www.zyxel.com

Handbook

USG FLEX H Series

USG FLEX 50H / USG FLEX 50HP
USG FLEX 100H / USG 100HP / USG FLEX 200H /
USG FLEX 200HP / USG FLEX 500H / USG FLEX 700H

Firmware Version: uOS1.32

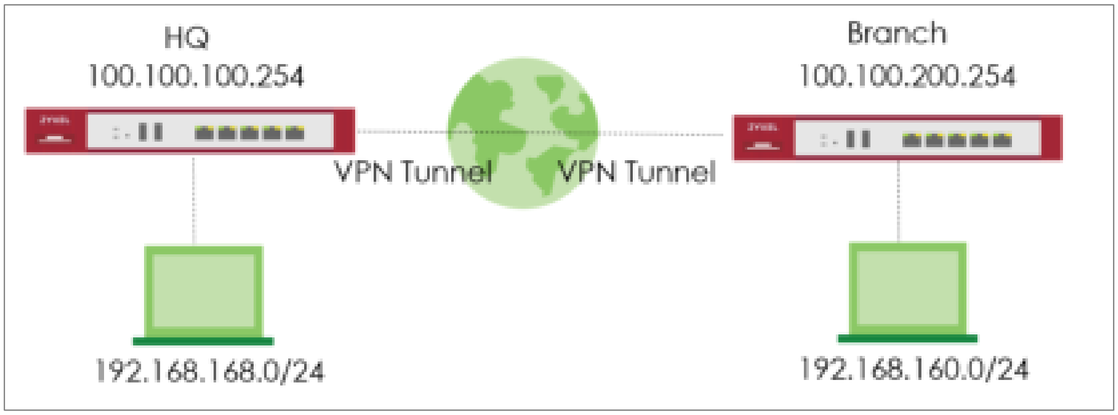
Jun. 2025

Table of Content

Chapter 1- VPN

How to Configure Site-to-site IPSec VPN Where the Peer has a Static IP Address

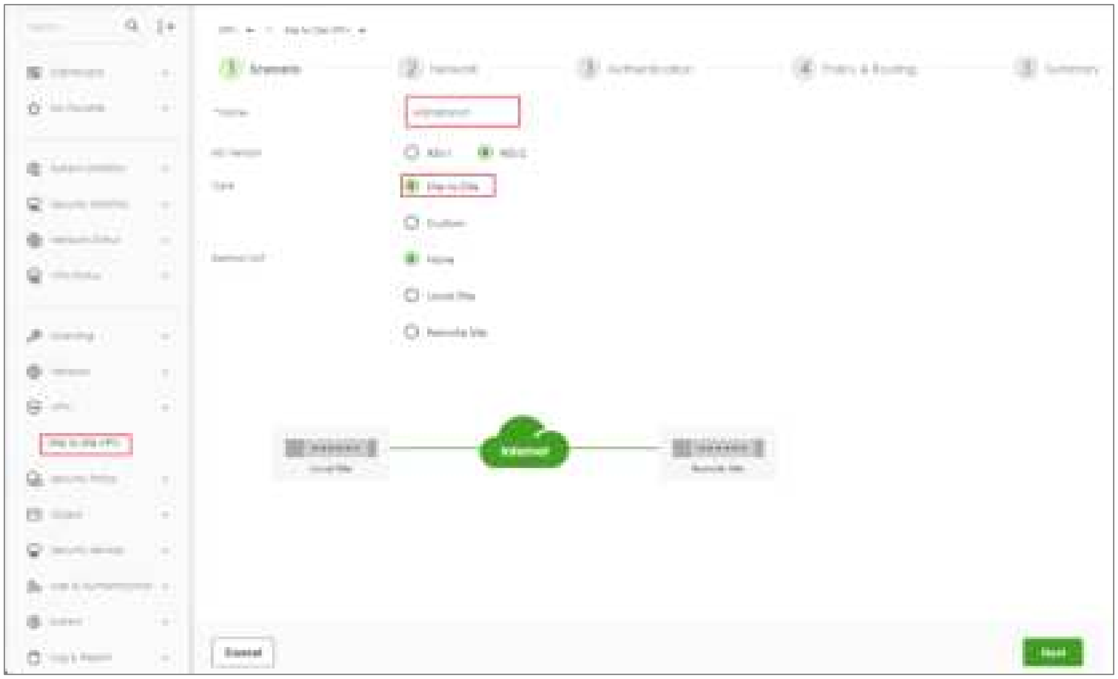
This example shows how to use the VPN Setup Wizard to create a site-to-site VPN with the Peer has a Static IP Address. The example instructs how to configure the VPN tunnel between each site. When the VPN tunnel is configured, each site can be accessed securely.



Set up IPSec VPN Tunnel for HQ

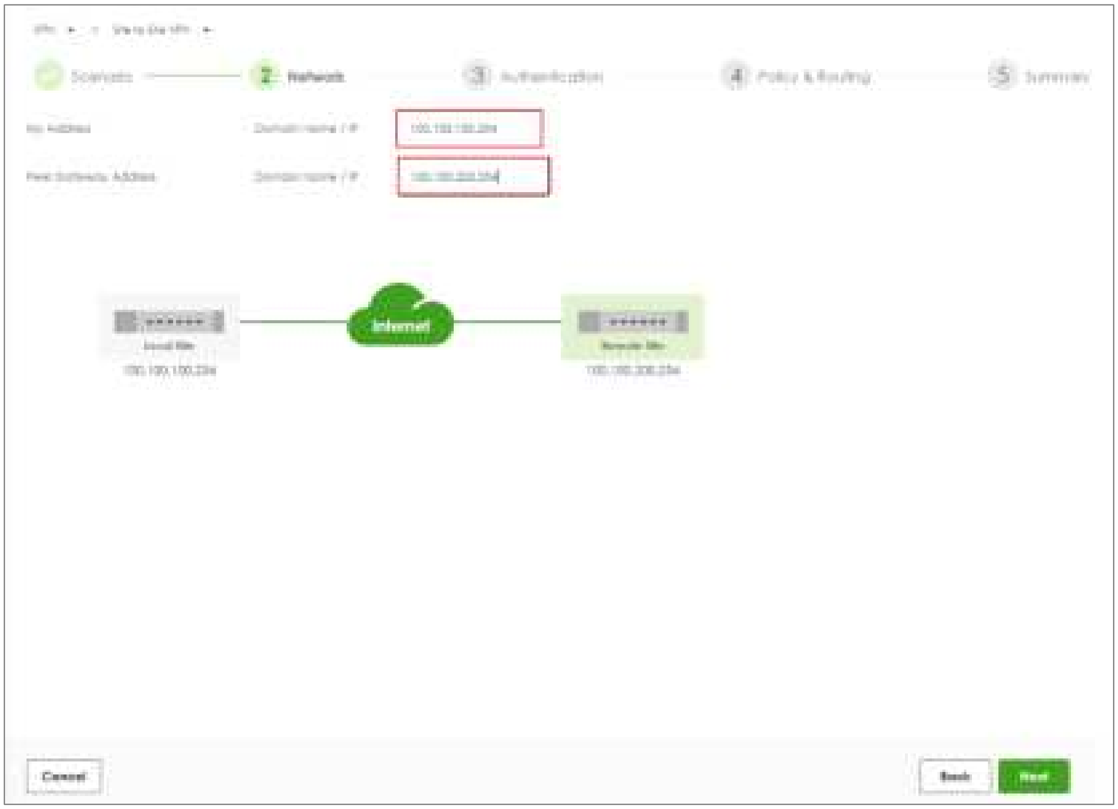
VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the type to the Site-to-Site. Click **Next**.



VPN > Site to Site VPN > Scenario > Network

Configure My Address and Peer Gateway Address. Click **Next**.



My Address Domain Name / IP 100.100.100.234

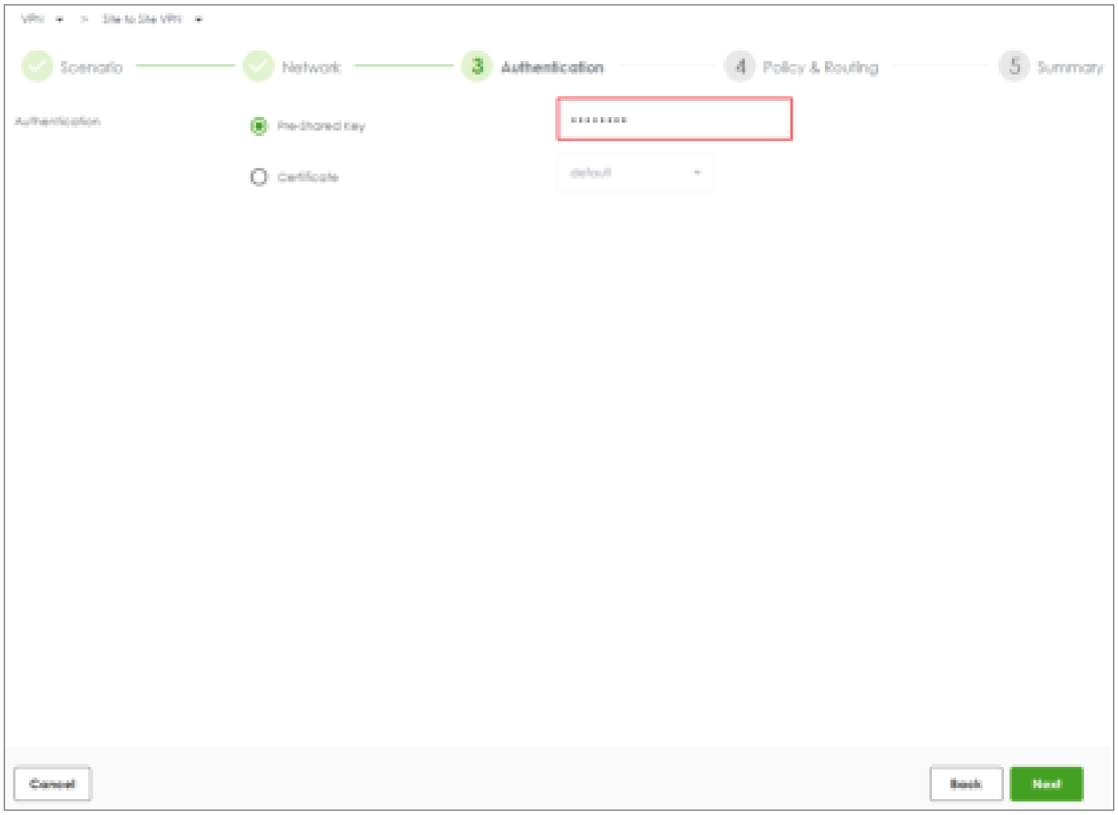
Peer Gateway Address Domain Name / IP 100.100.200.234

Local Site 100.100.100.234

Remote Site 100.100.200.234

VPN > Site to Site VPN > Scenario > Network > Authentication

Type a secure Pre-Shared Key. Click **Next**

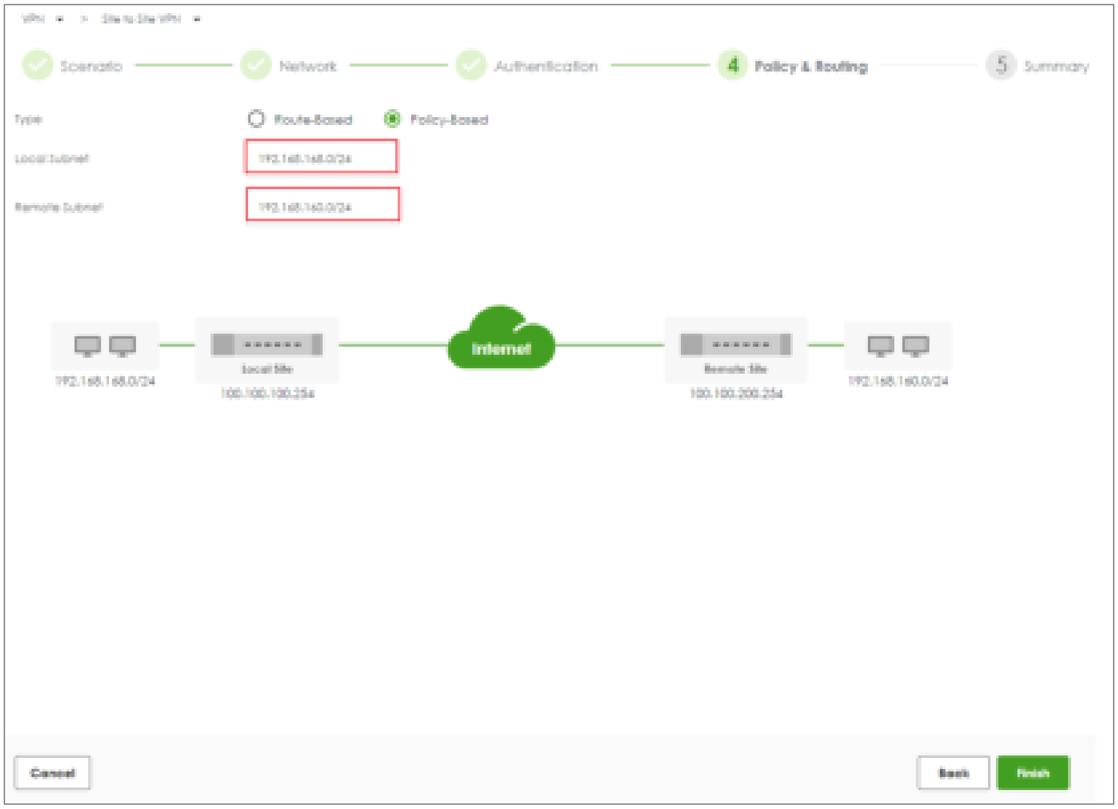


Authentication ● Pre-Shared Key ••••••••

○ Certificate default

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing

Set Local Subnet to be the IP address of the network connected to the gateway and Remote Subnet to be the IP address of the network connected to the peer gateway.



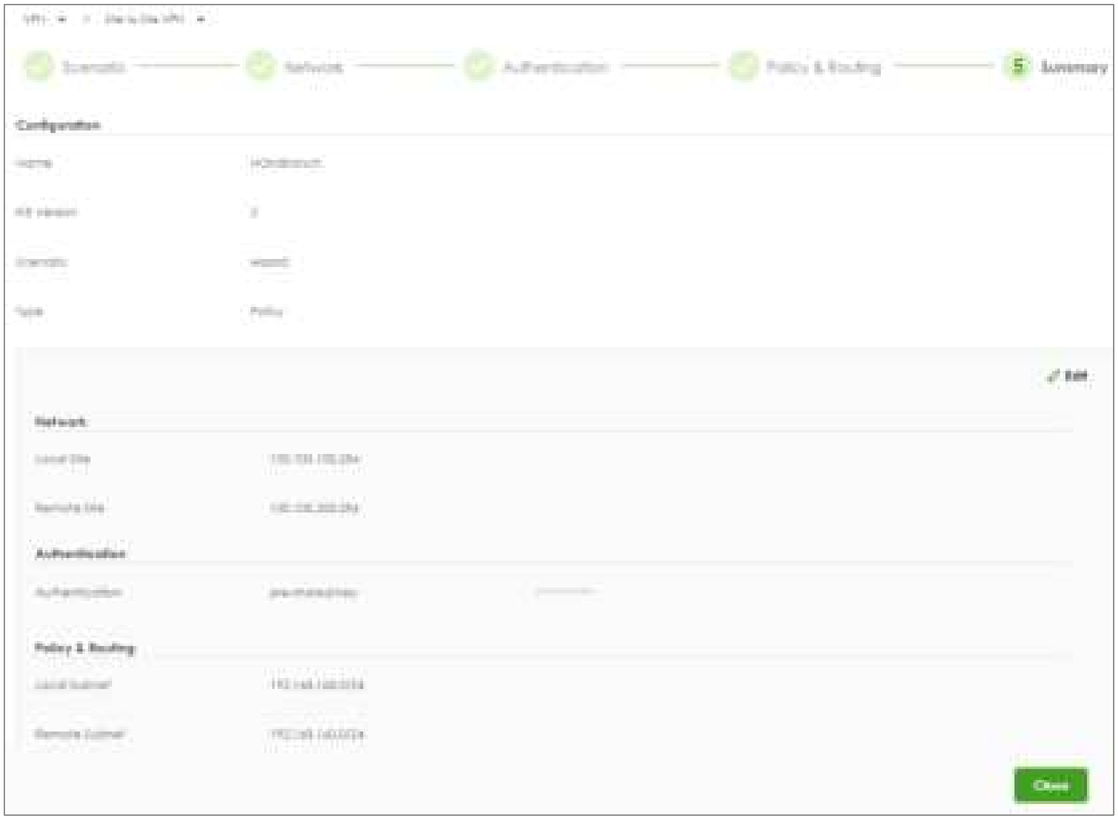
Type ○ Route-Based ● Policy-Based

Local Subnet 192.168.168.0/24

Remote Subnet 192.168.160.0/24

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing > Summary

The screen provides a summary of the VPN tunnel. You can Edit it if you want to modify.



Configuration

Name	HQtoBranch
IKE Version	2
Scenario	Wizard
Type	Policy

Network

Local Site	[illegible]
Remote Site	[illegible]

Authentication

Authentication	pre-shared key

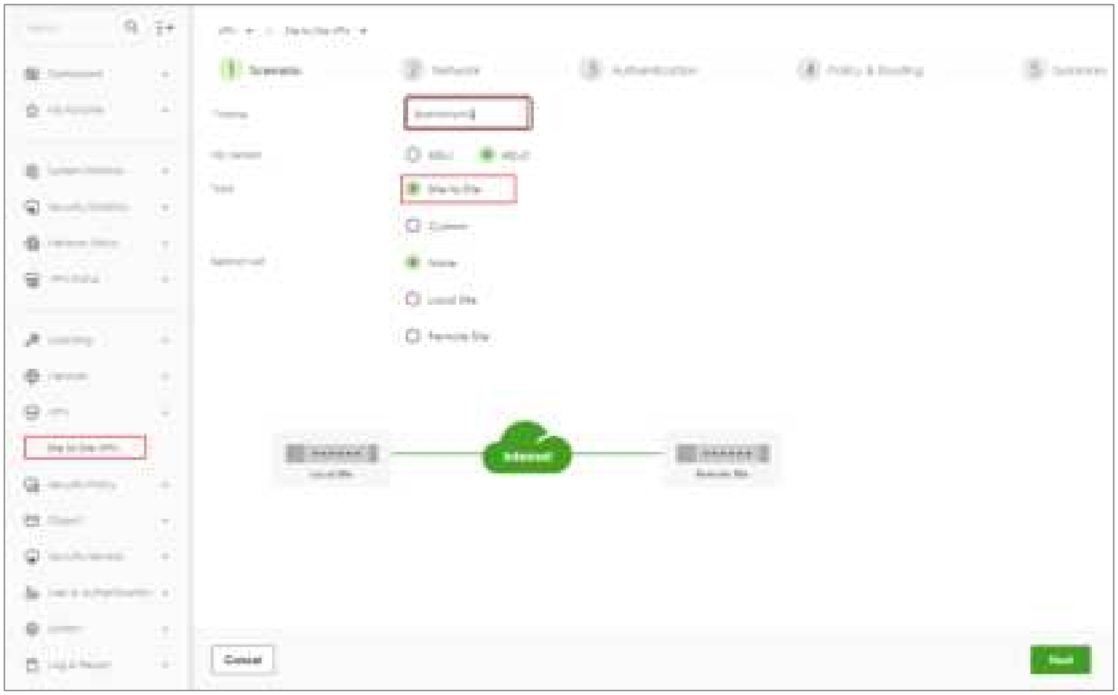
Policy & Routing

Local Subnet	[illegible]
Remote Subnet	[illegible]

Set up IPSec VPN Tunnel for Branch

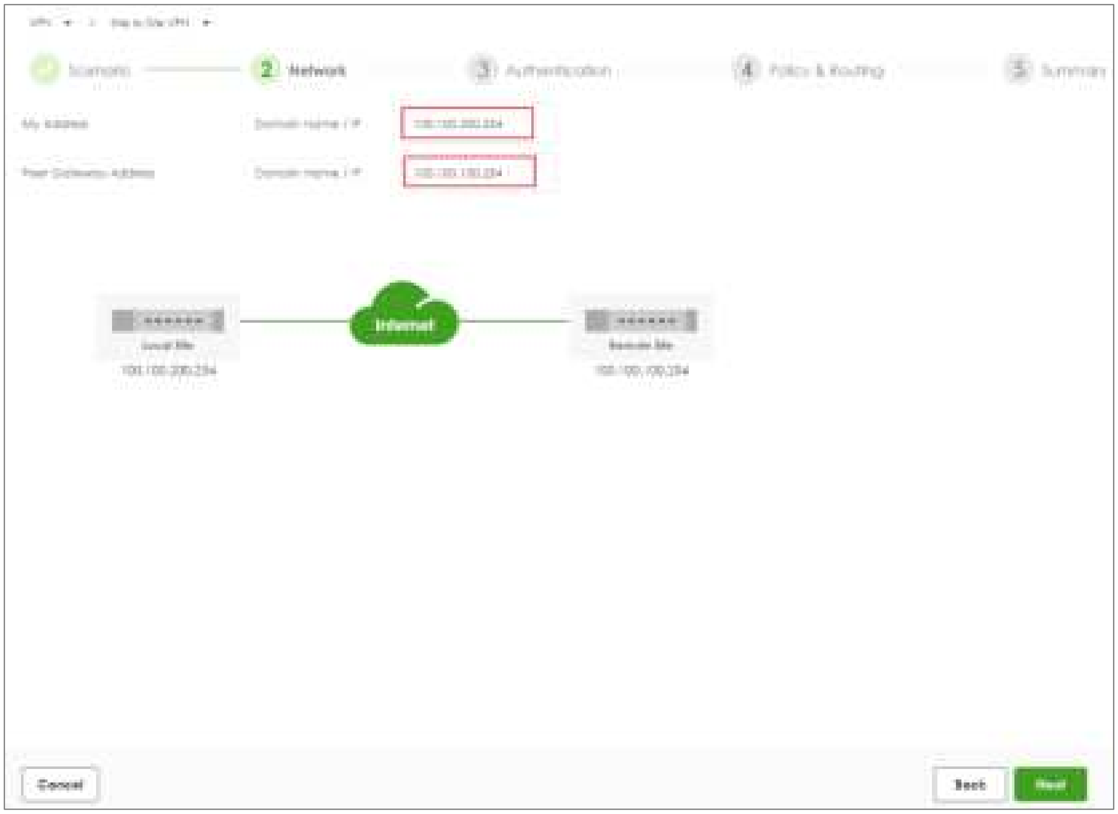
VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the type to the Site-to-Site. Click **Next**.



VPN > Site to Site VPN > Scenario > Network

Configure My Address and Peer Gateway Address. Click **Next.**



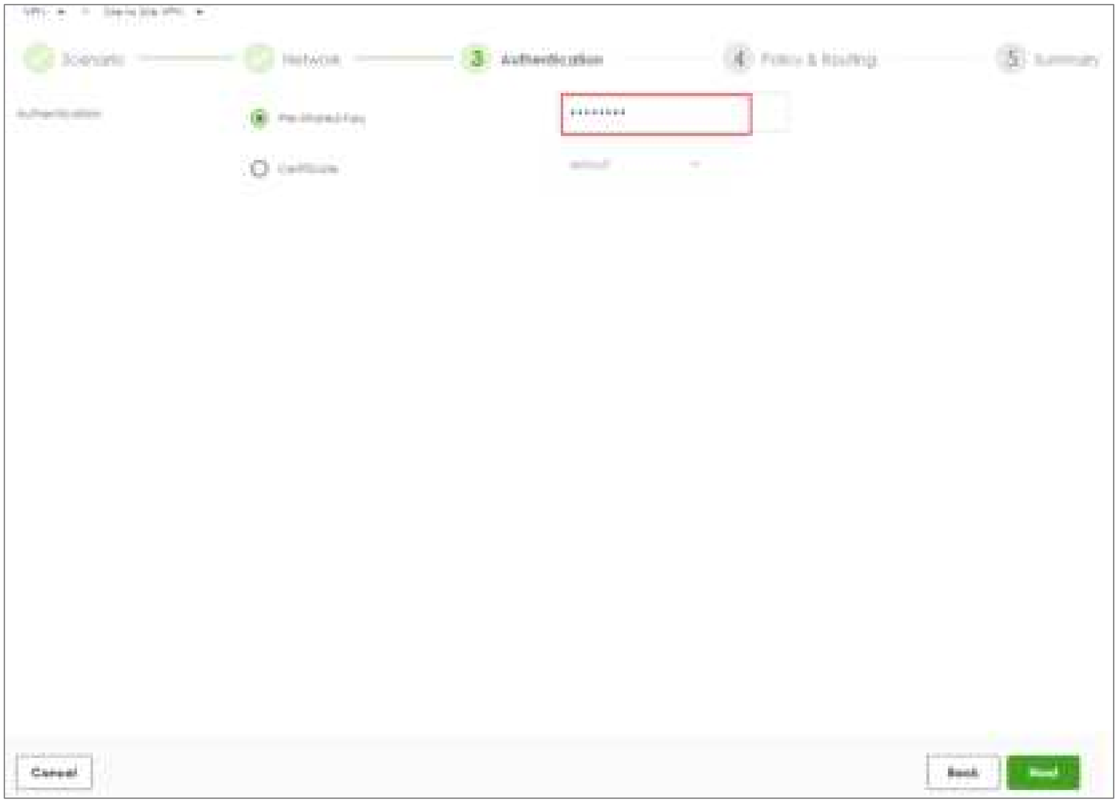
VPN > Site to Site VPN

My Address Domain Name / IP 100.100.200.234

Peer Gateway Address Domain Name / IP 100.100.100.234

VPN > Site to Site VPN > Scenario > Network > Authentication

Type a secure Pre-Shared Key. Click **Next.**

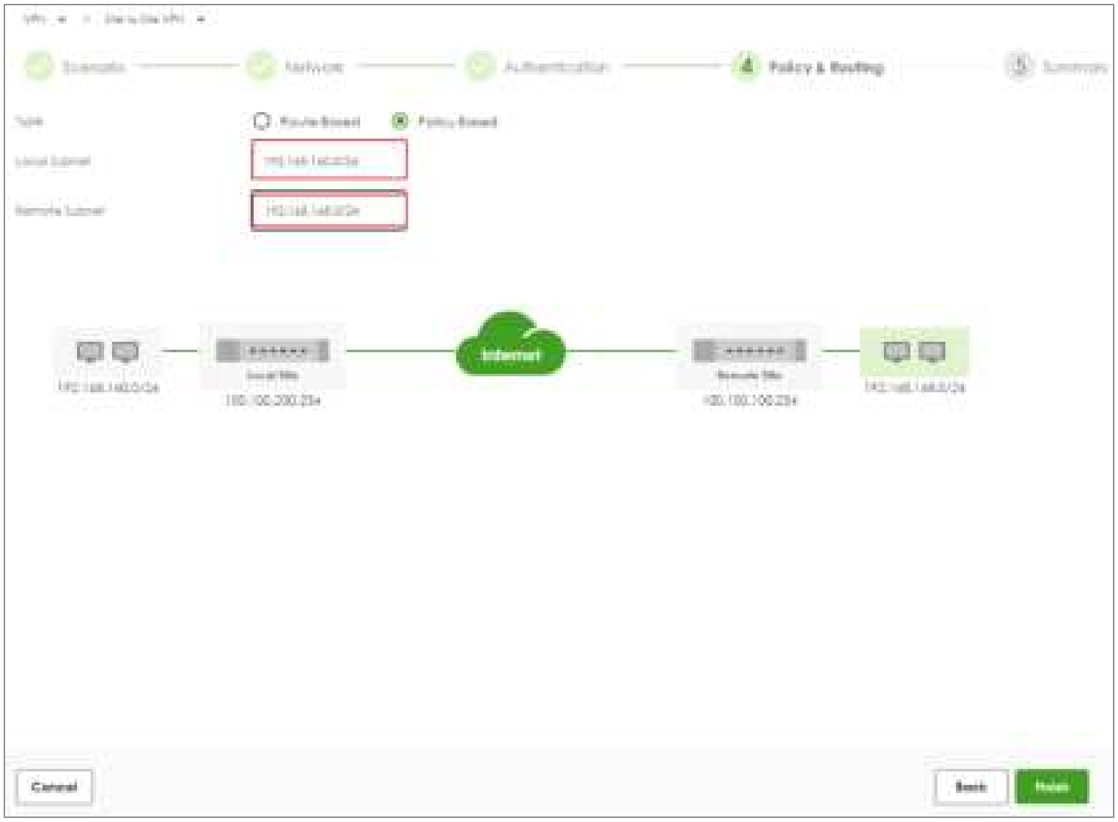


Authentication ● Pre-Shared Key ********

○ Certificate default

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing

Set Local Subnet to be the IP address of the network connected to the gateway and Remote Subnet to be the IP address of the network connected to the peer gateway.



Type ○ Route Based ● Policy Based

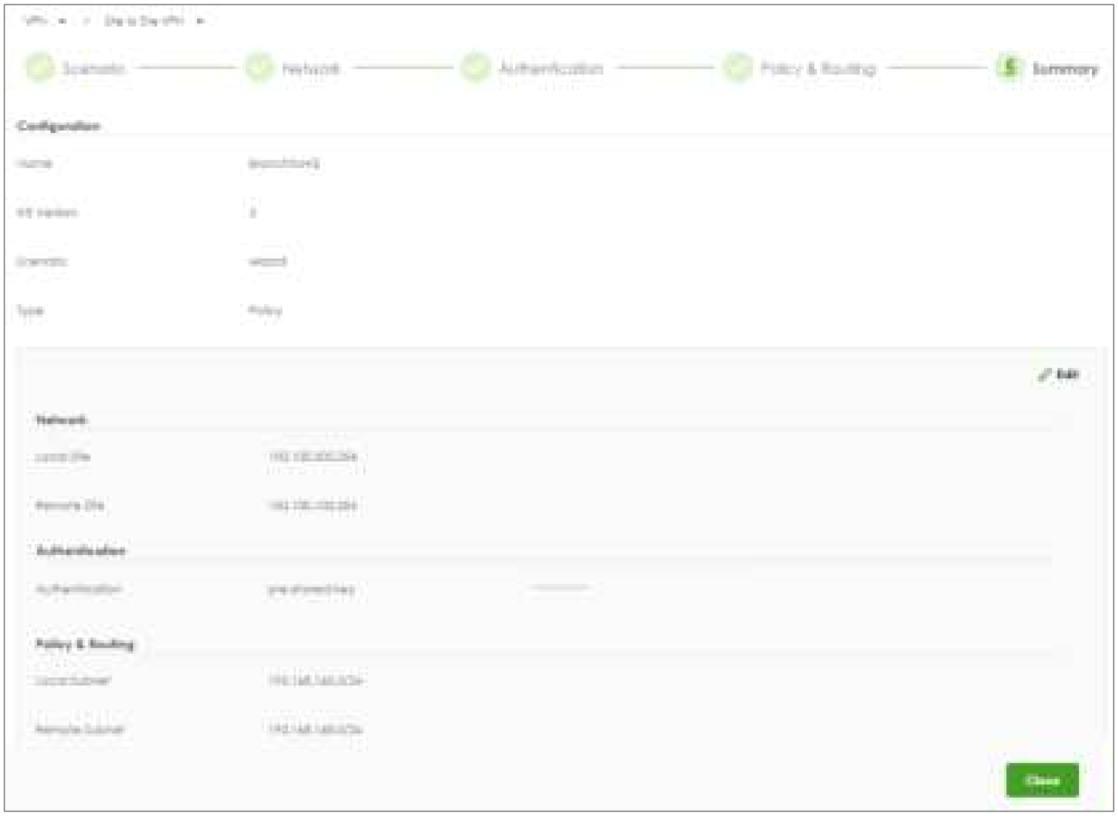
Local Subnet 192.168.140.0/24

Remote Subnet [illegible]

192.168.140.0/24 — Local Site 100.100.200.234 — Internet — Remote Site 100.100.100.234 — [illegible]

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing > Summary

The screen provides a summary of the VPN tunnel. You can Edit it if you want to modify.



Configuration

Name	[illegible]
IKE Version	2
Scenario	wizard
Type	Policy

Network

Local IPs	[illegible]
Remote IPs	[illegible]

Authentication

Authentication	pre-shared key

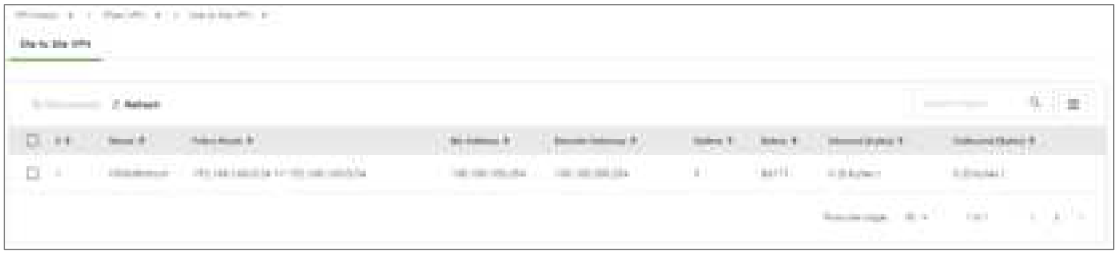
Policy & Routing

Local Subnet	[illegible]
Remote Subnet	[illegible]

Test IPSec VPN Tunnel

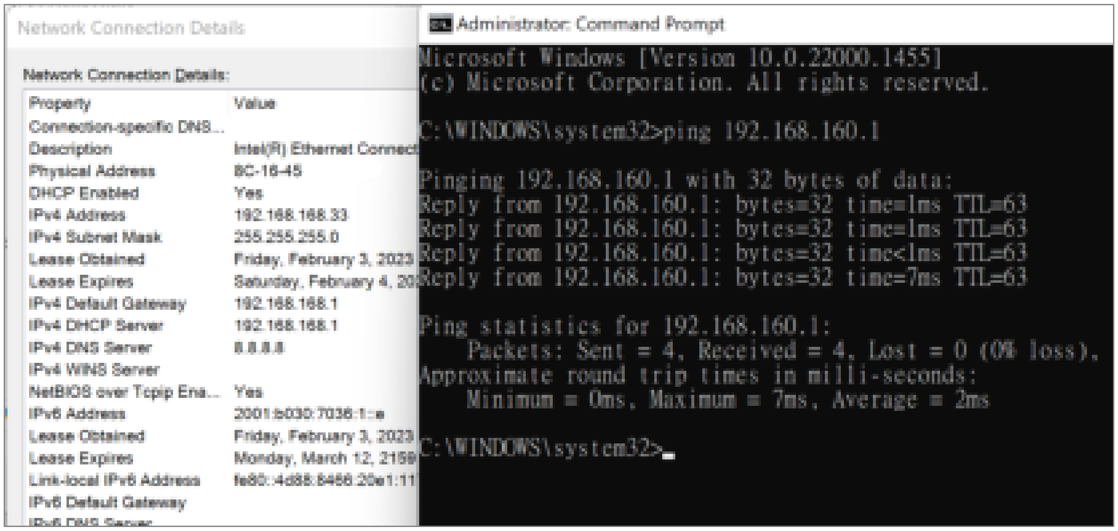
VPN Status > IPSec VPN

Verify the IPSec VPN status.



Ping the PC in Branch Office

Win 11 > cmd > ping 192.168.160.1



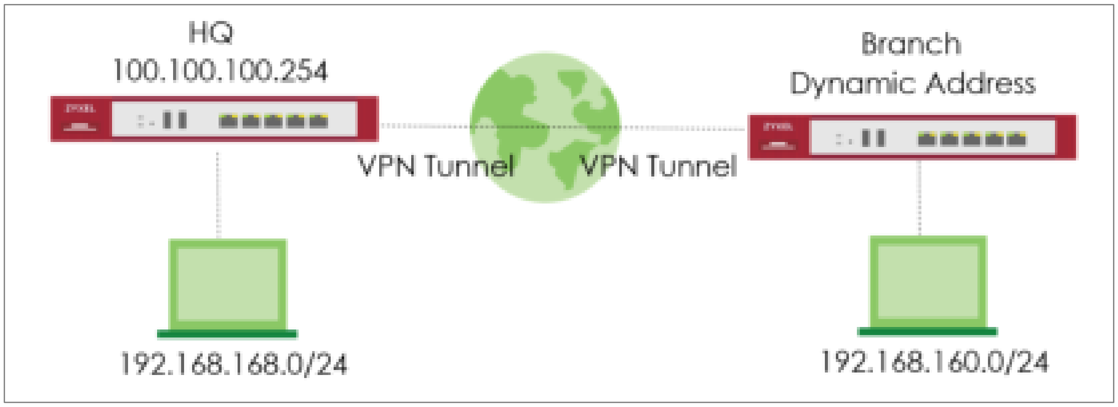
Network Connection Details:

Property	Value
Connection-specific DNS...	
Description	Intel(R) Ethernet Connecti
Physical Address	8C-16-45
DHCP Enabled	Yes
IPv4 Address	192.168.168.33
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	Friday, February 3, 2023
Lease Expires	Saturday, February 4, 20
IPv4 Default Gateway	192.168.168.1
IPv4 DHCP Server	192.168.168.1
IPv4 DNS Server	8.8.8.8
IPv4 WINS Server	
NetBIOS over Tcpip Ena...	Yes
IPv6 Address	2001:b030:7036:1::e
Lease Obtained	Friday, February 3, 2023
Lease Expires	Monday, March 12, 2159
Link-local IPv6 Address	fe80::4d88:8466:20e1:11
IPv6 Default Gateway	
IPv6 DNS Server	

```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ping 192.168.160.1

Pinging 192.168.160.1 with 32 bytes of data:
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time<1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=7ms TTL=63

Ping statistics for 192.168.160.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 2ms

C:\WINDOWS\system32>
```

How to Configure Site-to-site IPSec VPN Where the Peer has a Dynamic IP Address

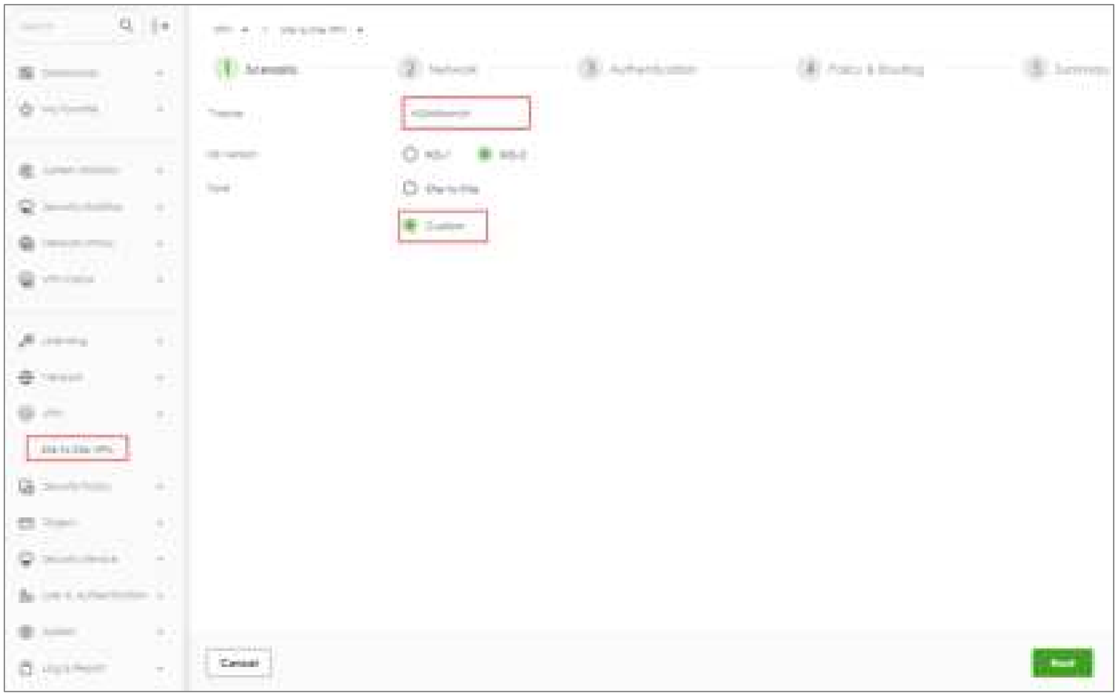
This example shows how to use the VPN Setup Wizard to create a site-to-site VPN with the Peer has a Dynamic IP Address. The example instructs how to configure the VPN tunnel between each site. When the VPN tunnel is configured, each site can be accessed securely.



Set up IPSec VPN Tunnel for HQ

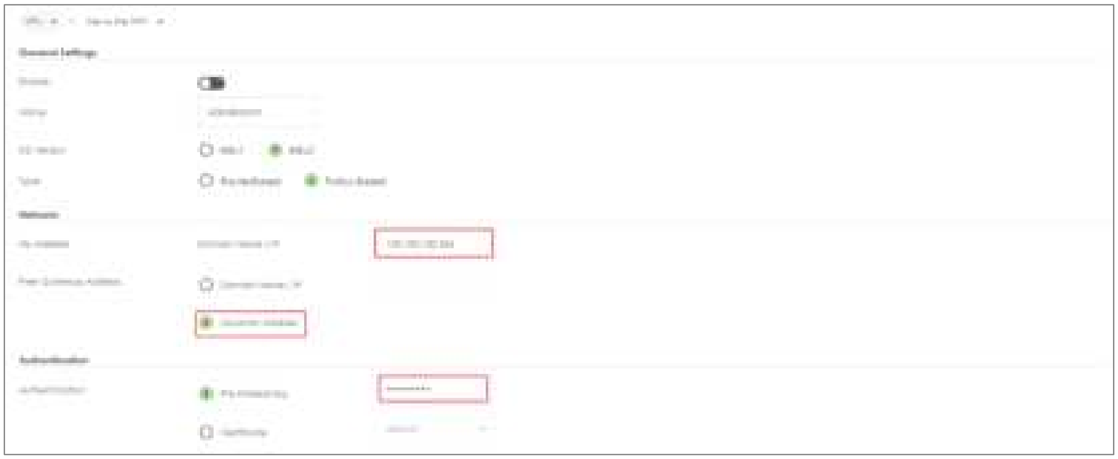
VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the type to the Custom. Click **Next**.

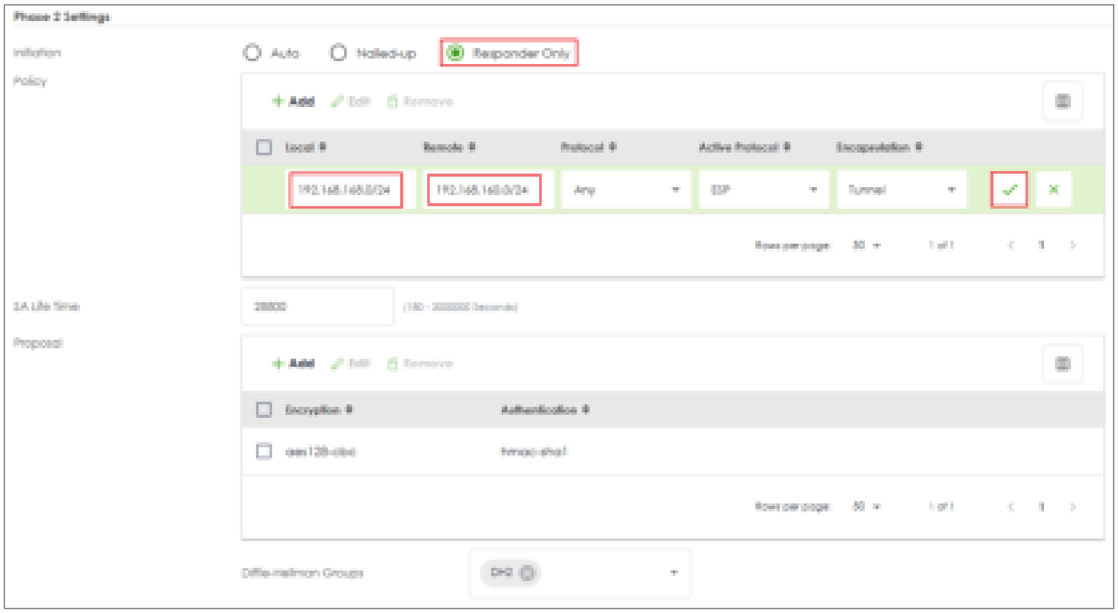


VPN > Site to Site VPN

Type My Address and select Peer Gateway Address as Dynamic Address. Type a secure Pre-shared key.



Scroll down to find the Phase2 setting. Type Local and Remote Subnet and select Responder Only. Then click save change.



Phase 2 Settings

Initiation: ○ Auto ○ Nailed-up ● Responder Only

Policy

Local	Remote	Protocol	Active Protocol	Encapsulation
192.168.165.0/24	192.168.160.0/24	Any	ESP	Tunnel

SA Life Time: 28800 (180 - 3000000 Seconds)

Proposal

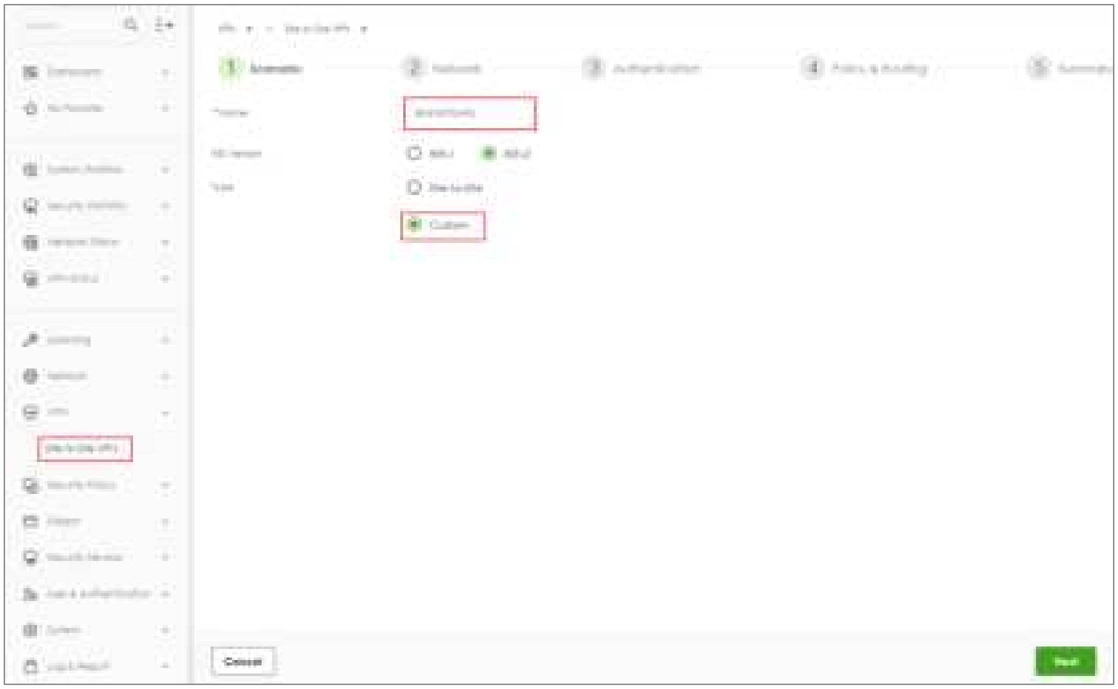
Encryption	Authentication
aes128-cbc	hmac-sha1

Diffie-Hellman Groups: DH2

Set up IPSec VPN Tunnel for Branch

VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the type to the Custom. Click **Next.**



VPN > Site to Site VPN

1 Scenario 2 Network 3 Authentication 4 Policy & Routing 5 Summary

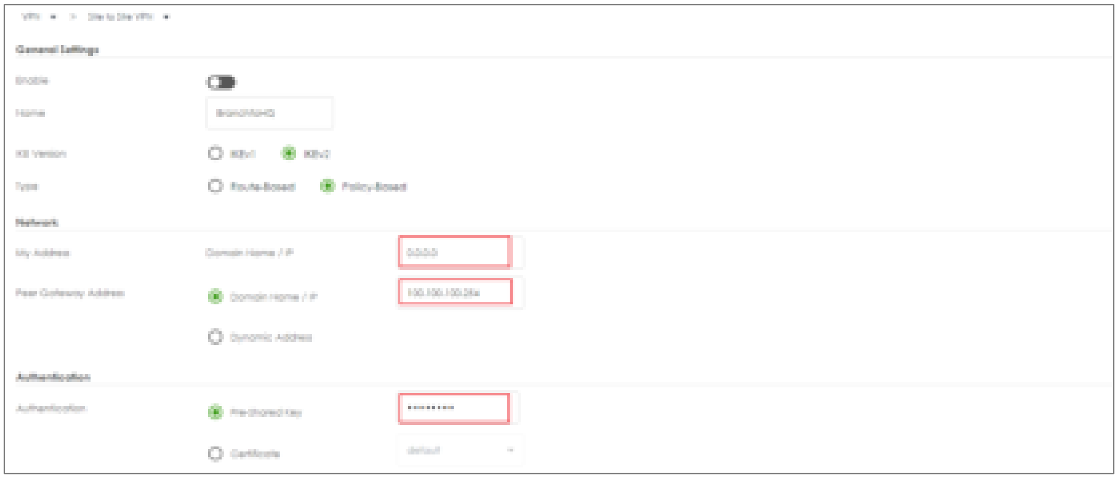
*Name: BranchtoHQ

IKE Version: ○ IKEv1 ● IKEv2

Type: ○ Site-to-site ● Custom

VPN > Site to Site VPN

Type My Address as 0.0.0.0 and type Peer Gateway Address. Type a secure Pre-shared key.



VPN > Site to Site VPN

General Settings

Enable

Name: BranchtoHQ

IKE Version: ○ IKEv1 ● IKEv2

Type: ○ Route-Based ● Policy-Based

Network

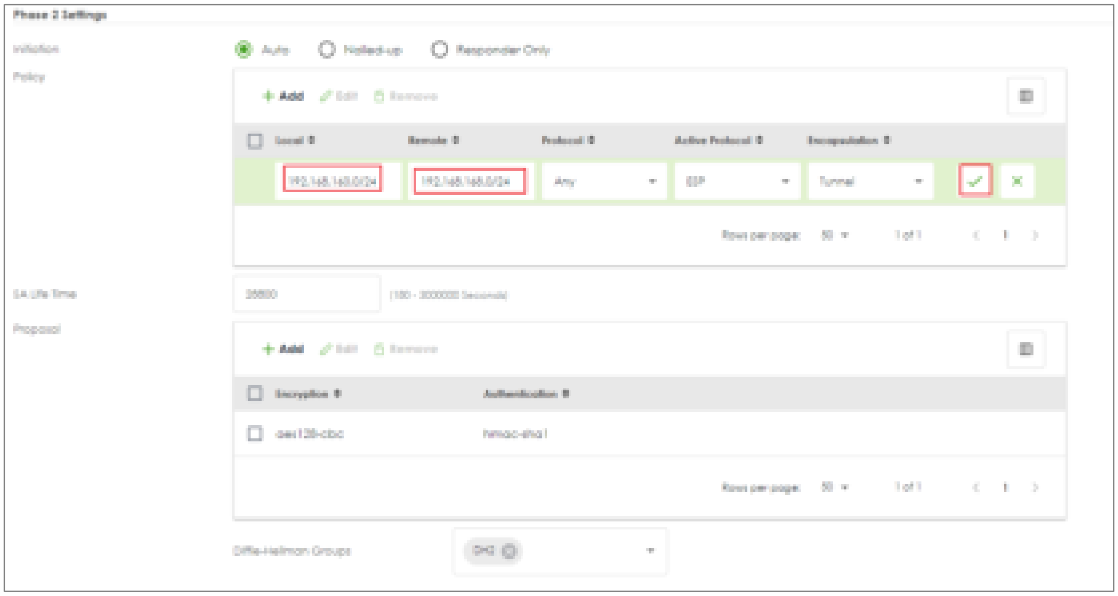
My Address: Domain Name / IP 0.0.0.0

Peer Gateway Address: ● Domain Name / IP 100.100.100.254
○ Dynamic Address

Authentication

Authentication: ● Pre-Shared Key *********
○ Certificate default

Scroll down to find the Phase2 setting, type Local and Remote Subnet. Then click save change.



Phase 2 Settings

Initiation: ● Auto ○ Nailed-up ○ Responder Only

Policy

□	Local	Remote	Protocol	Active Protocol	Encapsulation
	192.168.168.0/24	192.168.168.0/24	Any	ESP	Tunnel

SA Life Time: 28800 (180 - 3000000 Seconds)

Proposal

□	Encryption	Authentication
□	aes128-cbc	hmac-sha1

Diffie-Hellman Groups: DH2

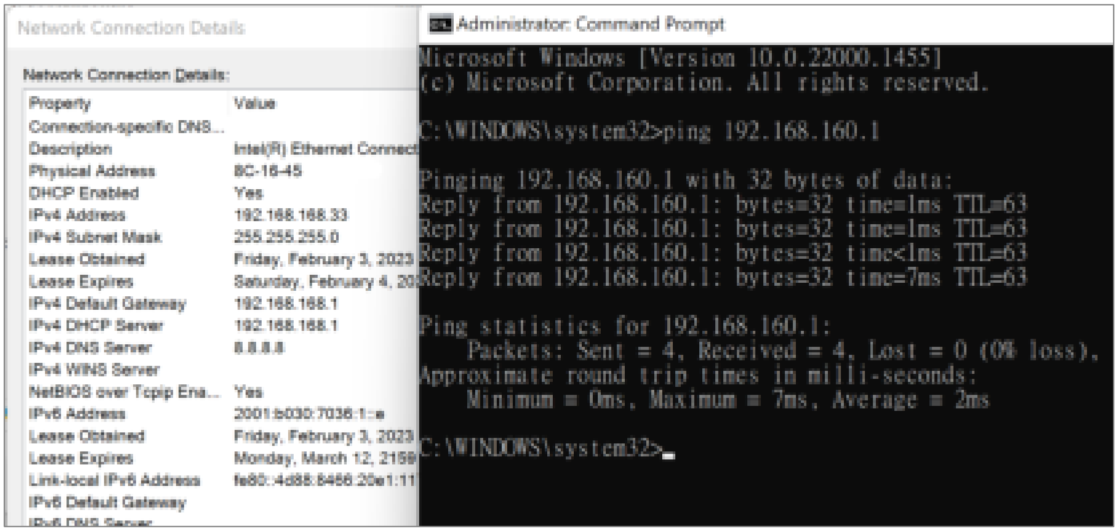
Test IPSec VPN Tunnel

VPN Status > IPSec VPN

Verify the IPSec VPN status.

Ping the PC in Branch Office

Win 11 > cmd > ping 192.168.160.1



Network Connection Details

Network Connection Details:

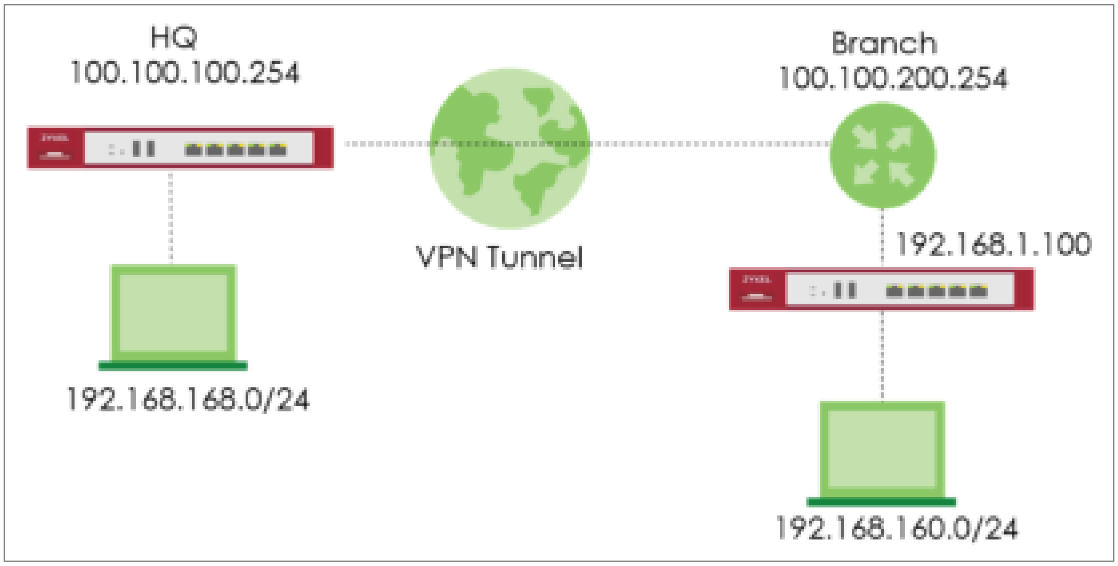
Property	Value
Connection-specific DNS...	
Description	Intel(R) Ethernet Connect
Physical Address	8C-16-45
DHCP Enabled	Yes
IPv4 Address	192.168.168.33
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	Friday, February 3, 2023
Lease Expires	Saturday, February 4, 20
IPv4 Default Gateway	192.168.168.1
IPv4 DHCP Server	192.168.168.1
IPv4 DNS Server	8.8.8.8
IPv4 WINS Server	
NetBIOS over Tcpip Ena...	Yes
IPv6 Address	2001:b030:7036:1::e
Lease Obtained	Friday, February 3, 2023
Lease Expires	Monday, March 12, 2159
Link-local IPv6 Address	fe80::4d88:8466:20e1:11
IPv6 Default Gateway	
IPv6 DNS Server	

Administrator: Command Prompt

```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ping 192.168.160.1

Pinging 192.168.160.1 with 32 bytes of data:
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time<1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=7ms TTL=63

Ping statistics for 192.168.160.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 2ms

C:\WINDOWS\system32>_
```

How to Configure IPSec Site to Site VPN while one Site is behind a NAT router

This example shows how to use the VPN Setup Wizard to create a IPSec Site to Site VPN tunnel between USG FLEX H devices. The example instructs how to configure the VPN tunnel between each site while one Site is behind a NAT router. When the IPSec Site to Site VPN tunnel is configured, each site can be accessed securely.

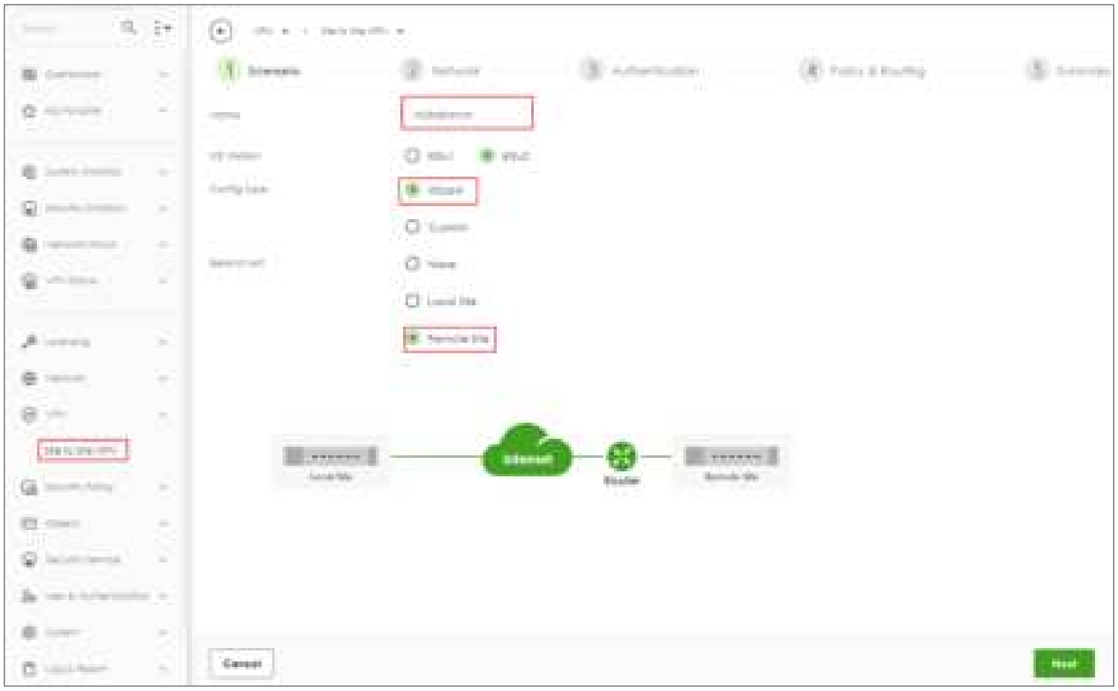


Note: Please ensure that you have NAT mapping UDP port 4500 to USG FLEX H device.

Set up IPSec VPN Tunnel for HQ

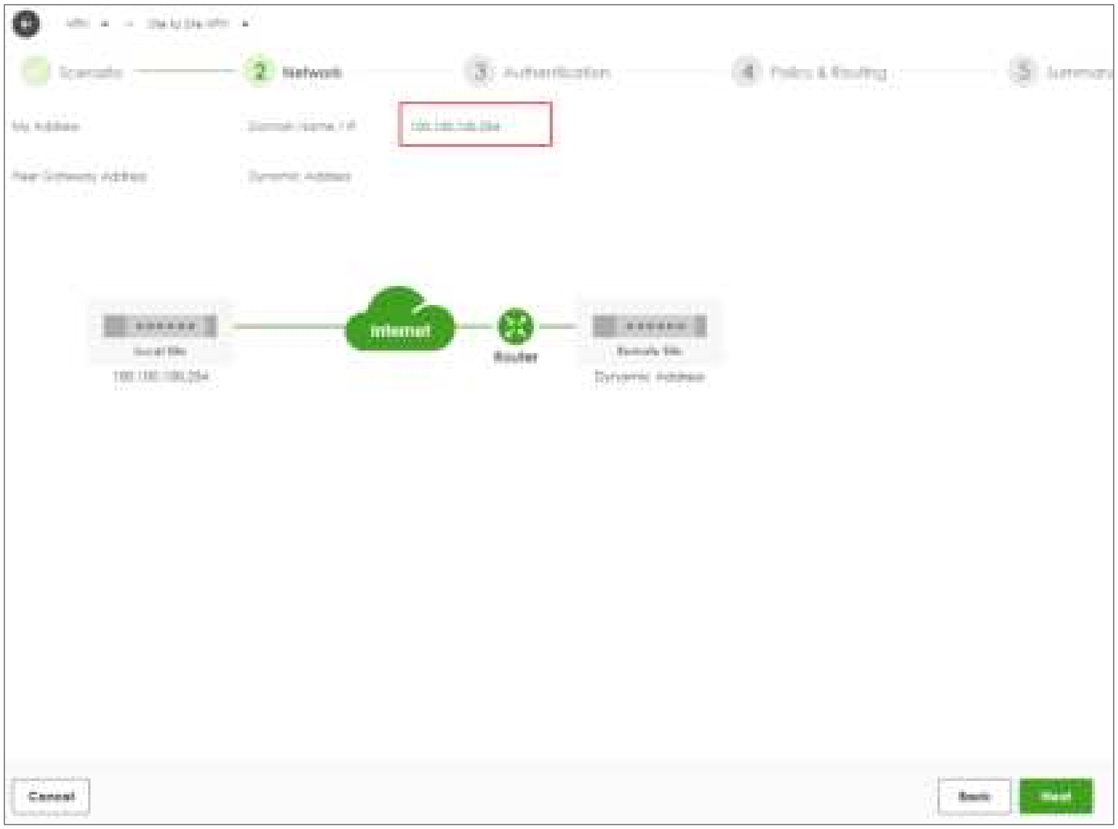
VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the Behind NAT to the Remote Site. Click **Next**.



VPN > Site to Site VPN > Scenario > Network

Configure My Address. Click **Next.**



My Address — Domain Name / IP — 100.100.100.254

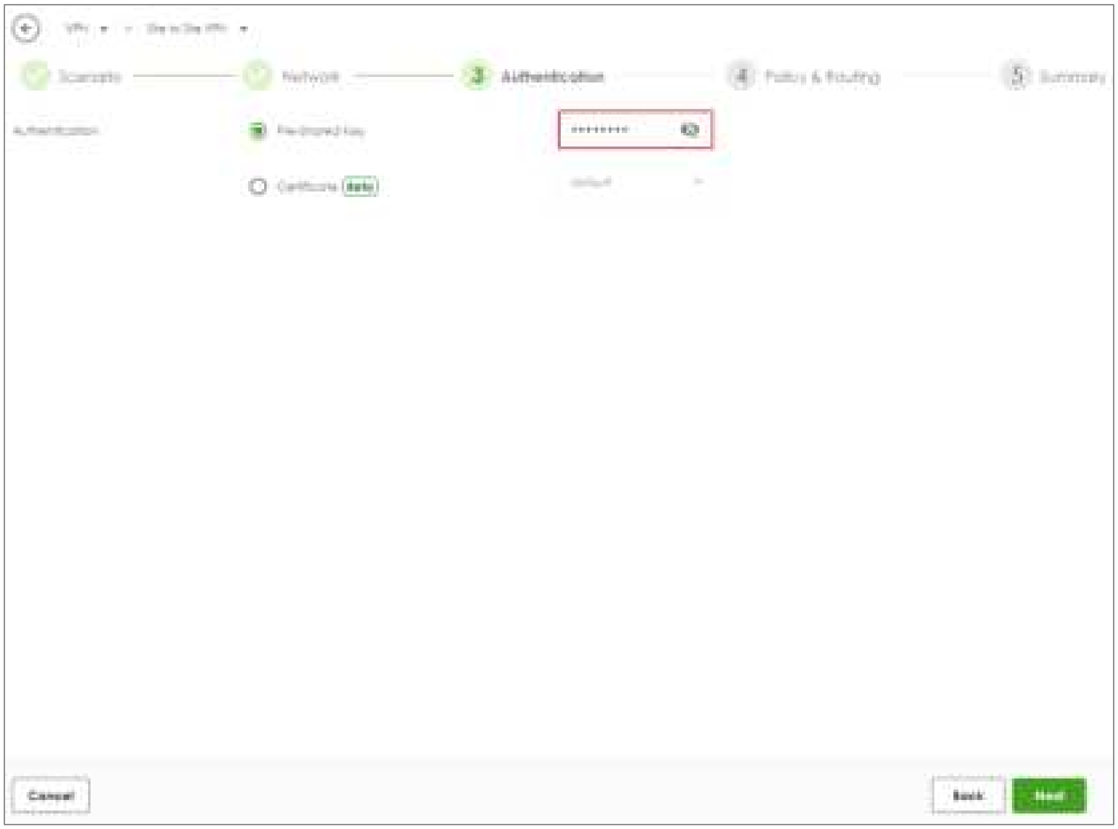
Peer Gateway Address — Dynamic Address

Local Site 100.100.100.254

Remote Site Dynamic Address

VPN > Site to Site VPN > Scenario > Network > Authentication

Type a secure Pre-Shared Key. Click **Next**

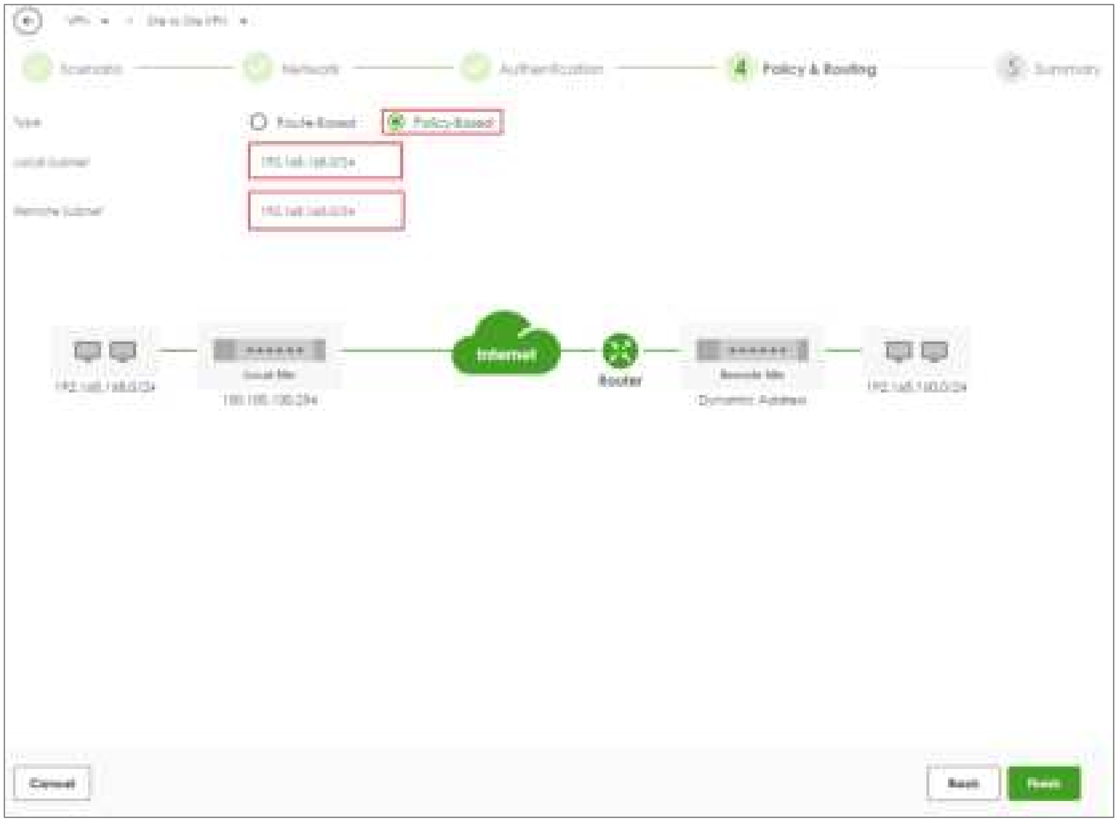


Authentication ● Pre-Shared Key *********

○ Certificate beta default

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing

Set Local Subnet to be the IP address of the network connected to the gateway and Remote Subnet to be the IP address of the network connected to the peer gateway.



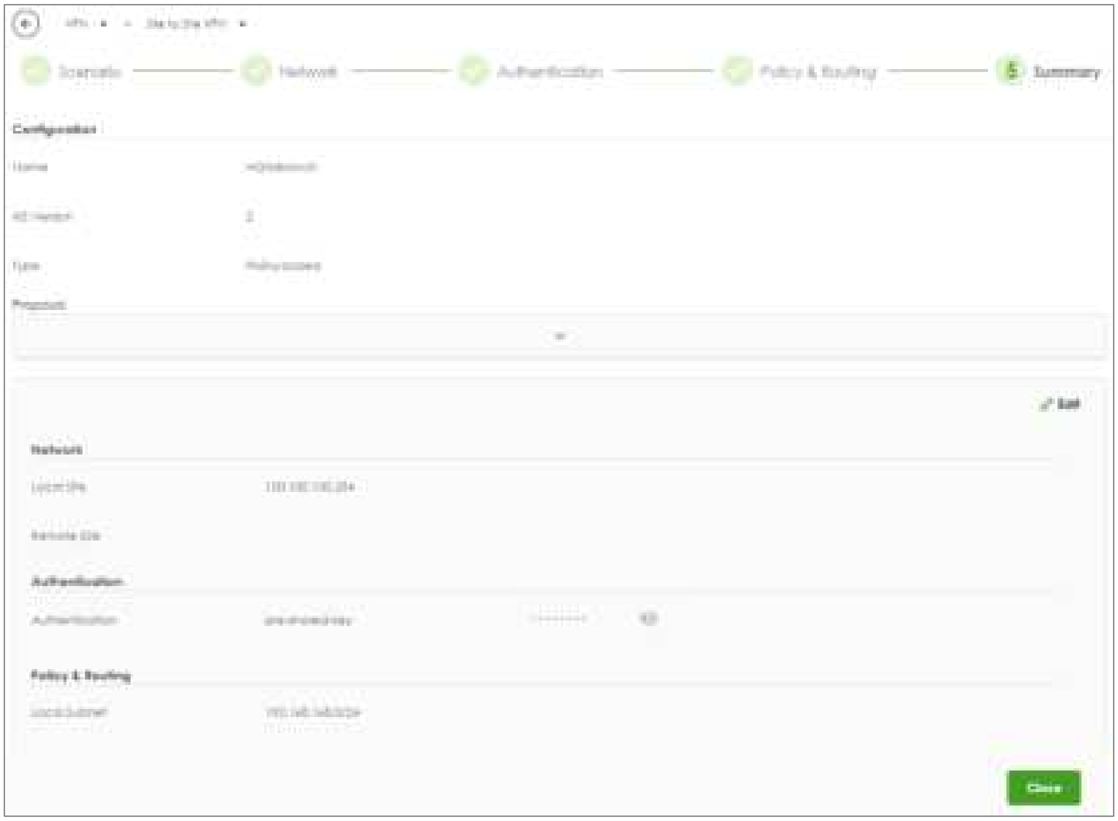
Type: ○ Route-Based ● Policy-Based

Local Subnet: 192.168.168.0/24

Remote Subnet: 192.168.160.0/24

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing > Summary

The screen provides a summary of the VPN tunnel. You can Edit it if you want to modify.



Configuration

Name [illegible]

IKE Version 2

Type Policy-based

Proposal

Edit

Network

Local Site [illegible]

Remote Site

Authentication

Authentication pre-shared key ••••••••

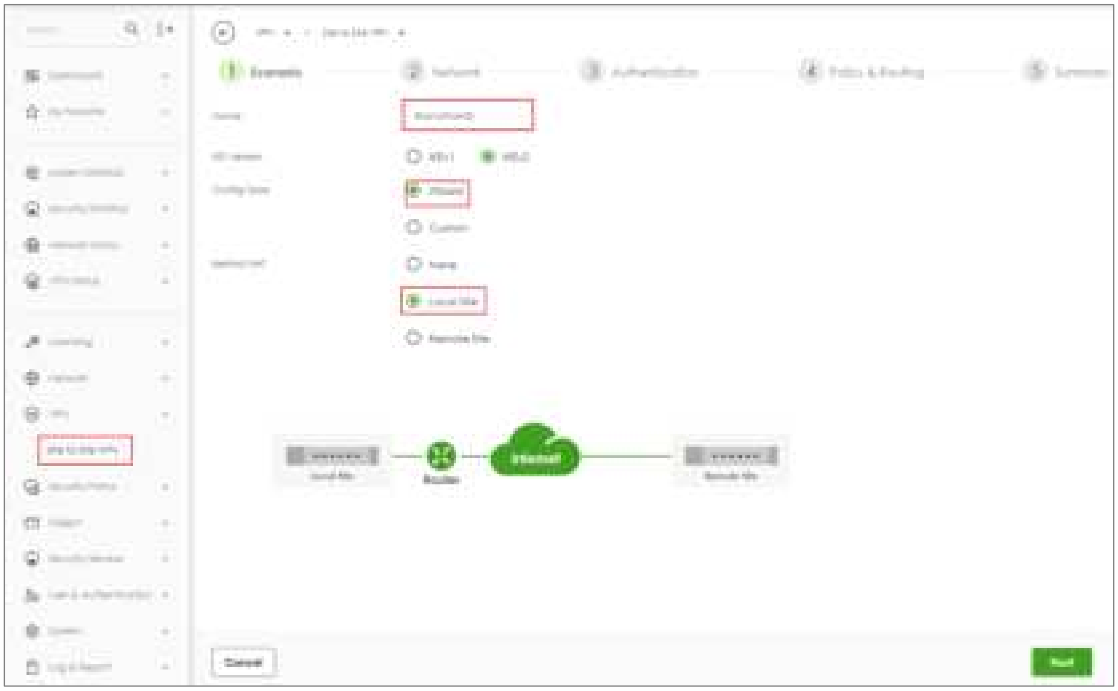
Policy & Routing

Local Subnet [illegible]

Set up IPSec VPN Tunnel for Branch

VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the Behind NAT to the Local Site. Click **Next.**



○ IKEv1 ● IKEv2

● Wizard

○ Custom

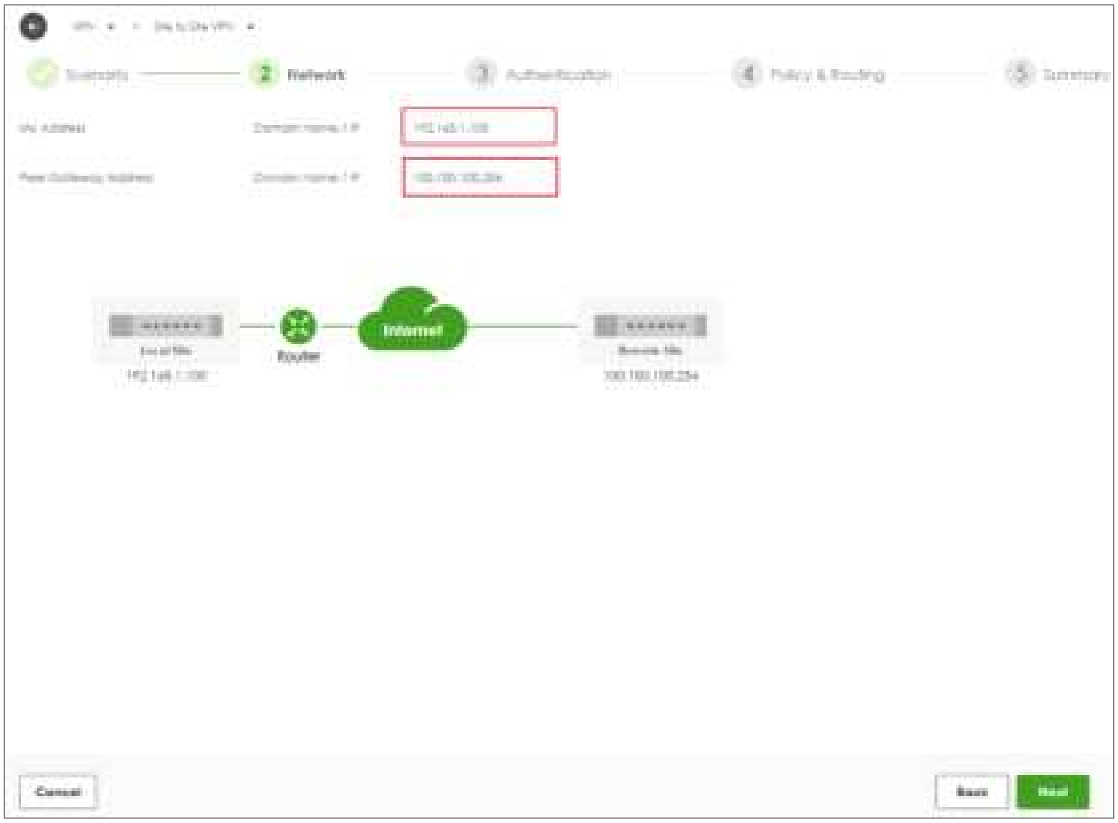
○ None

● Local Site

○ Remote Site

VPN > Site to Site VPN > Scenario > Network

Configure My Address and Peer Gateway Address. Click **Next.**

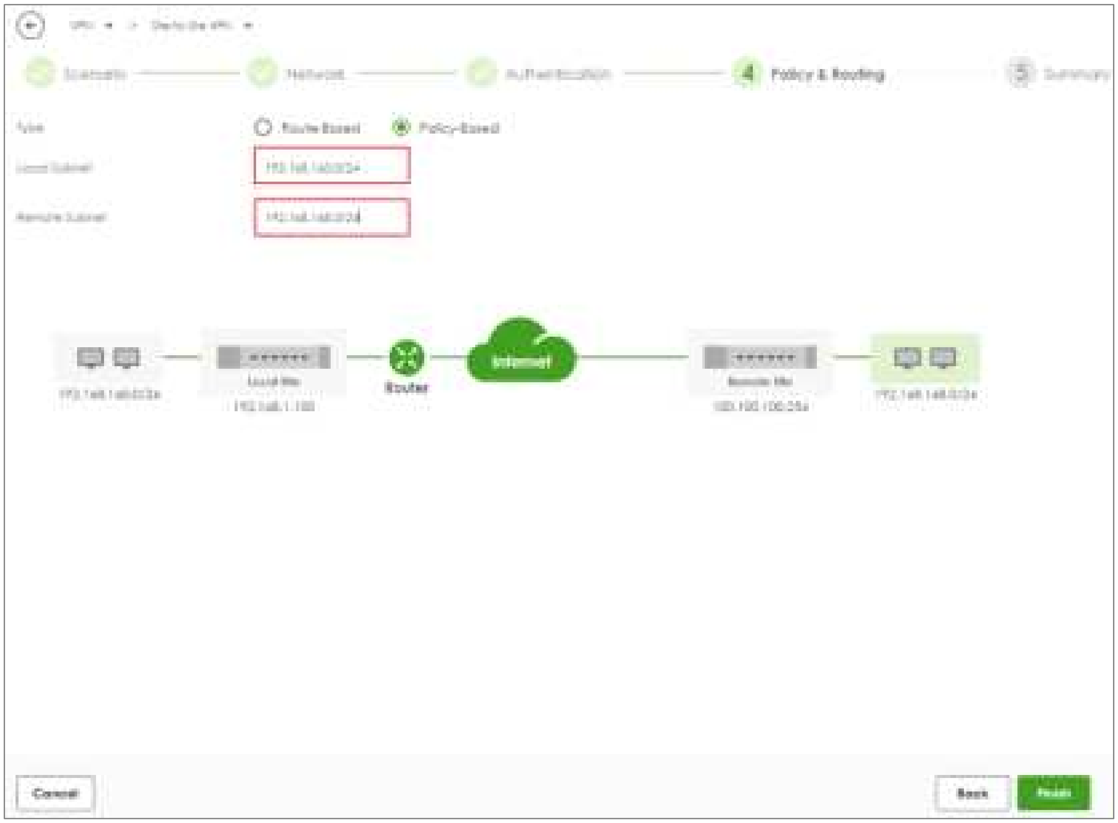


My Address Domain Name / IP 192.168.1.100

Peer Gateway Address Domain Name / IP 100.100.100.254

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing

Set Local Subnet to be the IP address of the network connected to the gateway and Remote Subnet to be the IP address of the network connected to the peer gateway.



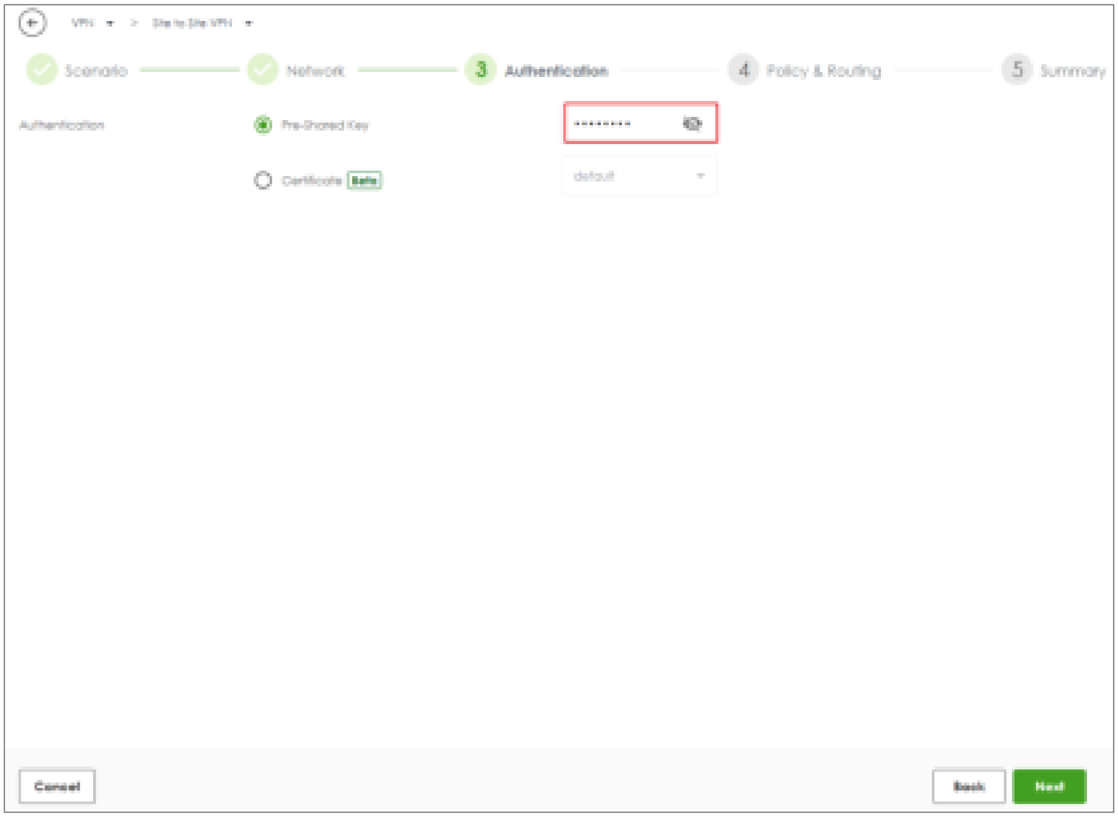
Type: ○ Route-Based ● Policy-Based

Local Subnet: 192.168.160.0/24

Remote Subnet: 192.168.168.0/24

VPN > Site to Site VPN > Scenario > Network > Authentication

Type a secure Pre-Shared Key. Click **Next**

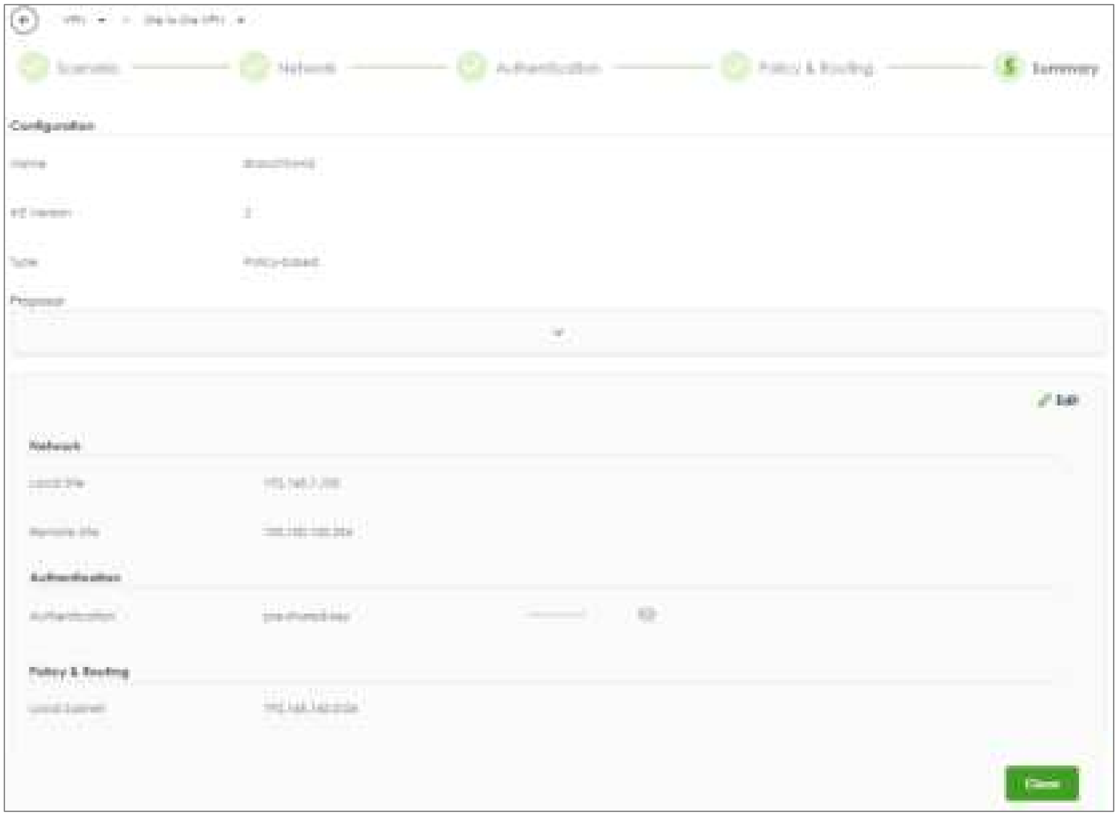


Authentication ● Pre-Shared Key ••••••••

○ Certificate Beta default

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing > Summary

The screen provides a summary of the VPN tunnel. You can Edit it if you want to modify.



Configuration

Name	[illegible]
IKE Version	2
Type	Policy-based

Proposal

Network

Local Site	[illegible]
Remote Site	[illegible]

Authentication

Authentication	pre-shared key

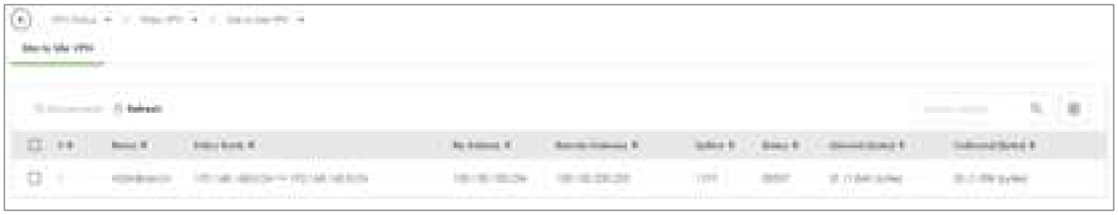
Policy & Routing

Local Subnet	[illegible]

Test IPSec VPN Tunnel

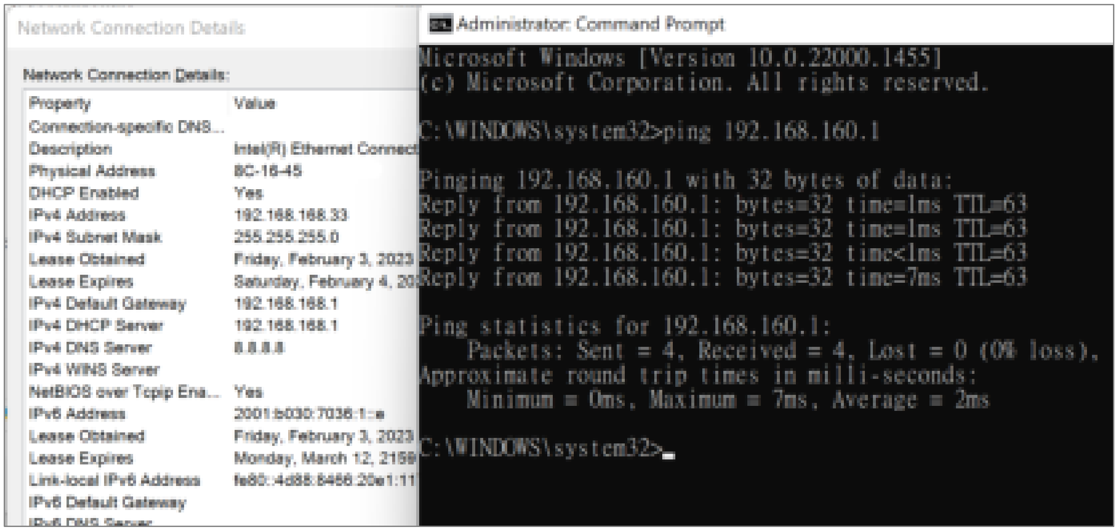
VPN Status > IPSec VPN

Verify the IPSec VPN status.



Ping the PC in Branch Office

Win 11 > cmd > ping 192.168.160.1



Network Connection Details

Network Connection Details:

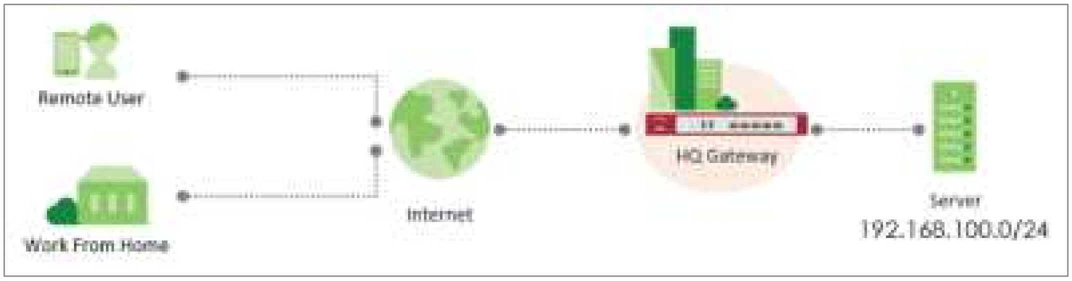
Property	Value
Connection-specific DNS...	
Description	Intel(R) Ethernet Connect
Physical Address	8C-16-45
DHCP Enabled	Yes
IPv4 Address	192.168.168.33
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	Friday, February 3, 2023
Lease Expires	Saturday, February 4, 20
IPv4 Default Gateway	192.168.168.1
IPv4 DHCP Server	192.168.168.1
IPv4 DNS Server	8.8.8.8
IPv4 WINS Server	
NetBIOS over Tcpip Ena...	Yes
IPv6 Address	2001:b030:7036:1::e
Lease Obtained	Friday, February 3, 2023
Lease Expires	Monday, March 12, 2159
Link-local IPv6 Address	fe80::4d88:8466:20e1:11
IPv6 Default Gateway	
IPv6 DNS Server	

Administrator: Command Prompt

```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ping 192.168.160.1

Pinging 192.168.160.1 with 32 bytes of data:
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time<1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=7ms TTL=63

Ping statistics for 192.168.160.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 2ms

C:\WINDOWS\system32>_
```

How to Configure Remote Access VPN with Zyxel VPN Client

This guide provides step-by-step instructions to set up Remote Access VPN on Zyxel USG FLEX H series devices using SSL VPN and IKEv2 VPN, with the new SecuExtender VPN Client. It's intended for IT administrators and support teams deploying secure remote access globally.



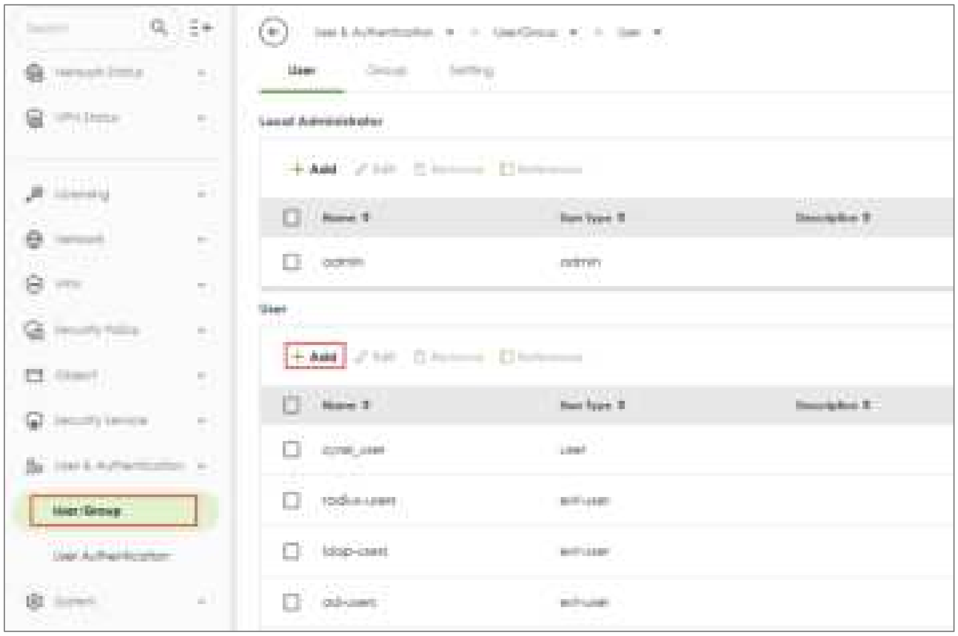
Before You Begin

1. Create a Local User for VPN Authentication

Navigate to **User & Authentication > User/Group > User**

Create a local user account for remote access authentication.

- Enter a username and password.
- Save the settings.

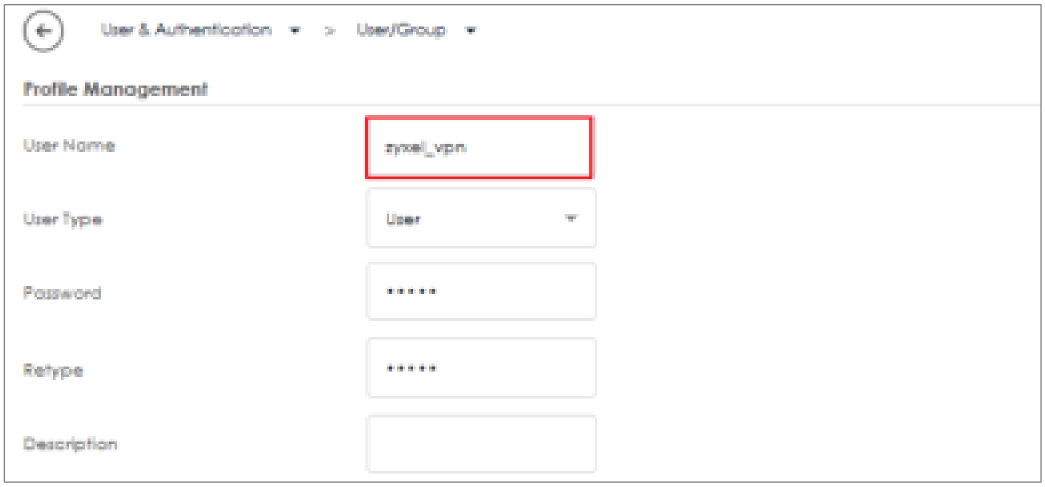


Local Administrator

□	Name	User Type	Description
□	admin	admin	

User

□	Name	User Type	Description
□	zyxel_user	user	
□	radius-users	ext-user	
□	ldap-users	ext-user	
□	ad-users	ext-user	



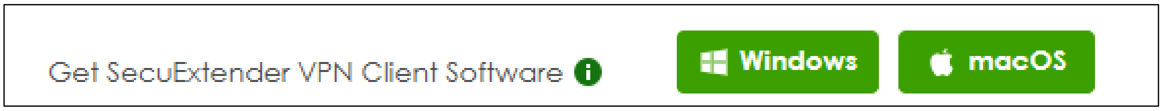
Profile Management

User Name	zyxel_vpn
User Type	User
Password	•••••
Retype	•••••
Description	

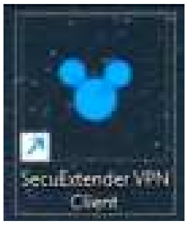
2. Download and Install the Latest SecuExtender VPN Client

You can download it from the device GUI or from the Zyxel official website.

