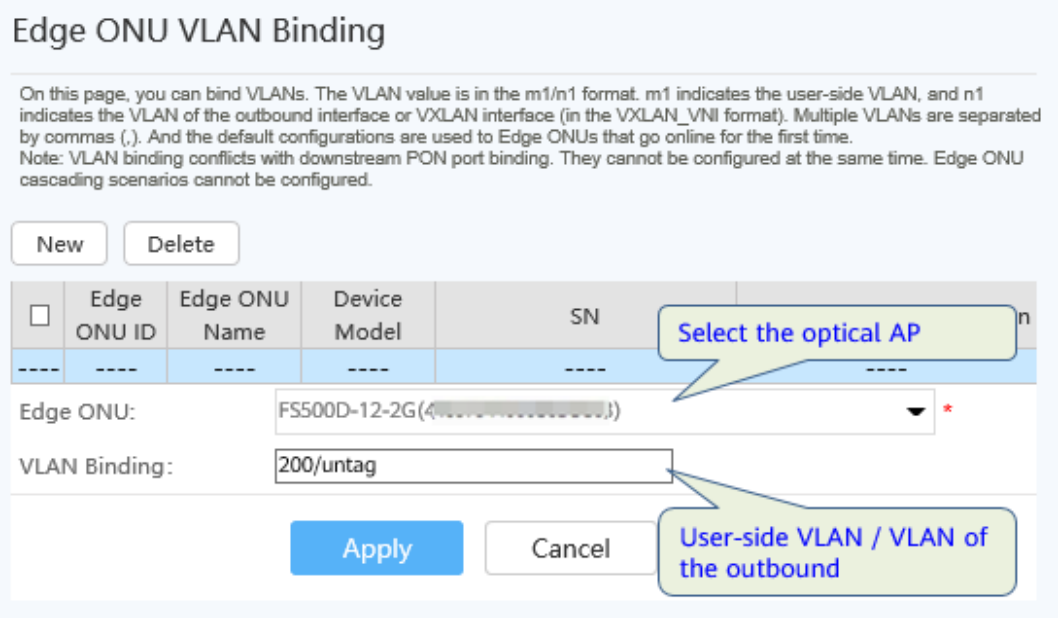
After configuration is completed, click "Apply".

NOTE

After the configuration is completed, this WAN connection will be deployed from the optical gateway to the optical AP. You can log in to the web interface of the optical AP to view this WAN information and status.

Step 4 Configuring VLAN binding for the optical AP.

In the navigation tree on the left, choose **Advanced** > **LAN** > **Edge ONU VLAN Binding**. In the pane on the right, click **New** to configure the VLAN binding.



After configuration is completed, click "Apply".

----End

Configure on the Optical AP

Step 1 Configuring the Local Login Web UI. For the configuration method, please refer to **4 Configuring the Local Login Web UI**