Download Link



After installation, desktop shortcut icons will appear:

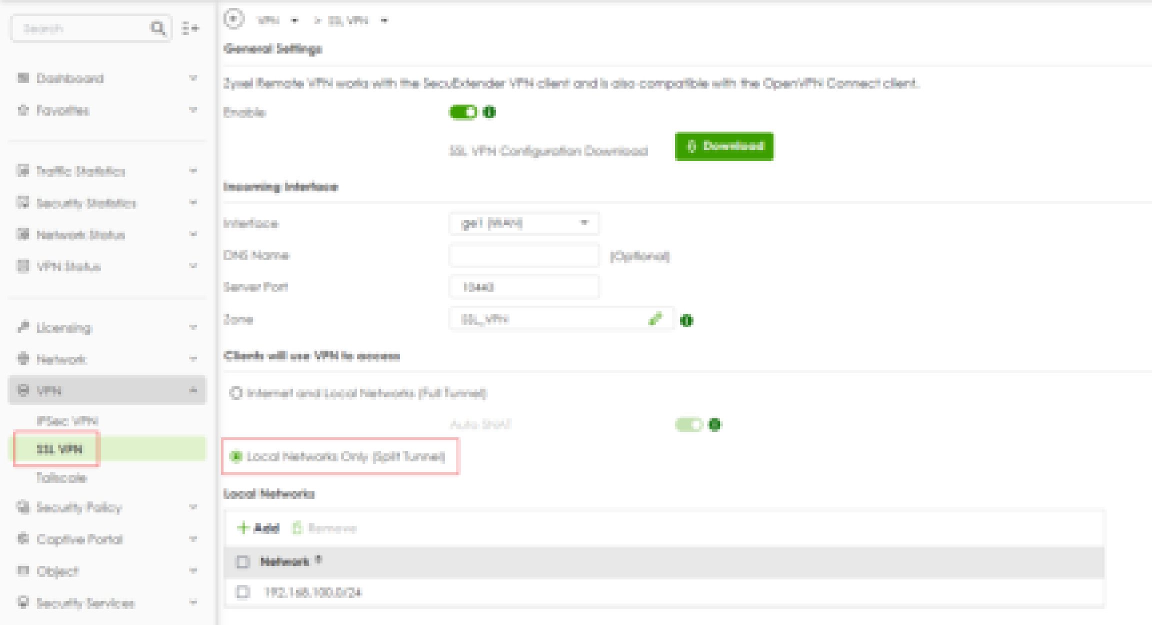


Configure SSL VPN on the Device

1. Navigate to **VPN > SSL VPN**
2. Enable **SSL VPN**
3. Select the incoming interface (e.g., *ge1(WAN)* or *ge4 (LAN)*).
4. Choose the Port (Default port: **10443**).
5. Choose the **tunnel type** based on your network policy:
   - **Internet and Local Networks (Full Tunnel)**: All traffic goes through VPN
   - **Local Networks Only (Split Tunnel)**: Only specified subnet(s) go through VPN
6. Define which internal network(s) VPN users can access.
   - Example: Allow access to *192.168.100.0/24*

     → Add to **Local Networks**: 192.168.100.0/24
7. The default address pool for SSL VPN is **192.168.51.0/24**
8. Assign allowed users for SSL VPN access

* This SSL VPN configuration is also compatible with standard OpenVPN clients. You can download the *.ovpn* file from the device and import it into an OpenVPN client to establish a connection.



General Settings

Zyxel Remote VPN works with the SecuExtender VPN client and is also compatible with the OpenVPN Connect client.

Enable: on

SSL VPN Configuration Download: Download

Incoming Interface

Interface: ge1 (WAN)

DNS Name: (Optional)

Server Port: 10443

Zone: SSL_VPN

Clients will use VPN to access

○ Internet and Local Networks (Full Tunnel)

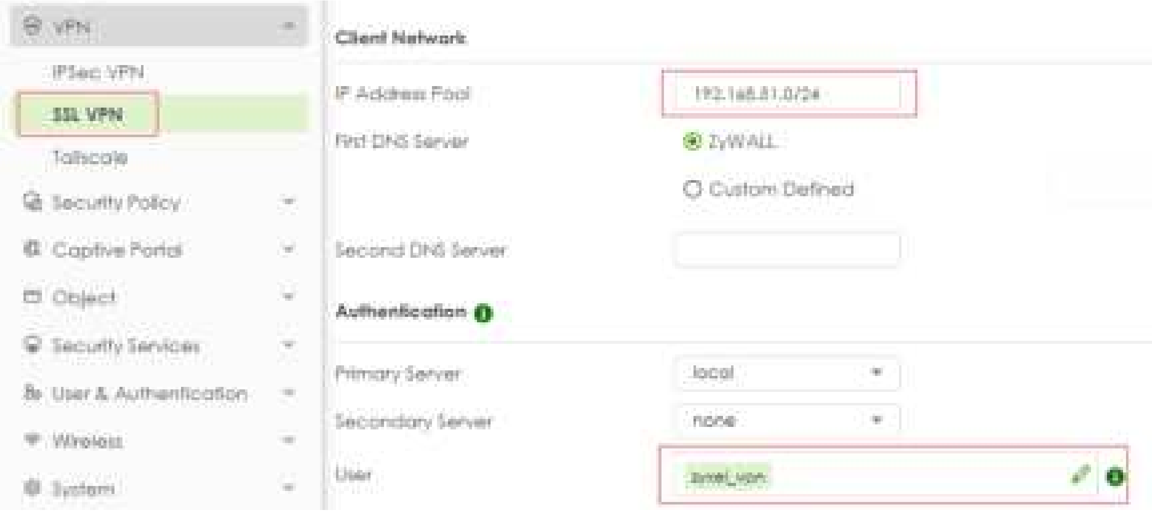
Auto SNAT

● Local Networks Only (Split Tunnel)

Local Networks

+ Add Remove

☐ Network
☐ 192.168.100.0/24



Client Network

IP Address Pool: 192.168.81.0/24

First DNS Server: ● ZyWALL ○ Custom Defined

Second DNS Server:

Authentication

Primary Server: local

Secondary Server: none

User: zyxel_vpn

Configure IKEv2 VPN on the Device

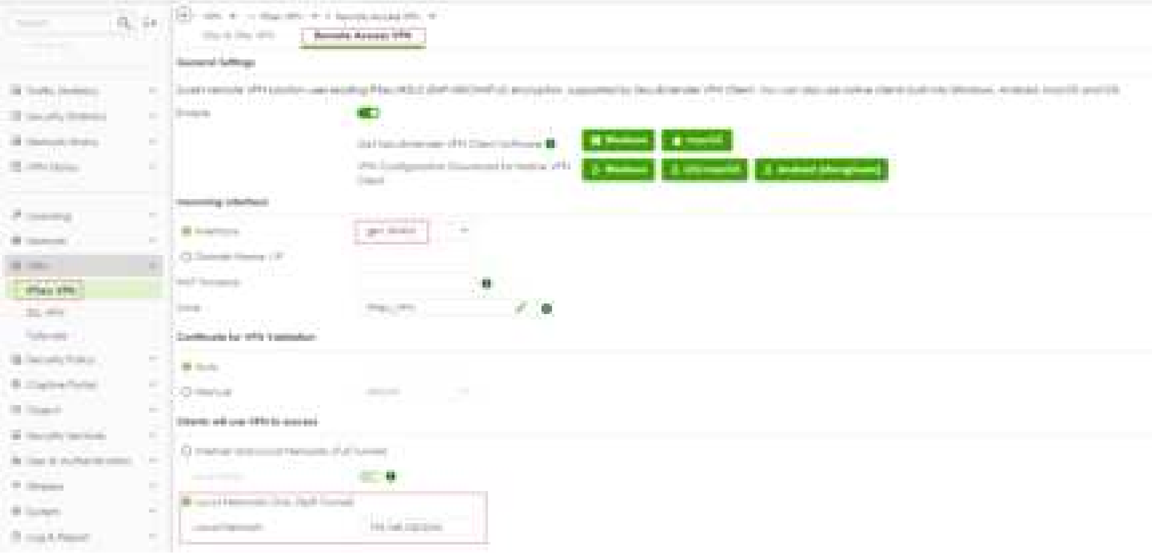
1. Navigate to **VPN > IPSec VPN > Remote Access VPN**
2. Enable **IPSev VPN**
3. Select the incoming interface (e.g., *ge1(WAN)* or *ge4 (LAN)*)
4. Choose the **tunnel type** based on your network policy:
   - **Internet and Local Networks (Full Tunnel)**: All traffic goes through VPN

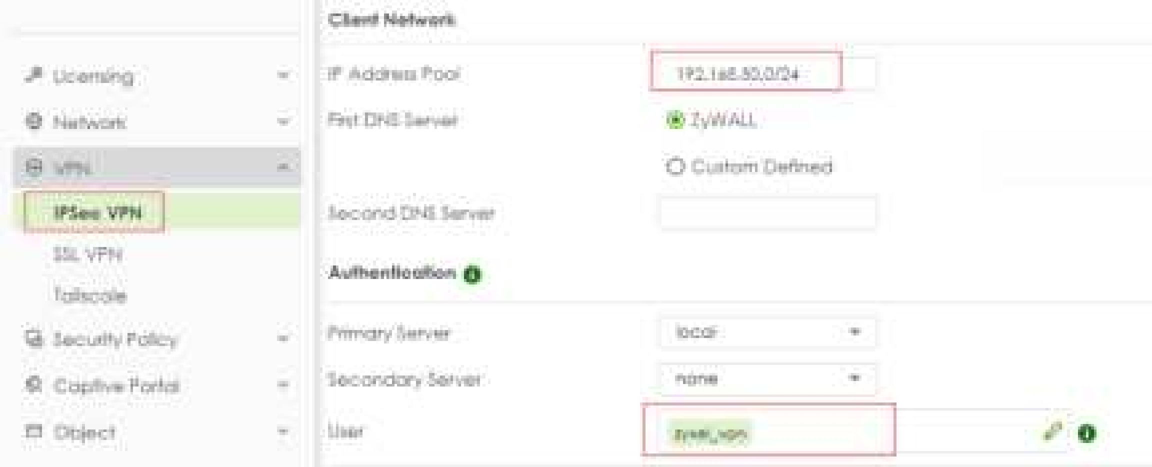
- **Local Networks Only (Split Tunnel)**: Only specified subnet(s) go through VPN

5. Define which internal network(s) VPN users can access.
   - *Example: Allow access to 192.168.100.0/24*

     → Add to **Local Network**: 192.168.100.0/24
6. The default address pool for IKEv2 VPN is **192.168.50.0/24**
7. Assign allowed users for IKEv2 VPN access

> Note: When configuring IKEv2 VPN for use with the **Windows (Native IKEv2 Client)** and selecting Interface as the incoming interface, you must enter the **domain name** (as shown in the certificate) in the **NAT Traversal** field.
>
> This allows the Windows client to correctly establish the VPN tunnel using the domain name instead of the IP address. (see **Self-Signed Certificate Scenario (For Windows Native IKEv2 Client)**





Client Network

IP Address Pool: 192.168.50.0/24

First DNS Server: ● ZyWALL ○ Custom Defined

Second DNS Server:

Authentication

Primary Server: local

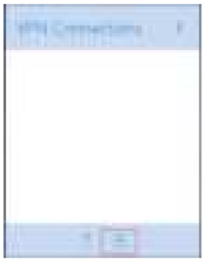
Secondary Server: none

User: zyxel_vpn

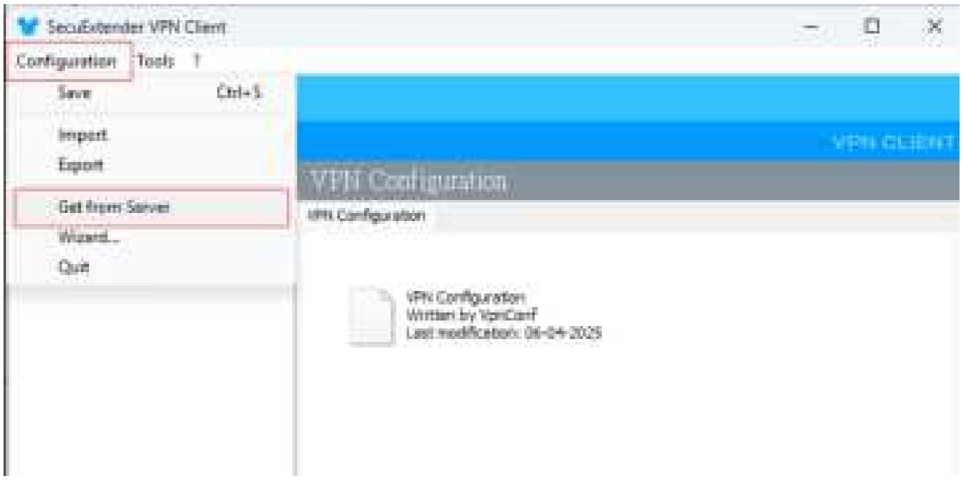
Set Up Remote Access on SecuExtender VPN Client

The new SecuExtender VPN Client combines **SSL VPN** and **IKEv2** VPN in a single application, eliminating the need for separate software.

1. Launch the client

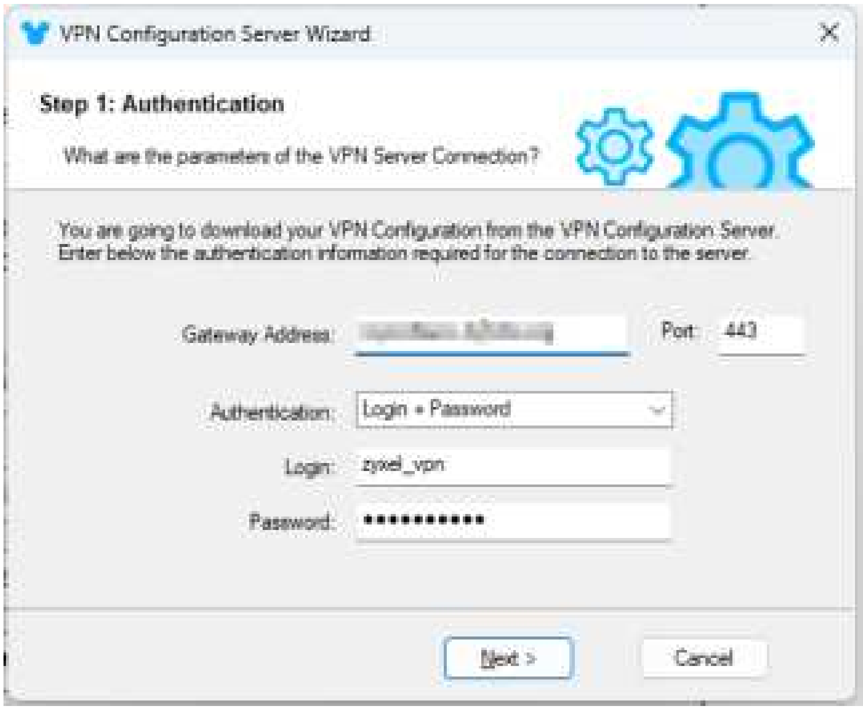


2. Navigate to **Menu** > **Configuration** > **Get from Server**



VPN Configuration
Written by VpnConf
Last modification: 06-04-2025

3. Enter the **Gateway Address**, **Username**, and **Password**
4. Click **Next** to fetch the VPN configuration file



VPN Configuration Server Wizard

Step 1: Authentication

What are the parameters of the VPN Server Connection?

You are going to download your VPN Configuration from the VPN Configuration Server.
Enter below the authentication information required for the connection to the server.

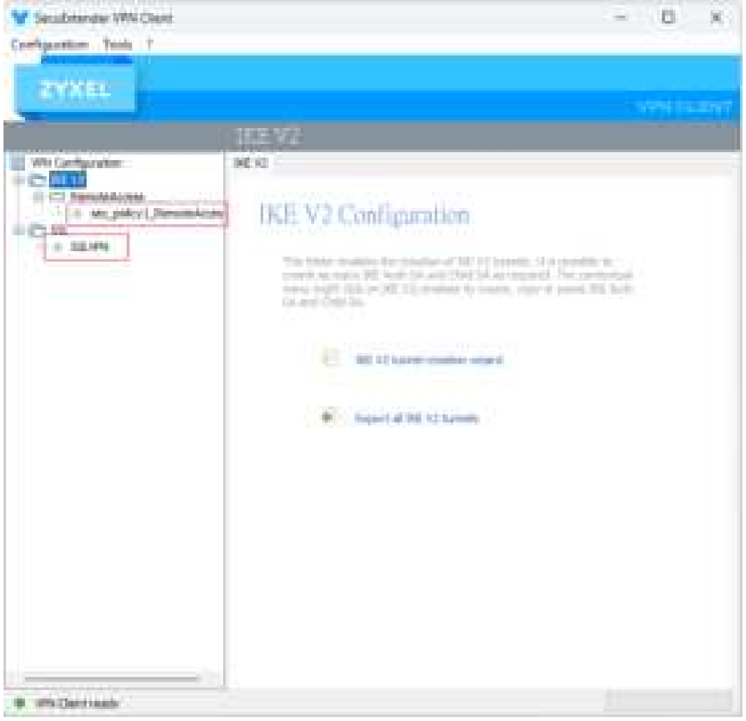
Gateway Address: [redacted] Port: 443

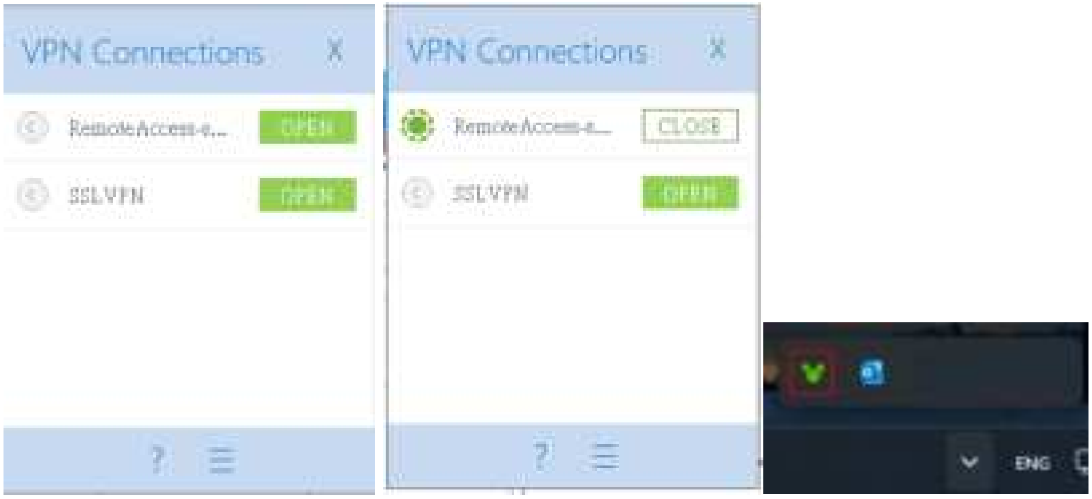
Authentication: Login + Password

Login: zyxel_vpn

Password: ●●●●●●●●●●●

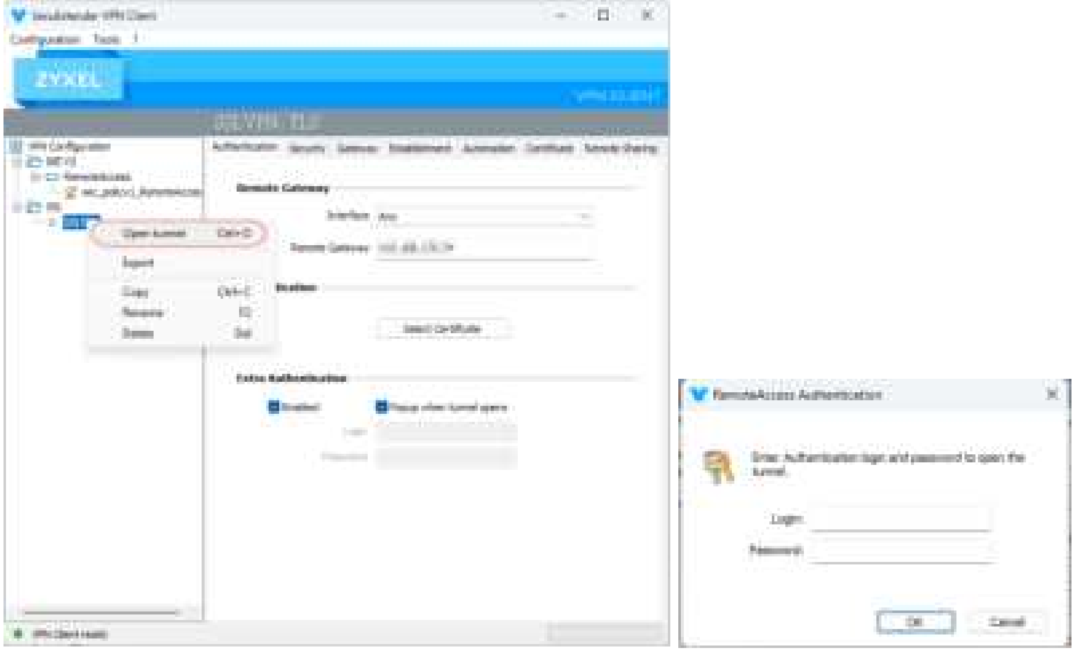
5. Both SSL VPN and IKEv2 settings will be available.





Test SSL VPN Tunnel on SecuExtender VPN Client

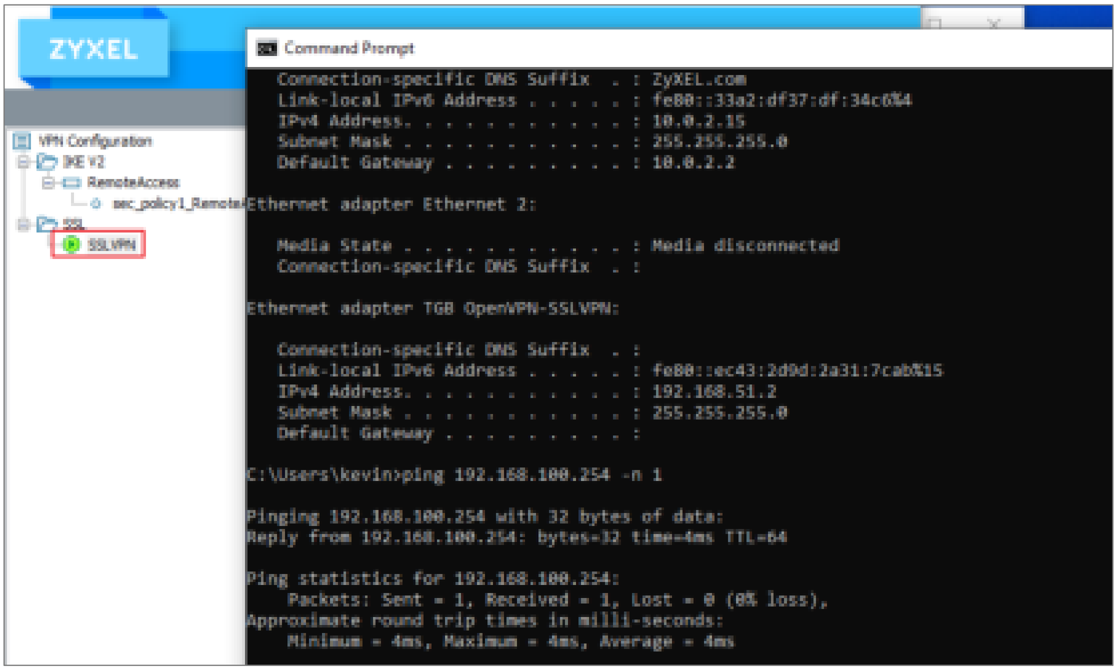
1. Launch the SecuExtender VPN Client
2. Right-click the VPN profile and "**Open Tunnel**" and log in.



Enter Authentication login and password to open the tunnel.

3. Once connected, the profile status will turn green, indicating an active tunnel.

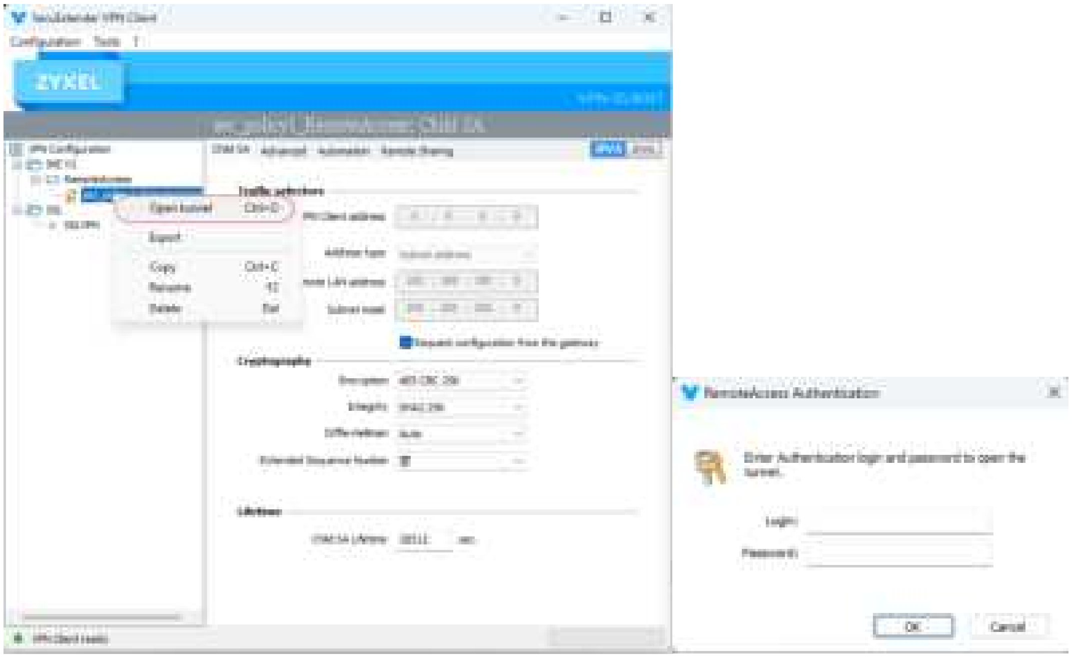
4. You should now be able to access internal network resources.



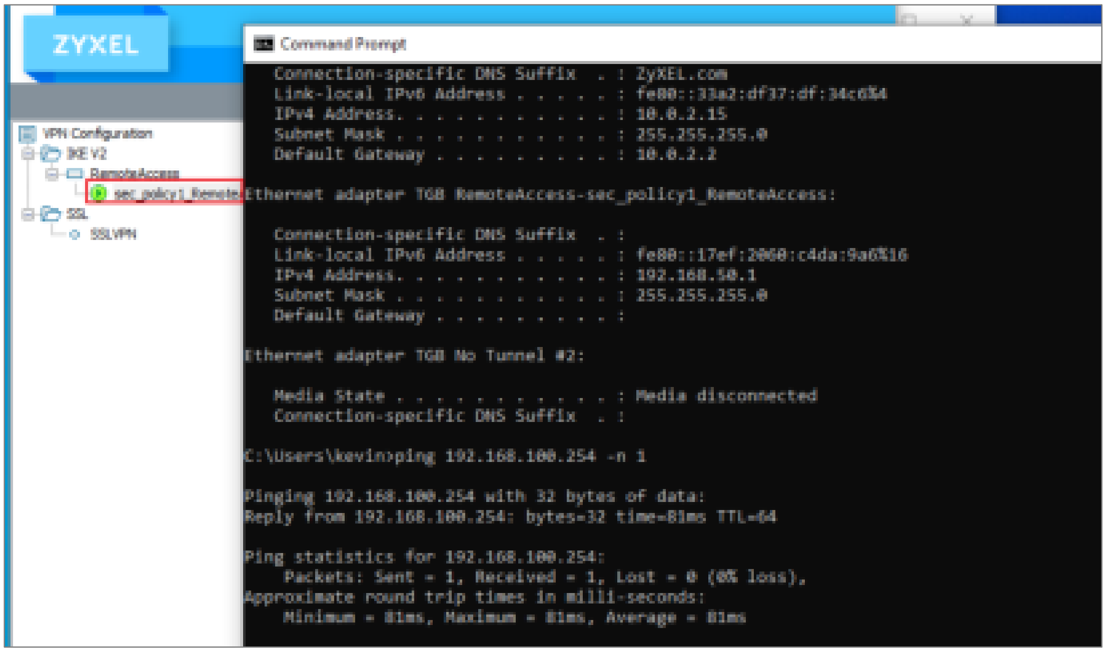
```
   Connection-specific DNS Suffix  . : ZyXEL.com
   Link-local IPv6 Address . . . . . : fe80::33a2:df37:df:34c6%4
   IPv4 Address. . . . . . . . . . . : 10.0.2.15
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 10.0.2.2

Ethernet adapter Ethernet 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter TGB OpenVPN-SSLVPN:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::ec43:2d9d:2a31:7cab%15
   IPv4 Address. . . . . . . . . . . : 192.168.51.2
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

C:\Users\kevin>ping 192.168.100.254 -n 1

Pinging 192.168.100.254 with 32 bytes of data:
Reply from 192.168.100.254: bytes=32 time=4ms TTL=64

Ping statistics for 192.168.100.254:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 4ms, Average = 4ms
```

Test IKEv2 VPN Tunnel on SecuExtender VPN Client

1. Launch the SecuExtender VPN Client
2. Right-click the VPN profile and "**Open Tunnel**" and log in.



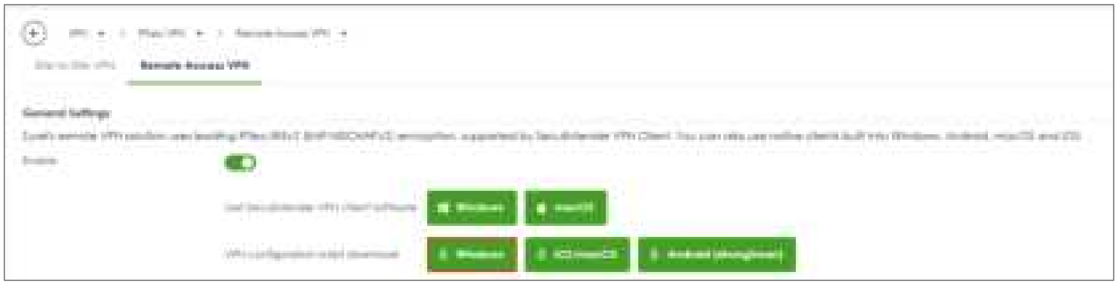
3. Once connected, the profile status will turn green, indicating an active tunnel.
4. You should now be able to access internal network resources.



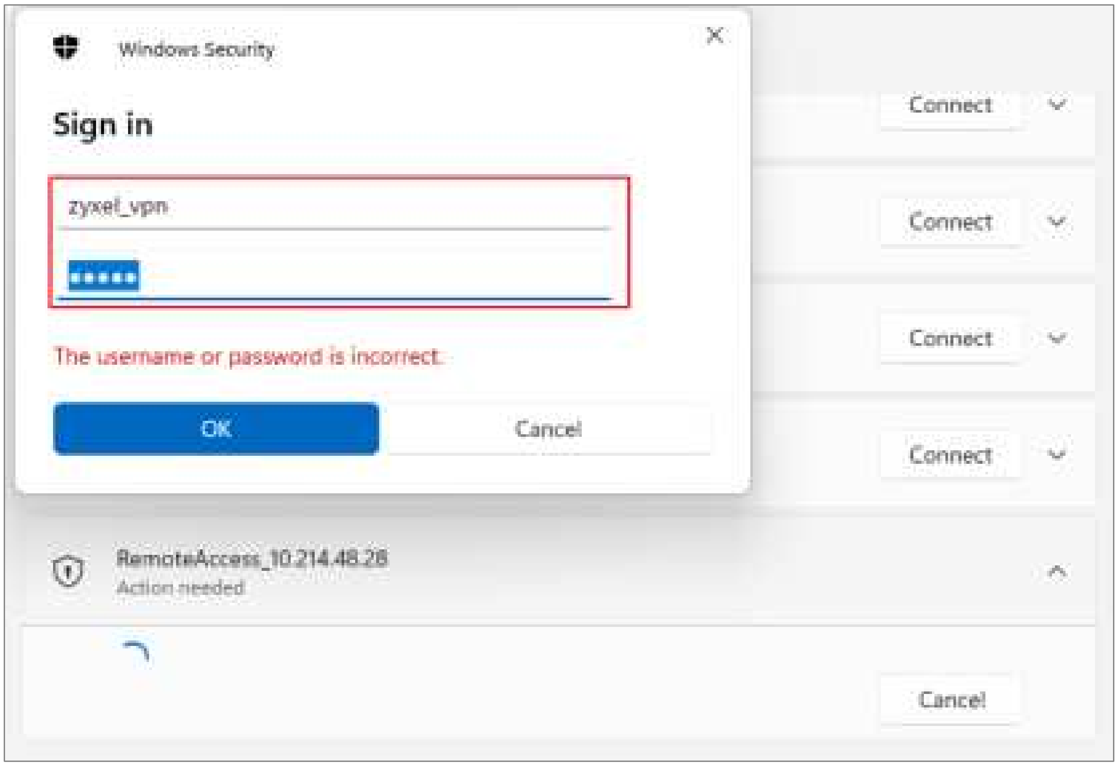
```
   Connection-specific DNS Suffix  . : ZyXEL.com
   Link-local IPv6 Address . . . . . : fe80::33a2:df37:df:34c6%4
   IPv4 Address. . . . . . . . . . . : 10.0.2.15
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 10.0.2.2

Ethernet adapter TGB RemoteAccess-sec_policy1_RemoteAccess:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::17ef:2060:c4da:9a6%16
   IPv4 Address. . . . . . . . . . . : 192.168.50.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Ethernet adapter TGB No Tunnel #2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

C:\Users\kevin>ping 192.168.100.254 -n 1

Pinging 192.168.100.254 with 32 bytes of data:
Reply from 192.168.100.254: bytes=32 time=81ms TTL=64

Ping statistics for 192.168.100.254:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 81ms, Maximum = 81ms, Average = 81ms
```

Set Up IKEv2 VPN On Windows (Native IKEv2 Client)

1. Download the VPN configuration script from the USG FLEX H web configurator.



2. Run the script (.bat file) and enter your credentials when prompted.



Windows Security

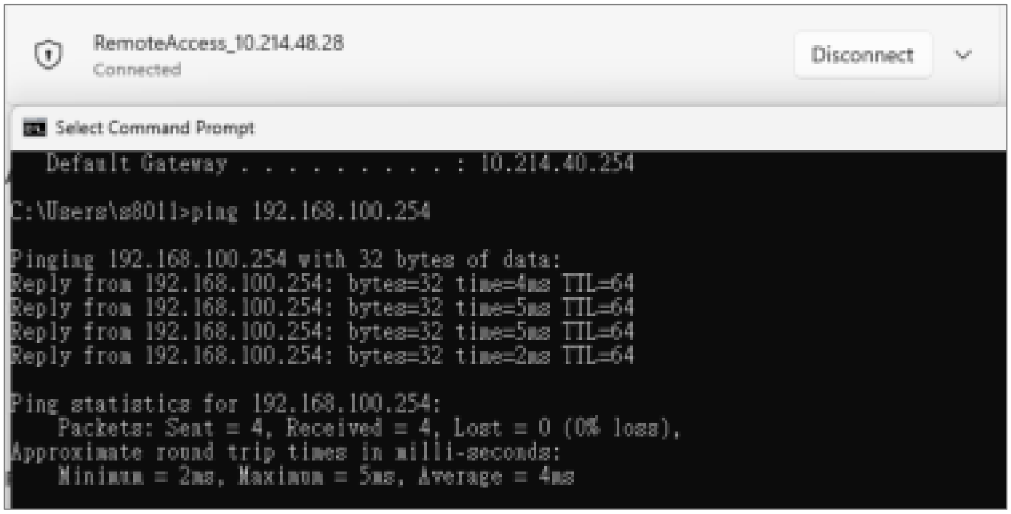
Sign in

zyxel_vpn

•••••

The username or password is incorrect.

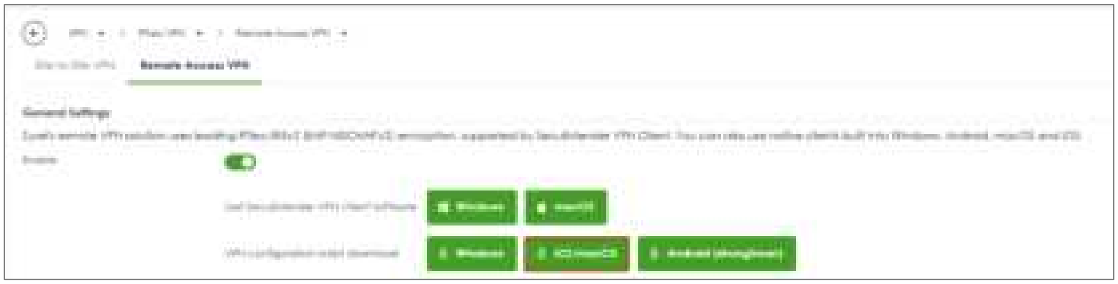
3. VPN will connect and access internal resources



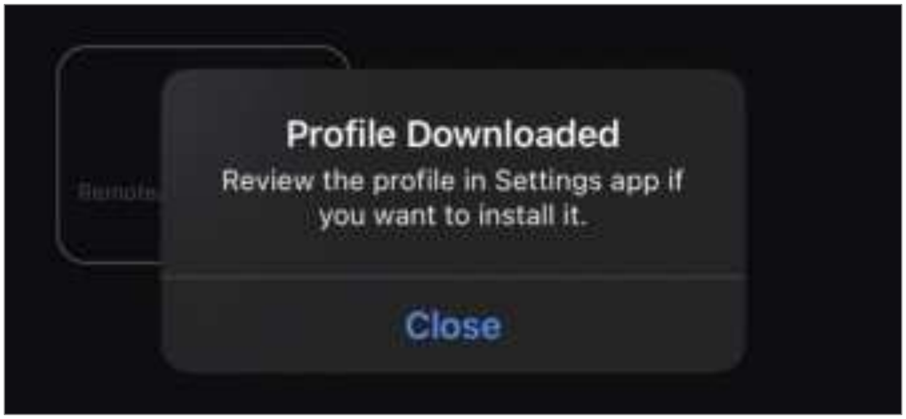
```
   Default Gateway . . . . . . . . . : 10.214.40.254

C:\Users\s8011>ping 192.168.100.254

Pinging 192.168.100.254 with 32 bytes of data:
Reply from 192.168.100.254: bytes=32 time=4ms TTL=64
Reply from 192.168.100.254: bytes=32 time=5ms TTL=64
Reply from 192.168.100.254: bytes=32 time=5ms TTL=64
Reply from 192.168.100.254: bytes=32 time=2ms TTL=64

Ping statistics for 192.168.100.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 5ms, Average = 4ms
```

Set Up IKEv2 VPN on iOS

1. Download the iOS/macOS VPN configuration script from the USG FLEX H web configurator.

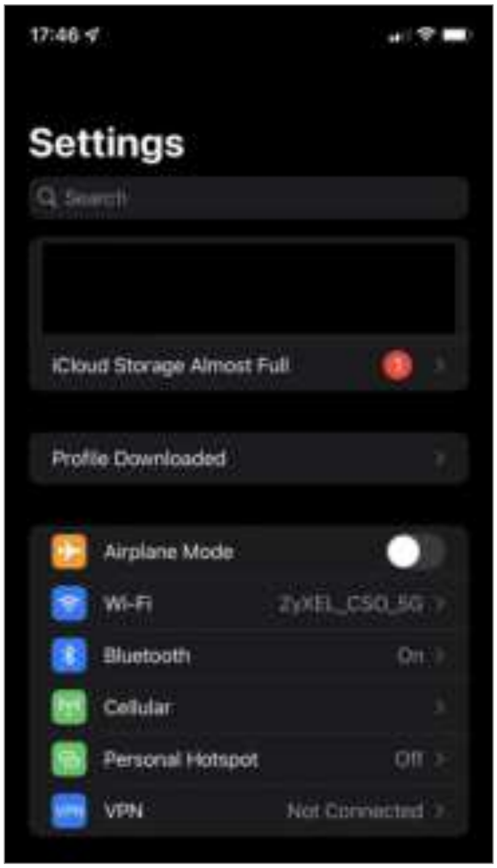


2. Send it to the iOS/macOS device.
3. Go to **Settings** > **Profile Downloaded**, then **Install**
   (Mac device: System Settings > Network / VPN)



Profile Downloaded

Review the profile in Settings app if you want to install it.



17:46

Settings

Search

iCloud Storage Almost Full 1

Profile Downloaded

Airplane Mode

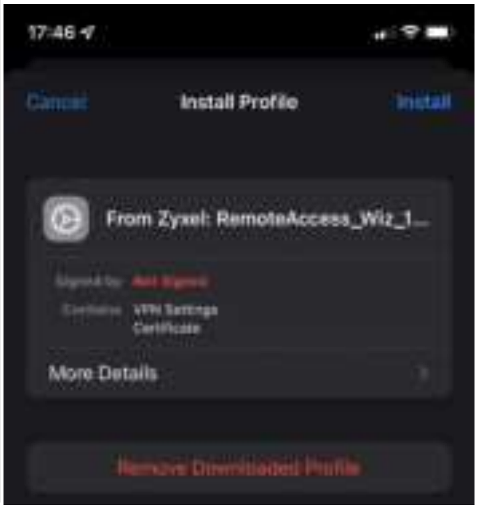
Wi-Fi ZyXEL_CSO_5G

Bluetooth On

Cellular

Personal Hotspot Off

VPN Not Connected



17:46

Cancel Install Profile Install

From Zyxel: RemoteAccess_Wiz_1...

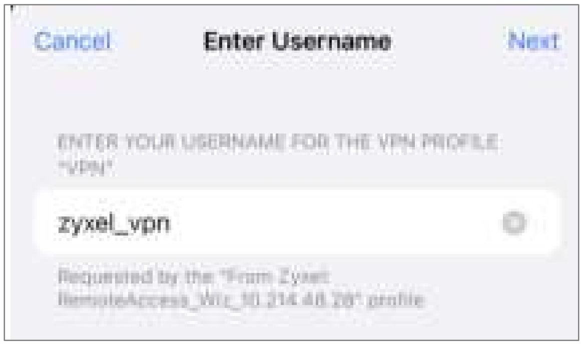
Signed by Not Signed

Contains VPN Settings
Certificate

More Details

Remove Downloaded Profile

4. Enter your username and password.

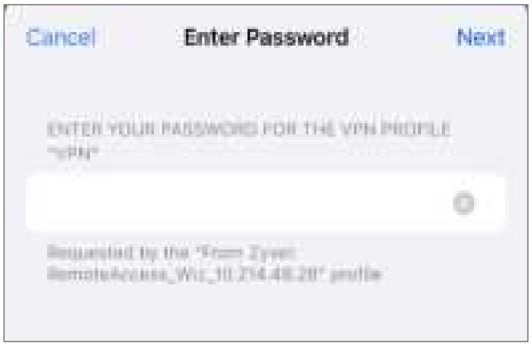


Cancel Enter Username Next

ENTER YOUR USERNAME FOR THE VPN PROFILE "VPN"

zyxel_vpn

Requested by the "From Zyxel: RemoteAccess_Wiz_10.214.48.28" profile

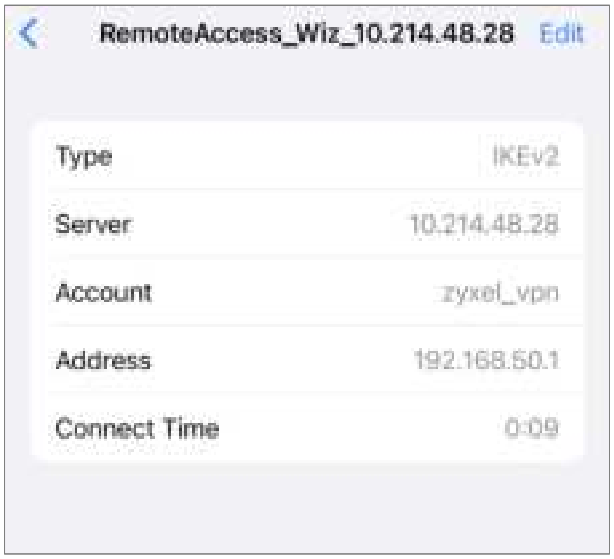


Cancel Enter Password Next

ENTER YOUR PASSWORD FOR THE VPN PROFILE "VPN"

Requested by the "From Zyxel: RemoteAccess_Wiz_10.214.48.28" profile

5. Connect to the VPN from the **Settings** > **VPN** menu.

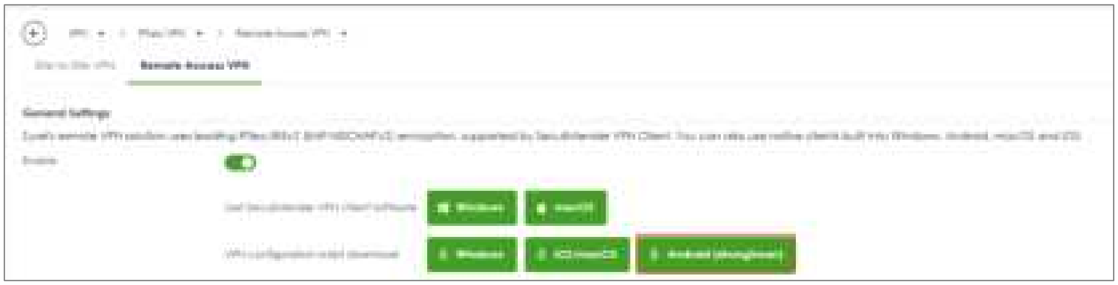


RemoteAccess_Wiz_10.214.48.28

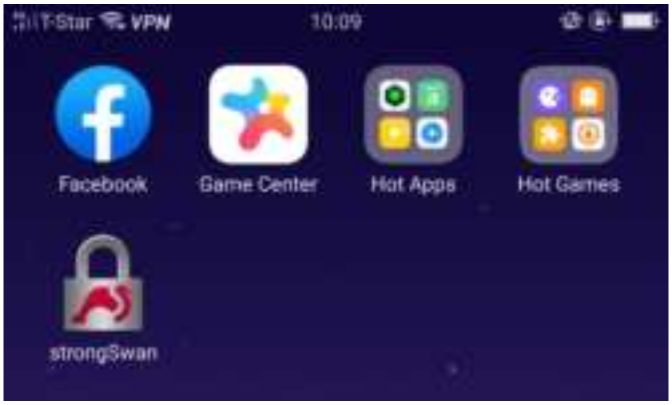
Type	IKEv2
Server	10.214.48.28
Account	zyxel_vpn
Address	192.168.50.1
Connect Time	0:09

Set Up IKEv2 VPN on Android (strongSwan App)

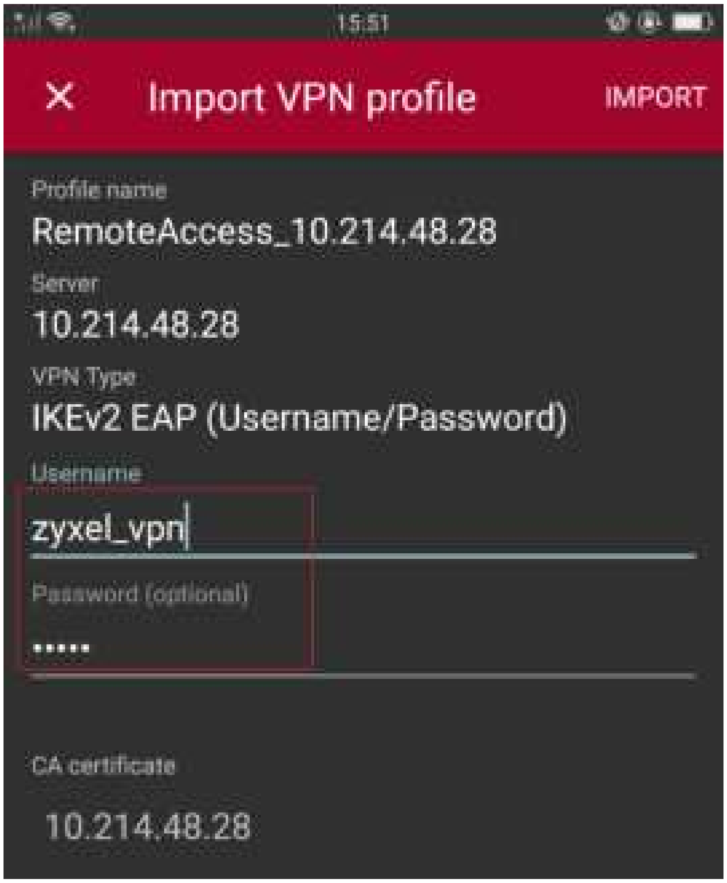
1. Download the Android VPN configuration script from the USG FLEX H web configurator.



2. Install the **strongSwan VPN Client** from Google Play Store



3. Send the config script to the Android device.
4. Import the profile into strongSwan



Profile name
RemoteAccess_10.214.48.28

Server
10.214.48.28

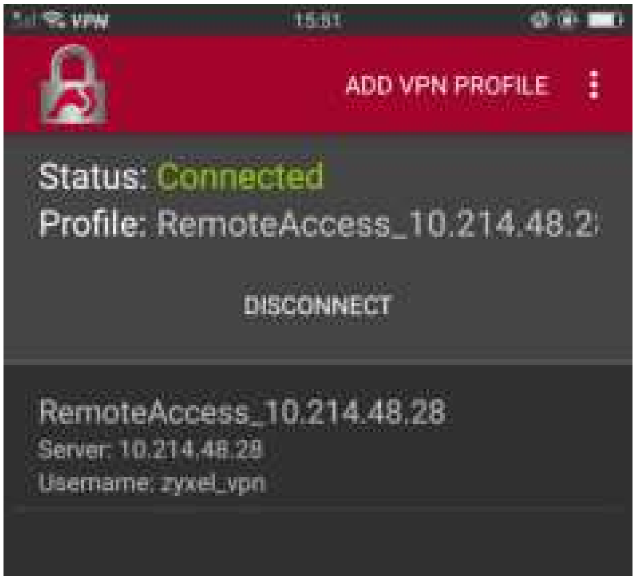
VPN Type
IKEv2 EAP (Username/Password)

Username
zyxel_vpn

Password (optional)
••••••

CA certificate
10.214.48.28

5. Connect to the VPN using your credentials

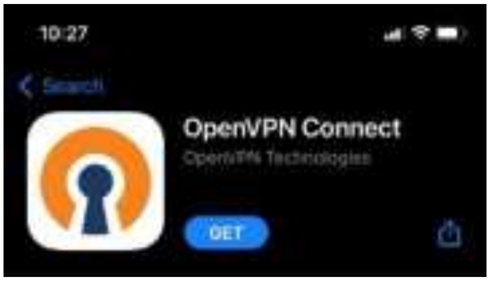


Status: Connected
Profile: RemoteAccess_10.214.48.2

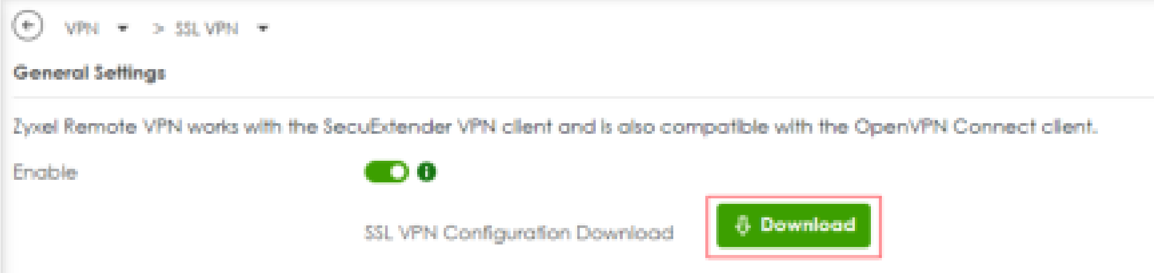
RemoteAccess_10.214.48.28
Server: 10.214.48.28
Username: zyxel_vpn

Set Up OpenVPN Client

1. Download and install the **OpenVPN Connect** client from the OpenVPN official website or app store.



2. Download the SSL VPN configuration script from the USG FLEX H web configurator at **VPN** > **SSL VPN**



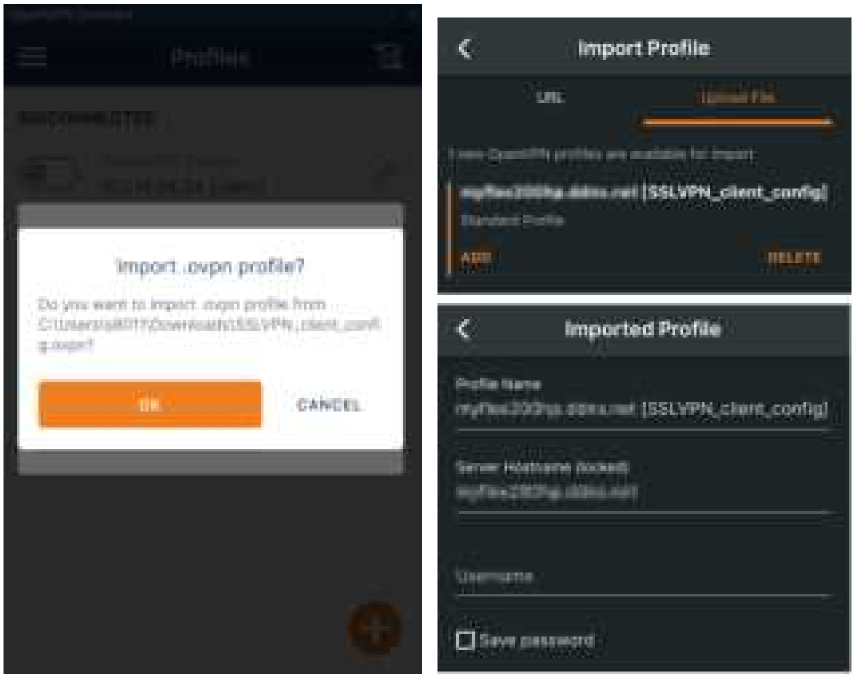
General Settings

Zyxel Remote VPN works with the SecuExtender VPN client and is also compatible with the OpenVPN Connect client.

Enable

SSL VPN Configuration Download

3. Import the *.ovpn* file into the OpenVPN client



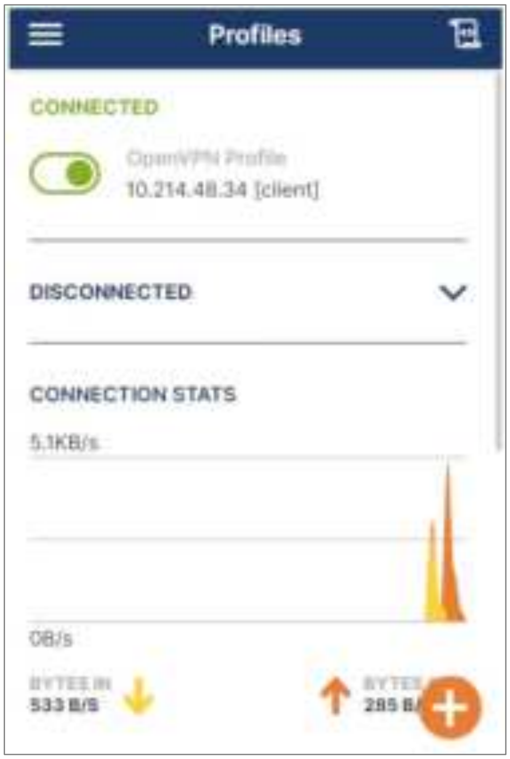
Do you want to import .ovpn profile from C:\Users\[illegible]\Downloads\SSLVPN_client_config.ovpn?

1 new OpenVPN profiles are available for import

myflex200hp.ddns.net [SSLVPN_client_config]

Standard Profile

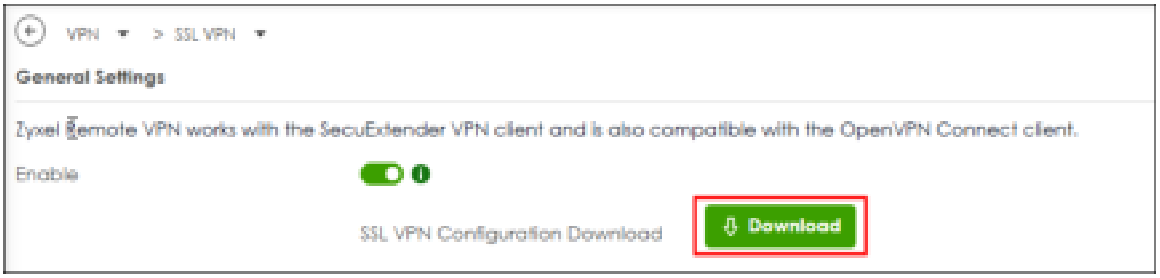
4. Once connected, you can access internal resources.



Configuring Split Routing for OpenVPN Connect Client

When the USG FLEX H is configured for **Full Tunnel** but you need **Split Tunnel** for specific clients, you can configure different split route settings by modifying the SSL VPN configuration file (.ovpn). This document explains the process:

1. Download the SSL VPN configuration file (.ovpn) from the USG FLEX H.

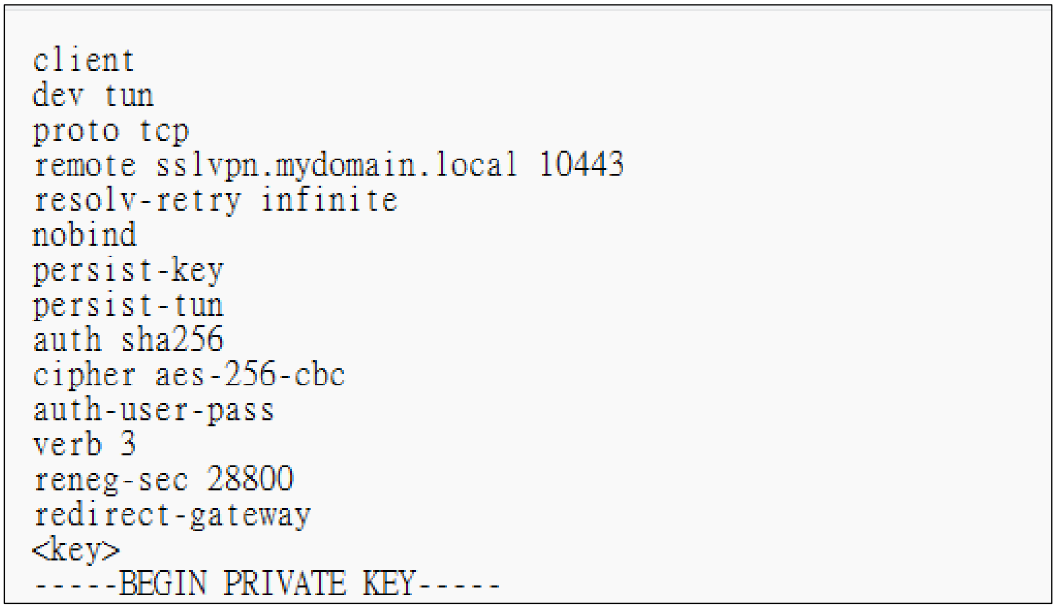


Zyxel Remote VPN works with the SecuExtender VPN client and is also compatible with the OpenVPN Connect client.

Enable

SSL VPN Configuration Download

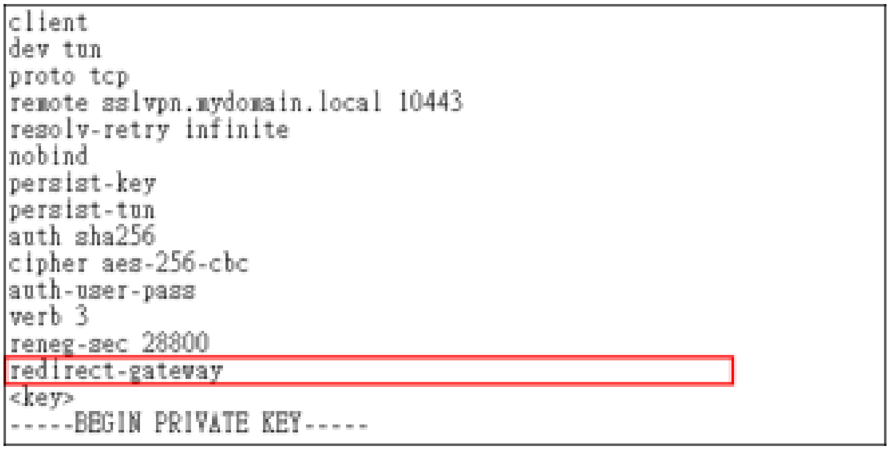
2. Open the .ovpn file in a text editor.



```
client
dev tun
proto tcp
remote sslvpn.mydomain.local 10443
resolv-retry infinite
nobind
persist-key
persist-tun
auth sha256
cipher aes-256-cbc
auth-user-pass
verb 3
reneg-sec 28800
redirect-gateway
<key>
-----BEGIN PRIVATE KEY-----
```

3. Modify the file to enable split routing:

   a. Remove the ***redirect-gateway*** line to disable full routing.



```
client
dev tun
proto tcp
remote sslvpn.mydomain.local 10443
resolv-retry infinite
nobind
persist-key
persist-tun
auth sha256
cipher aes-256-cbc
auth-user-pass
verb 3
reneg-sec 28800
redirect-gateway
<key>
-----BEGIN PRIVATE KEY-----
```

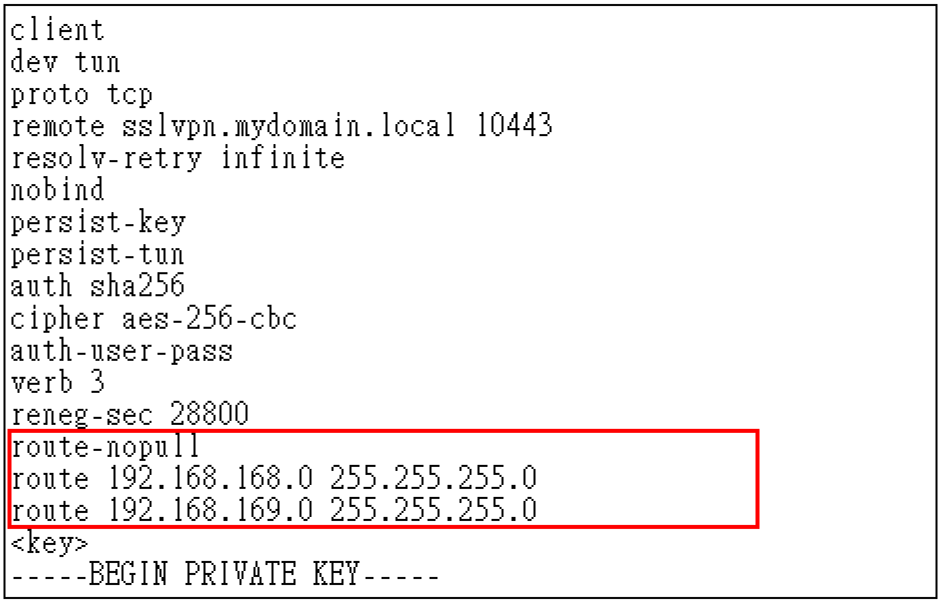
   b. Add ***route-nopull*** to prevent pulling routes from the SSL VPN server.

   c. Add specific routes, e.g., *route 192.168.168.0/24* and *route 192.168.169.0/24*

Add split routes

➔ Add "route 192.168.168.0 255.255.255.0"

➔ Add "route 192.168.169.0 255.255.255.0"



```
client
dev tun
proto tcp
remote sslvpn.mydomain.local 10443
resolv-retry infinite
nobind
persist-key
persist-tun
auth sha256
cipher aes-256-cbc
auth-user-pass
verb 3
reneg-sec 28800
route-nopull
route 192.168.168.0 255.255.255.0
route 192.168.169.0 255.255.255.0
<key>
-----BEGIN PRIVATE KEY-----
```

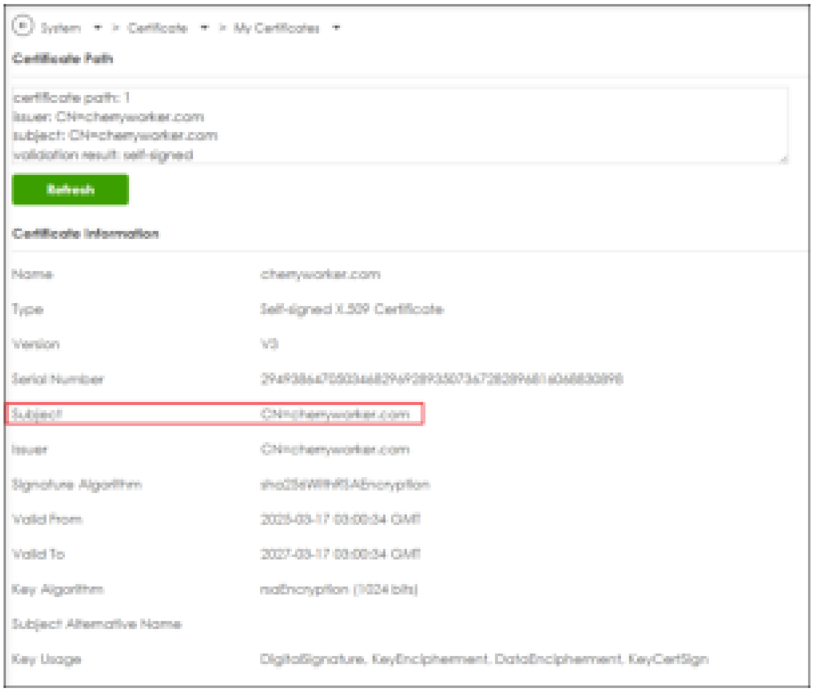
Troubleshooting Self-Signed Certificates with Native Windows VPN Client

If using a self-signed certificate with a domain name and the incoming interface set to “Interface”, you may encounter connection issues. Follow these steps to configure **NAT Traversal** to resolve this:

Conditions

(1) Incoming Interface set to “**Interface**”.

(2) The self-signed certificate subject name (Certificate for VPN Validation) set as a “**domain name**”. (e.g., cherryworker.com)



System > Certificate > My Certificates

Certificate Path

certificate path: 1
issuer: CN=cherryworker.com
subject: CN=cherryworker.com
validation result: self-signed

Certificate Information

Name	cherryworker.com
Type	Self-signed X.509 Certificate
Version	V3
Serial Number	[illegible]
Subject	CN=cherryworker.com
Issuer	CN=cherryworker.com
Signature Algorithm	sha256WithRSAEncryption
Valid From	2025-03-17 03:00:34 GMT
Valid To	2027-03-17 03:00:34 GMT
Key Algorithm	rsaEncryption (1024 bits)
Subject Alternative Name	
Key Usage	DigitalSignature, KeyEncipherment, DataEncipherment, KeyCertSign

Solution: Configure NAT Traversal

(1) Log in to the USG FLEX H management interface.

(2) Navigate to **VPN > IPSec VPN > Remote Access VPN**.

(3) Locate the **NAT Traversal** settings.

(4) Set the **NAT Traversal** field to the same domain name as the certificate (e.g., cherryworker.com).

(5) Save the settings.

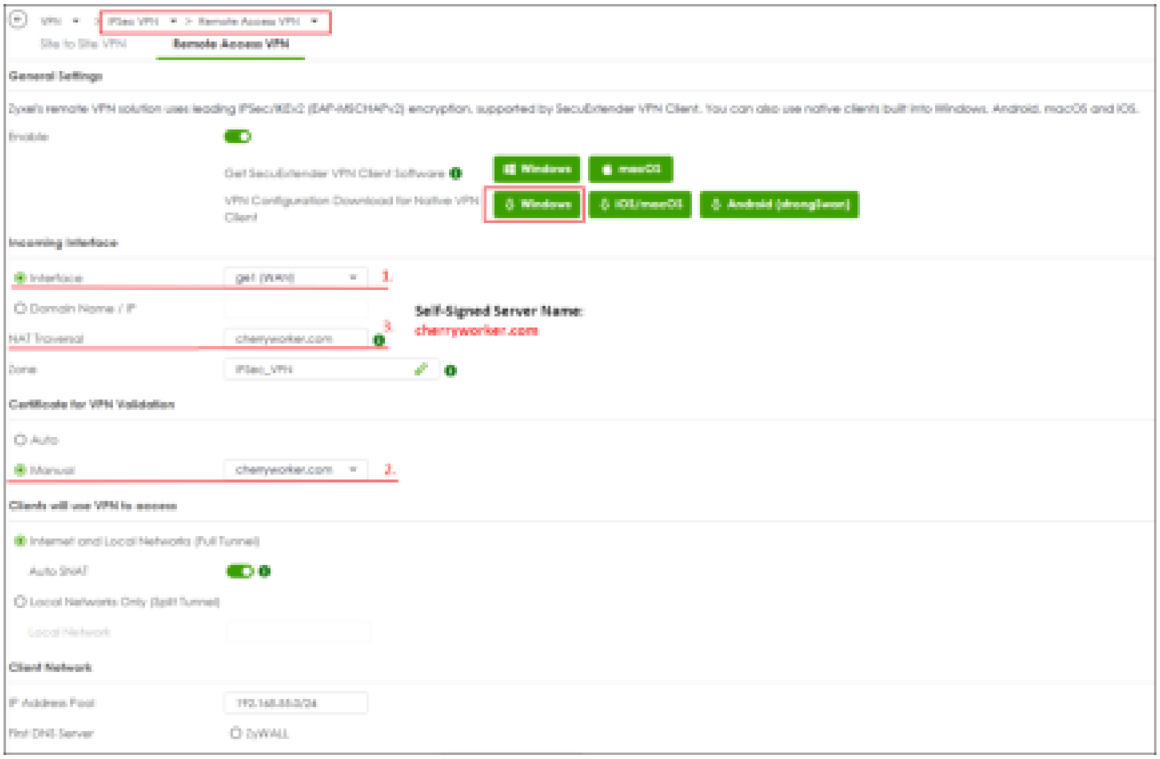
(6) Download the updated Windows VPN configuration script from the USG FLEX H web configurator.

(7) The script will automatically use the domain name (e.g., cherryworker.com) instead of an IP address for the “ServerAddress”.

(8) The VPN should connect without manual changes to the script.

This ensures proper script generation and prevents connection failure.

More info: Microsoft Troubleshooting Guide. (https://learn.microsoft.com/en-us/troubleshoot/windows-server/networking/troubleshoot-always-on-vpn)



General Settings

Zyxel's remote VPN solution uses leading IPSec/IKEv2 (EAP-MSCHAPv2) encryption, supported by SecuExtender VPN Client. You can also use native clients built into Windows, Android, macOS and iOS.

Enable: ●

Get SecuExtender VPN Client Software

VPN Configuration Download for Native VPN Client

Incoming Interface

● Interface: ge1 (WAN) 1.

○ Domain Name / IP

NAT Traversal: cherryworker.com 3.

Self-Signed Server Name:
cherryworker.com

Zone: IPSec_VPN

Certificate for VPN Validation

○ Auto

● Manual: cherryworker.com 2.

Clients will use VPN to access

● Internet and Local Networks (Full Tunnel)

Auto SNAT: ●

○ Local Networks Only (Split Tunnel)

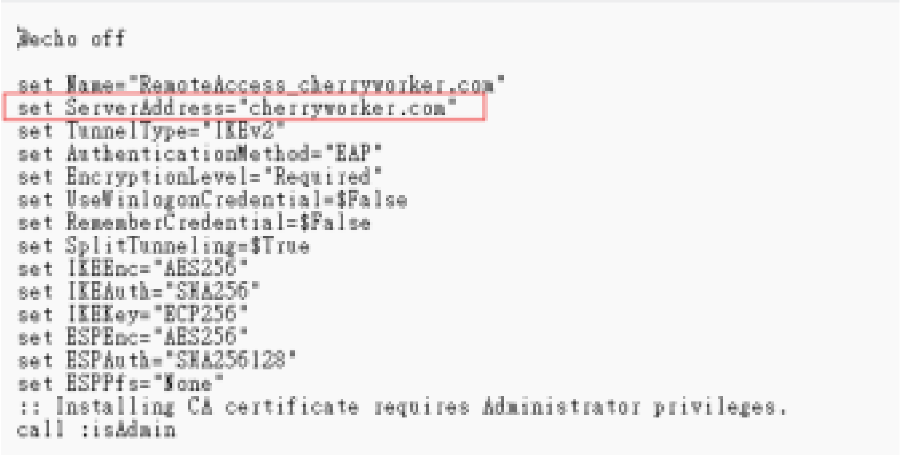
Local Network

Client Network

IP Address Pool: 192.168.[illegible]/24

First DNS Server: ○ ZyWALL

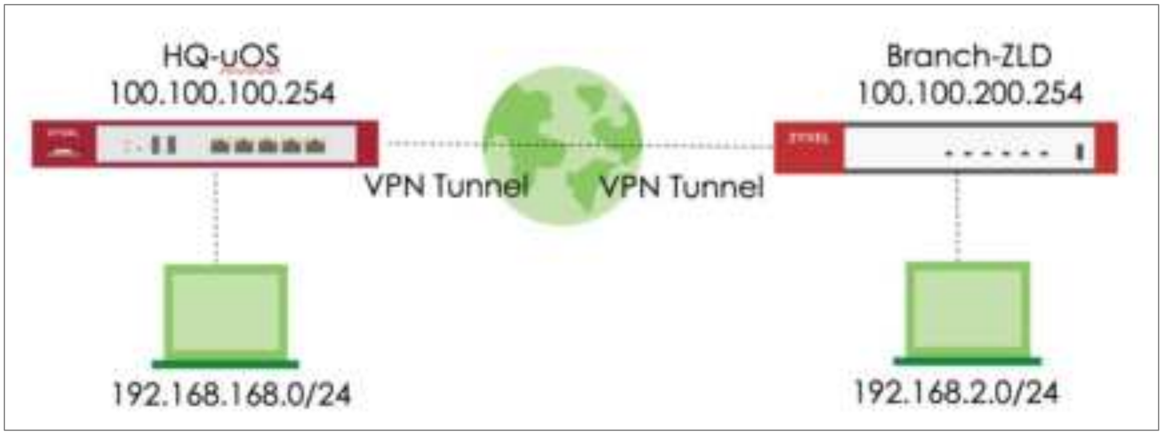
Script of “ServerAddress”.



```
@echo off

set Name="RemoteAccess_cherryworker.com"
set ServerAddress="cherryworker.com"
set TunnelType="IKEv2"
set AuthenticationMethod="EAP"
set EncryptionLevel="Required"
set UseWinlogonCredential=$False
set RememberCredential=$False
set SplitTunneling=$True
set IKEEnc="AES256"
set IKEAuth="SHA256"
set IKEKey="ECP256"
set ESPEnc="AES256"
set ESPAuth="SHA256128"
set ESPPfs="None"
:: Installing CA certificate requires Administrator privileges.
call :isAdmin
```

How to Configure Site-to-site IPSec VPN between ZLD and uOS device

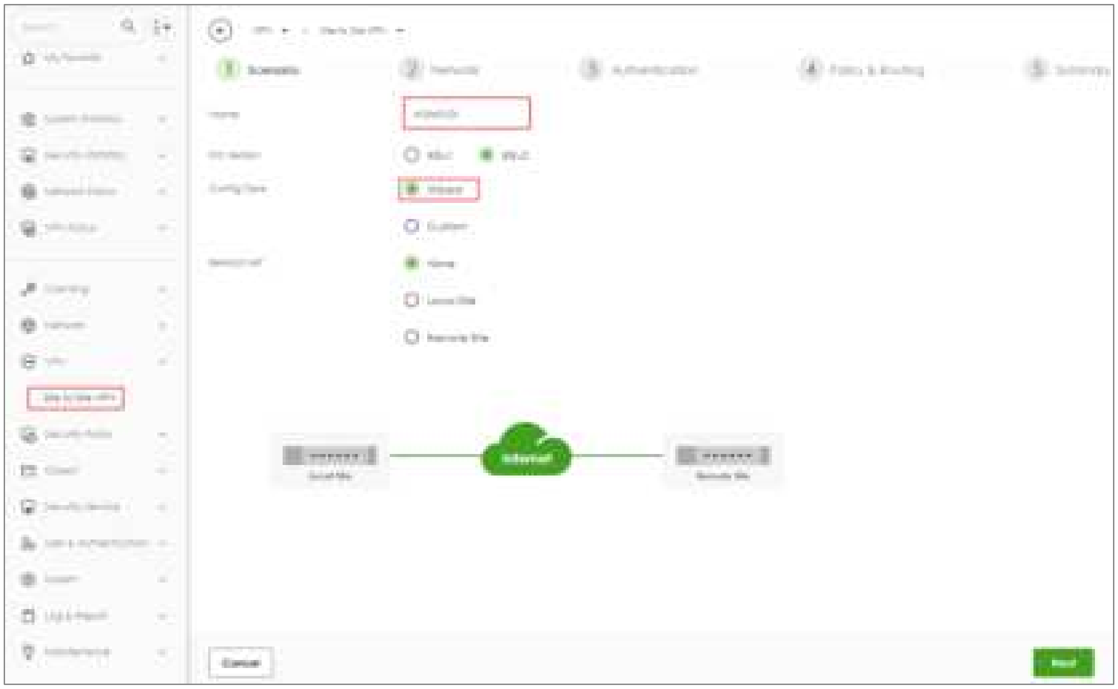
This example shows how to use the VPN Setup Wizard to create a site-to-site VPN with the Peer gateway is ZLD device. The example instructs how to configure the VPN tunnel between each site. When the VPN tunnel is configured, each site can be accessed securely.



Set up IPSec VPN Tunnel for uOS

VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the type to the Site-to-Site. Click **Next**.



Name [illegible]

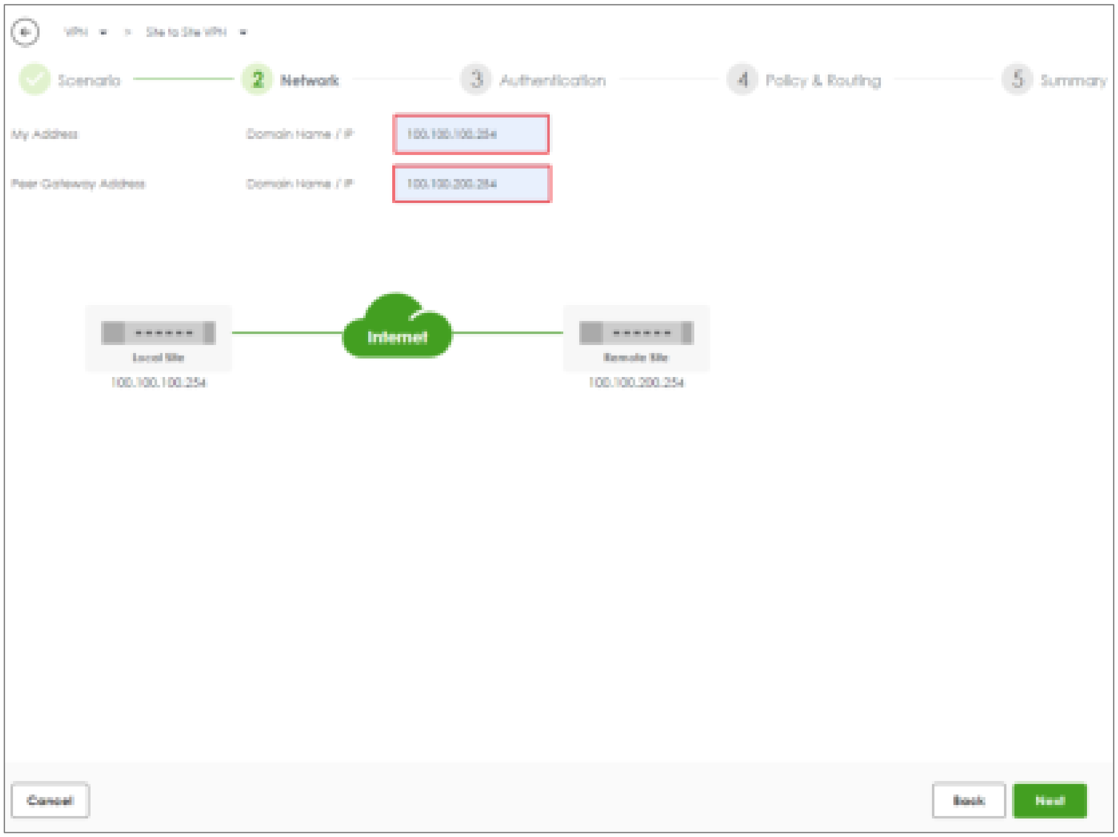
IKE Version ○ IKEv1 ● IKEv2

Config Type ● Wizard ○ Custom

Behind NAT ● None ○ Local Site ○ Remote Site

VPN > Site to Site VPN > Scenario > Network

Configure My Address and Peer Gateway Address. Click **Next.**

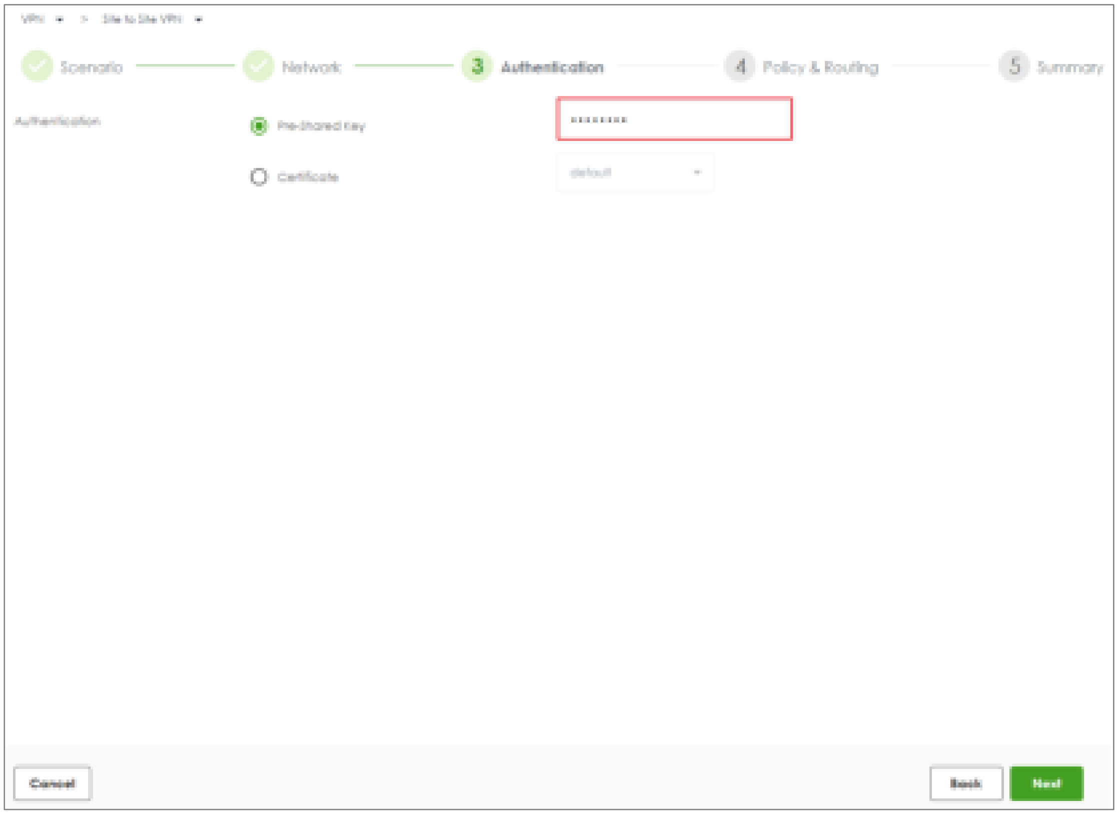


My Address Domain Name / IP 100.100.100.254

Peer Gateway Address Domain Name / IP 100.100.200.254

VPN > Site to Site VPN > Scenario > Network > Authentication

Type a secure Pre-Shared Key. Click **Next**



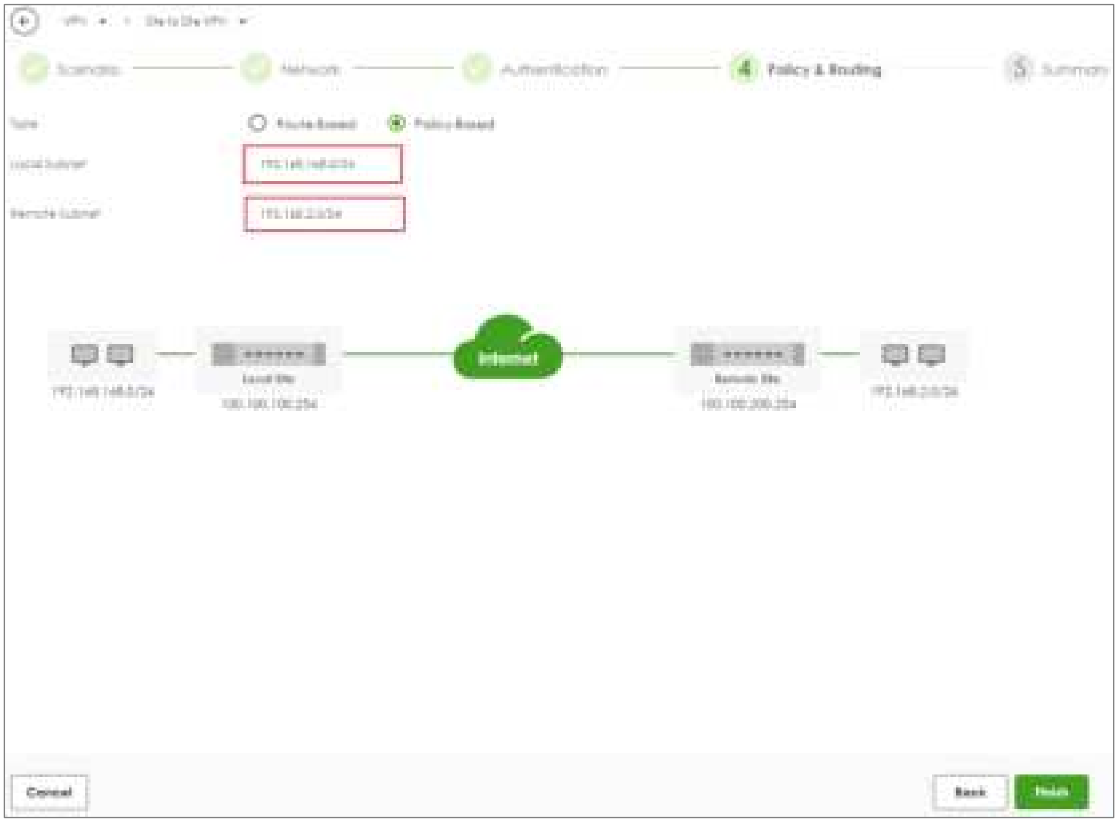
Authentication

● Pre-Shared Key ·········

○ Certificate default

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing

Set Local Subnet to be the IP address of the network connected to USG FLEX H and Remote Subnet to be the IP address of the network connected to the peer ZyWALL.



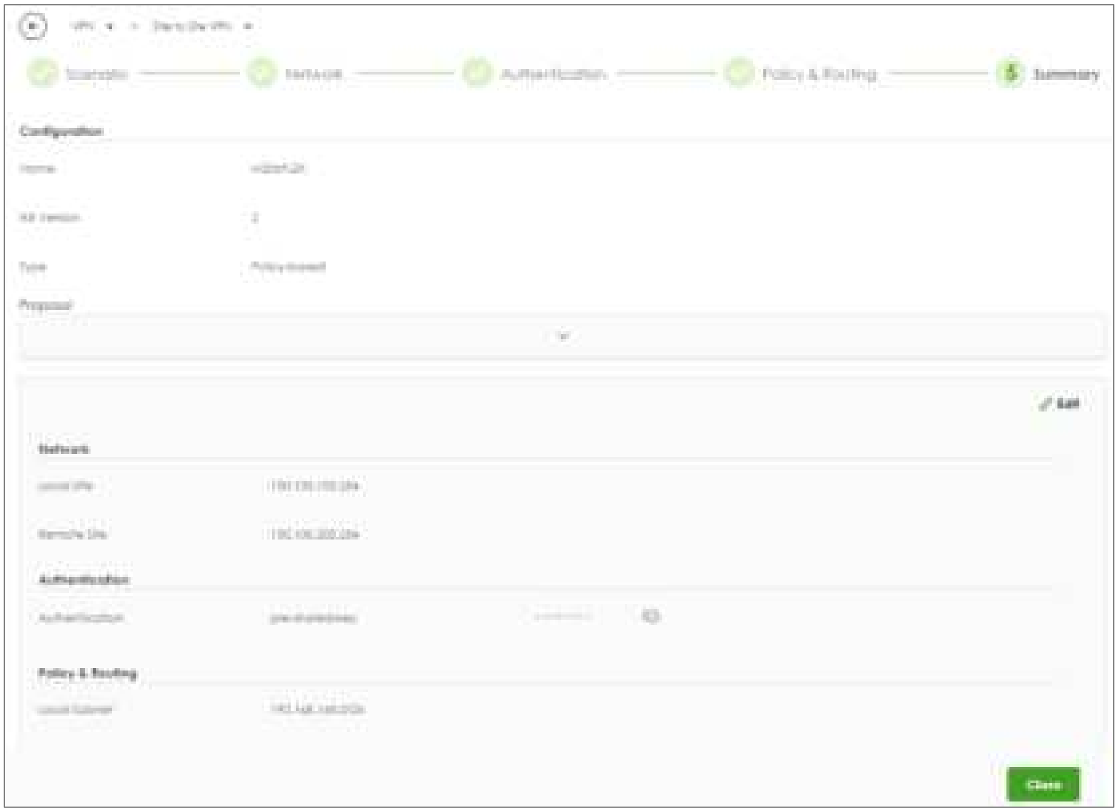
Type ○ Route Based ● Policy Based

Local Subnet 192.168.168.0/24

Remote Subnet 192.168.2.0/24

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing > Summary

The screen provides a summary of the VPN tunnel. You can Edit it if you want to modify.



Configuration

Name [illegible]

IKE Version 2

Type Policy-based

Proposal

Network

Local Site [illegible]

Remote Site [illegible]

Authentication

Authentication pre-shared key [illegible]

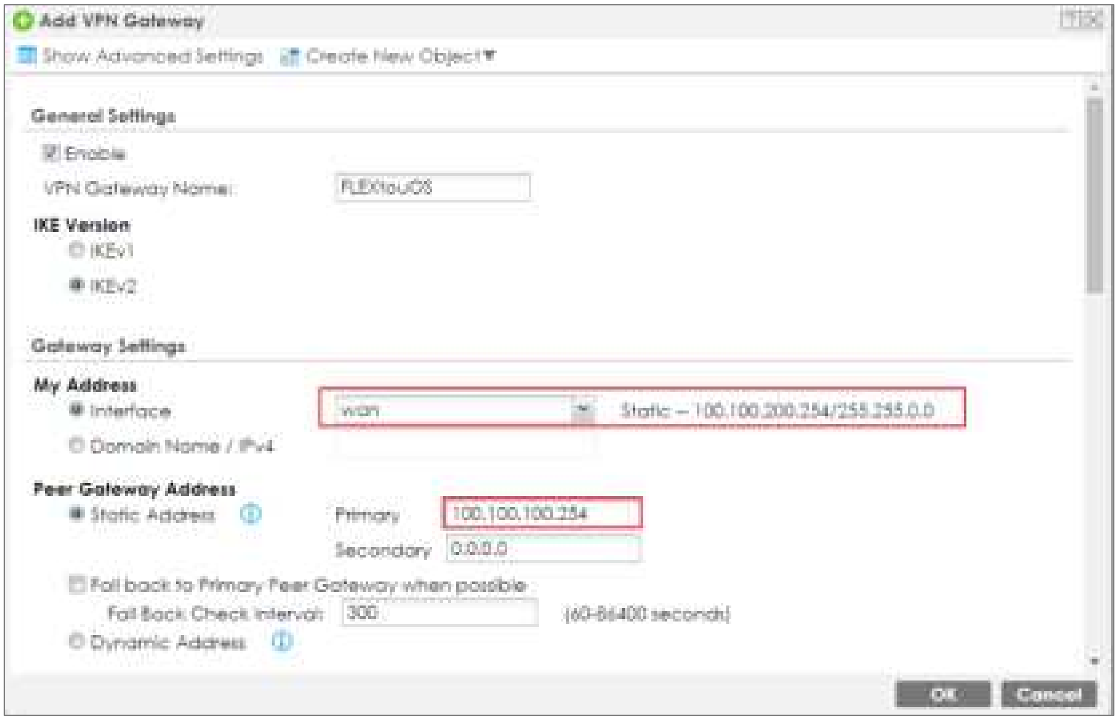
Policy & Routing

Local Subnet [illegible]

Set up IPSec VPN Tunnel for ZLD

VPN > IPSec VPN > VPN Gateway

Select the WAN interface and type the Peer Gateway Address.



General Settings

☑ Enable

VPN Gateway Name: FLEXtoUOS

IKE Version

○ IKEv1

● IKEv2

Gateway Settings

My Address

● Interface: wan — Static – 100.100.200.254/255.255.0.0

○ Domain Name / IPv4

Peer Gateway Address

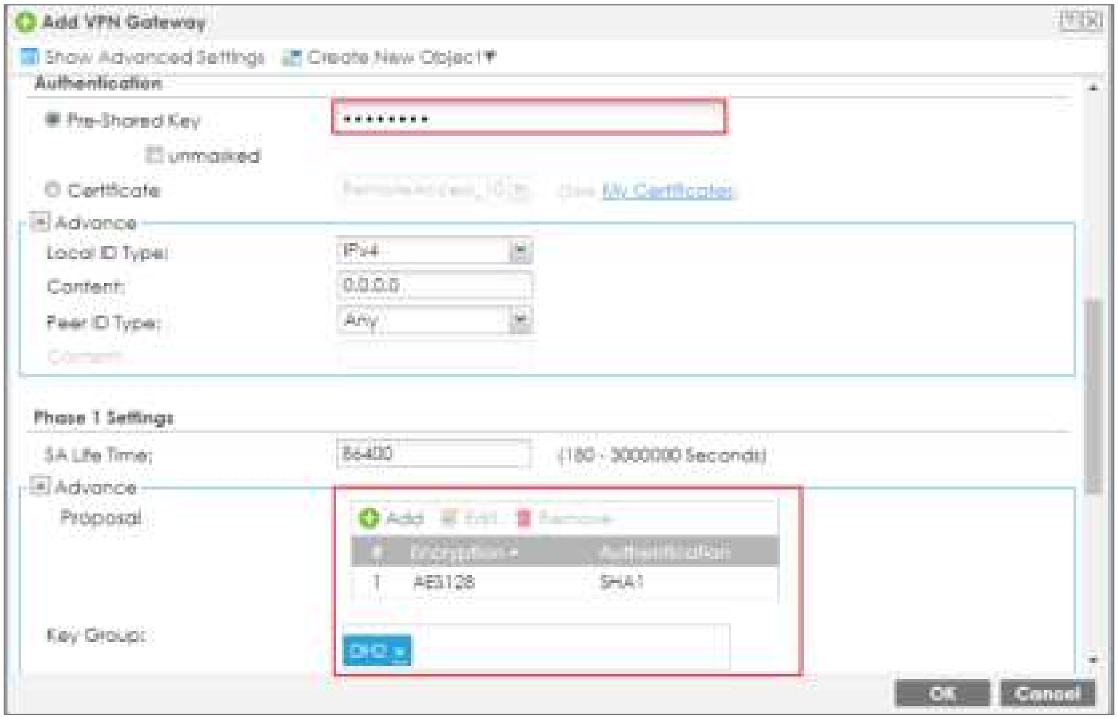
● Static Address — Primary: 100.100.100.254 — Secondary: 0.0.0.0

□ Fall back to Primary Peer Gateway when possible

Fall Back Check Interval: 300 (60-86400 seconds)

○ Dynamic Address

Type Pre-shared Key. The default proposal which created by wizard is "Encryption:AES128, Authentication:SHA1, Key Group:DH2". Those are the same as uOS.



Add VPN Gateway

Show Advanced Settings | Create New Object

Authentication

● Pre-Shared Key: *********

□ unmasked

○ Certificate: [illegible] See My Certificates

Advance

Local ID Type: IPv4

Content: 0.0.0.0

Peer ID Type: Any

Content:

Phase 1 Settings

SA Life Time: 86400 (180 - 3000000 Seconds)

Advance

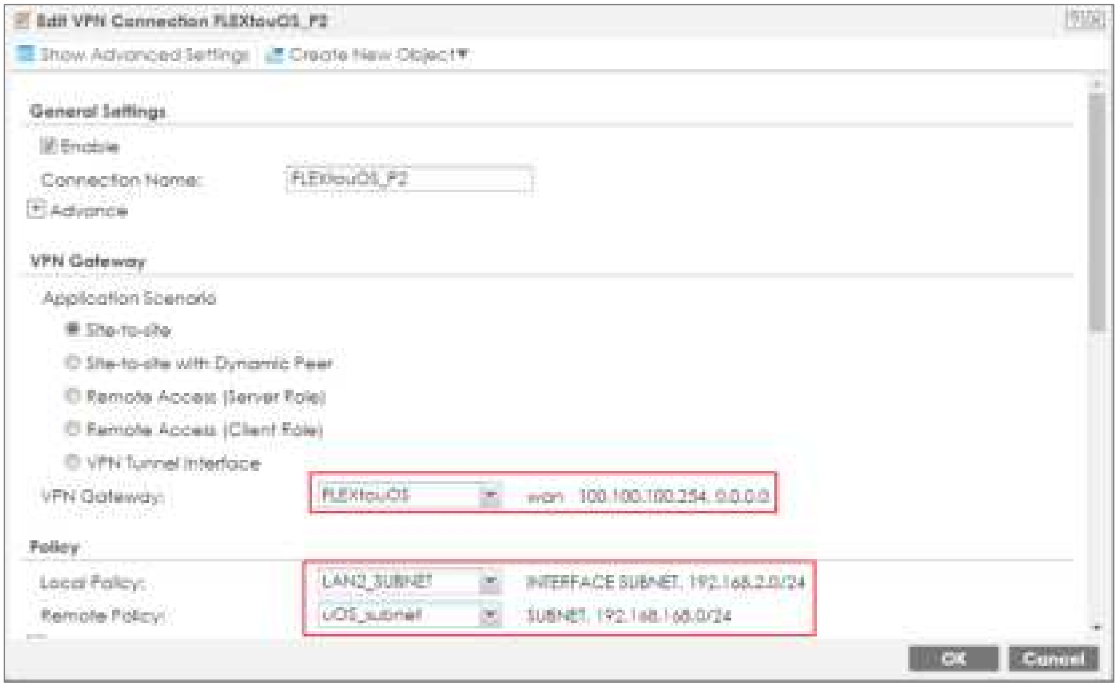
Proposal

#	Encryption	Authentication
1	AES128	SHA1

Key Group: DH2

VPN > IPSec VPN > VPN Connection

Select VPN Gateway and set Local Subnet to be the IP address of the network connected to be ZyWALL and Remote Subnet to be the IP address of the network connected to the peer USG FLEX H.



Edit VPN Connection FLEXtouOS_P2

General Settings

☑ Enable

Connection Name: FLEXtouOS_P2

⊞ Advance

VPN Gateway

Application Scenario

● Site-to-site

○ Site-to-site with Dynamic Peer

○ Remote Access (Server Role)

○ Remote Access (Client Role)

○ VPN Tunnel Interface

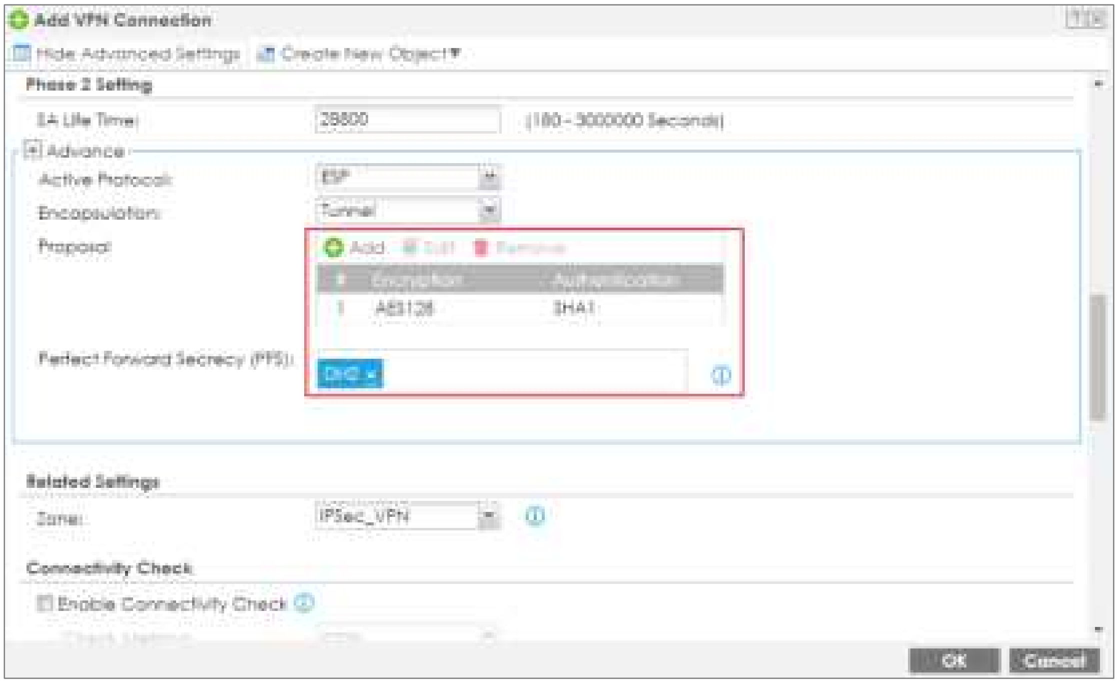
VPN Gateway: FLEXtouOS ▼ wan 100.100.100.254, 0.0.0.0

Policy

Local Policy: LAN2_SUBNET ▼ INTERFACE SUBNET, 192.168.2.0/24

Remote Policy: uOS_subnet ▼ SUBNET, 192.168.168.0/24

The default proposal which created by wizard is “Encryption: AES128, Authentication: SHA1, Key Group: DH2”. Those are the same as uOS.