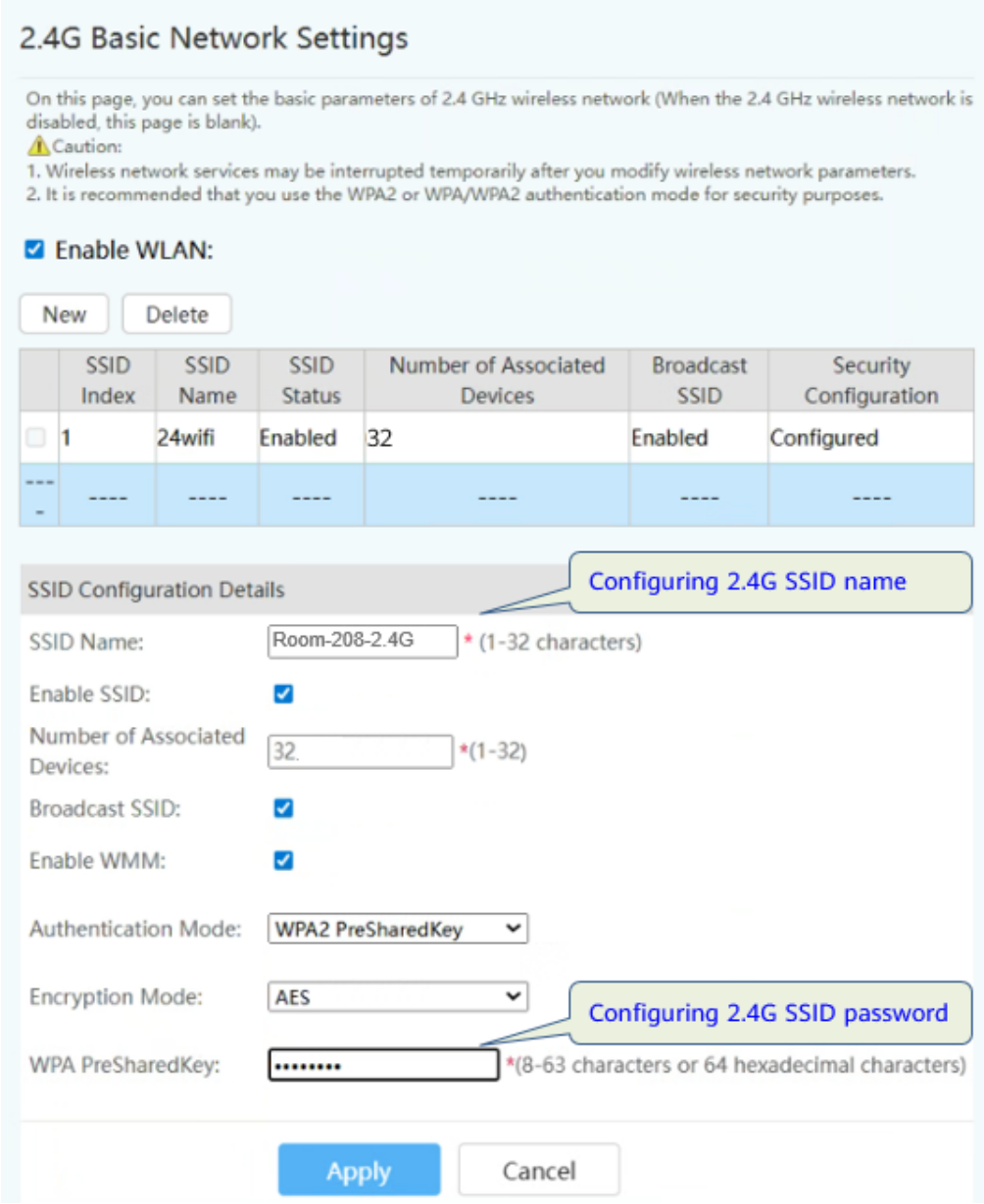
Step 2 Configuring the Wi-Fi SSID.

NOTE

Configure 2.4G and 5G spectrum Wi-Fi SSIDs according to actual needs.