Phase 2 Setting

SA Life Time: 28800 (180 - 3000000 Seconds)

Advance

Active Protocol: ESP

Encapsulation: Tunnel

Proposal:

#	Encryption	Authentication
1	AES128	SHA1

Perfect Forward Secrecy (PFS): DH2 ×

Related Settings

Zone: IPSec_VPN

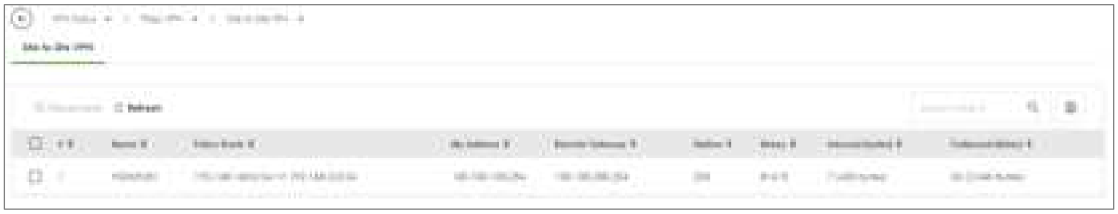
Connectivity Check

□ Enable Connectivity Check

Test IPSec VPN Tunnel

VPN Status > IPSec VPN

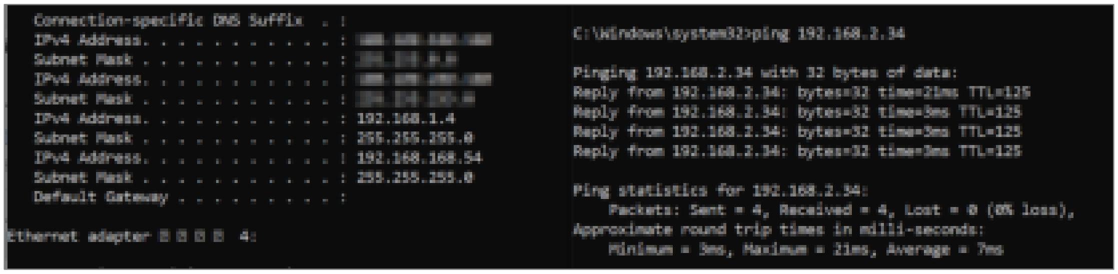
Verify the IPSec VPN status on uOS device.



Refresh

Ping the PC that is connected to ZLD device

Win 11 > cmd > ping 192.168.2.34

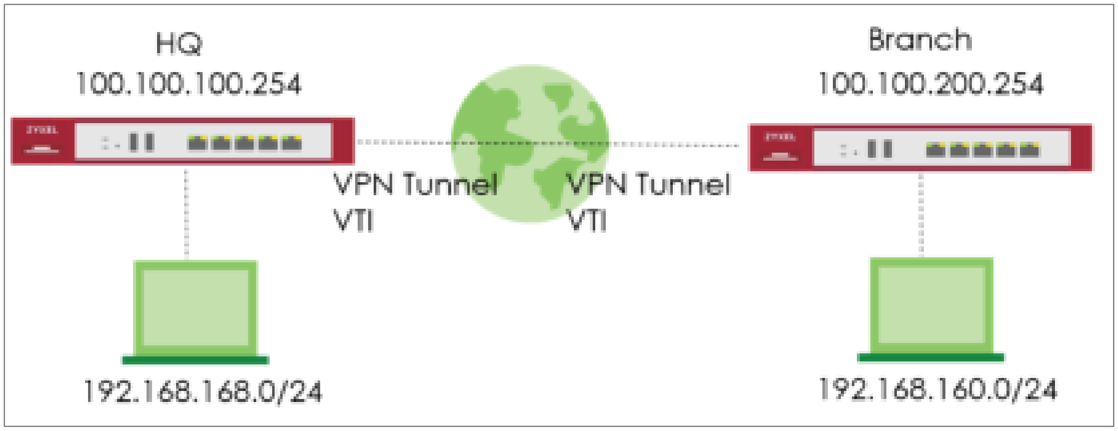


```
   Connection-specific DNS Suffix  . :
   IPv4 Address. . . . . . . . . . . : [redacted]
   Subnet Mask . . . . . . . . . . . : [redacted]
   IPv4 Address. . . . . . . . . . . : [redacted]
   Subnet Mask . . . . . . . . . . . : [redacted]
   IPv4 Address. . . . . . . . . . . : 192.168.1.4
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   IPv4 Address. . . . . . . . . . . : 192.168.168.54
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Ethernet adapter □ □ □ □  4:
```

```
C:\Windows\system32>ping 192.168.2.34

Pinging 192.168.2.34 with 32 bytes of data:
Reply from 192.168.2.34: bytes=32 time=21ms TTL=125
Reply from 192.168.2.34: bytes=32 time=3ms TTL=125
Reply from 192.168.2.34: bytes=32 time=3ms TTL=125
Reply from 192.168.2.34: bytes=32 time=3ms TTL=125

Ping statistics for 192.168.2.34:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 21ms, Average = 7ms
```

How to Configure Route-Based VPN

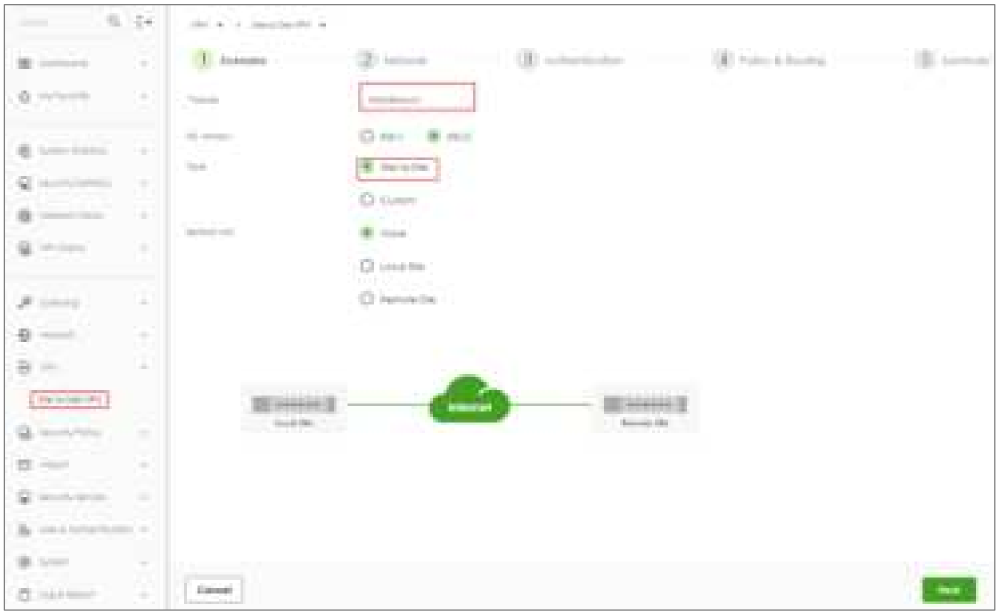
This example shows how to use the VPN Setup Wizard to create a site-to-site VPN with the Peer has a Static IP Address. The example instructs how to configure the VPN tunnel between each site. When the VPN tunnel is configured, each site can be accessed securely.



Set up IPSec VPN Tunnel for HQ

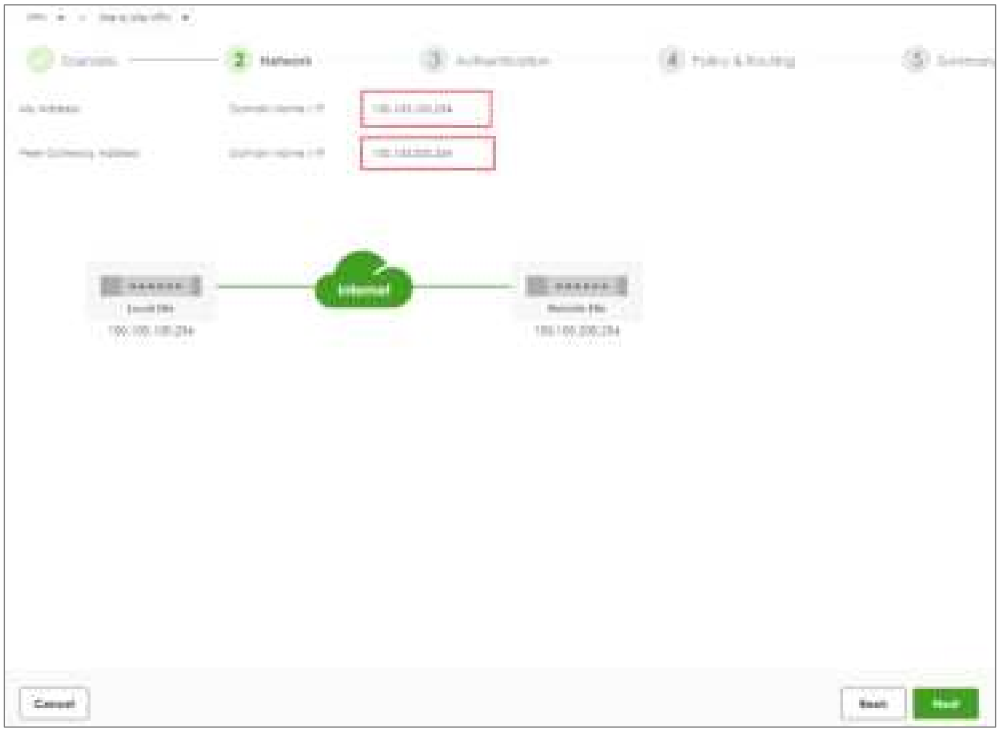
VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the type to the Site-to-Site. Click **Next**.



VPN > Site to Site VPN > Scenario > Network

Configure My Address and Peer Gateway Address. Click **Next.**

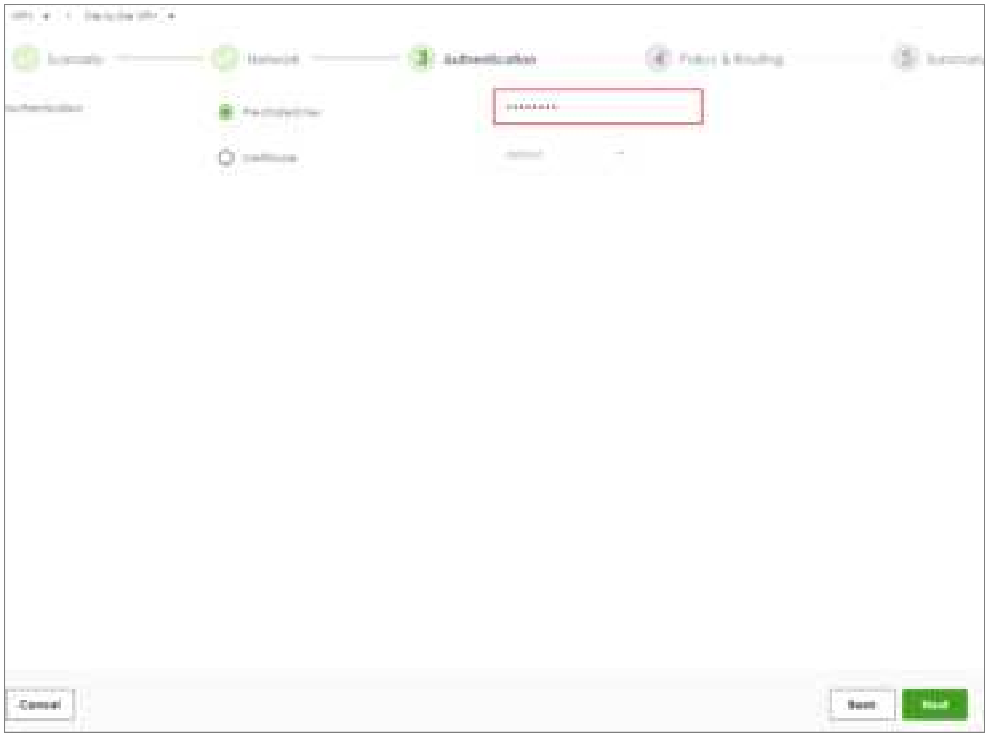


My Address Domain Name / IP 100.100.100.254

Peer Gateway Address Domain Name / IP 100.100.200.254

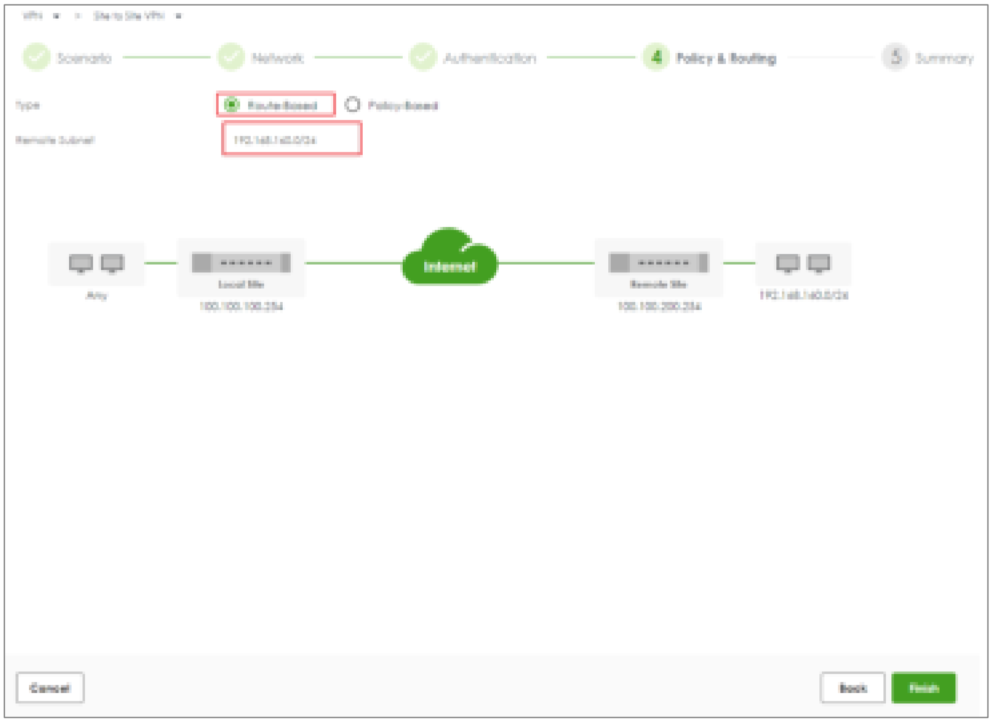
VPN > Site to Site VPN > Scenario > Network > Authentication

Type a secure Pre-Shared Key. Click **Next**



VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing

Set Type to Route-Based and configure the Remote Subnet.

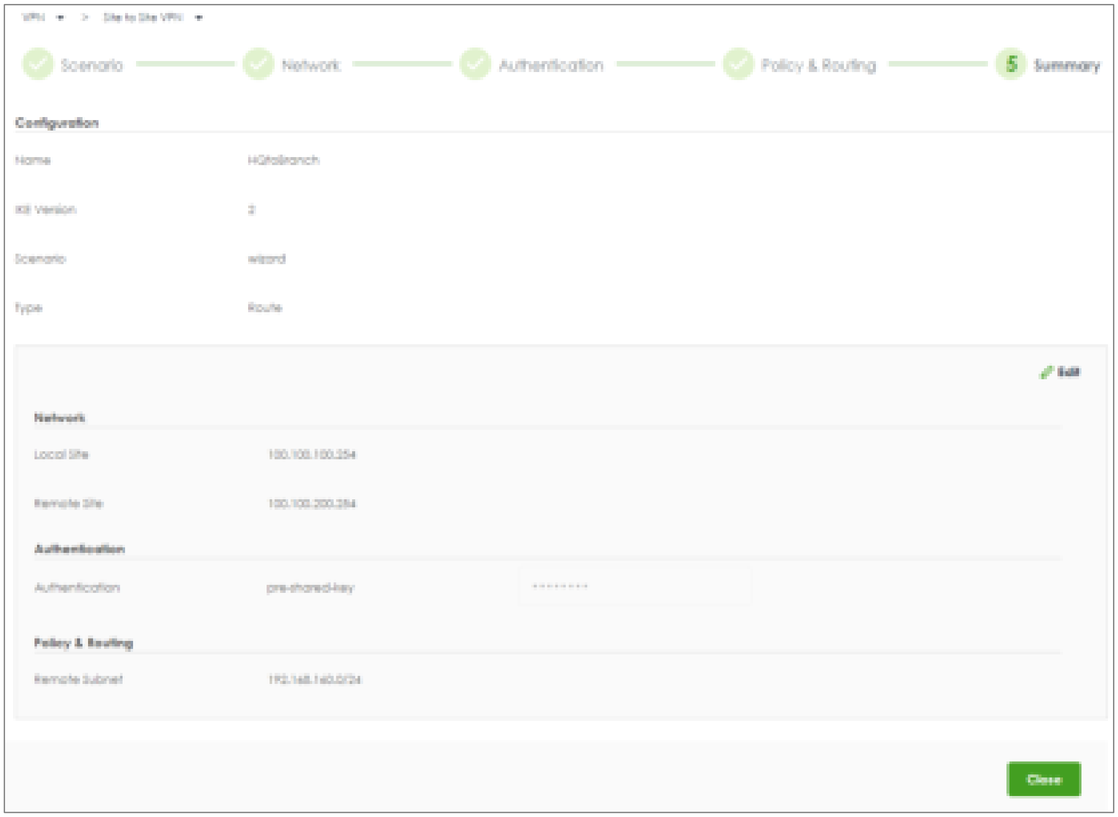


Type ● Route-Based ○ Policy-Based

Remote Subnet 192.168.160.0/24

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing > Summary

The screen provides a summary of the VPN tunnel. You can Edit it if you want to modify.



Configuration

Name	HQtoBranch
IKE Version	2
Scenario	wizard
Type	Route

Network

Local Site	100.100.100.254
Remote Site	100.100.200.254

Authentication

Authentication	pre-shared-key	********

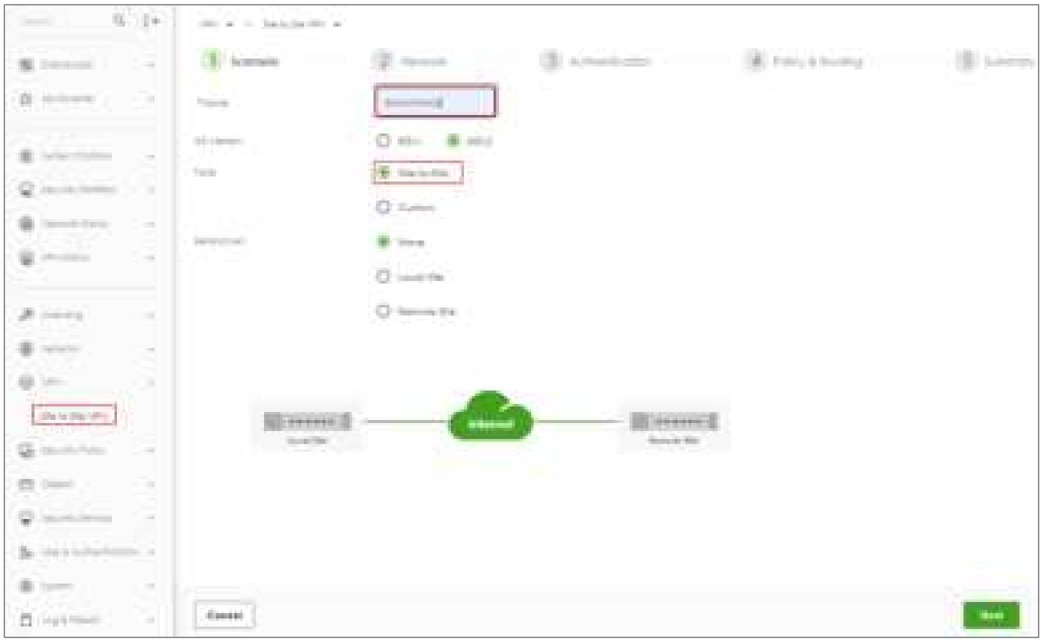
Policy & Routing

Remote Subnet	192.168.160.0/24

Set up IPSec VPN Tunnel for Branch

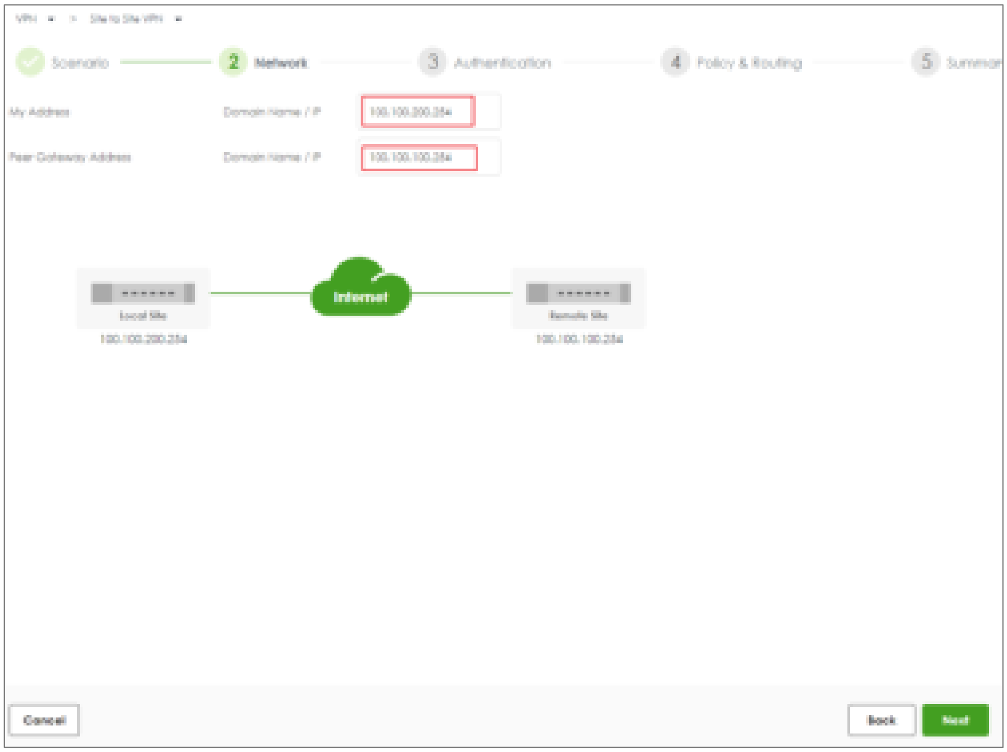
VPN > Site to Site VPN > Scenario

Type the VPN name used to identify this VPN connection. Select the type to the Site-to-Site. Click **Next**.



VPN > Site to Site VPN > Scenario > Network

Configure My Address and Peer Gateway Address. Click **Next.**

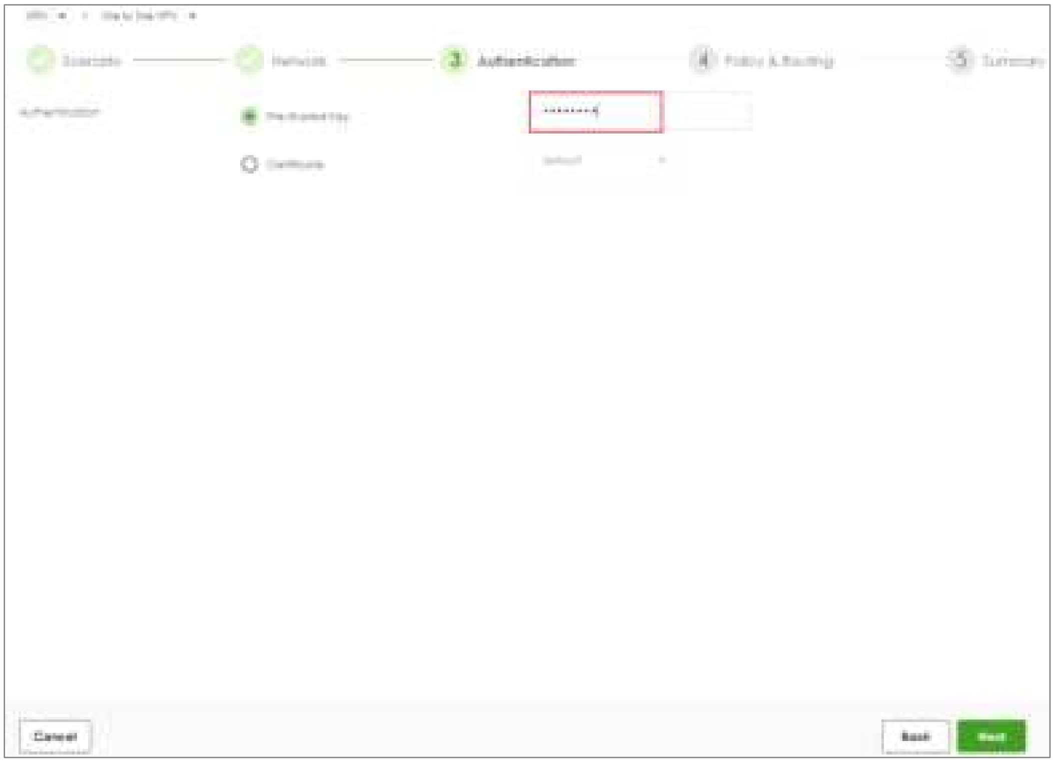


My Address — Domain Name / IP: 100.100.200.254

Peer Gateway Address — Domain Name / IP: 100.100.100.254

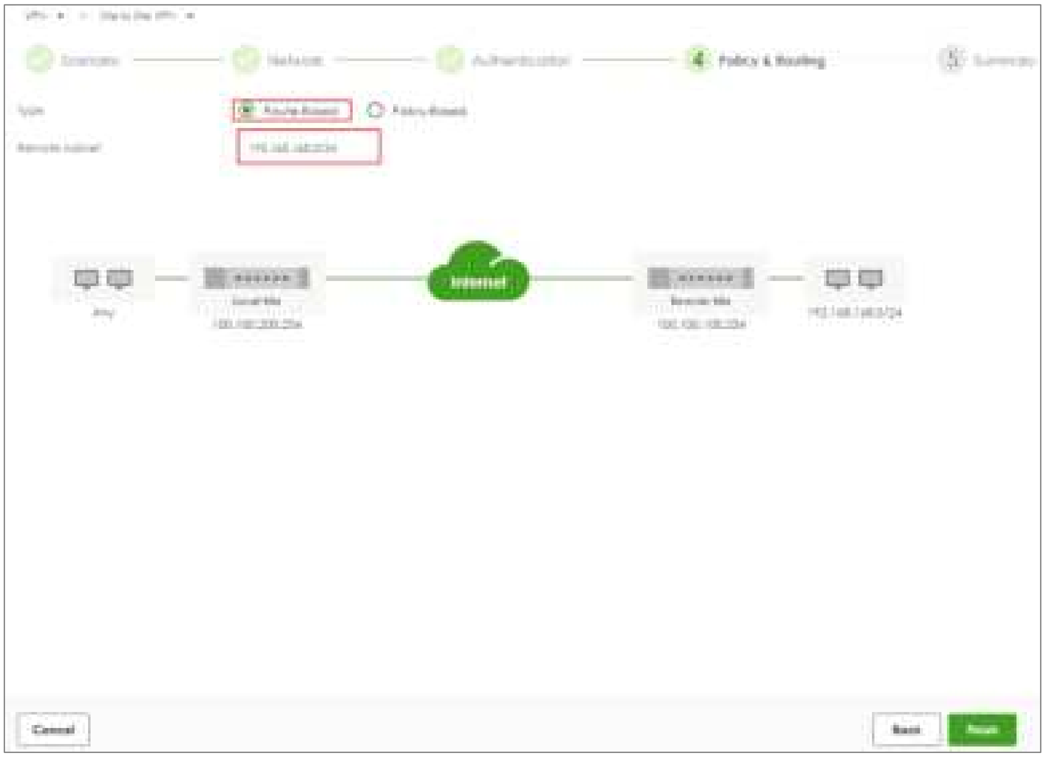
VPN > Site to Site VPN > Scenario > Network > Authentication

Type a secure Pre-Shared Key. Click **Next**



VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing

Set Type to Route-Based and Remote Subnet.

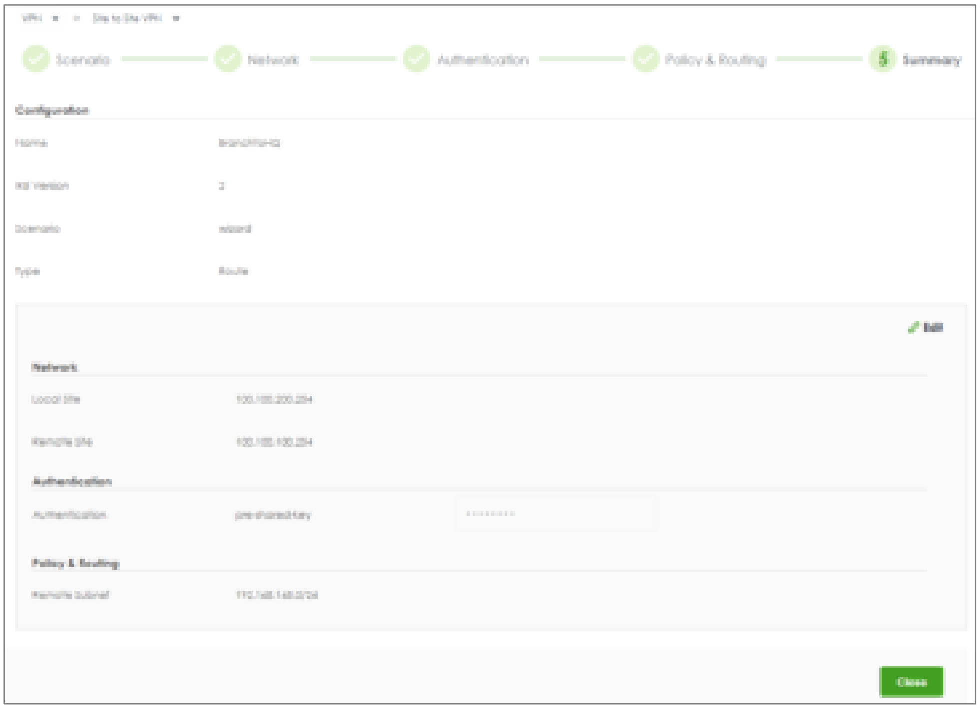


Type ● Route-Based ○ Policy-Based

Remote Subnet [illegible]

VPN > Site to Site VPN > Scenario > Network > Authentication > Policy & Routing > Summary

The screen provides a summary of the VPN tunnel. You can Edit it if you want to modify.



Configuration

Name BranchtoHQ

IKE Version 2

Scenario wizard

Type Route

Network

Local Site 100.100.200.254

Remote Site 100.100.100.254

Authentication

Authentication pre-shared-key ••••••••

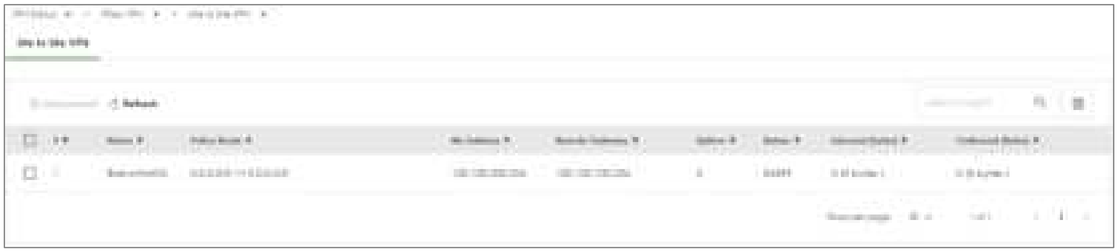
Policy & Routing

Remote Subnet 192.168.168.0/24

Test IPSec VPN Tunnel

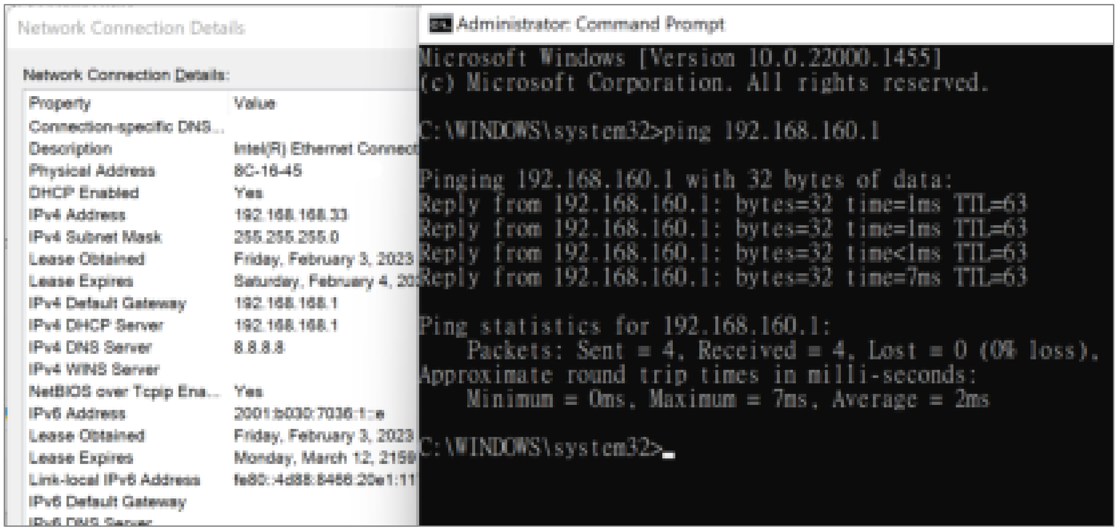
VPN Status > IPSec VPN

Verify the IPSec VPN status.



Ping the PC in Branch Office

Win 11 > cmd > ping 192.168.160.1



Network Connection Details

Network Connection Details:

Property	Value
Connection-specific DNS...	
Description	Intel(R) Ethernet Connect
Physical Address	8C-16-45
DHCP Enabled	Yes
IPv4 Address	192.168.168.33
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	Friday, February 3, 2023
Lease Expires	Saturday, February 4, 20
IPv4 Default Gateway	192.168.168.1
IPv4 DHCP Server	192.168.168.1
IPv4 DNS Server	8.8.8.8
IPv4 WINS Server	
NetBIOS over Tcpip Ena...	Yes
IPv6 Address	2001:b030:7036:1::e
Lease Obtained	Friday, February 3, 2023
Lease Expires	Monday, March 12, 2159
Link-local IPv6 Address	fe80::4d88:8466:20e1:11
IPv6 Default Gateway	
IPv6 DNS Server	

Administrator: Command Prompt

```
Microsoft Windows [Version 10.0.22000.1455]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ping 192.168.160.1

Pinging 192.168.160.1 with 32 bytes of data:
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=1ms TTL=63
Reply from 192.168.160.1: bytes=32 time<1ms TTL=63
Reply from 192.168.160.1: bytes=32 time=7ms TTL=63

Ping statistics for 192.168.160.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 7ms, Average = 2ms

C:\WINDOWS\system32>_
```

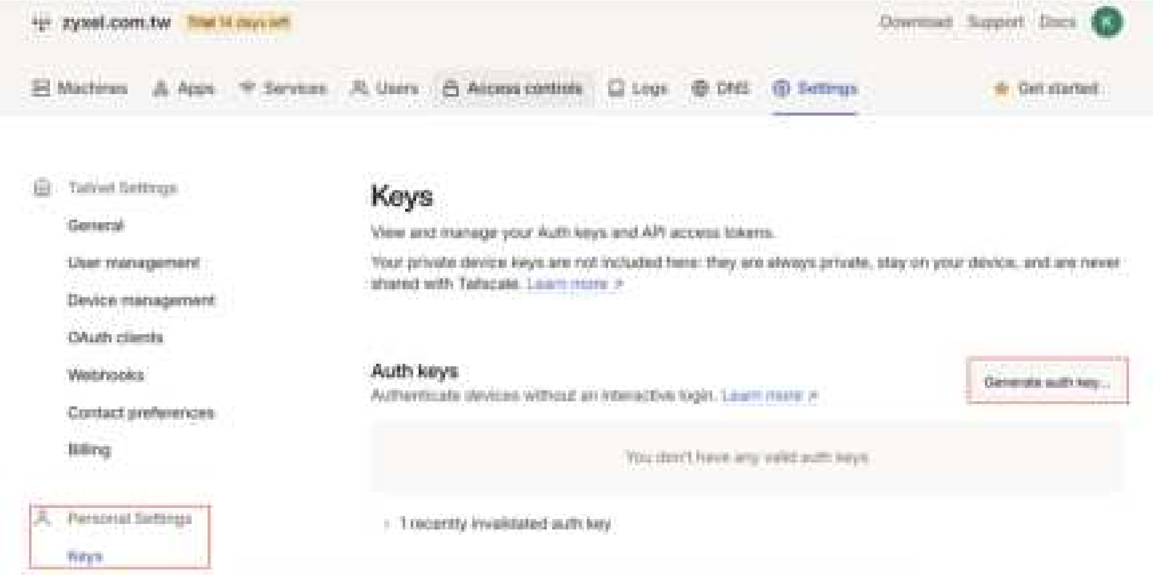
How to Use Tailscale

What’s Tailscale?

Tailscale is a secure, peer-to-peer VPN solution that simplifies connecting devices over the internet. Unlike traditional VPNs, Tailscale establishes direct connections between devices without requiring complex firewall configurations or static IP addresses. It uses a mesh network topology, allowing every device to communicate directly with every other device securely.

Start to Tailscale and implement on Firewall

1. Please refer TailScale KB to create an account and start.
2. Navigate to “Settings -> Personal Settings -> Keys” and “Generate auth key”.



Keys

View and manage your Auth keys and API access tokens.

Your private device keys are not included here: they are always private, stay on your device, and are never shared with Tailscale. Learn more ↗

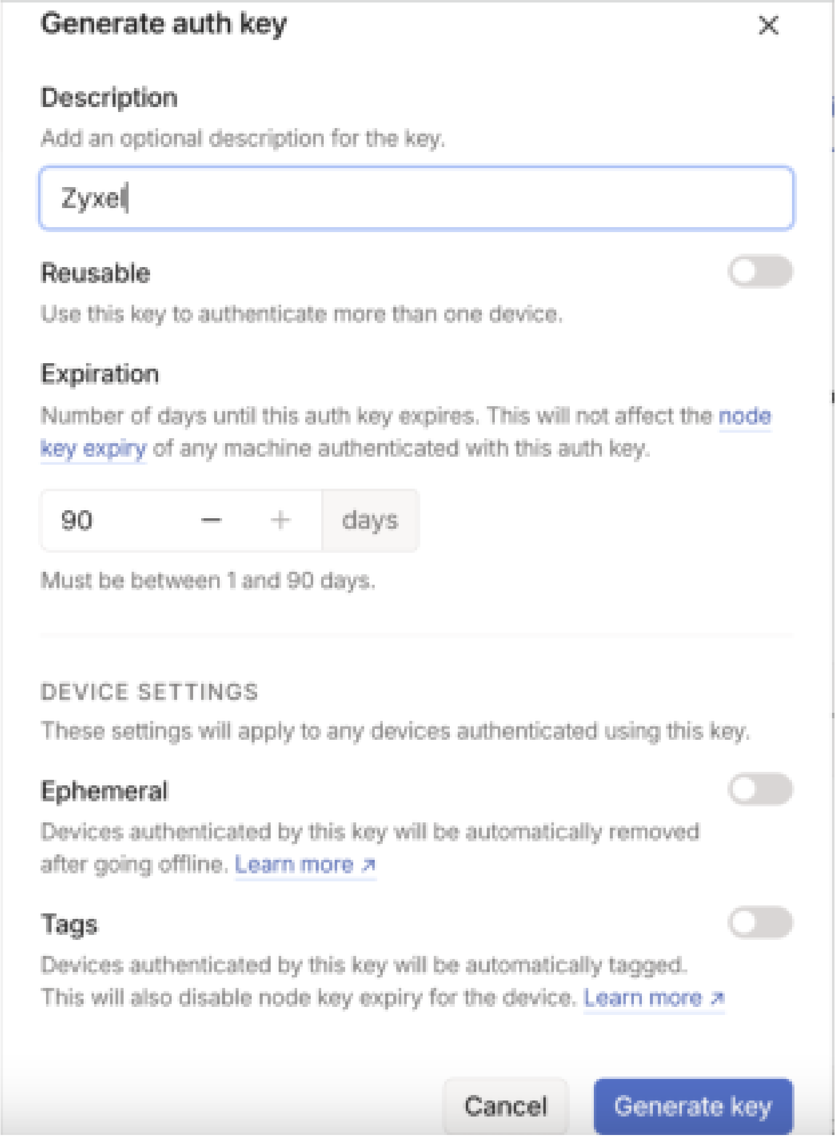
Auth keys

Authenticate devices without an interactive login. Learn more ↗

You don't have any valid auth keys

1 recently invalidated auth key

3. Give a Description Name as you want and disable "Reusable" due to security reason then click "Generate key".



Generate auth key

Description

Add an optional description for the key.

Zyxel

Reusable

Use this key to authenticate more than one device.

Expiration

Number of days until this auth key expires. This will not affect the node key expiry of any machine authenticated with this auth key.

90 days

Must be between 1 and 90 days.

DEVICE SETTINGS

These settings will apply to any devices authenticated using this key.

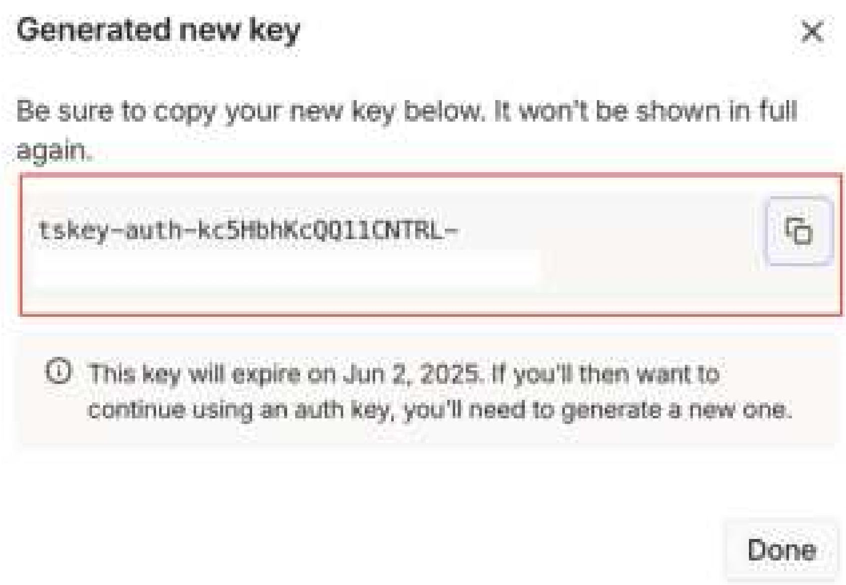
Ephemeral

Devices authenticated by this key will be automatically removed after going offline. Learn more ↗

Tags

Devices authenticated by this key will be automatically tagged. This will also disable node key expiry for the device. Learn more ↗

Copy the key.



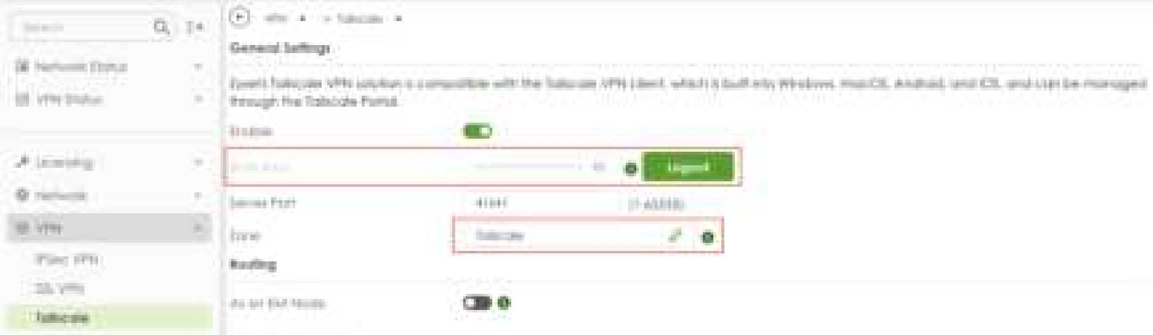
Generated new key

Be sure to copy your new key below. It won't be shown in full again.

tskey-auth-kc5HbhKcQQ11CNTRL-

This key will expire on Jun 2, 2025. If you'll then want to continue using an auth key, you'll need to generate a new one.

4. Login Firewall and navigate to “VPN -> Tailscale”, paste to the “Auth Keys”.



General Settings

Zyxel's Tailscale VPN solution is compatible with the Tailscale VPN client, which is built into Windows, macOS, Android, and iOS, and can be managed through the Tailscale Portal.

Enable

Auth Keys

Service Port 41641 (1-65535)

Zone Tailscale

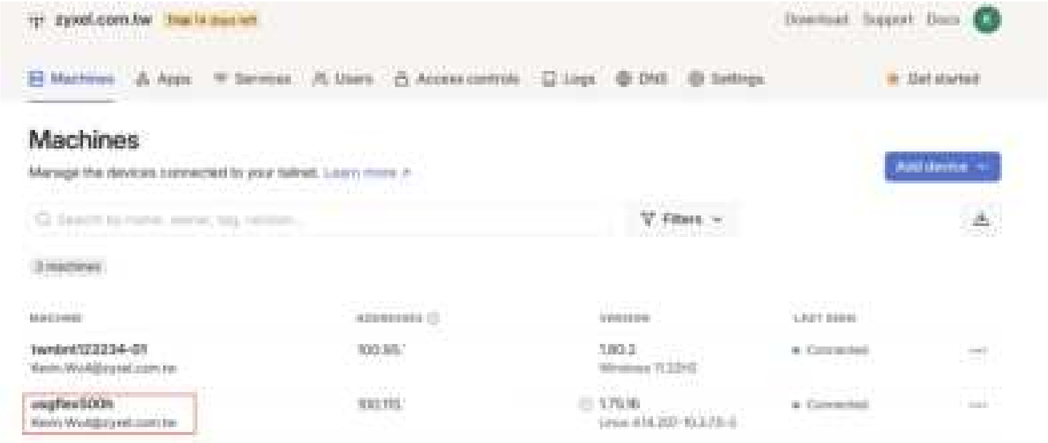
Routing

As an Exit Node

Note:

- When you want to change the key, please click Logout.
- You can choose the zone by yourself. We recommend using Tailscale zone for some predefined rules.

5. Go back to the Tailscale admin page. You will see the Firewall device.

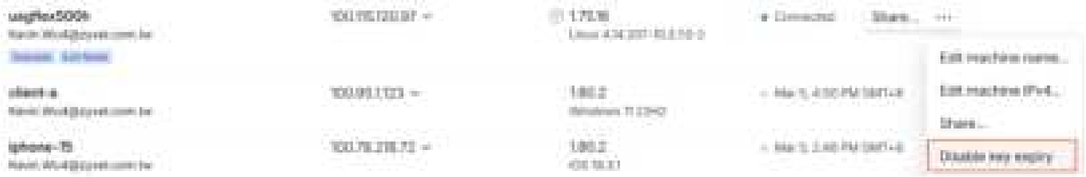


Machines

Manage the devices connected to your tailnet. Learn more ↗

MACHINE	ADDRESSES	VERSION	LAST SEEN
twrdnt122234-01 Kevin.Wu4@zyxel.com.tw	100.85.'	1.80.2 Windows 11 22H2	● Connected
usgflex500h Kevin.Wu4@zyxel.com.tw	100.115.'	1.75.16 Linux 4.14.207-10.3.7.0-5	● Connected

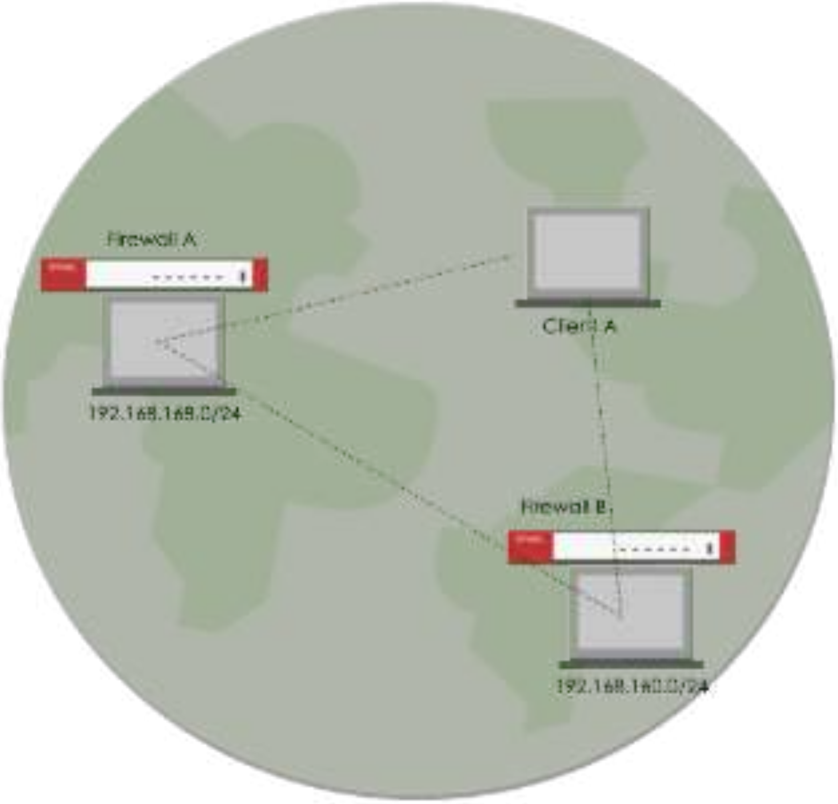
Click “Disable key expiry” for all client to prevent lost connection while expire.



usgflex500h Kevin.Wu4@zyxel.com.tw	100.115.120.97	1.75.16 Linux 4.14.207-10.3.7.0-5	● Connected
client-a Kevin.Wu4@zyxel.com.tw	100.93.1.123	1.80.2 Windows 11 22H2	Mar 5, 4:50 PM GMT+8
iphone-15 Kevin.Wu4@zyxel.com.tw	100.78.218.72	1.80.2 iOS 18.3.1	Mar 5, 2:40 PM GMT+8

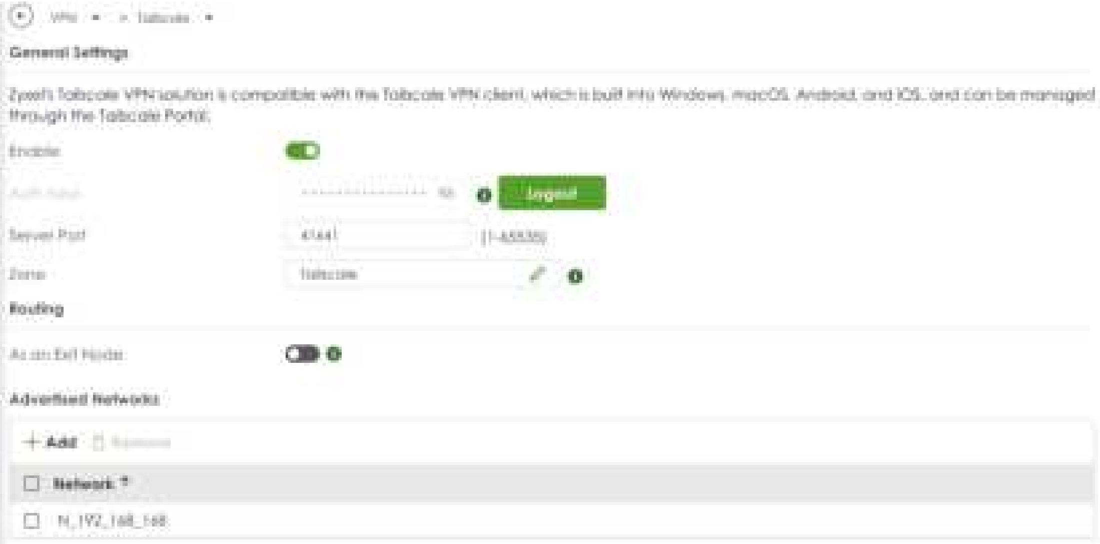
Scenario

We have two subnets, 192.168.168.0/24 and 192.168.160.0/24, which are located behind firewalls. Both the firewalls and the Client A are part of the Tailscale VPN network. The objectives are as follows:



Case1: Allow Client A to access the 192.168.168.0/24 and 192.168.160.0/24 subnets

1. Advertised 192.168.168.0/24 in Firewall A.



VPN > Tailscale

General Settings

Zyxel's Tailscale VPN solution is compatible with the Tailscale VPN client, which is built into Windows, macOS, Android, and iOS, and can be managed through the Tailscale Portal.

Enable

Auth Key ················ Logout

Server Port 41641 (1-65535)

Zone Tailscale

Routing

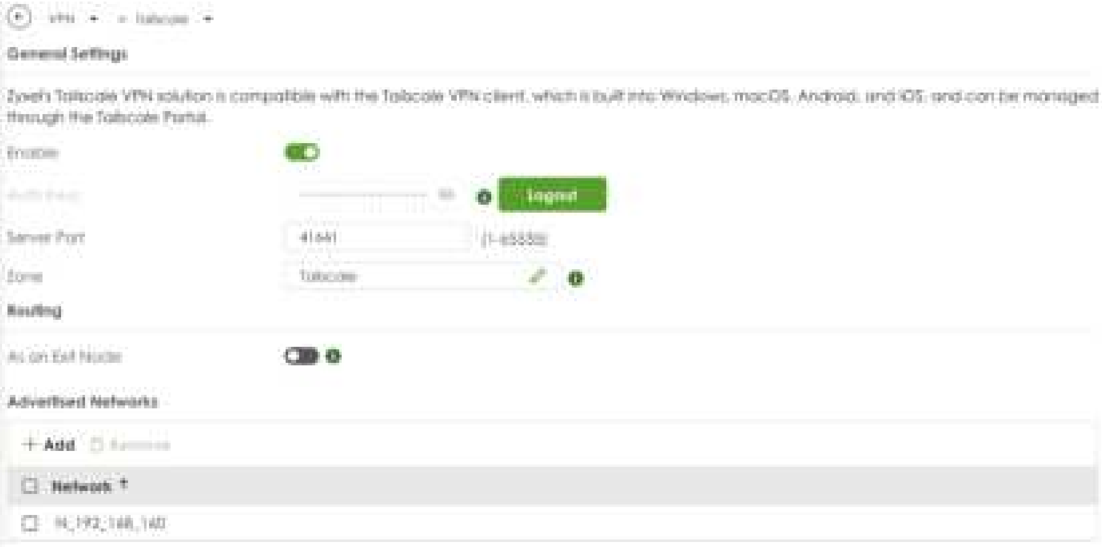
As an Exit Node

Advertised Networks

+ Add Remove

☐ Network
☐ N_192_168_168

2. Advertised 192.168.160.0/24 in Firewall B.



VPN > Tailscale

General Settings

Zyxel's Tailscale VPN solution is compatible with the Tailscale VPN client, which is built into Windows, macOS, Android, and iOS, and can be managed through the Tailscale Portal.

Enable

Auth Key ················ Logout

Server Port 41641 (1-65535)

Zone Tailscale

Routing

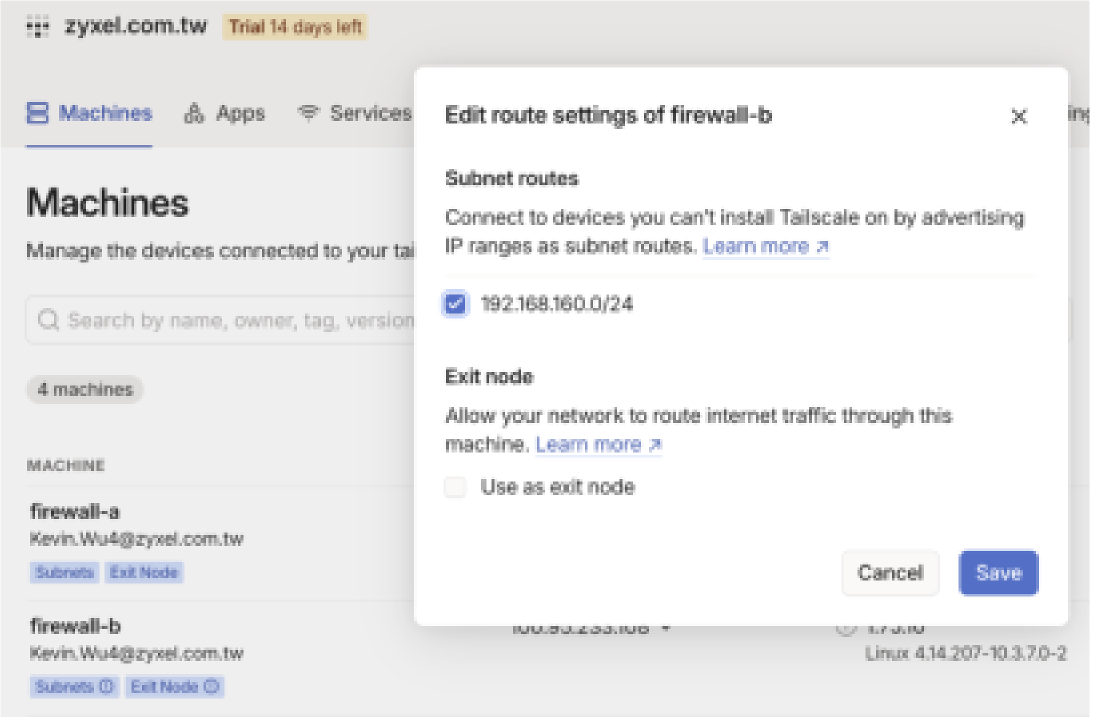
As an Exit Node

Advertised Networks

+ Add Remove

☐ Network
☐ N_192_168_160

3. Ensure Both subnets have been approved from Tailscale portal.



Edit route settings of firewall-b ✕

Subnet routes

Connect to devices you can't install Tailscale on by advertising IP ranges as subnet routes. Learn more ↗

☑ 192.168.160.0/24

Exit node

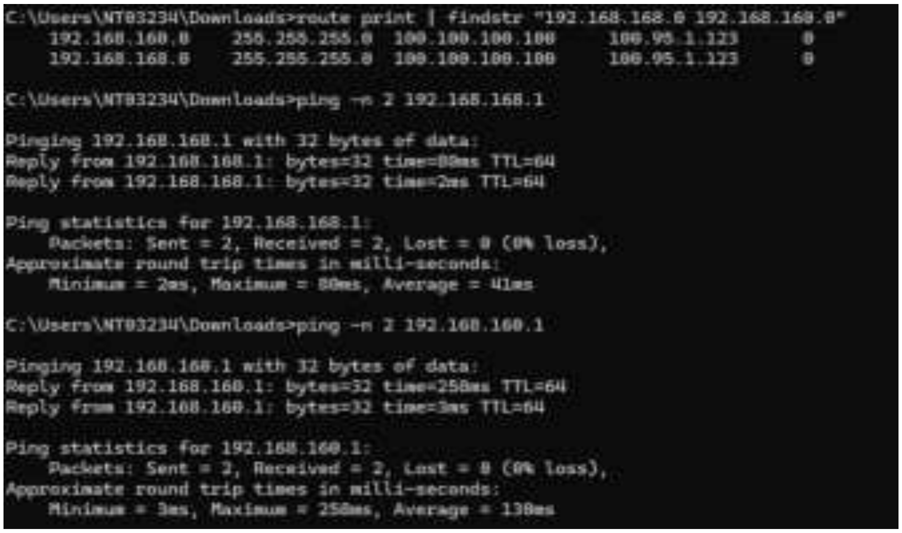
Allow your network to route internet traffic through this machine. Learn more ↗

□ Use as exit node

Cancel | Save

Test the Result

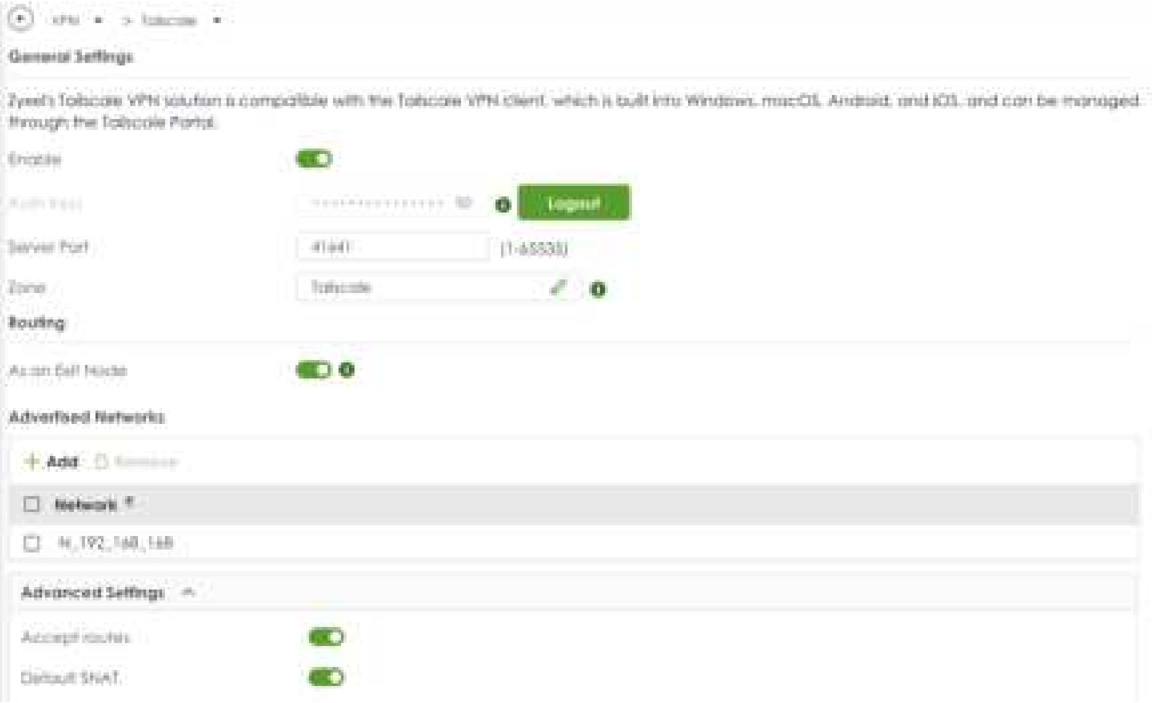
Now, Client A know how to route traffic and able to access 192.168.168.1 and 192.168.160.1.



```
C:\Users\NT03234\Downloads>route print | findstr "192.168.168.0 192.168.160.0"
     192.168.160.0    255.255.255.0  100.100.100.100     100.95.1.123      0
     192.168.168.0    255.255.255.0  100.100.100.100     100.95.1.123      0

C:\Users\NT03234\Downloads>ping -n 2 192.168.168.1

Pinging 192.168.168.1 with 32 bytes of data:
Reply from 192.168.168.1: bytes=32 time=80ms TTL=64
Reply from 192.168.168.1: bytes=32 time=2ms TTL=64

Ping statistics for 192.168.168.1:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 80ms, Average = 41ms

C:\Users\NT03234\Downloads>ping -n 2 192.168.160.1

Pinging 192.168.160.1 with 32 bytes of data:
Reply from 192.168.160.1: bytes=32 time=258ms TTL=64
Reply from 192.168.160.1: bytes=32 time=3ms TTL=64

Ping statistics for 192.168.160.1:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 258ms, Average = 130ms
```

Case 2: Allow Client A to access internet through Firewall

1. Take Firewall A as example. Enable "Exit Node" and "Default SNAT".



VPN > Tailscale

General Settings

Zyxel's Tailscale VPN solution is compatible with the Tailscale VPN client, which is built into Windows, macOS, Android, and iOS, and can be managed through the Tailscale Portal.

Enable: ●
Auth Key: •••••••••••••••• Logout
Server Port: 41641 (1-65535)
Zone: Tailscale

Routing

As an Exit Node: ●

Advertised Networks

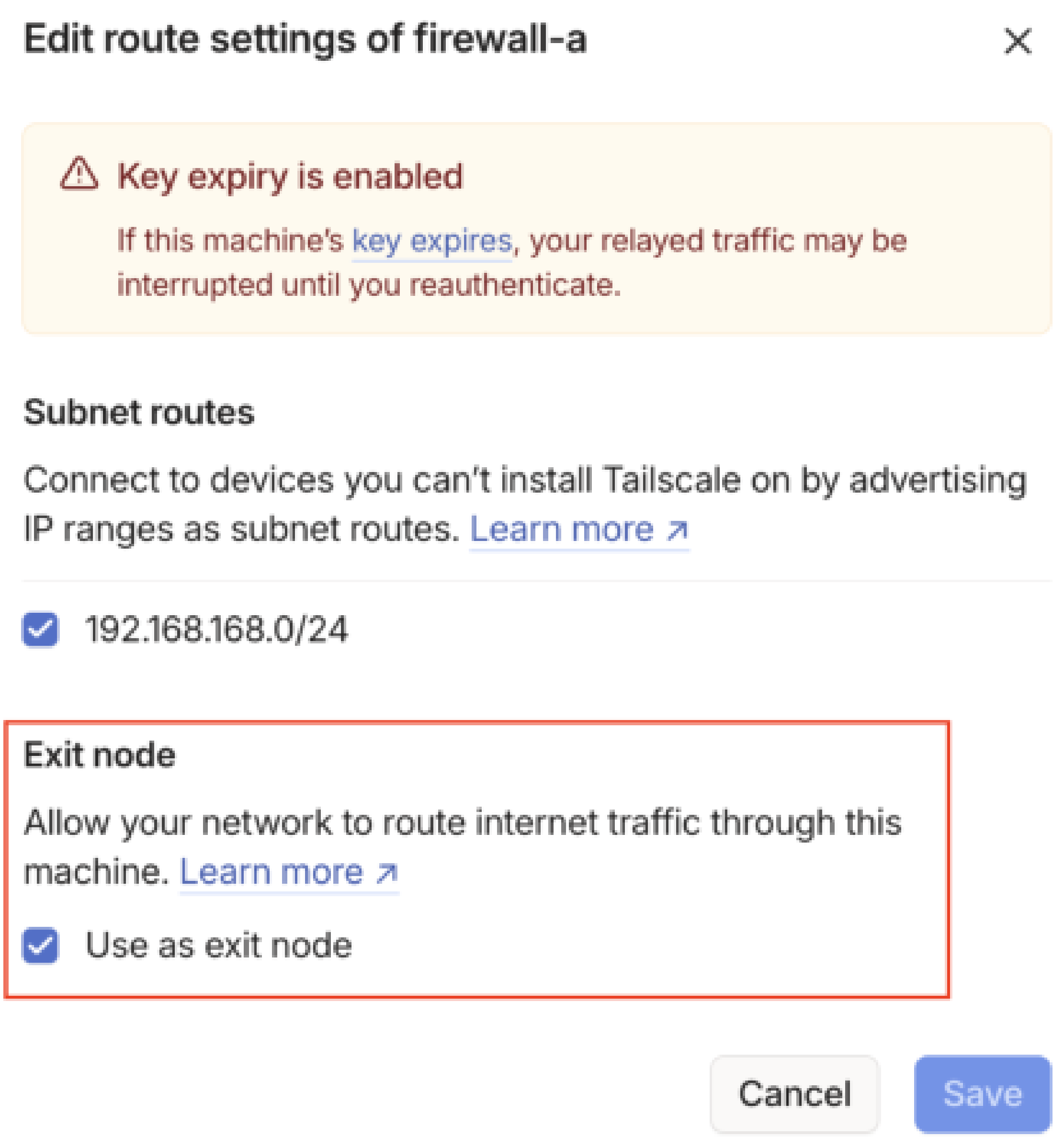
+ Add Remove

□	Network
□	N_192_168_168

Advanced Settings

Accept routes: ●
Default SNAT: ●

2. Ensure the Exit-Node have been enabled from Tailscale portal.



Edit route settings of firewall-a

Key expiry is enabled

If this machine's key expires, your relayed traffic may be interrupted until you reauthenticate.

Subnet routes

Connect to devices you can't install Tailscale on by advertising IP ranges as subnet routes. Learn more ↗

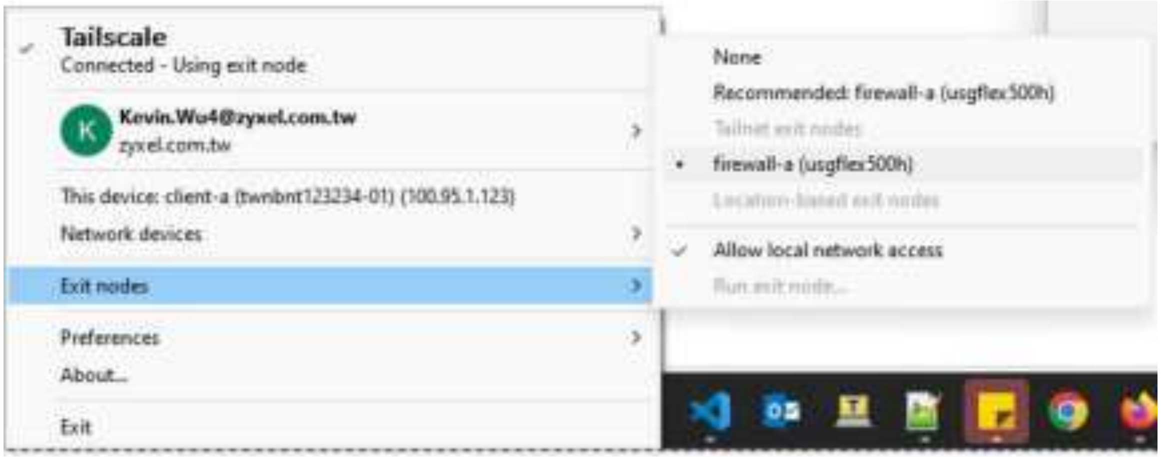
☑ 192.168.168.0/24

Exit node

Allow your network to route internet traffic through this machine. Learn more ↗

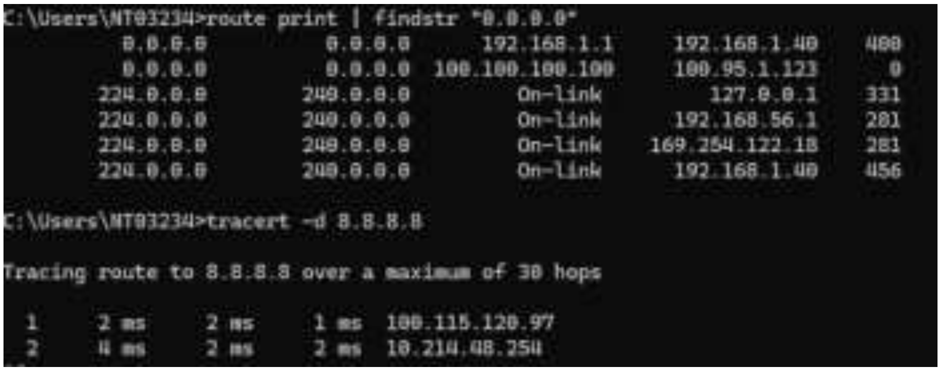
☑ Use as exit node

3. Client A need to select Firewall A as exit node.


Tailscale
Connected - Using exit node
Kevin.Wu4@zyxel.com.tw
zyxel.com.tw
This device: client-a (twnbnt123234-01) (100.95.1.123)
Network devices
Exit nodes
Preferences
About...
Exit
None
Recommended: firewall-a (usgflex500h)
Tailnet exit nodes
• firewall-a (usgflex500h)
Location-based exit nodes
✓ Allow local network access
Run exit node...

Test the Result

The internet traffic will send to Firewall A.



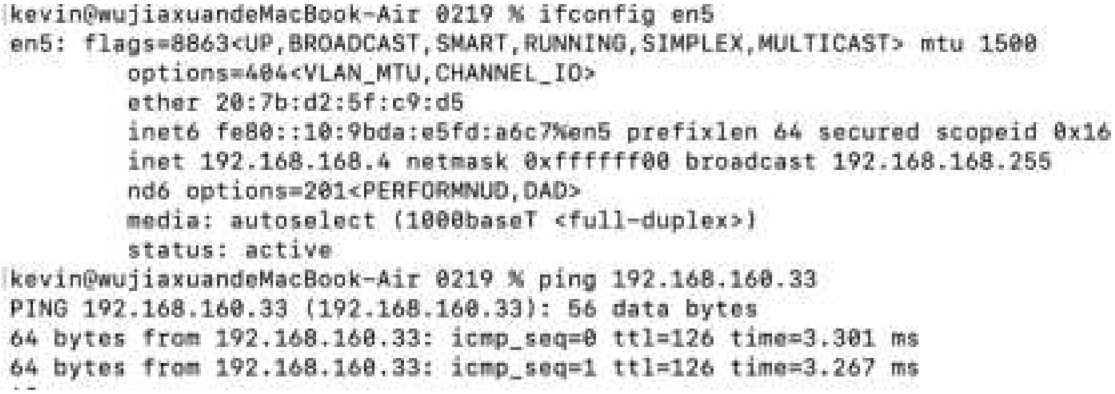
```
C:\Users\NT03234>route print | findstr "0.0.0.0"
          0.0.0.0          0.0.0.0      192.168.1.1     192.168.1.40    400
          0.0.0.0          0.0.0.0  100.100.100.100     100.95.1.123      0
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link    169.254.122.18    281
        224.0.0.0        240.0.0.0         On-link      192.168.1.40    456

C:\Users\NT03234>tracert -d 8.8.8.8

Tracing route to 8.8.8.8 over a maximum of 30 hops

  1     2 ms     2 ms     1 ms  100.115.120.97
  2     4 ms     2 ms     2 ms  10.214.48.254
```

Case3: The devices within the 192.168.168.0/24 and 192.168.160.0/24 subnets can communicate with each other

Once you completed advertised Networks, you can communicate each other.

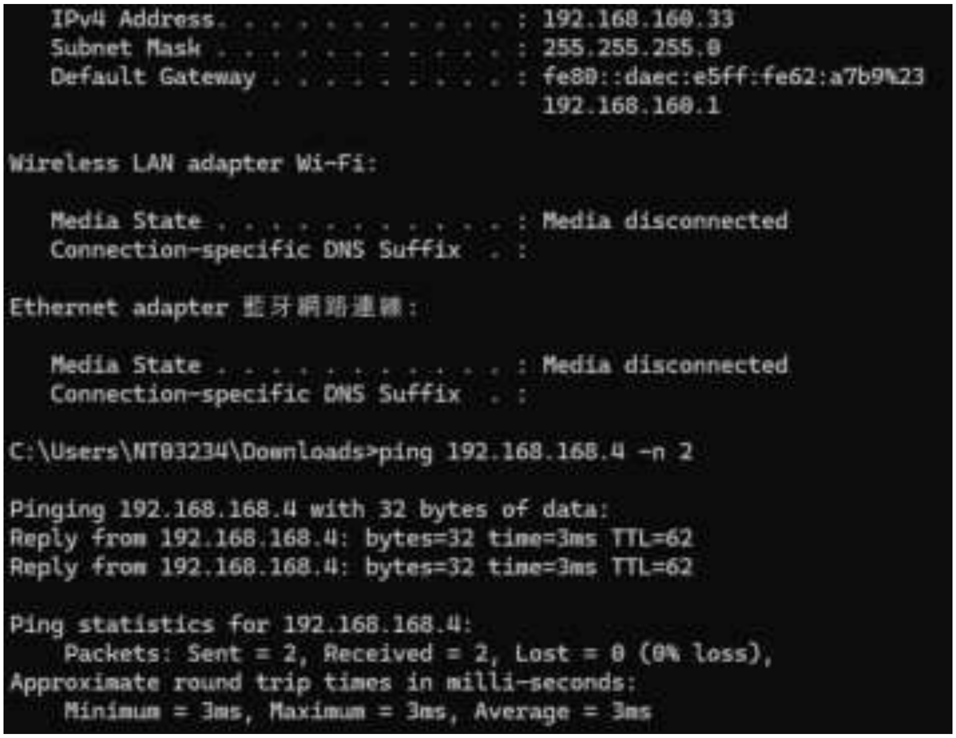
Test the Result

The ping test from Firewall A



```
kevin@wujiaxuandeMacBook-Air 0219 % ifconfig en5
en5: flags=8863<UP,BROADCAST,SMART,RUNNING,SIMPLEX,MULTICAST> mtu 1500
        options=404<VLAN_MTU,CHANNEL_IO>
        ether 20:7b:d2:5f:c9:d5
        inet6 fe80::10:9bda:e5fd:a6c7%en5 prefixlen 64 secured scopeid 0x16
        inet 192.168.168.4 netmask 0xffffff00 broadcast 192.168.168.255
        nd6 options=201<PERFORMNUD,DAD>
        media: autoselect (1000baseT <full-duplex>)
        status: active
kevin@wujiaxuandeMacBook-Air 0219 % ping 192.168.160.33
PING 192.168.160.33 (192.168.160.33): 56 data bytes
64 bytes from 192.168.160.33: icmp_seq=0 ttl=126 time=3.301 ms
64 bytes from 192.168.160.33: icmp_seq=1 ttl=126 time=3.267 ms
```

The ping test from Firewall B

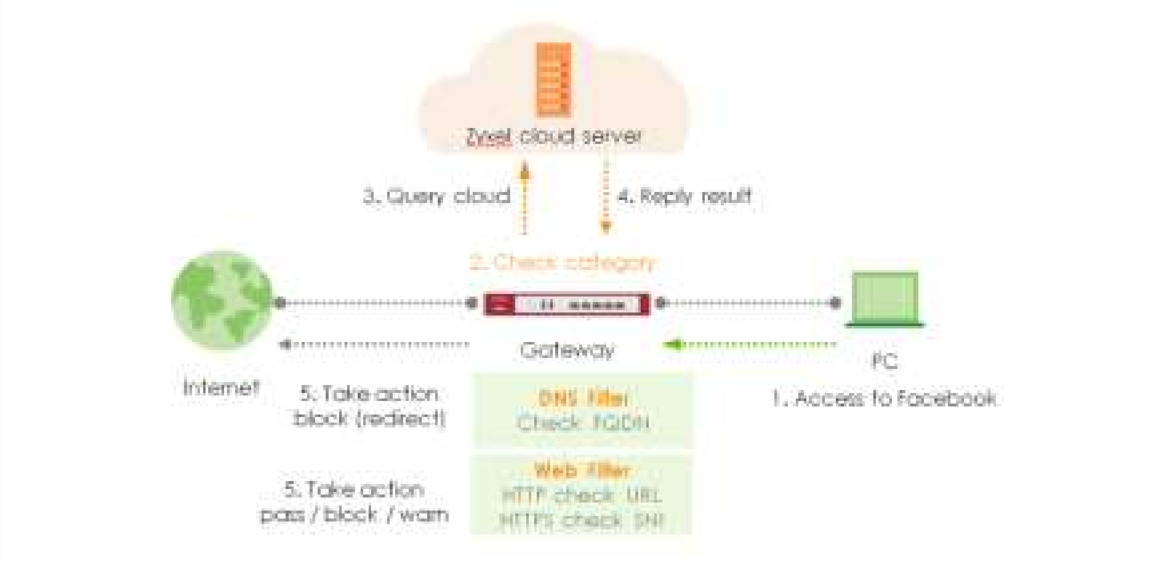


```
   IPv4 Address. . . . . . . . . . . : 192.168.160.33
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : fe80::daec:e5ff:fe62:a7b9%23
                                       192.168.160.1

Wireless LAN adapter Wi-Fi:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Ethernet adapter 藍牙網路連線:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

C:\Users\NT03234\Downloads>ping 192.168.168.4 -n 2

Pinging 192.168.168.4 with 32 bytes of data:
Reply from 192.168.168.4: bytes=32 time=3ms TTL=62
Reply from 192.168.168.4: bytes=32 time=3ms TTL=62

Ping statistics for 192.168.168.4:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 3ms, Average = 3ms
```

Chapter 2- Security Service

How to Block HTTPS Websites Using Content Filtering and SSL Inspection

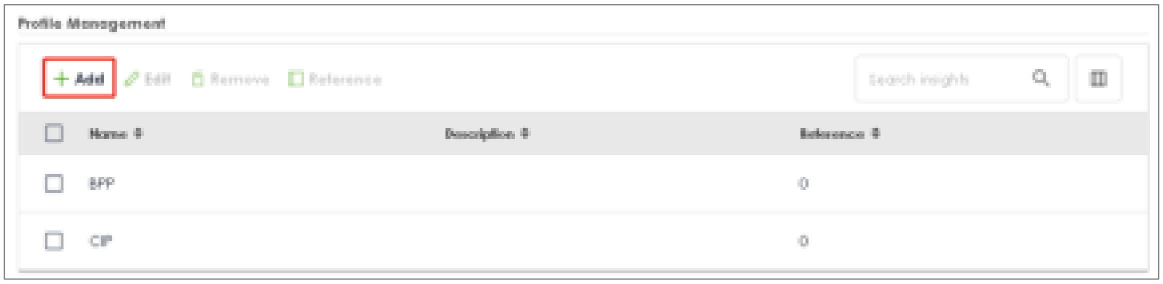
This is an example of using a FLEX Content Filtering, SSL Inspection and Security Policy to block access to malicious or not business-related websites.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Set Up Content Filter

Go to Security Service > Content Filtering. Click Add to create a content filtering profile in Profile Management.

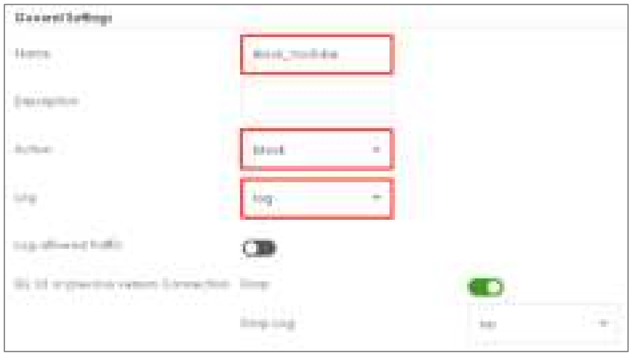


Profile Management

+ Add | Edit | Remove | Reference | Search insights

□	Name	Description	Reference
□	BPP		0
□	CIP		0

Type profile name and enable log for block action in General Settings.



General Settings

Name: block_YouTube

Description:

Action: Block

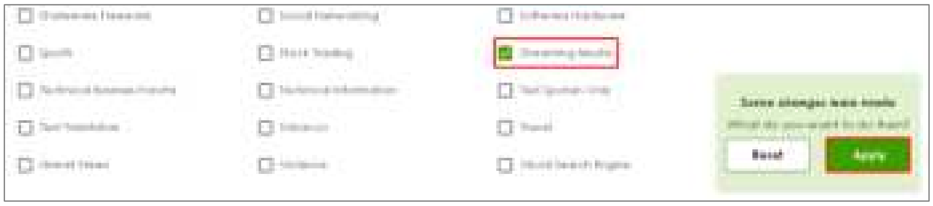
Log: log

Log allowed traffic

SSL V3 or previous version Connection: Drop

Drop Log: log

Tick Streaming Media category in Managed Categories, and click Apply.



□ Shareware Freeware □ Social Networking □ Software Hardware

□ Sports □ Stock Trading ☑ Streaming Media

□ Technical Business Forums □ Technical Information □ Text Spoken Only

□ Text Translation □ Tobacco □ Travel

□ Usenet News □ Violence □ Visual Search Engine

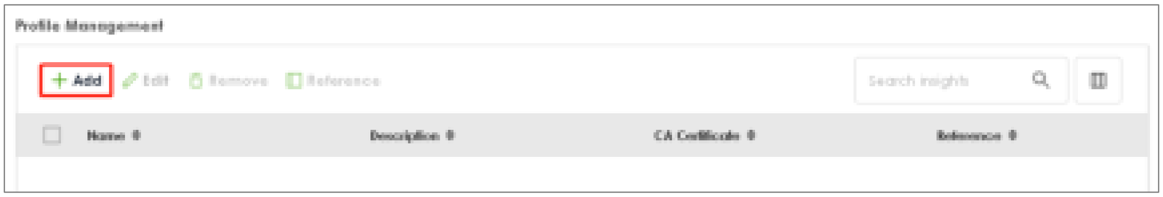
Some changes was made

What do you want to do then?

Reset | Apply

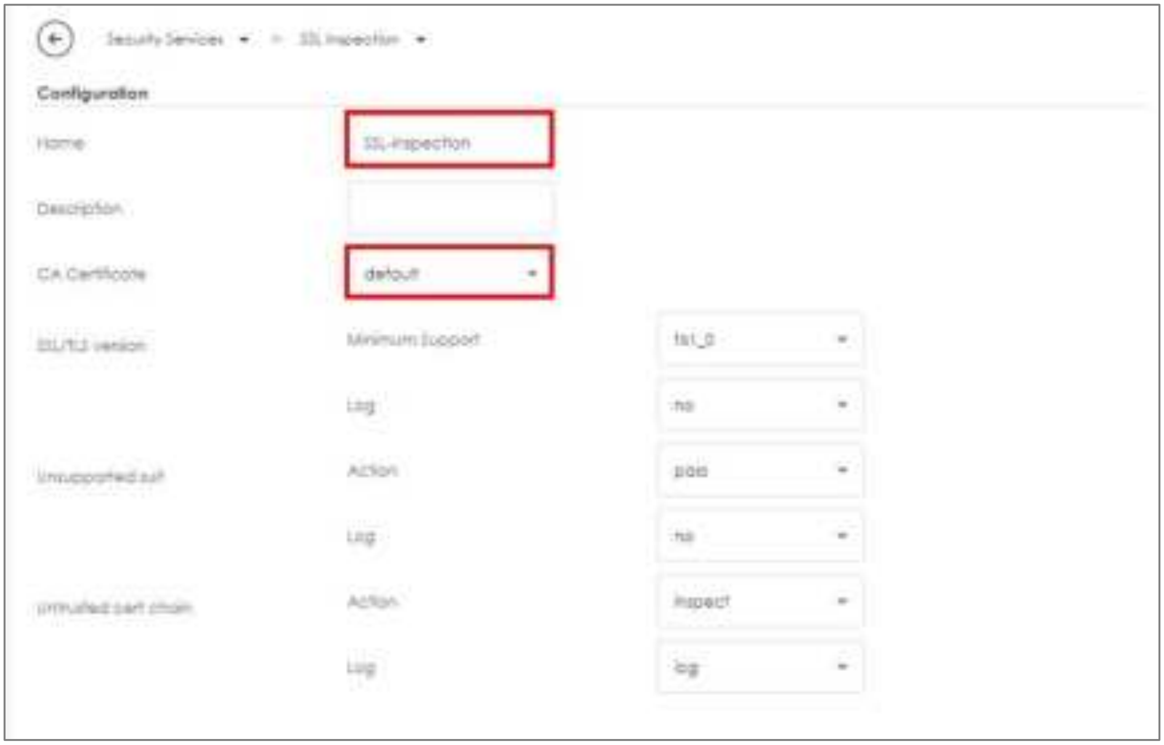
Set Up SSL Inspection

In the FLEX, go to Security Service > SSL inspection > profile > Profile Management, and click Add to create profile



Name	Description	CA Certificate	Reference

Type profile Name, and select the CA Certificate to be the certificate used in this profile. Leave other actions as default settings.



Name: SSL-inspection

Description:

CA Certificate: default

SSL/TLS version: Minimum Support: tls1_0

Log: no

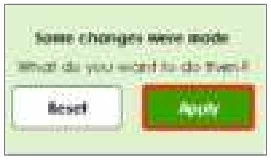
Unsupported suit: Action: pass

Log: no

Untrusted cert chain: Action: inspect

Log: log

Click Apply to add SSL Inspection profile.



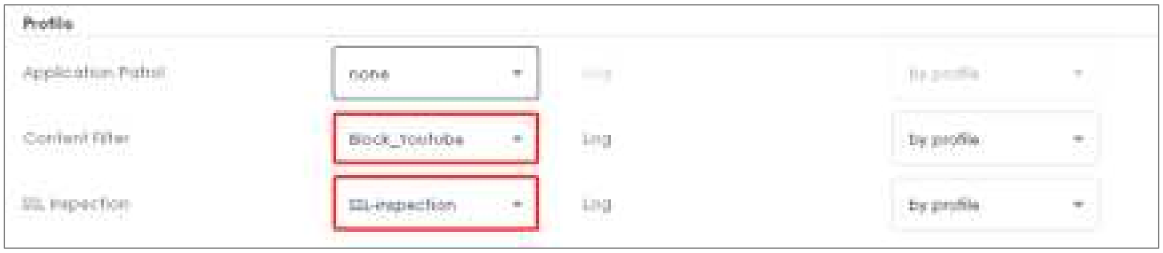
Some changes were made

What do you want to do them?

Set Up the Security Policy

Go to Security Policy > Policy control. Edit LAN_Outgoing, and scroll down to profile section.

Select Content Filtering, and SSL Inspection. Click Apply to save.



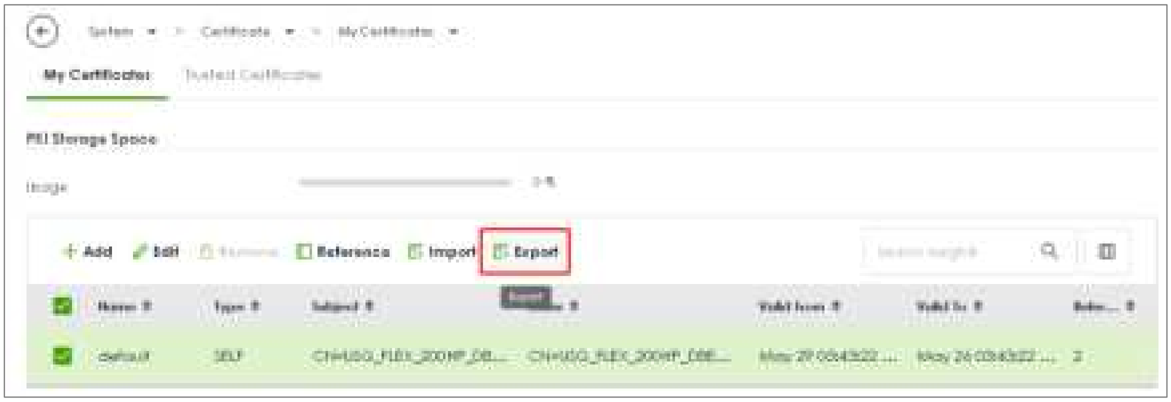
Profile

Application Patrol	none	Log	by profile
Content Filter	Block_Youtube	Log	by profile
SSL Inspection	SSL-inspection	Log	by profile

Export Certificate from FLEX and Import it to Windows

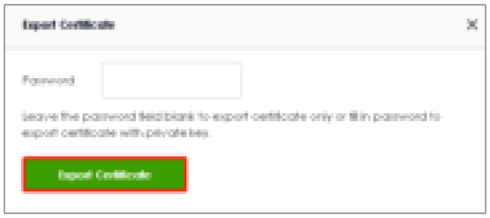
When SSL inspection is enabled and an access website does not trust the FLEX certificate, the browser will display a warning page of security certificate problems.

Go to System > Certificate > My Certificates to export default certificate from FLEX.



☑	Name	Type	Subject	[illegible]	Valid From	Valid To	Refer...
☑	default	SELF	CN=USG_FLEX_200HP_DB...	CN=USG_FLEX_200HP_DBE...	May 29 03:43:22 ...	May 26 03:43:22 ...	2

Click Export Certificate to export certificate file, and Save default certificate as default.crt file to Windows OS.

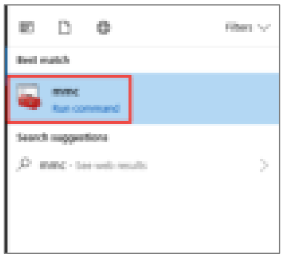


Export Certificate

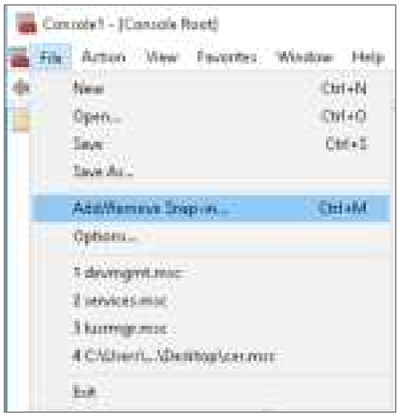
Password

Leave the password field blank to export certificate only or fill in password to export certificate with private key.

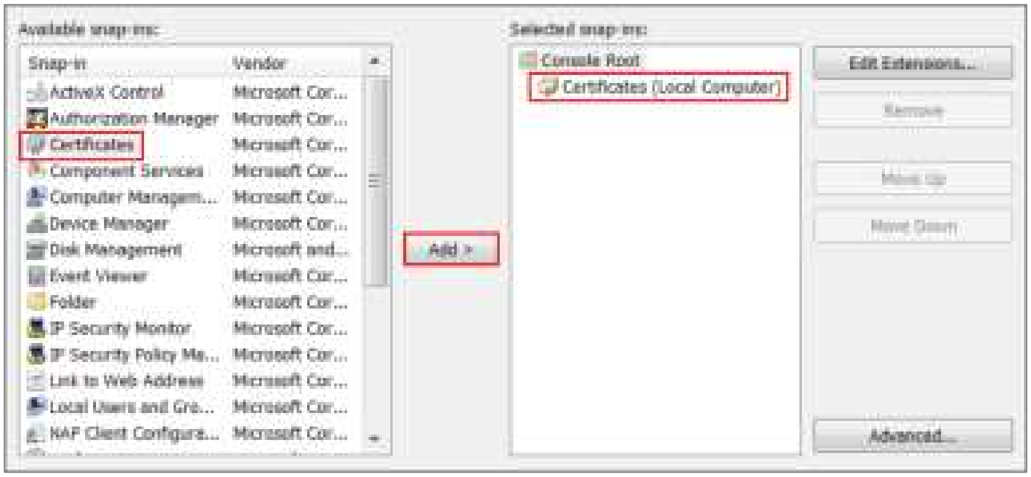
In Windows Start Menu > Search Box, type MMC and press Enter.



In the mmc console window, click File > Add/Remove Snap-in...



In the Available snap-ins, select the Certificates and click Add button. Select Computer account > Local Computer. Then, click Finished and OK to close the Snap-ins window.



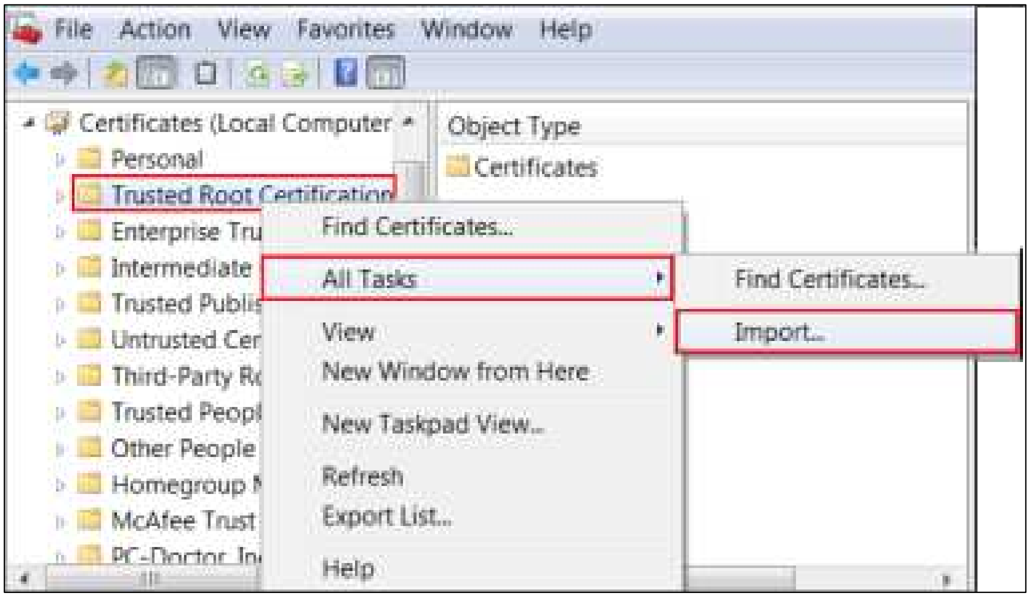
Available snap-ins:

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
IP Security Monitor	Microsoft Cor...
IP Security Policy Ma...	Microsoft Cor...
Link to Web Address	Microsoft Cor...
Local Users and Gro...	Microsoft Cor...
NAP Client Configura...	Microsoft Cor...

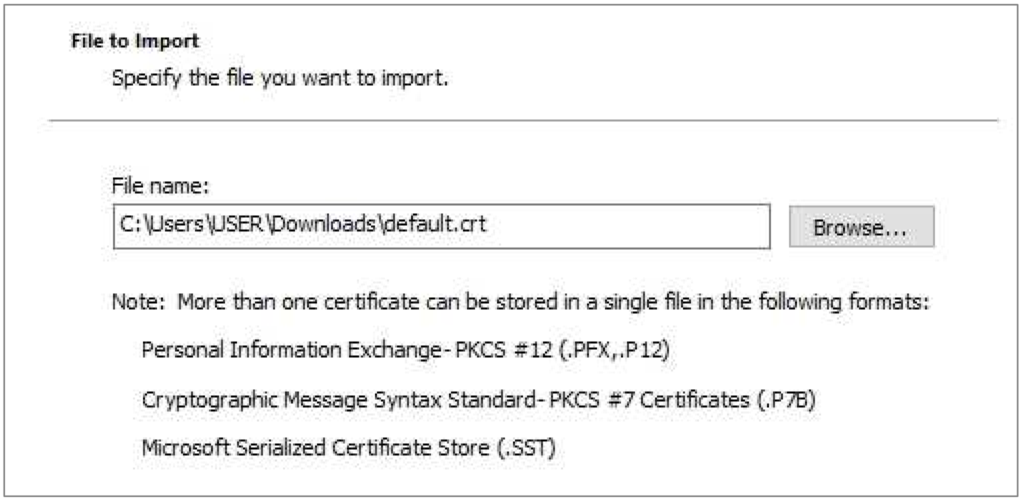
Selected snap-ins:

Console Root
Certificates (Local Computer)

In the mmc console window, open the Certificates (Local Computer) > Trusted Root Certification Authorities, right click Certificate > All Tasks > Import…



Click Next. Then, Browse..., and locate the default.crt file you downloaded earlier. Then, click Next.


File to Import

Specify the file you want to import.

File name:

C:\Users\USER\Downloads\default.crt

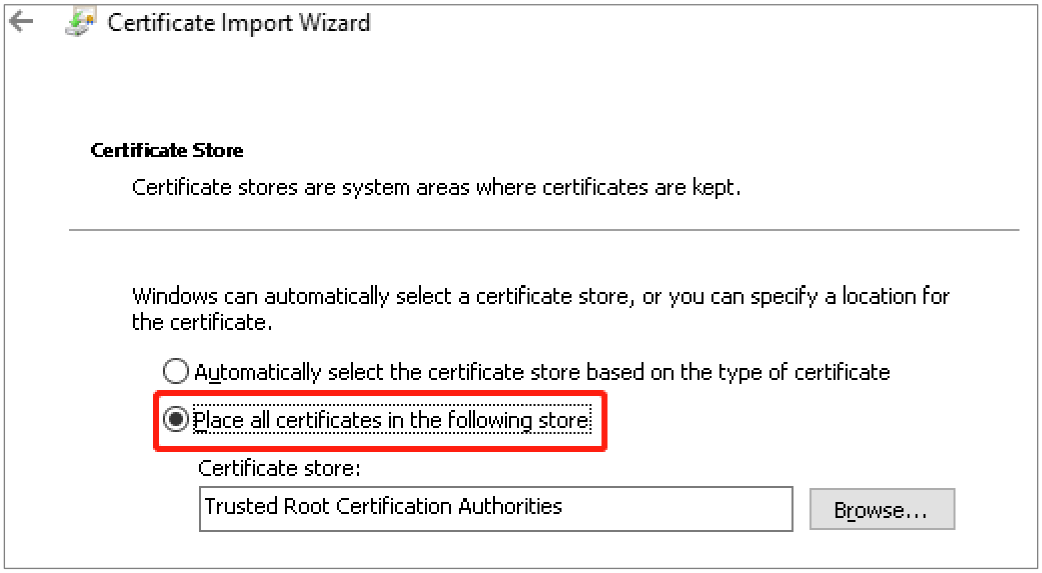
Note: More than one certificate can be stored in a single file in the following formats:

Personal Information Exchange- PKCS #12 (.PFX,.P12)

Cryptographic Message Syntax Standard- PKCS #7 Certificates (.P7B)

Microsoft Serialized Certificate Store (.SST)

Select Place all certificates in the following store and then click Browse and find Trusted Root Certification Authorities. Click Next, then click Finish.



Certificate Store

Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for the certificate.

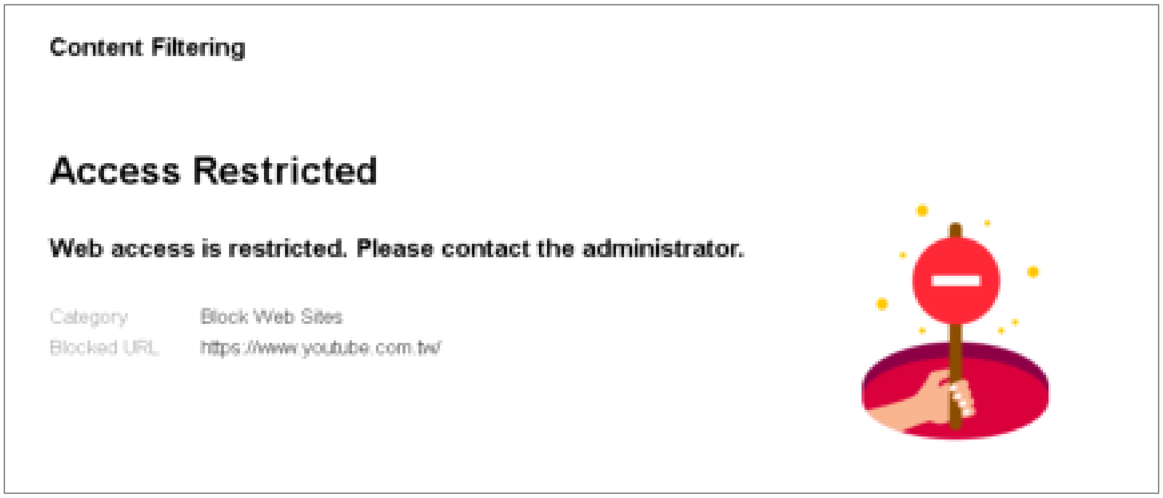
○ Automatically select the certificate store based on the type of certificate

● Place all certificates in the following store

Certificate store: Trusted Root Certification Authorities

Test the Result

Using Web Browser to access the YouTube. The gateway will redirect you to a blocked page.



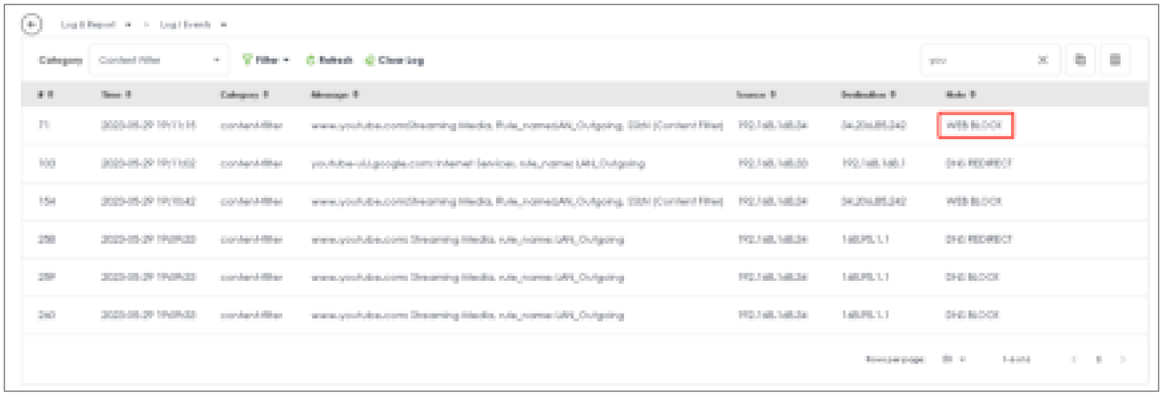
Content Filtering

Access Restricted

Web access is restricted. Please contact the administrator.

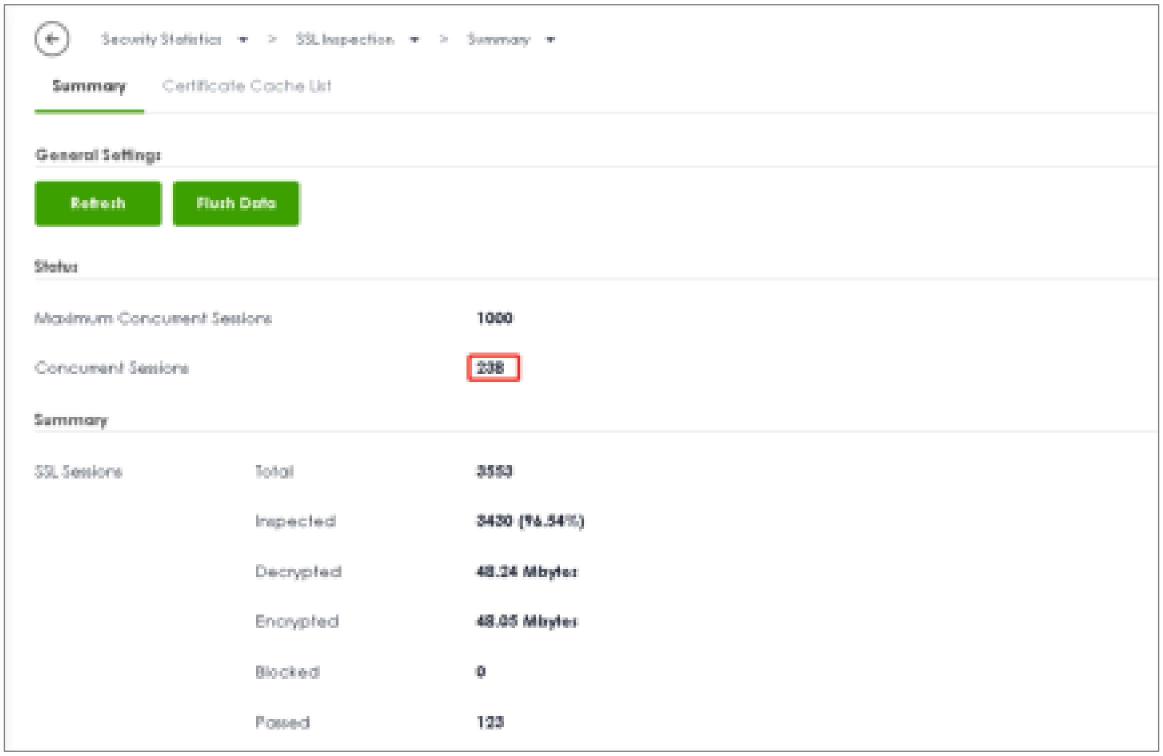
Category	Block Web Sites
Blocked URL	https://www.youtube.com.tw/

Go to Log & Report > Log/Events and select Content Filtering to check the logs.



#	Time	Category	Message	Source	Destination	Note
71	2025-05-29 19:11:15	content-filter	www.youtube.com:Streaming Media, Rule_name:LAN_Outgoing, [illegible] (Content Filter)	192.168.168.34	34.206.85.242	WEB BLOCK
100	2025-05-29 19:11:02	content-filter	youtube-ui.l.google.com: Internet Services, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS REDIRECT
154	2025-05-29 19:10:42	content-filter	www.youtube.com:Streaming Media, Rule_name:LAN_Outgoing, [illegible] (Content Filter)	192.168.168.34	34.206.85.242	WEB BLOCK
258	2025-05-29 19:09:33	content-filter	www.youtube.com: Streaming Media, rule_name: LAN_Outgoing	192.168.168.34	168.95.1.1	DNS REDIRECT
259	2025-05-29 19:09:33	content-filter	www.youtube.com: Streaming Media, rule_name: LAN_Outgoing	192.168.168.34	168.95.1.1	DNS BLOCK
260	2025-05-29 19:09:33	content-filter	www.youtube.com: Streaming Media, rule_name: LAN_Outgoing	192.168.168.34	168.95.1.1	DNS BLOCK

Go to Security Statistics > SSL Inspection > Summary. Traffic is inspected by SSL inspection.



General Settings

Status

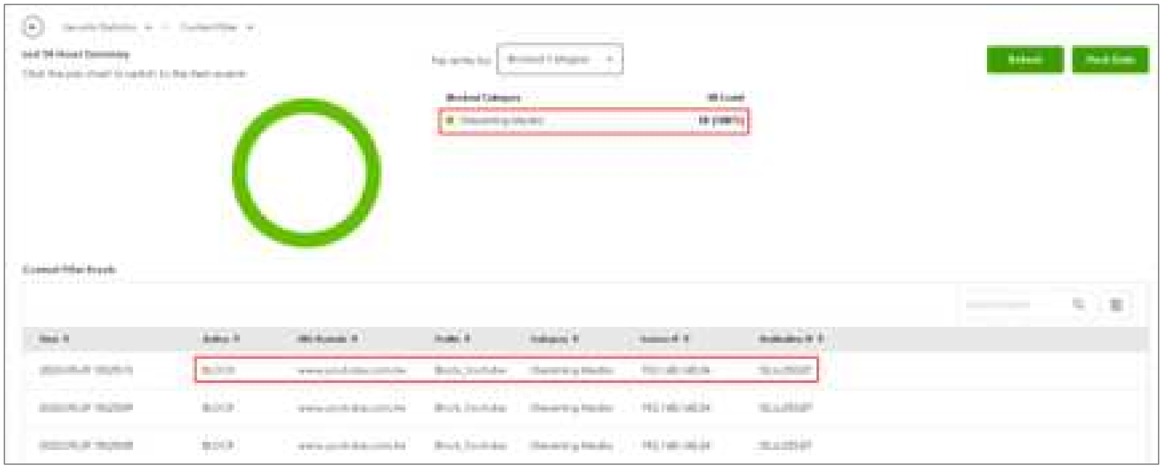
Maximum Concurrent Sessions 1000

Concurrent Sessions 238

Summary

SSL Sessions	Total	3553
	Inspected	3430 (96.54%)
	Decrypted	48.24 Mbytes
	Encrypted	48.05 Mbytes
	Blocked	0
	Passed	123

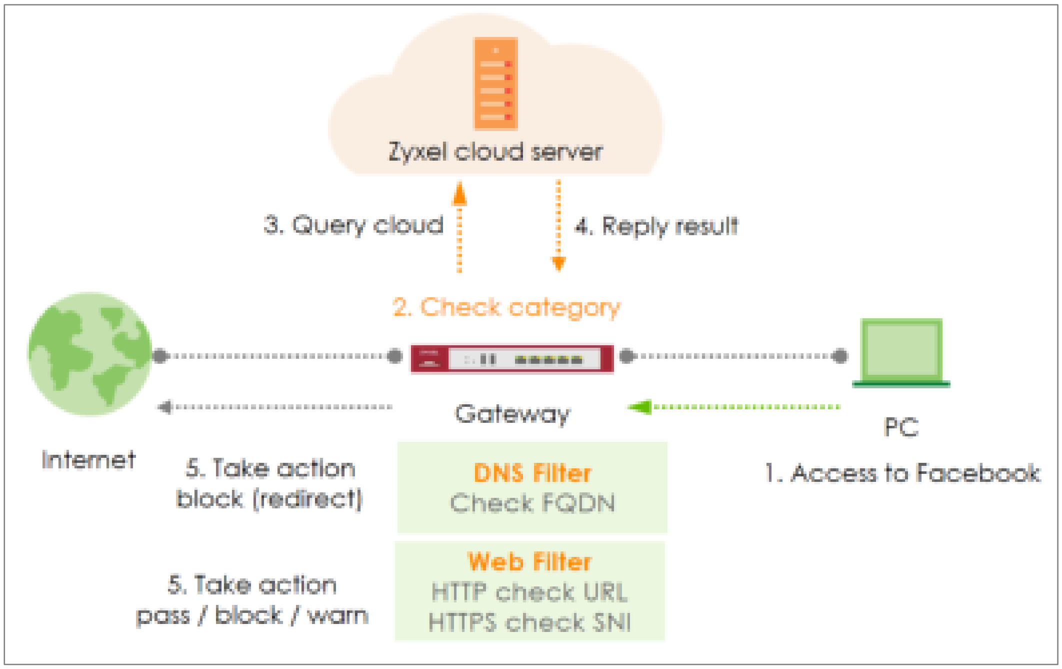
Go to Security Statistics > Content Filter to check summary of all events.



How to Configure Content Filter with HTTPs Domain Filter

The Content Filter with HTTPs Domain Filter allows you to block HTTPs websites by category service. The filtering feature is based on over 100 categories that is built in USG Flex H such as pornography, gambling, hacking, etc.

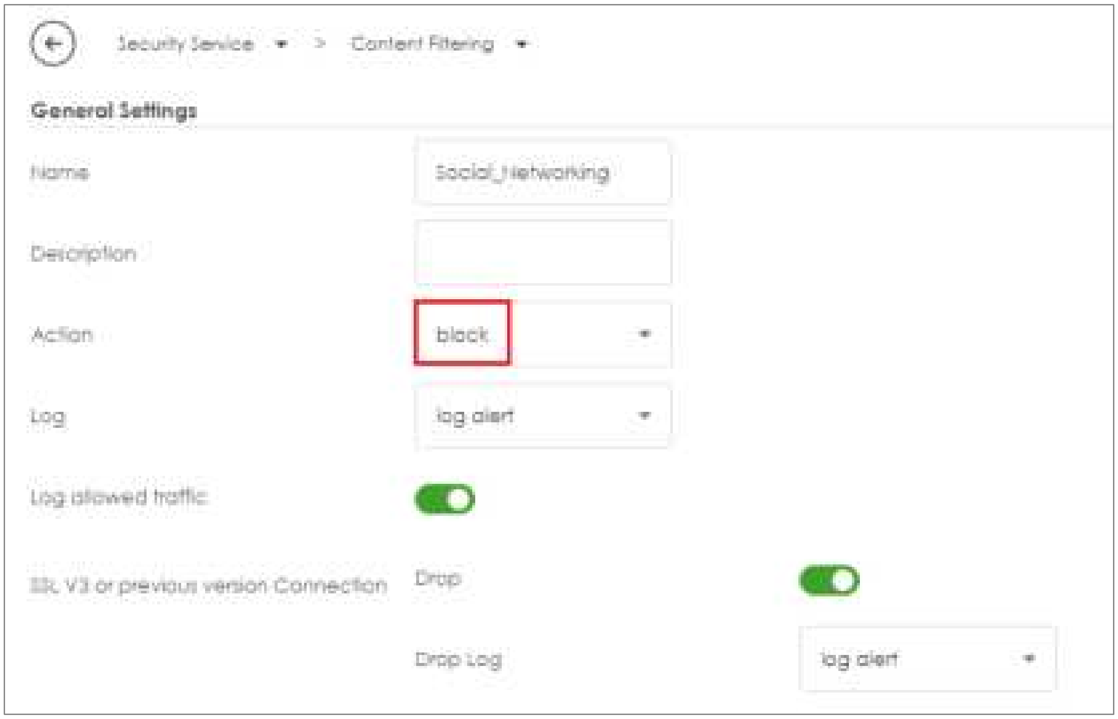
When the user makes an HTTPS request, the information contains a Server Name Indication (SNI) extension fields in server FQDN. Using the SNI to query category from local cache then the cloud database, then take action when it matches the block category in the Content Filter profile.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 500H (Firmware Version: uOS 1.10).

Set Up the Content Filter

Go to **Security Service > Content Filtering > Profile Management > Add a Content Filter profile**. Configure a **Name** for you to identify the **Content Filter profile** such as "Social_Networking". Configure the **Action** to block when the Content Filter detects events.



Security Service > Content Filtering

General Settings

Name: Social_Networking

Description:

Action: block

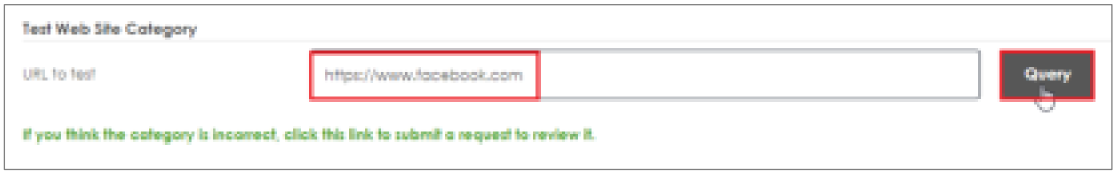
Log: log alert

Log allowed traffic: ●

SSL V3 or previous version Connection: Drop ●

Drop Log: log alert

Navigate to **Test Web Site Category** and type URL to test the category and click **Query**.



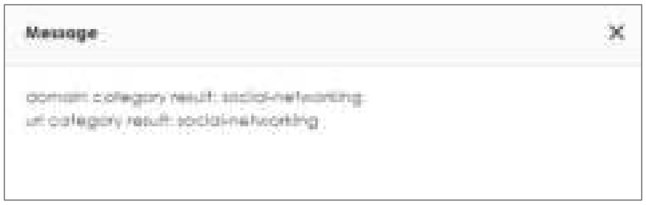
Test Web Site Category

URL to test: https://www.facebook.com

Query

If you think the category is incorrect, click this link to submit a request to review it.

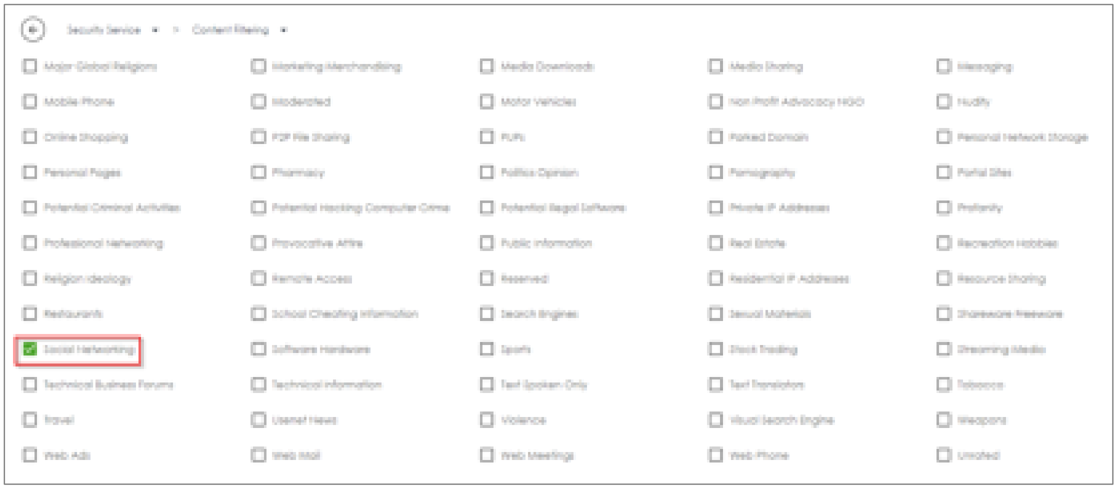
You will see the category recorded in the external content filter server's database for both HTTP and HTTPS Domain you specified.



Message

domain category result: social-networking
url category result: social-networking

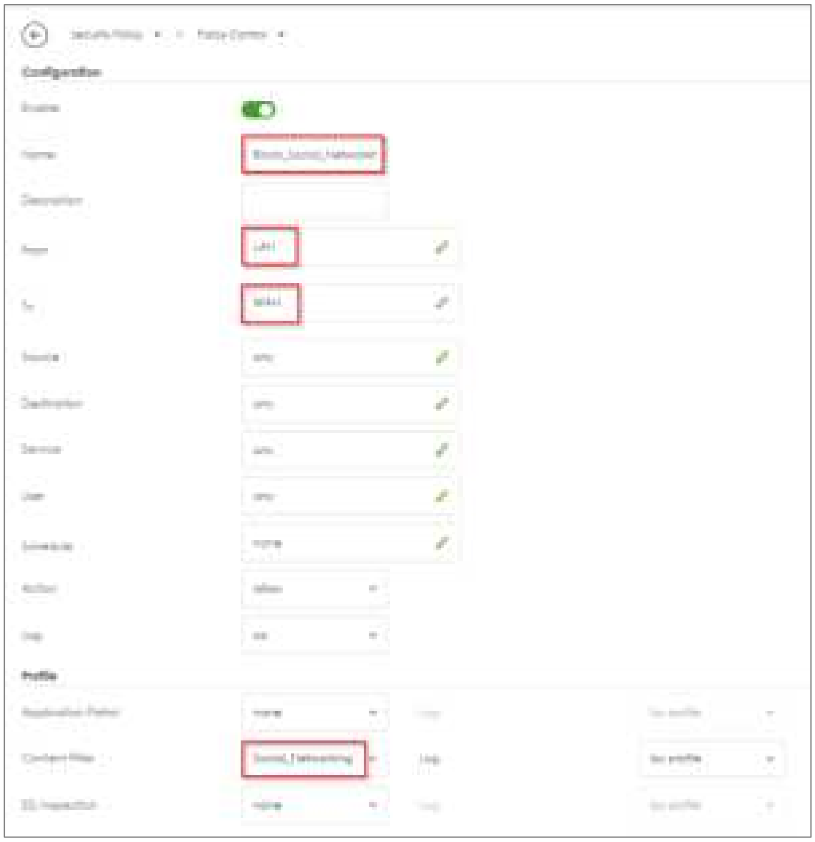
Scroll to the **Managed Categories** section, and select categories in this section to control access to specific types of Internet content.



□ Major Global Religions
□ Mobile Phone
□ Online Shopping
□ Personal Pages
□ Potential Criminal Activities
□ Professional Networking
□ Religion Ideology
□ Restaurants
☑ Social Networking
□ Technical Business Forums
□ Travel
□ Web Ads
□ Marketing Merchandising
□ Moderated
□ P2P File Sharing
□ Pharmacy
□ Potential Hacking Computer Crime
□ Provocative Attire
□ Remote Access
□ School Cheating Information
□ Software Hardware
□ Technical Information
□ Usenet News
□ Web Mail
□ Media Downloads
□ Motor Vehicles
□ PUPs
□ Politics Opinion
□ Potential Illegal Software
□ Public Information
□ Reserved
□ Search Engines
□ Sports
□ Text Spoken Only
□ Violence
□ Web Meetings
□ Media Sharing
□ Non Profit Advocacy NGO
□ Parked Domain
□ Pornography
□ Private IP Addresses
□ Real Estate
□ Residential IP Addresses
□ Sexual Materials
□ Stock Trading
□ Text Translation
□ Visual Search Engine
□ Web Phone
□ Messaging
□ Nudity
□ Personal Network Storage
□ Portal Sites
□ Profanity
□ Recreation Hobbies
□ Resource Sharing
□ Shareware Freeware
□ Streaming Media
□ Tobacco
□ Weapons
□ Unrated

Set Up the Security Policy

Go to **Security Policy > Policy Control** to configure a **Name** for you to identify the **Security Policy** profile. For **From** and **To** policies, select the direction of travel of packets to which the policy applies and apply the **Profile > Content Filter** "Social_Networking" on this security policy.



Security Policy > Policy Control

Configuration

Enable

Name: Block_Social_Networkin

Description

From: LAN1

To: WAN1

Source: any

Destination: any

Service: any

User: any

Schedule: none

Action: allow

Log: no

Profile

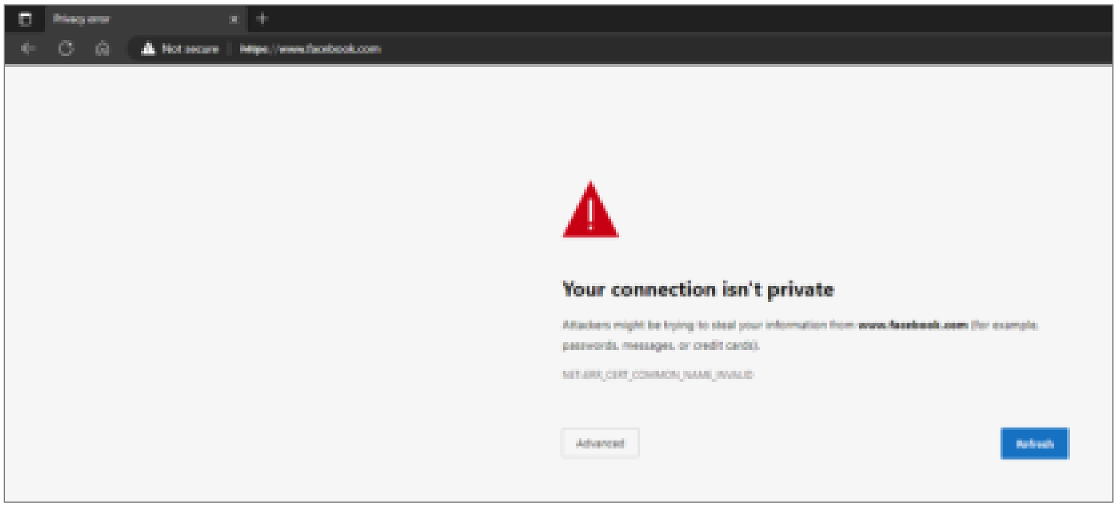
Application Patrol: none | Log | no profile

Content Filter: Social_Networking | Log | by profile

SSL Inspection: none | Log | no profile

Test Result

Type the URL http://www.facebook.com/ or https://www. facebook.com/ onto the browser and cannot browse facebook.



Your connection isn't private

Attackers might be trying to steal your information from **www.facebook.com** (for example, passwords, messages, or credit cards).

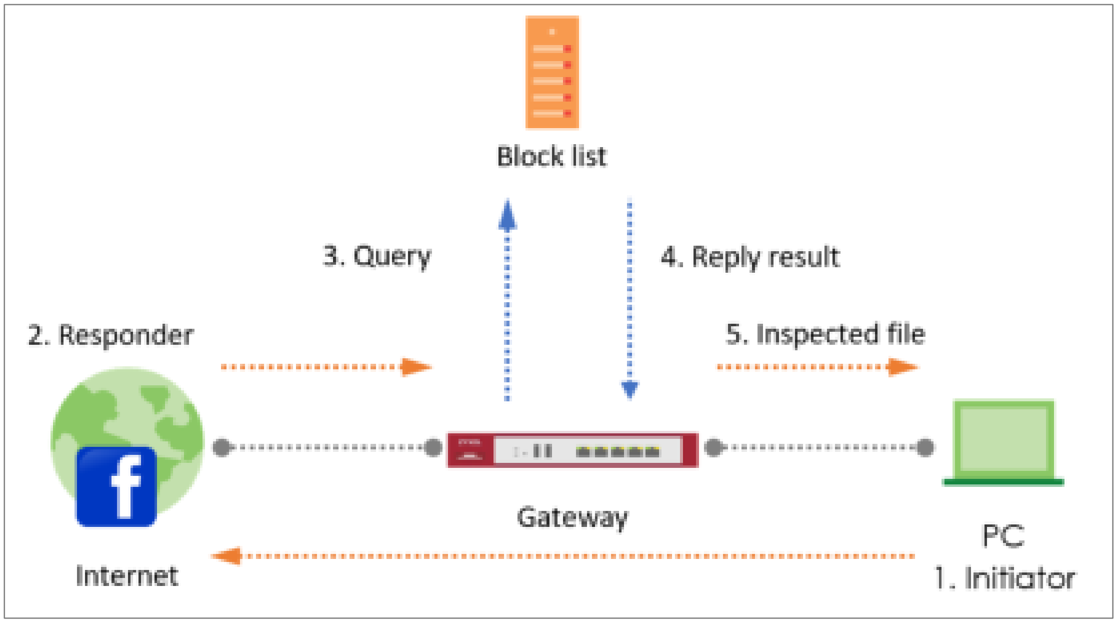
NET::ERR_CERT_COMMON_NAME_INVALID

Navigate to **Log & Report > Log / Events**, you will see [alert] log of blocked messages.

[illegible]

How to Block Facebook Using a Content Filter Block List

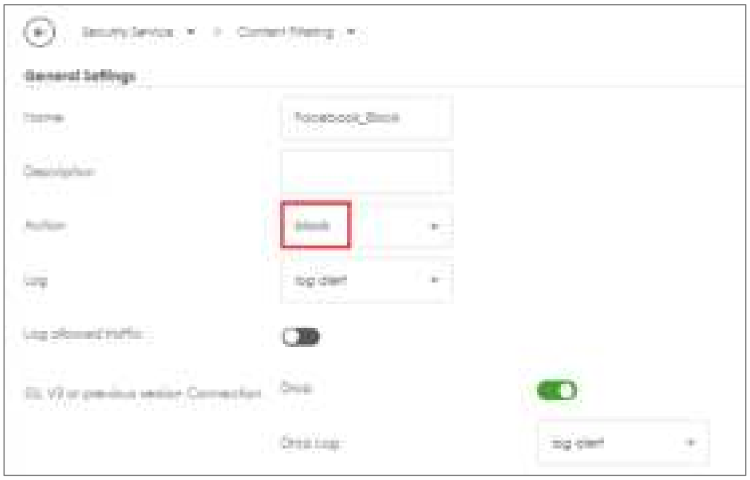
This is an example of using USG Flex H UTM Profile in a Security Policy to block access to a specific social network service. You can use Content Filter and Policy Control to make sure that a certain web page cannot be accessed through both HTTP and HTTPS protocols.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 500H (Firmware Version: uOS 1.10).

Set Up the Content Filter

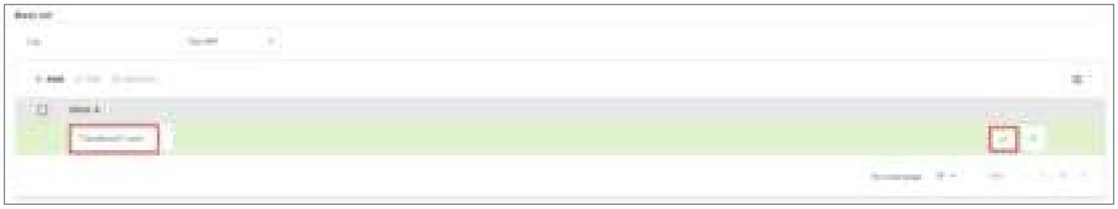
In the USG Flex H, go to **Security Service > Content Filtering > Profile Management > Add a Content Filter profile**. Configure a **Name** for you to identify the **Content Filter profile** such as “Facebook_Block”. Configure the **Action** to block when the Content Filter detects events.



General Settings

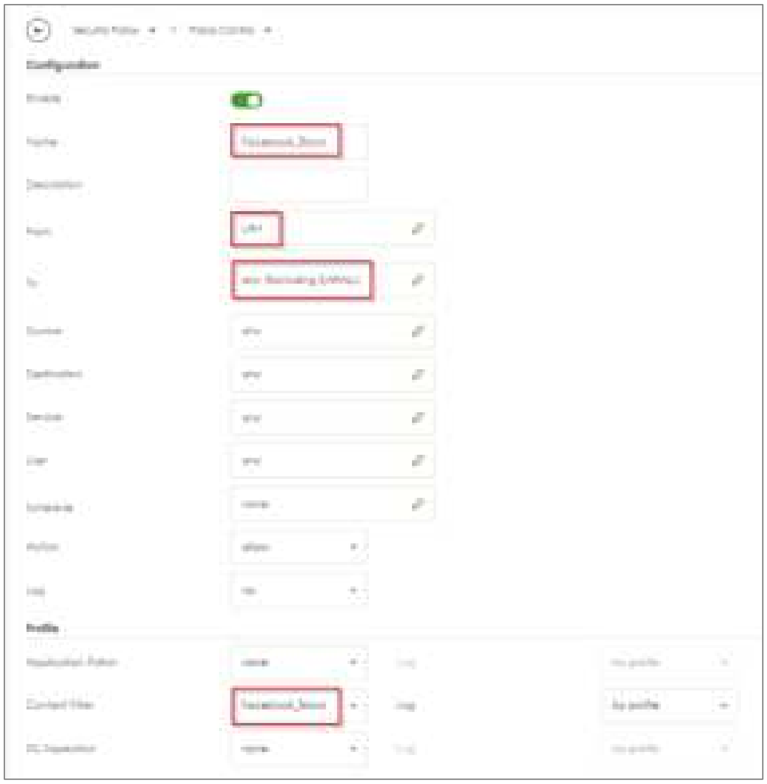
Name: Facebook_Block
Description:
Action: block
Log: log alert
Log allowed traffic
SSL V3 or previous version Connection: Drop
Drop Log: log alert

Go to **Block List** and type URL “*.facebook*.com” to add the URL that you want to block.



Set Up the Security Policy

Go to **Security Policy > Policy Control** to configure a **Name** for you to identify the **Security Policy** profile. For **From** and **To** policies, select the direction of travel of packets to which the policy applies and apply the **Profile > Content Filter** “Facebook_Block” on this security policy.



Security Policy > Policy Control

Configuration

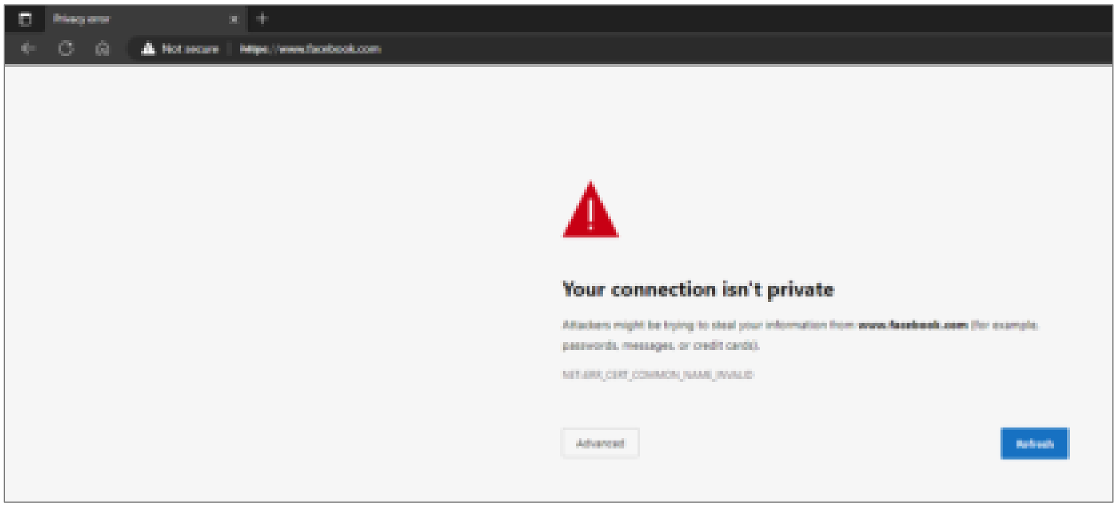
Enable	●		
Name	Facebook_Block		
Description			
From	LAN		
To	any (Excluding ZyWALL)		
Source	any		
Destination	any		
Service	any		
User	any		
Schedule	none		
Action	allow		
Log	no		

Profile

Application Patrol	none	Log	no profile
Content Filter	Facebook_Block	Log	by profile
SSL Inspection	none	Log	no profile

Test the Result

Type the URL http://www.facebook.com/ or https://www. facebook.com/ onto the browser and cannot browse facebook.

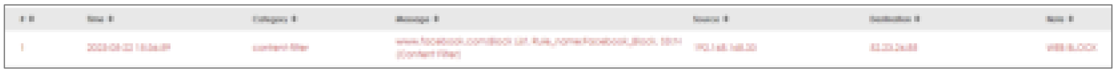


Your connection isn't private

Attackers might be trying to steal your information from **www.facebook.com** (for example, passwords, messages, or credit cards).

NET::ERR_CERT_COMMON_NAME_INVALID

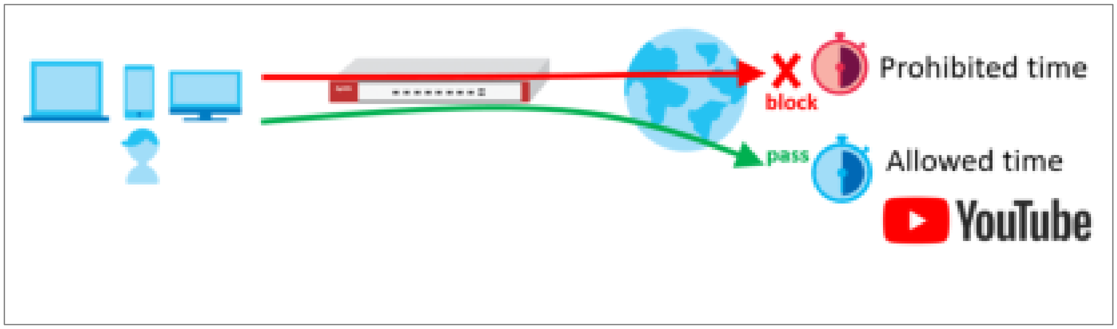
Go to **Log & Report > Log / Events**, you will see [alert] log of blocked messages.



# ⇕	Time ⇕	Category ⇕	Message ⇕	Source ⇕	Destination ⇕	Note ⇕
1	[illegible]	content-filter	www.facebook.com:Block List. Rule_name:Facebook_Block. [illegible] (Content Filter)	192.168.168.33	[illegible]	WEB BLOCK

How to block YouTube access by Schedule

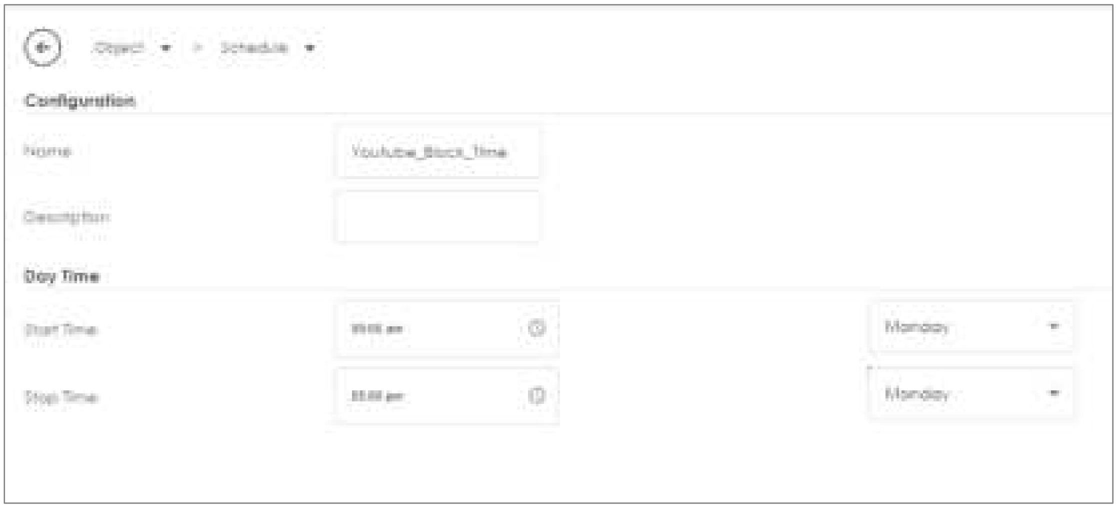
This is an example of using the USG Flex H to block access YouTube access by schedule. You can use Application Patrol and security policy with schedule settings to make sure that YouTube cannot be accessed in your network at a specific prohibited time. This article will guide you on how to deploy it.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 500H (Firmware Version: uOS 1.10).

Set Up the Schedule

Go to **Object > Schedule > Recurring > Add Schedule Recurring Rule**. Configure a **Name** for you to identify the **Schedule Recurring Rule**. Specify the **Day Time** hour and minute when the schedule begins and ends each day.



Configuration

Name: Youtube_Block_Time

Description:

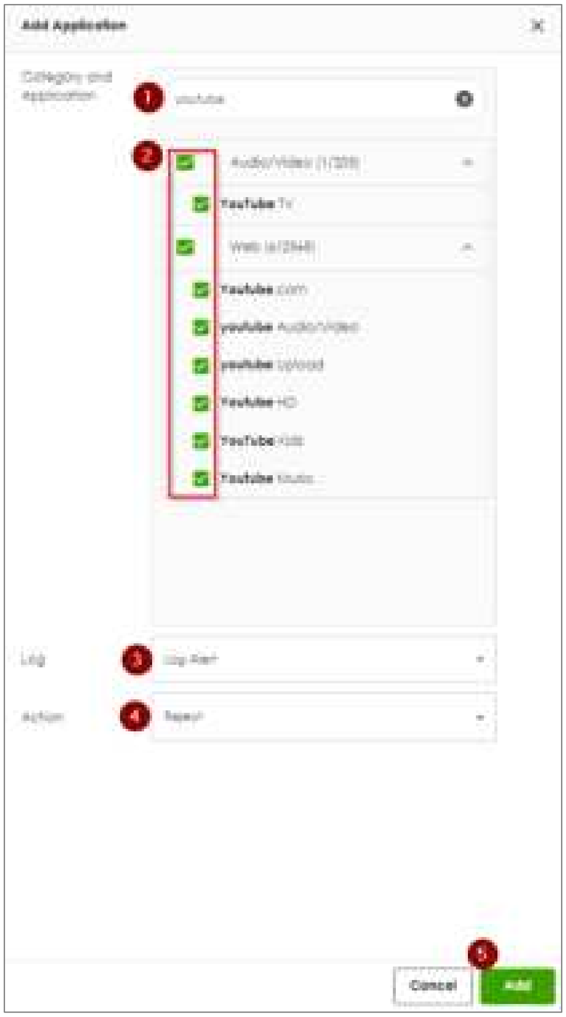
Day Time

Start Time: [illegible] am Monday

Stop Time: [illegible] pm Monday

Create the Application Patrol profile

In the USG Flex H, go to **Security Service > App Patrol > General Settings > Application Management**. To add an App Patrol profile, configure the profile name and select "**Search Application**". Then enter the keyword "youtube" to search the key-related results and select all YouTube-related apps and click **Add.**



Add Application

Category and Application 1 youtube

2 ☑ Audio/Video (1/209)

☑ YouTube TV

☑ Web (6/2568)

☑ Youtube.com

☑ youtube Audio/Video

☑ youtube Upload

☑ Youtube HD

☑ YouTube Kids

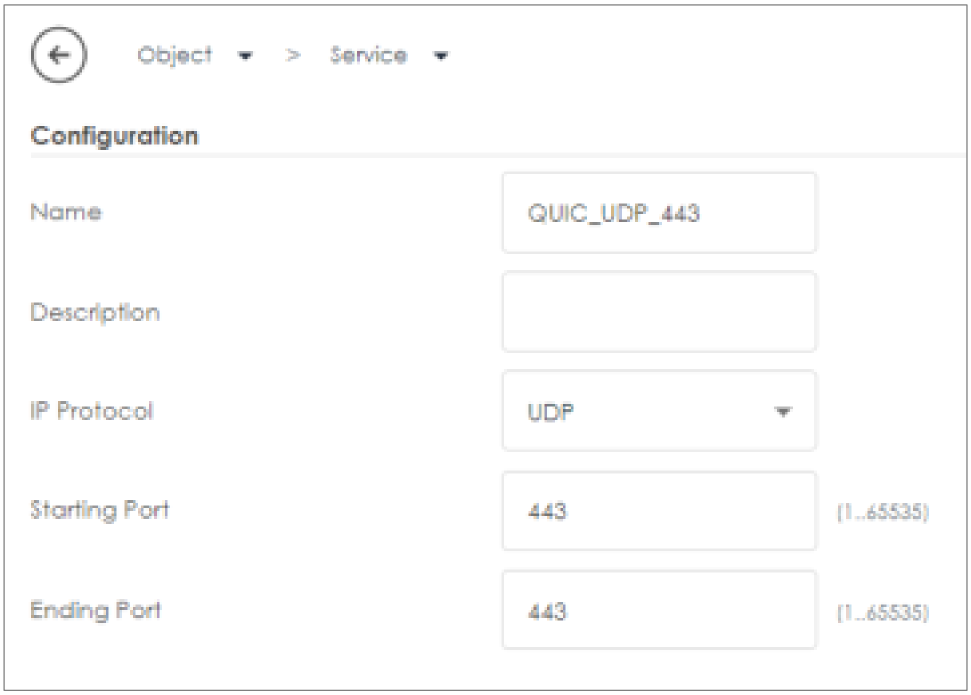
☑ Youtube Studio

Log 3 Log Alert

Action 4 Reject

Set Up the Security Policy

Go to **Object > Service** to add a UDP 443 service object.

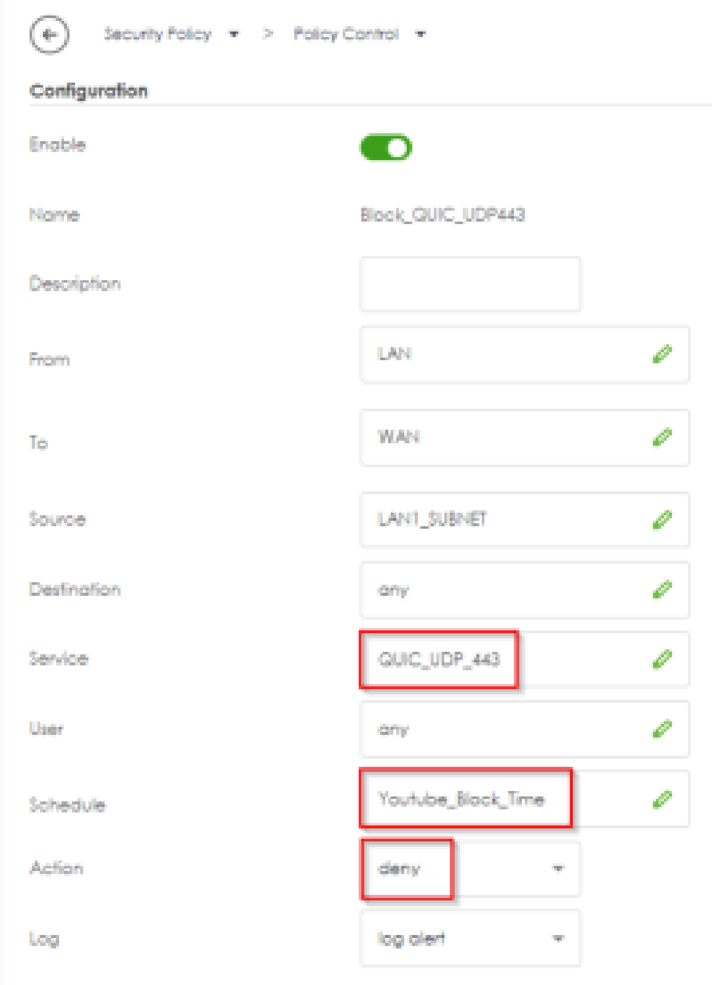


Configuration

Name	QUIC_UDP_443	
Description		
IP Protocol	UDP	
Starting Port	443	(1..65535)
Ending Port	443	(1..65535)

Go to **Security Policy > Policy Control** to configure a **Name** for you to identify the **Security Policy** profile. For **From** and **To** policies, select the direction of travel of packets to which the policy applies. Select the **service** QUIC_UDP443 and select the **Schedule** that defines when the policy would be applied.

In this example, select "Youtube_Blocked_Time".

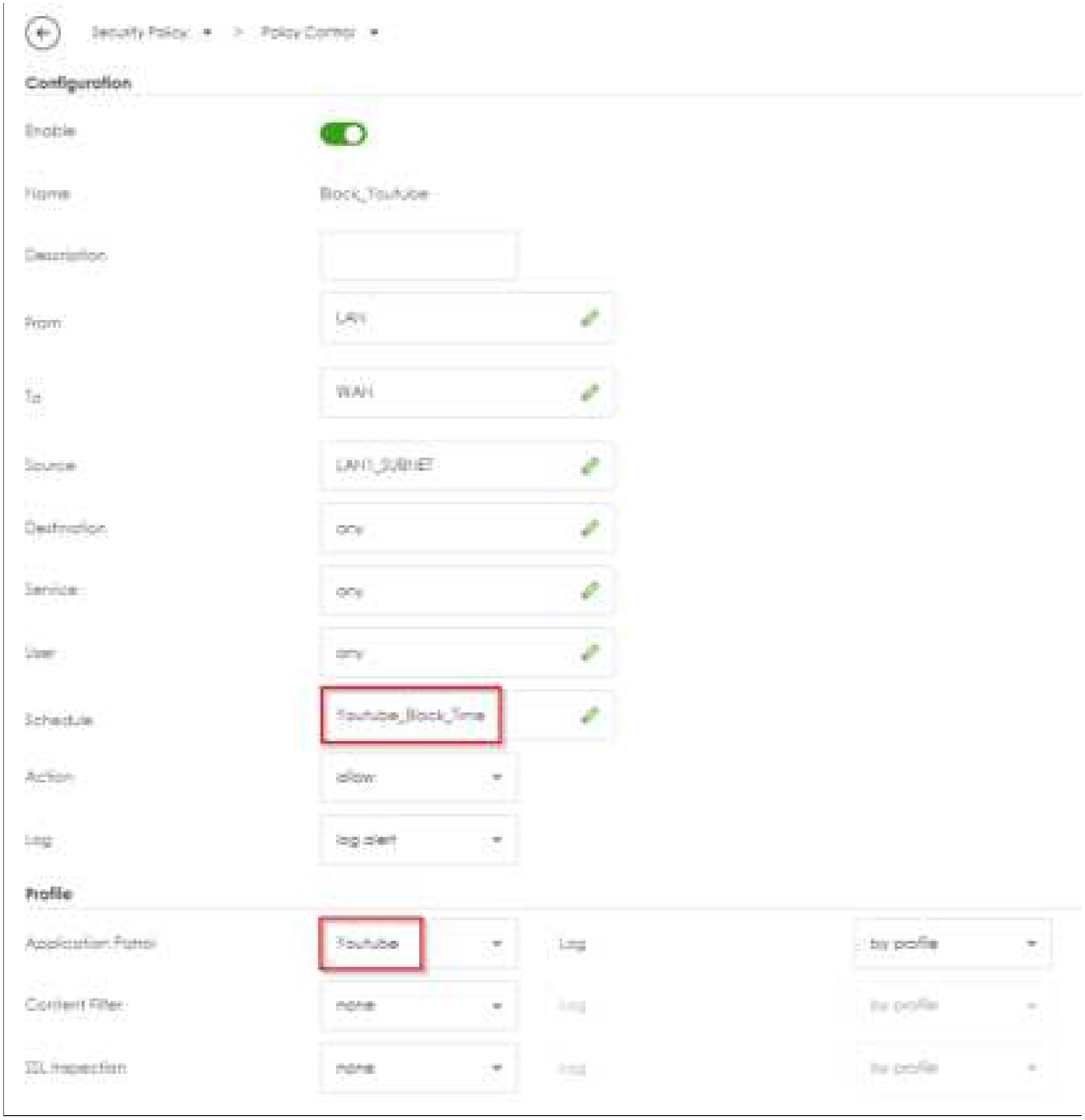


Security Policy ▾ > Policy Control ▾

Configuration

Enable	●
Name	Block_QUIC_UDP443
Description	
From	LAN
To	WAN
Source	LAN1_SUBNET
Destination	any
Service	QUIC_UDP_443
User	any
Schedule	Youtube_Block_Time
Action	deny ▾
Log	log alert ▾

Add another security policy to block YouTube by schedule. To configure a **Name** and the **From**, **To** traffic direction. Select the **Schedule** that defines when the policy would be applied. Finally, to scroll down the **Profile**, check **Application Patrol** and select a profile from the list box. In this example, **Schedule**: Youtube_Block_Time; **Application Patrol**: Youtube.



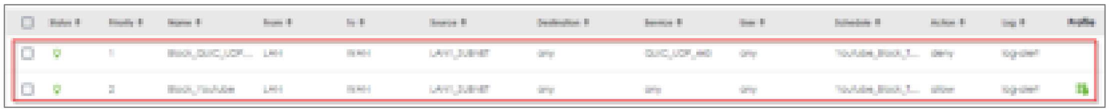
Configuration

Enable	●		
Name	Block_Youtube		
Description			
From	LAN		
To	WAN		
Source	LAN1_SUBNET		
Destination	any		
Service	any		
User	any		
Schedule	Youtube_Block_Time		
Action	allow		
Log	log alert		

Profile

Application Patrol	Youtube	Log	by profile
Content Filter	none	Log	by profile
SSL Inspection	none	Log	by profile

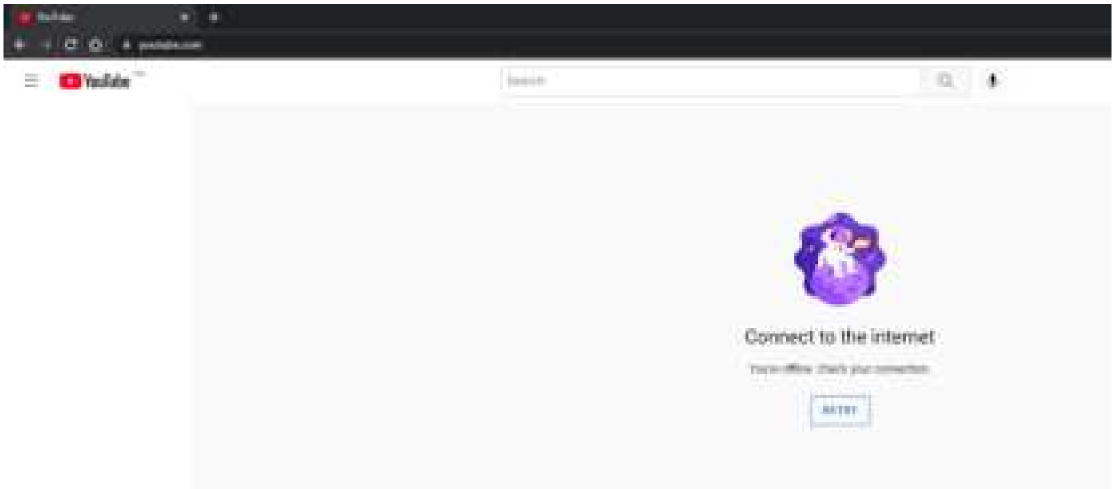
Then go back to the security policy page and move the security priority of block UDP 443 is higher than block YouTube by schedule.



□	Status	Priority	Name	From	To	Source	Destination	Service	User	Schedule	Action	Log	Profile
□		1	Block_QUIC_UDP...	LAN	WAN	LAN1_SUBNET	any	QUIC_UDP_443	any	YouTube_Block_T...	deny	log-alert	
□		2	Block_YouTube	LAN	WAN	LAN1_SUBNET	any	any	any	YouTube_Block_T...	allow	log-alert	

Test the Result

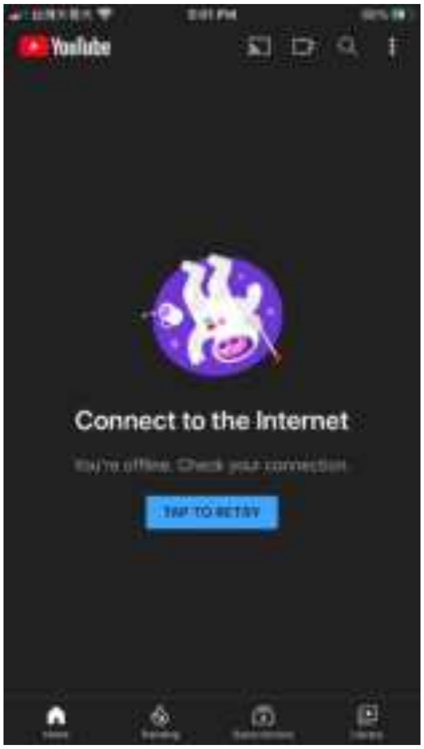
Type the URL http://www.youtube.com/ or https://www.youtube.com/ onto the browser and cannot browse YouTube.



Connect to the internet

You're offline. Check your connection.

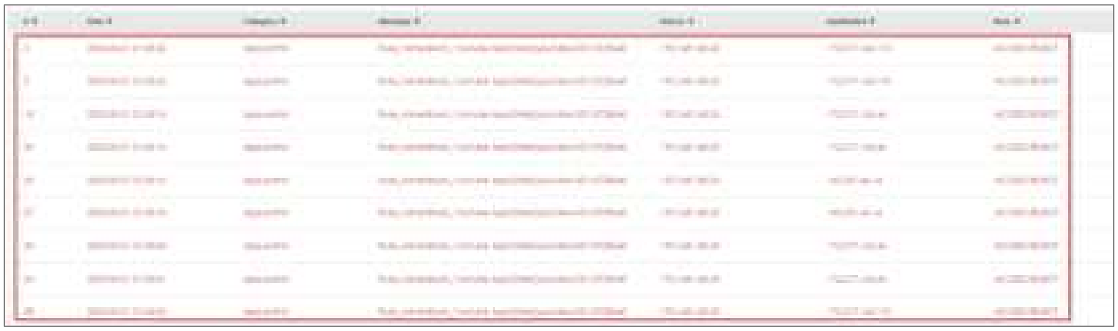
Open the YouTube APP on the phone and cannot access to YouTube.



Connect to the Internet

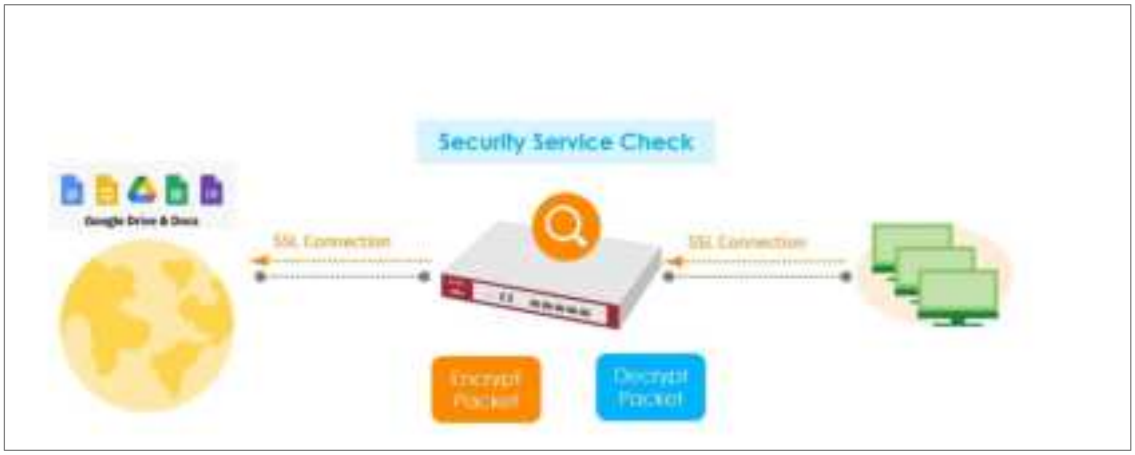
You're offline. Check your connection.

Go to **Log & Report > Log / Events**, you will see [alert] log of blocked messages.



How to Control Access to Google Drive

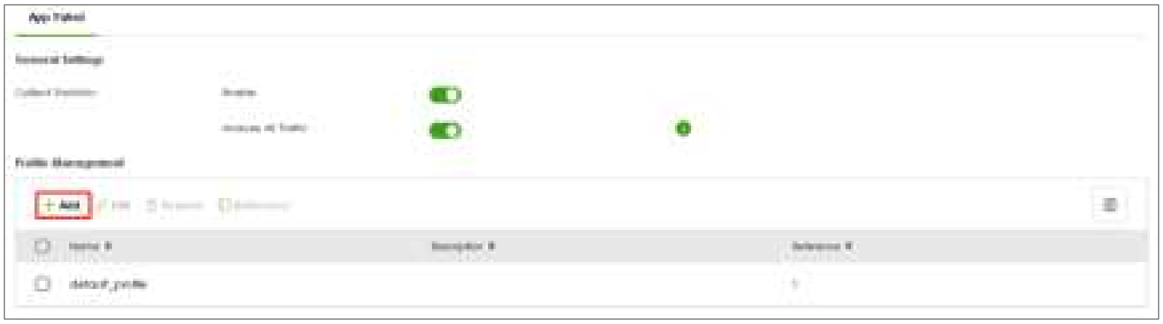
This is an example of using a FLEX UTM Profile in a Security Policy to block access to a specific file transfer service. You can use Application Patrol and Policy Control to make sure that a certain file transfer service cannot be accessed through both HTTP and HTTPS protocols.



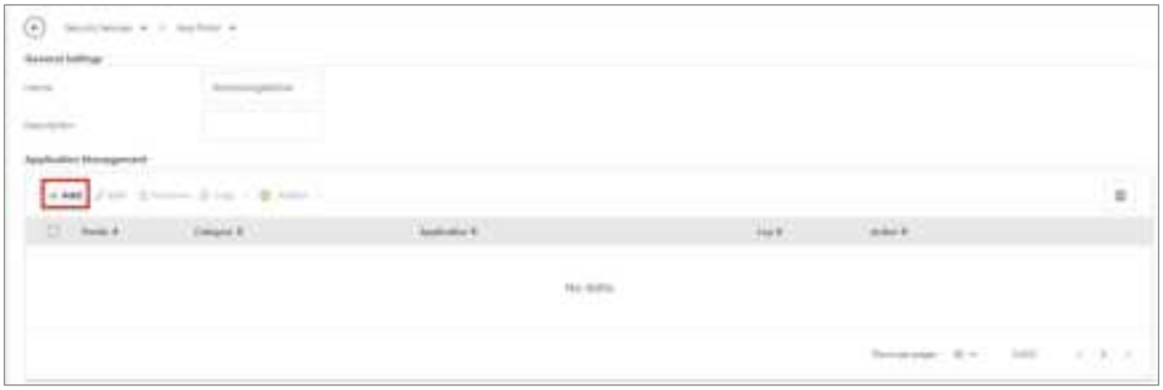
Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Create app patrol profile

Go to Security Service > App patrol > Profile management, and click Add to create profile

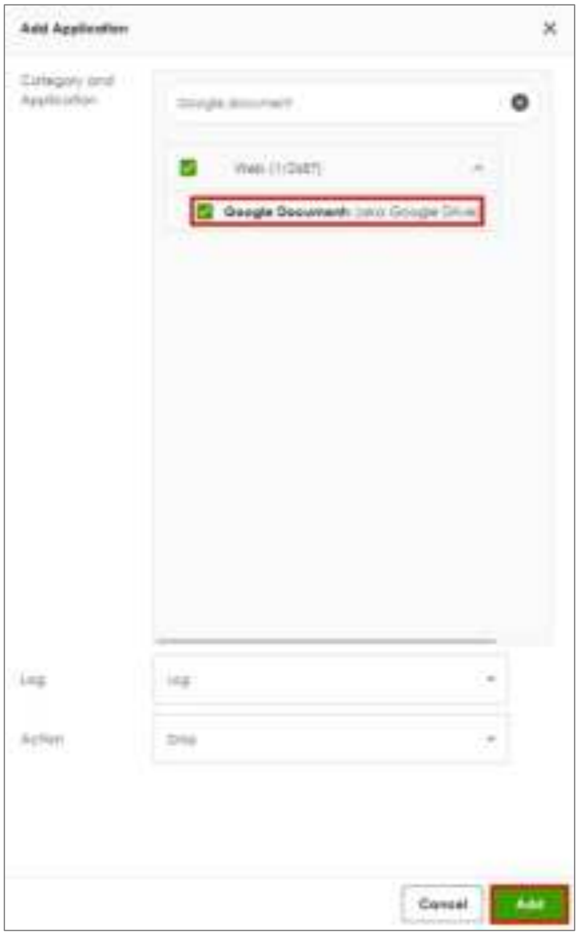


Click add to add application in this profile.



Search **Google Documents(aka Google Drive)**, and select this Application.

Action set to Drop, and click Add.



Add Application

Category and Application: Google document

☑ Web (1/2487)

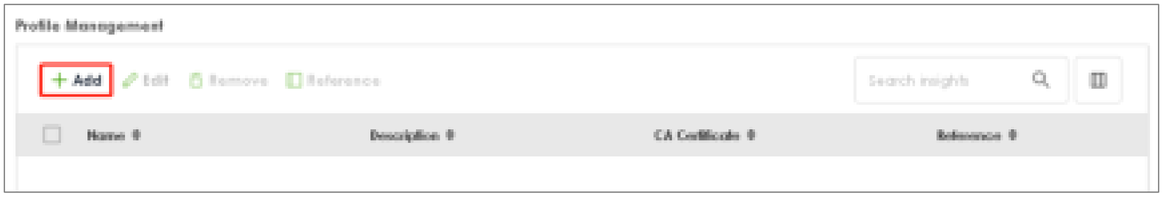
☑ **Google Documents** (aka Google Drive)

Log: log

Action: Drop

Set Up SSL Inspection on the FLEX

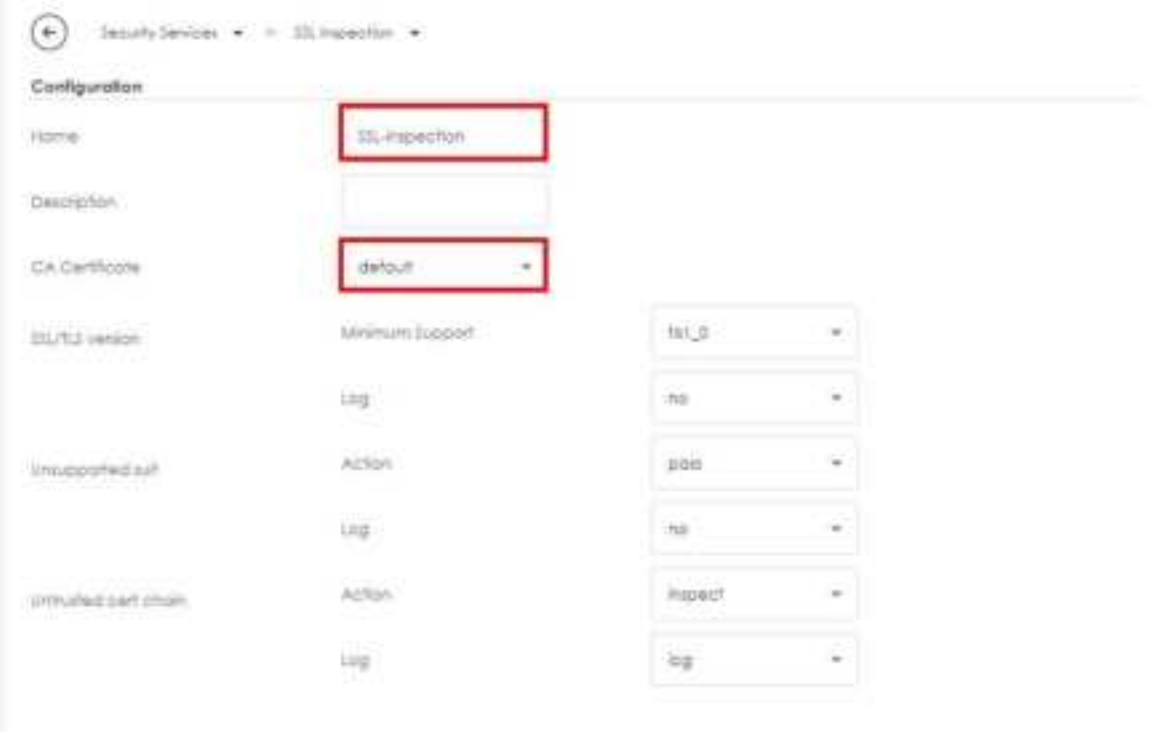
In the FLEX, go to Security Service > SSL inspection > profile > Profile Management, and click Add to create profile



Profile Management

□	Name	Description	CA Certificate	Reference

Type profile Name, and select the CA Certificate to be the certificate used in this profile. Leave other actions as default settings.



Security Services > SSL Inspection

Configuration

Name: SSL-inspection

Description:

CA Certificate: default

SSL/TLS version — Minimum Support: tls1_0

Log: no

Unsupported suit — Action: pass

Log: no

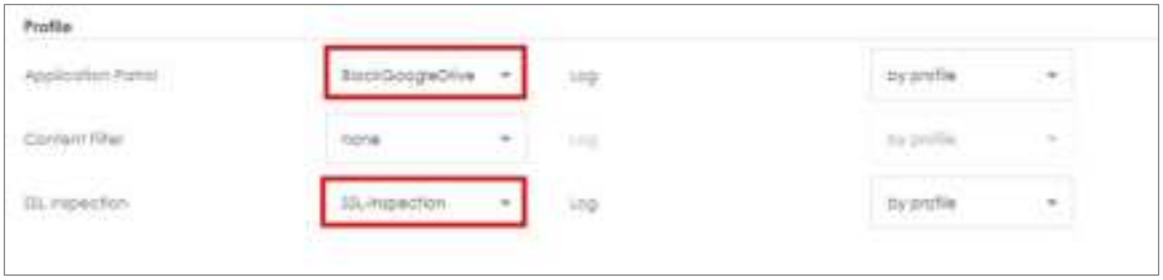
Untrusted cert chain — Action: inspect

Log: log

Apply profile to security policy

Go to Security Policy > Policy control. Edit LAN_Outgoing, and scroll down to profile section.

Select Application Patrol, and SSL Inspection.



Profile

Application Patrol: BlockGoogleDrive — Log: by profile

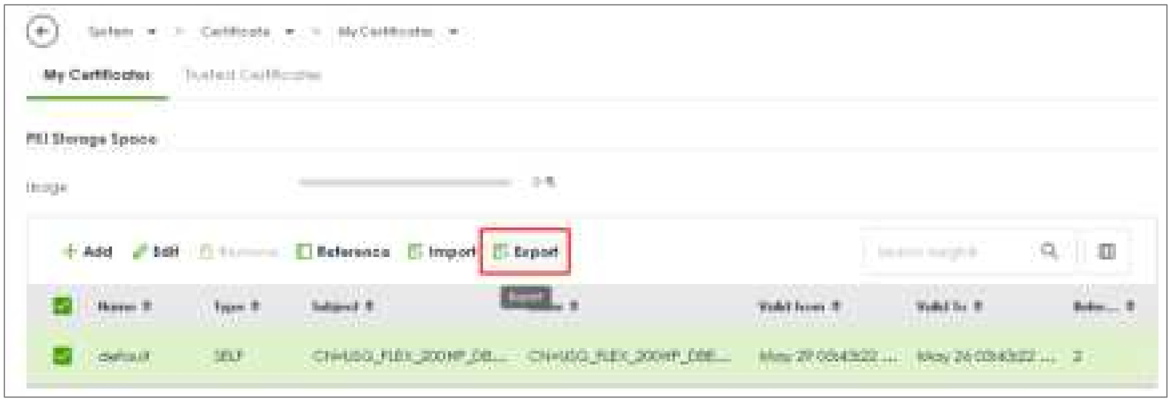
Content Filter: none — Log: by profile

SSL Inspection: SSL-inspection — Log: by profile

Export Certificate from FLEX and import to Lan hosts

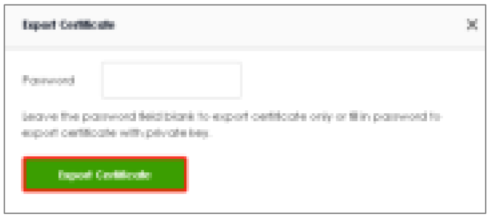
When SSL inspection is enabled and an access website does not trust the FLEX certificate, the browser will display a warning page of security certificate problems.

Go to System > Certificate > My Certificates to export default certificate from FLEX.



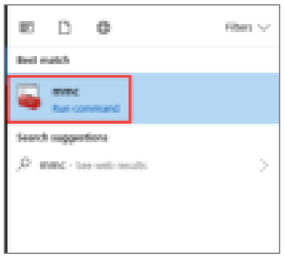
Name	Type	Subject	Issuer	Valid From	Valid To	Refer...
default	SELF	CN=USG_FLEX_200HP_DB...	CN=USG_FLEX_200HP_DBE...	May 29 05:43:22 ...	May 26 03:43:22 ...	2

Click Export Certificate to export certificate file, and Save default certificate as default.crt file to Windows OS.

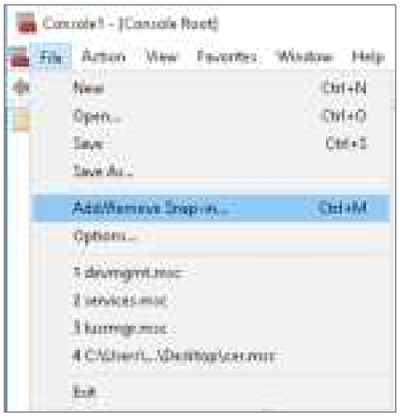


Leave the password field blank to export certificate only or fill in password to export certificate with private key.

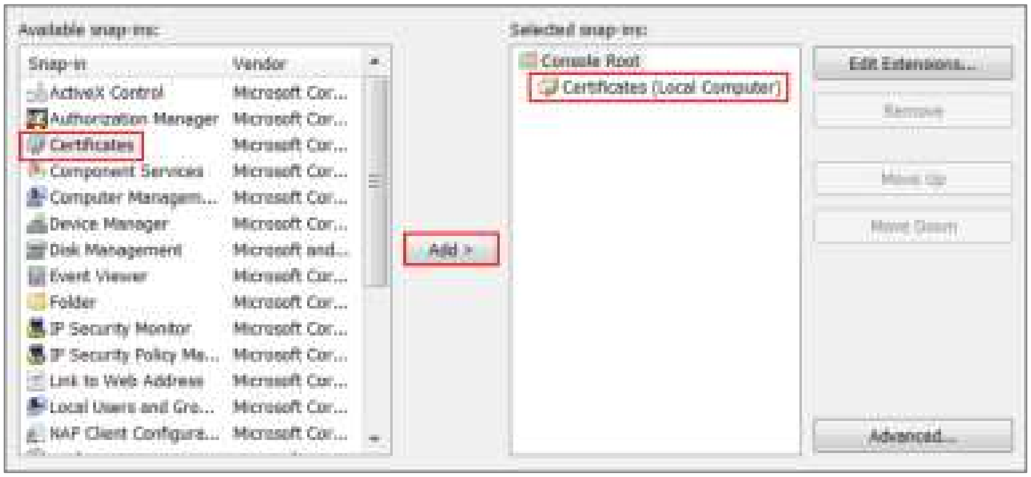
In Windows Start Menu > Search Box, type MMC and press Enter.



In the mmc console window, click File > Add/Remove Snap-in...



In the Available snap-ins, select the Certificates and click Add button. Select Computer account > Local Computer. Then, click Finished and OK to close the Snap-ins window.

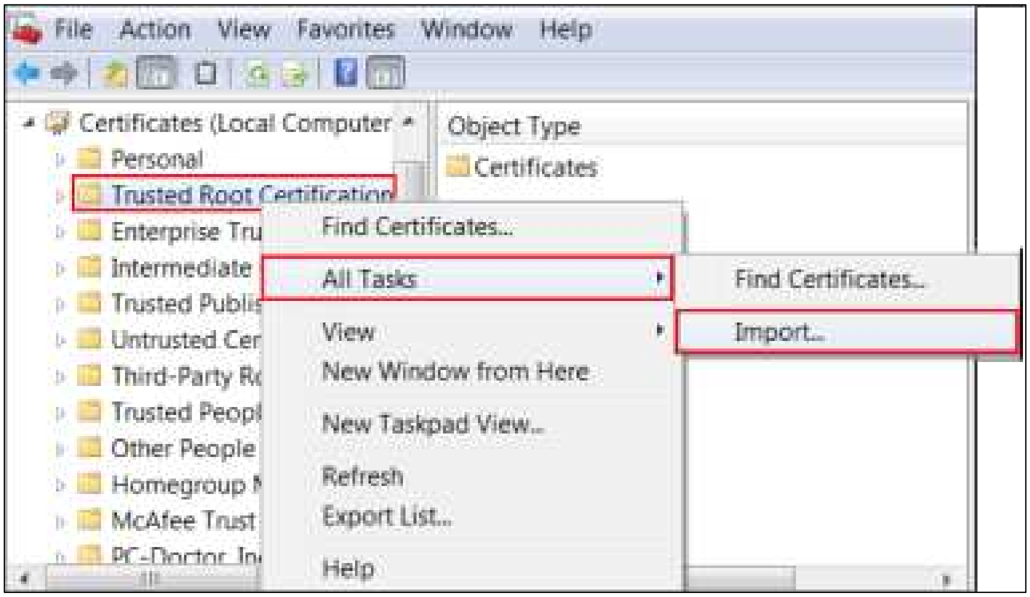

Available snap-ins:

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
IP Security Monitor	Microsoft Cor...
IP Security Policy Ma...	Microsoft Cor...
Link to Web Address	Microsoft Cor...
Local Users and Gro...	Microsoft Cor...
NAP Client Configura...	Microsoft Cor...

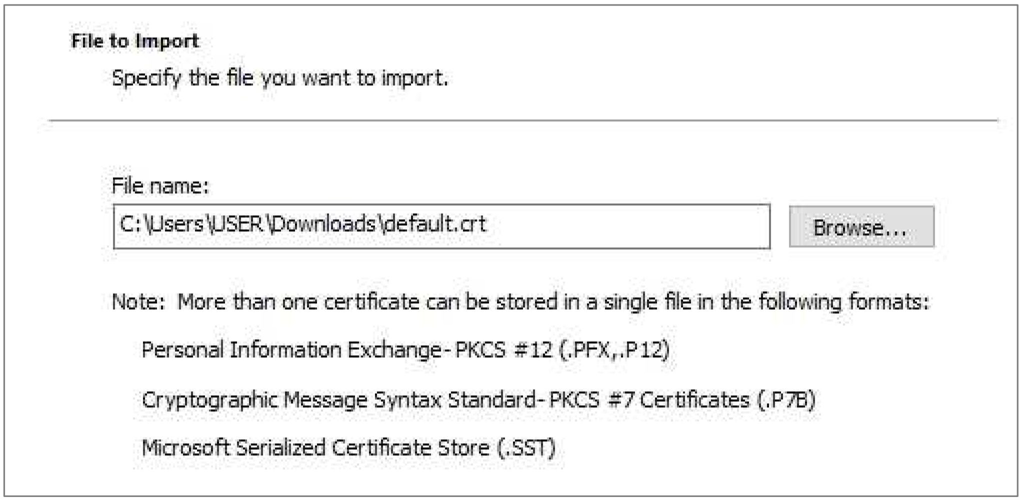
Selected snap-ins:

Console Root
Certificates (Local Computer)

In the mmc console window, open the Certificates (Local Computer) > Trusted Root Certification Authorities, right click Certificate > All Tasks > Import…



Click Next. Then, Browse..., and locate the default.crt file you downloaded earlier. Then, click Next.



File to Import

Specify the file you want to import.

File name:

C:\Users\USER\Downloads\default.crt

Browse...

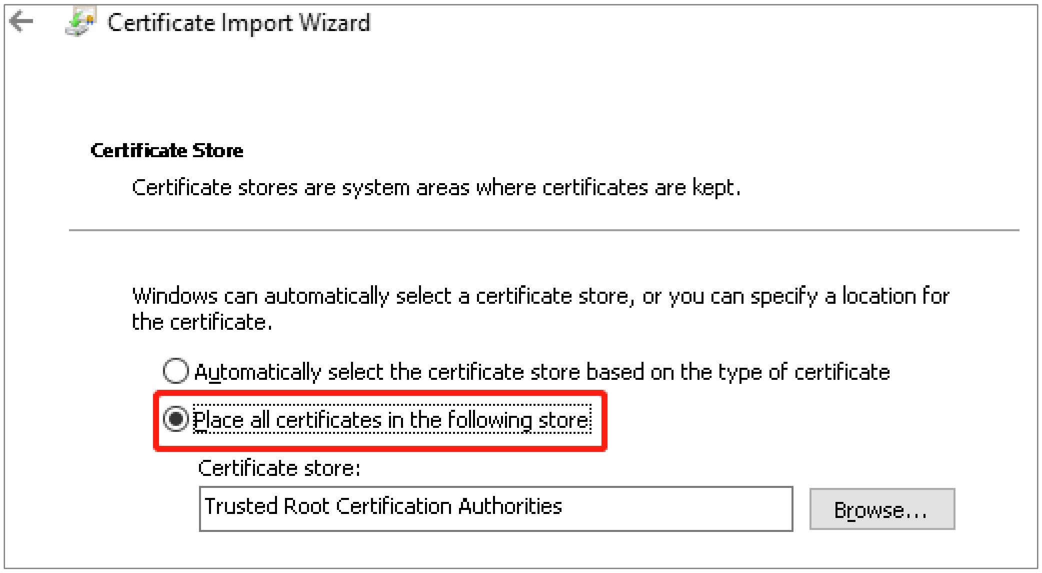
Note: More than one certificate can be stored in a single file in the following formats:

Personal Information Exchange- PKCS #12 (.PFX,.P12)

Cryptographic Message Syntax Standard- PKCS #7 Certificates (.P7B)

Microsoft Serialized Certificate Store (.SST)

Select Place all certificates in the following store and then click Browse and find Trusted Root Certification Authorities. Click Next, then click Finish.



Certificate Import Wizard

Certificate Store

Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for the certificate.

○ Automatically select the certificate store based on the type of certificate

● Place all certificates in the following store

Certificate store: Trusted Root Certification Authorities

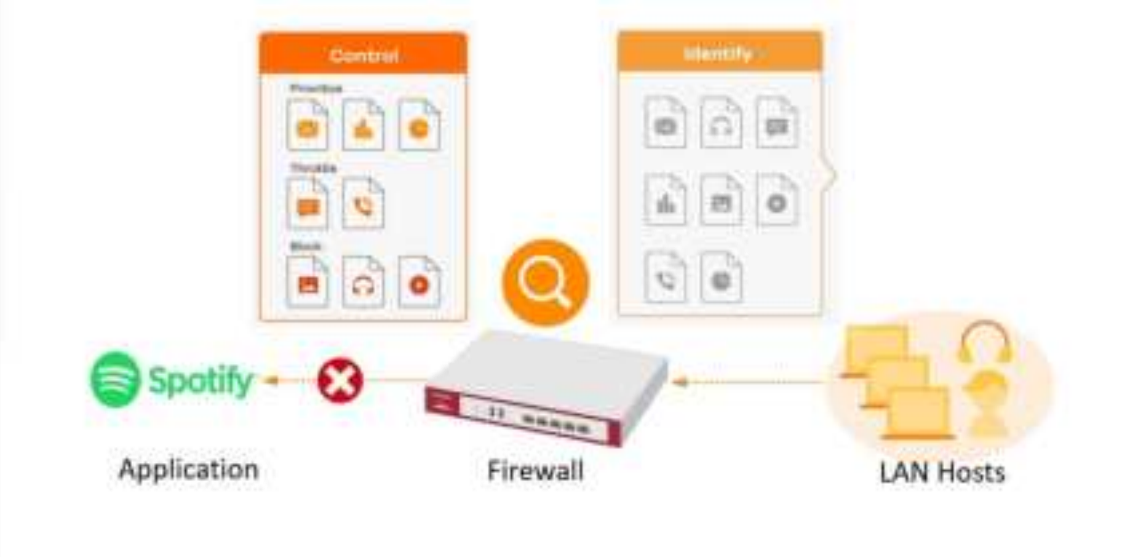
Test the Result

Access to Google drive from Lan host to verify if it is blocked by firewall Application patrol.

Go to Log & Report > Log/Events and select Application Patrol to check the logs.

How to Block the Spotify Music Streaming Service

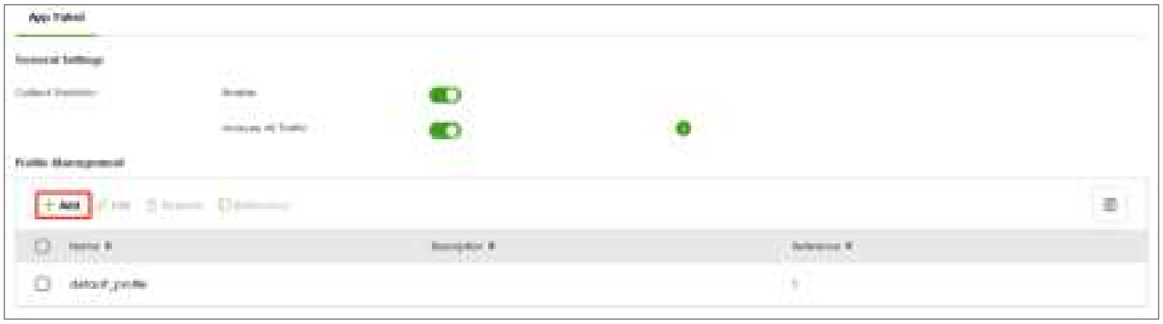
This is an example of using a FLEX UTM App Patrol Profile in a Security Policy to block the Spotify Music Streaming Service. You can use Application Patrol and Policy Control to ensure that the Spotify Music Streaming Service cannot be accessed on the LAN.



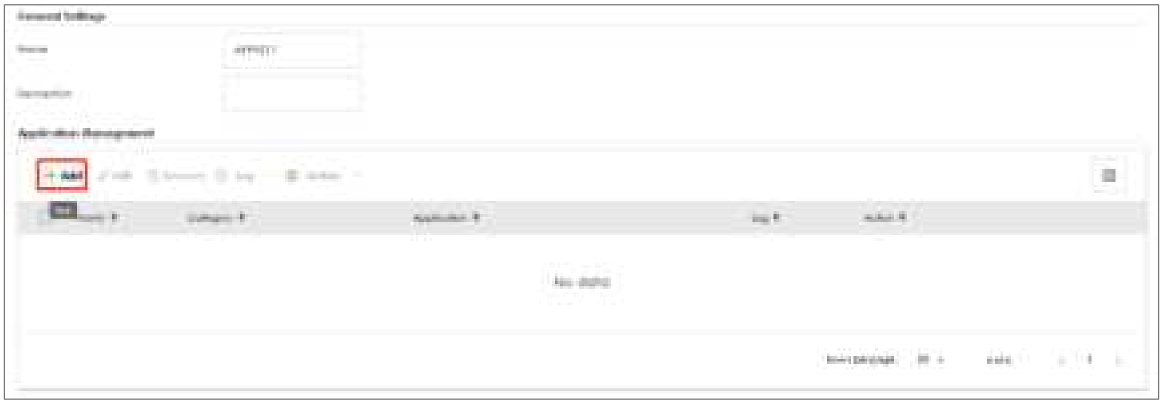
Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Create a App Patrol profile

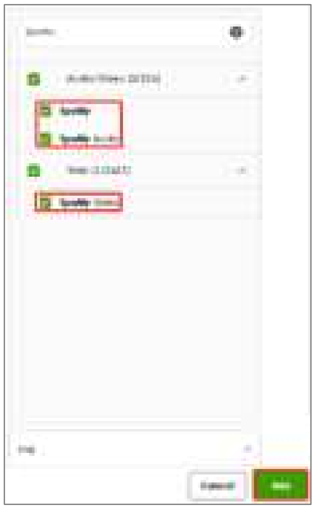
Go to Security Service > App patrol > Profile management, and click Add to create profile.



Click add to add application in this profile.



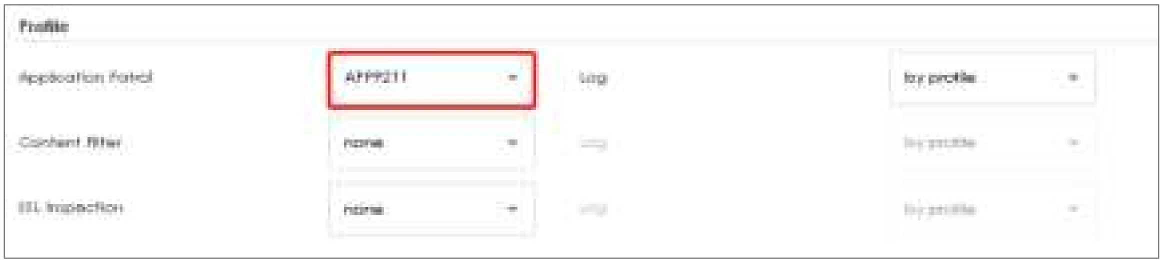
Search Spotify, and select this Application. Action set to Drop, and click Add.



Apply profile to security policy

Go to Security Policy > Policy control. Edit LAN_Outgoing, and scroll down to profile section.

Apply Application Patrol profile to Security policy.



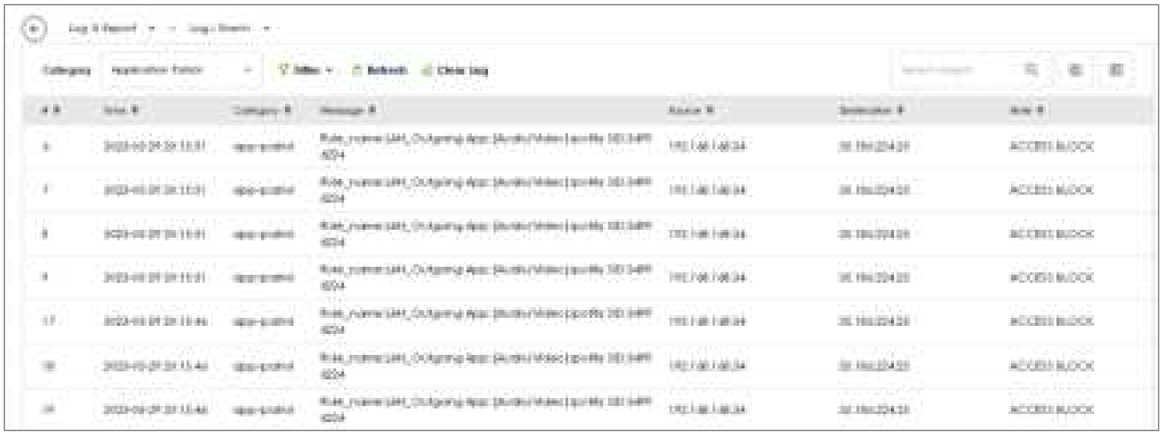
Profile

Application Patrol	APP9211	Log	by profile
Content Filter	none	Log	by profile
SSL Inspection	none	Log	by profile

Test the Result

Access to Spotify from Lan host to verify if it is blocked by firewall Application patrol.

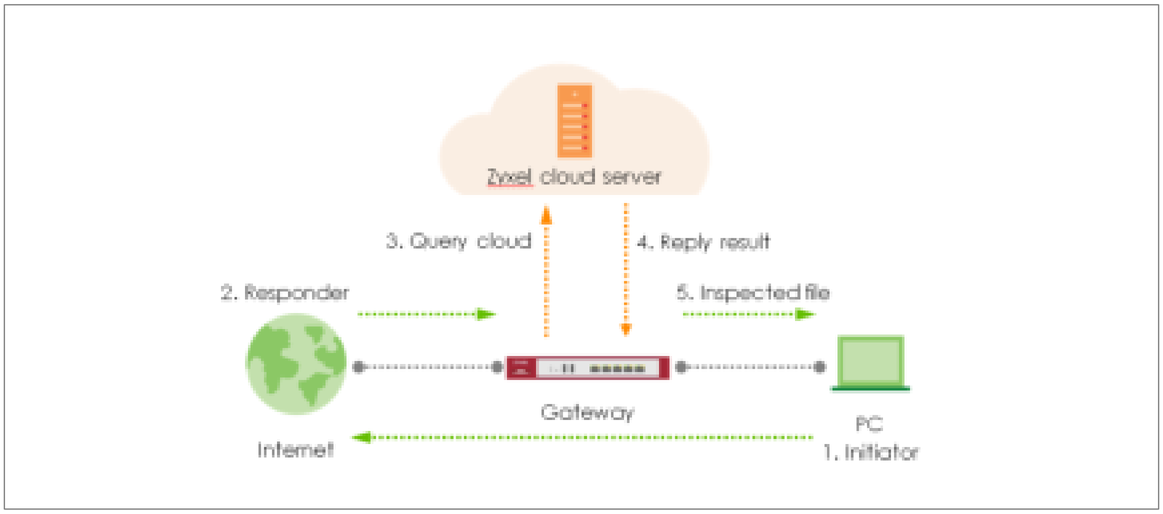
Go to Log & Report > Log/Events and select Application Patrol to check the logs.



#	Time	Category	Message	Source	Destination	Note
6	2023-03-29 20:15:31	app-patrol	Rule_name:LAN_Outgoing App: [Audio/Video] spotify [illegible]	192.168.168.34	35.186.224.25	ACCESS BLOCK
7	2023-03-29 20:15:31	app-patrol	Rule_name:LAN_Outgoing App: [Audio/Video] spotify [illegible]	192.168.168.34	35.186.224.25	ACCESS BLOCK
8	2023-03-29 20:15:31	app-patrol	Rule_name:LAN_Outgoing App: [Audio/Video] spotify [illegible]	192.168.168.34	35.186.224.25	ACCESS BLOCK
9	2023-03-29 20:15:31	app-patrol	Rule_name:LAN_Outgoing App: [Audio/Video] spotify [illegible]	192.168.168.34	35.186.224.25	ACCESS BLOCK
17	2023-03-29 20:15:46	app-patrol	Rule_name:LAN_Outgoing App: [Audio/Video] spotify [illegible]	192.168.168.34	35.186.224.25	ACCESS BLOCK
18	2023-03-29 20:15:46	app-patrol	Rule_name:LAN_Outgoing App: [Audio/Video] spotify [illegible]	192.168.168.34	35.186.224.25	ACCESS BLOCK
19	2023-03-29 20:15:46	app-patrol	Rule_name:LAN_Outgoing App: [Audio/Video] spotify [illegible]	192.168.168.34	35.186.224.25	ACCESS BLOCK

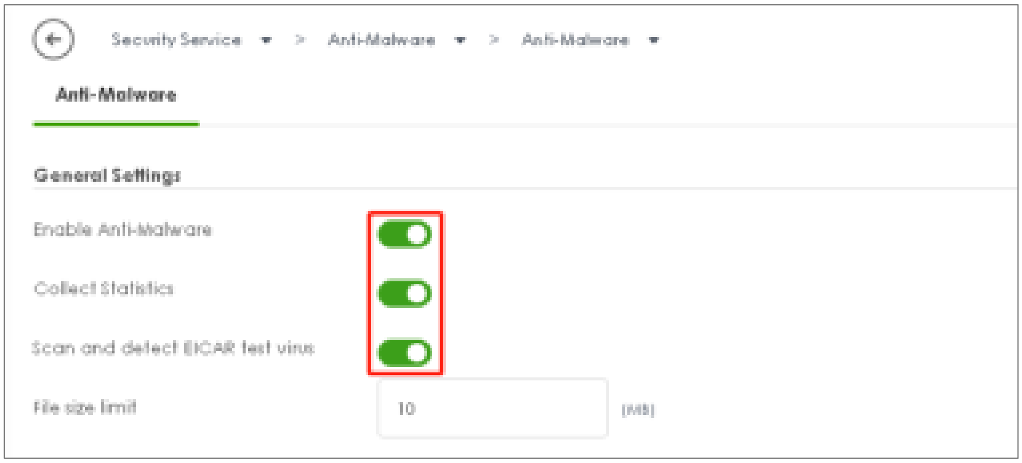
How does Anti-Malware Work

There are many viruses exist on the internet. And it may auto-downloaded on unexpected situation when you surfing between websites. The Anti-Malware is a good choose to protecting your computer to downloads unsafe application or files.



Enable Anti-Malware function to protecting your traffic

Go to Security Service > Anti-Malware. Turn on this feature. Select Collect Statistics and Scan and detect EICAR test virus.



General Settings

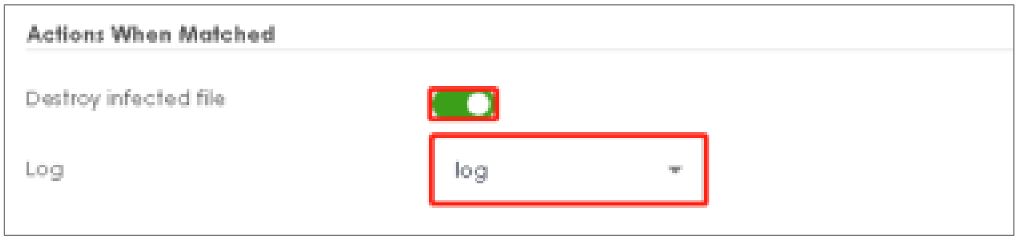
Enable Anti-Malware: on

Collect Statistics: on

Scan and detect EICAR test virus: on

File size limit: 10 (MB)

Select Destroy infected file and log in Actions When Matched



Actions When Matched

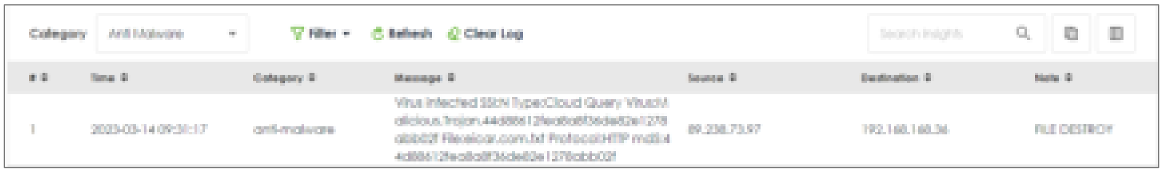
Destroy infected file: on

Log: log

Test the Result

Download EIACR file from a LAN host to verify if Anti-malware works for detection.