1. Create a new 2.4G Wi-Fi SSID.

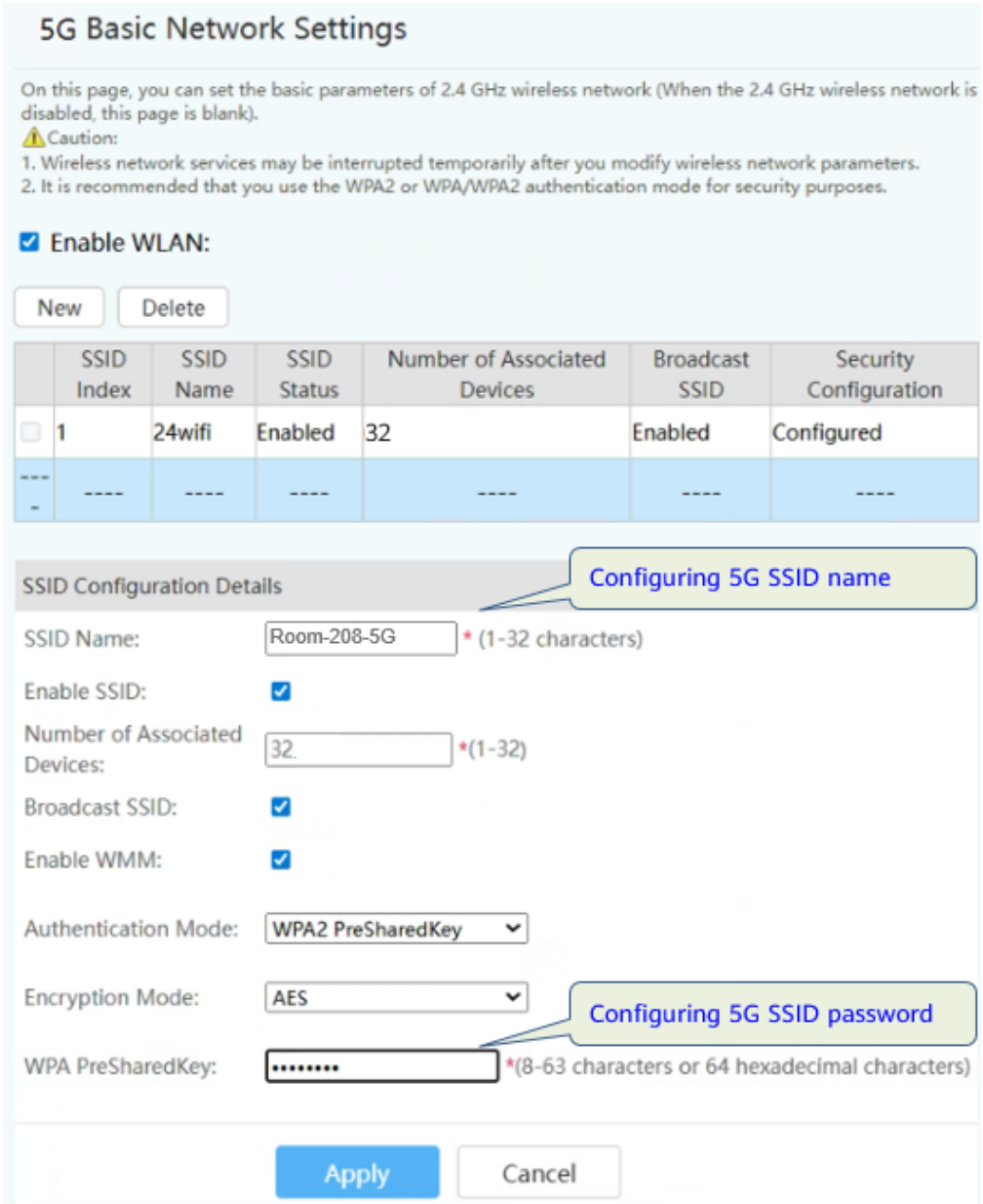
   In the navigation tree on the left, choose **Advanced** > **WLAN** > **2.4G Basic Network Settings**. In the pane on the right, click "New" to add a 2.4G Wi-Fi SSID, set parameters based on the data plan.



After configuration is completed, click "Apply".

2. Create a new 5G Wi-Fi SSID.

   In the navigation tree on the left, choose **Advanced** > **WLAN** > **5G Basic Network Settings**. In the pane on the right, check "New" to add a 5G Wi-Fi SSID, set parameters based on the data plan.



After configuration is completed, click "Apply".

Step 3 The configuration is complete, and the Wi-Fi service of the optical AP is now activated.

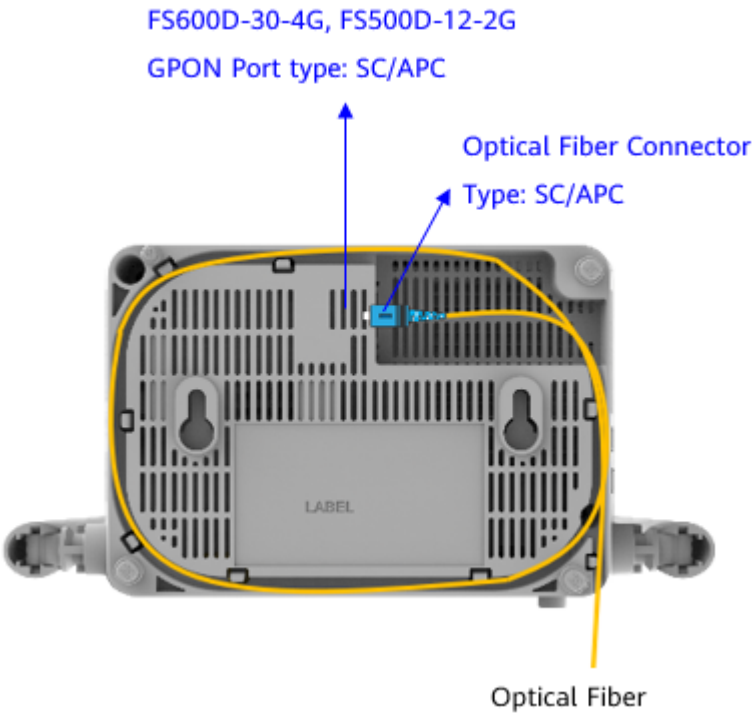
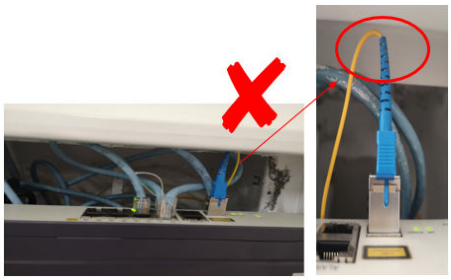
----End

10 Troubleshooting Common Service Faults

10.1 Optical AP Failing to Go Online

Table 10-1 Guide for handling failures of optical AP to go online after power-on

Fault Description	An optical AP fails to go online after power-on.
Possible Cause	• The receive optical power on the optical AP is abnormal. • The bending radius of the optical cable is too small, or the cable is damaged. • The optical cable is contaminated.

Procedure	1. Measure the optical power and check whether it is too high or too low. **10.4.2 Use an Optical Power Meter to Measure the Optical Power**, **10.4.1 Analyze Optical Power** • If the optical power is too high, add optical attenuators or rectify the optical path. • If the optical power is too low, go to the next step. 2. If the optical power is normal, check whether the type of fiber optic connector is correct.  3. If the optical power is zero or too low, check whether there are overbent optical fibers. Diagram of Excessive Fiber Optic Bend  4. If no, check whether there are faulty optical fibers. 5. Check whether the split ratio is too high, resulting in low optical power. 6. Use a fiber cleaning pen to test whether there is light leakage due to fiber faults. **10.4.4 Checking Whether the Optical Fiber Is Damaged Using the Red Pointer**

	7. Use a fiber end face detector to test whether the optical fiber and the upstream optical port of the device are contaminated. **10.4.3 Cleaning the Connector of an Optical Fiber** 8. Contact Huawei engineers to handle the fault.

10.2 Internet Access Failure

Internet access failure means that Internet resources cannot be obtained, for example, web pages cannot be opened or files cannot be downloaded.

To rectify the fault, you can start from the fault scope and preliminarily determine the possible causes of the fault based on the fault scope.

Table 10-2 Possible Causes for Internet Access Failure

Fault Symptom	Fault Scope	Possible Causes
Only one PC connected to an optical AP fails to access the Internet, and other PCs connected to the same optical AP can access the Internet normally	User terminal	• The PC fails to obtain an IP address. • Virus in the user PC. • The browser on the PC is faulty. • The PC runs for a long time, causing slow response. • The network adapter of the user PC is abnormal or faulty.
All PCs connected to the same optical AP cannot access the Internet, but PCs connected to other optical APs are normal	Optical AP	• The WAN port of the Optical AP is not established. • The SSID broadcast function of the optical AP is not enabled on the optical AP, and Wi-Fi terminals cannot find the SSID. • The Optical AP hardware is abnormal or faulty.
Users connected to all optical APs of the optical gateway cannot access the Internet	Optical gateway	• The hardware of the optical gateway is abnormal or faulty. • The upper-layer network is faulty.

10.3 Wi-Fi Service Troubleshooting

The following table lists the common Wi-Fi service faults.

Table 10-3 Common Wi-Fi Service Faults

Fault Symptom	Possible Causes	Treatment Method
No Wi-Fi signal is found	The optical AP hardware is abnormal or faulty	Check whether the operating status indicator of the optical AP is normal
	The Wi-Fi switch of the optical AP is not turned on	Check the Wi-Fi parameter settings and ensure that the wireless network is enabled. If not, open it and try again
Unable to connect to Wi-Fi	The terminal selects an incorrect SSID	Check the SSID and connect the correct SSID
	The authentication information entered by the terminal is incorrect	Check the password and re-enter the correct password
Wi-Fi signal intermittently	There are strong interference sources around the optical AP, and Wi-Fi signals are interfered	Check whether there are microwave ovens, electric refrigerators, wireless mice, and cordless phones around the optical AP because the frequency of these appliances interferes with the frequency of Wi-Fi signals, causing performance degradation
	Too many obstacles cause severe Wi-Fi signal attenuation	Signal attenuation is mainly caused by metal objects, walls (especially load-bearing walls), and large household appliances/furniture