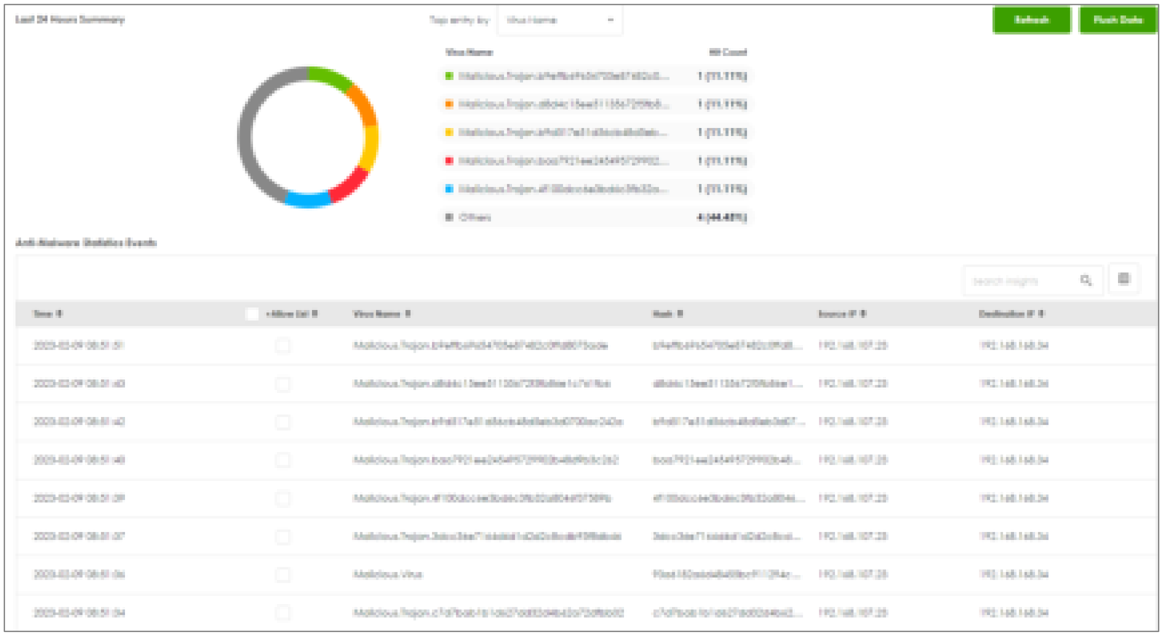
Go to Log & Report > Log/Events and select Anti Malware to check the logs.



Category: Anti Malware

#	Time	Category	Message	Source	Destination	Note
1	2023-03-14 09:31:17	anti-malware	Virus infected SSN TypeCloud Query Virus:Malicious.Trojan.44d88612fea8a8f36de82e1278abb02f File:eicar.com.txt Protocol:HTTP md5:44d88612fea8a8f36de82e1278abb02f	89.238.73.97	192.168.168.36	FILE DESTROY

Go to Security Statistics > Anti-Malware to check summary of all events.



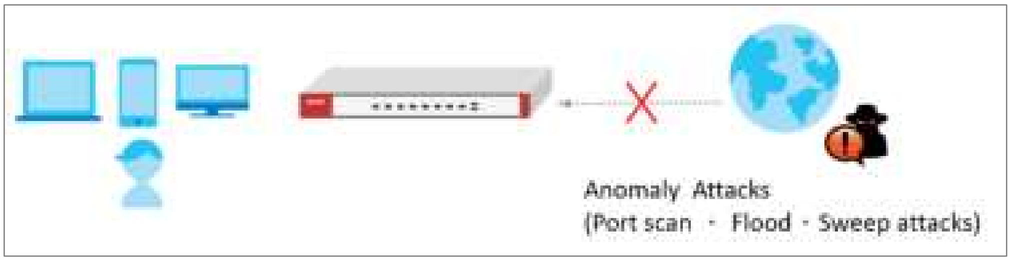
Top entry by: Virus Name

Virus Name	Hit Count
🟩 Malicious.Trojan.[illegible]...	1 (11.11%)
🟧 Malicious.Trojan.[illegible]...	1 (11.11%)
🟨 Malicious.Trojan.[illegible]...	1 (11.11%)
🟥 Malicious.Trojan.[illegible]...	1 (11.11%)
🟦 Malicious.Trojan.[illegible]...	1 (11.11%)
■ Others	4 (44.45%)

Time	+ Allow List	Virus Name	Hash	Source IP	Destination IP
2023-03-09 08:51:51	□	Malicious.Trojan.[illegible]	[illegible]...	192.168.107.23	192.168.168.34
2023-03-09 08:51:43	□	Malicious.Trojan.[illegible]	[illegible]...	192.168.107.23	192.168.168.34
2023-03-09 08:51:42	□	Malicious.Trojan.[illegible]	[illegible]...	192.168.107.23	192.168.168.34
2023-03-09 08:51:40	□	Malicious.Trojan.[illegible]	[illegible]...	192.168.107.23	192.168.168.34
2023-03-09 08:51:39	□	Malicious.Trojan.[illegible]	[illegible]...	192.168.107.23	192.168.168.34
2023-03-09 08:51:37	□	Malicious.Trojan.[illegible]	[illegible]...	192.168.107.23	192.168.168.34
2023-03-09 08:51:36	□	Malicious.Virus	[illegible]...	192.168.107.23	192.168.168.34
2023-03-09 08:51:34	□	Malicious.Trojan.[illegible]	[illegible]...	192.168.107.23	192.168.168.34

How to Detect and Prevent TCP Port Scanning with DoS Prevention

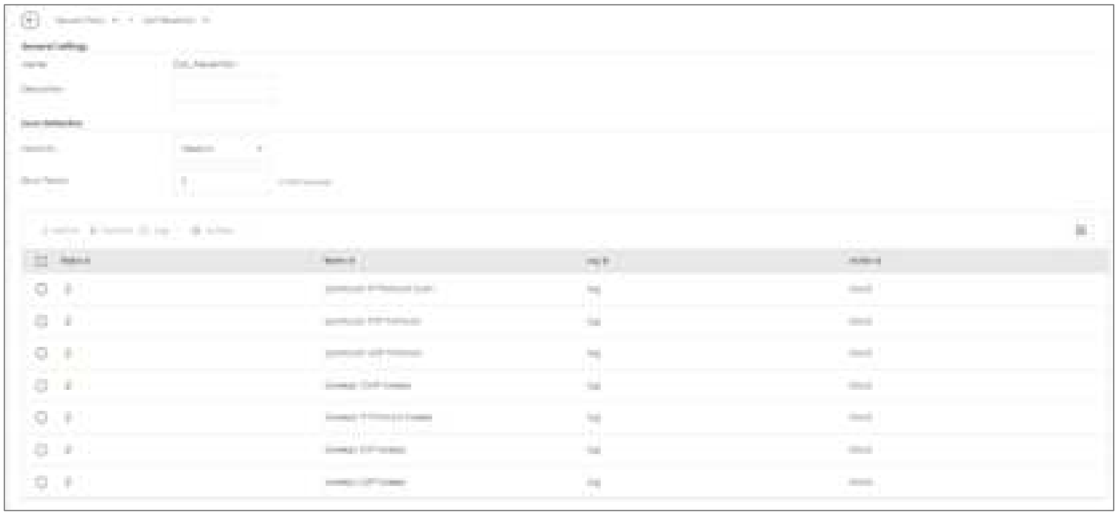
This is an example of using a USG Flex H DoS Prevention Profile to protect against anomalies based on violations of protocol standards (RFCs Requests for Comments) and abnormal traffic flows such as port scans.

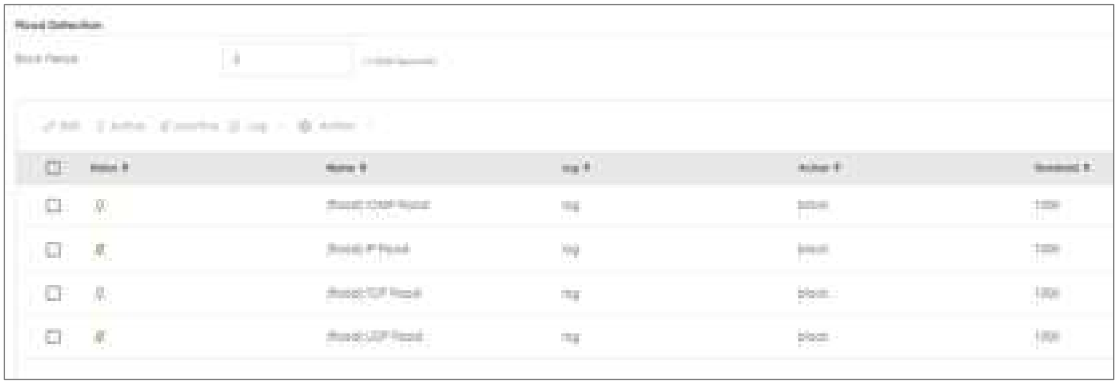


Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 500H (Firmware Version: uOS 1.10).

Set Up the DoS Prevention

In the USG Flex H, go to **Security Policy > Dos Prevention > Add a profile**. Configure a **Name** for you to identify the **profile** such as “DoS_Prevention”. Configure the **Scan Detection** and **Flood Detection** to block when the Dos prevention events were detected.





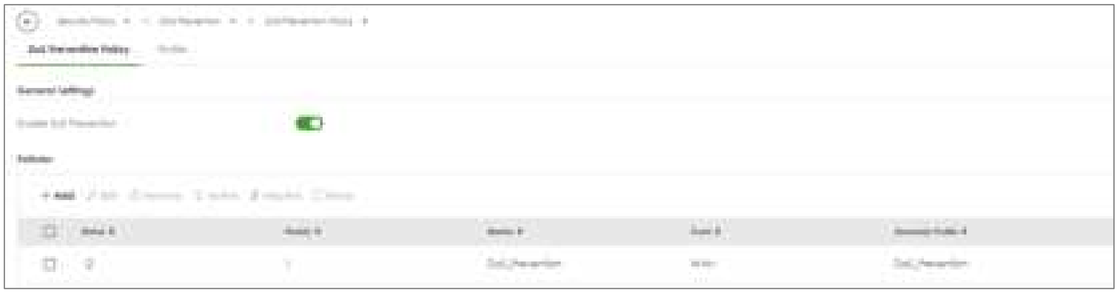
Flood Detection

Block Period: 1 (1-3600 Seconds)

☐	Status	Name	Log	Action	Threshold
☐		(flood) ICMP Flood	log	block	1000
☐		(flood) IP Flood	log	block	1000
☐		(flood) TCP Flood	log	block	1000
☐		(flood) UDP Flood	log	block	1000

Set Up the DoS Prevention Policy

In the USG Flex H, go to **Security Policy > Dos Prevention > DoS Prevention Policy** Configure a **Name** for you to identify the **policy** such as “DoS_Prevention”. Configure the **From** and **Anomaly Profile** to block when the DoS prevention events were detected.



General Settings

Enable DoS Prevention

Policies

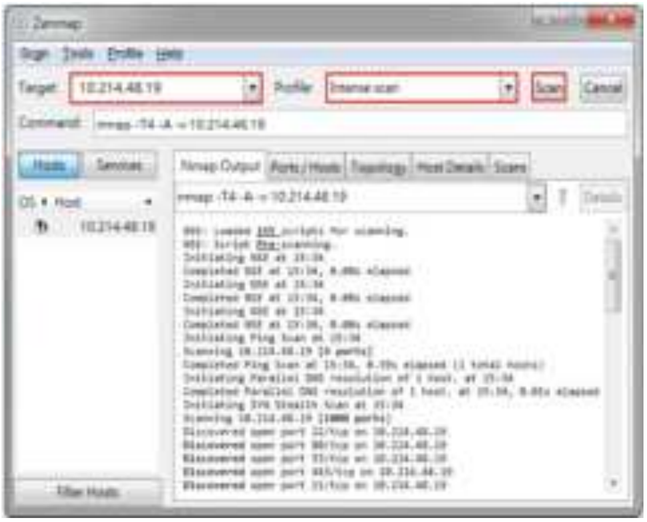
	Status	Priority	Name	From	Anomaly Profile
□		1	DoS_Prevention	WAN	DoS_Prevention

Test the Result

Using the port scan tool Nmap or hping3 to scan the wan interface.

For example, using Nmap security scanner for testing the result:

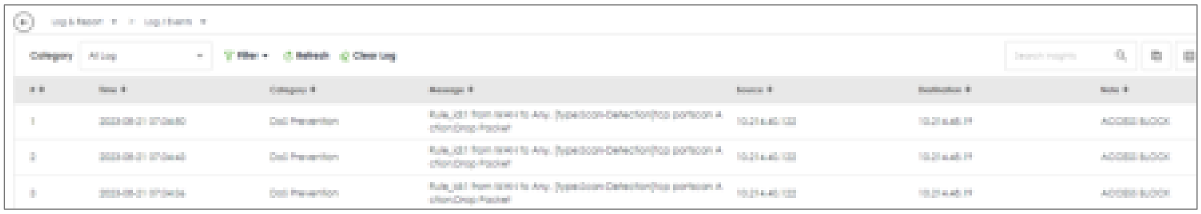
Open the Nmap GUI, set the Target to be the WAN IP of USG Flex H (10.214.48.19 in this example) and set Profile to be Intense Scan and click Scan.



Target: 10.214.48.19
Profile: Intense scan
Command: nmap -T4 -A -v 10.214.48.19

```
NSE: Loaded 155 scripts for scanning.
NSE: Script Pre-scanning.
Initiating NSE at 15:34
Completed NSE at 15:34, 0.00s elapsed
Initiating NSE at 15:34
Completed NSE at 15:34, 0.00s elapsed
Initiating NSE at 15:34
Completed NSE at 15:34, 0.00s elapsed
Initiating Ping Scan at 15:34
Scanning 10.214.48.19 [4 ports]
Completed Ping Scan at 15:34, 0.33s elapsed (1 total hosts)
Initiating Parallel DNS resolution of 1 host. at 15:34
Completed Parallel DNS resolution of 1 host. at 15:34, 0.02s elapsed
Initiating SYN Stealth Scan at 15:34
Scanning 10.214.48.19 [1000 ports]
Discovered open port 22/tcp on 10.214.48.19
Discovered open port 80/tcp on 10.214.48.19
Discovered open port 53/tcp on 10.214.48.19
Discovered open port 443/tcp on 10.214.48.19
Discovered open port 21/tcp on 10.214.48.19
```

Navigate to **Log & Report > Log / Events**, you will see log of blocked messages.



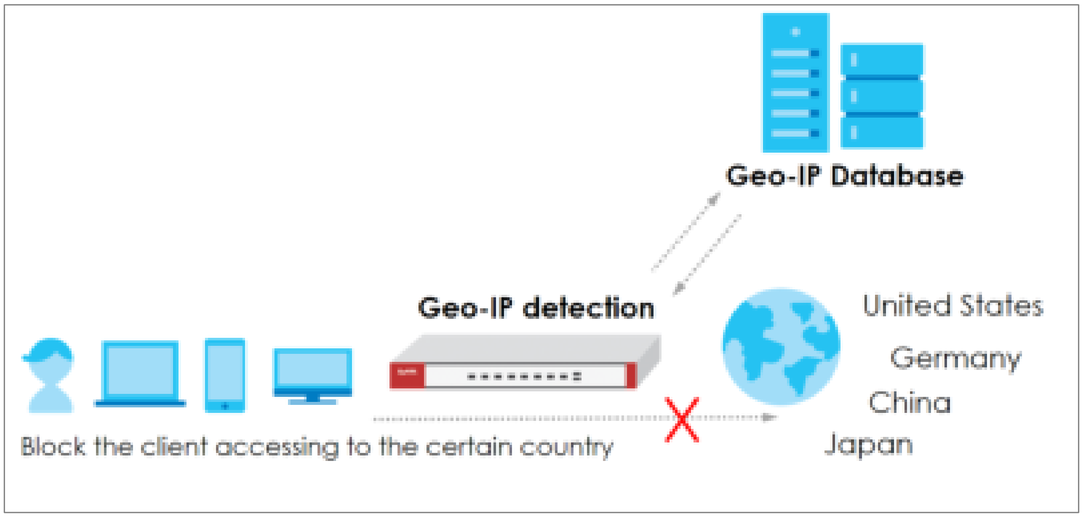
Category: All Log

#	Time	Category	Message	Source	Destination	Note
1	2023-08-21 07:04:50	DoS Prevention	Rule_id:1 from WAN to Any. [type=Scan-Detection(tcp portscan A ction:Drop Packet	10.214.40.122	10.214.48.19	ACCESS BLOCK
2	2023-08-21 07:04:43	DoS Prevention	Rule_id:1 from WAN to Any. [type=Scan-Detection(tcp portscan A ction:Drop Packet	10.214.40.122	10.214.48.19	ACCESS BLOCK
3	2023-08-21 07:04:36	DoS Prevention	Rule_id:1 from WAN to Any. [type=Scan-Detection(tcp portscan A ction:Drop Packet	10.214.40.122	10.214.48.19	ACCESS BLOCK

How to block the client from accessing to certain country using Geo IP?

The Geo IP offers to identify the country-based IP addresses; it allows you to block the client from accessing a certain country based on the security policy.

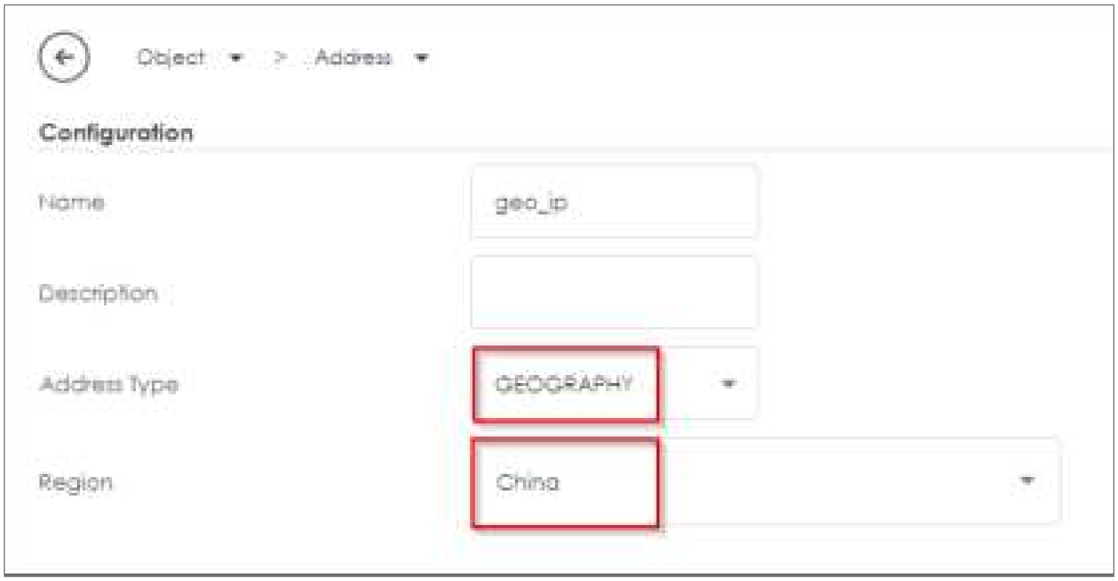
When the user makes HTTP or HTTPS request, USG Flex H queries the IP address from the cloud database, then takes action when it matches the block country in the security policy.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG Flex 500H (Firmware Version: uOS 1.10)

Set Up the Address Objet with Geo IP

Navigate to **Object > Address > Geo IP > Add geo IP related objects.**



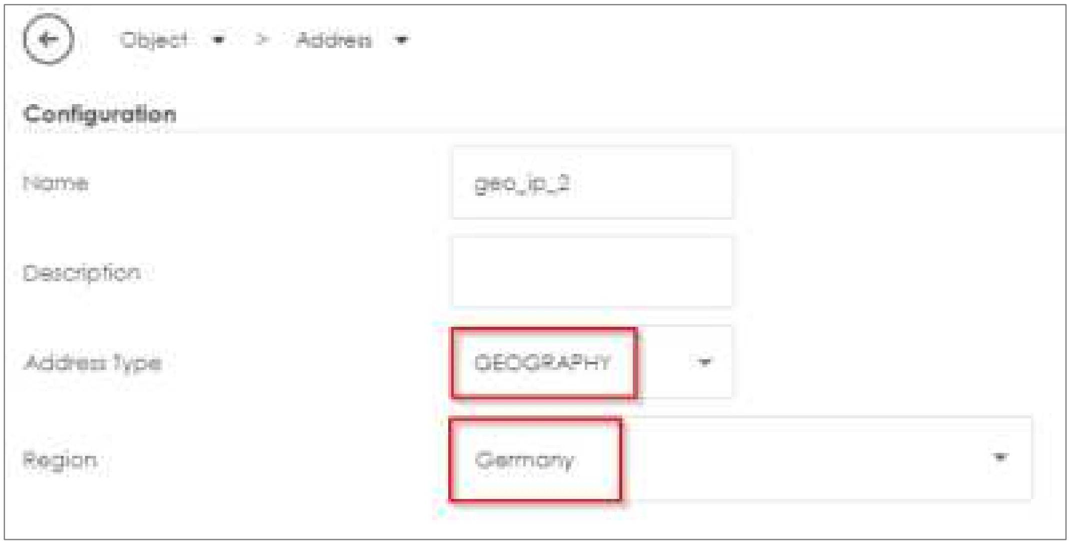
Configuration

Name: geo_ip

Description:

Address Type: GEOGRAPHY

Region: China



Configuration

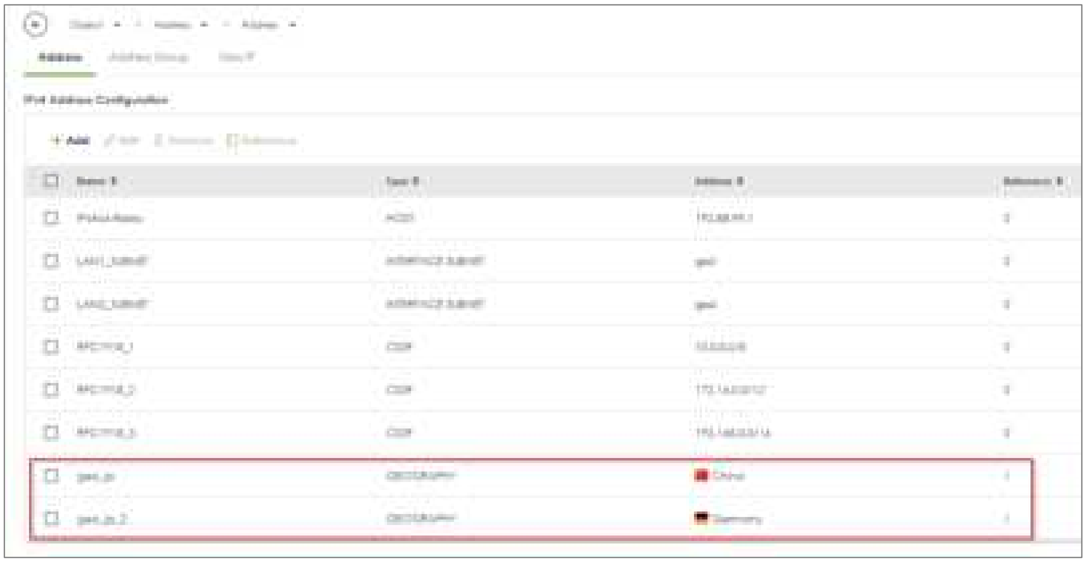
Name: geo_ip_2

Description:

Address Type: GEOGRAPHY

Region: Germany

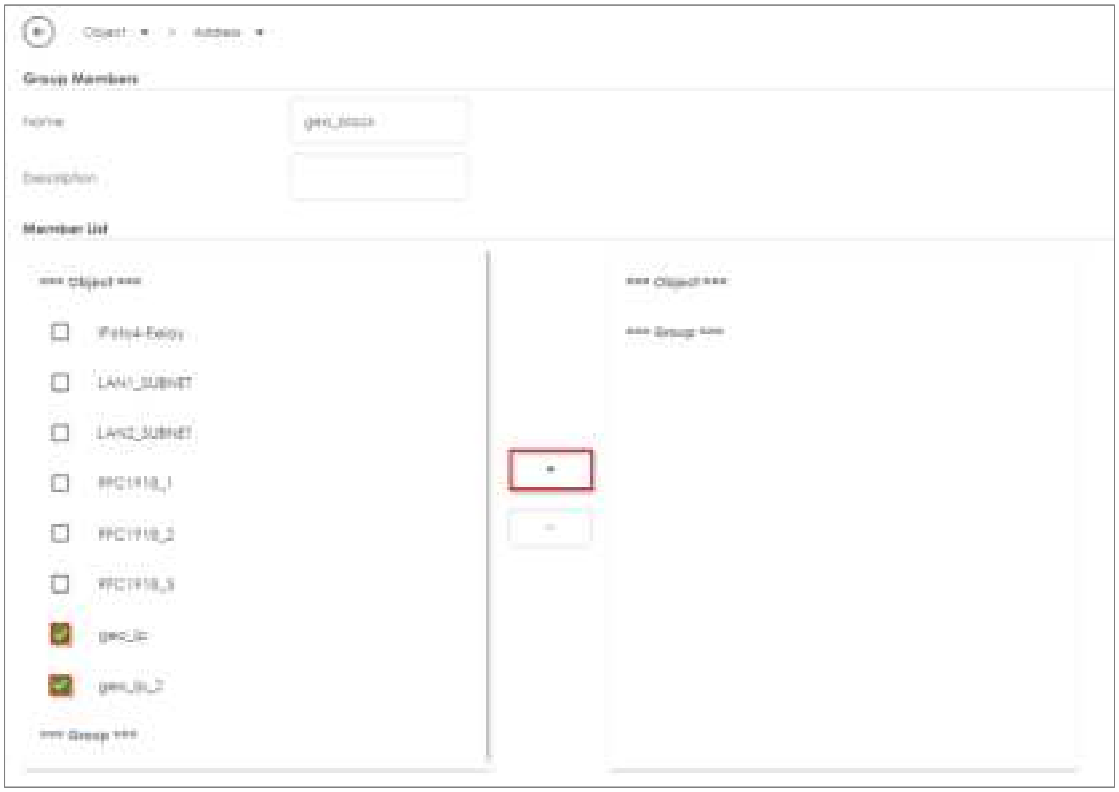
Navigate to **Object > Address > Address**, you can see the customized GEOGRAPHY address object.



IPv4 Address Configuration

□	Name	Type	Address	Reference
□	IPv4-Relay	HOST	192.168.99.1	0
□	LAN1_SUBNET	INTERFACE SUBNET	ge3	0
□	LAN2_SUBNET	INTERFACE SUBNET	ge4	0
□	RFC1918_1	CIDR	10.0.0.0/8	0
□	RFC1918_2	CIDR	172.16.0.0/12	0
□	RFC1918_3	CIDR	192.168.0.0/16	0
□	geo_ip	GEOGRAPHY	🟥 China	0
□	geo_ip_2	GEOGRAPHY	■ Germany	0

Go to **Object > Address > Address Group> Add Address Group Rule**, add all customized GEOGRAPHY addresses into the same **Member** object.



Group Members

Name: geo_block

Description:

Member List

*** Object ***

□ IPv4-Relay

□ LAN1_SUBNET

□ LAN2_SUBNET

□ RFC1918_1

□ RFC1918_2

□ RFC1918_3

☑ geo_ip

☑ geo_ip_2

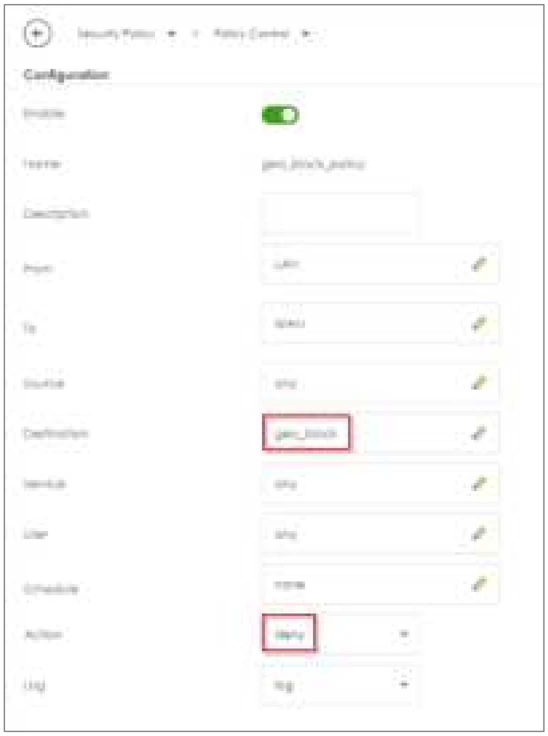
*** Group ***

*** Object ***

*** Group ***

Set Up the Security Policy

Go to **Security Policy > Policy Control**, configure a **Name** for you to identify the **Security Policy** profile. Set deny Geo IP traffic from LAN to WAN (geo_block_policy in this example).



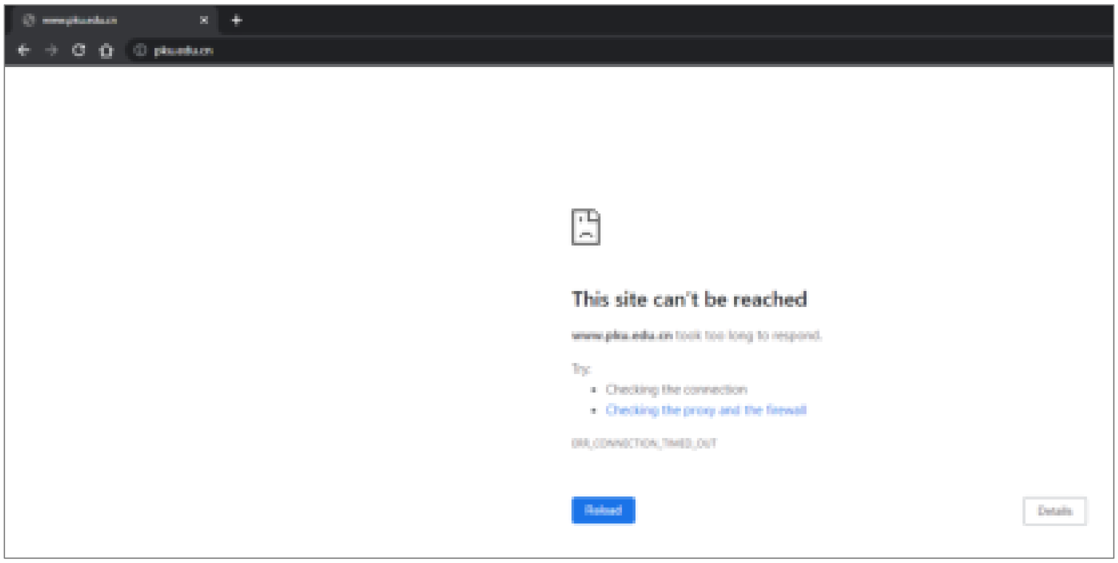
Security Policy > Policy Control

Configuration

Enable	●
Name	geo_block_policy
Description	
From	LAN
To	WAN
Source	any
Destination	geo_block
Service	any
User	any
Schedule	none
Action	deny
Log	log

Test the Result

When the LAN PC tries to access a website that matches the blocked geographical location, it is unable to reach those sites.



www.pku.edu.cn

pku.edu.cn

This site can't be reached

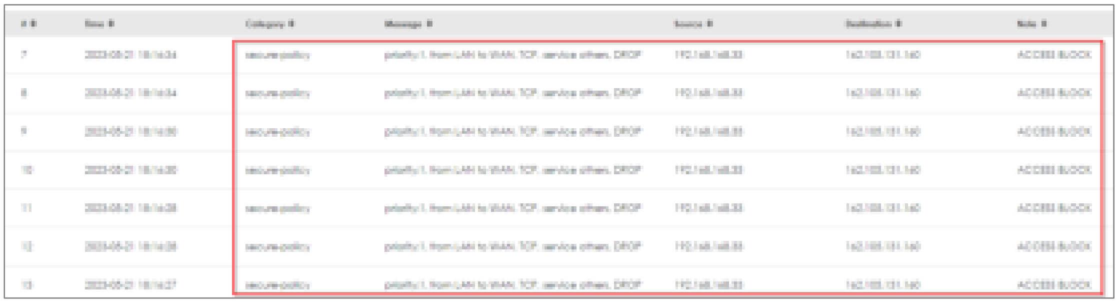
www.pku.edu.cn took too long to respond.

Try:

- Checking the connection
- Checking the proxy and the firewall

ERR_CONNECTION_TIMED_OUT

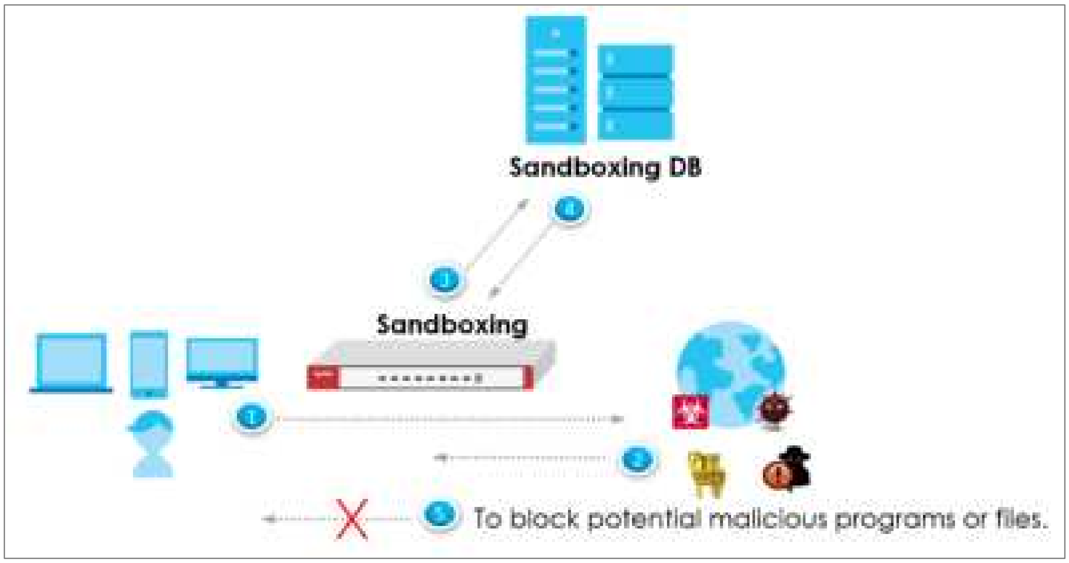
To view the log message, go to USG Flex H **Log & Report > Log / Events**. You will find log messages similar to the following. Any traffic that matches the Geo IP policy will be blocked, and the details will be displayed in the Message field.



#	Time	Category	Message	Source	Destination	Note
7	2023-05-21 18:16:34	secure-policy	priority:1, from LAN to WAN, TCP, service others, DROP	192.168.168.33	162.105.131.160	ACCESS BLOCK
8	2023-05-21 18:16:34	secure-policy	priority:1, from LAN to WAN, TCP, service others, DROP	192.168.168.33	162.105.131.160	ACCESS BLOCK
9	2023-05-21 18:16:30	secure-policy	priority:1, from LAN to WAN, TCP, service others, DROP	192.168.168.33	162.105.131.160	ACCESS BLOCK
10	2023-05-21 18:16:30	secure-policy	priority:1, from LAN to WAN, TCP, service others, DROP	192.168.168.33	162.105.131.160	ACCESS BLOCK
11	2023-05-21 18:16:28	secure-policy	priority:1, from LAN to WAN, TCP, service others, DROP	192.168.168.33	162.105.131.160	ACCESS BLOCK
12	2023-05-21 18:16:28	secure-policy	priority:1, from LAN to WAN, TCP, service others, DROP	192.168.168.33	162.105.131.160	ACCESS BLOCK
13	2023-05-21 18:16:27	secure-policy	priority:1, from LAN to WAN, TCP, service others, DROP	192.168.168.33	162.105.131.160	ACCESS BLOCK

How to Use Sandbox to Detect Unknown Malware?

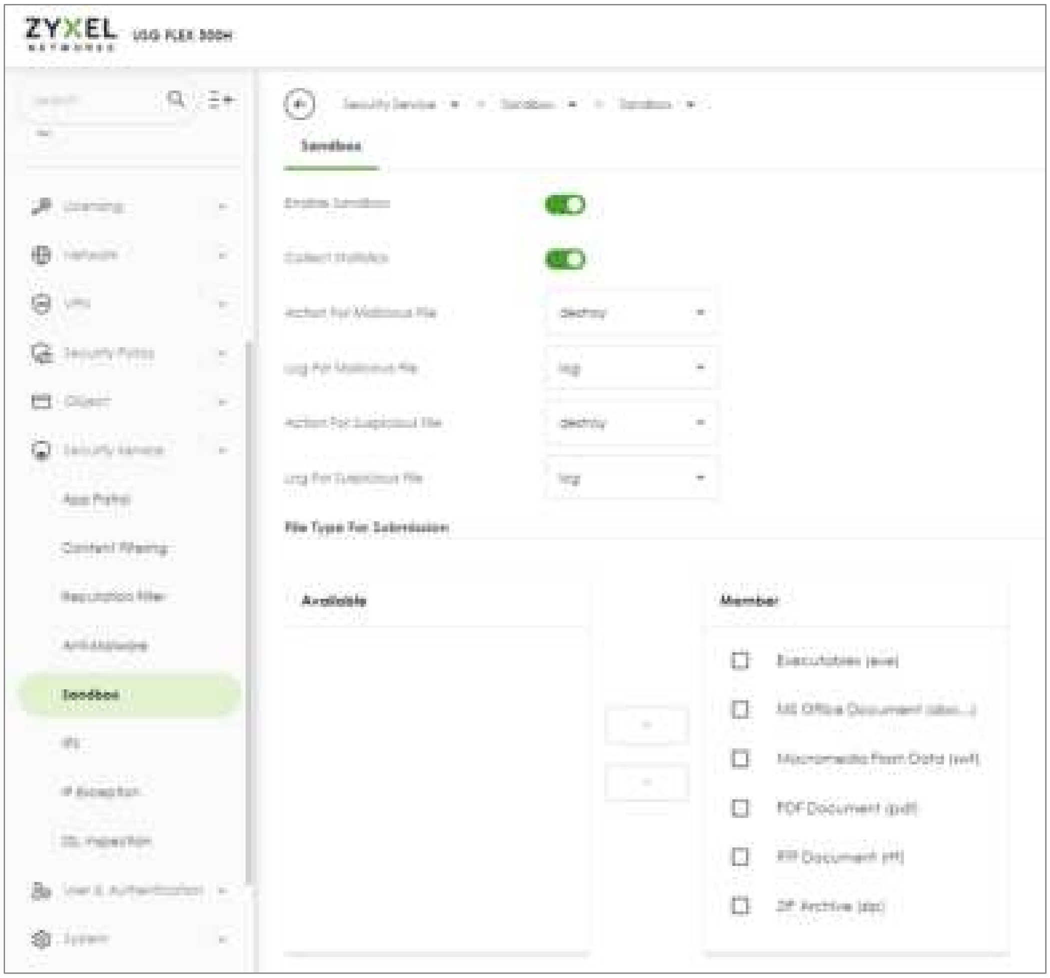
This is an example of using the USG Flex H to employ Sandboxing for detecting unknown malware. To achieve this goal, you can configure the Sandboxing profile within the security service path, and this article will guide you on its deployment.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 500H (Firmware Version: uOS 1.10).

Set Up the Sandbox

Navigate to **Security Service > Sandbox**. Enable Sandbox option and choose the desired action when the Sandbox detects malicious and suspicious files. Additionally, select the desired file type for submission; currently, we support the following file types: Executables (exe), MS Office Document (doc...), Macromedia Flash Data (swf), PDF Document (pdf), RTF Document (rtf), and ZIP Archive (zip).



Enable Sandbox: ●

Collect Statistics: ●

Action For Malicious File: destroy

Log For Malicious File: log

Action For Suspicious File: destroy

Log For Suspicious File: log

File Type For Submission

Available

Member

- □ Executables (exe)
- □ MS Office Document (doc...)
- □ Macromedia Flash Data (swf)
- □ PDF Document (pdf)
- □ RTF Document (rtf)
- □ ZIP Archive (zip)

Test the Result

When downloading the file, the firewall will query the Sandbox DB to detect whether it is a malicious or suspicious file. You can navigate to **Log & Report** > **Log/Events** to see the sandbox related logs.

How to Configure Reputation Filter- IP Reputation

As cyber threats such as scanners, botnets, phishing, etc. grow increasingly, how to identify suspect IP addresses of threats efficiently becomes a crucial task.

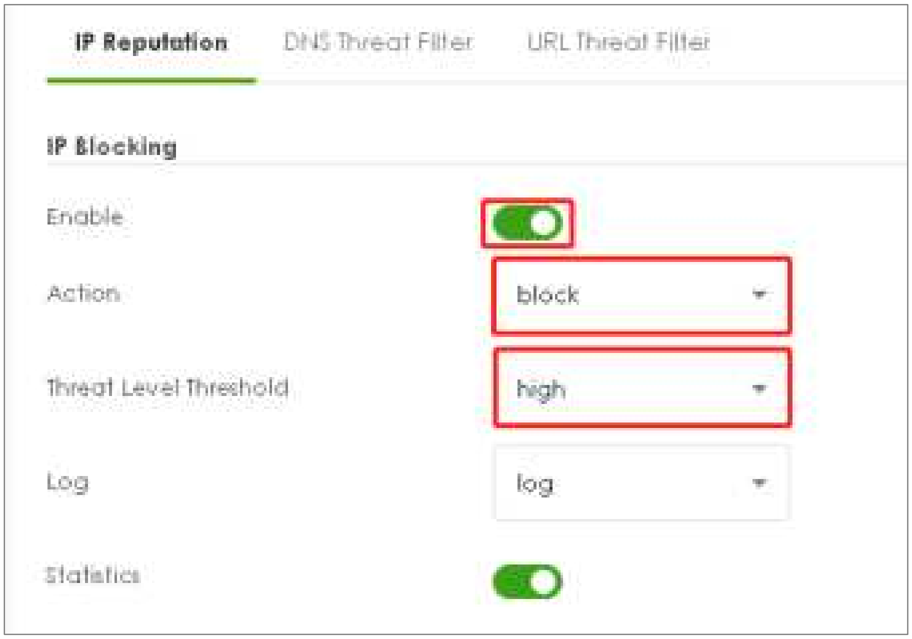
With regularly updated IP database, FLEX prevents threats by blocking connection to/from known IP addresses based on signature database. It filters source and destination addresses in your network traffic to take the proper risk prevention actions.

This example illustrates how to configure IP Reputation on FLEX gateway to detect cyber threats for both incoming and outgoing traffic.

Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Set Up the IP reputation filter

Go to Security Service > Reputation Filter > IP reputation. Turn on this feature. Select Block on Action field. The threat level threshold is measured by the query score of IP signature database.



IP Blocking

Enable: ●

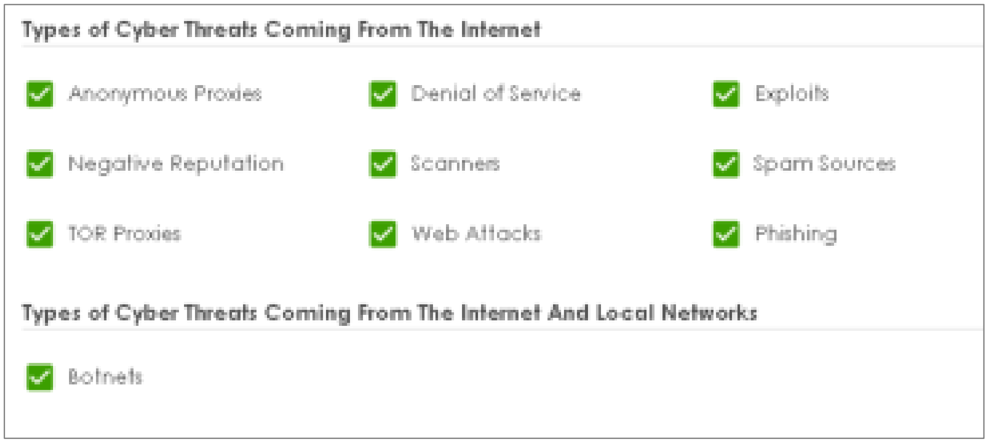
Action: block

Threat Level Threshold: high

Log: log

Statistics: ●

Select categories in Types of Cyber Threats Coming from the Internet, and Types of Cyber Threats Coming from The Internet and Local Networks.



Types of Cyber Threats Coming From The Internet

☑ Anonymous Proxies ☑ Denial of Service ☑ Exploits

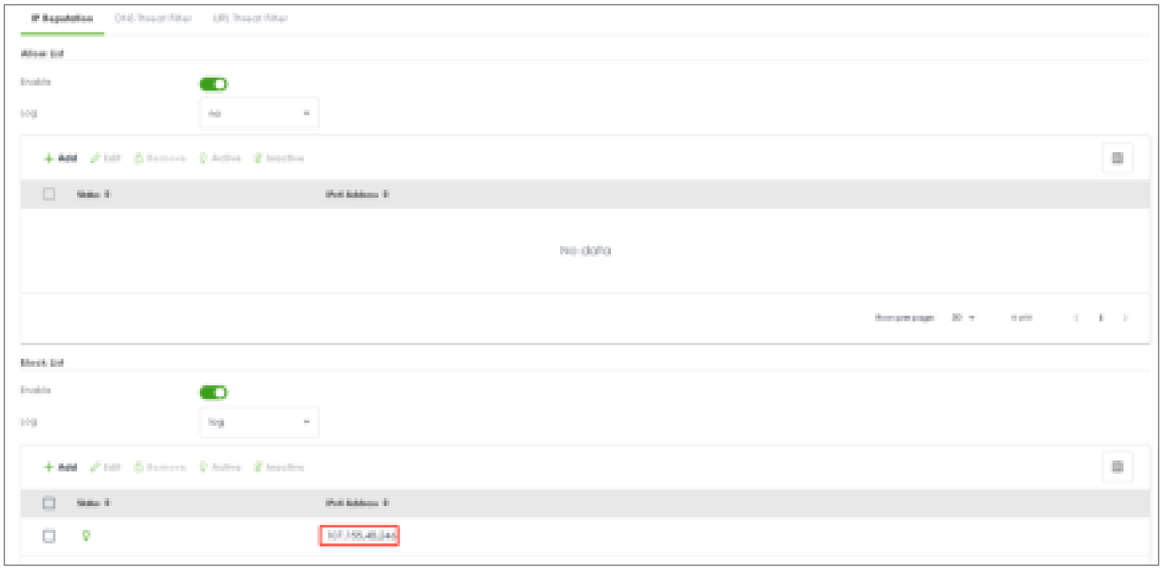
☑ Negative Reputation ☑ Scanners ☑ Spam Sources

☑ TOR Proxies ☑ Web Attacks ☑ Phishing

Types of Cyber Threats Coming From The Internet And Local Networks

☑ Botnets

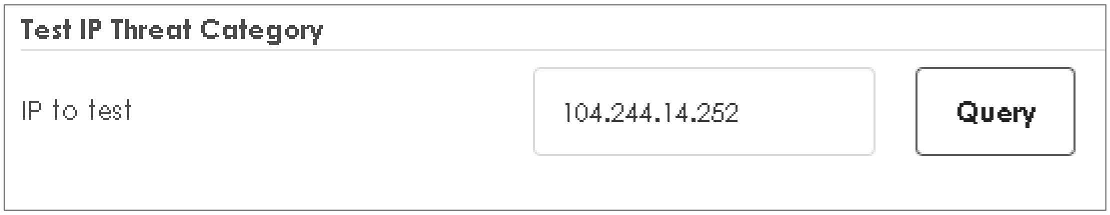
Go to Security Service > Reputation Filter > IP reputation > White List and Black List to manually adding IP addresses to Black List.



107.155.48.246

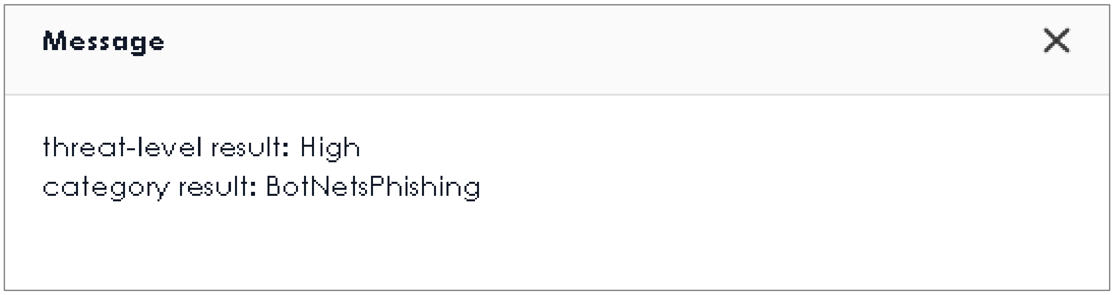
Test the Result

Verify an IP in Test IP Threat Category. In Test IP Threat Category, enter a malicious IP and query the result.



Test IP Threat Category

IP to test: 104.244.14.252

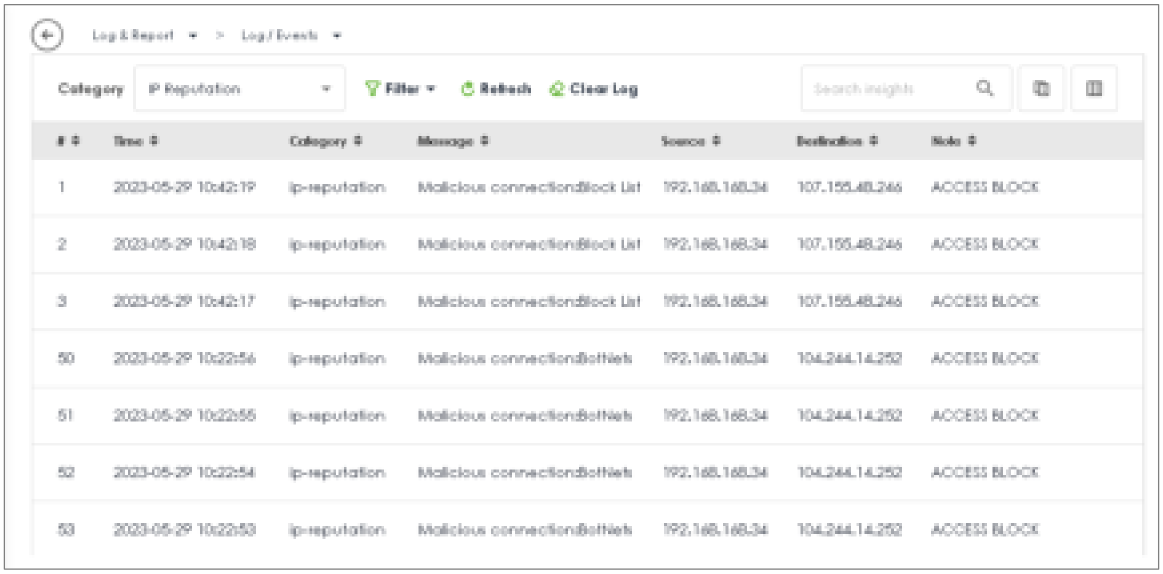


Message

threat-level result: High
category result: BotNetsPhishing

Try to generate ICMP packet from LAN to destination IP 107.155.48.246, and 104.244.14.252

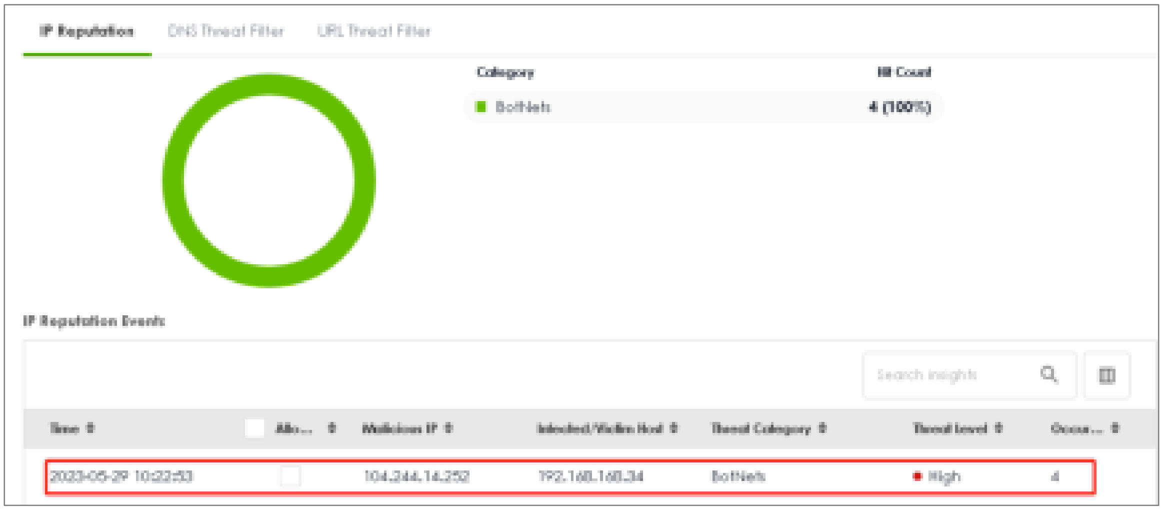
Go to Log & Report > Log/Events and select IP reputation Filter to check the logs.



Category: IP Reputation

#	Time	Category	Message	Source	Destination	Note
1	2023-05-29 10:42:19	ip-reputation	Malicious connection:Block List	192.168.168.34	107.155.48.246	ACCESS BLOCK
2	2023-05-29 10:42:18	ip-reputation	Malicious connection:Block List	192.168.168.34	107.155.48.246	ACCESS BLOCK
3	2023-05-29 10:42:17	ip-reputation	Malicious connection:Block List	192.168.168.34	107.155.48.246	ACCESS BLOCK
50	2023-05-29 10:22:56	ip-reputation	Malicious connection:BotNets	192.168.168.34	104.244.14.252	ACCESS BLOCK
51	2023-05-29 10:22:55	ip-reputation	Malicious connection:BotNets	192.168.168.34	104.244.14.252	ACCESS BLOCK
52	2023-05-29 10:22:54	ip-reputation	Malicious connection:BotNets	192.168.168.34	104.244.14.252	ACCESS BLOCK
53	2023-05-29 10:22:53	ip-reputation	Malicious connection:BotNets	192.168.168.34	104.244.14.252	ACCESS BLOCK

Go to Security Statistics > Reputation Filter > IP reputation to check summary of all events.



Category	Hit Count
🟩 BotNets	4 (100%)

IP Reputation Events

Time ⇕	□ Allo... ⇕	Malicious IP ⇕	Infected/Victim Host ⇕	Threat Category ⇕	Threat Level ⇕	Occur... ⇕
2023-05-29 10:22:53	□	104.244.14.252	192.168.168.34	BotNets	● High	4

How to Configure Reputation Filter- URL Threat Filter

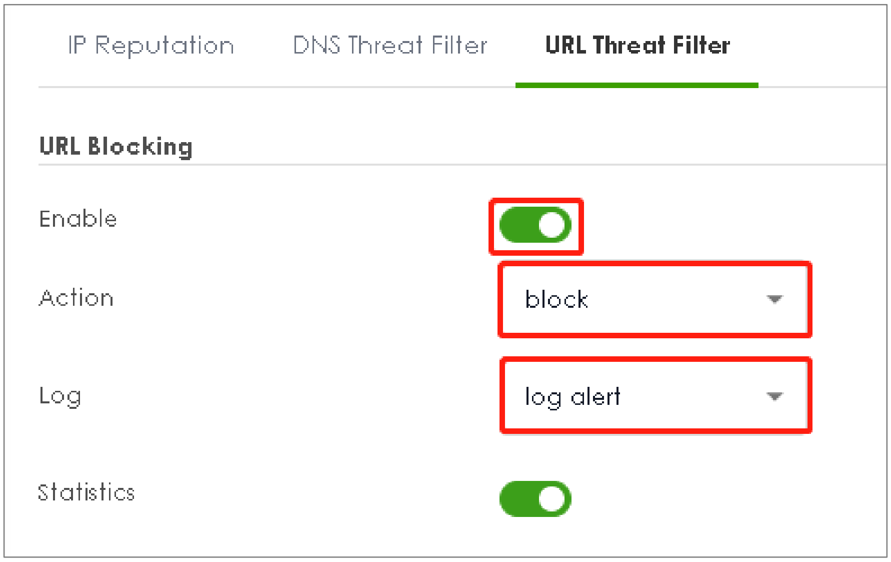
URL Threat Filter can avoid users to browse some malicious URLs (such as anonymizers, browser exploits, phishing sites, spam URLs, spyware) and allows administrator to manage which URLs can be browsed or not.

This example demonstrates how to configure the URL Threat Filter to redirect web access after the client hits the URL Threat Filter categories.

Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Set Up the URL Threat Filter

Go to Security Service > Reputation Filter > URL Threat Filter. Turn on this feature. Select Block on Action field. When a client hits URL Threat Filter, the page will be Blocked. Choose Log-alert on Log field.



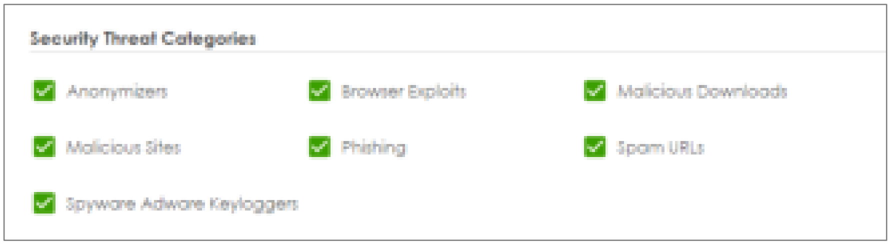
URL Blocking

Enable ●

Action: block

Log: log alert

Statistics ●



Security Threat Categories

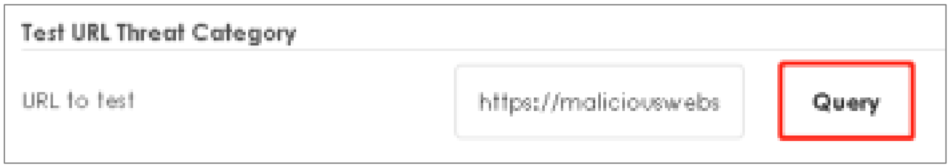
☑ Anonymizers ☑ Browser Exploits ☑ Malicious Downloads

☑ Malicious Sites ☑ Phishing ☑ Spam URLs

☑ Spyware Adware Keyloggers

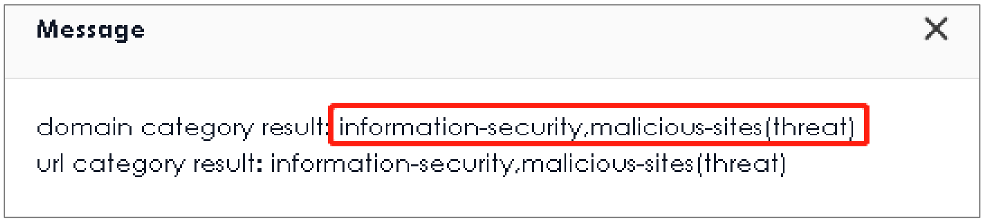
Test the Result

Verify a URL in the Security Threat Categories. In Test URL Threat Category, enter a malicious URL and query the result.



Test URL Threat Category

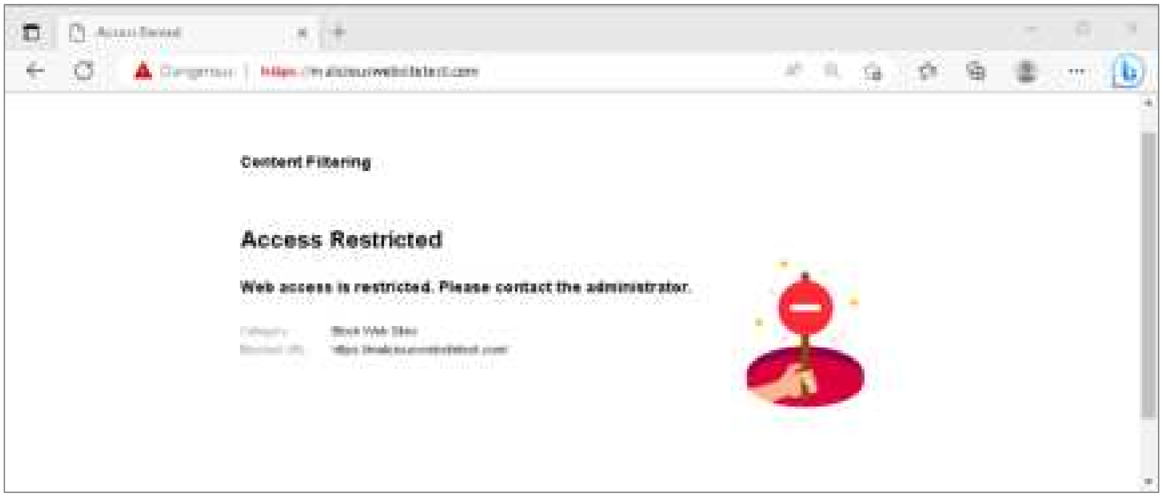
URL to test: https://maliciouswebs



Message

domain category result: information-security,malicious-sites(threat)
url category result: information-security,malicious-sites(threat)

Using Web Browser to access the malicious site. The gateway will redirect you to a blocked page.



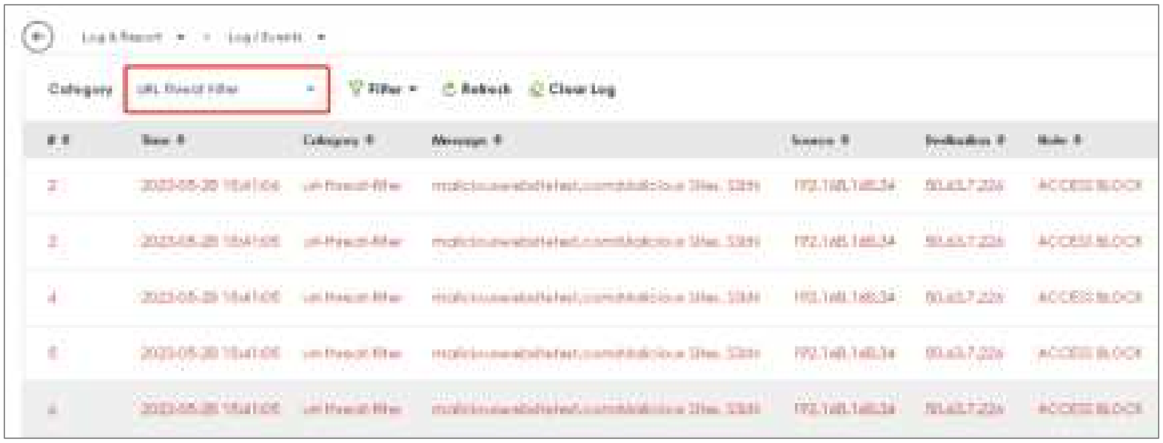
Content Filtering

Access Restricted

Web access is restricted. Please contact the administrator.

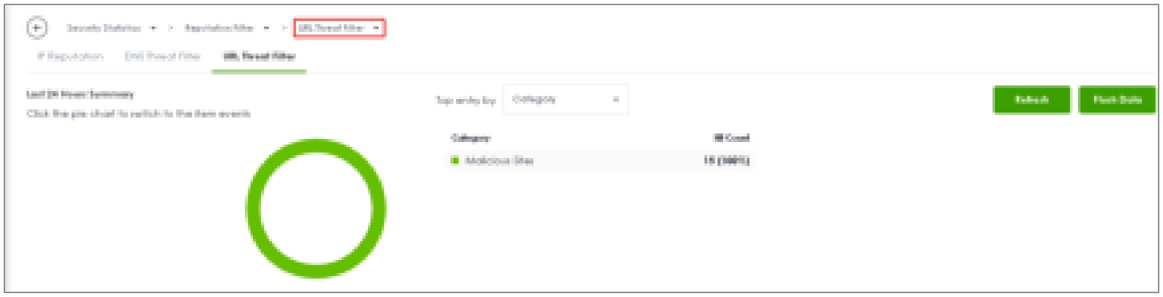
Category: Block Web Sites
Blocked URL: https://maliciouswebsitetest.com

Go to Log & Report > Log/Events and select URL Threat Filter to check the logs.



#	Time	Category	Message	Source	Destination	Note
2	2023-05-28 15:41:04	url-threat-filter	maliciouswebsitetest.com:Malicious Sites. SSH	192.168.168.34	50.63.7.226	ACCESS BLOCK
3	2023-05-28 15:41:05	url-threat-filter	maliciouswebsitetest.com:Malicious Sites. SSH	192.168.168.34	50.63.7.226	ACCESS BLOCK
4	2023-05-28 15:41:05	url-threat-filter	maliciouswebsitetest.com:Malicious Sites. SSH	192.168.168.34	50.63.7.226	ACCESS BLOCK
5	2023-05-28 15:41:05	url-threat-filter	maliciouswebsitetest.com:Malicious Sites. SSH	192.168.168.34	50.63.7.226	ACCESS BLOCK
6	2023-05-28 15:41:05	url-threat-filter	maliciouswebsitetest.com:Malicious Sites. SSH	192.168.168.34	50.63.7.226	ACCESS BLOCK

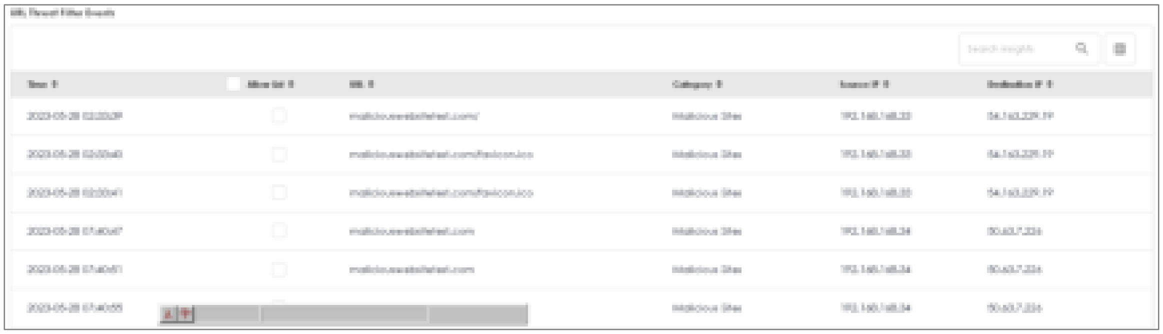
Go to Security Statistics > Reputation Filter > URL Threat Filter to check summary of all events.



Last 24 Hours Summary

Click the pie chart to switch to the item events

Category	Hit Count
🟩 Malicious Sites	15 (100%)



URL Threat Filter Events

Time	Allow List	URL	Category	Source IP	Destination IP
2023-05-28 02:20:39	□	maliciouswebsitetest.com/	Malicious Sites	192.168.168.33	54.163.229.19
2023-05-28 02:20:40	□	maliciouswebsitetest.com/favicon.ico	Malicious Sites	192.168.168.33	54.163.229.19
2023-05-28 02:20:41	□	maliciouswebsitetest.com/favicon.ico	Malicious Sites	192.168.168.33	54.163.229.19
2023-05-28 07:40:47	□	maliciouswebsitetest.com	Malicious Sites	192.168.168.34	50.63.7.226
2023-05-28 07:40:51	□	maliciouswebsitetest.com	Malicious Sites	192.168.168.34	50.63.7.226
2023-05-28 07:40:55			Malicious Sites	192.168.168.34	50.63.7.226

How to Configure Reputation Filter- DNS Threat Filter

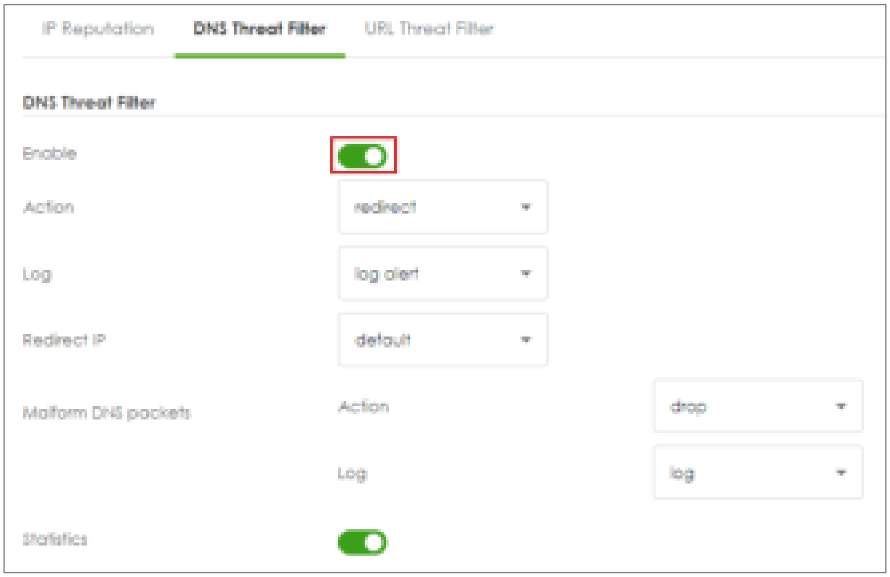
DNS Threat Filter is a mechanism aimed at protecting users by intercepting DNS request attempting to connect to known malicious or unwanted domains and returning a false, or rather controlled IP address. The controlled IP address points to a sinkhole server defined by the administrator.

When a client wants to access a malicious domain, the query is sent to the DNS server for getting the domain name details. All of the traffic now here gateway intercepts this query which is outgoing. The cloud server identifies that this is bad site. What gateway can do here is send the redirect IP address where we deploy a blocked page to the client. The client will connect to redirect IP address instead of the real IP address of malicious domain, and get the blocked page with the web access. This example shows how to configure DNS Threat Filter to redirect web access after client hit the filter profile.

Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Set Up the DNS Threat Filter

Go to Security Service > Reputation Filter > DNS Threat Filter. Turn on this feature. Select Redirect on Action field. When a client hits DNS Threat Filter, the page will be redirected to the default blocked page or a custom IP address. Choose Log-alert on Log field. Configure Default on Redirect IP field to allow gateway redirect to the default blocked page.



DNS Threat Filter

Enable: on

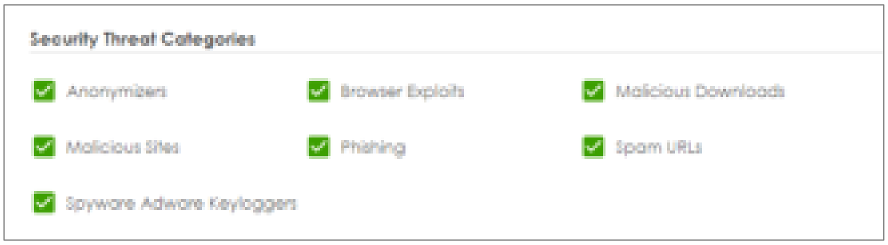
Action: redirect

Log: log alert

Redirect IP: default

Malform DNS packets: Action: drop; Log: log

Statistics: on



Security Threat Categories

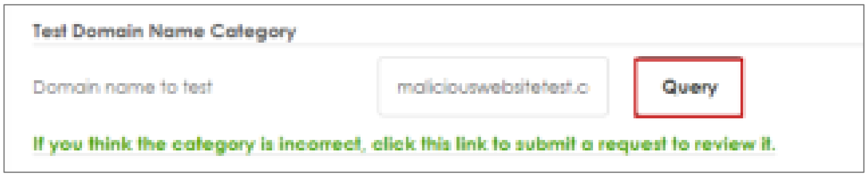
☑ Anonymizers ☑ Browser Exploits ☑ Malicious Downloads

☑ Malicious Sites ☑ Phishing ☑ Spam URLs

☑ Spyware Adware Keyloggers

Test the Result

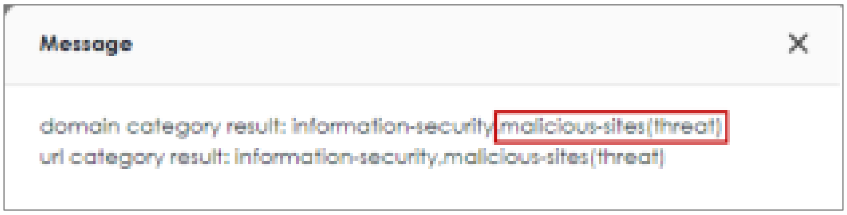
Verify a domain name in the Security Threat Categories. In Test Domain Name Category, enter a malicious domain and query the result.



Test Domain Name Category

Domain name to test: maliciouswebsitetest.c

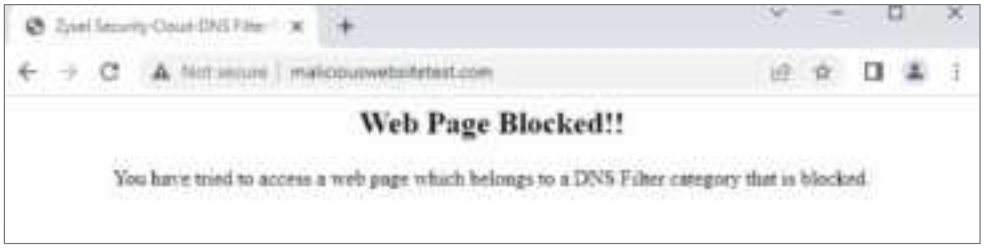
If you think the category is incorrect, click this link to submit a request to review it.



Message

domain category result: information-security,malicious-sites(threat)
url category result: information-security,malicious-sites(threat)

Using Web Browser to access the malicious site. The gateway will redirect you to a blocked page.

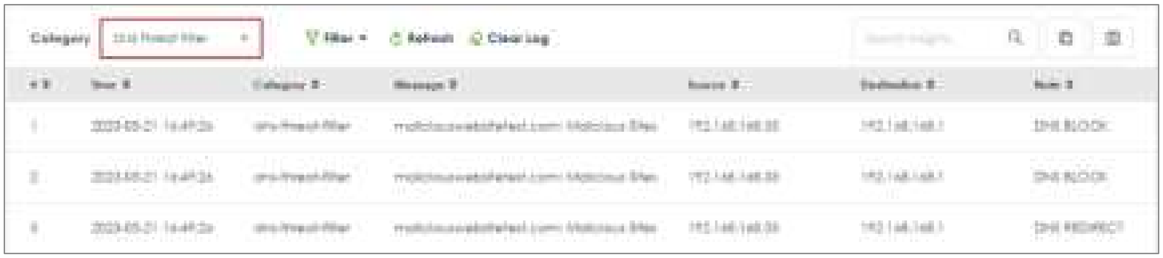


Zyxel Security Cloud DNS Filter
Not secure | maliciouswebsitetest.com

Web Page Blocked!!

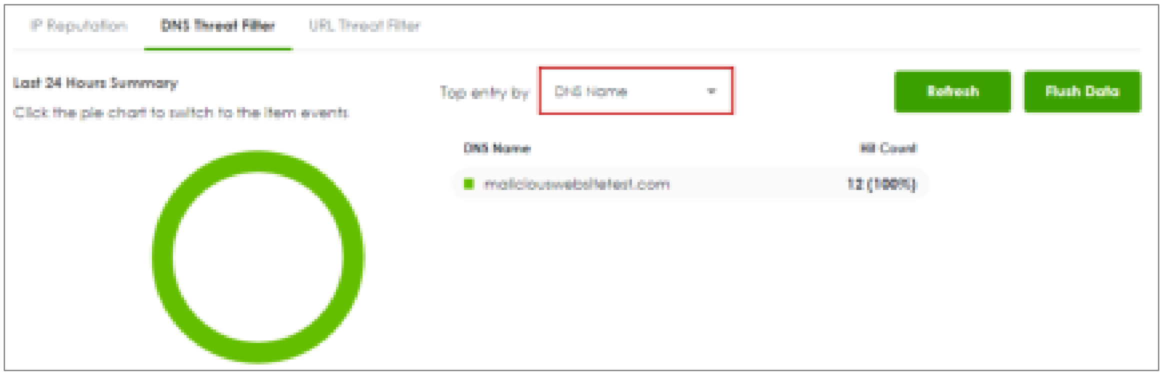
You have tried to access a web page which belongs to a DNS Filter category that is blocked.

Go to Log & Report > Log/Events and select DNS Threat Filter to check the logs.



#	Time	Category	Message	Source	Destination	Note
1	2023-05-21 16:49:26	dns-threat-filter	maliciouswebsitetest.com: Malicious Sites	192.168.168.33	192.168.168.1	DNS BLOCK
2	2023-05-21 16:49:26	dns-threat-filter	maliciouswebsitetest.com: Malicious Sites	192.168.168.33	192.168.168.1	DNS BLOCK
3	2023-05-21 16:49:26	dns-threat-filter	maliciouswebsitetest.com: Malicious Sites	192.168.168.33	192.168.168.1	DNS REDIRECT

Go to Security Statistics > Reputation Filter > DNS Threat Filter to check summary of all events.



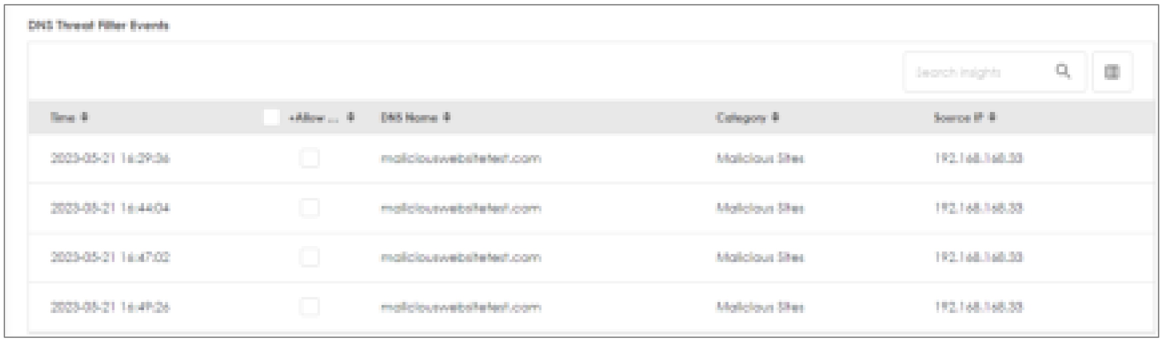
IP Reputation | DNS Threat Filter | URL Threat Filter

Last 24 Hours Summary

Click the pie chart to switch to the item events

Top entry by: DNS Name

DNS Name	Hit Count
🟩 maliciouswebsitetest.com	12 (100%)



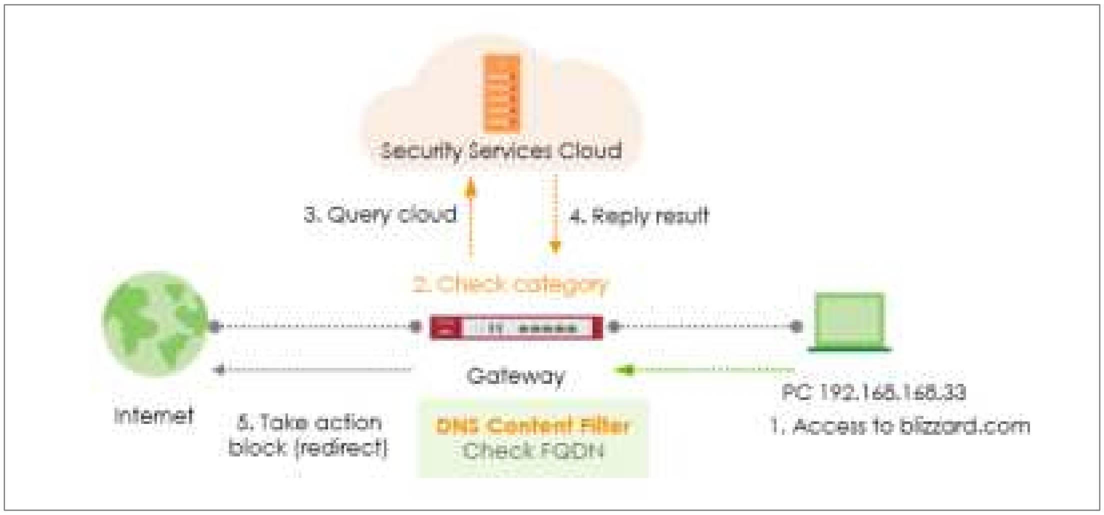
DNS Threat Filter Events

Time	□ +Allow ...	DNS Name	Category	Source IP
2023-05-21 16:29:36	□	maliciouswebsitetest.com	Malicious Sites	192.168.168.33
2023-05-21 16:44:04	□	maliciouswebsitetest.com	Malicious Sites	192.168.168.33
2023-05-21 16:47:02	□	maliciouswebsitetest.com	Malicious Sites	192.168.168.33
2023-05-21 16:49:26	□	maliciouswebsitetest.com	Malicious Sites	192.168.168.33

How to Configure DNS Content Filter

Compared to web content filter, DNS content filter is a stronger tool for SMB because it can restrict the number of attacks faced by network access, thereby helping to reduce the remediation workload of IT professionals.

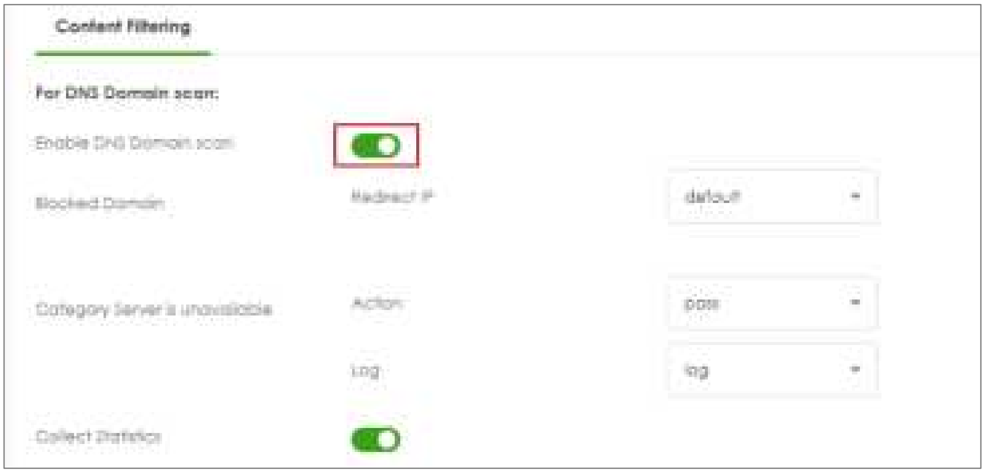
DNS content filter intercept DNS request from client, check the domain name category and takes a corresponding action, reducing the risk of phishing attacks, and obfuscate source IPs using hijacked domain names. Fully customizable blacklist to ban access to any unwanted domains and prevent reaching those known domains hosting malicious content. This example shows how to configure DNS Content Filter to block users in the local network to access the gaming websites.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Set Up the DNS Content Filter

Go to Security Service > Content Filtering > For DNS Domain scan. Turn on this feature. Select Redirect IP for the Blocked Domain. If user selects the default, when client hits DNS Content Filter profile, the page will be redirected to block page http://dnsft.cloud.zyxel.com/.



Content Filtering

For DNS Domain scan:

Enable DNS Domain scan

Blocked Domain

Redirect IP: default

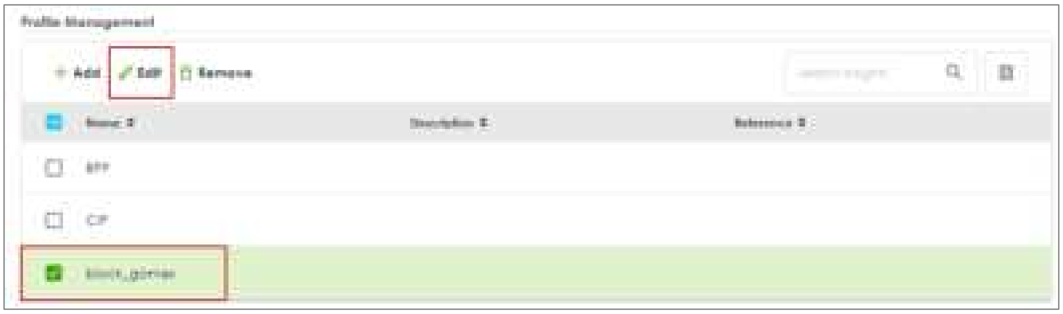
Category Server is unavailable

Action: pass

Log: log

Collect Statistics

Add a new profile in Profile Management to block gaming websites.



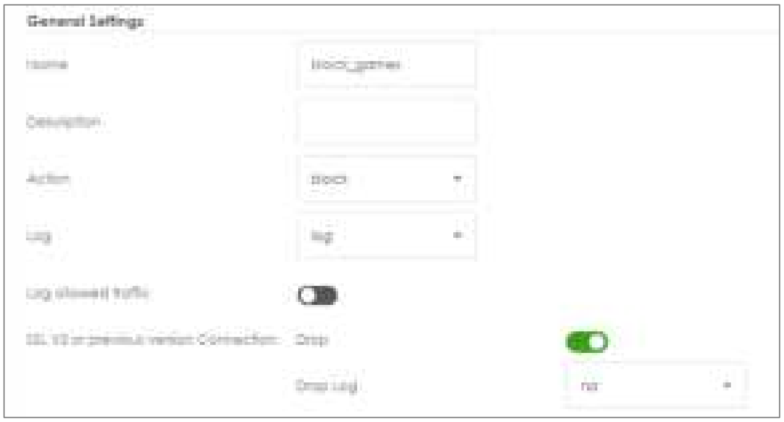
Profile Management

+ Add | Edit | Remove

	Name	Description	Reference
□	APP		
□	CF		
☑	block_gamin		

Action: block

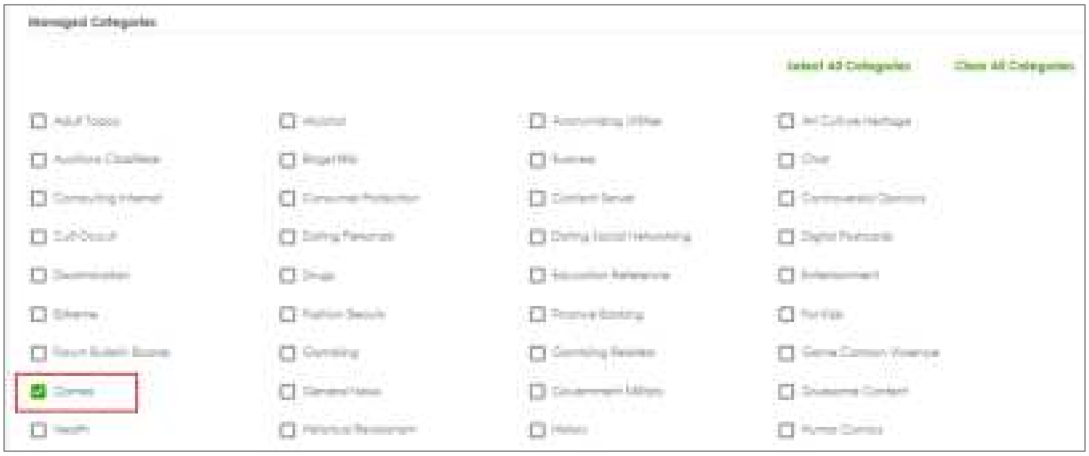
Log: log or log alert



General Settings

Name	block_games
Description	
Action	block
Log	log
Log allowed traffic	○
SSL V3 or previous version Connection: Drop	●
Drop Log	no

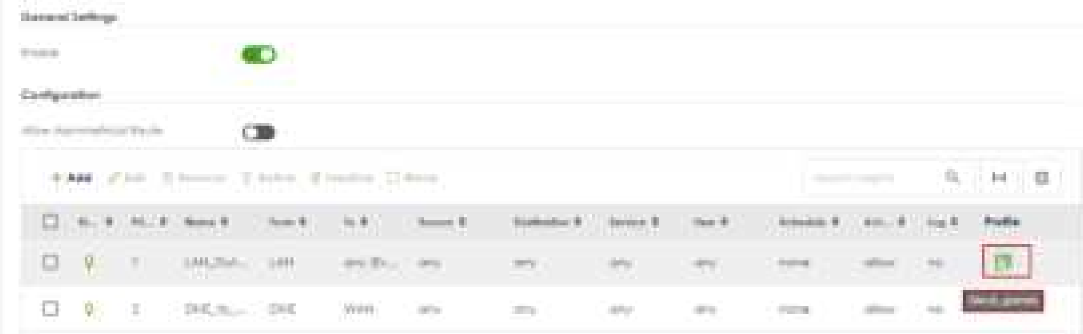
Enable the checkbox of "Games" in managed categories.



Managed Categories

- ☐ Adult Topics
- ☐ Auctions Classifieds
- ☐ Computing Internet
- ☐ Cult Occult
- ☐ Discrimination
- ☐ Extreme
- ☐ Forum Bulletin Boards
- ☑ Games
- ☐ Health
- ☐ Alcohol
- ☐ Blogs/Wiki
- ☐ Consumer Protection
- ☐ Dating Personals
- ☐ Drugs
- ☐ Fashion Beauty
- ☐ Gambling
- ☐ General News
- ☐ Historical Revisionism
- ☐ Anonymizing Utilities
- ☐ Business
- ☐ Content Server
- ☐ Dating Social Networking
- ☐ Education Reference
- ☐ Finance Banking
- ☐ Gambling Related
- ☐ Government Military
- ☐ History
- ☐ Art Culture Heritage
- ☐ Chat
- ☐ Controversial Opinions
- ☐ Digital Postcards
- ☐ Entertainment
- ☐ For Kids
- ☐ Game Cartoon Violence
- ☐ Gruesome Content
- ☐ Humor Comics

Apply the profile to security policy. In this example, the profile is applied to security policy rule "LAN_Outgoing".



General Settings

Enable ●

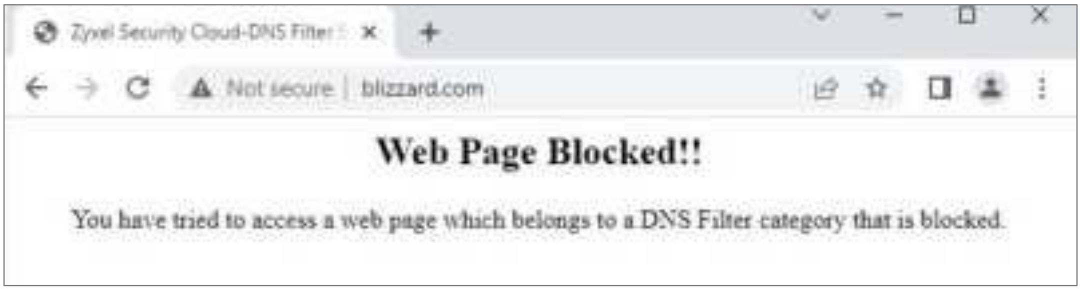
Configuration

Allow Asymmetrical Route ○

☐	St...	Pri...	Name	From	To	Source	Destination	Service	User	Schedule	Act...	Log	Profile
☐		1	LAN_Out...	LAN	any (Ex...	any	any	any	any	none	allow	no	
☐		2	DMZ_to_...	DMZ	WAN	any	any	any	any	none	allow	no	

Test the Result

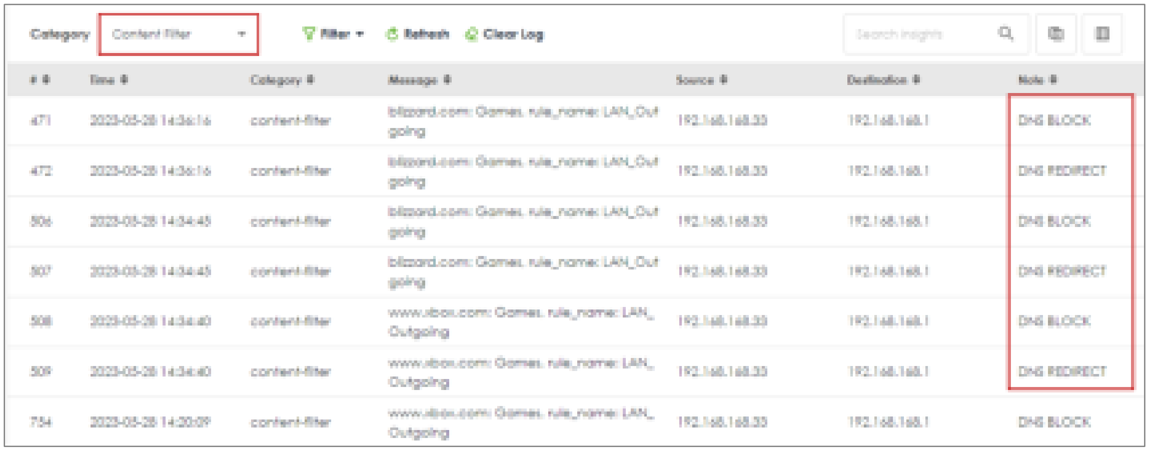
Access a gaming website blizzard.com. The gateway will redirect you to a blocked page.



Web Page Blocked!!

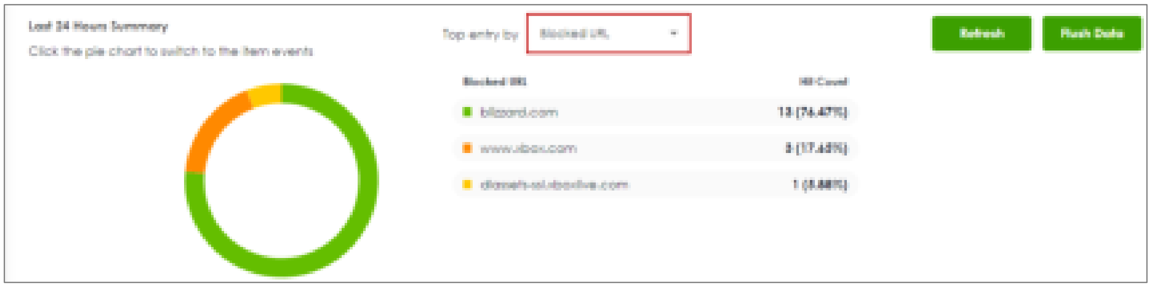
You have tried to access a web page which belongs to a DNS Filter category that is blocked.

Go to Log & Report > Log/Events and select Content Filter to check the logs.



#	Time	Category	Message	Source	Destination	Note
471	2023-05-28 14:36:16	content-filter	blizzard.com: Games, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS BLOCK
472	2023-05-28 14:36:16	content-filter	blizzard.com: Games, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS REDIRECT
506	2023-05-28 14:34:45	content-filter	blizzard.com: Games, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS BLOCK
507	2023-05-28 14:34:45	content-filter	blizzard.com: Games, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS REDIRECT
508	2023-05-28 14:34:40	content-filter	www.xbox.com: Games, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS BLOCK
509	2023-05-28 14:34:40	content-filter	www.xbox.com: Games, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS REDIRECT
754	2023-05-28 14:20:09	content-filter	www.xbox.com: Games, rule_name: LAN_Outgoing	192.168.168.33	192.168.168.1	DNS BLOCK

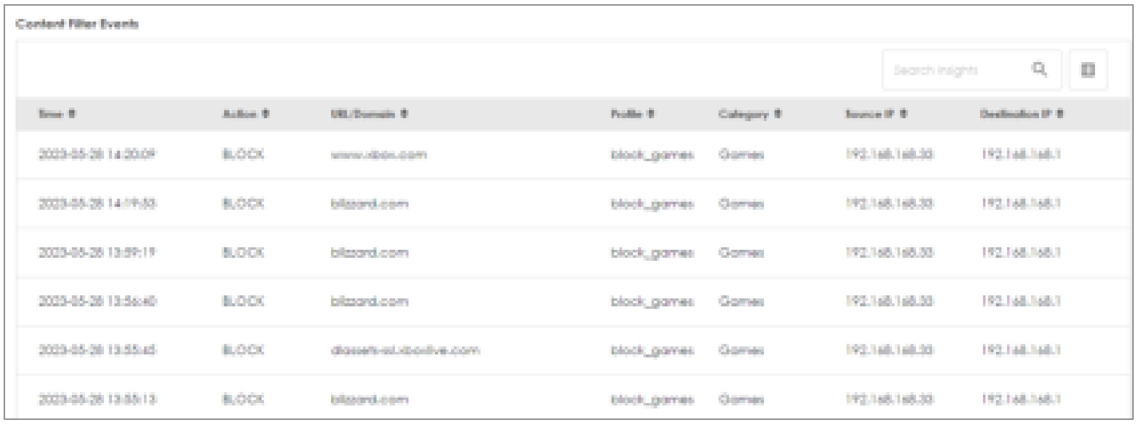
Go to Security Statistics > Content Filter to check summary of all events.



Last 24 Hours Summary

Click the pie chart to switch to the item events

Blocked URL	Hit Count
🟩 blizzard.com	13 (76.47%)
🟧 www.xbox.com	3 (17.65%)
🟨 dlassets-ssl.xboxlive.com	1 (5.88%)

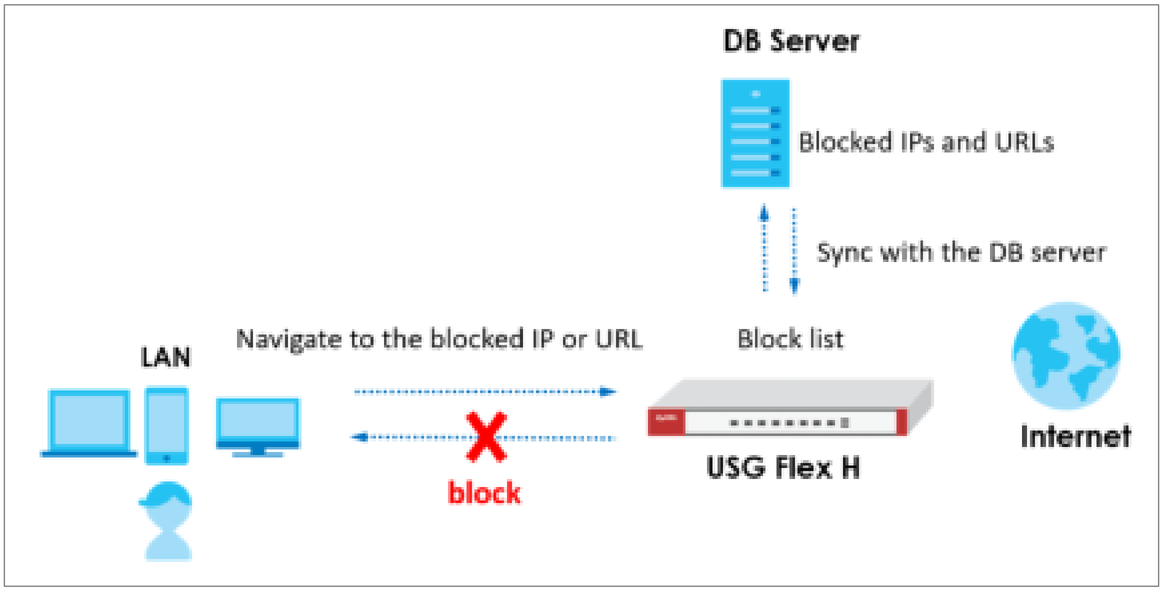


Content Filter Events

Time ⇕	Action ⇕	URL/Domain ⇕	Profile ⇕	Category ⇕	Source IP ⇕	Destination IP ⇕
2023-05-28 14:20:09	BLOCK	www.xbox.com	block_games	Games	192.168.168.33	192.168.168.1
2023-05-28 14:19:53	BLOCK	blizzard.com	block_games	Games	192.168.168.33	192.168.168.1
2023-05-28 13:59:19	BLOCK	blizzard.com	block_games	Games	192.168.168.33	192.168.168.1
2023-05-28 13:56:40	BLOCK	blizzard.com	block_games	Games	192.168.168.33	192.168.168.1
2023-05-28 13:55:45	BLOCK	dlassets-ssl.xboxlive.com	block_games	Games	192.168.168.33	192.168.168.1
2023-05-28 13:55:13	BLOCK	blizzard.com	block_games	Games	192.168.168.33	192.168.168.1

External Block List for Reputation Filter

The administrator can configure an external block list for the Reputation Filter to expand its usage. This article will provide guidance on setting up the external block list for the IP Reputation and DNS Threat Filter/URL Threat Filter.