Common Wi-Fi signal interference of home appliances is as follows:

Wi-Fi signal transmission frequency:

- 802.11b/g/n/ax/be: 2.4 GHz
- 802.11a/n/ac/ax/be: 5 GHz

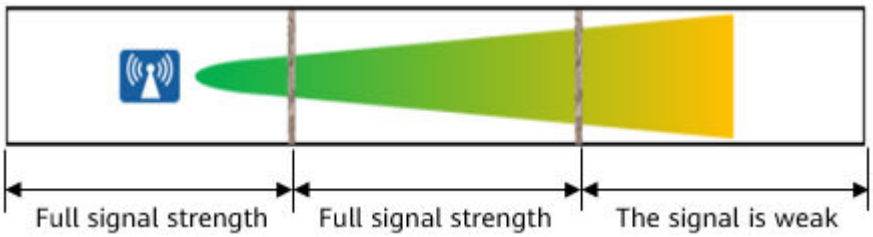
This frequency is the same as that of microwave ovens, refrigerators, wireless mice, or cordless phones. Co-channel interference exists, and the closer the distance, the greater the impact.

If there are multiple radio signals around, the radio signals on the same channel or adjacent channels also affect each other, resulting in low stability.

Table 10-4 Common frequency interference

Devices	Parameter	Interference Evaluation
Microwave oven	Frequency: S (2.4-2.5 GHz) Power: > 800 W	Large interference range: The Wi-Fi rate decreases significantly when the distance is less than 4 m. The Wi-Fi network is occasionally disconnected when the distance is less than 2 m.
Mobile phone	Frequency: 2.4 GHz Power: 3 W	Severe short-distance interference: If the distance is less than 1 m, the Wi-Fi rate decreases significantly. If the distance is less than 0.5 m, the Wi-Fi network is disconnected.
Wireless Cameras	Frequency: 2.4 GHz Power: 0.5–1 W	The interference is relatively light and still needs to be far away from.
Bluetooth Device	Frequency: 2.4 GHz Power: 1 mW	Very little interference.

The more obstacles, the greater the attenuation of Wi-Fi signals.



Typical barrier penetration loss is shown in the following table.

Table 10-5 Typical Barrier Penetration Loss

Obstacles	Thickness (mm)	2.4 GHz Signal Attenuation (dB)	5 GHz Signal Attenuation (dB)
Ordinary brick wall	120	10	20
Thickened brick wall	240	15	25
Concrete	240	25	30
Asbestos	8	3	4
Foam board	8	3	4

Obstacles	Thickness (mm)	2.4 GHz Signal Attenuation (dB)	5 GHz Signal Attenuation (dB)
Hollow wood	20	2	3
Ordinary wooden door	40	3	4
Solid wood door	40	10	15
Ordinary glass	8	4	7
Thickened glass	12	8	10
Bulletproof glass	30	25	35
Bearing column	500	25	30
Rolling shutter door	10	15	20
Steel plate	80	30	35
Elevators	80	30	35

10.4 Optical Power Exception Handling

Checking the optical power is one of the most common methods for troubleshooting optical fiber networks. By checking and analyzing the upstream and downstream optical power, you can determine whether the fiber link quality is normal.

10.4.1 Analyze Optical Power

In optical power analysis, the actual optical attenuation is compared with the theoretical value to determine the quality of the optical line and locate the abnormal attenuation point in the optical line.

In normal cases, the actual optical attenuation is close to the theoretical value. If the actual attenuation is much greater than the theoretical attenuation, there are abnormal attenuation points on the fiber link.

The theoretical values of optical attenuation are shown in Table 3-1.**Table 10-6**

Table 10-6 Theoretical optical attenuation

Name	Type	Average Loss (dB)
Connection Point	fusion	≤ 0.1
	Active connector (flanged plate)	≤ 0.3
	Cold/Quick Coupler	≤ 0.5

Name	Type	Average Loss (dB)
Optical fiber	1490nm/1577nm (1 km)	≤ 0.23
	1310nm / 1270nm (1 km)	≤ 0.35
PoF cable	04053088 & 04053162 Indoor Double-End Flat PoF cable	Insertion loss of connector: • Insertion loss ≤ 0.50 • Return loss ≥ 50 Insertion loss of cable (optical fiber): • 1310 nm: 0.35 dB / km • 1550 nm: 0.21 dB / km Overall insertion loss of the PoF cable = Insertion loss of the connector + Insertion loss of the cable.

Table 3-2 lists the possible fault points and possible causes when the actual optical attenuation value is greater than the theoretical value.**Table 10-7**

Table 10-7 Fault Type

Fault point	Possible Causes
Connection points (cold connection, fusion connection, movable connector, quick connector, etc.)	• The fiber cores at both ends of the fiber at the cold or fusion point are not aligned. • Bubbles exist at the fusion point. • The active connector, quick coupler is faulty, or the interface is dirty.
optical fiber	• The end surface of the optical fiber connector is dirty, scratched, or dented. • The optical fiber connector is too tight or loose. • Different types of fiber connectors are interconnected. • The optical fiber is bent. • The optical fiber is damaged. • Multimode fiber is used.

10.4.2 Use an Optical Power Meter to Measure the Optical Power

This topic describes how to use an optical power meter to measure the optical power.

Prerequisites

- The device has been powered on.
- The laser on the optical port is turned on.

Tools, Instruments and Materials

- The length of the fiber jumper is less than 1 m. It is recommended that new fiber jumpers be used.
- Optical power meter.

Impact on the System

When the optical power meter is used to measure the downstream optical power, the services carried on the link are interrupted.

Precautions

NOTICE

Note that the laser is not visible, which has nothing to do with wearing laser protective glasses. Do not look close to or directly into the laser transmitter port and fiber connector of the optical interface board. Otherwise, the laser can cause damage to the eyes and even lead to blindness. It is prohibited to point bright light against flammable materials.

Before and after measuring the optical power, clean the optical interface. If the contaminated fiber is in contact with the normal fiber end face, the normal fiber end face will be contaminated, causing abnormal attenuation and reflection, and affecting the fiber link quality.

Procedure

Step 1 Set the measurement parameters of the optical power meter.

Step 2 Unplug the fiber optic connector from the optical AP, connect the optical power meter to the fiber optic connector, and measure the received optical power of the optical AP.

Step 3 Check and record the reading of the optical power meter.

NOTE

- If the optical power meter jitters within 0.2 dBm, it is normal. In this case, take the average value.
- If the change of the optical power meter exceeds 0.2 dBm, the optical fiber may not be properly connected, the optical fiber may be bent too much, or the connector of the optical fiber may be dirty.
- Do not bend the optical fiber. Otherwise, the test result may be affected.

Step 4 After the test is complete, remove the optical power meter and reconnect the optical fiber link.

----End

10.4.3 Cleaning the Connector of an Optical Fiber

This topic describes how to clean the connector of an optical fiber. Frequent insertion and removal or not taking dustproof treatment for a long time causes the connector to be unclean and deteriorated, which compromises the quality of the line. Therefore, you need to take measures to prevent dust and periodically clean optical fiber connectors, including the connector endface of an optical fiber, optical port of an optical module, and fiber adapter.

Prerequisites

Prepare the cleaning tools before cleaning, and follow the instructions in "Precautions".

Context

A large number of optical fiber connectors are used in optical transmission, which are easy to be contaminated in OM. The dust particles that can be seen by a microscope affect the quality of optical signals. As a result, the system performance deteriorates and network stability is affected. For two connected optical components, dust particles may damage the surface of the optical fiber. If the cladding or edge of an optical fiber has dust particles, the cores of two connected optical fibers may not be exactly aligned. As a result, the quality of optical signals is affected.

A 1 μm dust particle on a single-mode optical fiber blocks 1% optical signals and therefore leads to 0.05 dB attenuation loss. A 9 μm dust particle is hard to be seen without a microscope but it completely blocks the core of an optical fiber. Therefore, even an extremely small contaminant that can only be found by an instrument such as a microscope may block the connector of an optical fiber. Besides dust particles, the following contaminants need to be cleaned away:

- Grease (usually brought by hands)
- Condensation residues
- Powder (evaporation residues of water or solvent)

Such contaminants will also damage optical components and are more difficult to clean away than dust particles. To clean optical components, you must follow the corresponding steps.