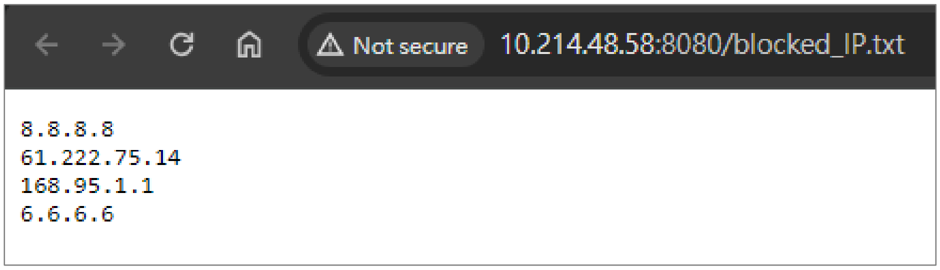


Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.20).

Set Up the DB server

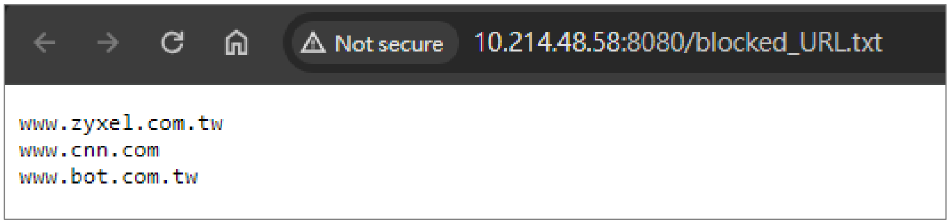
The administrator can set up websites to maintain external block lists. The USG Flex H firewall can update the external block list via a URL. For example,

http://10.214.48.58:8080/blocked_IP.txt



```
8.8.8.8
61.222.75.14
168.95.1.1
6.6.6.6
```

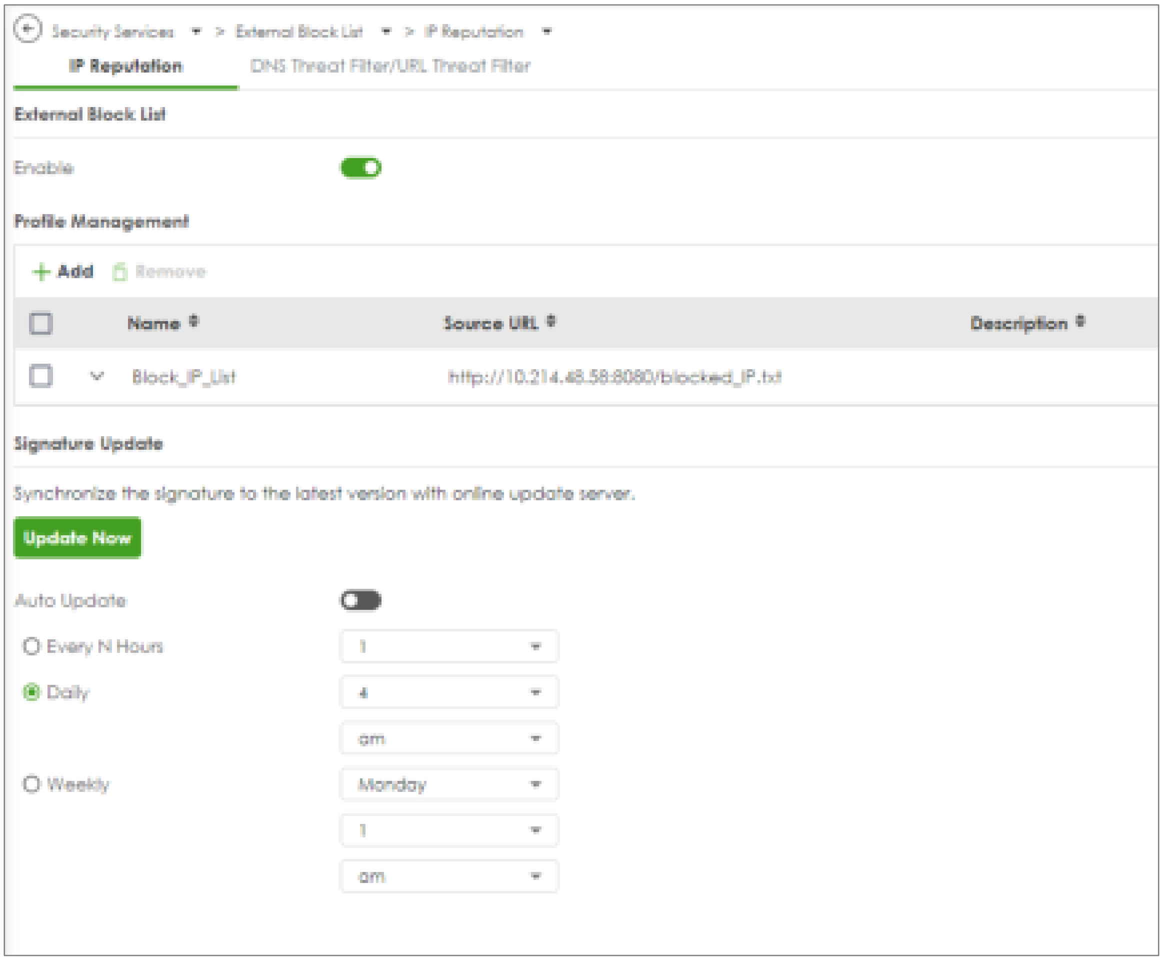
http://10.214.48.58:8080/blocked_URL.txt



```
www.zyxel.com.tw
www.cnn.com
www.bot.com.tw
```

Set Up the External Block List of IP Reputation

Navigate to Security Services > External Block List > IP Reputation and add a service URL such as http://10.214.48.58:8080/blocked_IP.txt and then click “Update Now” to update the block list.


Security Services ▾ > External Block List ▾ > IP Reputation ▾
IP Reputation
DNS Threat Filter/URL Threat Filter

External Block List

Enable: on

Profile Management

□	Name	Source URL	Description
□	Block_IP_List	http://10.214.48.58:8080/blocked_IP.txt	

Signature Update

Synchronize the signature to the latest version with online update server.

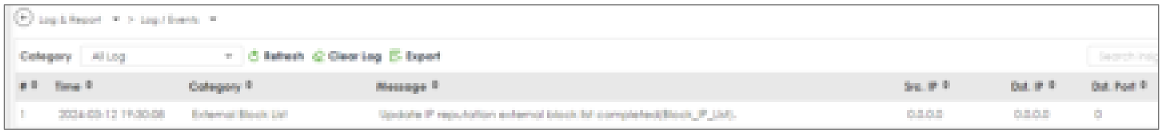
Auto Update: off

○ Every N Hours: 1

● Daily: 4, am

○ Weekly: Monday, 1, am

If the IP Reputation external block list is updated successfully and you can observe the corresponding log message.

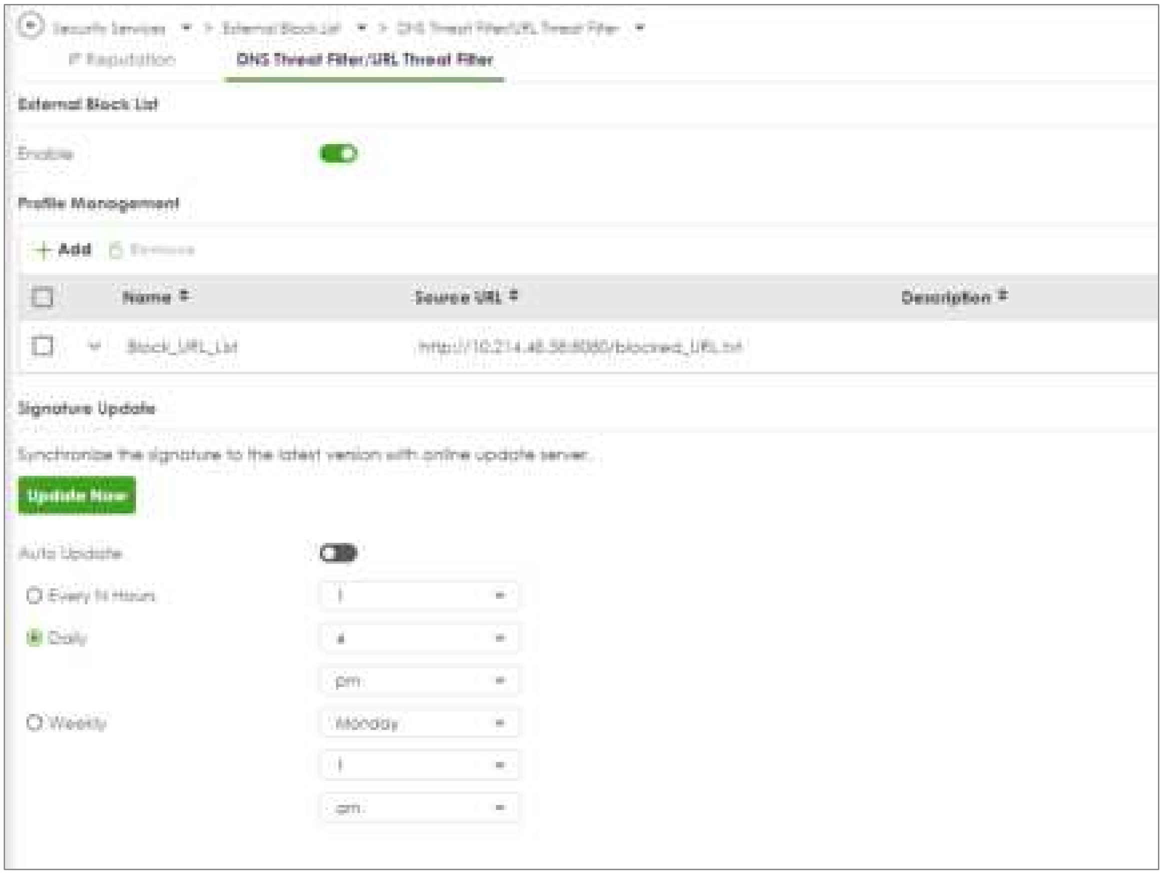


Category: All Log

#	Time	Category	Message	Src. IP	Dst. IP	Dst. Port
1	2024-03-12 19:30:08	External Block List	Update IP reputation external block list completed(Block_IP_List).	0.0.0.0	0.0.0.0	0

Set Up the External Block List of DNS Threat Filter/URL Threat Filter

Navigate to Security Services > External Block List > DNS Threat Filter/URL Threat Filter and add a service URL such as http://10.214.48.58:8080/blocked_URL.txt and then click "Update Now" to update the block list.



Security Services > External Block List > DNS Threat Filter/URL Threat Filter

IP Reputation | DNS Threat Filter/URL Threat Filter

External Block List

Enable: on

Profile Management

+ Add | Remove

□	Name	Source URL	Description
□	Block_URL_List	http://10.214.48.58:8080/blocked_URL.txt	

Signature Update

Synchronize the signature to the latest version with online update server.

Update Now

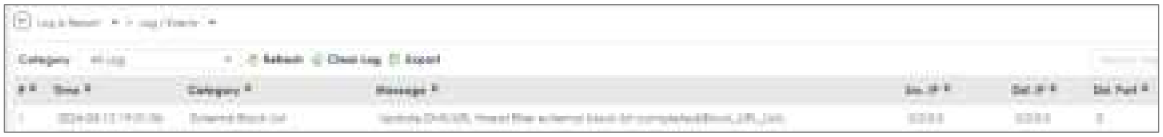
Auto Update: off

○ Every N Hours: 1

● Daily: 4 pm

○ Weekly: Monday 1 am

If the DNS/URL threat filter external block list is updated successfully and you can observe the corresponding log message.



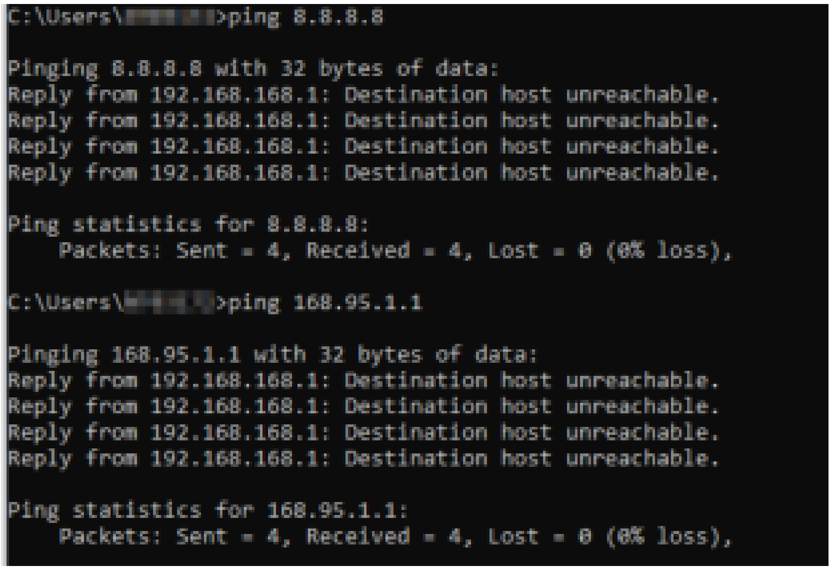
Log & Report > Log / Events

Category: All Log | Refresh | Clear Log | Export

#	Time	Category	Message	Src. IP	Dst. IP	Dst. Port
1	[illegible]	External Block List	[illegible]	[illegible]	[illegible]	[illegible]

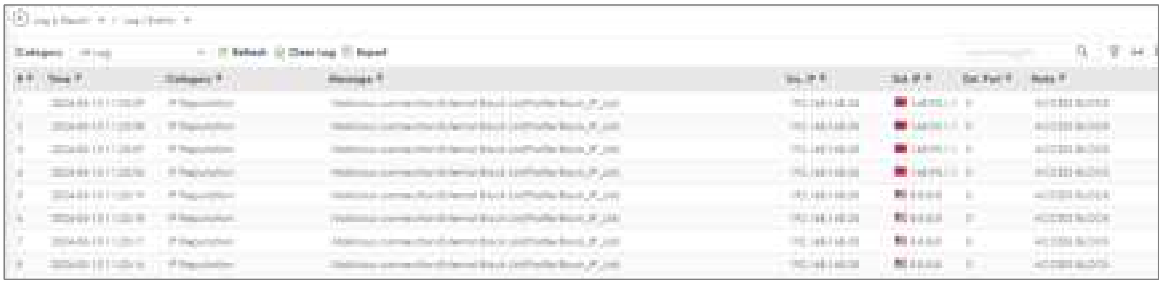
Test the Result

For instance, if the IP addresses 8.8.8.8 and 168.95.1.1 exist in the external block list, attempts to access these blocked IPs will be blocked as expected.

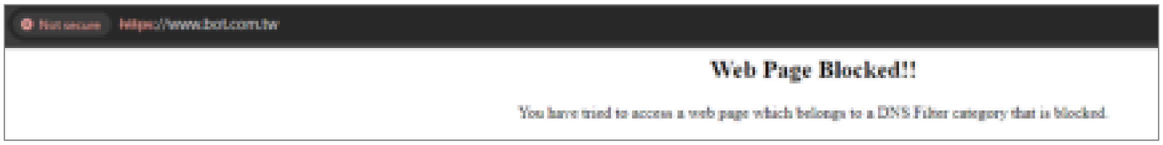


```
C:\Users\[redacted]>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 192.168.168.1: Destination host unreachable.
Reply from 192.168.168.1: Destination host unreachable.
Reply from 192.168.168.1: Destination host unreachable.
Reply from 192.168.168.1: Destination host unreachable.

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\[redacted]>ping 168.95.1.1

Pinging 168.95.1.1 with 32 bytes of data:
Reply from 192.168.168.1: Destination host unreachable.
Reply from 192.168.168.1: Destination host unreachable.
Reply from 192.168.168.1: Destination host unreachable.
Reply from 192.168.168.1: Destination host unreachable.

Ping statistics for 168.95.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

Go to Log & Report > Log / Events to observe block messages.



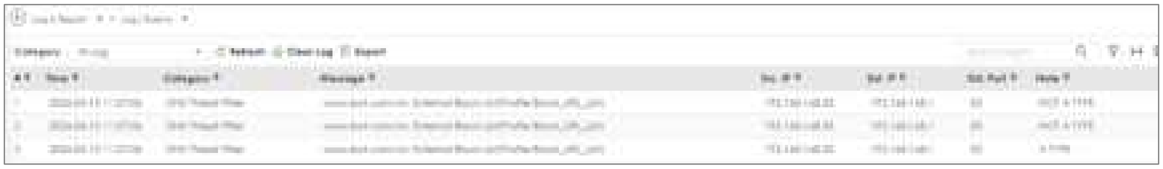
Attempts to access URLs that exist in the block list will also be blocked as expected.



Web Page Blocked!!

You have tried to access a web page which belongs to a DNS Filter category that is blocked.

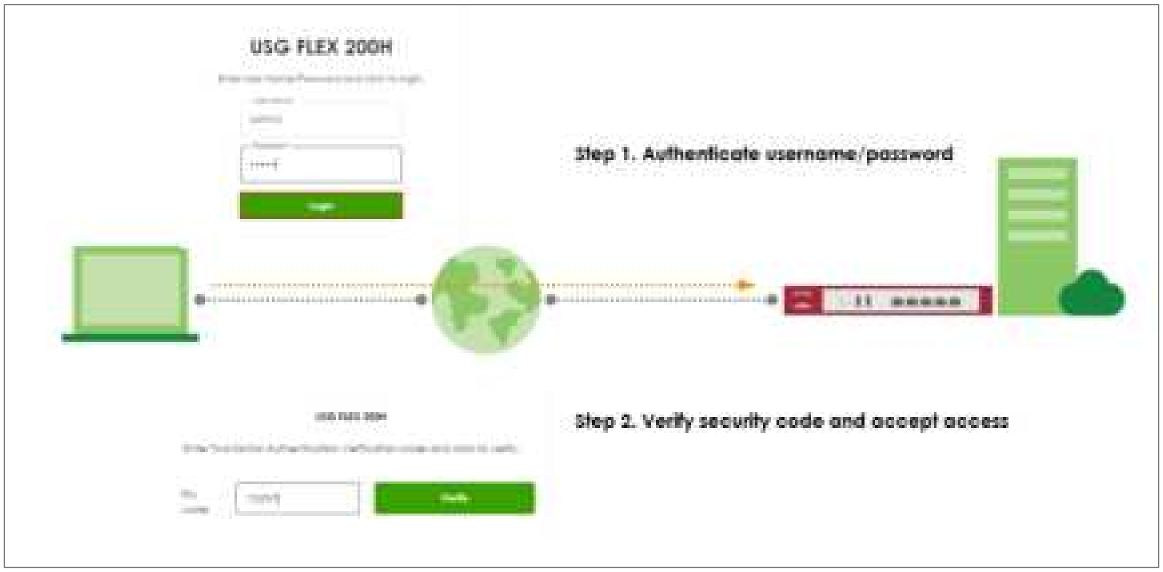
Go to Log & Report > Log / Events to observe block messages.



Chapter 3- Authentication

How to Use Two Factor with Google Authenticator for Admin Access

Google authenticator is the most secure method to receive verification code for 2-factor authentication. Google authenticator gives a new code every 30 seconds, so each code expires in just 30 seconds which make it a secure option to generate codes for 2-step verification. Furthermore, Google authenticator is free to download, easy to use, and is able to work without Internet. This example illustrates how to set up two factor with Google Authenticator for admin access.


USG FLEX 200H
Step 1. Authenticate username/password
Step 2. Verify security code and accept access

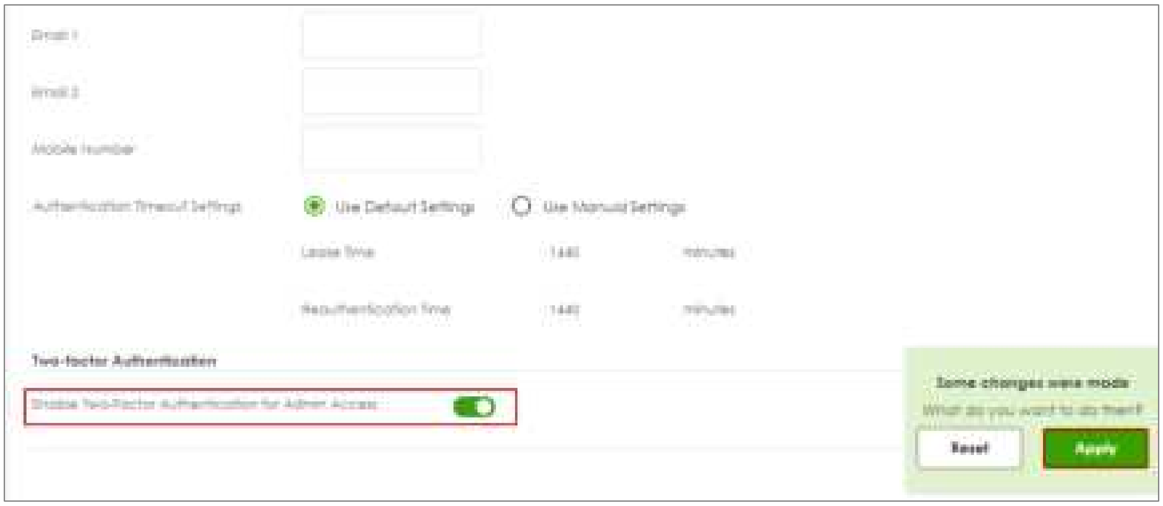
Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Two Factor with Google Authenticator Flow

1. Enable Google Authentication on specific admin user.
2. Set up Google Authenticator.
3. Configure valid time and login service types.

Enable Google Authentication on specific admin user

Go to User & Authentication > User/Group. Select a specific local administrator and enable Two-factor authentication.



Email 1

Email 2

Mobile Number

Authentication Timeout Settings ● Use Default Settings ○ Use Manual Settings

Lease Time 1440 minutes

Reauthentication Time 1440 minutes

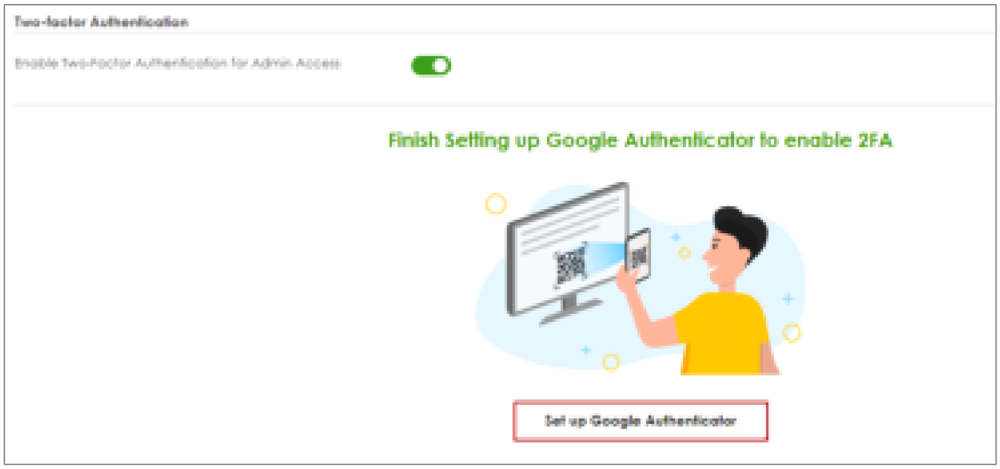
Two-factor Authentication

Enable Two-Factor Authentication for Admin Access

Some changes were made

What do you want to do then?

Click "Set up Google Authenticator" to start setting up Google Authenticator on your mobile phone.

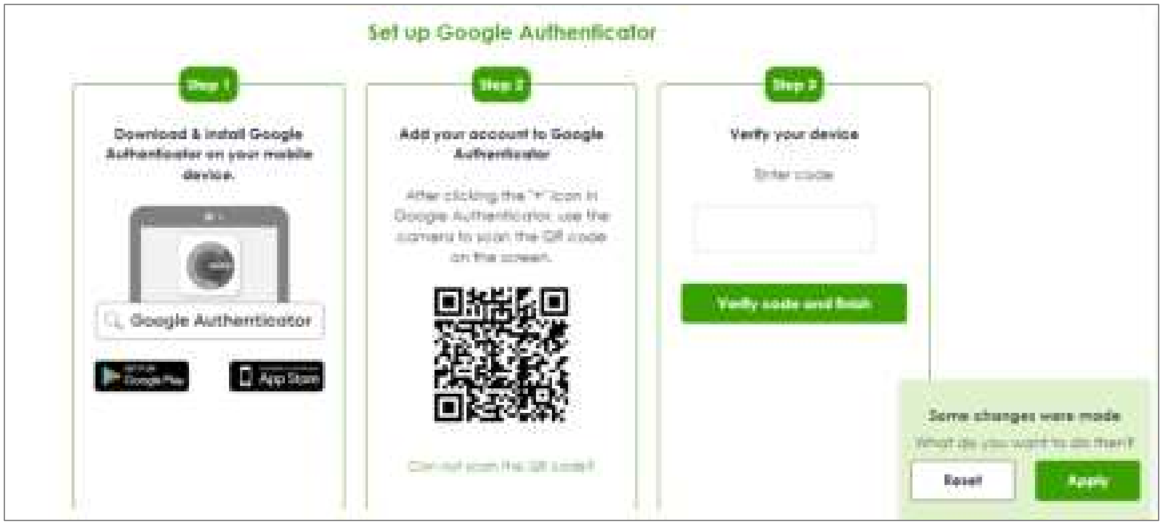


Two-factor Authentication

Enable Two-Factor Authentication for Admin Access

Finish Setting up Google Authenticator to enable 2FA

Set up Google Authenticator



Set up Google Authenticator

Step 1

Download & install Google Authenticator on your mobile device.

Step 2

Add your account to Google Authenticator

After clicking the "+" icon in Google Authenticator, use the camera to scan the QR code on the screen.

Can not scan the QR code?

Step 3

Verify your device

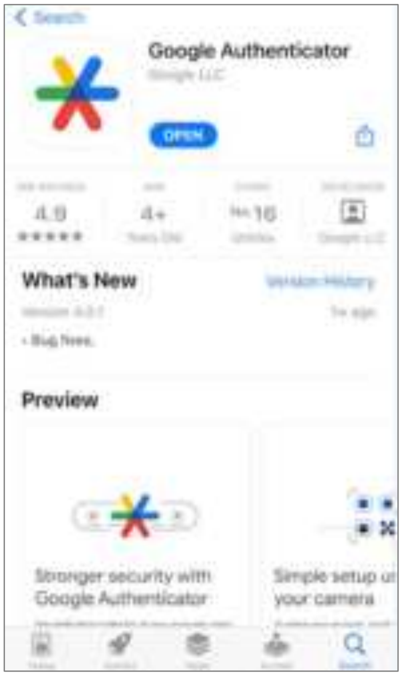
Enter code

Some changes were made

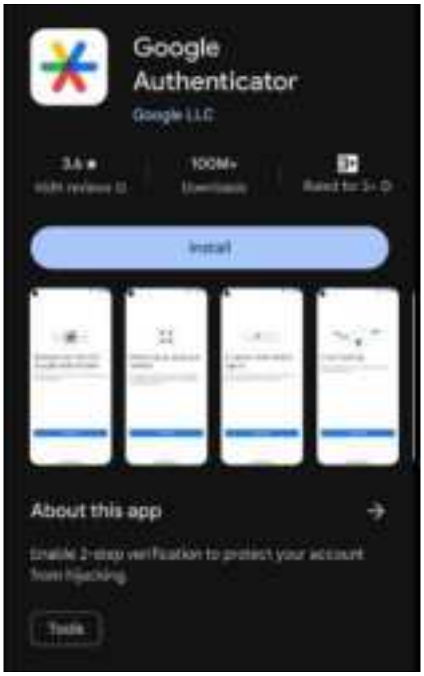
What do you want to do then?

1. Download and install Google Authenticator on your mobile device.

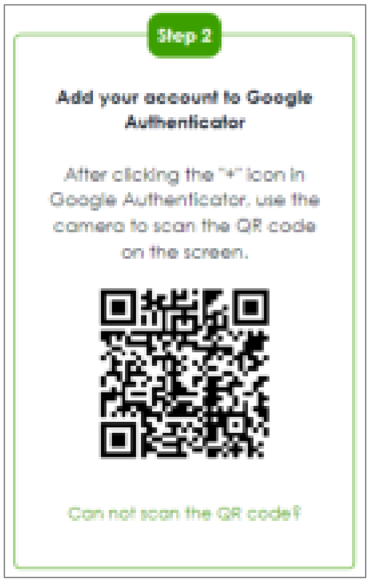
Apple Store



Google Play

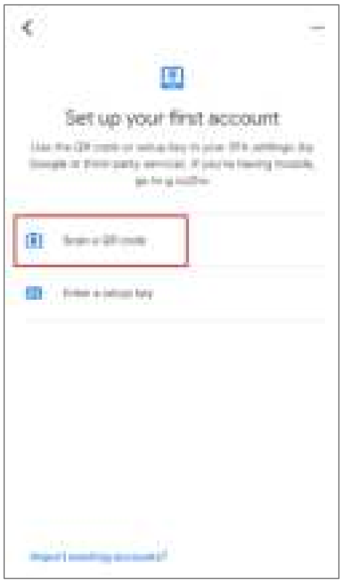


2. Register the admin account to Google Authenticator. Open Google Authenticator App and scan the barcode on Web GUI.



Add your account to Google Authenticator

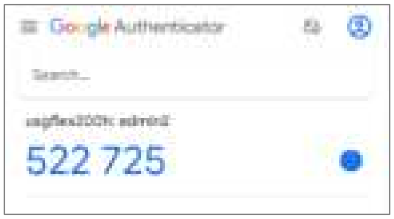
After clicking the "+" icon in Google Authenticator, use the camera to scan the QR code on the screen.



Set up your first account

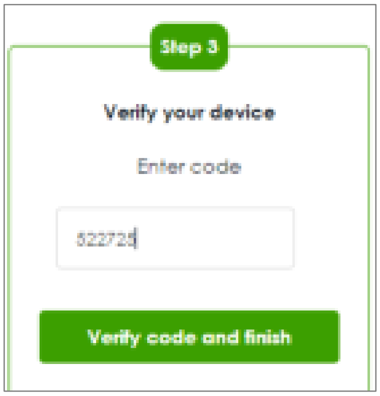
Use the QR code or setup key in your 2FA settings (by Google or third-party service). If you're having trouble, go to g.co/2fa

3. Enter the token code which displays on Google Authenticator to "Step 3" and click "Verify code and finish" to submit and verify the code.



usgflex200h: admin2

522 725

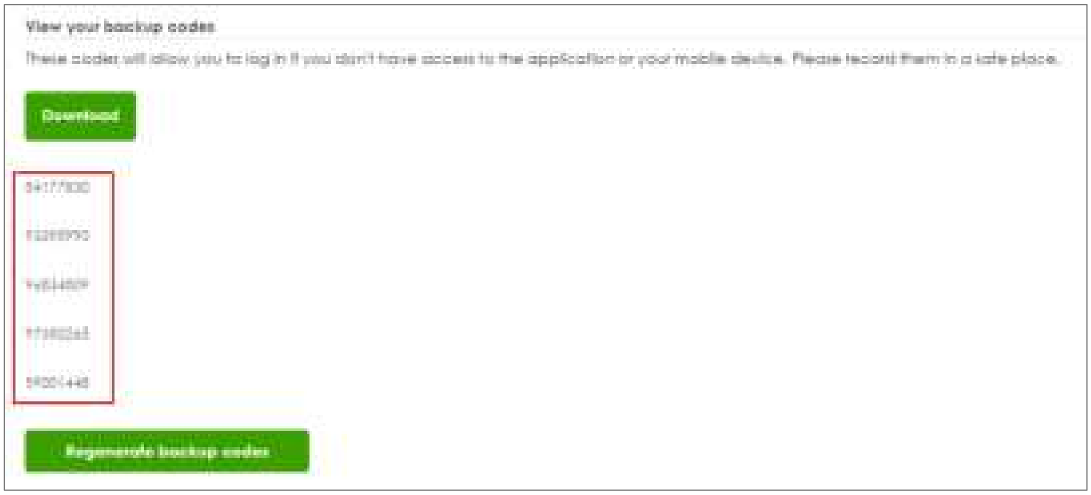


Verify your device

Enter code

522725

4. After 2FA registration is set up successfully, there are backup codes on web GUI. The backup codes are for device login in the case you don't have access to the application on your mobile device. Download the backup codes and record them in a safe place.



View your backup codes

These codes will allow you to log in if you don't have access to the application or your mobile device. Please record them in a safe place.

54177830

13289990

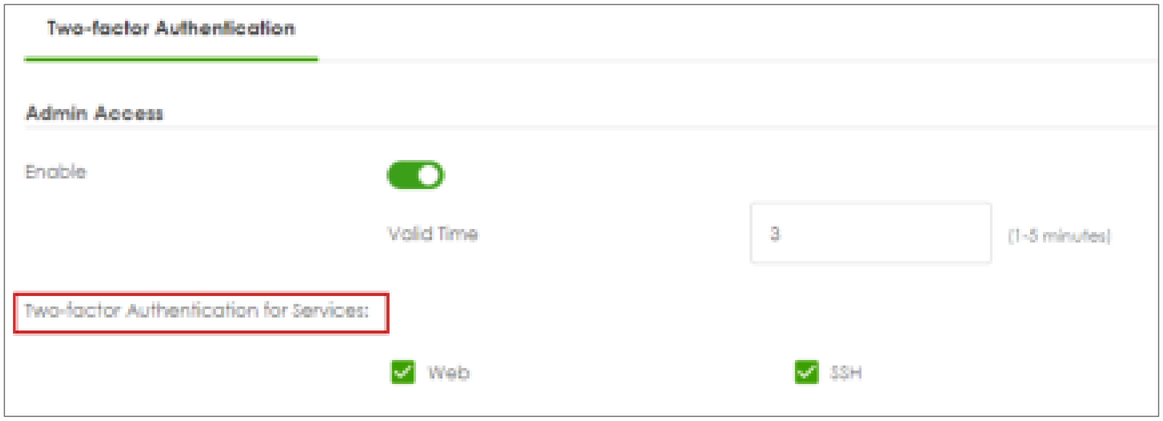
96834509

77382265

59201448

Configure valid time and login service types

Go to User & Authentication > User Authentication. Two factor authentication for admin access is enabled by default. You need to select which services require two-factor authentication for admin user manually. The valid time is the deadline that admin needs to submit the two-factor authentication code to get the access. The access request is rejected if submitting the code later than valid time. By default, the valid time is 3 minutes.



Admin Access

Enable ●

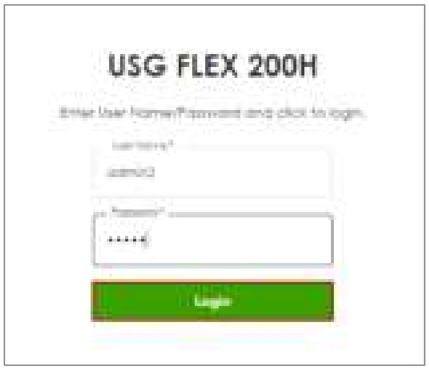
Valid Time 3 (1-5 minutes)

Two-factor Authentication for Services:

☑ Web ☑ SSH

Test the Result

1. Login with the admin account "admin2".



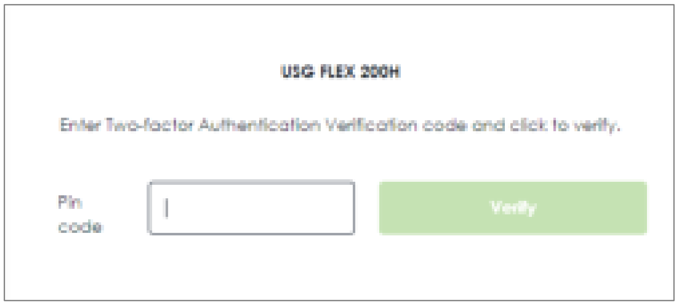
USG FLEX 200H

Enter User Name/Password and click to login.

User Name*: admin2

Password*: •••••

2. A pop-up window appears for administrator to enter the verification code.

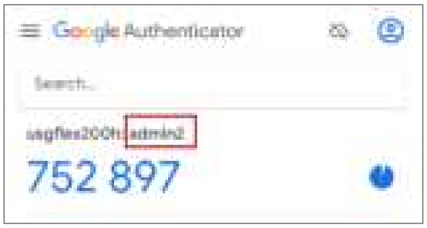


USG FLEX 200H

Enter Two-factor Authentication Verification code and click to verify.

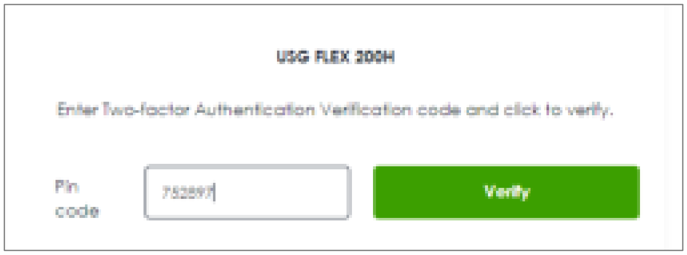
Pin code

3. Enter the code shown on Google Authenticator and click "Verify". You can also enter the backup code if you don't have mobile device on hand.



usgflex200h:admin2

752 897

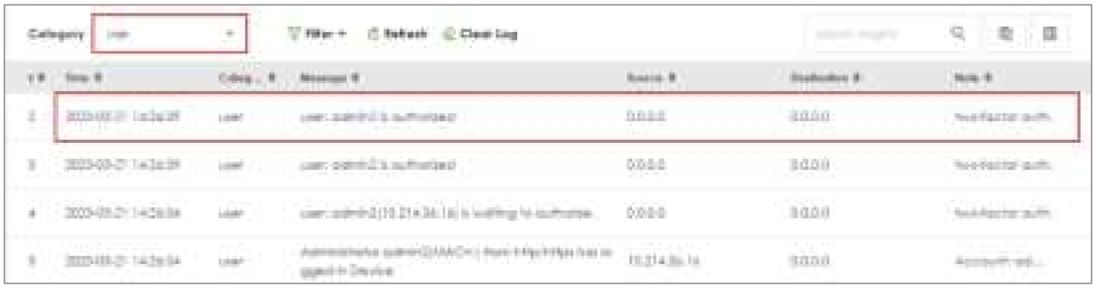


USG FLEX 200H

Enter Two-factor Authentication Verification code and click to verify.

Pin code: 752897

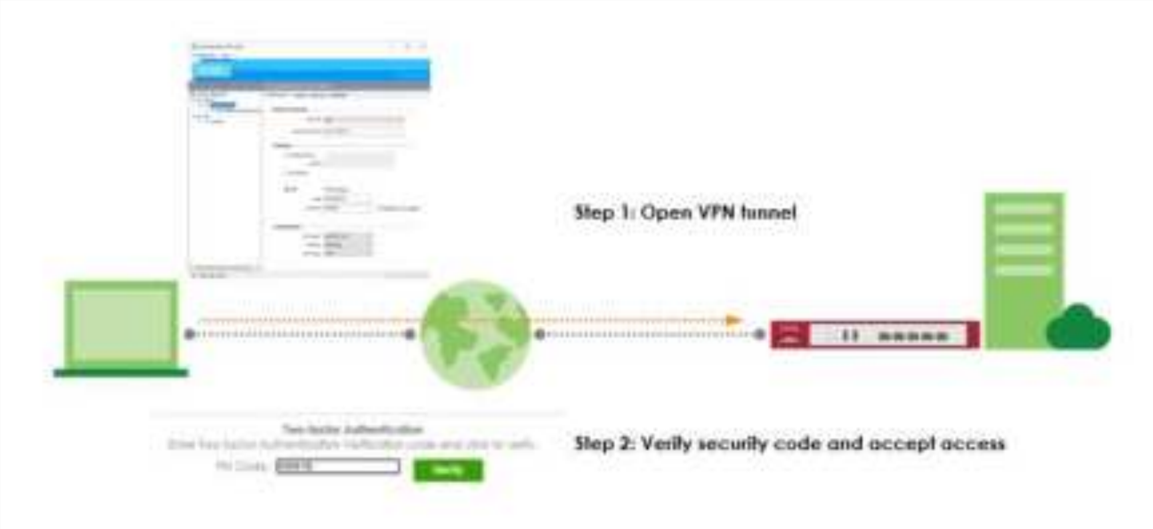
4. Authorize with username, password and the token code successfully. Go to Log & Report > Log/Events and select "User" to check the login status.



#	Time	Categ...	Message	Source	Destination	Note
2	2023-03-21 14:26:39	user	user: admin2 is authorized	0.0.0.0	0.0.0.0	two-factor auth
3	2023-03-21 14:26:39	user	user: admin2 is authorized	0.0.0.0	0.0.0.0	two-factor auth
4	2023-03-21 14:26:34	user	user: admin2(10.214.36.16) is waiting to authorize.	0.0.0.0	0.0.0.0	two-factor auth
5	2023-03-21 14:26:34	user	Administrator admin2(MAC=) from http/https has logged in Device	10.214.36.16	0.0.0.0	Account: ad...

How to Use Two Factor with Google Authenticator for Remote Access VPN and SSL VPN

Google authenticator is the most secure method to receive verification code for 2-factor authentication. Google authenticator gives a new code every 30 seconds, so each code expires in just 30 seconds which make it a secure option to generate codes for 2-step verification. Furthermore, Google authenticator is free to download, easy to use, and is able to work without Internet. This example illustrates how to set up two factor with Google Authenticator for Remote Access VPN and SSL VPN.


Step 1: Open VPN tunnel
Two-factor Authentication
PIN Code:
Verify
Step 2: Verify security code and accept access

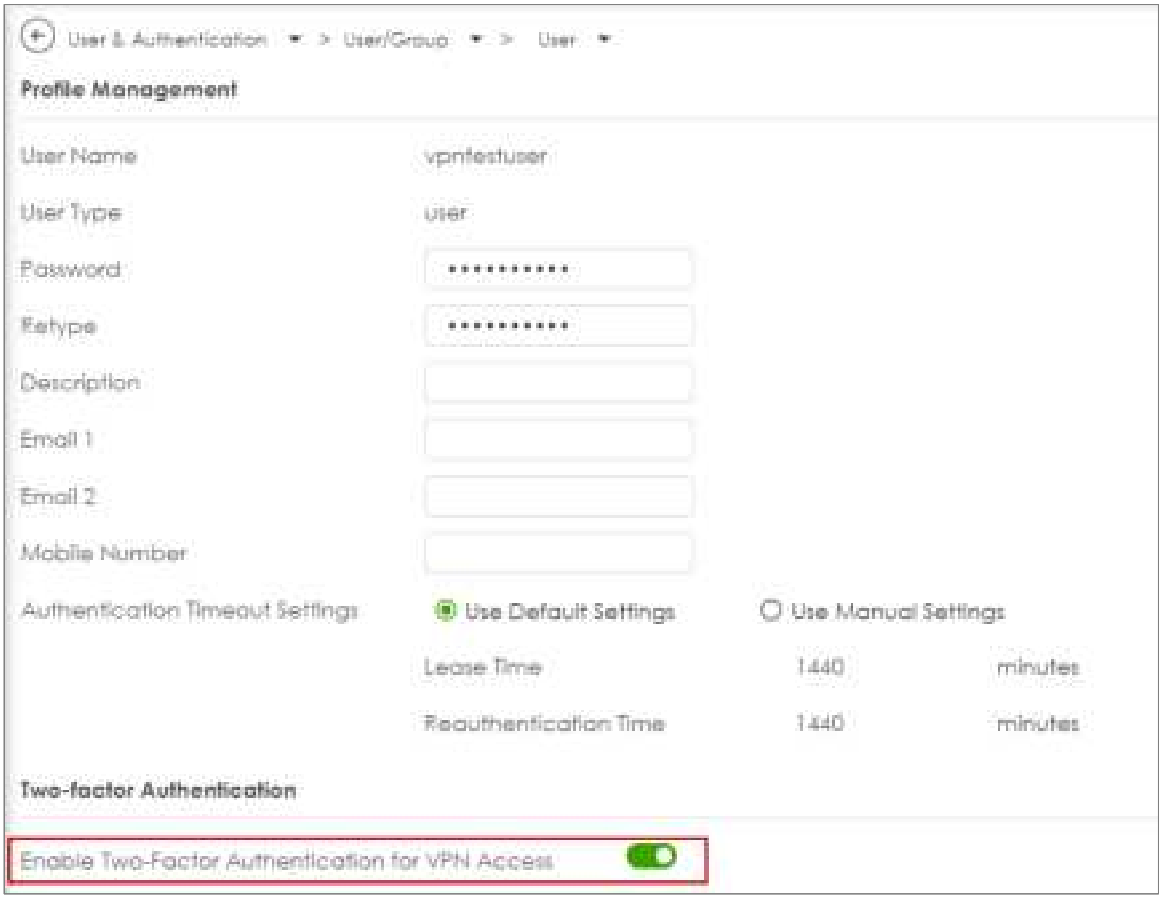
💡Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.20).

Two Factor with Google Authenticator Flow

4. Enable Google Authentication on a user.
5. Set up Google Authenticator.
6. Configure valid time and VPN types.

Enable Google Authentication on a User

Go to User & Authentication > User/Group. Select a local user and enable Two-factor authentication.



User & Authentication ▾ > User/Group ▾ > User ▾

Profile Management

User Name: vpntestuser

User Type: user

Password: ***********

Retype: ***********

Description:

Email 1:

Email 2:

Mobile Number:

Authentication Timeout Settings: ● Use Default Settings ○ Use Manual Settings

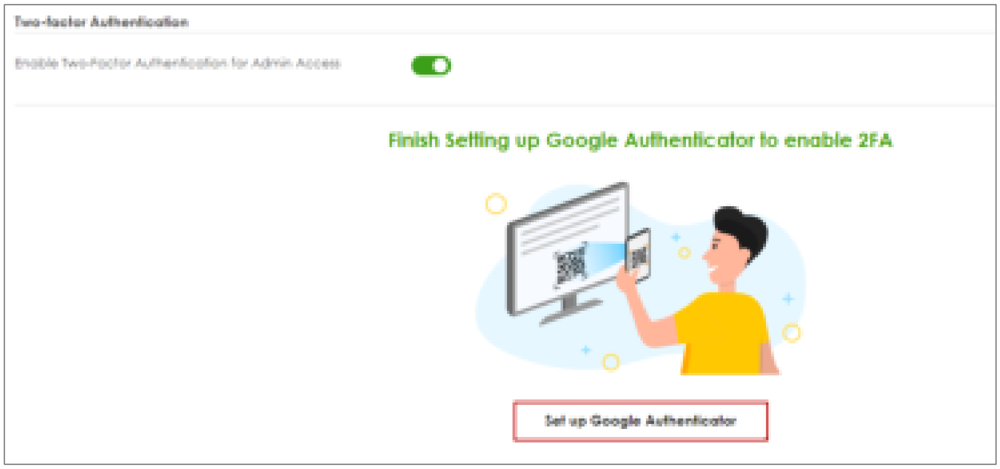
Lease Time: 1440 minutes

Reauthentication Time: 1440 minutes

Two-factor Authentication

Enable Two-Factor Authentication for VPN Access ●

Click "Set up Google Authenticator" to start setting up Google Authenticator on your mobile phone.

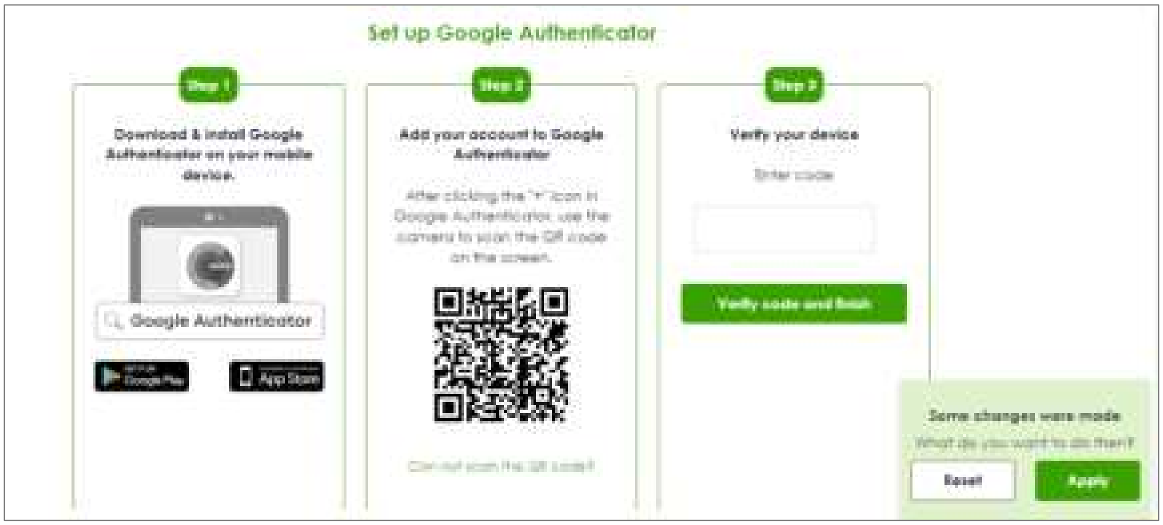


Two-factor Authentication

Enable Two-Factor Authentication for Admin Access

Finish Setting up Google Authenticator to enable 2FA

Set up Google Authenticator



Set up Google Authenticator

Step 1

Download & install Google Authenticator on your mobile device.

Step 2

Add your account to Google Authenticator

After clicking the "+" icon in Google Authenticator, use the camera to scan the QR code on the screen.

Can not scan the QR code?

Step 3

Verify your device

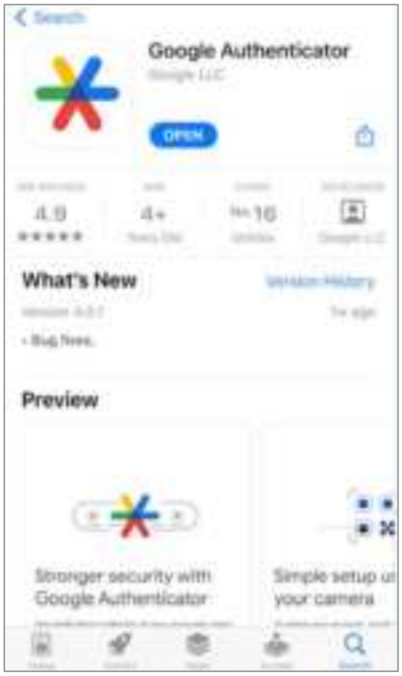
Enter code

Some changes were made

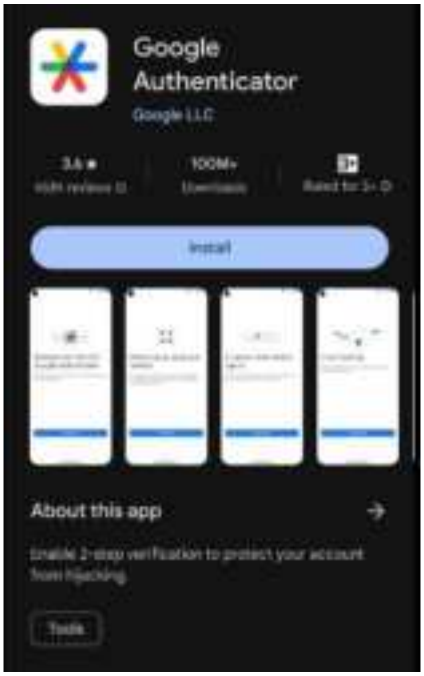
What do you want to do then?

5. Download and install Google Authenticator on your mobile device.

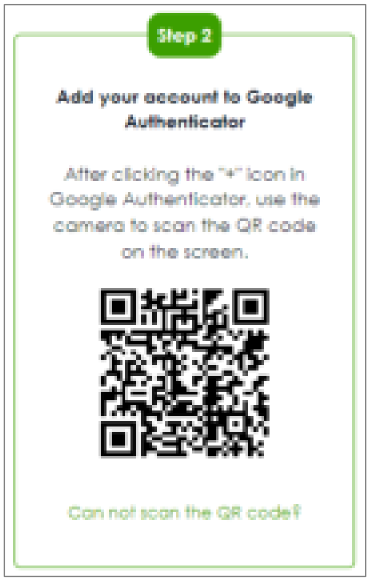
Apple Store



Google Play


Google Authenticator
Google LLC
100M+
Install
About this app
Enable 2-step verification to protect your account from hijacking
Tools

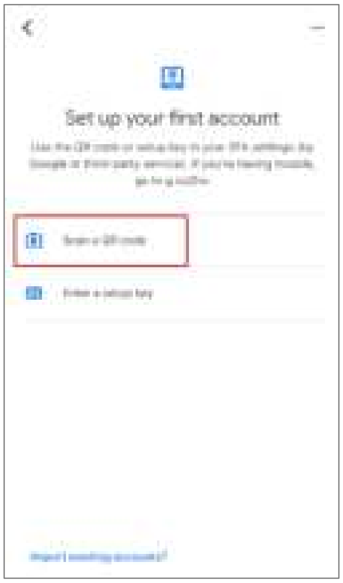
6. Register the user account to Google Authenticator. Open Google Authenticator App and scan the barcode on Web GUI.


Step 2

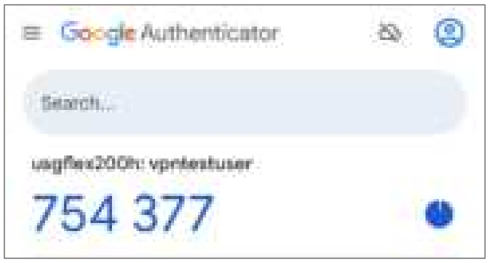
Add your account to Google Authenticator

After clicking the "+" icon in Google Authenticator, use the camera to scan the QR code on the screen.

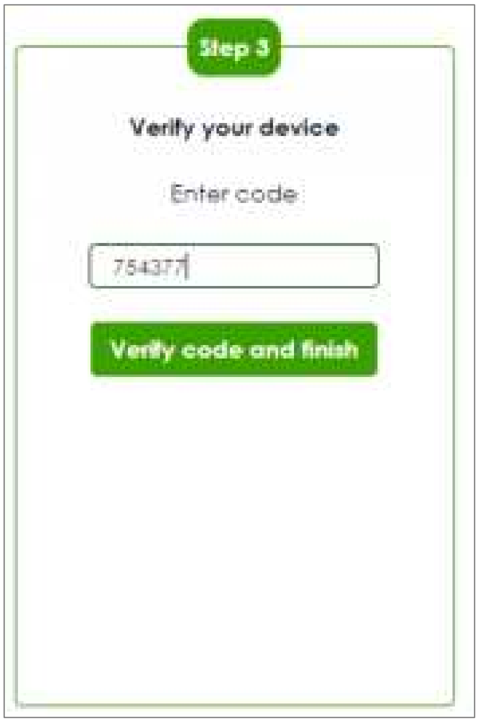
Can not scan the QR code?


Set up your first account

7. Enter the token code which displays on Google Authenticator to “Step 3” and click “Verify code and finish” to submit and verify the code.



usgflex200h: vpntestuser
754 377

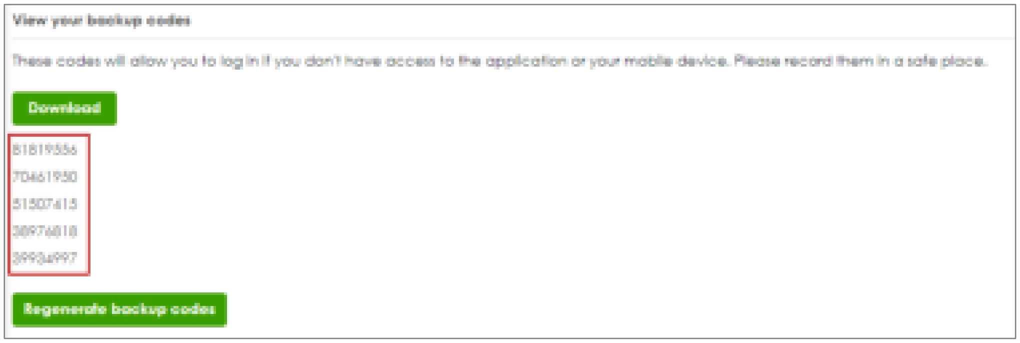


Verify your device

Enter code

754377

8. After 2FA registration is set up successfully, there are backup codes on web GUI. The backup codes are for device login in the case you don't have access to the application on your mobile device. Download the backup codes and record them in a safe place.

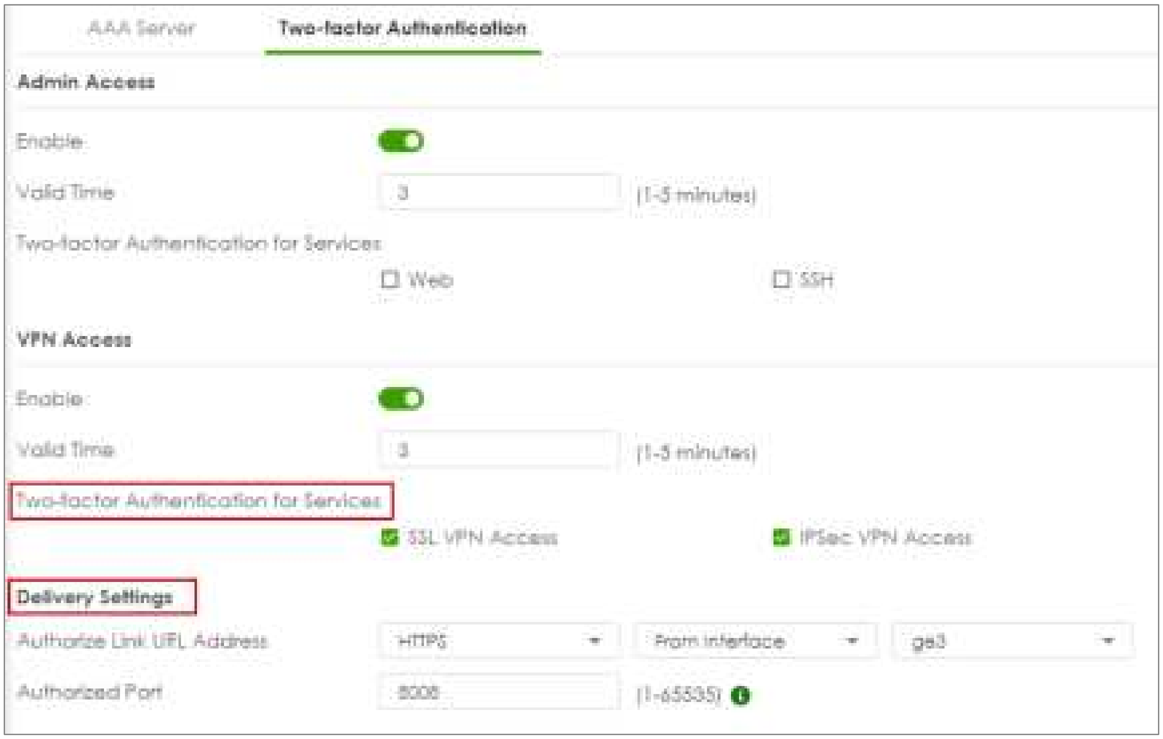

View your backup codes

These codes will allow you to log in if you don't have access to the application or your mobile device. Please record them in a safe place.

81819556
70461950
51507415
38976818
39934997

Configure valid time and login service types

Enable two factor authentication for VPN access. Configure valid time and select which VPN type requires two-factor authentication for VPN user. The valid time is the deadline that user needs to submit the two-factor authentication code to get the VPN access. The request is rejected if submitting the code later than valid time. By default, the valid time is 3 minutes. The authentication page is working on specific service port. After building up VPN tunnel, user have to enter the code in the Web GUI.



Admin Access

Enable: ●

Valid Time: 3 (1-5 minutes)

Two-factor Authentication for Services: □ Web □ SSH

VPN Access

Enable: ●

Valid Time: 3 (1-5 minutes)

Two-factor Authentication for Services: ☑ SSL VPN Access ☑ IPSec VPN Access

Delivery Settings

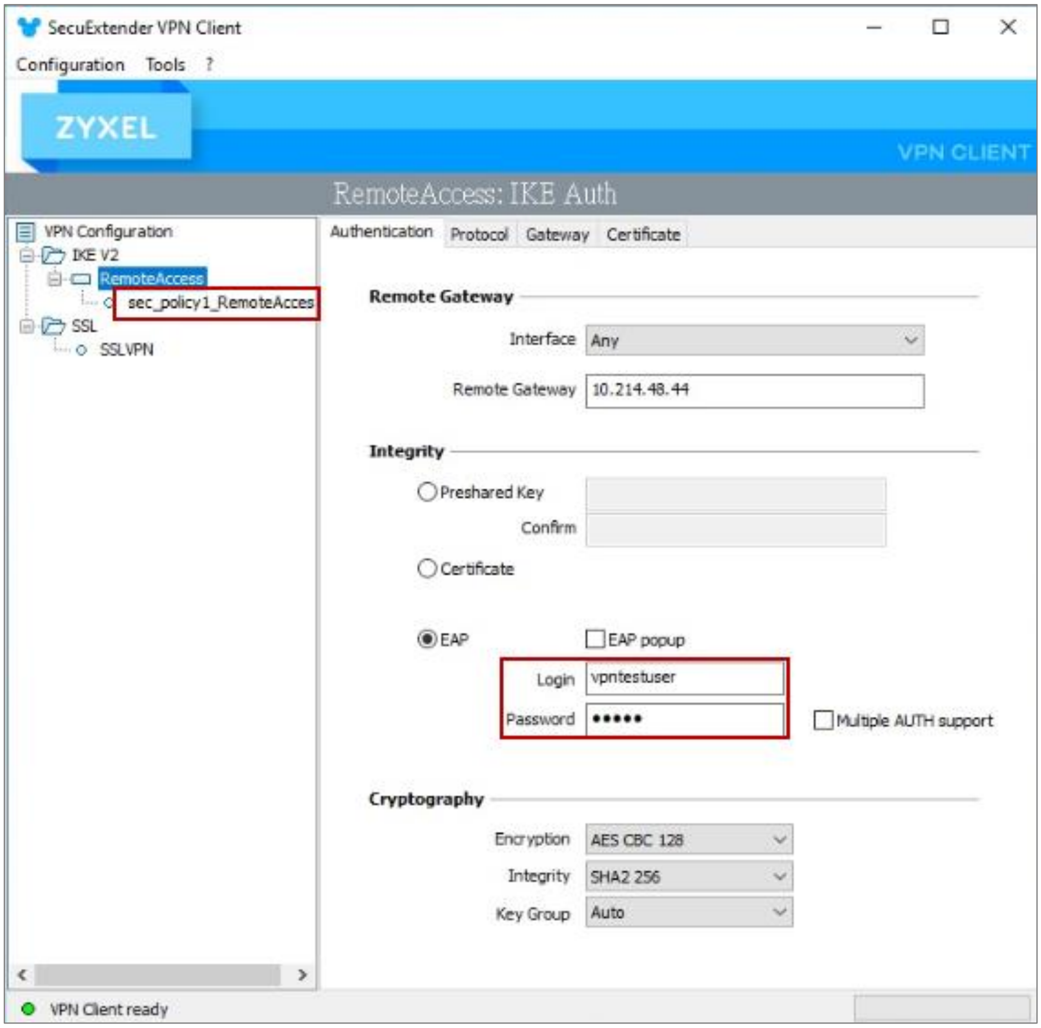
Authorize Link URL Address: HTTPS ▾ From interface ▾ ge3 ▾

Authorized Port: 8008 (1-65535)

Test the Result

Remote Access VPN (IKEv2)

1. Open Remote Access VPN tunnel on SecuExtender VPN Client.



Remote Gateway

Interface: Any

Remote Gateway: 10.214.48.44

Integrity

○ Preshared Key

Confirm

○ Certificate

● EAP   □ EAP popup

Login: vpntestuser

Password: •••••

□ Multiple AUTH support

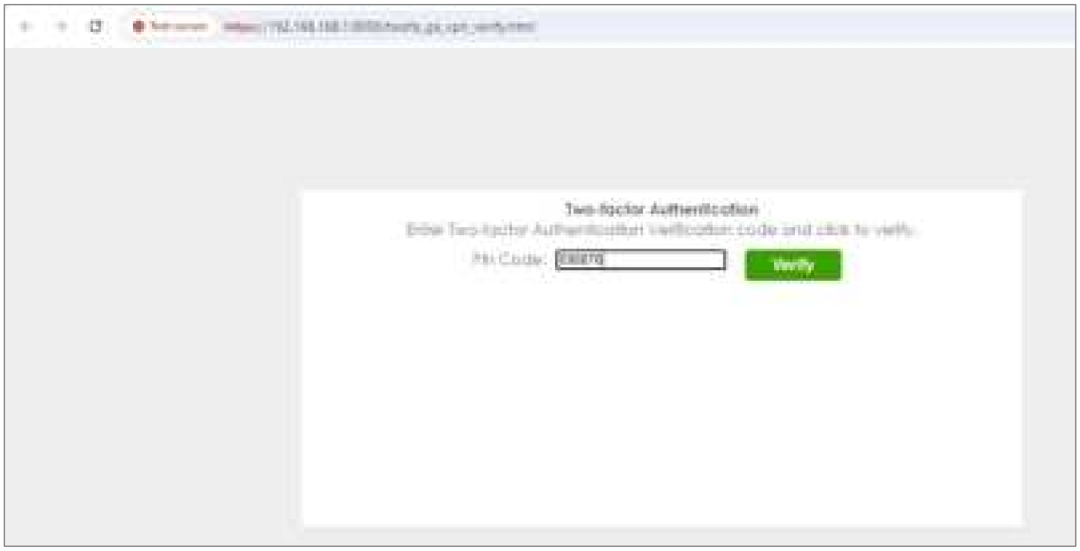
Cryptography

Encryption: AES CBC 128

Integrity: SHA2 256

Key Group: Auto

2. The browser will pop up authentication page to enter the verification code. Enter the code shown on Google Authenticator and click "Verify". You can also enter the backup code if you don't have mobile device on hand.

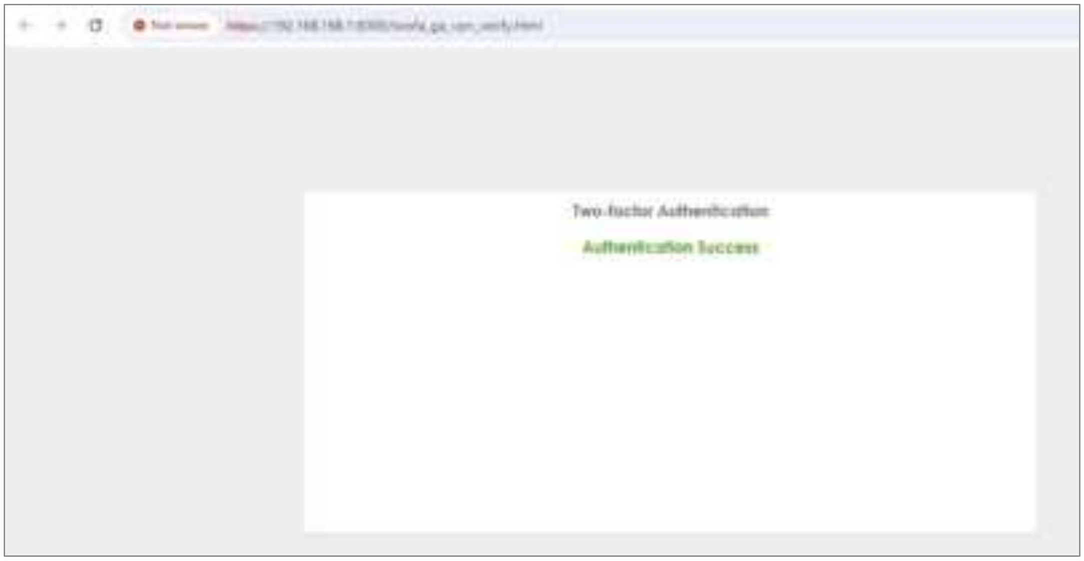


Two-factor Authentication

Enter Two-factor Authentication Verification code and click to verify.

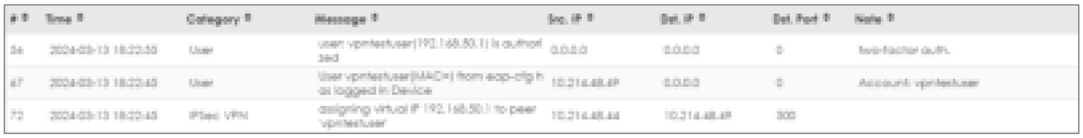
PIN Code: 230870

3. Authorize with username, password and the token code successfully.



Two-factor Authentication

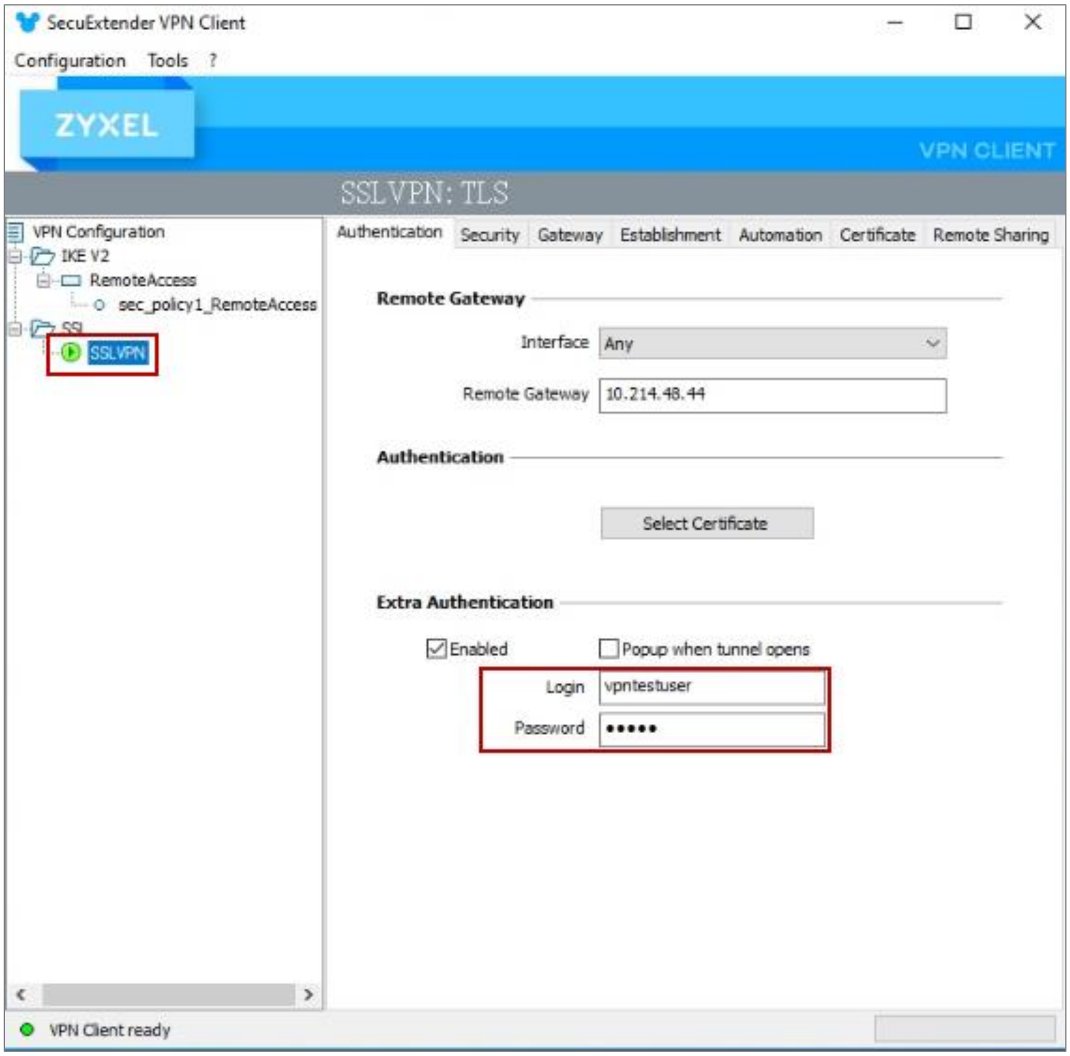
Authentication Success



#	Time	Category	Message	Src. IP	Dst. IP	Dst. Port	Note
56	2024-03-13 18:22:35	User	user: vpntestuser(192.168.50.1) is authorized	0.0.0.0	0.0.0.0	0	two-factor auth.
67	2024-03-13 18:22:45	User	User vpntestuser(MAC=) from eap-cfg has logged in Device	10.214.48.49	0.0.0.0	0	Account: vpntestuser
72	2024-03-13 18:22:45	IPSec VPN	assigning virtual IP 192.168.50.1 to peer 'vpntestuser'	10.214.48.44	10.214.48.49	500	

SSL VPN

1. Open SSL VPN tunnel on SecuExtender VPN Client.



Interface: Any

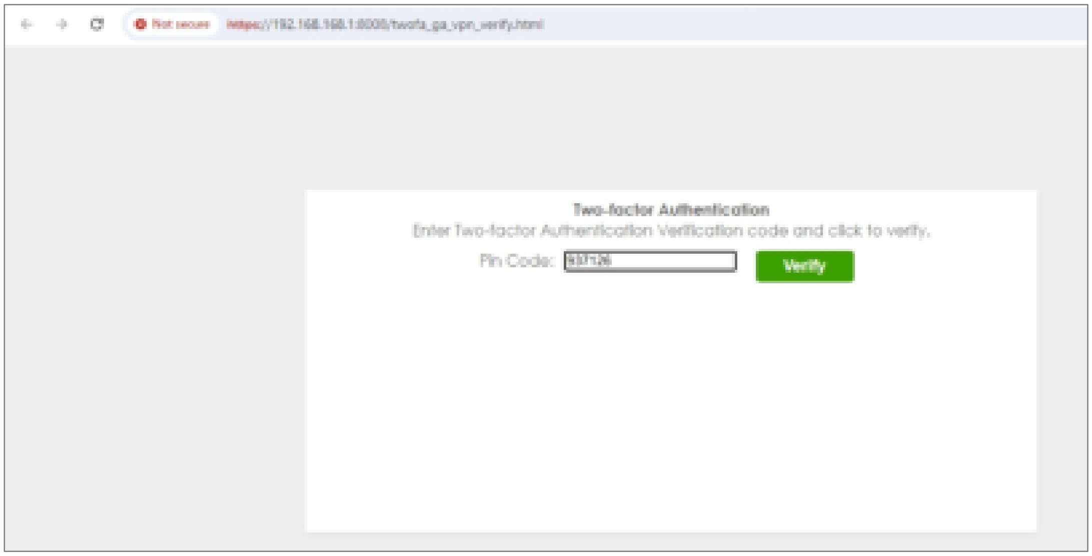
Remote Gateway: 10.214.48.44

☑ Enabled □ Popup when tunnel opens

Login: vpntestuser

Password: •••••

2. The browser will pop up authentication page to enter the verification code. Enter the code shown on Google Authenticator and click "Verify". You can also enter the backup code if you don't have mobile device on hand.

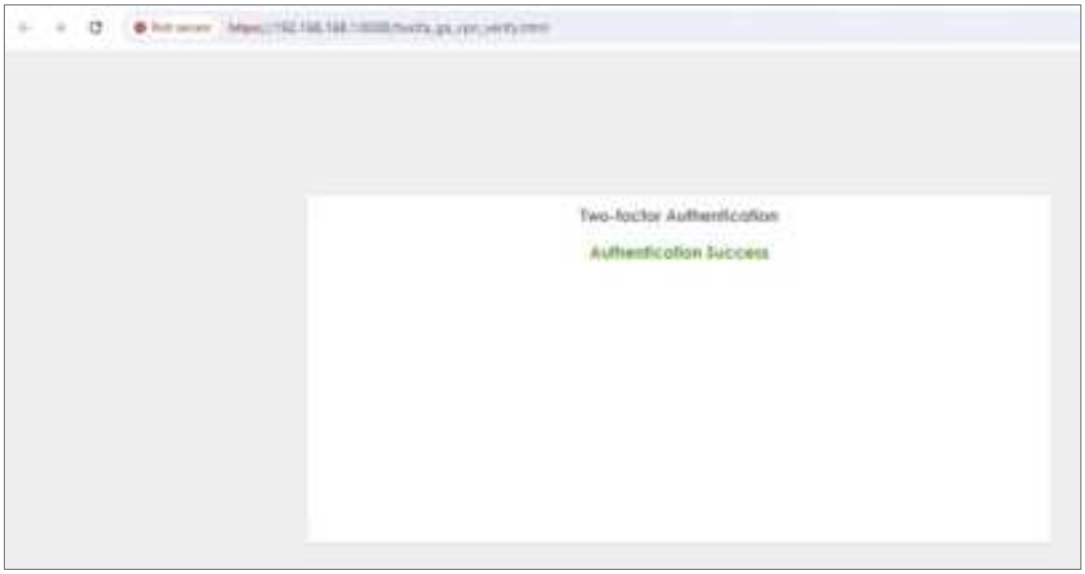


Two-factor Authentication

Enter Two-factor Authentication Verification code and click to verify.

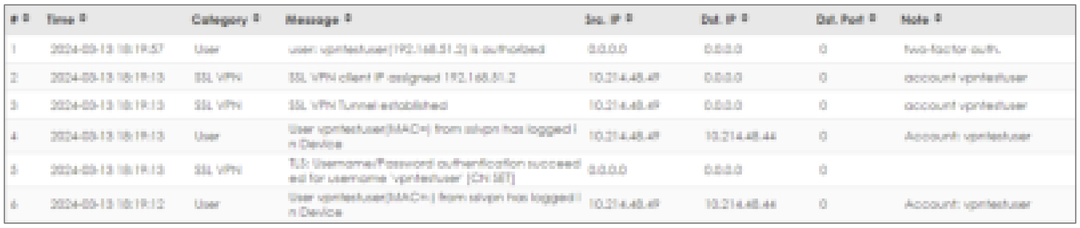
Pin Code: 837126

3. Authorize with username, password and the token code successfully.



Two-factor Authentication

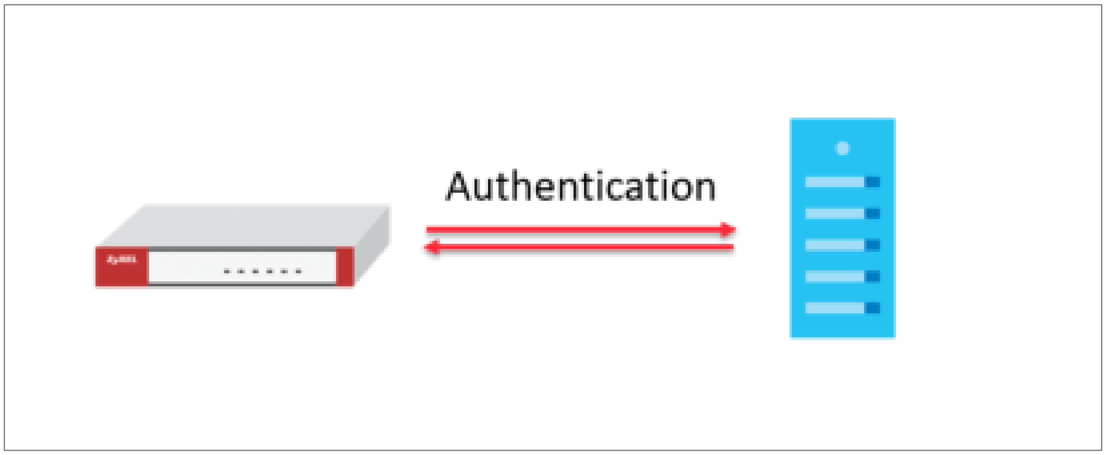
Authentication Success



#	Time	Category	Message	Src. IP	Dst. IP	Dst. Port	Note
1	2024-03-13 18:19:57	User	user: vpntestuser(192.168.51.2) is authorized	0.0.0.0	0.0.0.0	0	two-factor auth.
2	2024-03-13 18:19:13	SSL VPN	SSL VPN client IP assigned 192.168.51.2	10.214.48.49	0.0.0.0	0	account vpntestuser
3	2024-03-13 18:19:13	SSL VPN	SSL VPN Tunnel established	10.214.48.49	0.0.0.0	0	account vpntestuser
4	2024-03-13 18:19:13	User	User vpntestuser(MAC=) from sslvpn has logged in Device	10.214.48.49	10.214.48.44	0	Account: vpntestuser
5	2024-03-13 18:19:13	SSL VPN	TLS: Username/Password authentication succeeded for username 'vpntestuser' [CN SET]	0.0.0.0	0.0.0.0	0	
6	2024-03-13 18:19:12	User	User vpntestuser(MAC=) from sslvpn has logged in Device	10.214.48.49	10.214.48.44	0	Account: vpntestuser

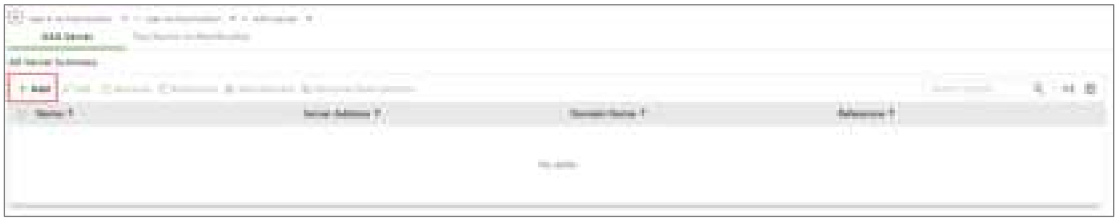
How to set up AD authentication with Microsoft AD

This is an example of using USG FLEX H to configure AD authentication with Microsoft Active Directory(AD). The article briefly explains the parameters for the AD configuration and guides how to join domain to the AD server.

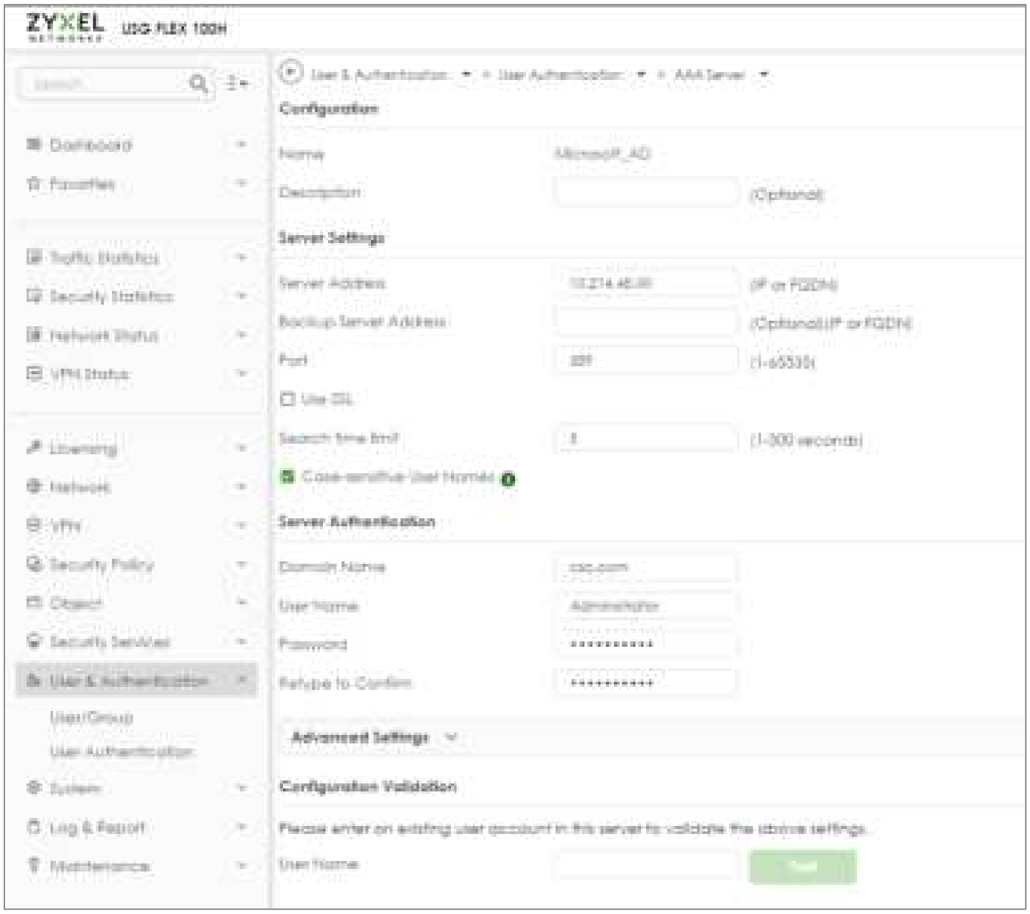


Set Up a profile for AD server

Go to User & Authentication > User Authentication > AAA Server > AD. Click +Add to create a new profile



Enter the Server Address and port for Server settings. (10.214.48.XX:389 in this example). Enter the domain name and the credentials for logging into the AD server, and click Apply.



Configuration

Name: Microsoft_AD

Description: (Optional)

Server Settings

Server Address: 10.214.48.XX (IP or FQDN)

Backup Server Address: (Optional)(IP or FQDN)

Port: 389 (1-65535)

☐ Use SSL

Search time limit: 5 (1-300 seconds)

☑ Case-sensitive User Names

Server Authentication

Domain Name: csc.com

User Name: Administrator

Password: ••••••••••

Retype to Confirm: ••••••••••

Advanced Settings

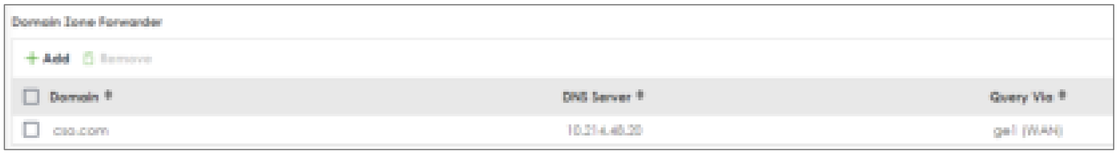
Configuration Validation

Please enter an existing user account in this server to validate the above settings.

User Name: Test

Join Domain

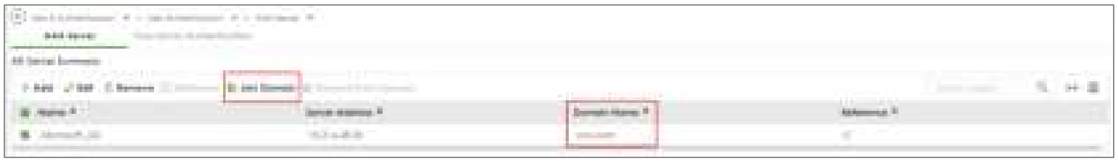
After the profile is created, go to System > DNS & DDNS > DNS, create a domain zone forwarder, and configure the DNS server IP as the IP address for the domain controller.



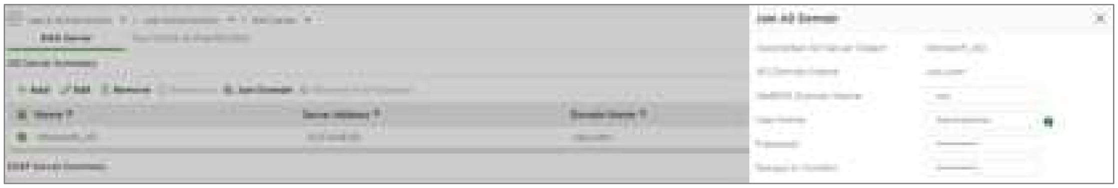
Domain Zone Forwarder

Domain	DNS Server	Query Via
cso.com	10.214.48.20	ge1 (WAN)

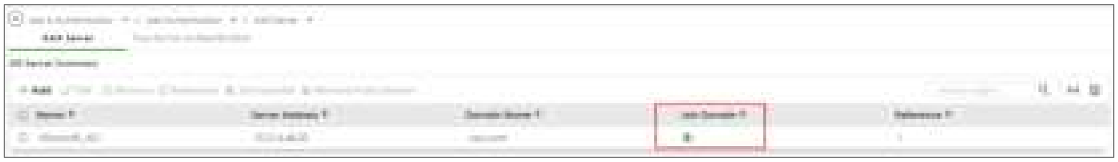
After the action above, go back to the profile page, tick it and click **Join Domain**



Enter NetBIOS Domain Name, Username and Password, click Apply.

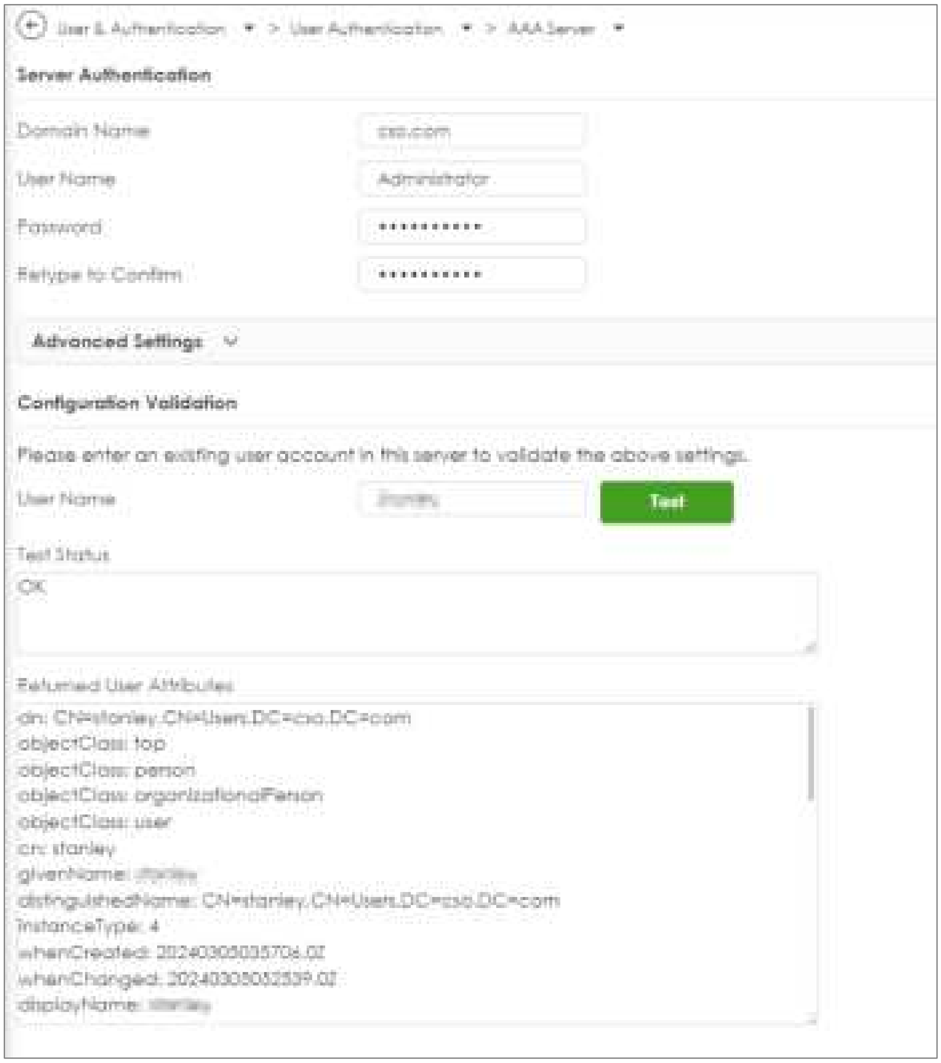


After join domain successfully, you can see this icon.



Test the Result

Scroll down to the bottom of the profile, you will see the Configuration Validation section, using a user account from the server specified above to test if the configuration is correct.



User & Authentication ▾ > User Authentication ▾ > AAA Server ▾

Server Authentication

Domain Name	csio.com
User Name	Administrator
Password	***********
Retype to Confirm	***********

Configuration Validation

Please enter an existing user account in this server to validate the above settings.

User Name: stanley

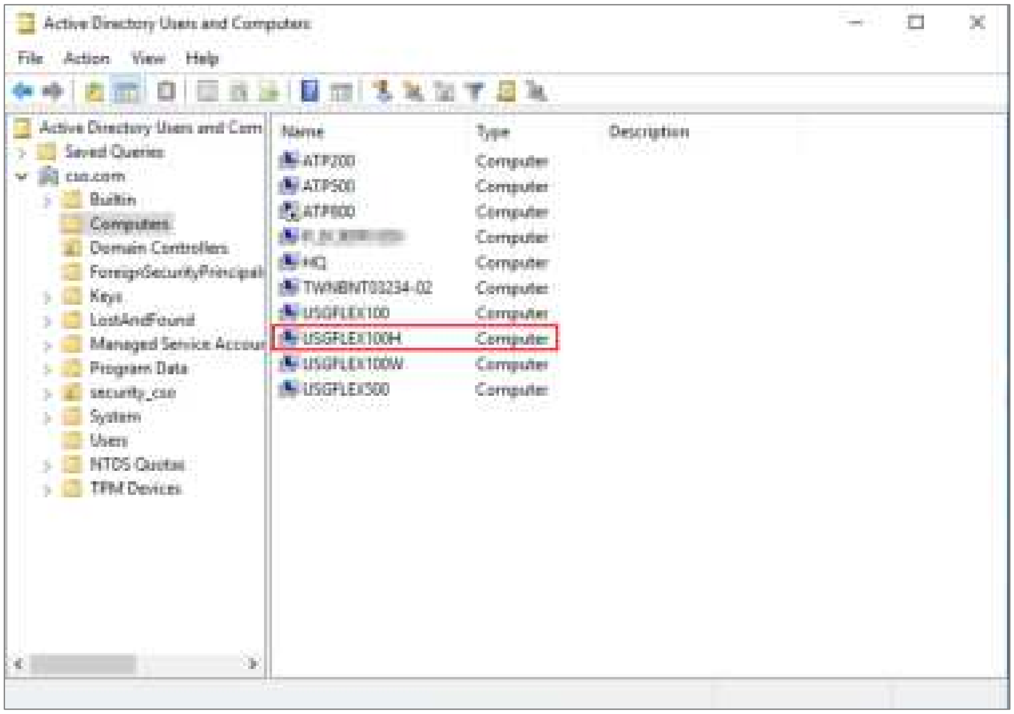
Test Status

```
OK
```

Returned User Attributes

```
dn: CN=stanley,CN=Users,DC=csio,DC=com
objectClass: top
objectClass: person
objectClass: organizationalPerson
objectClass: user
cn: stanley
givenName: [redacted]
distinguishedName: CN=stanley,CN=Users,DC=csio,DC=com
instanceType: 4
whenCreated: 20240305035706.0Z
whenChanged: 20240305052539.0Z
displayName: [redacted]
```

Check **computers** on Microsoft AD, you can see your firewall means join domain successfully.

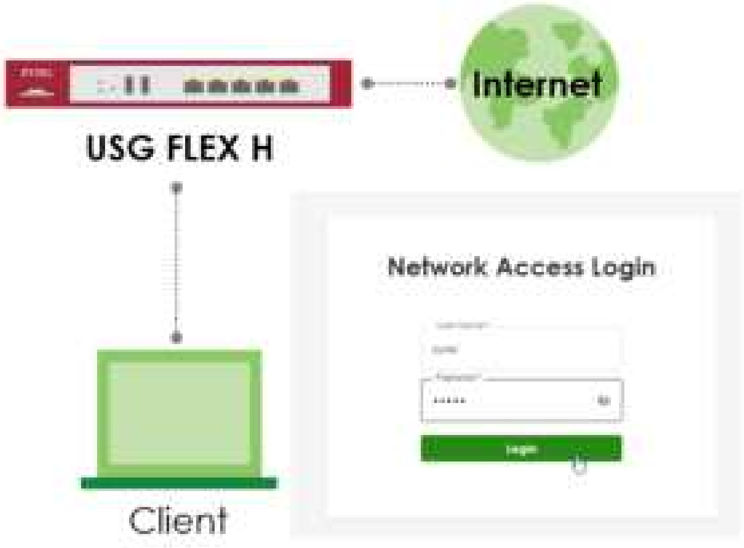


- Active Directory Users and Com
  - Saved Queries
  - cso.com
    - Builtin
    - Computers
    - Domain Controllers
    - ForeignSecurityPrincipal
    - Keys
    - LostAndFound
    - Managed Service Accou
    - Program Data
    - security_cso
    - System
    - Users
    - NTDS Quotas
    - TPM Devices

Name	Type	Description
ATP200	Computer	
ATP500	Computer	
ATP800	Computer	
[redacted]	Computer	
HQ	Computer	
TWNBNT03234-02	Computer	
USGFLEX100	Computer	
USGFLEX100H	Computer	
USGFLEX100W	Computer	
USGFLEX500	Computer	

How to Set Up Captive Portal?

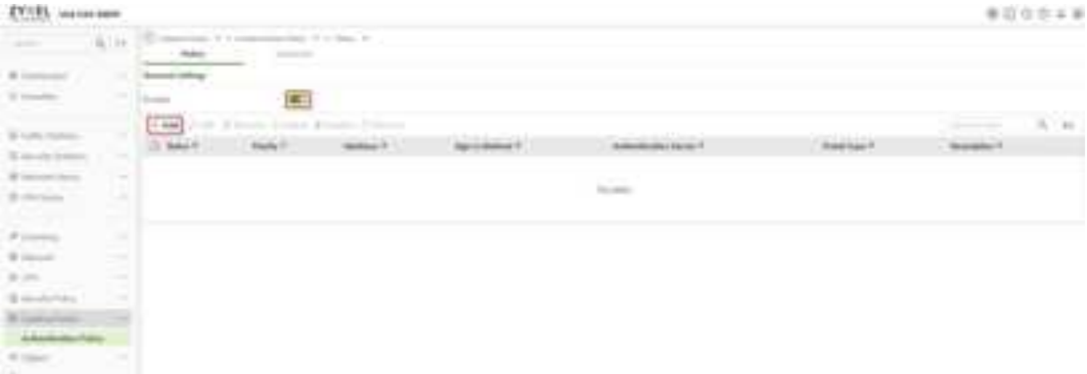
The Captive Portal feature provides functionality that requires LAN client users to complete the authentication procedure of Network Access Login page before accessing the internet. This article will guide users on how to set up and verify this feature.



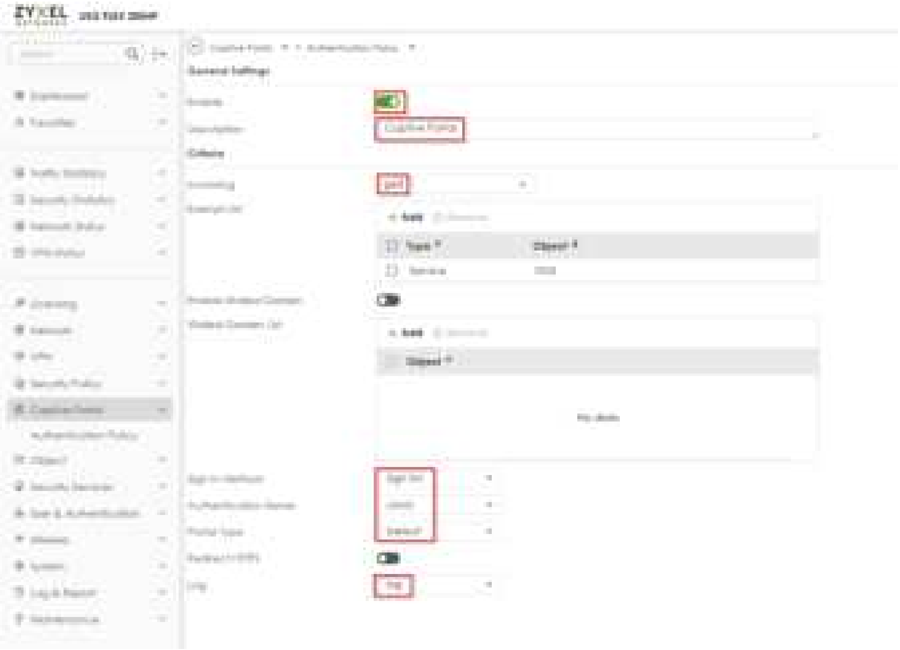
Note: Captive Portal is supported on USG Flex 100H, USG FLEX 200H, USG FLEX 200HP, USG FLEX 500H, USG FLEX 700H.This example was tested using USG FLEX 200HP (Firmware Version: uOS 1.32).

Configure the Captive Portal via the Web-GUI

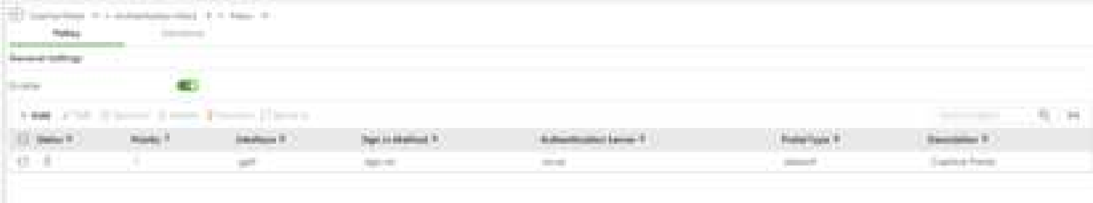
1. **Enable the Captive Portal and add a policy** - Navigate to the Web-GUI path Captive Portal > Authentication Policy > Policy > To enable the **Captive Portal function and add a policy**.



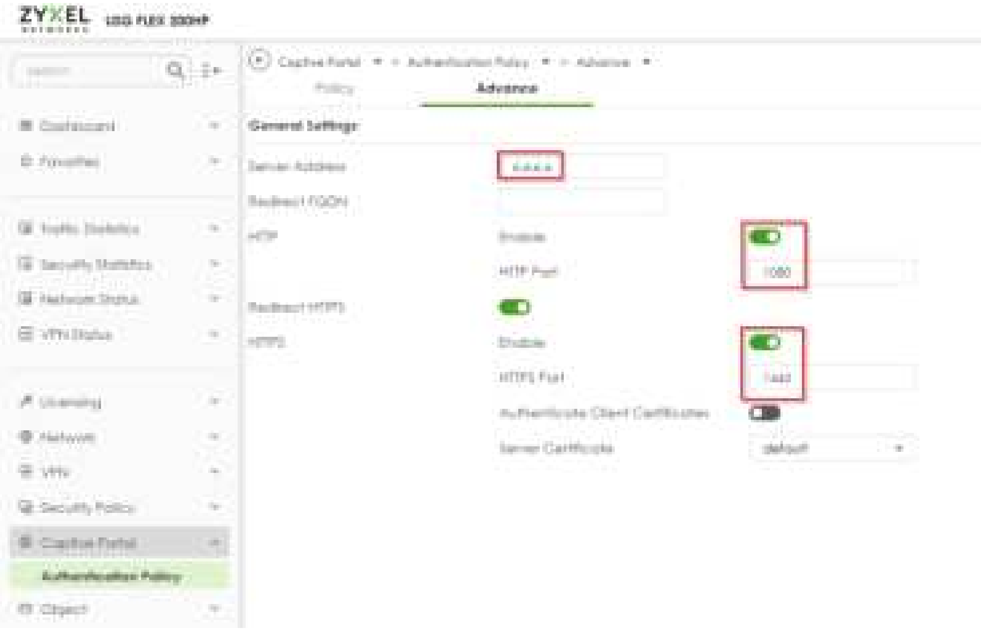
2. **Add an Authentication Policy** – Enable the Authentication Policy, provide a Description, select the Incoming interface, choose the Sign In Method, specify the Authentication Server and Portal Type, and enable Log.



3. **Check the settings** – Ensure the Captive Portal function and the Authentication Policy are enabled.



4. **Edit the Advance settings** – The default server address is 6.6.6.6, the default HTTP port is set to 1080, and the default HTTPS port is set to 1443.



General Settings

Server Address: 6.6.6.6

Redirect FQDN:

HTTP: Enable ●; HTTP Port: 1080

Redirect HTTPS: ●

HTTPS: Enable ●; HTTPS Port: 1443

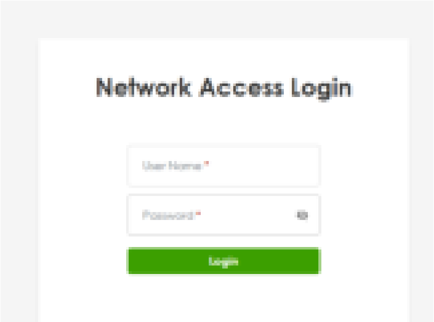
Authenticate Client Certificates: ○

Server Certificate: default

Verify the Captive Portal function

The PC client must complete the authentication process of the Captive Portal before gaining access to the internet.

1. The PC client connects to the LAN port and opens the browser, which will be redirected to the Network Access Login page.



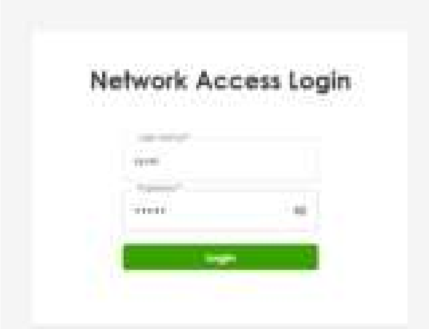
Network Access Login

User Name *

Password *

Login

2. Enter the login User Name and Password.



Network Access Login

User Name*

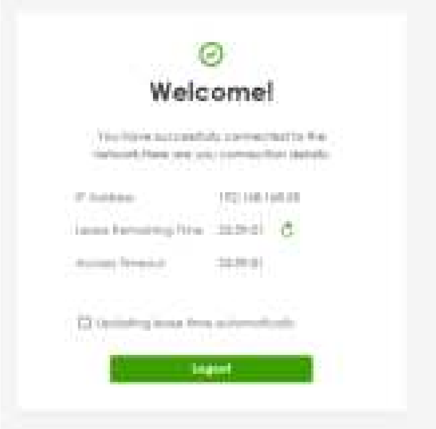
zyxel

Password*

•••••

Login

3. Once successfully logged into the Network Access Login page, the client will be redirected to the Welcome page, which displays the client's IP address, lease remaining time, and access timeout.



Welcome!

You have successfully connected to the network.Here are your connection details.

IP Address [illegible]

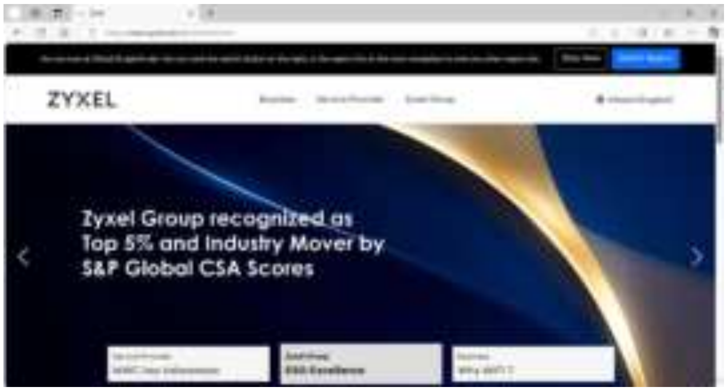
Lease Remaining Time [illegible]

Access Timeout [illegible]

□ Updating lease time automatically

Logout

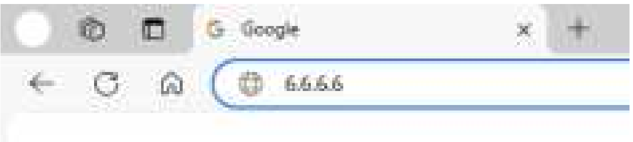
4. Eventually, the client can access the internet normally.



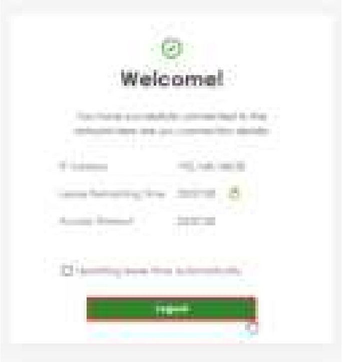
ZYXEL
Zyxel Group recognized as Top 5% and Industry Mover by S&P Global CSA Scores

How to logout the Captive Portal?

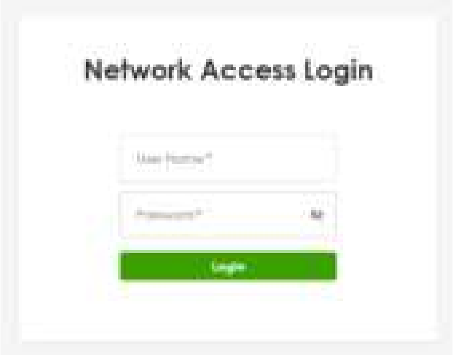
1. Enter the defined server link. The default link is https://6.6.6.6.



2. Enter the Welcome page and click 'Logout'.

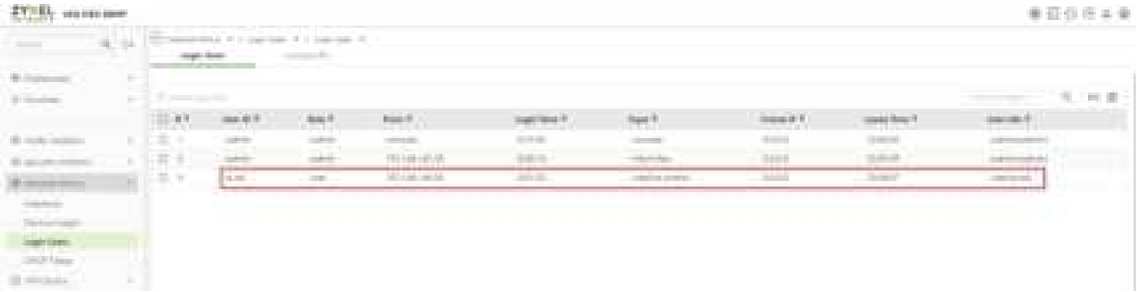


3. Redirect to the Network Access Login page. If the user needs to access the internet, they must re-enter the username and password to complete the Captive Portal authentication process.

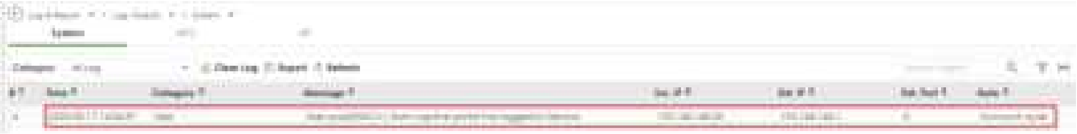


How to check the status?

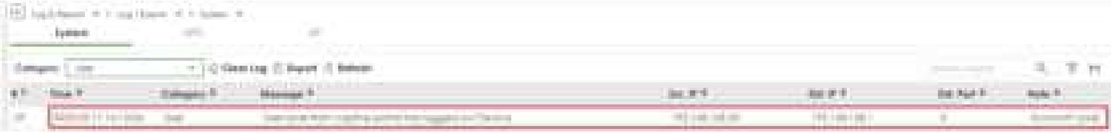
When the user successfully logs into the Captive Portal page, they can navigate to the GUI path: Network Status > Login Users > Login Users, to check if the user account has already logged into the Captive Portal.



They can also navigate to the GUI path: Log & Report > Log / Events > System, to verify the log message indicating that they have successfully logged into the captive portal.



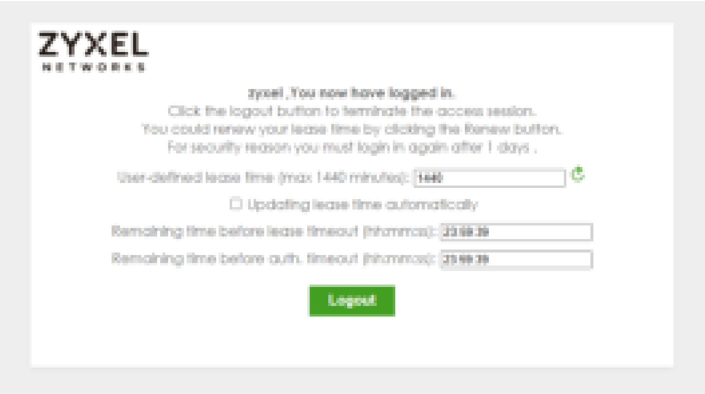
When the user successfully logs out the Captive Portal page, they can navigate to the GUI path: Log & Report > Log / Events > System, to verify the log message indicating that they have successfully logged out the captive portal.



Feature Change:

💡 Starting from firmware version uOS 1.32, the user must log in to the Captive Portal before using the User Aware function for security policy or BWM policy utilization.

Prior to firmware version uOS 1.32, users were able to successfully log in to the device's GUI link to utilize security policies or BWM policies, as shown below:



zyxel , You now have logged in.
Click the logout button to terminate the access session.
You could renew your lease time by clicking the Renew button.
For security reason you must login in again after 1 days .

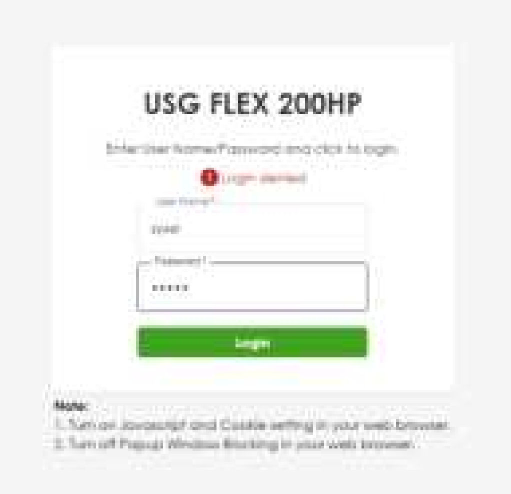
User-defined lease time (max 1440 minutes): 1440

□ Updating lease time automatically

Remaining time before lease timeout (hh:mm:ss): 23:59:39

Remaining time before auth. timeout (hh:mm:ss): 23:59:39

Starting from firmware version uOS 1.32, if an account that does not belong to the Local Administrator attempts to log in to the Web-GUI page, access will be denied, as shown below:



USG FLEX 200HP

Enter User Name/Password and click to login.

Login denied

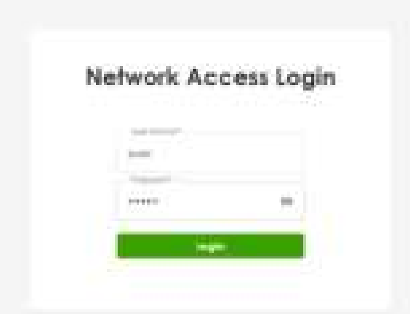
User Name*: zyxel

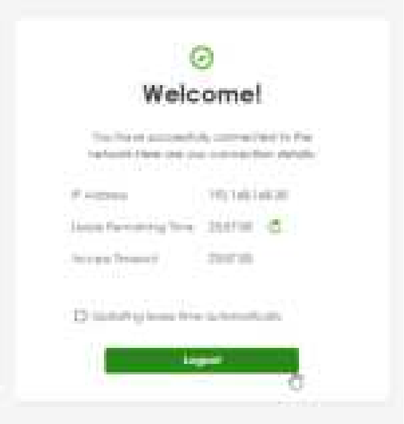
Password*: •••••

Note:
1. Turn on Javascript and Cookie setting in your web browser.
2. Turn off Popup Window Blocking in your web browser.

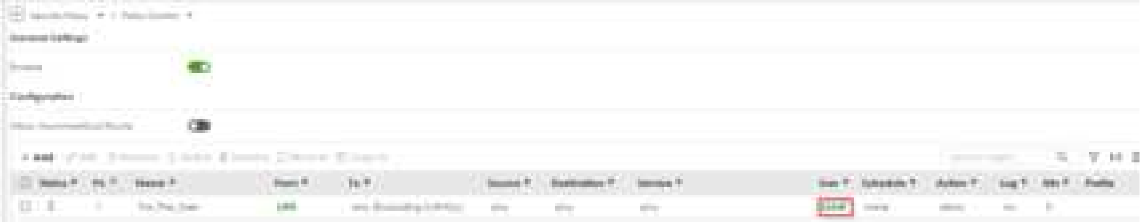
Therefore, starting from firmware version uOS 1.32, if users wish to utilize security policies or BWM policies for login users, they need to enable the Captive Portal function. Users must successfully log in to the Network Access Login page to activate the security or BWM policies, as show in below:

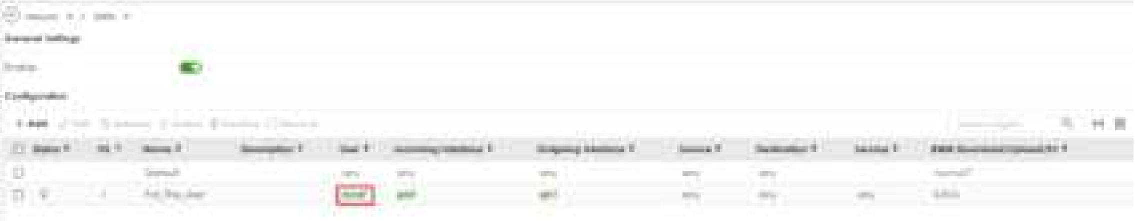
The user successfully logged in to the Network Access Login page.





They can then activate the security or BWM policies for the specific user account.

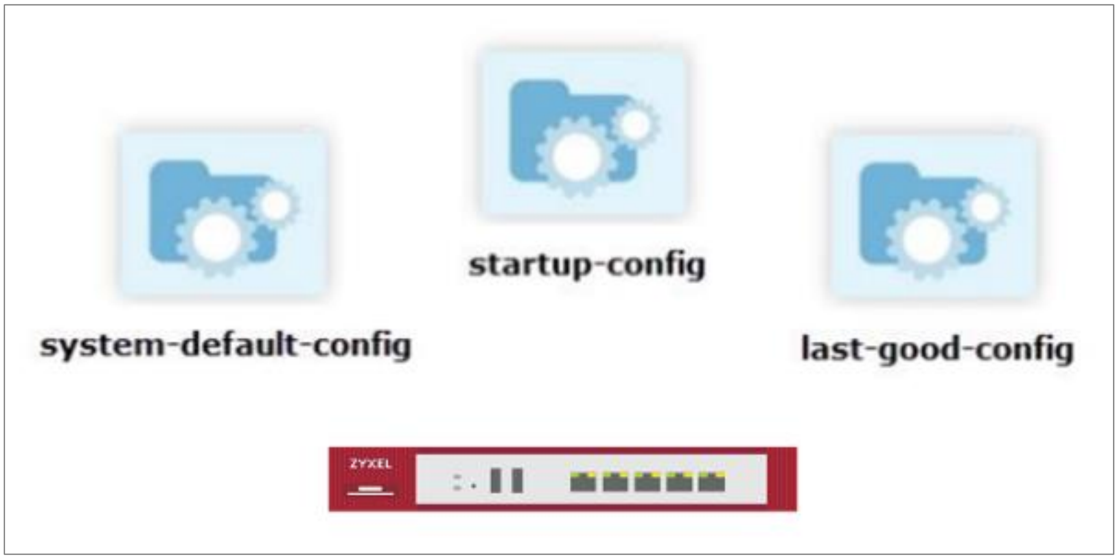




Chapter 4- Maintenance

How to Manage Configuration Files

This is an example of how to rename, download, copy, apply and upload configuration files. Once your USG FLEX H device is configured and functioning properly, it is highly recommended that you back up your configuration file before making further configuration changes. The backup configuration file will be useful in case you need to return to your previous settings.



Note: The **system-default.conf** file contains the ZyWALL default settings. This configuration file is included when you upload a firmware package.

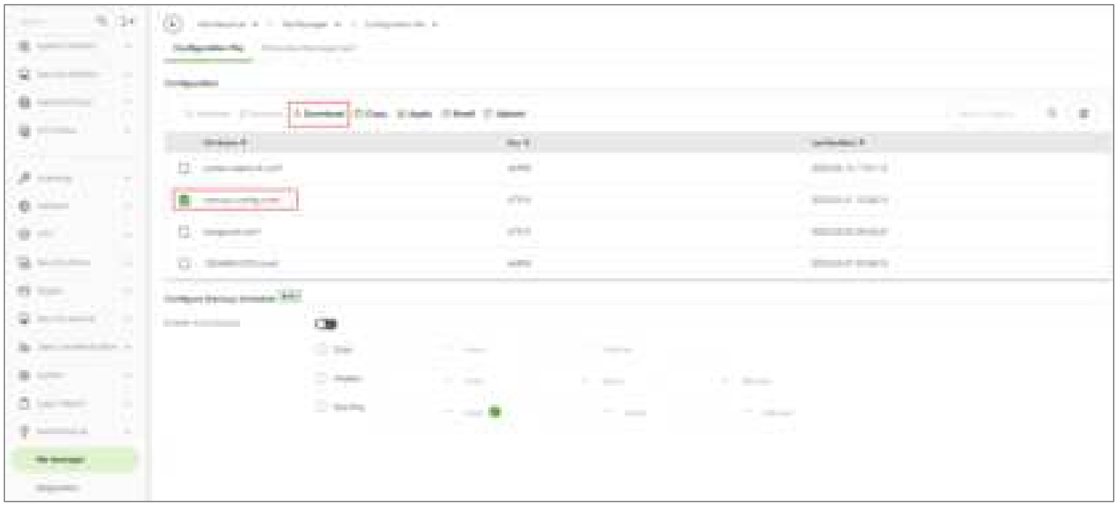
The **startup-config.conf** file is the configuration file that the ZyWALL is currently using. If you make and save changes during your management session, the changes are applied to this configuration file.

The **lastgood.conf** is the most recently used (valid) configuration file that was saved when the device last restarted.

Download the Configuration Files

Maintenance > File Manager > Configuration File

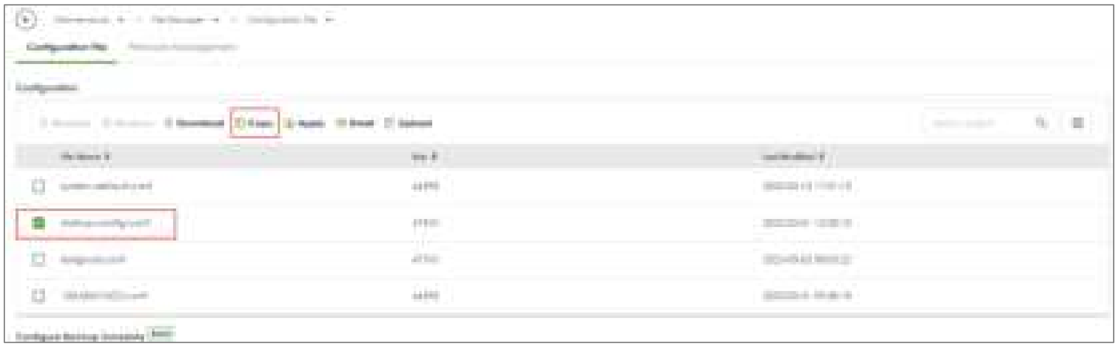
Select the statup-config.conf and click “Download”.



Copy the Configuration Files

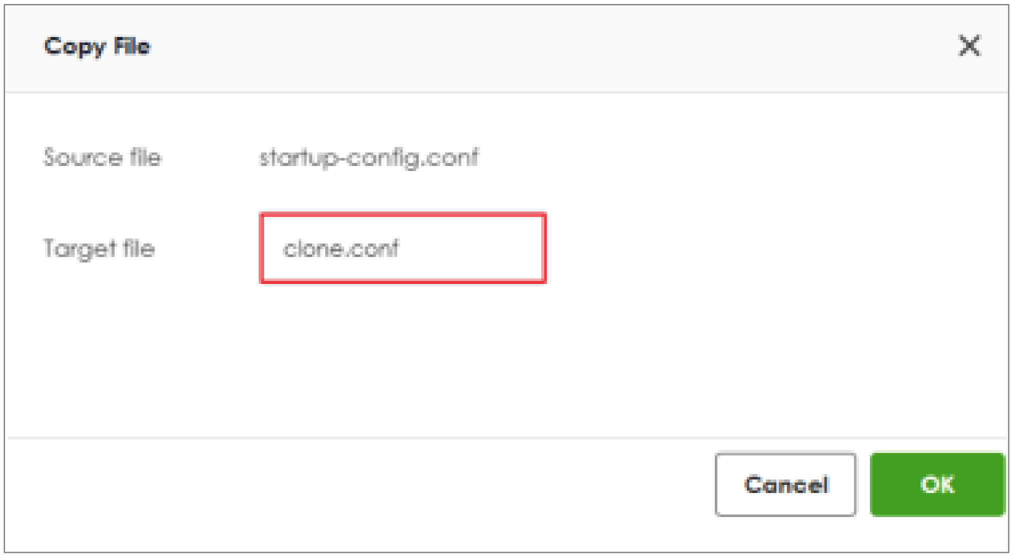
Maintenance > File Manager > Configuration File

Select the file and click “Copy”.



A pop-up screen will appear allowing you to edit the Target file name.

The file as format: [a-zA-Z0-9~_.=-]{1,63}.conf



Copy File

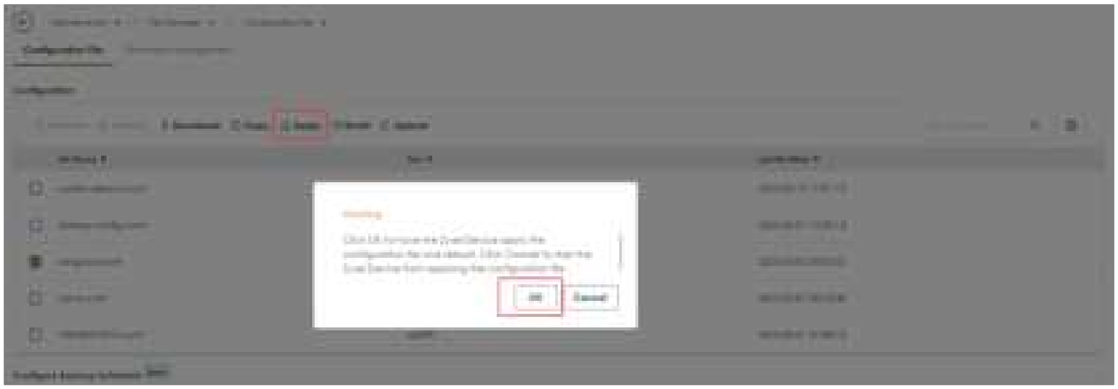
Source file startup-config.conf

Target file clone.conf

Apply the Configuration Files

Maintenance > File Manager > Configuration File

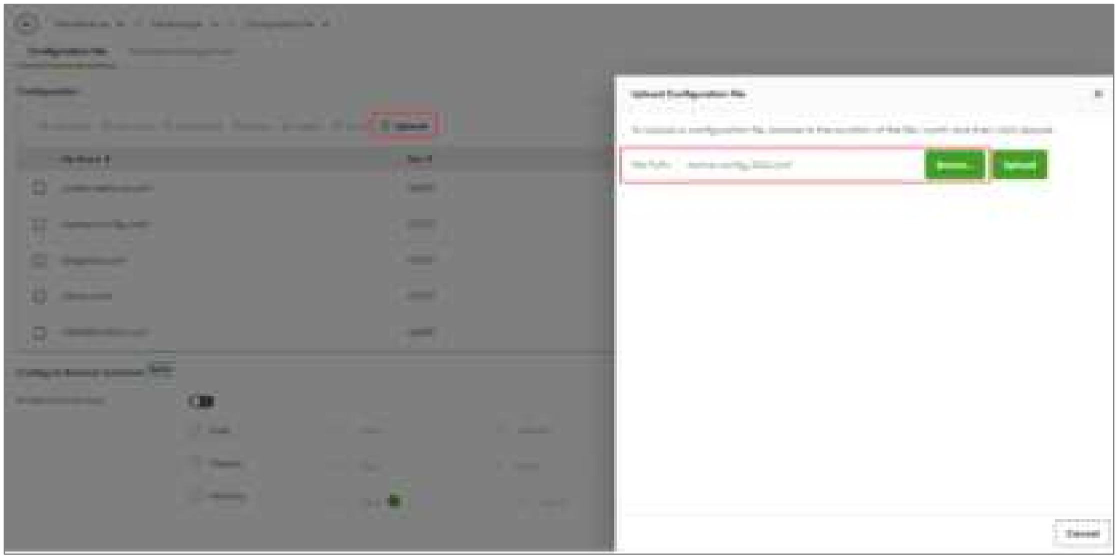
Select a specific configuration file to have ZyWALL use it. For example, select the **system-default.conf** file and click **Apply** to reset all of the ZyWALL settings to the factory defaults. Or select the **lastgood.conf** which is the most recently used (valid) configuration file that was saved when the device last restarted. If you uploaded and applied a configuration file with an error, select this file then click **Apply** to return the valid configuration. Click "OK", ZyWALL will reboot automatically.



Upload the Configuration Files

Maintenance > File Manager > Configuration File

Select Upload and Browse a new or previously saved configuration file from your computer to the USG FLEX H device. You cannot upload a configuration file which has the same name in the device.



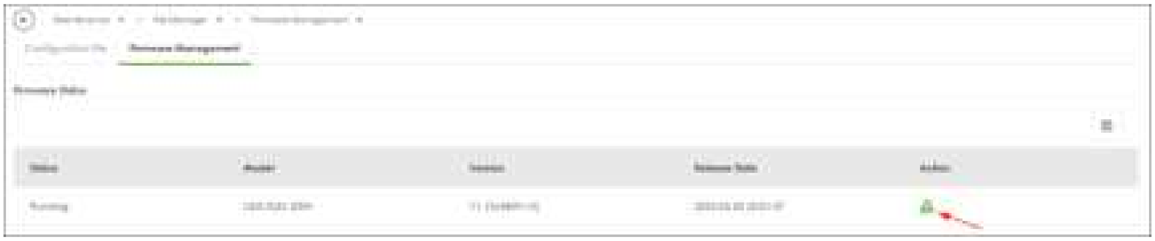
How to Manage Firmware

For management convenience, administrators have the capability to upgrade the firmware effortlessly either from a PC or using the cloud firmware upgrade function. Additionally, the firmware upgrade can be scheduled to occur automatically within a preconfigured timeframe.

Local Firmware Upgrade

You can click the green button to upgrade firmware by browsing the .bin file from your PC.

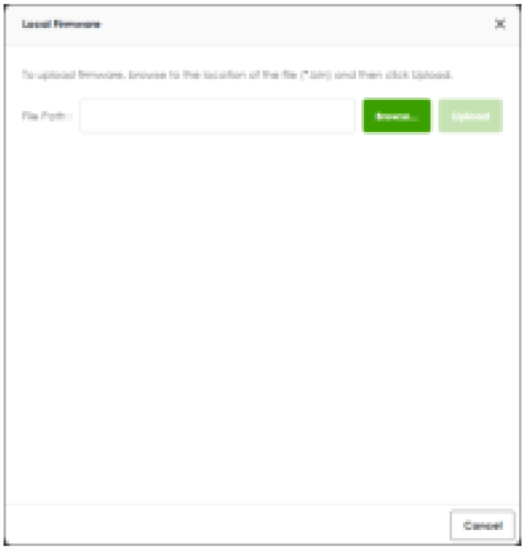
> Note: You can download the latest firmware version from [myZyxel.com](https://portal.myzyxel.com/my/firmwares) portal. (https://portal.myzyxel.com/my/firmwares)



Configuration File | Firmware Management

Firmware Status

Status	Model	Version	Release Date	Action
Running	[illegible]	[illegible]	[illegible]	



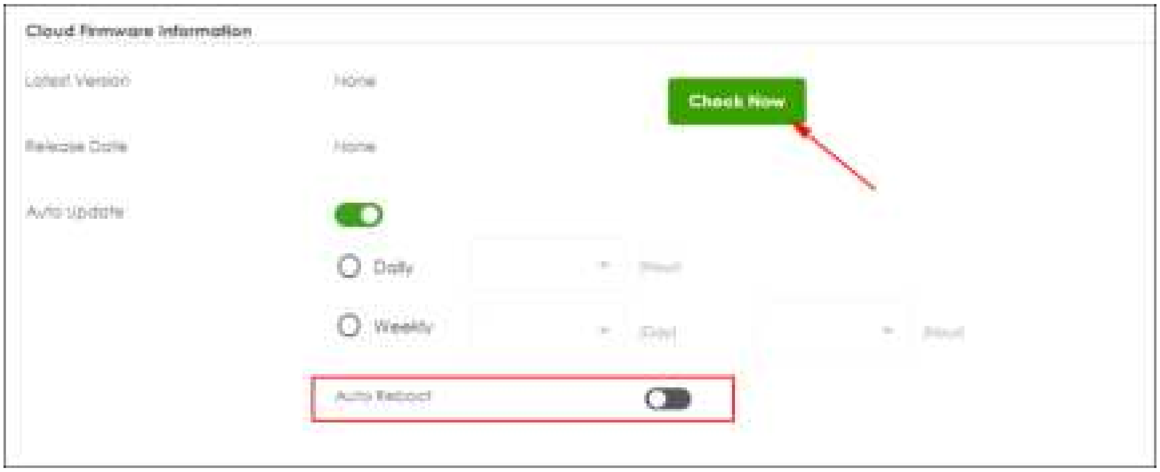
Local Firmware

To upload firmware, browse to the location of the file (*.bin) and then click Upload.

File Path :

Cloud Firmware Upgrade

The cloud firmware upgrade function allows you to verify the most recent firmware version by clicking the "Check New" button.
Furthermore, the "Auto Update" feature can be activated to automatically download firmware to your firewall first and reboot your device within a specified time frame.



Cloud Firmware Information

Latest Version None

Release Date None

Auto Update

○ Daily (Hour)

○ Weekly (Day) (Hour)

Auto Reboot

Chapter 5- Others

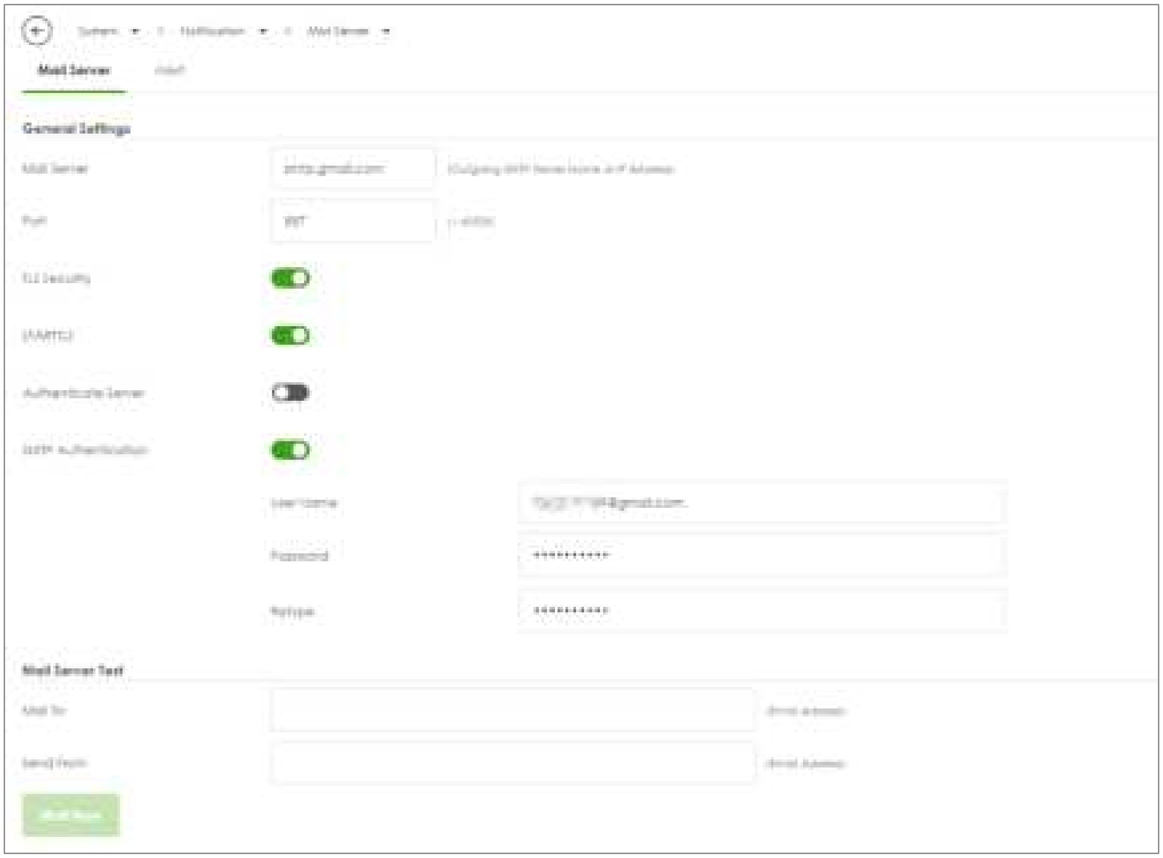
How to Setup and Configure Daily Report

Administrators can efficiently oversee gateway events by reviewing the Daily Report for management purposes. This example demonstrates how to set up the Daily Report, including the option to select specific log messages for inclusion. Once configured, you can utilize "Send Report Now" to assess your device's current status and establish a schedule for receiving the report.

Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 500H (Firmware Version: uOS 1.10).

Set Up the Mail Server

Before setting up the Email Daily Report, we will be required to set up a mail server. Navigate to the System > Notification > Mail Server. Input your Mail Server and port, and activate TLS Security and STARTTLS in their respective fields. Next, complete your account and password for SMTP Authentication as the Sender.



System > Notification > Mail Server

General Settings

Mail Server: smtp.gmail.com (Outgoing SMTP Server Name or IP Address)

Port: 587 (1-65535)

TLS Security: ●

STARTTLS: ●

Authenticate Server: ○

SMTP Authentication: ●

User Name: [illegible]@gmail.com

Password: ***********

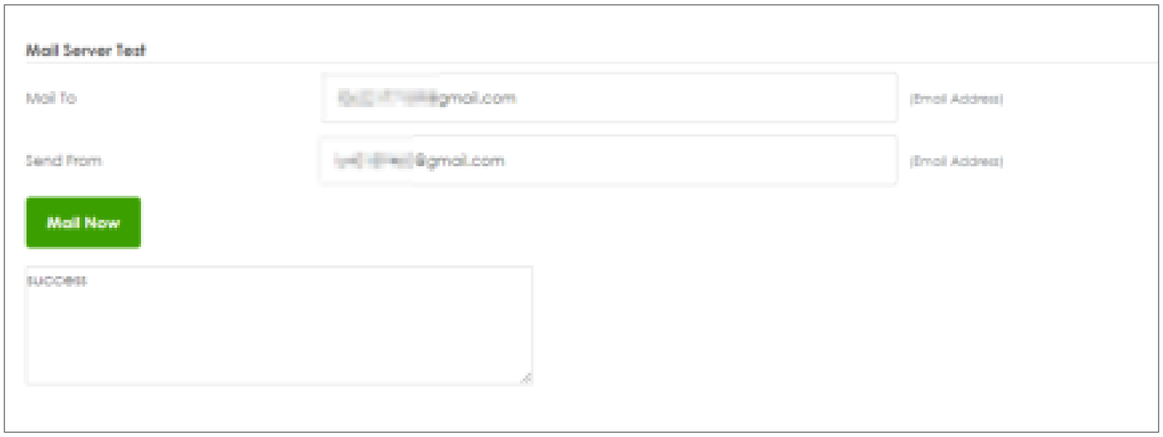
Retype: ***********

Mail Server Test

Mail To: (Email Address)

Send From: (Email Address)

You can verify the correctness of the settings by using the Mail Server Test below. If it is successful, you will receive an email.

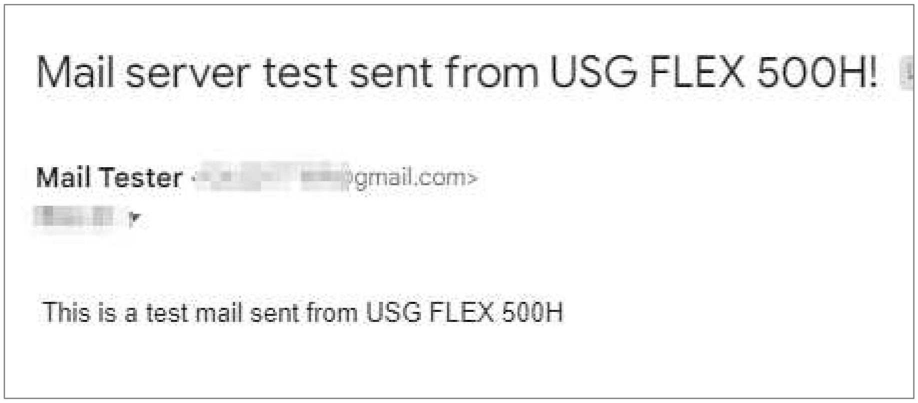


Mail Server Test

Mail To: [redacted]gmail.com (Email Address)

Send From: [redacted]@gmail.com (Email Address)

success



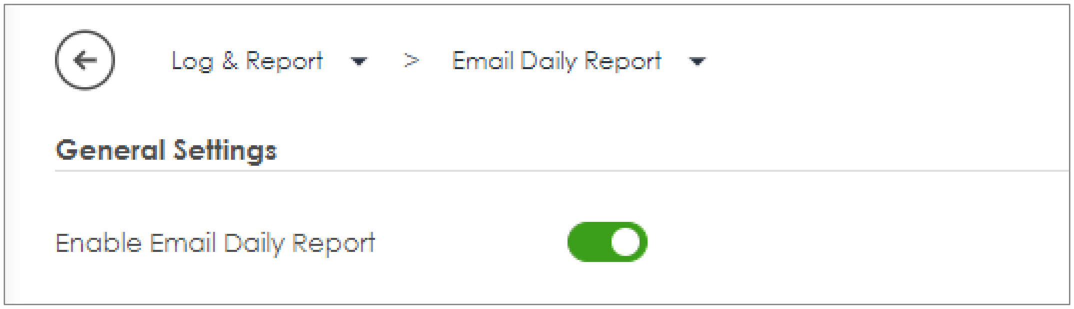
Mail server test sent from USG FLEX 500H!

Mail Tester <[redacted]gmail.com>
[redacted]

This is a test mail sent from USG FLEX 500H

Set Up Email Daily Report

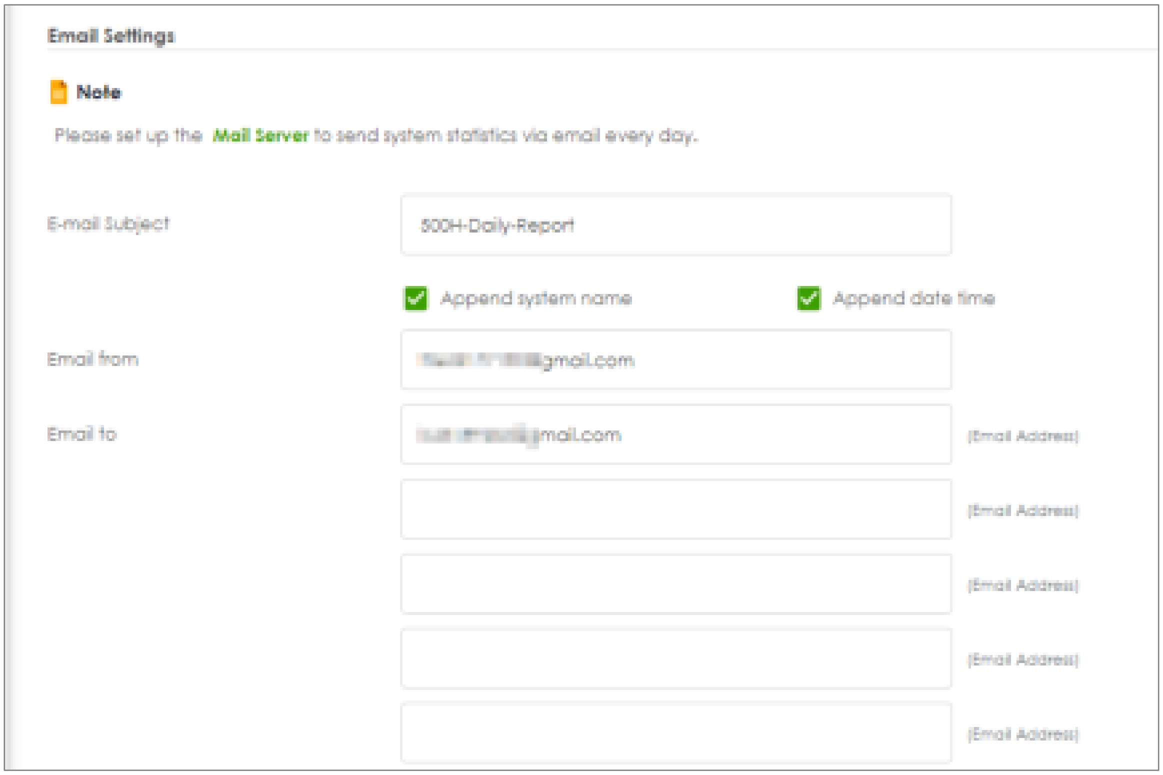
Navigate to Log & Report > Email Daily Report. Enable your Email Daily Report



General Settings

Enable Email Daily Report: ●

Type your Email Subject and your Sender and Receiver in the field.



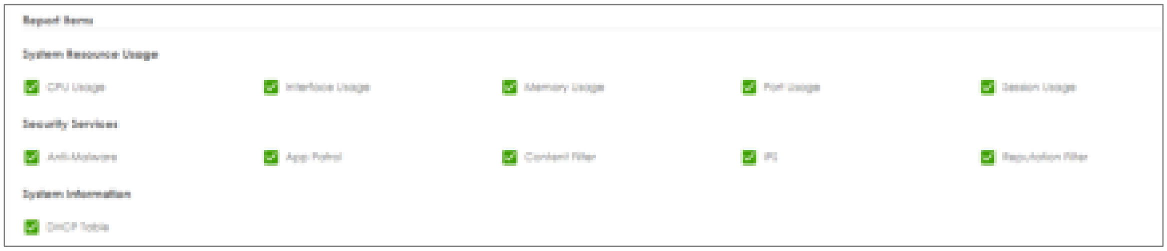
Email Settings

Note

Please set up the **Mail Server** to send system statistics via email every day.

E-mail Subject	500H-Daily-Report	
	☑ Append system name ☑ Append date time	
Email from	[redacted]gmail.com	
Email to	[redacted]mail.com	(Email Address)
		(Email Address)
		(Email Address)
		(Email Address)
		(Email Address)

Scroll down the page and go to Report Items to set up which messages you would like to include in the daily report



Report Items

System Resource Usage

☑ CPU Usage ☑ Interface Usage ☑ Memory Usage ☑ Port Usage ☑ Session Usage

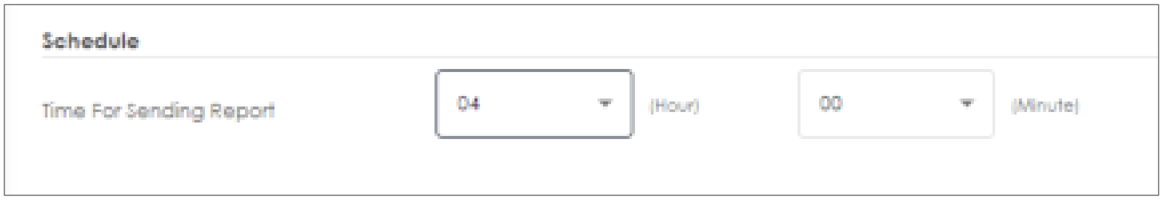
Security Services

☑ Anti-Malware ☑ App Patrol ☑ Content Filter ☑ IPS ☑ Reputation Filter

System Information

☑ DHCP Table

You can set up a Schedule at the bottom of the page

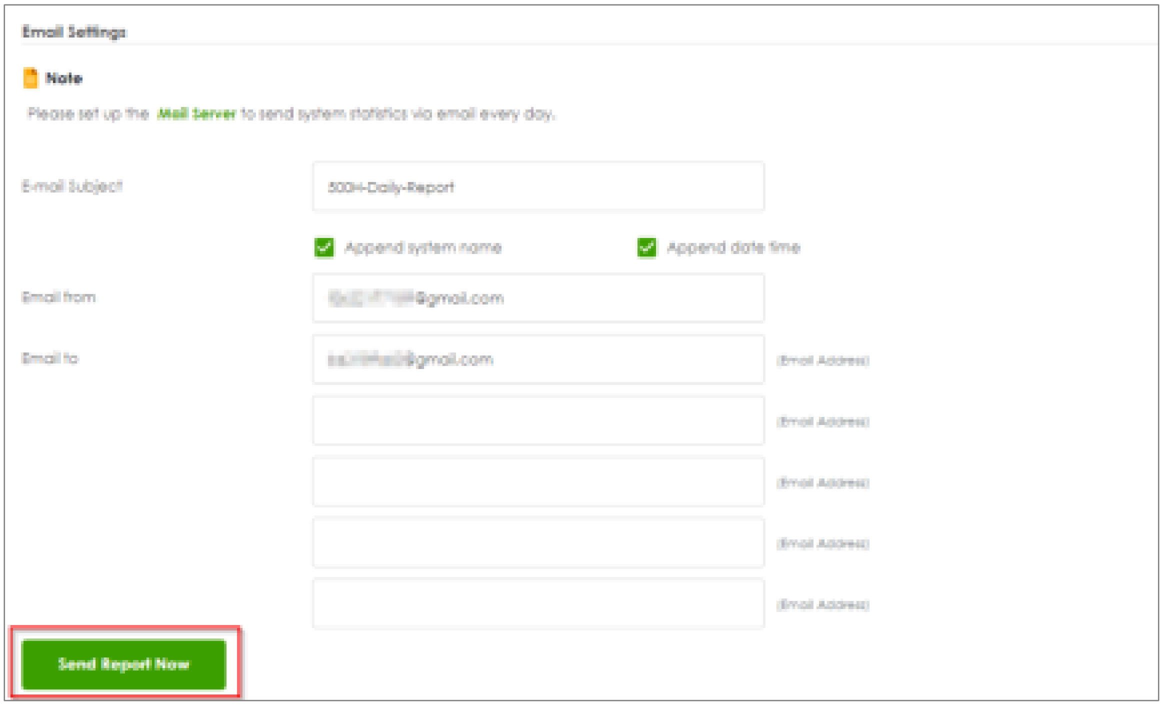


Schedule

Time For Sending Report 04 (Hour) 00 (Minute)

Test the Email Daily Report

To confirm if the daily report has been set up successfully, click "Send Report Now."



Email Settings

Note

Please set up the **Mail Server** to send system statistics via email every day.

E-mail Subject: 500H-Daily-Report

☑ Append system name ☑ Append date time

Email from: [redacted]@gmail.com

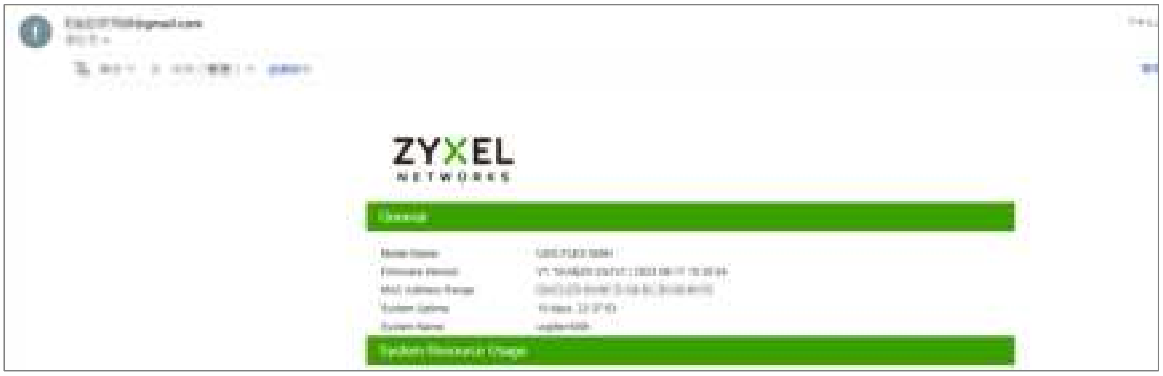
Email to: [redacted]@gmail.com (Email Address)

(Email Address)

(Email Address)

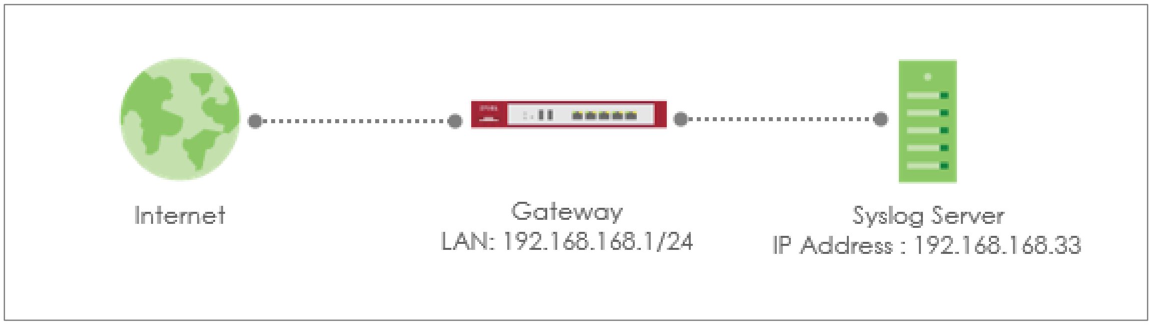
(Email Address)

(Email Address)



How to Setup and Send Logs to a Syslog Server

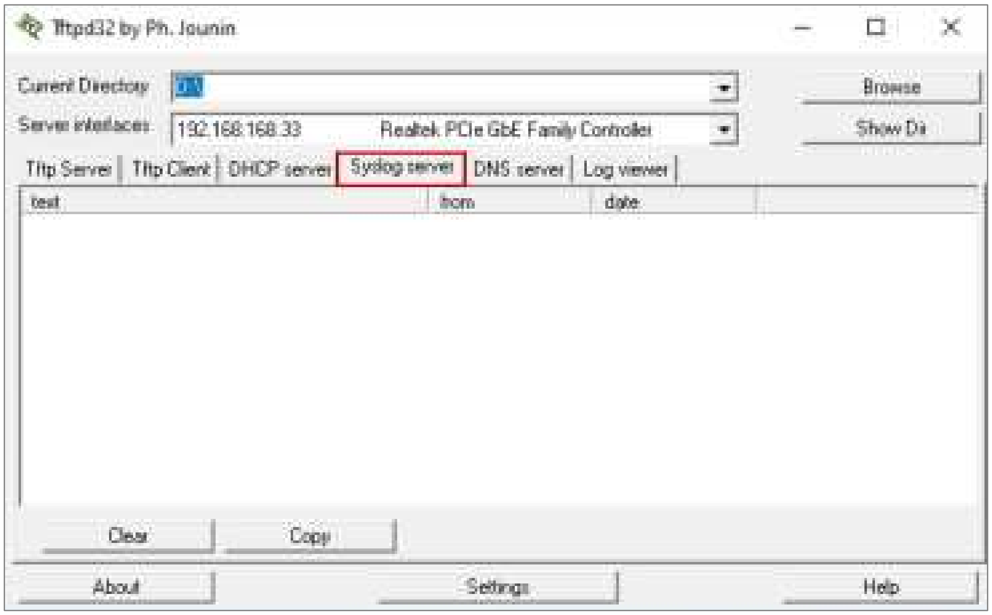
For management purposes, administrators can easily monitor events occurring on the gateway by reading the syslog. This example shows how to send logs to a syslog server. You can also specify which log messages to syslog server. When the syslog server is configured, you will receive the real time system logs.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Set Up the Syslog Server

Install the syslog server. In this example, we use tftpd32 as the syslog server.



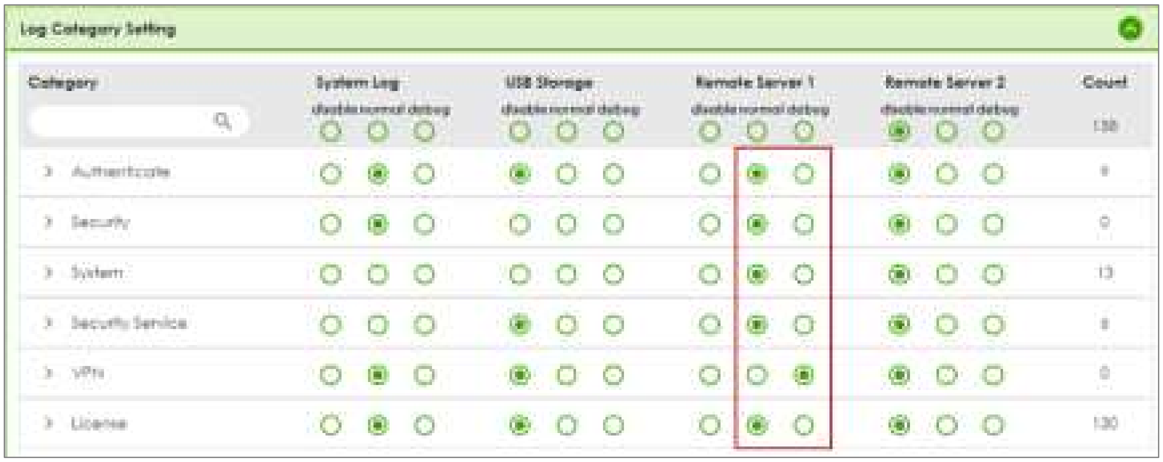
Tftpd32 by Ph. Jounin

Current Directory: D:\

Server interfaces: 192.168.168.33 Realtek PCIe GbE Family Controller

Set Up Remote Server Setting on the Gateway

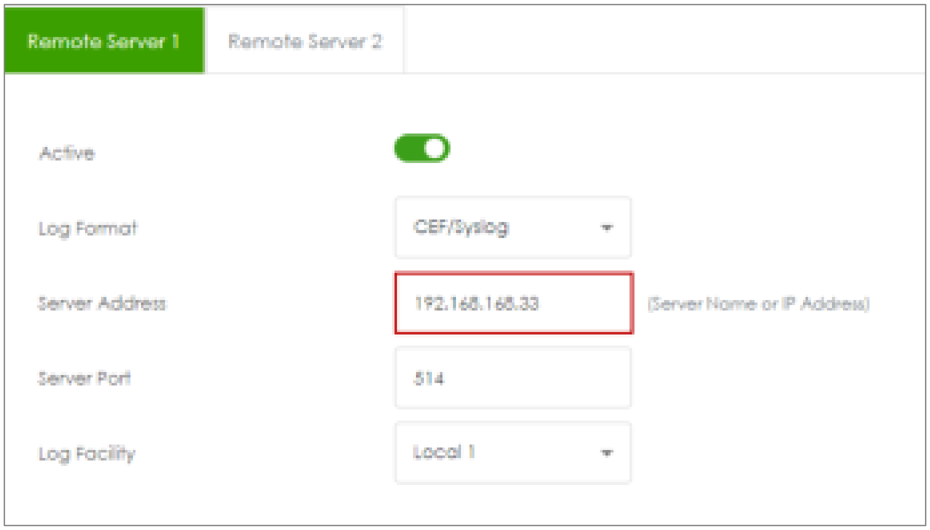
Go to Log & Report > Log Settings > Log Category Setting. Use the drop-down list to select what information you want to log from each log category.



Log Category Setting

Category	System Log			USB Storage			Remote Server 1			Remote Server 2			Count
	disable	normal	debug	disable	normal	debug	disable	normal	debug	disable	normal	debug	
	○	○	○	○	○	○	○	○	○	●	○	○	158
› Authenticate	○	●	○	●	○	○	○	●	○	●	○	○	8
› Security	○	●	○	○	○	○	○	●	○	●	○	○	0
› System	○	○	○	○	○	○	○	●	○	●	○	○	13
› Security Service	○	○	○	●	○	○	○	●	○	●	○	○	8
› VPN	○	●	○	●	○	○	○	○	●	●	○	○	0
› License	○	●	○	●	○	○	○	●	○	●	○	○	130

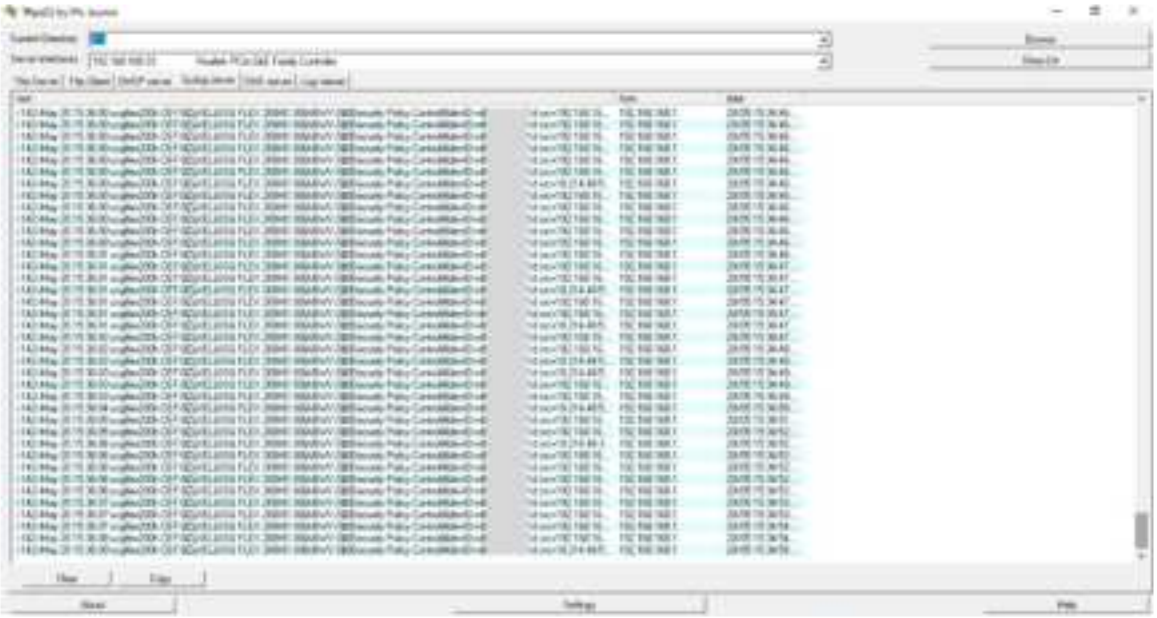
Go to Log & Report > Log Settings > Remote Syslog Server. Set Log Format to be CEF/Syslog and type the server name or the IP address of the syslog server. Turn on "Active" to send log information to the server.



Active	●
Log Format	CEF/Syslog
Server Address	192.168.168.33 (Server Name or IP Address)
Server Port	514
Log Facility	Local 1

Test the Remote Syslog Server

Check logs on the syslog server.



How to Setup and Send logs to the USB storage

The USG FLEX H Series device can use a connected USB device to store the system log and other diagnostic information. This example shows how to use the USB device to store the system log information.

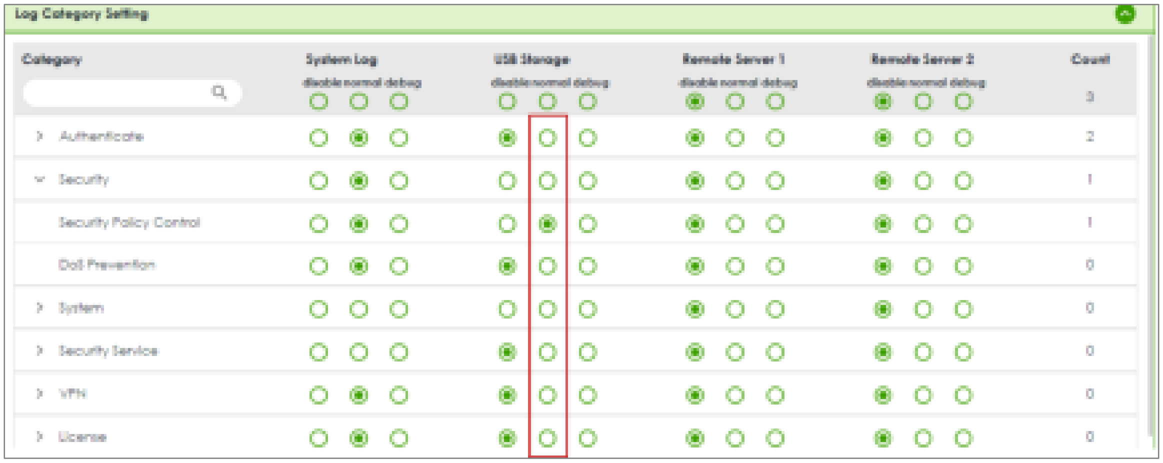
Note: The USB storage must allow writing (it cannot be read-only) and use the FAT16, FAT32, EXT2, or EXT3 file system. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10). The USB port can provide max. 900mA output power. You might need to connect external power for the USB storage device.

USB Storage device

Plug in an external USB storage device. USB storage devices with FAT16, FAT32, EXT2, or EXT3 file systems are supported to be connected to the USB port of the gateway.

Set Up the USB storage on the Gateway

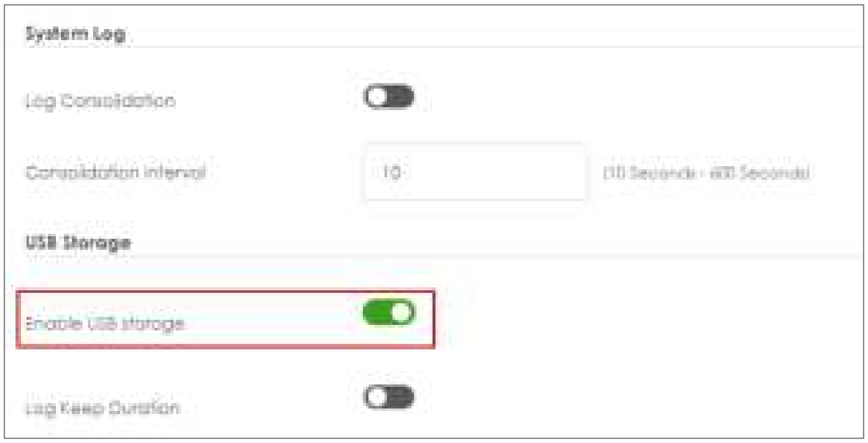
Go to Log & Report > Log Settings > Log Category Setting. Use the drop-down list to select what information you want to log from each log category.



Log Category Setting

Category	System Log			USB Storage			Remote Server 1			Remote Server 2			Count
	disable	normal	debug	disable	normal	debug	disable	normal	debug	disable	normal	debug	
	○	○	○	○	○	○	●	○	○	●	○	○	3
› Authenticate	○	●	○	●	○	○	●	○	○	●	○	○	2
⌄ Security	○	●	○	○	○	○	●	○	○	●	○	○	1
Security Policy Control	○	●	○	○	●	○	●	○	○	●	○	○	1
DoS Prevention	○	●	○	●	○	○	●	○	○	●	○	○	0
› System	○	○	○	○	○	○	●	○	○	●	○	○	0
› Security Service	○	○	○	●	○	○	●	○	○	●	○	○	0
› VPN	○	●	○	●	○	○	●	○	○	●	○	○	0
› License	○	●	○	●	○	○	●	○	○	●	○	○	0

Go to Log & Report > Log Settings > USB Storage. Turn on “Enable USB storage” to store the system logs on a USB device.



System Log

Log Consolidation: Off

Consolidation Interval: 10 (10 Seconds - 600 Seconds)

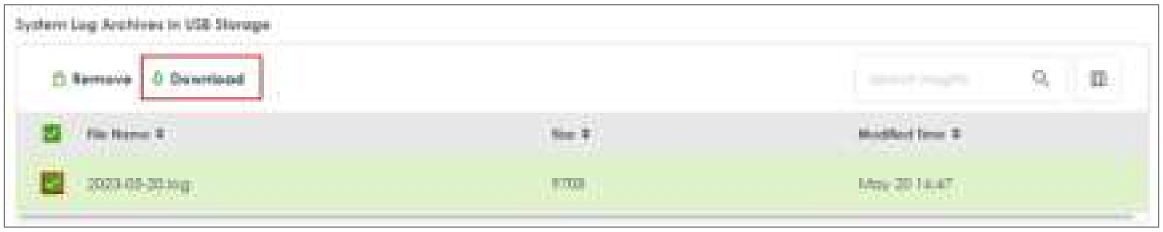
USB Storage

Enable USB storage: On

Log Keep Duration: Off

Check the USG Log Files

Go to Maintenance > Diagnostics > System Log. Select a file and click “Download” to view the log.

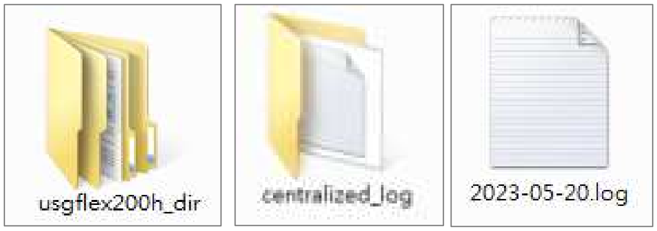


System Log Archives in USB Storage

Remove | Download

☑	File Name	Size	Modified Time
☑	2023-05-20.log	9708	May 20 14:47

You can also connect the USB storage to PC and find the files in the following path.
\Model Name_dir\centralized_log\YYYY-MM-DD.log



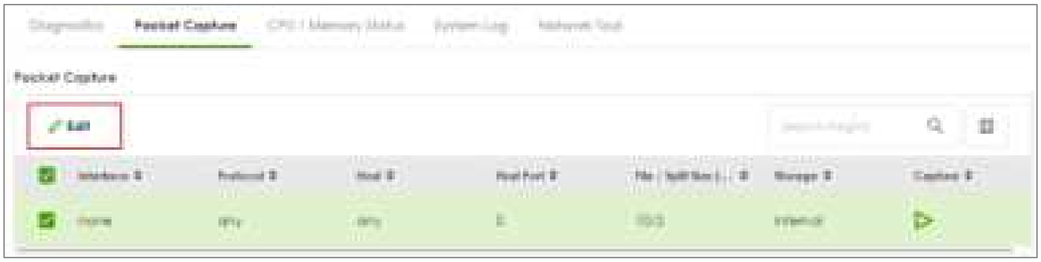
How to Perform and Use the Packet Capture Feature

This example shows how to use the Packet Capture feature to capture network traffic going through the device's interfaces. Studying these packet captures may help you analyze network problems.

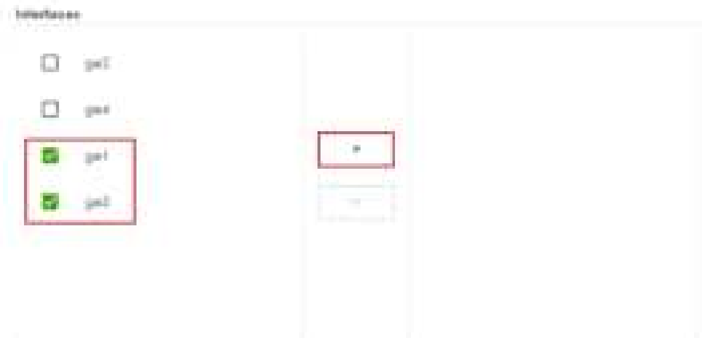
> Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.10).

Set Up the Packet Capture Feature

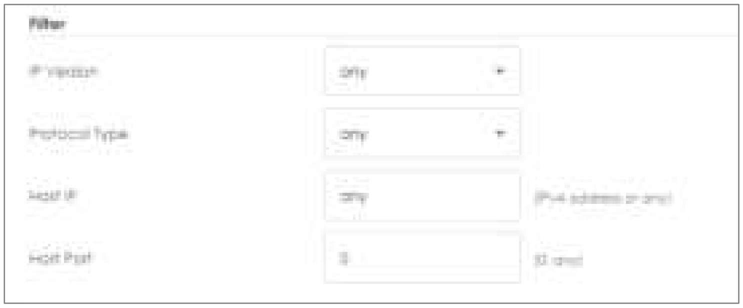
5. Go to Maintenance > Diagnostics > Packet Capture. Select "none" and click "Edit".



6. In Interfaces, select interfaces for which to capture packets and click the right arrow button to move them to the list.



7. In Filter, select IP Version for which to capture packets. Select any to capture packets for all IP versions.
   Select the Protocol Type of traffic for which to capture packets. Select any to capture packets for all types of traffic.
   Select a Host IP address object for which to capture packets. Select any to capture packets for all hosts. Select User Defined to be able to enter an IP address.



Filter

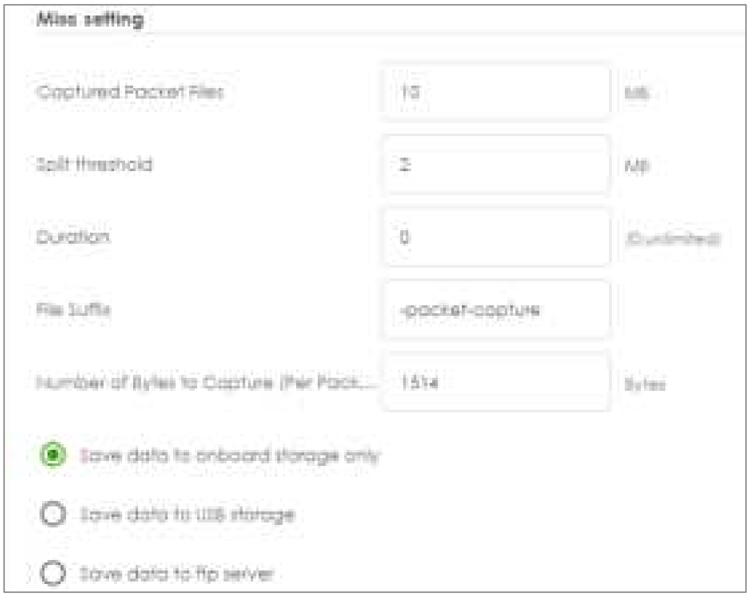
IP Version: any

Protocol Type: any

Host IP: any (IPv4 address or any)

Host Port: 0 (0: any)

8. In Misc setting, select "Save data to onboard storage only", "Save data to USB storage" or "Save data to ftp server".



Misc setting

Captured Packet Files: 10 MB

Split threshold: 2 MB

Duration: 0 (0:unlimited)

File Suffix: -packet-capture

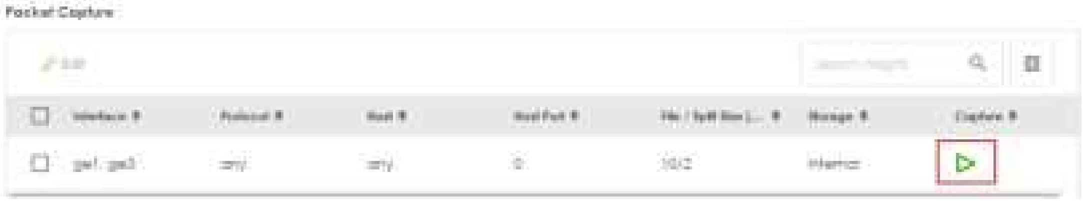
Number of Bytes to Capture (Per Pack...: 1514 Bytes

● Save data to onboard storage only

○ Save data to USB storage

○ Save data to ftp server

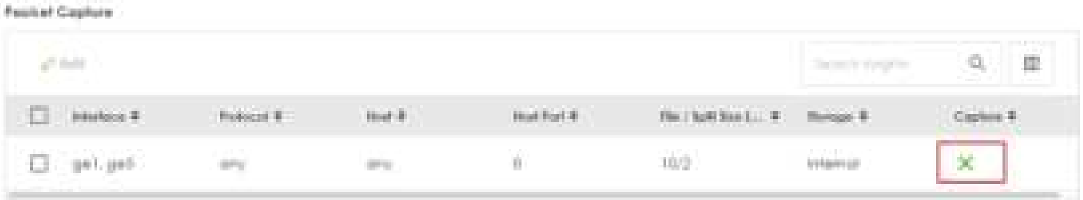
9. Click the icon to start capturing packets.



Packet Capture

☐	Interface	Protocol	Host	Host Port	File / Split Size (...	Storage	Capture
☐	ge1, ge3	any	any	0	10/2	internal	▷

10. Click the icon to stop capturing packets.

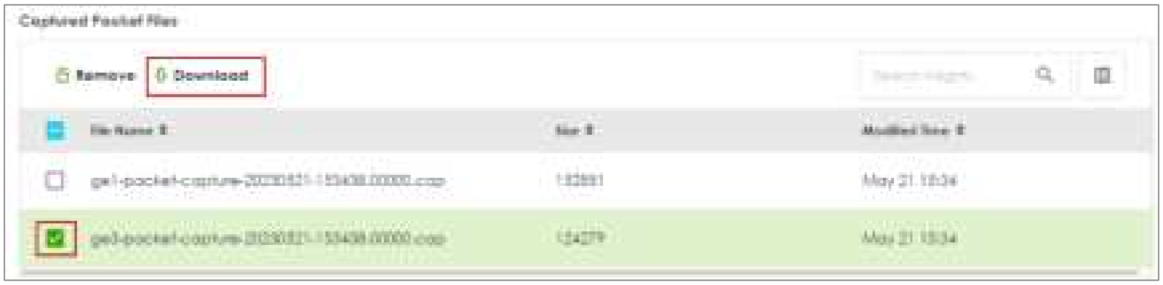


Packet Capture

☐	Interface	Protocol	Host	Host Port	File / Split Size (...	Storage	Capture
☐	ge1, ge3	any	any	0	10/2	internal	✕

Download the Captured Packet Files

In Captured Packet Files, select the file and click Download. You can download one file only at once. The captured files are named according to the date and time of capture, so new files will not overwrite existing ones.



Captured Packet Files

☐	File Name	Size	Modified Time
☐	ge1-packet-capture-20230521-153438.00000.cap	132881	May 21 15:34
☑	ge3-packet-capture-20230521-153438.00000.cap	124279	May 21 15:34

Check Real-Time traffic using command

Traffic-capture is a CLI-based packet capturing tool on the device. It can be used to sniffer and analyze network traffic by intercepting and displaying packets transmitted in the network interface.

Syntax:

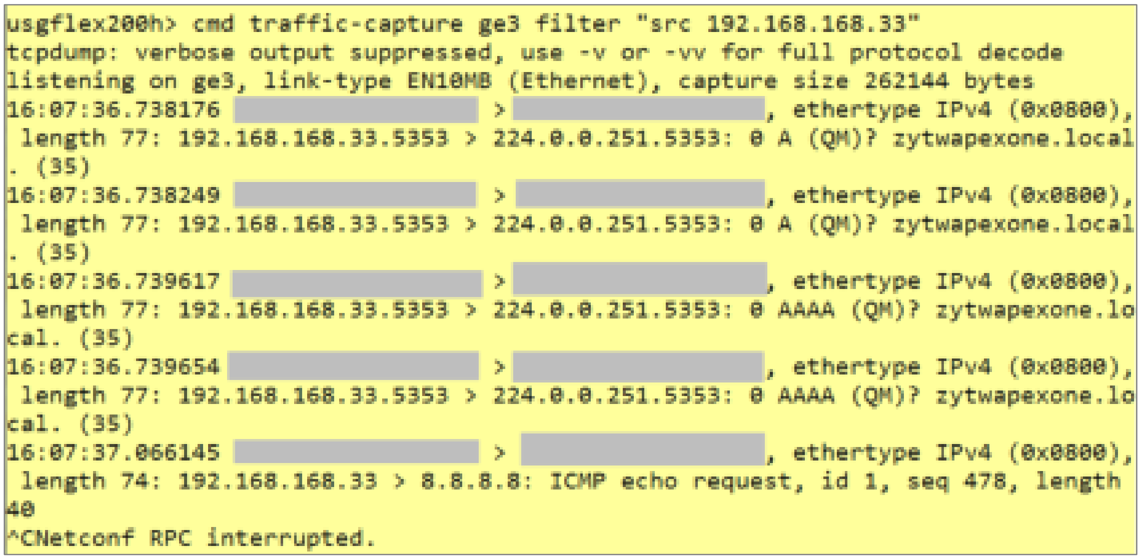
cmd traffic-capture <interface name>

cmd traffic-capture <interface name> filter <icmp|tcp|udp|arp|esp>

cmd traffic-capture <interface name> filter “src <ip address>”

cmd traffic-capture <interface name> filter “port <port number>”

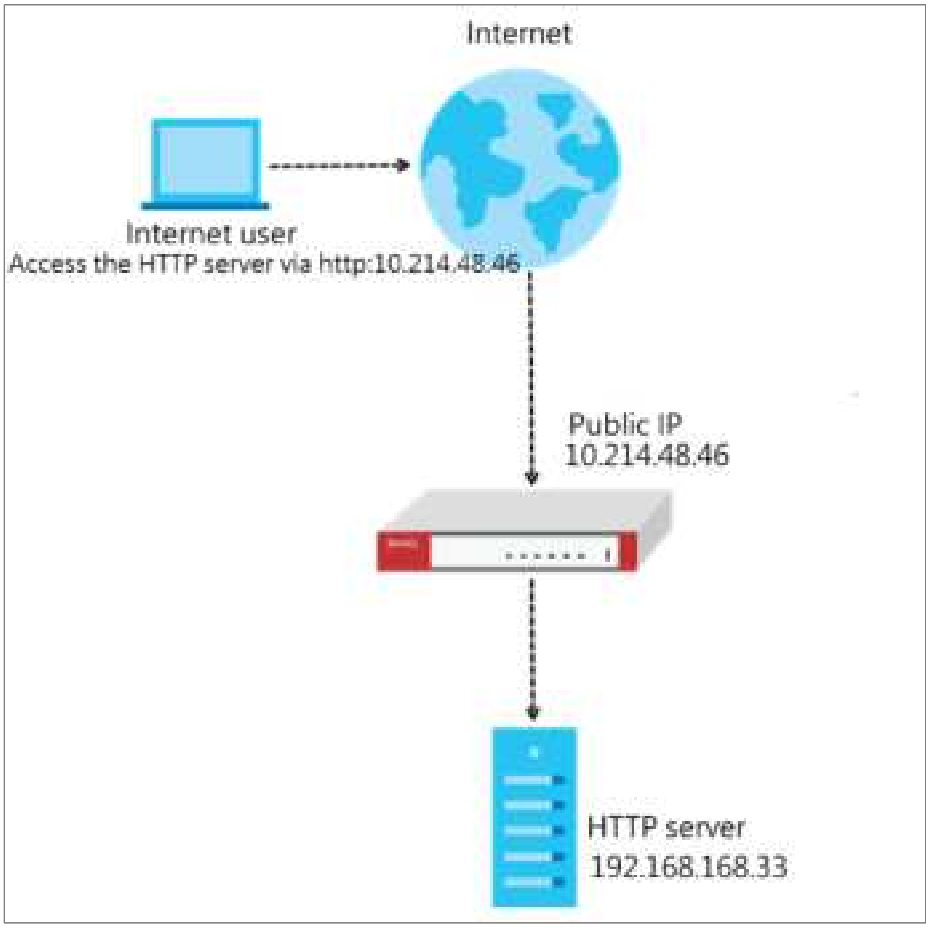
cmd traffic-capture <interface name> filter “host <ip address> and port <port number>”



```
usgflex200h> cmd traffic-capture ge3 filter "src 192.168.168.33"
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on ge3, link-type EN10MB (Ethernet), capture size 262144 bytes
16:07:36.738176 [redacted] > [redacted], ethertype IPv4 (0x0800),
 length 77: 192.168.168.33.5353 > 224.0.0.251.5353: 0 A (QM)? zytwapexone.local
. (35)
16:07:36.738249 [redacted] > [redacted], ethertype IPv4 (0x0800),
 length 77: 192.168.168.33.5353 > 224.0.0.251.5353: 0 A (QM)? zytwapexone.local
. (35)
16:07:36.739617 [redacted] > [redacted], ethertype IPv4 (0x0800),
 length 77: 192.168.168.33.5353 > 224.0.0.251.5353: 0 AAAA (QM)? zytwapexone.lo
cal. (35)
16:07:36.739654 [redacted] > [redacted], ethertype IPv4 (0x0800),
 length 77: 192.168.168.33.5353 > 224.0.0.251.5353: 0 AAAA (QM)? zytwapexone.lo
cal. (35)
16:07:37.066145 [redacted] > [redacted], ethertype IPv4 (0x0800),
 length 74: 192.168.168.33 > 8.8.8.8: ICMP echo request, id 1, seq 478, length
40
^CNetconf RPC interrupted.
```

How to Allow Public Access to a Server Behind USG FLEX H

Here is an example of allowing access to the internal server behind a USG FLEX H device with network address translation (NAT). Internet users can access the server directly by its public IP address and a NAT rule will forward traffic from the internet to the local server in the intranet.



Set Up the NAT

Go to Network > NAT, and click +Add to create a NAT rule.

- Input the rule name

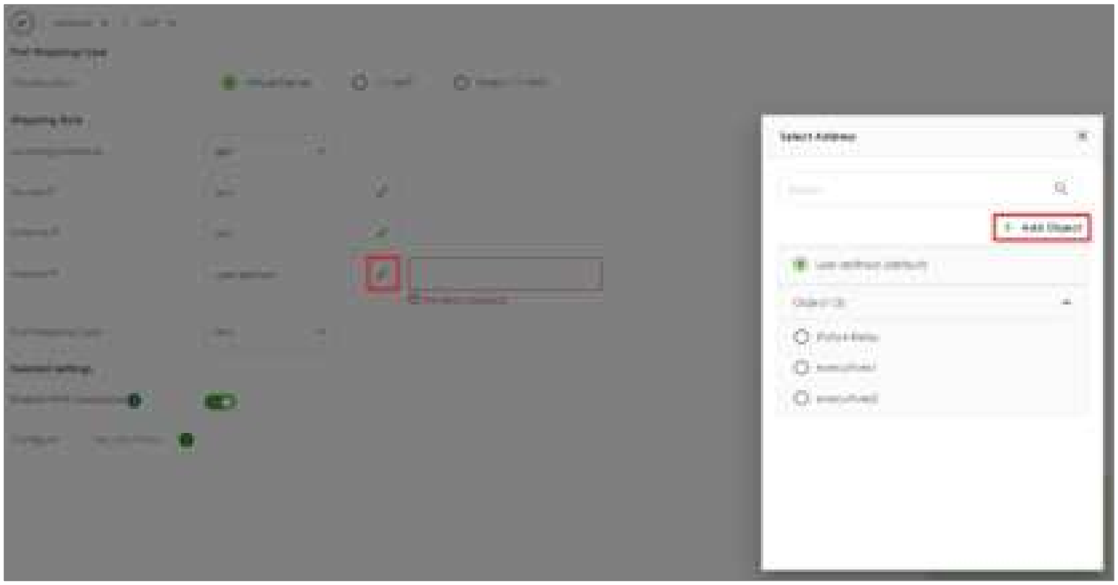
- select Virtual Server

- Incoming Interface: ge1

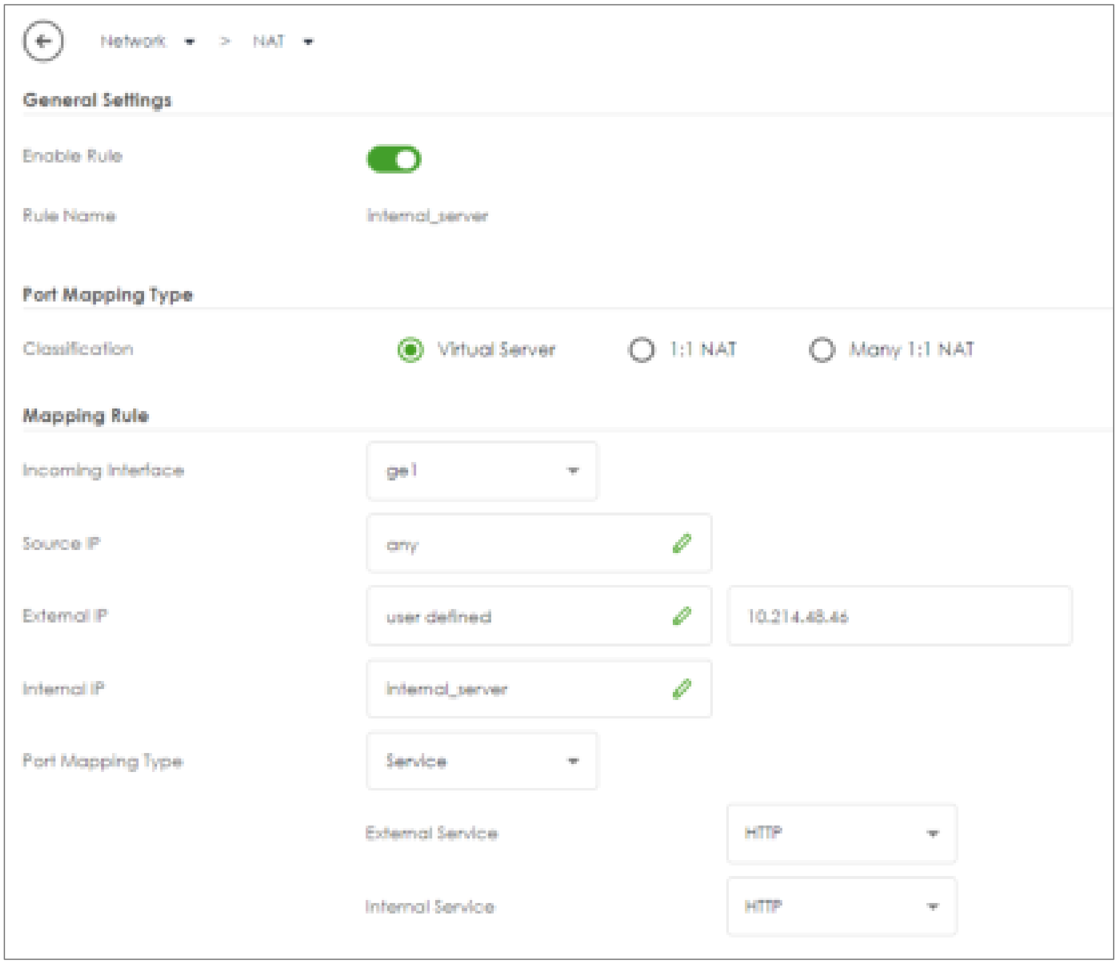
- Configure the Source IP to limit the access by the Source IP. You may select Any

- Configure the External IP. Select Any to choose the ge1 interface IP as the external IP.

- Configure the internal IP. Click +Add Object to create an address object as a host 192.168.168.33 which is the IP address of the internal server.



- Port Mapping Type: Select HTTP for both external and internal service.



General Settings

Enable Rule

Rule Name: internal_server

Port Mapping Type

Classification: ● Virtual Server ○ 1:1 NAT ○ Many 1:1 NAT

Mapping Rule

Incoming Interface: ge1

Source IP: any

External IP: user defined 10.214.48.46

Internal IP: internal_server

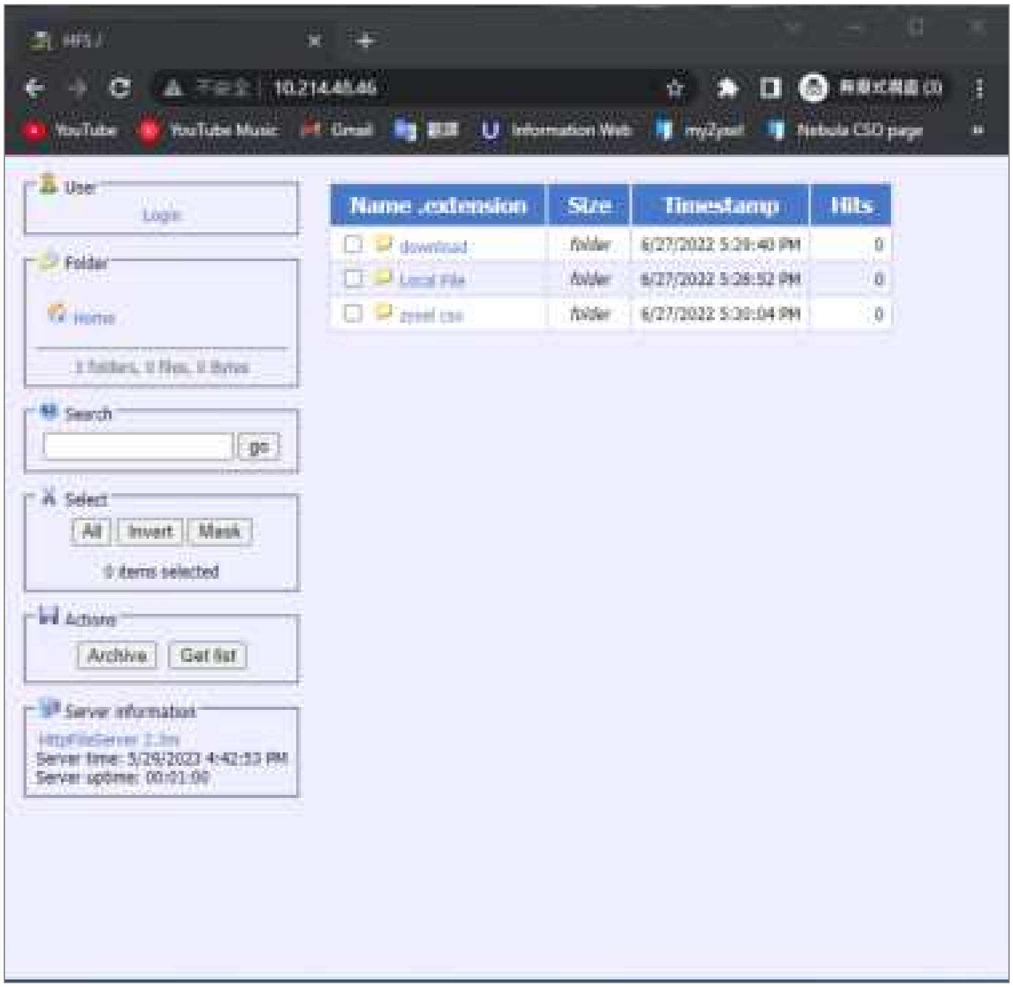
Port Mapping Type: Service

External Service: HTTP

Internal Service: HTTP

Test the Result

Type http://10.214.48.46 into the browser, and it display the HTTP service page.



3 folders, 0 files, 0 bytes

0 items selected

HttpFileServer 2.3m
Server time: 5/29/2023 4:42:53 PM
Server uptime: 00:01:00

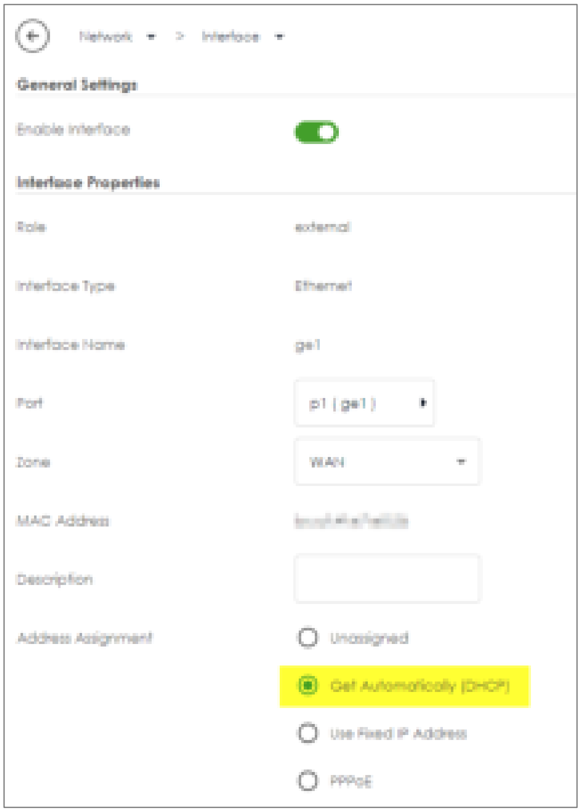
Name .extension	Size	Timestamp	Hits
□ download	folder	6/27/2022 5:29:40 PM	0
□ Local File	folder	6/27/2022 5:28:52 PM	0
□ zyxel cso	folder	6/27/2022 5:30:04 PM	0

How to Configure DHCP Option 60 – Vendor Class Identifier

USG FLEX H series supports DHCP option 60. By VCI string matching, a DHCP client can select a specific DHCP server within the WAN network. This feature proves beneficial in network environments where multiple DHCP servers offer services. Clients that need Internet service can be directed to the DHCP server that provides corresponding Internet connection details via the identical option 60 string. On the other hand, IPTV clients can relay to another DHCP server for obtaining IPTV service information.

Set Up DHCP 60 on the USG FLEX H

1. Go to Network > Interface > External, and edit the WAN interface.
2. Make sure the WAN interface is set as a DHCP client. Select **Get Automatically (DHCP)** for Address Assignment.



Network > Interface

General Settings

Enable Interface: on

Interface Properties

Role: external

Interface Type: Ethernet

Interface Name: ge1

Port: p1 (ge1)

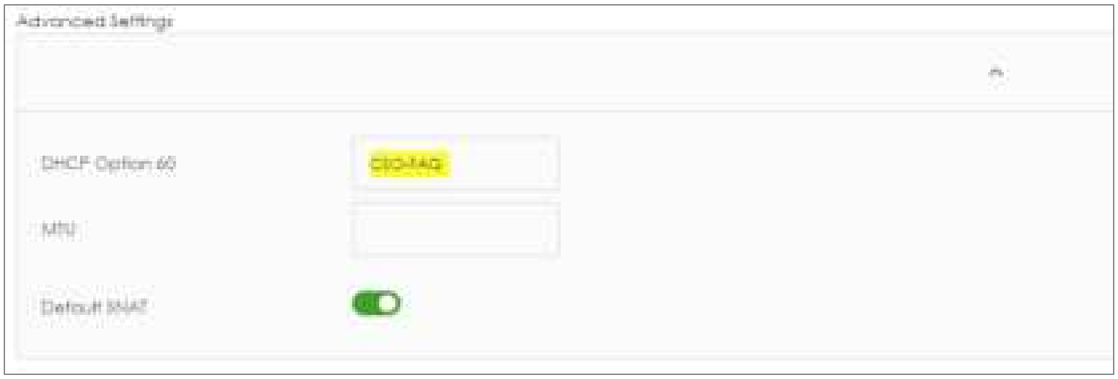
Zone: WAN

MAC Address: [redacted]

Description:

Address Assignment:
○ Unassigned
● Get Automatically (DHCP)
○ Use Fixed IP Address
○ PPPoE

3. Scroll down and expand the Advanced Settings: DHCP Option 60
4. Enter the VCI string in the field of DHCP Option 60, and click **Apply**



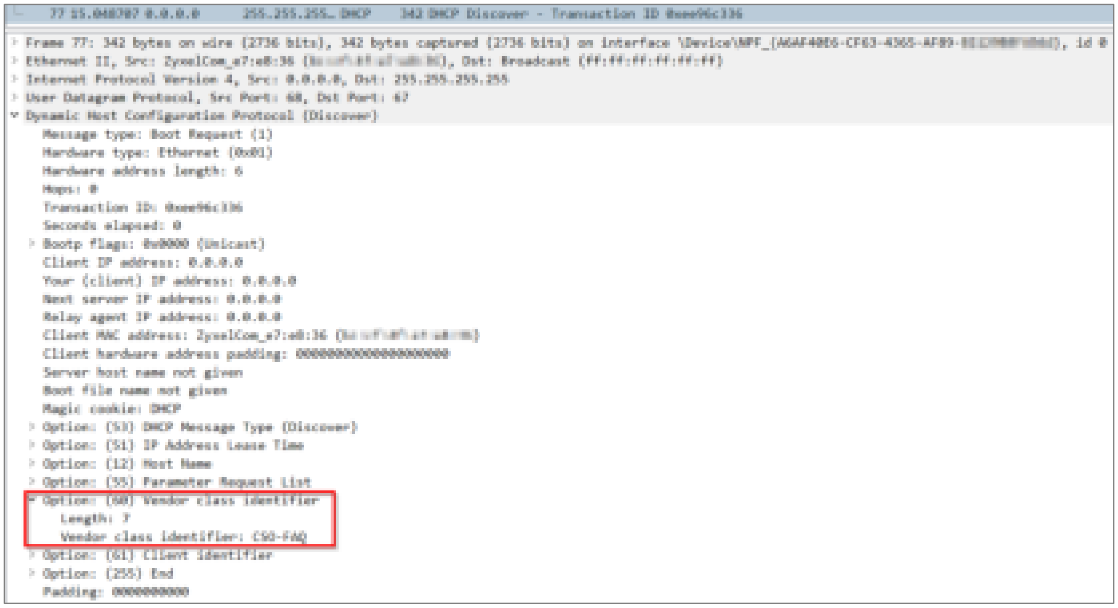
DHCP Option 60: CSO-FAQ

MTU:

Default SNAT: ●

Test DHCP Option 60

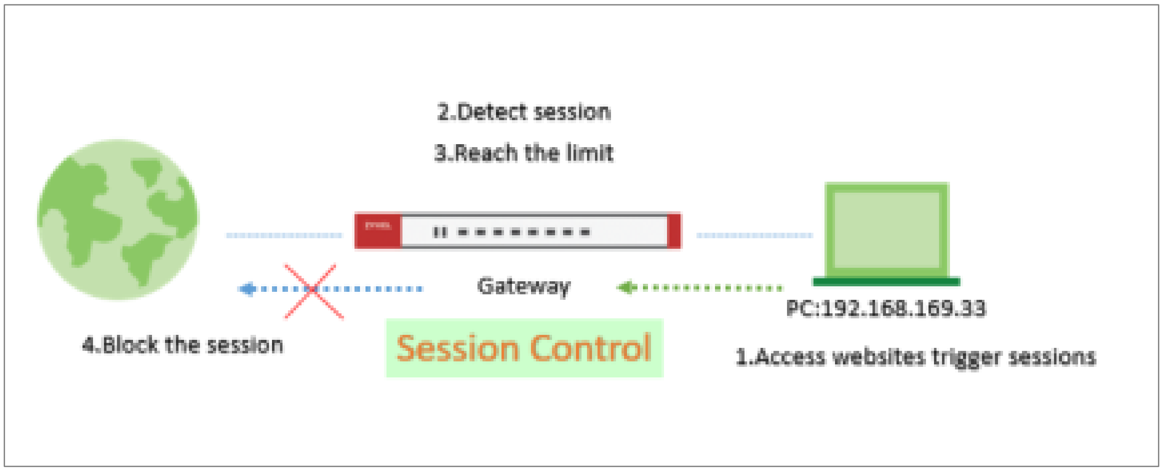
To check the functionality of DHCP Option 60, we can use packet capture software to check if option 60 string exists in the DHCP discover message that is sent from the USG FLEX H.