Tools and Materials

The following lists commonly used cleaning tools and materials:

- Optical power meter: used for testing whether the laser on the connector of an optical fiber is disabled.
- Lint-free wipe: a piece of long silk cotton specially used for cleaning the connector endfaces of an optical fiber.
- Lint-free swab: used for cleaning the optical port of an optical module, and a fiber adapter. It has two specifications: ф2.5 mm and ф1.25 mm. You can select one according to the port type (use the lint-free swab with ф2.5 mm for the ports of SC and FC types, and use that with ф1.25 mm for the ports of LC and MTRJ types).
- Protective cap: used on the connector of an optical fiber, optical port of an optical module, and fiber adapter.
- Cleaning tool box: used for placing lint-free wipes and protective caps. Place lint-free wipes and protective caps separately from other tools.
- Cleaning reagent (alcohol): used for cleaning the connector of an optical fiber. It is flammable and therefore must be safely stored and kept clean.
- Optical fiber endface magnifier: a microscope (400*) used for checking whether the connector endface of an optical fiber is clean and smooth.

Impact on the System

An optical module must be powered off before its port is cleaned. In this case, services carried on the optical port will be interrupted.

Precautions

DANGER

- Never look into the optical port or the connector of an optical fiber without eye protection. Never put an optical port towards the flammables.
- Never clean an optical fiber connector when the laser is on.
- ESD discharge damages the equipment. To remove or insert a pluggable optical module before or after cleaning, wear an ESD wrist strap or ESD gloves.

- Put a protective cap into the cleaning tool box immediately after taking it off. Place unused protective caps in the cleaning tool box, or in the ESD bag for sealed storage. Clean protective caps quarterly (it is recommended to clean them by using an ultrasonic cleaner).
- Keep your hands clean and dry before cutting a lint-free wipe, and place unused lint-free wipes in the clean ESD bag or the cleaning tool box for sealed storage.
- After the cleaning, cover the connector of the optical fiber, optical module, and fiber adapter that will not be immediately used with protective caps.

Procedure

- Clean the connector endface of an optical fiber.
  a. Power off the laser of the connector before cleaning. Disconnect the optical fiber (at both ends) to be cleaned.
  b. Use the optical power meter to test the optical power and ensure that no optical signals are sent from the connector of the optical fiber.
  c. Clip a piece of lint-free wipe into 32 small pieces of the same size.
  d. Use a dry lint-free wipe (two-layer) to wipe the connector endface of the optical fiber along one direction once. For a seriously contaminated connector, use a lint-free wipe (two-layer) dipped with a little cleaning reagent to wipe the connector endface of the optical fiber along one direction once, and then use a dry lint-free wipe (two-layer) to wipe it along one direction once again for ensuring that the connector endface is dry

     NOTE

     - A lint-free wipe can be used only once. Use the portion of the lint-free wipe that is not touched by your hands.
     - You can use the optical fiber end magnifier to check the cleaning and abrasion condition of an optical fiber connector.

  e. After the cleaning, do not touch the connector. Connect the optical fiber (at both ends) immediately. Cover the optical connectors that will not be immediately used with protective caps.
  f. Power on the laser.
- Clean the optical port of an optical module.
  a. Power off the laser of the optical module before cleaning. Disconnect the optical fiber (at both ends) from the optical module.

b. Use the optical power meter to test the optical power and ensure that no optical signals are sent from the port of the optical module.
c. Wear an ESD wrist strap or ESD gloves to remove a pluggable optical module.
d. Select lint-free swabs with a suitable diameter according to the type of the optical port. Dip a swab with the cleaning reagent, insert the swab into the inside of the optical port, and then clean it by rotating the swab 360 degrees in one direction along the inner wall of the optical port.

NOTE

The lint-free swab with ϕ2.5 mm is used for the ports of SC and FC types and that with ϕ1.25 mm is used for the ports of LC and MTRJ types.

e. Insert a dry swab of the same type into the inside of the optical port and clean it by rotating the swab 360 degrees in one direction along the inner wall of the optical port.
f. After the cleaning, connect the optical fiber (at both ends). Cover the ports of the optical modules that will not be immediately used with protective caps. Wear an ESD wrist strap or ESD gloves to insert a pluggable optical module.
g. Power on the laser.

- Clean a fiber adapter.
  a. Power off the laser of the optical port before cleaning. Disconnect the optical fiber (at both ends) from the fiber adapter.
  b. Use the optical power meter to test the optical power and ensure that no optical signals are sent from the connector of the fiber adapter.
  c. Select lint-free swabs with a suitable diameter according to the type of the fiber adapter. Dip a swab with the cleaning reagent, insert the swab into the socket inside the fiber adapter, and then clean it by rotating the swab 360 degrees in one direction along the inner wall of the fiber adapter.

NOTE

The lint-free swab with ϕ2.5 mm is used for the ports of SC and FC types and that with ϕ1.25 mm is used for the ports of LC and MTRJ types.

  d. Insert a dry swab of the same type into the socket inside the fiber adapter and clean it by rotating the swab 360 degrees in one direction along the inner wall of the fiber adapter.

NOTE

Use an ultrasonic cleaner to clean fiber adapters when there are a large quantity of them.

  e. After the cleaning, connect the optical fiber (at both ends). Cover the fiber adapters that will not be immediately used with protective caps.
  f. Power on the laser.

----End

10.4.4 Checking Whether the Optical Fiber Is Damaged Using the Red Pointer

The red pointer, also called visual fault locating meter or visual fault detector, sends red light to check whether the optical fiber has red light leak to locate the damage point of an optical fiber.

Context

You can directly see the position with red light leak by using the red pointer. For onsite observation, it can only be used for locating the damage point of an optical fiber in a short distance.

An optical fiber is generally damaged on the bare fiber, coiled fiber or fusion splicing point.

Precautions

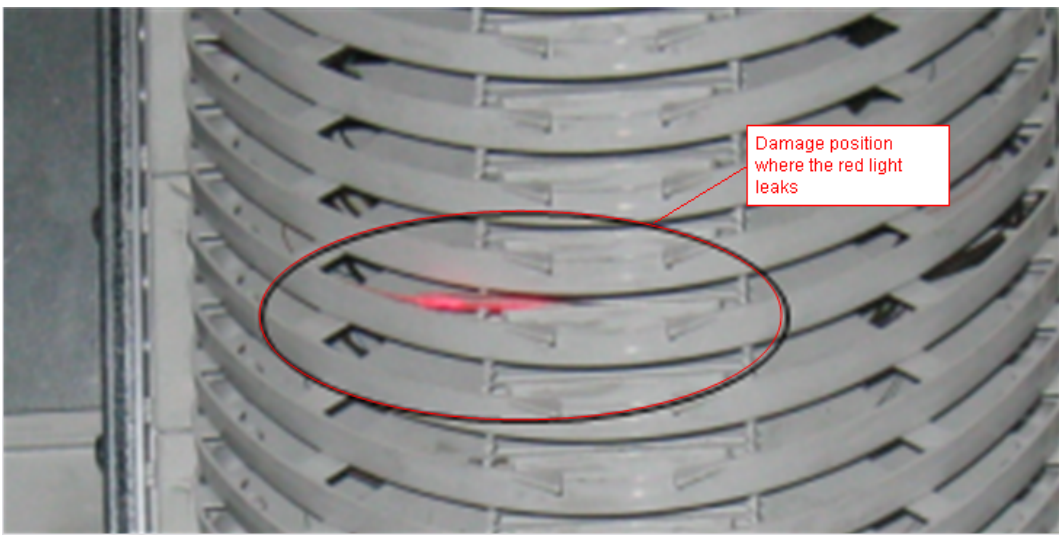
DANGER

Never look directly into the optical fiber connector or the laser transmit port on the optical port board without eye protection. Never put the optical port towards the flammables.

Procedure

Step 1 Place the red pointer on the endface of an optical fiber and send red light.

Step 2 Check whether the optical fiber has red light leak. If the red light leaks, the fiber is damaged.



Step 3 Replace or re-splice the optical fiber that has red light leak.

- Replace the optical fiber if its bending is excessively large.

  NOTE

  The bending diameter of an optical fiber must be longer than 6 cm.

- Splice the optical fiber again if air bubbles exist at the splicing point.

----End