```
     77 15.048707 0.0.0.0       255.255.255.255 DHCP    342 DHCP Discover - Transaction ID 0xee96c336
> Frame 77: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface \Device\NPF_{A6AF40E6-CF63-4365-AF89-[redacted]}, id 0
> Ethernet II, Src: ZyxelCom_e7:e8:36 ([redacted]), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
v Dynamic Host Configuration Protocol (Discover)
    Message type: Boot Request (1)
    Hardware type: Ethernet (0x01)
    Hardware address length: 6
    Hops: 0
    Transaction ID: 0xee96c336
    Seconds elapsed: 0
  > Bootp flags: 0x0000 (Unicast)
    Client IP address: 0.0.0.0
    Your (client) IP address: 0.0.0.0
    Next server IP address: 0.0.0.0
    Relay agent IP address: 0.0.0.0
    Client MAC address: ZyxelCom_e7:e8:36 ([redacted])
    Client hardware address padding: 00000000000000000000
    Server host name not given
    Boot file name not given
    Magic cookie: DHCP
  > Option: (53) DHCP Message Type (Discover)
  > Option: (51) IP Address Lease Time
  > Option: (12) Host Name
  > Option: (55) Parameter Request List
  v Option: (60) Vendor class identifier
      Length: 7
      Vendor class identifier: CSO-FAQ
  > Option: (61) Client identifier
  > Option: (255) End
    Padding: 0000000000
```

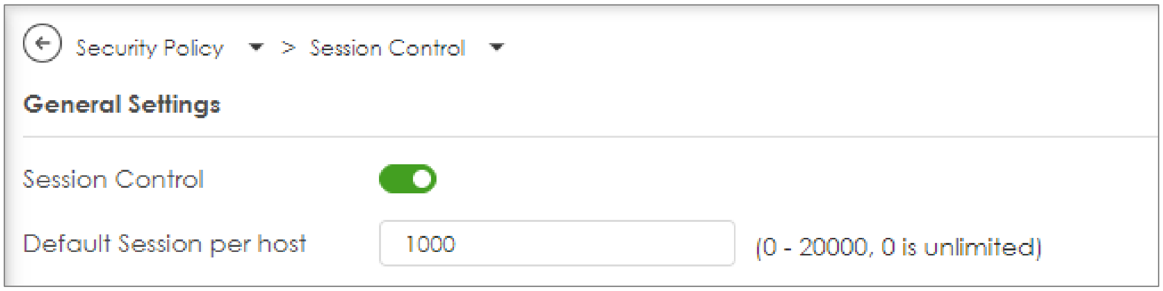
How to Configure Session Control

Session control can address abnormal user behavior. By monitoring session activities, the firewall can detect deviations from normal usage, such as sudden traffic spikes or unauthorized access attempts. This proactive approach enables prompt action to be taken to investigate and mitigate potential security threats .



Set Up the Session Control

Go to Security Policy > Session Control. Turn on this feature.

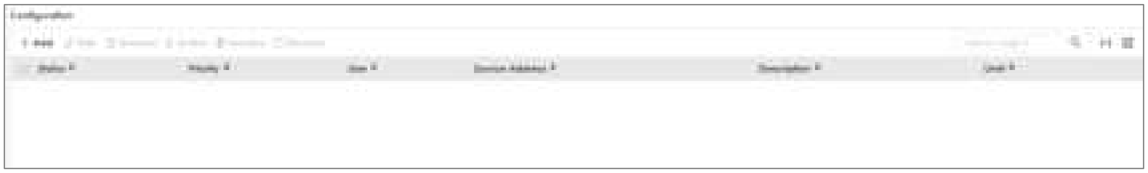


Session Control: On

Default Session per host: 1000 (0 - 20000, 0 is unlimited)

You can field in the value of the Session per hosts you would like to limit.

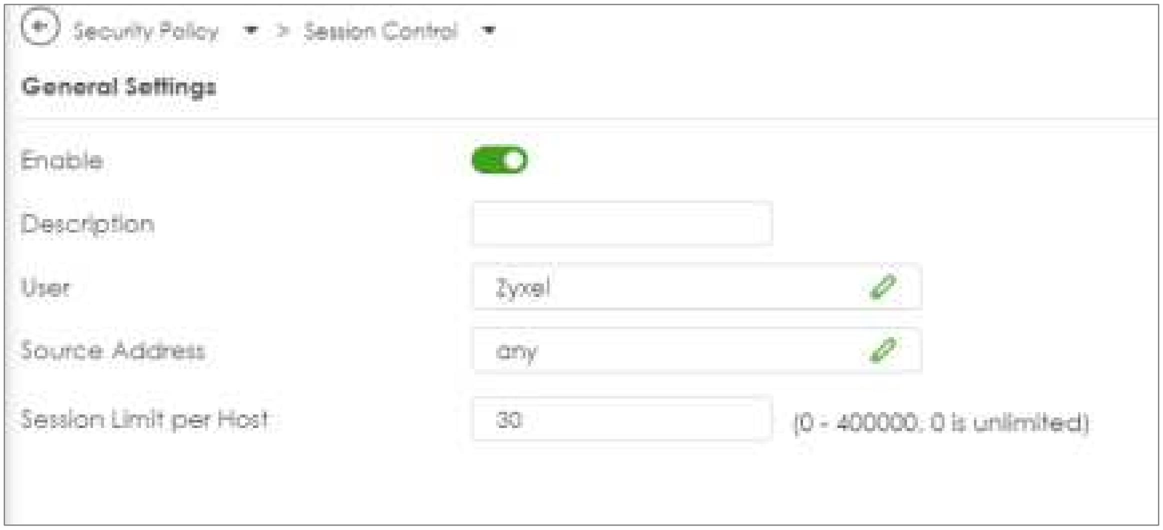
The field here is for the client who is not in the rule under the list



Status	Priority	User	Source Address	Description	Limit

To limit a user’s session. You can set up specific rules for each user

Click Add >Select one of the user and field in the Session limit for the user and click save.



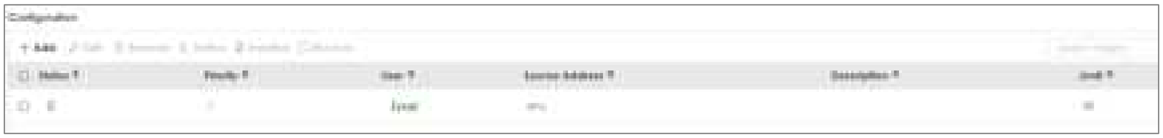
Enable: On

Description:

User: Zyxel

Source Address: any

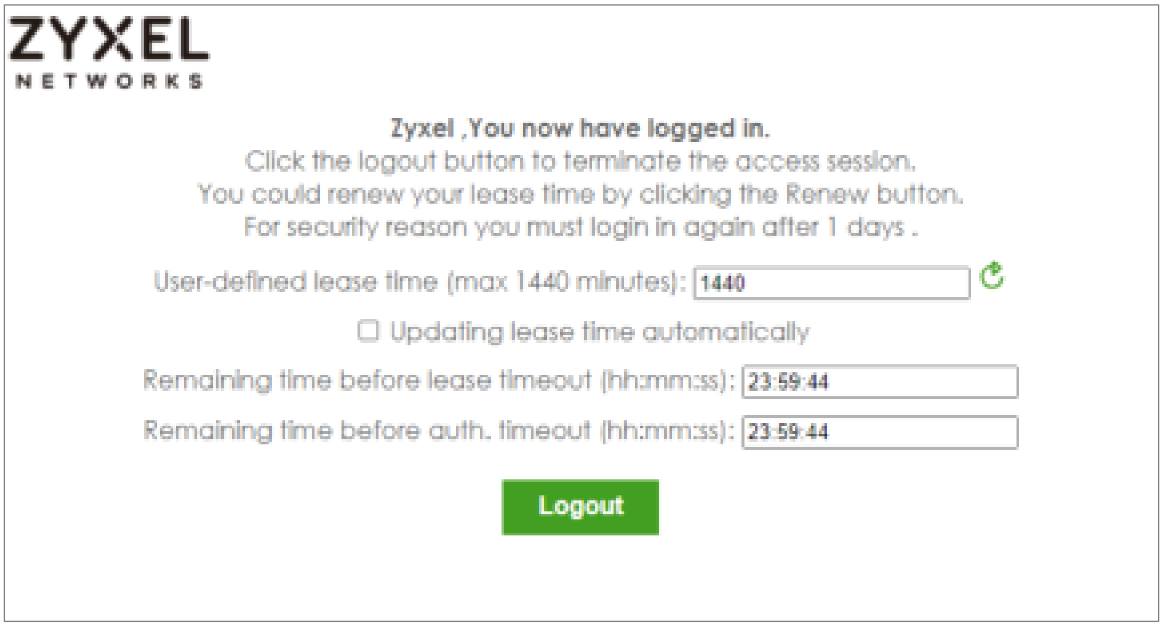
Session Limit per Host: 30 (0 - 400000, 0 is unlimited)



Status	Priority	User	Source Address	Description	Limit
	[illegible]	Zyxel	any		30

Test the Result

Log in as User: Zyxel



Zyxel ,You now have logged in.

Click the logout button to terminate the access session.

You could renew your lease time by clicking the Renew button.

For security reason you must login in again after 1 days .

User-defined lease time (max 1440 minutes): 1440

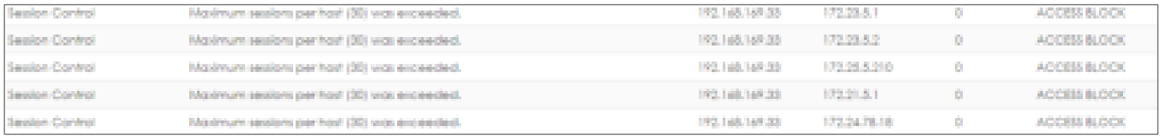
□ Updating lease time automatically

Remaining time before lease timeout (hh:mm:ss): 23:59:44

Remaining time before auth. timeout (hh:mm:ss): 23:59:44

Try to access web browser to hit the session limit

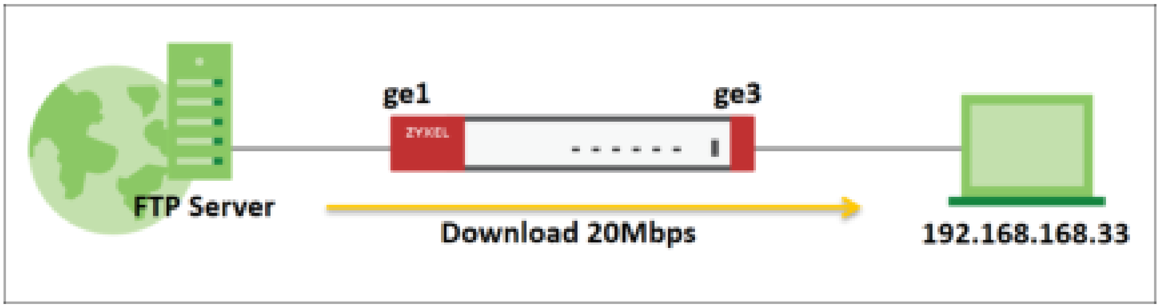
Go to Log & Report > Log/Events and select Session Control to check the logs.



```
Session Control    Maximum sessions per host (30) was exceeded.    192.168.169.33    172.23.5.1      0    ACCESS BLOCK
Session Control    Maximum sessions per host (30) was exceeded.    192.168.169.33    172.23.5.2      0    ACCESS BLOCK
Session Control    Maximum sessions per host (30) was exceeded.    192.168.169.33    172.25.5.210    0    ACCESS BLOCK
Session Control    Maximum sessions per host (30) was exceeded.    192.168.169.33    172.21.5.1      0    ACCESS BLOCK
Session Control    Maximum sessions per host (30) was exceeded.    192.168.169.33    172.24.78.18    0    ACCESS BLOCK
```

How to Configure Bandwidth Management for FTP Traffic

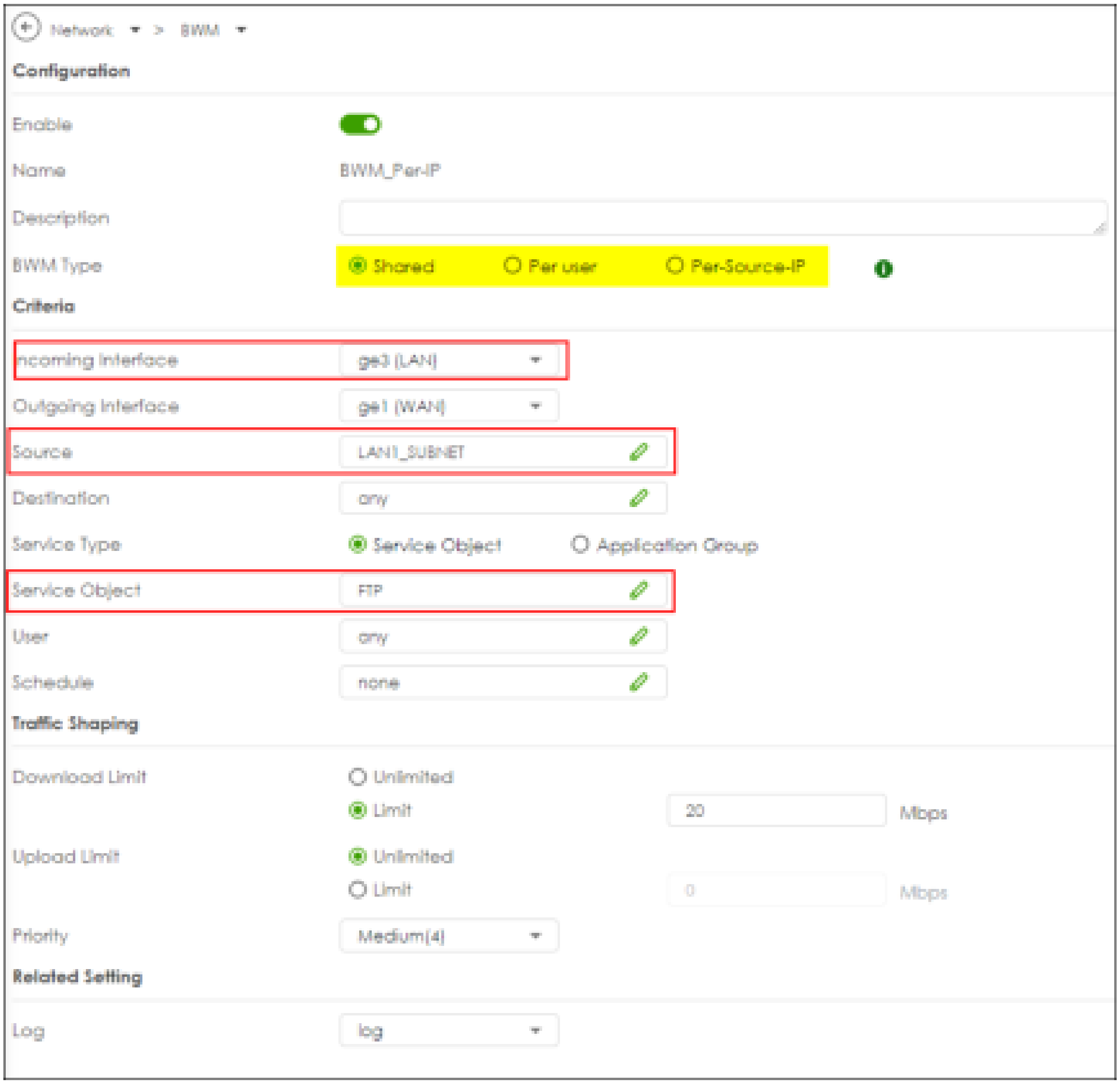
This example illustrates how to use USG Bandwidth Management (BWM) for controlling FTP traffic bandwidth allocation. By specifying criteria such as incoming interface, outgoing interface, source address, destination address, service objects, application group, and user, you can create a sequence of conditions to allocate bandwidth for packets that match these criteria. Once BWM is set up, it allows you to limit bandwidth for high-consumption services like FTP, ensuring bandwidth guarantees. This is a practical example of implementing BWM for FTP traffic with a USG device.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. The total available bandwidth assumption is 5Mbps. This example was tested using USG FLEX 500H

Set Up the BWM rule for FTP download

Go to Network > BWM scan. Click on “Add” button to create a new BWM rule.



Network > BWM

Configuration

Enable	●
Name	BWM_Per-IP
Description	
BWM Type	● Shared ○ Per user ○ Per-Source-IP

Criteria

ncoming Interface	ge3 (LAN)
Outgoing Interface	ge1 (WAN)
Source	LAN1_SUBNET
Destination	any
Service Type	● Service Object ○ Application Group
Service Object	FTP
User	any
Schedule	none

Traffic Shaping

Download Limit	○ Unlimited	
	● Limit	20 Mbps
Upload Limit	● Unlimited	
	○ Limit	0 Mbps
Priority	Medium(4)	

Related Setting

Log	log

Incoming Interface: ge3

Outgoing Interface: ge1

Source: LAN1 IP Subnet

Application Group: FTP

Traffic Shaping: Download Limit 20 Mbps.

> Note: The terms "incoming interface" and "destination interface" indicate the direction of traffic that the client initiates during a session. The term "Source IP information" denotes the initial IP address. Furthermore, the Application Group function identifies client traffic types based not only on the service port but on other criteria as well.

Different Scenarios:

(1) Shared

If you select the "Shared" setting in the BWM rule, the selected IP addresses will share the configured bandwidth.

e.g. Limit the maximum FTP download bandwidth to 20 Mbps for whole of LAN1 PCs.

(2) Per User

If you select the "Per User" setting in the BWM rule, each user will have a limited bandwidth.

e.g. Limit the maximum FTP download bandwidth to 20 Mbps for each user.

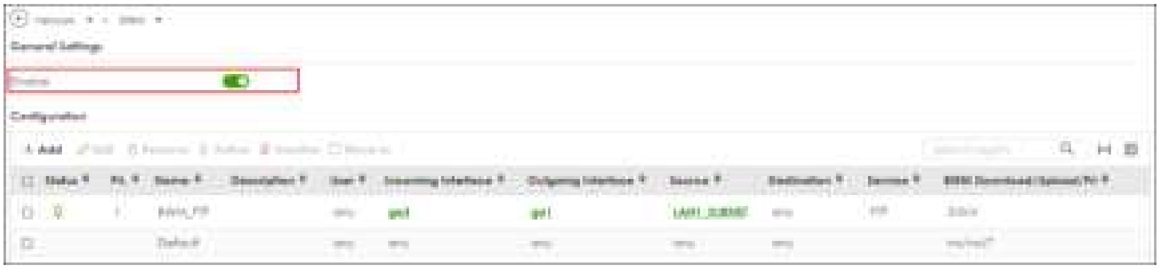
(3) Per-Source-IP

If you select the "Per-Source-IP" setting in the BWM rule, each selected IP address will have a limited bandwidth.

e.g. Limit the FTP download bandwidth for each LAN1 PC to 20 Mbps.

> Note: If you select the "Per User" option or configure "User" as a condition, the Captive Portal service must be enabled, and the PC must be authenticated by the firewall first.

Turn on this feature. It will enable BWM function to allowing the rules to be effectively applied.



General Settings

Enable

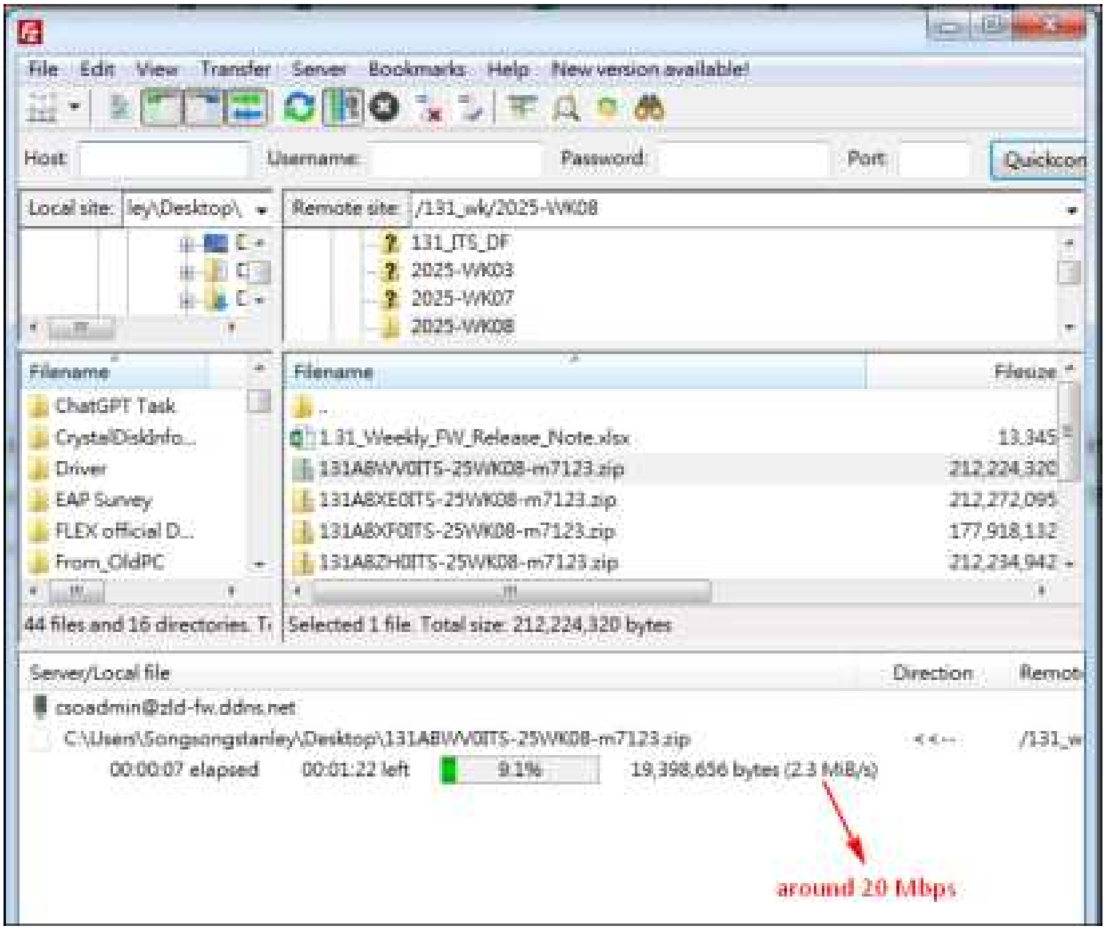
Configuration

+ Add Edit Remove Active Inactive Move to

□	Status	Pri.	Name	Description	User	Incoming Interface	Outgoing Interface	Source	Destination	Service	BWM Download/Upload/Pri
□	💡	1	BWM_FTP		any	ge3	ge1	LAN1_SUBNET	any	FTP	[illegible]
□			Default		any	any	any	any	any		no/no/[illegible]

Test the Result

The PC connect to LAN1 and download file by FTP. the download speed is around 20 Mbps.



File Edit View Transfer Server Bookmarks Help New version available!
Host: Username: Password: Port: Quickcon

Local site: ley\Desktop\

Remote site: /131_wk/2025-WK08

- 131_ITS_DF
- 2025-WK03
- 2025-WK07
- 2025-WK08

Filename
ChatGPT Task
CrystalDiskInfo...
Driver
EAP Survey
FLEX official D...
From_OldPC

Filename	Filesize
..	
1.31_Weekly_FW_Release_Note.xlsx	13,345
131ABWV0ITS-25WK08-m7123.zip	212,224,320
131ABXE0ITS-25WK08-m7123.zip	212,272,095
131ABXF0ITS-25WK08-m7123.zip	177,918,132
131ABZH0ITS-25WK08-m7123.zip	212,234,942

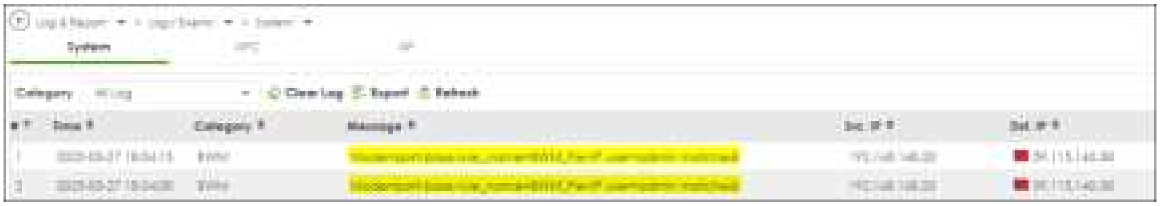
44 files and 16 directories. T

Selected 1 file. Total size: 212,224,320 bytes

Server/Local file	Direction	Remot
csoadmin@zld-fw.ddns.net		
C:\Users\Songsongstanley\Desktop\131ABWV0ITS-25WK08-m7123.zip	<<--	/131_w
00:00:07 elapsed 00:01:22 left 9.1% 19,398,656 bytes (2.3 MiB/s)		

around 20 Mbps

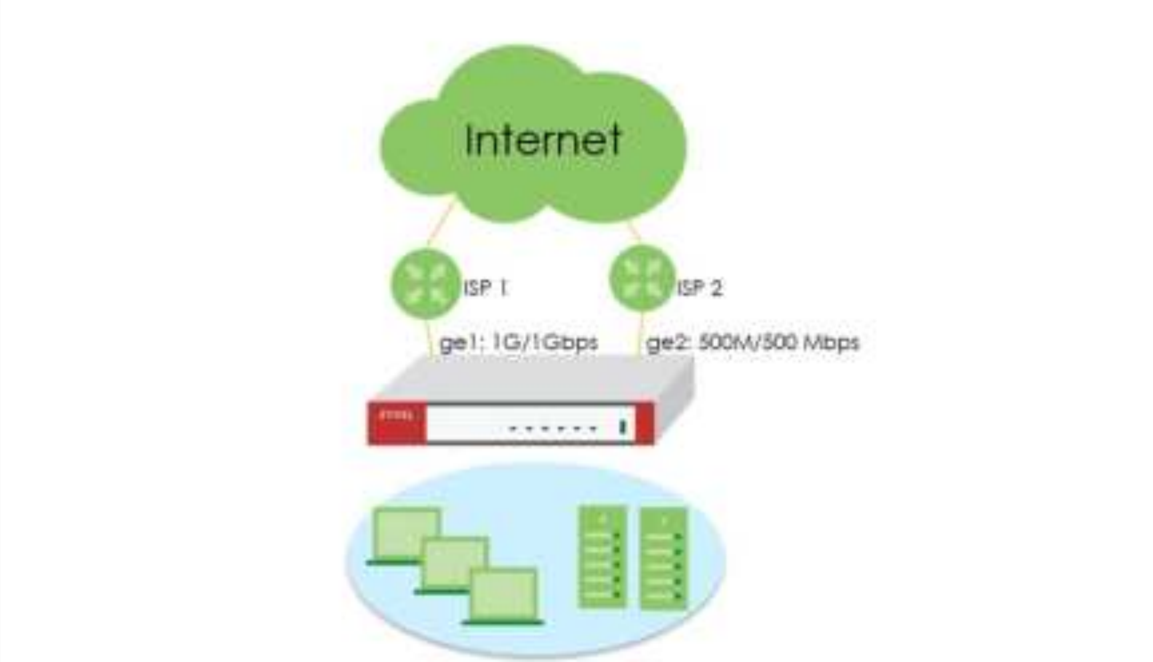
Go to Log & Report > Log/Events and select BWM to check the logs.



#	Time	Category	Message	Src. IP	Dst. IP
1	2025-03-27 18:04:15	BWM	[illegible]	[illegible]	[illegible]
2	2025-03-27 18:04:[illegible]	BWM	[illegible]	[illegible]	[illegible]

How to Configure WAN trunk for Spillover and Least Load First

In the realm of network management, WAN trunk spillover and the Least Load First (LLF) algorithm are vital for optimizing resource utilization and enhancing network performance. WAN trunk spillover ensures seamless connectivity by distributing traffic across multiple WAN connections, preventing bottlenecks, and maximizing bandwidth usage. The LLF algorithm intelligently balances traffic load by prioritizing the least loaded WAN links, minimizing latency, and improving overall network efficiency. This is an example of using the FLEX H series for two spillovers and the Least Load First configuration. The following example is based on GE1 1G/1G and GE2 500/500 Mbps for illustration.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 500H (Firmware Version: uOS 1.20).

Least Load First

The "Least Load First" algorithm allocates new session traffic based on the current outbound bandwidth utilization of each trunk member interface. This utilization, measured as outbound throughput over available bandwidth, serves as the load balancing index. For instance, if WAN 1 has a throughput of 1000K and WAN 2 has 5K, the Zyxel Device calculates the load balancing index accordingly. With WAN 2 showing a lower utilization, indicating lesser utilization compared to WAN 1, subsequent new session traffic is routed through WAN 2 for optimal load distribution.

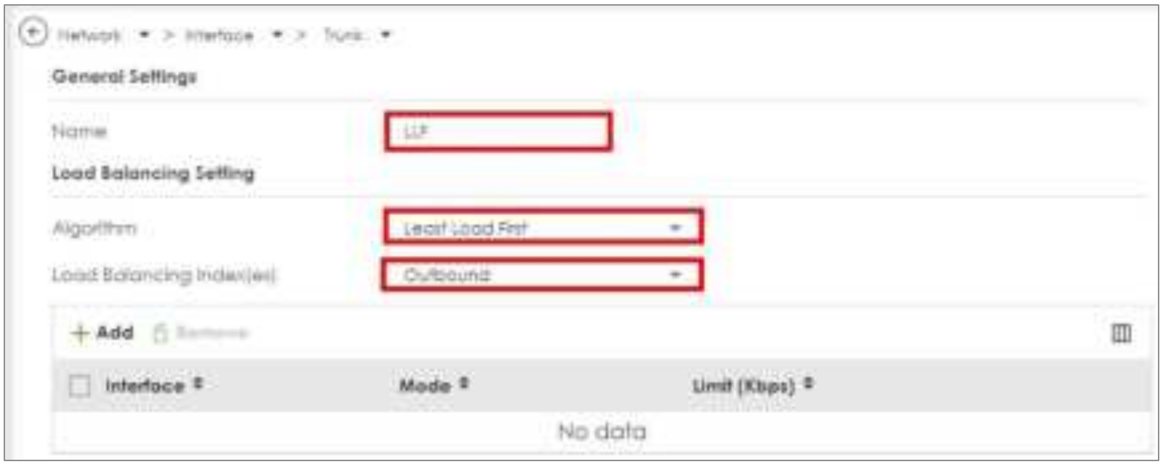
Spillover

The "Spillover" load balancing algorithm prioritizes the first interface in the trunk member list until its maximum load capacity is reached. Any excess traffic from new sessions is then directed to subsequent interfaces in the list, continuing until all member interfaces are utilized or traffic demands are met. For example, if the first interface offers unlimited access while the second incurs usage-based billing, the algorithm only activates the second interface when traffic surpasses the threshold of the first. This approach optimizes bandwidth usage on the first interface, minimizing Internet fees and preventing overload situations on individual interfaces.

Set Up the User-Defined Trunk

Spillover and Least Load First

Go to Network > Interface > Trunk page, and click **Add** button to create user-defined Trunk. In the general settings, we can configure the following settings;
Name: Least Load First (Enter a descriptive name for this trunk)
Algorithm: LLF
Load Balancing Index: Outbound
Note: *This field is available if you selected to use the* ***Least Load First*** *or* ***Spillover*** *method.*



Network > Interface > Trunk

General Settings

Name: LLF

Load Balancing Setting

Algorithm: Least Load First

Load Balancing Index(es): Outbound

□ Interface	Mode	Limit (Kbps)
No data		

Click **Add** to add a member interface to the trunk, in this scenario, we have ge1, and ge2 for Internet access.

Member: ge1(Wan)

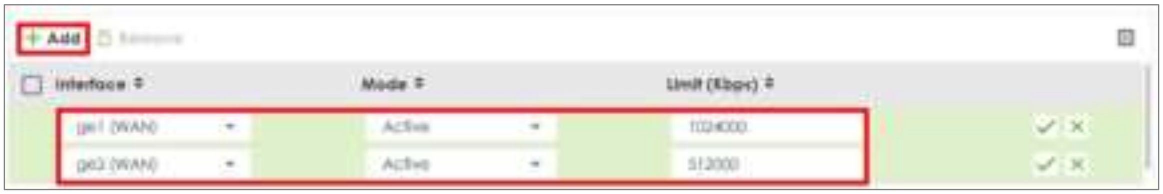
Mode: Active

Limit(Kbps): 1024000

Member: ge2(Wan)

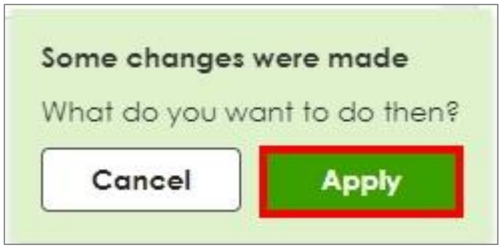
Mode: Active

Limit(Kbps): 512000



□ Interface	Mode	Limit (Kbps)
ge1 (WAN)	Active	1024000
ge2 (WAN)	Active	512000

Click **Apply** to save changes.



Some changes were made

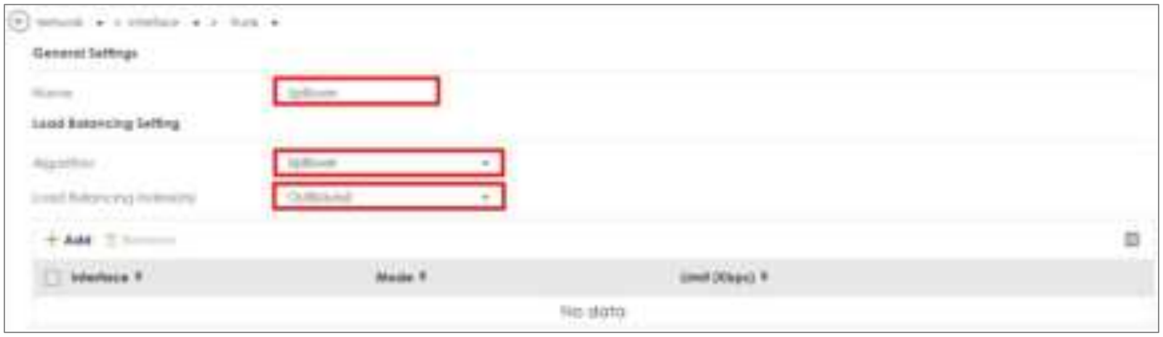
What do you want to do then?

After the Trunk LLF is created, let's create a second WAN trunk for spillover testing, click **Add** button to create 2nd user-defined Trunk.

Name: Spillover (Enter a descriptive name for this trunk)

Algorithm: Spillover

Load Balancing Index: Outbound



General Settings

Name: Spillover

Load Balancing Setting

Algorithm: Spillover

Load Balancing Index(es): Outbound

Interface	Mode	Limit (Kbps)
No data		

Click **Add** to add a member interface to the trunk.

Member: ge1(Wan)

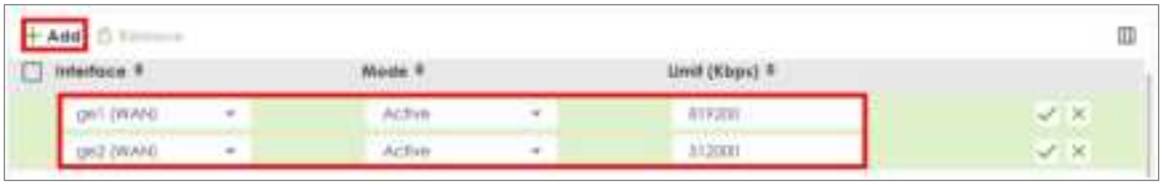
Mode: Active

Limit(Kbps): 819200

Member: ge2(Wan)

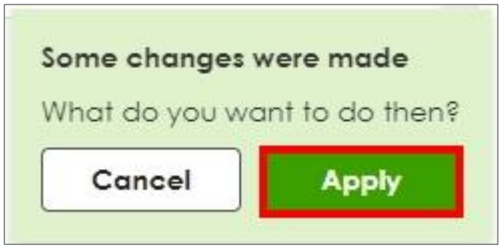
Mode: Active

Limit(Kbps): 512000



Interface	Mode	Limit (Kbps)
ge1 (WAN)	Active	819200
ge2 (WAN)	Active	512000

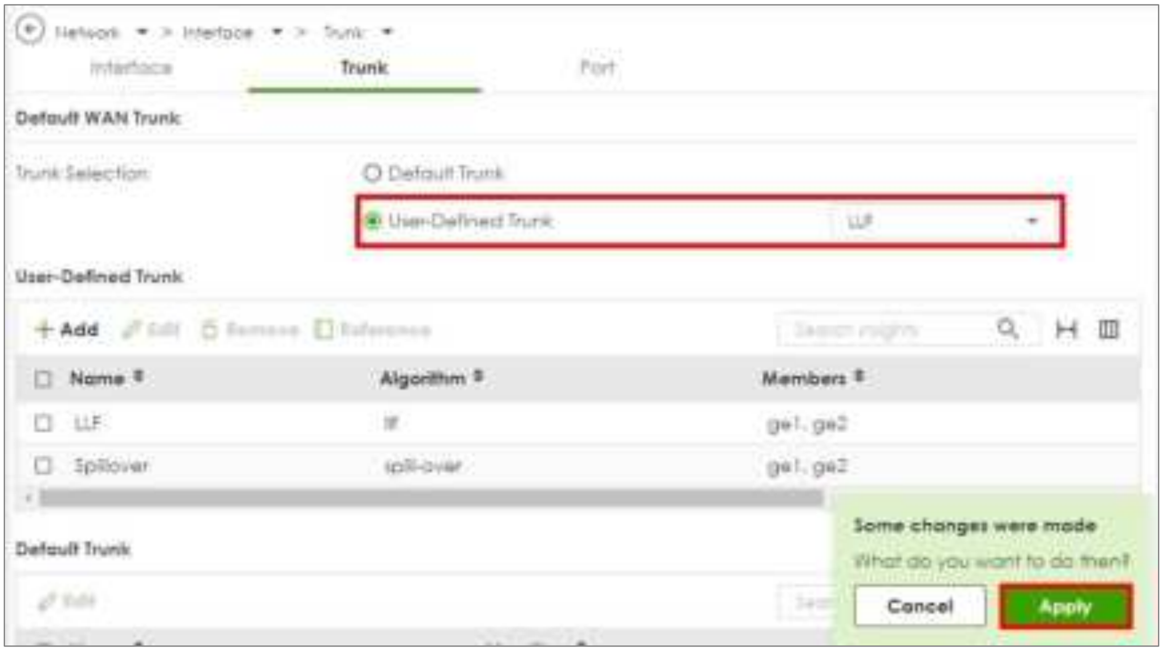
Click **Apply** to save changes.



Some changes were made

What do you want to do then?

Go to Default WAN Trunk section, select User-Defined Trunk and select the newly created (LLF or Spillover) Trunk from the list box. Click **Apply** to save changes.



Network > Interface > Trunk

Interface | Trunk | Port

Default WAN Trunk

Trunk Selection ○ Default Trunk

● User-Defined Trunk LLF

User-Defined Trunk

+ Add Edit Remove Reference

☐	Name	Algorithm	Members
☐	LLF	llf	ge1, ge2
☐	Spillover	spill-over	ge1, ge2

Default Trunk

Edit

Some changes were made

What do you want to do then?

Cancel Apply

Test the Result

Spillover

1) Apply Spillover in User-Defined Trunk.

2) Connect two hosts on the LAN side. Host A upload a large file to an FTP server.

3) Go to Traffic Statistics > Port to check interface utilization. Upload traffic should go to ge1 as this interface is the first member interface in Trunk Spillover. Check if maximum load capacity 819200bps is reached. Any excess traffic from new sessions is then directed to subsequent interfaces in the list

4) Host B generates ICMP traffic to 8.8.8.8.

5) Capture packets on the interface ge2 to see if new sessions are captured on ge2.

Least Load First

1) Apply LLF in User-Defined Trunk

2) Connect two hosts on the LAN side. Host A upload a large file to an FTP server.

3) Go to Traffic Statistics > Port to check interface utilization.

4) Host B generates ICMP traffic to 8.8.8.8.

5) Capture packets on the interface with lower traffic load to verify if the ICMP traffic is routed through the less congested interface.

How Does SIP ALG Function Work on USG FLEX H?

SIP ALG consists of two key services for managing traffic on firewalls: SIP transformation and SIP pinholes.

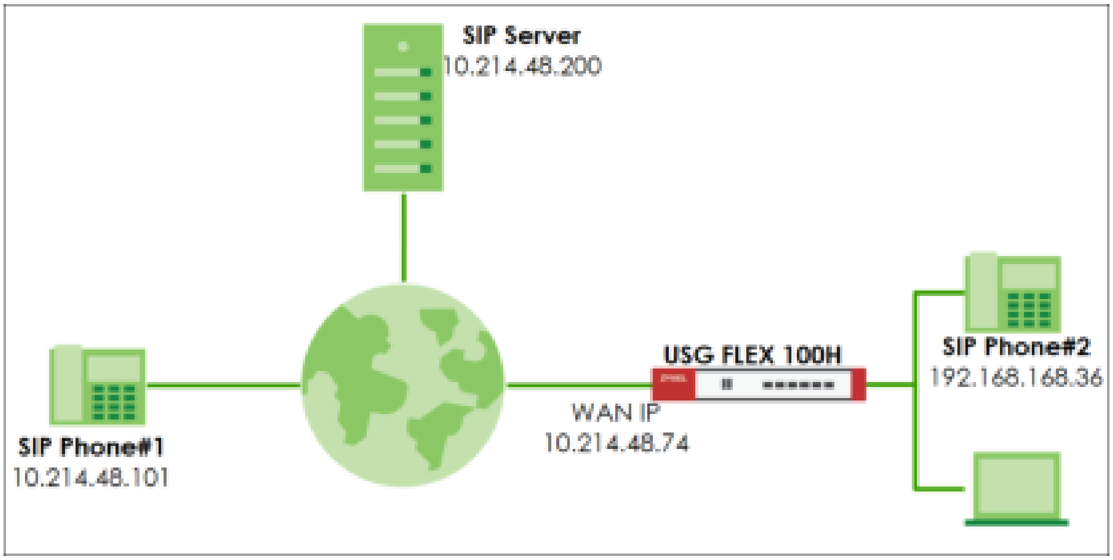
SIP Transformation

The SIP transformation function modifies SIP header information, facilitating SIP signaling traffic over NAT operations. This enables seamless communication between private IP addresses and public IP addresses.

SIP Pinholes

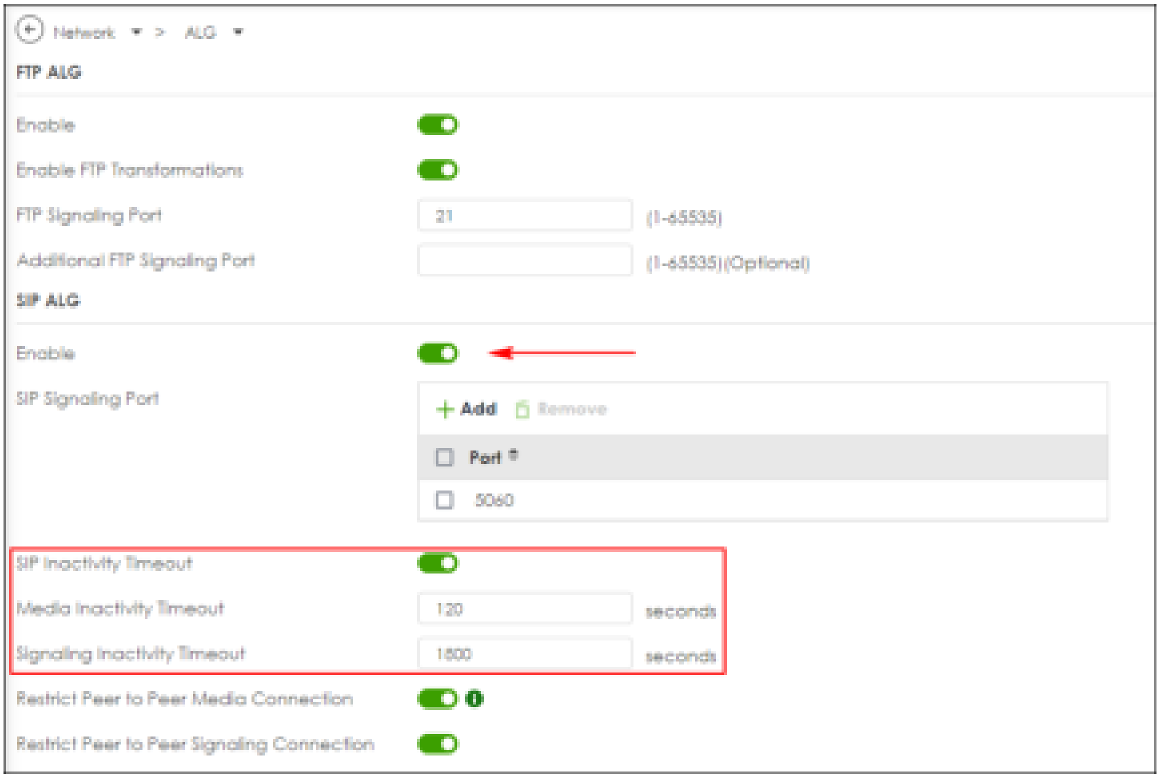
SIP pinholes ensure the persistence of registered SIP sessions and RTP sessions during NAT operations. This prevents issues such as dropped calls or non-functioning phone calls caused by expired SIP/RTP sessions on the firewall.

Cloud-based SIP servers are typically sophisticated enough to distinguish between a client's local (private IP) and public IP, making SIP transformation unnecessary in most scenarios. However, the SIP pinhole feature remains essential for proper NAT operations. The SIP ALG feature on H Series firewalls focuses on supporting SIP pinholes. This ensures that SIP and RTP sessions are managed effectively, maintaining reliable communication across firewalls.



SIP ALG Feature for Keep SIP/RTP Activity Sessions on Firewall

Go to Network > ALG > SIP ALG feature.



Network > ALG

FTP ALG

Enable	●	
Enable FTP Transformations	●	
FTP Signaling Port	21	(1-65535)
Additional FTP Signaling Port		(1-65535)(Optional)

SIP ALG

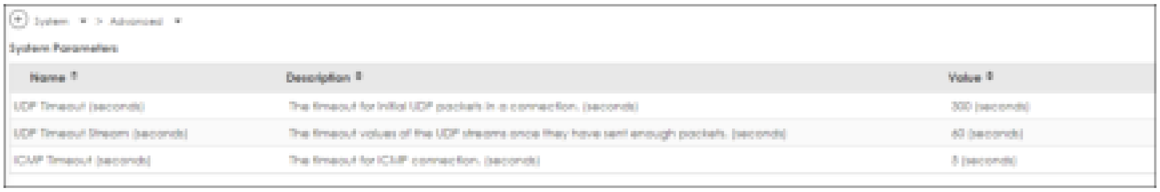
Enable	●	
SIP Signaling Port	+ Add Remove	
	□ Port	
	□ 5060	
SIP Inactivity Timeout	●	
Media Inactivity Timeout	120	seconds
Signaling Inactivity Timeout	1800	seconds
Restrict Peer to Peer Media Connection	●	
Restrict Peer to Peer Signaling Connection	●	

SIP Signaling port:

Default SIP service port is 5060. You can configure to other ports to fulfil your network environment.

SIP Inactivity timeout:

In firewall default setting, general UDP session timeout is 300 seconds, and UDP stream timeout is 60 seconds. (System > Advanced)



System > Advanced

System Parameters

Name	Description	Value
UDP Timeout (seconds)	The timeout for initial UDP packets in a connection. (seconds)	300 (seconds)
UDP Timeout Stream (seconds)	The timeout values of the UDP streams once they have sent enough packets. (seconds)	60 (seconds)
ICMP Timeout (seconds)	The timeout for ICMP connection. (seconds)	5 (seconds)

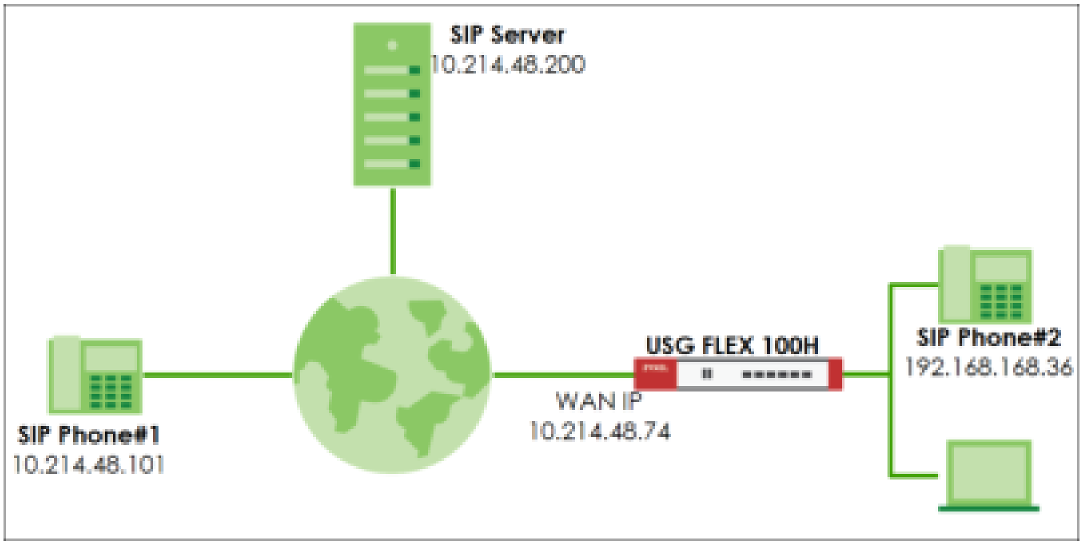
You can configure Media(RTP) and Signaling(SIP) timeout for your SIP phone, it could keep the sessions on firewall to prevent lost incoming phone call due to session expired.

Peer to Peer connection restriction:

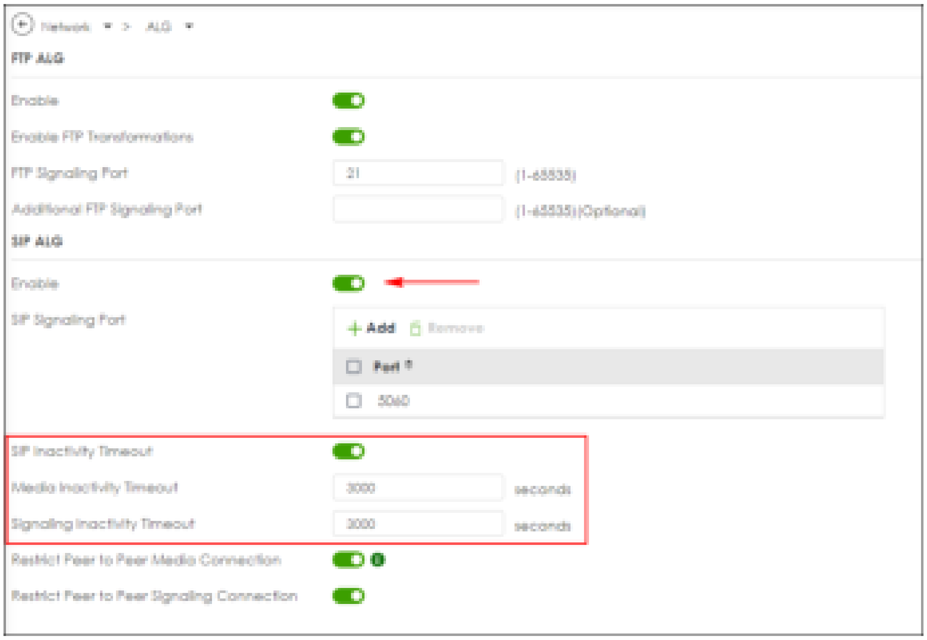
It is for incoming STP/RTP traffic. If the source IP address doesn't match to exist sessions, then firewall will drop the incoming traffic.

Test the Result

Dial the SIP phone call from SIP Phone#1 to SIP Phone#2.



Turn on SIP ALG feature and enable "SIP Inactivity Timeout" service, also have an extend Signaling(SIP) and Media(RTP) inactivity timeout as 3000 seconds.



FTP ALG

Enable	●	
Enable FTP Transformations	●	
FTP Signaling Port	21	(1-65535)
Additional FTP Signaling Port		(1-65535)(Optional)

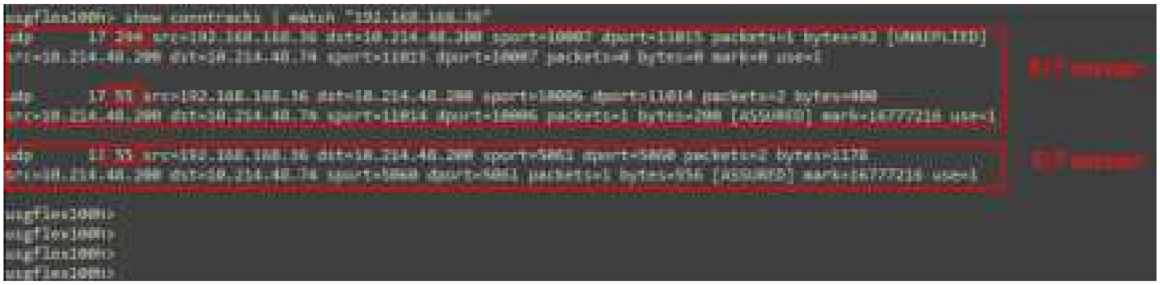
SIP ALG

Enable	●	
SIP Signaling Port	□ Port □ 5060	
SIP Inactivity Timeout	●	
Media Inactivity Timeout	3000	seconds
Signaling Inactivity Timeout	3000	seconds
Restrict Peer to Peer Media Connection	●	
Restrict Peer to Peer Signaling Connection	●	

Use CLI command to check exist sessions has been extended successfully.

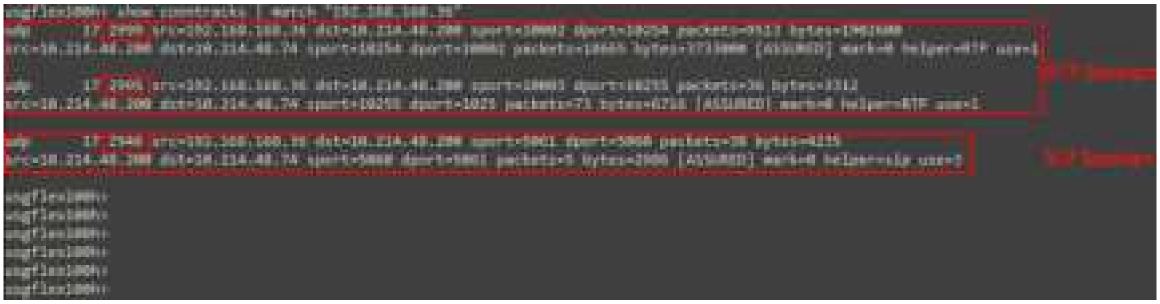
CLI> show conntracks | match "<IP address>"

Before enabling the SIP ALG feature, system will use the default UDP timeout.



```
usgflex100h> show conntracks | match "192.168.168.36"
udp      17 294 src=192.168.168.36 dst=10.214.48.200 sport=10007 dport=11015 packets=1 bytes=92 [UNREPLIED]
src=10.214.48.200 dst=10.214.48.74 sport=11015 dport=10007 packets=0 bytes=0 mark=0 use=1

udp      17 55 src=192.168.168.36 dst=10.214.48.200 sport=10006 dport=11014 packets=2 bytes=400
src=10.214.48.200 dst=10.214.48.74 sport=11014 dport=10006 packets=1 bytes=200 [ASSURED] mark=16777216 use=1

udp      17 55 src=192.168.168.36 dst=10.214.48.200 sport=5061 dport=5060 packets=2 bytes=1178
src=10.214.48.200 dst=10.214.48.74 sport=5060 dport=5061 packets=1 bytes=556 [ASSURED] mark=16777216 use=1

usgflex100h>
usgflex100h>
usgflex100h>
usgflex100h>
```

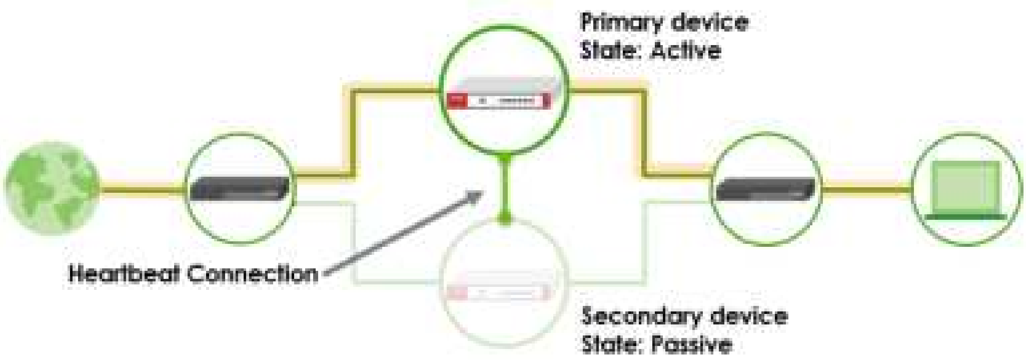
After enabling the SIP ALG feature, system will extend the timeout value.



```
usgflex100h> show conntracks | match "192.168.168.36"
udp      17 2999 src=192.168.168.36 dst=10.214.48.200 sport=10002 dport=10254 packets=9513 bytes=1902600
src=10.214.48.200 dst=10.214.48.74 sport=10254 dport=10002 packets=18669 bytes=3733800 [ASSURED] mark=0 helper=RTP use=1

udp      17 2995 src=192.168.168.36 dst=10.214.48.200 sport=10003 dport=10255 packets=36 bytes=2312
src=10.214.48.200 dst=10.214.48.74 sport=10255 dport=1025 packets=73 bytes=6716 [ASSURED] mark=0 helper=RTP use=1

udp      17 2940 src=192.168.168.36 dst=10.214.48.200 sport=5061 dport=5060 packets=38 bytes=4215
src=10.214.48.200 dst=10.214.48.74 sport=5060 dport=5061 packets=5 bytes=2906 [ASSURED] mark=0 helper=sip use=3

usgflex100h>
usgflex100h>
usgflex100h>
usgflex100h>
usgflex100h>
usgflex100h>
```

How to Deploy Device HA

The Device HA feature acts as a failover when one of the devices in the network fails or can't access the Internet. Device HA uses a dedicated heartbeat link between an active device and a passive device for status syncing and backup to the passive device. On the passive device, all ports are disabled except for the port with the heartbeat link. This example illustrates how to deploy the Device HA in your network.

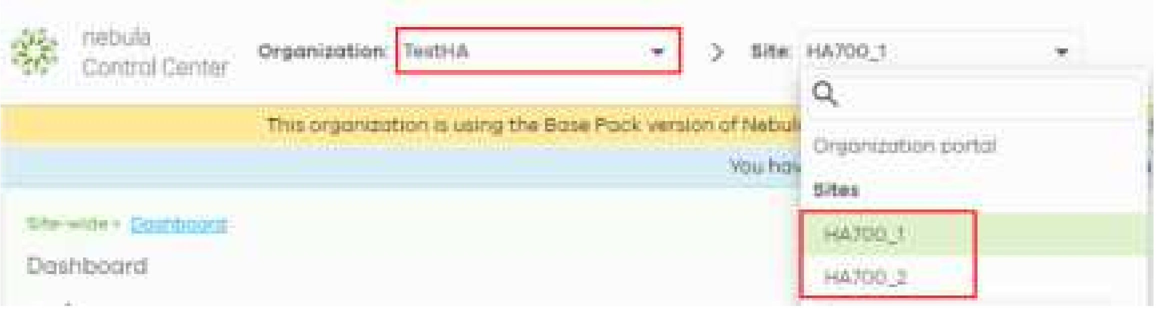


Note: Device HA is supported on USG FLEX 200H, USG FLEX 200HP, USG FLEX 500H, USG FLEX 700H.This example was tested using USG FLEX 200H (Firmware Version: uOS 1.32).

Prerequisites for Device HA

The primary and secondary devices in Device HA mode must meet the following requirements:

1. **The same model** - Both devices must be of the same hardware model. In this example, both devices must be USG FLEX 200H. You cannot set up Device HA between different models, USG FLEX 200H and USG FLEX 200HP.
2. **The same firmware version** - Both devices must be running the same firmware version (uOS 1.31 or later versions).
3. **The same Organization on Nebula** - Both devices must be registered to the same Organization on Nebula.
   - Assign the primary USG FLEX H to the first site
   - Assign the secondary USG FLEX H to the second site

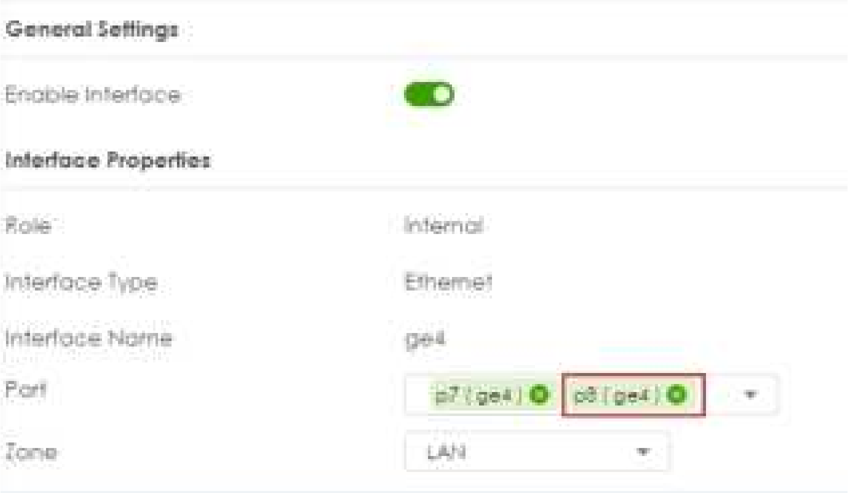


4. **Enable SSH port number** - The SSH service under System > SSHH must be enabled on both devices. SSH port number must use **22** to enable synchronization for Device HA.
5. **WAN connection of the active device** - Ensure that the active device has normal WAN connectivity to the internet and is connected to Nebula.

Note: It is highly recommended to complete device registration steps on Nebula before pairing HA.

Configuration on the primary device

1. Set up with your desired configuration and networking settings.
2. The highest-numbered copper Ethernet port is reserved for heartbeat communication. Make sure the heartbeat port is not assigned to any interface. In this example, P8 is the heartbeat port on USG FLEX 200H. **Remove** P8 from interface ge4.



General Settings

Enable Interface	●

Interface Properties

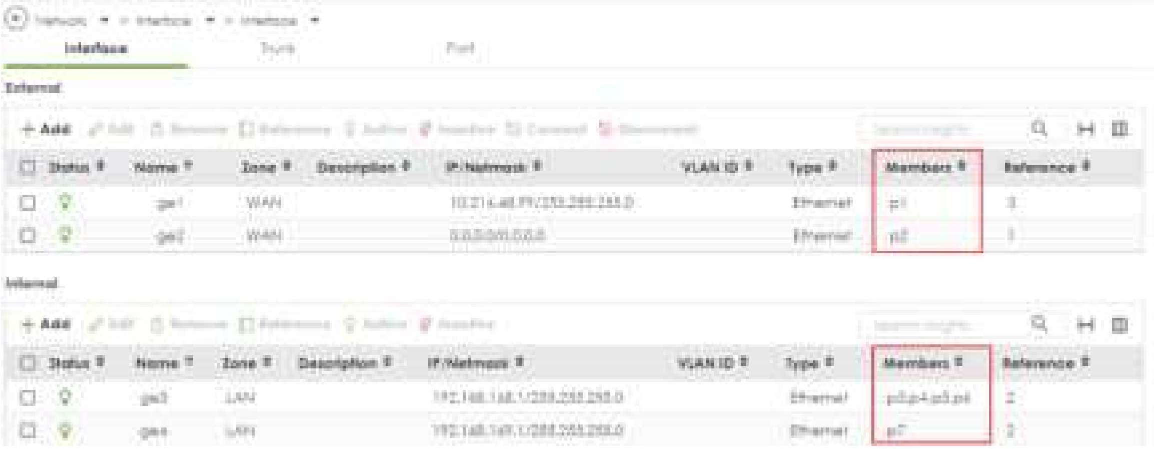
Role	Internal
Interface Type	Ethernet
Interface Name	ge4
Port	p7 (ge4) p8 (ge4)
Zone	LAN

Note: Heartbeat port for HA synchronization

USG FLEX 200H/200HP: P8

USG FLEX 500H/700H: P12

Go to Network > Interface and make sure p8 doesn't belong to any interface.



External

	Status	Name	Zone	Description	IP/Netmask	VLAN ID	Type	Members	Reference
□		ge1	WAN		10.214.48.[illegible]/255.255.255.0		Ethernet	p1	3
□		ge2	WAN		0.0.0.0/0.0.0.0		Ethernet	p2	1

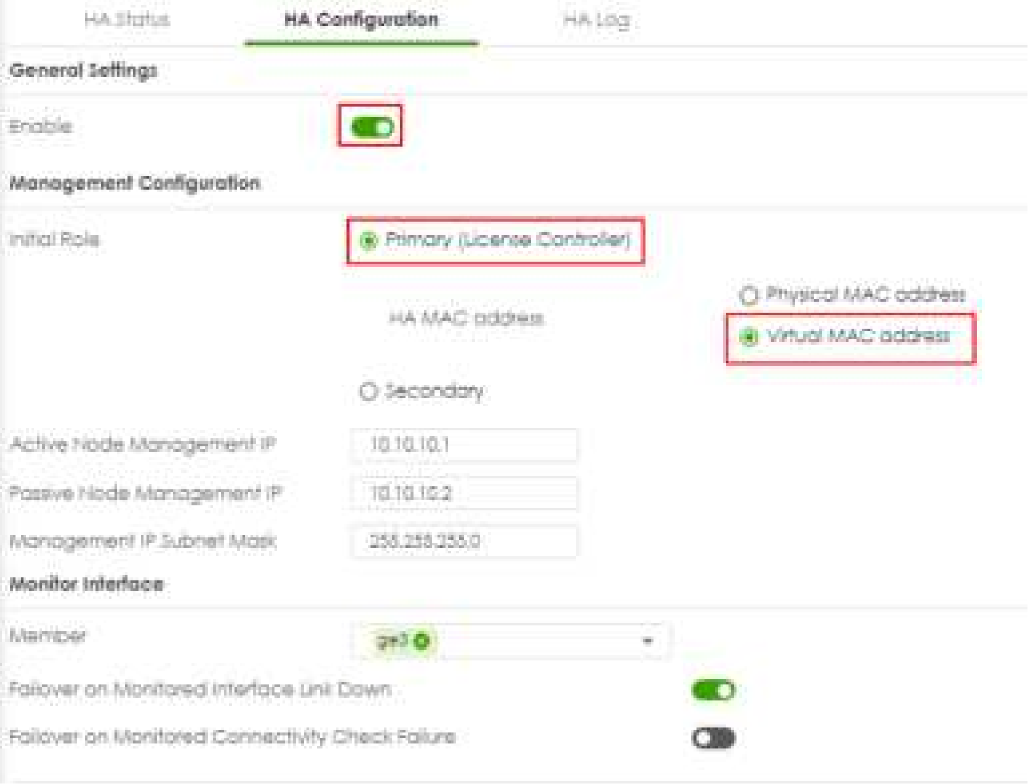
Internal

	Status	Name	Zone	Description	IP/Netmask	VLAN ID	Type	Members	Reference
□		ge3	LAN		192.168.168.1/255.255.255.0		Ethernet	p3,p4,p5,p6	2
□		ge4	LAN		192.168.169.1/255.255.255.0		Ethernet	p7	2

3. Go to **System > Device HA > HA Configuration**.
    - Select Primary role.
    - Select HA MAC address.

      If Virtual MAC Address is selected, the MAC address of each interface will be replaced as follows.

      D8:EC:E5:XX:XX:1D -> D**6**:EC:E5:XX:XX:1D
    - Configure Management IP for active and passive role. The two management IPs must be different but in the same subnet.
    - Select monitor interfaces. HA failover will be triggered when monitored interface is down. Turn on "**Enable**" to enable Device HA and Apply.



General Settings

Enable: ●

Management Configuration

Initial Role: ● Primary (License Controller)

HA MAC address: ○ Physical MAC address ● Virtual MAC address

○ Secondary

Active Node Management IP: 10.10.10.1

Passive Node Management IP: 10.10.10.2

Management IP Subnet Mask: 255.255.255.0

Monitor Interface

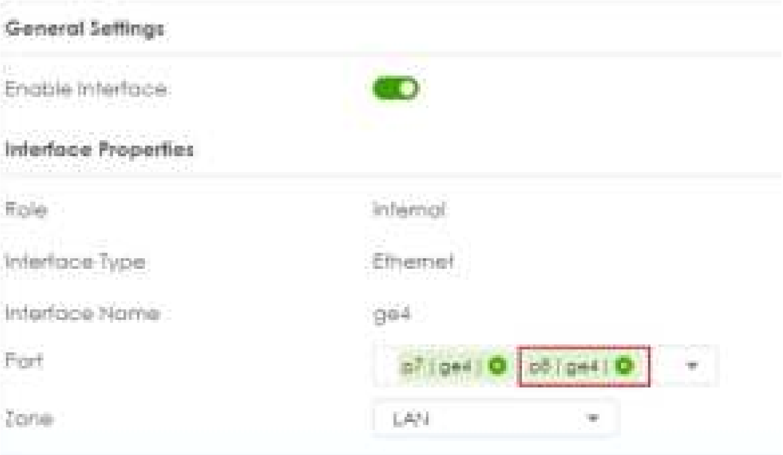
Member: ge3

Failover on Monitored Interface Link Down: ●

Failover on Monitored Connectivity Check Failure: ○

Configuration on the secondary device

1. Make sure the secondary device is reset to default settings. Follow the wizard to register it to Nebula and it to the same organization as the primary device.
2. After the secondary device is registered to Nebula successfully, remove wan connection from the secondary device and login to the device via lan interface to configure HA.
3. Make sure the heartbeat port is not assigned to any interface. In this example, P8 is the heartbeat port on USG FLEX 200H. **Remove** P8 from interface ge4.



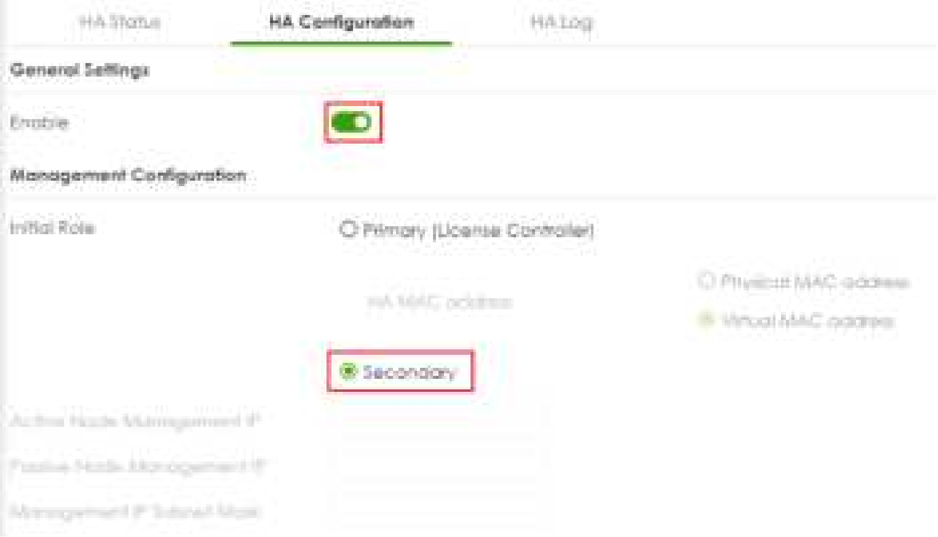
General Settings

Enable Interface: ●

Interface Properties

Role	internal
Interface Type	Ethernet
Interface Name	ge4
Port	p7 | ge4 | ⊗ p8 | ge4 | ⊗
Zone	LAN

4. Go to **System > Device HA > HA Configuration**. Select Secondary role. Turn on "Enable" to enable Device HA and Apply. Logout from the secondary device and unplug all Ethernet cables of wan and lan interfaces.



General Settings

Enable: ●

Management Configuration

Initial Role: ○ Primary (License Controller)

HA MAC address: ○ Physical MAC address ● Virtual MAC address

● Secondary

Active Node Management IP

Passive Node Management IP

Management IP Subnet Mask

Connect the heartbeat ports

Connect the heartbeat ports of the primary and secondary device directly and avoid putting a device in between such as a switch.

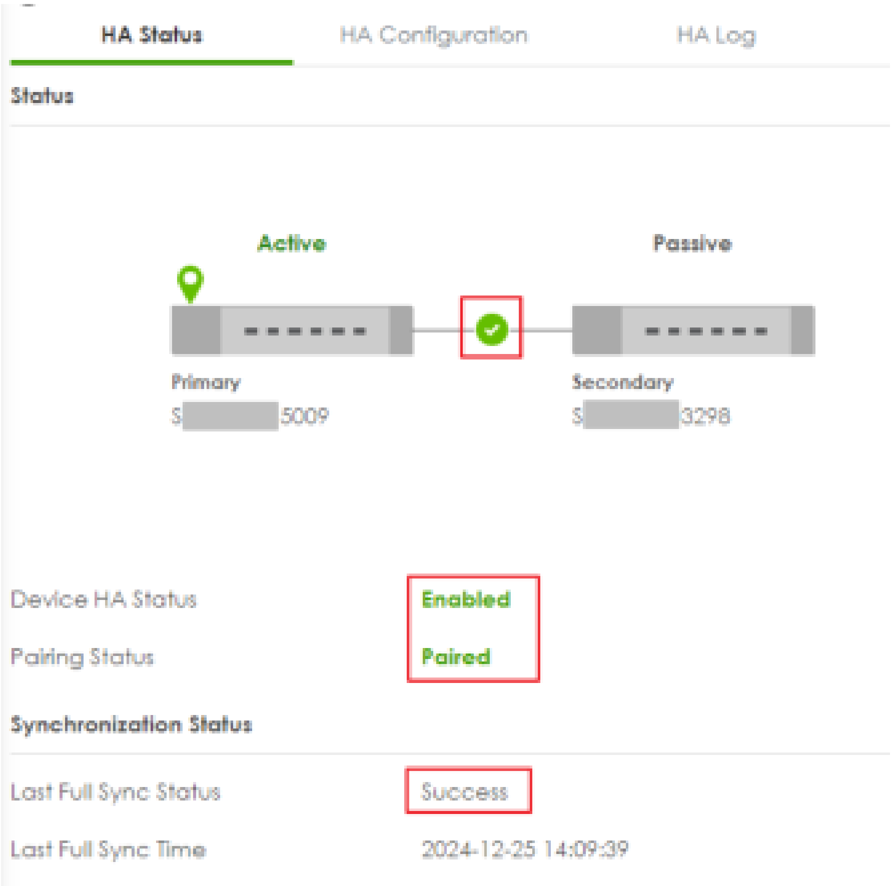
> Note: The heartbeat port of the primary and secondary device must be connected directly to each other (not through a switch).

Check HA status

Login to the primary device and go to **System > Device HA > HA Status**. Make sure the heartbeat link status is connected. You can also use the SYS LED on the active device to check the paring status.

Pairing status: Paired

Last Full Sync Status: Success



Primary
S[redacted]5009

Secondary
S[redacted]3298

Device HA Status Enabled

Pairing Status Paired

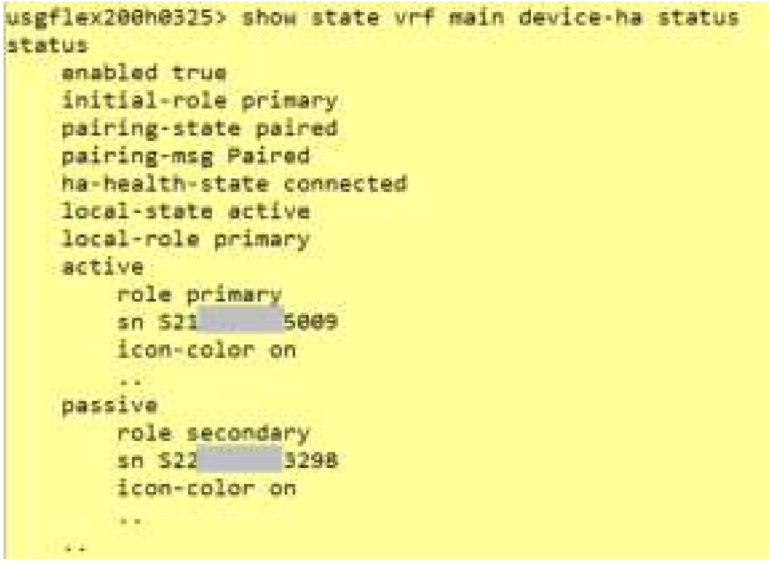
Synchronization Status

Last Full Sync Status Success

Last Full Sync Time 2024-12-25 14:09:39

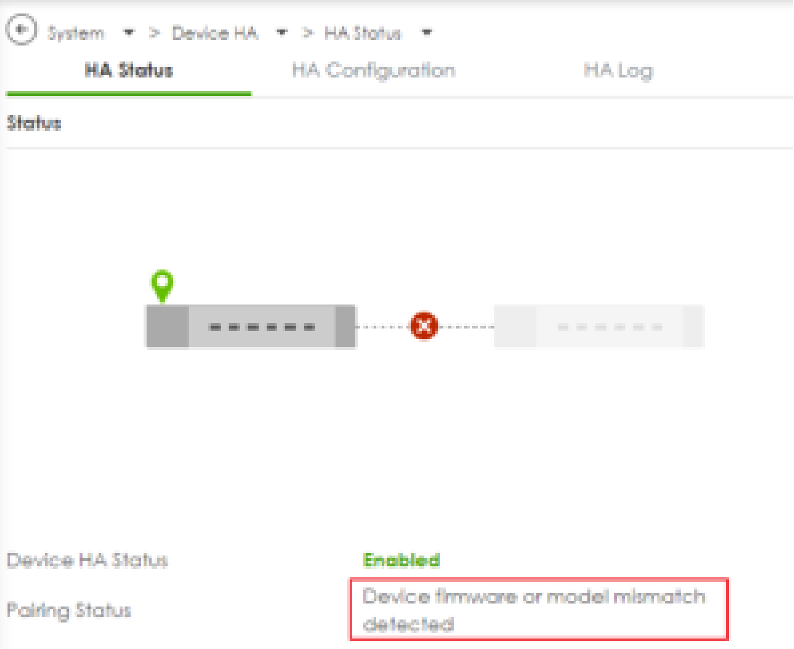
You can also enter the command on the primary device to check HA status. ***usgflex200h> show state vrf main device-ha status***

Synchronization can take up to 5 minutes or so. Once it has finished synchronizing, you can verify if the settings are synchronized by accessing the passive device through Passive Node Management IP. Once pairing is complete, the secondary device's license will automatically be transferred to the primary device and you will receive an email notification.



```
usgflex200h0325> show state vrf main device-ha status
status
    enabled true
    initial-role primary
    pairing-state paired
    pairing-msg Paired
    ha-health-state connected
    local-state active
    local-role primary
    active
        role primary
        sn S21[redacted]5009
        icon-color on
        ..
    passive
        role secondary
        sn S22[redacted]3298
        icon-color on
        ..
    ..
```

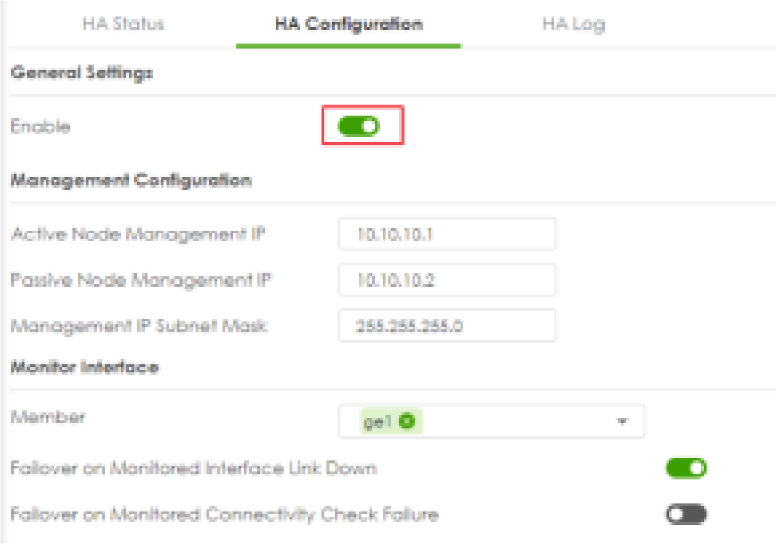
If Paring Status is not "Paired", check what the error message is and resolve the error. In this example, the error is "Device firmware mismatch". Check the firmware version on primary and secondary again and make sure firmware version on both devices are identical.



Device HA Status: Enabled

Pairing Status: Device firmware or model mismatch detected

Note: After the error is resolved (Upgrade two devices to the same firmware version), you can keep the heartbeat port connected on both devices, and disable and enable HA on the **primary** device to trigger pairing again.



General Settings

Enable: ●

Management Configuration

Active Node Management IP: 10.10.10.1

Passive Node Management IP: 10.10.10.2

Management IP Subnet Mask: 255.255.255.0

Monitor Interface

Member: ge1

Failover on Monitored Interface Link Down: ●

Failover on Monitored Connectivity Check Failure: ○

HA Synchronization

- Full Synchronization: Use the command on active device to manually force a full synchronization. You can also use SYS LED on the passive device to check the status of HA synchronization.

  usgflex200h> cmd device-ha force-sync full

- Incremental Synchronization: This happens automatically when changes are made to the active firewall. The updates are synced to the passive firewall within 5 seconds. It is important to only make configuration changes on the active device.

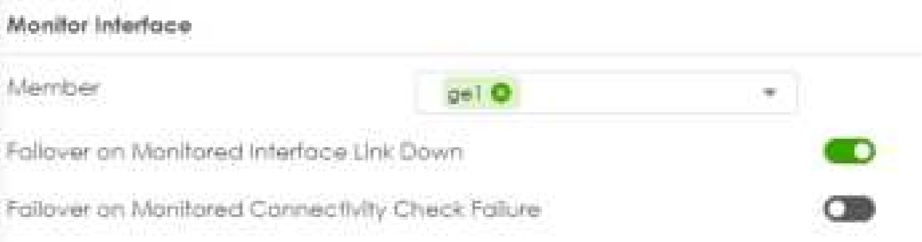
Note: All configuration changes must be made on the active device. Do NOT manually configure the passive device.

Connect the network cables to the secondary device

Once the devices have been properly synchronized, connect all network cables to wan and lan interfaces of the secondary devices.

Test HA Failover

1. In this example, ge1 is the monitored interface. Unplug the Ethernet cable of ge1 interface from the primary device to trigger HA failover.



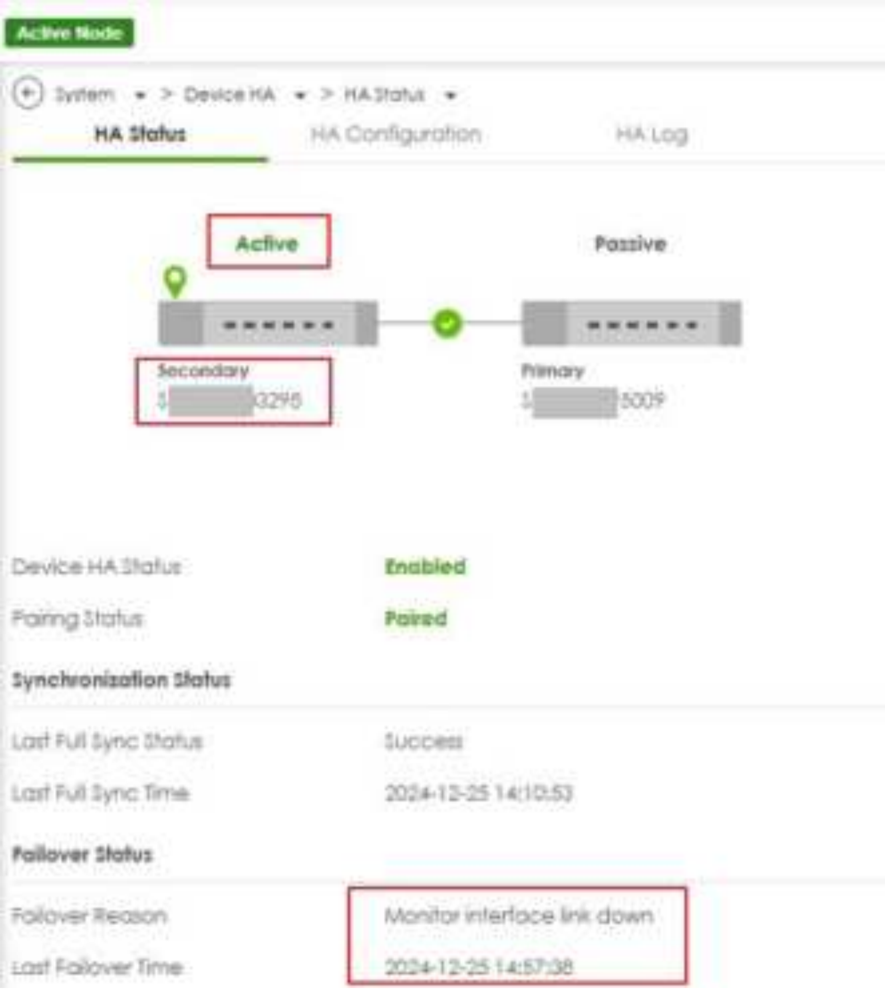
Monitor Interface

Member: ge1

Failover on Monitored Interface Link Down: ●

Failover on Monitored Connectivity Check Failure: ○

2. Check HA Status and HA log by accessing Active Node Management IP https://10.10.10.1. In HA Status, the secondary device becomes Active role.



Device HA Status: Enabled

Pairing Status: Paired

Synchronization Status

Last Full Sync Status: Success

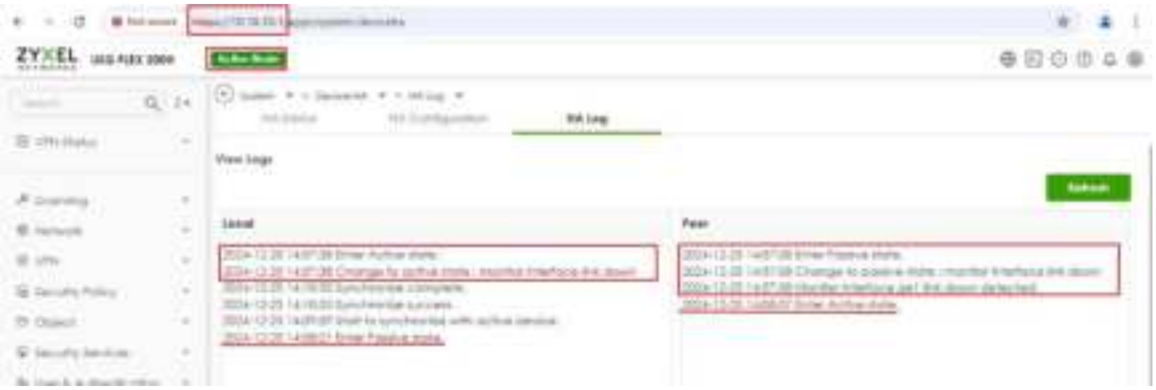
Last Full Sync Time: 2024-12-25 14:10:53

Failover Status

Failover Reason: Monitor interface link down

Last Failover Time: 2024-12-25 14:57:38

In HA Log, the secondary device (Local) changes the state from Passive to Active.



Local

```
2024-12-20 [illegible] Enter Active state.
2024-12-20 [illegible] Change to active state : monitor interface link down
2024-12-20 [illegible] Synchronize complete.
2024-12-20 [illegible] Synchronize success.
2024-12-20 [illegible] Start to synchronize with active device.
2024-12-20 [illegible] Enter Passive state.
```

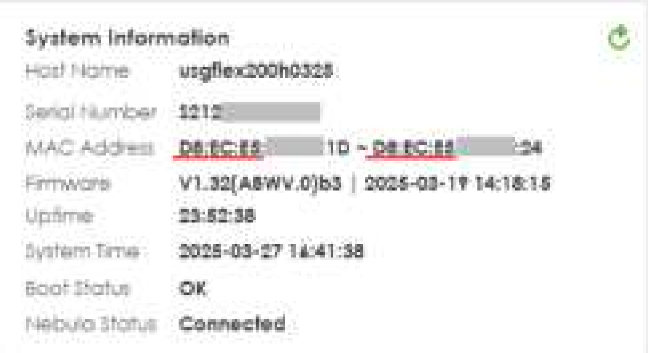
Peer

```
2024-12-20 [illegible] Enter Passive state.
2024-12-20 [illegible] Change to passive state : monitor interface link down
2024-12-20 [illegible] Monitor interface ge1 link down detected.
2024-12-20 [illegible] Enter Active state.
```

Check Virtual MAC Address

Active Device

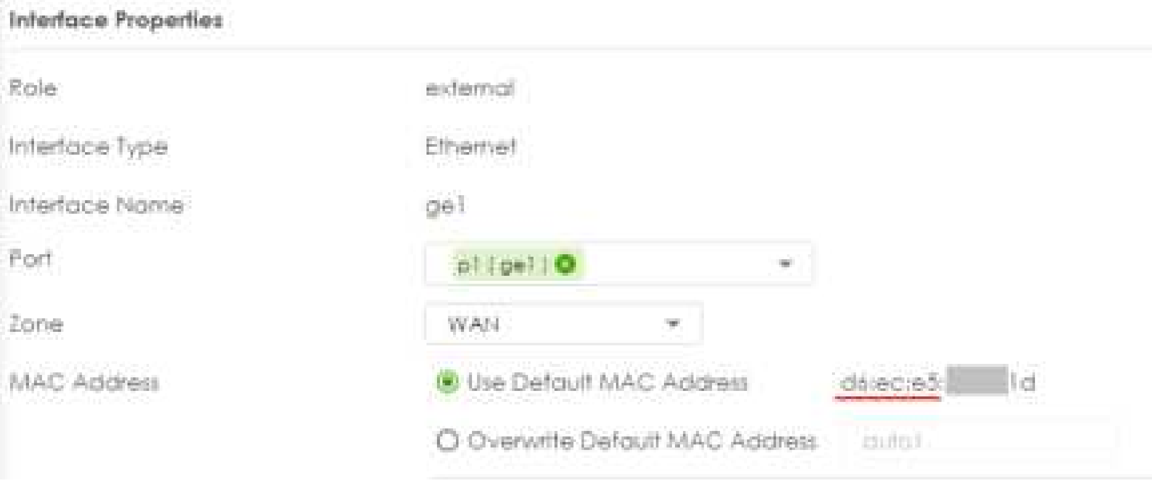
On Dashboard > System Information, MAC address is the physical MAC address.



System Information

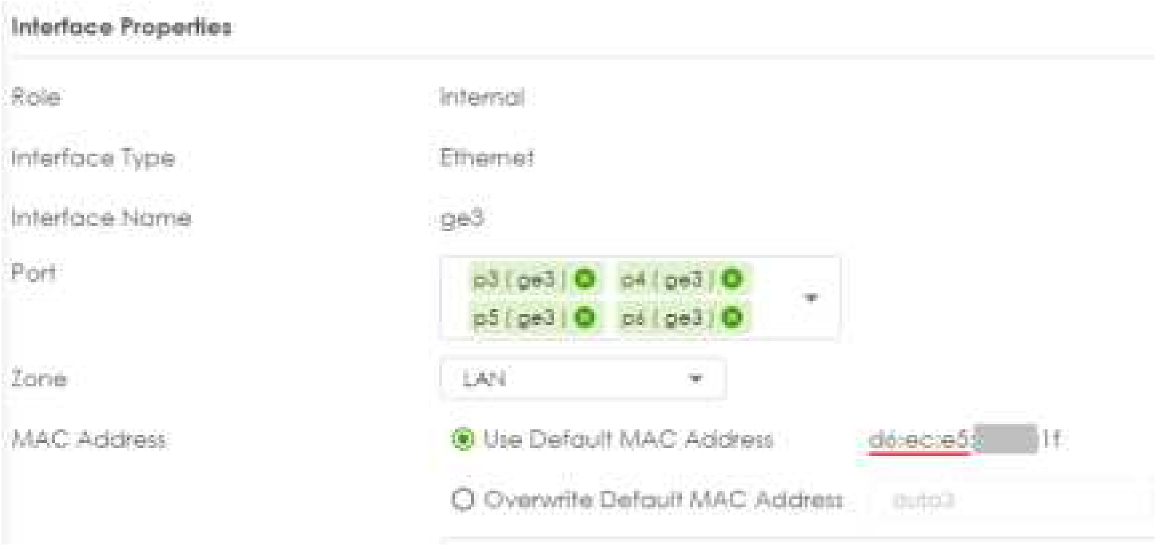
Host Name	usgflex200h0328
Serial Number	S212[redacted]
MAC Address	D8:EC:E5:[redacted]1D ~ D8:EC:E5[redacted]:24
Firmware	V1.32(ABWV.0)b3 | 2025-03-19 14:18:15
Uptime	23:52:38
System Time	2025-03-27 14:41:38
Boot Status	OK
Nebula Status	Connected

In Network > Interface, it shows the Virtual MAC address.



Interface Properties

Role	external
Interface Type	Ethernet
Interface Name	ge1
Port	P1 (ge1)
Zone	WAN
MAC Address	● Use Default MAC Address d8:ec:e5:[redacted]1d ○ Overwrite Default MAC Address auto1



Interface Properties

Role: Internal

Interface Type: Ethernet

Interface Name: ge3

Port: p3 (ge3) p4 (ge3) p5 (ge3) p6 (ge3)

Zone: LAN

MAC Address: ● Use Default MAC Address d6:ec:e5[redacted]1f

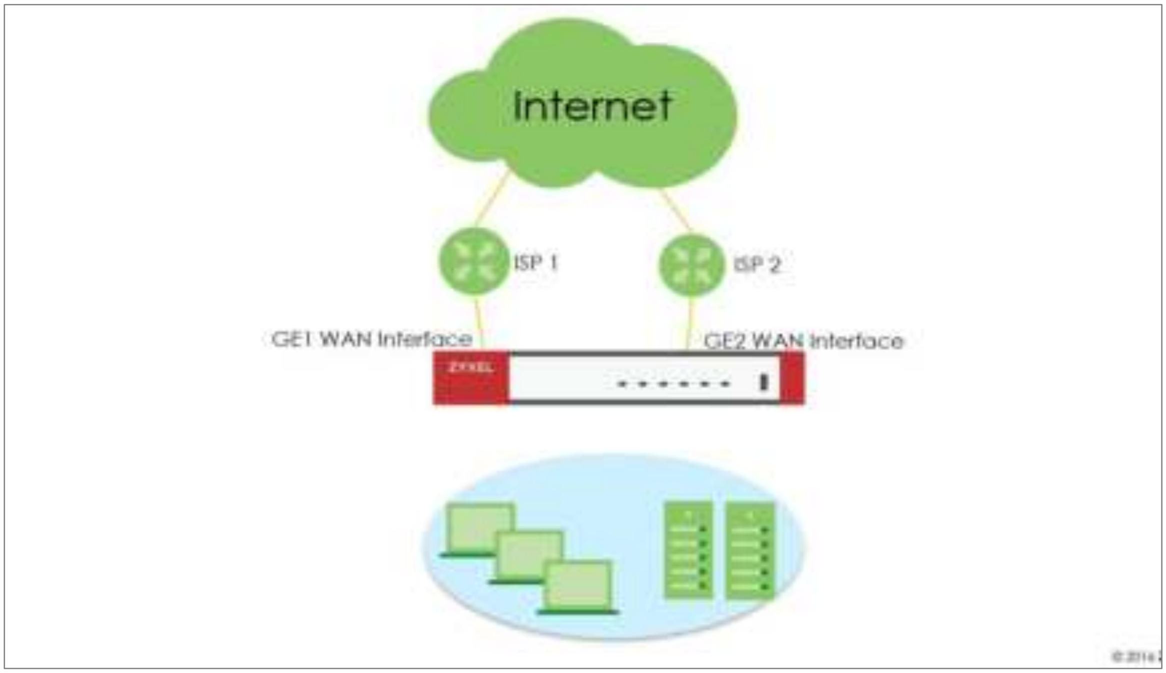
○ Overwrite Default MAC Address auto3

SYS LED Status

State	SYS LED on Active Device	SYS LED on Passive Device
Pairing in Progress	Alternating Green on: 500ms, Red on: 500ms 🟢 🔴	Green Solid 🟢
Pairing fail	Red Blinking (1sec) ▨	Green Solid 🟢
Sync. in Progress	Green Solid 🟢	Amber Blinking (500ms) ▨
Sync. Completed	Green Solid 🟢	Amber Solid 🟠
Active Node Running	Green Solid 🟢	Amber Solid 🟠

How to check Packet Flow Explorer

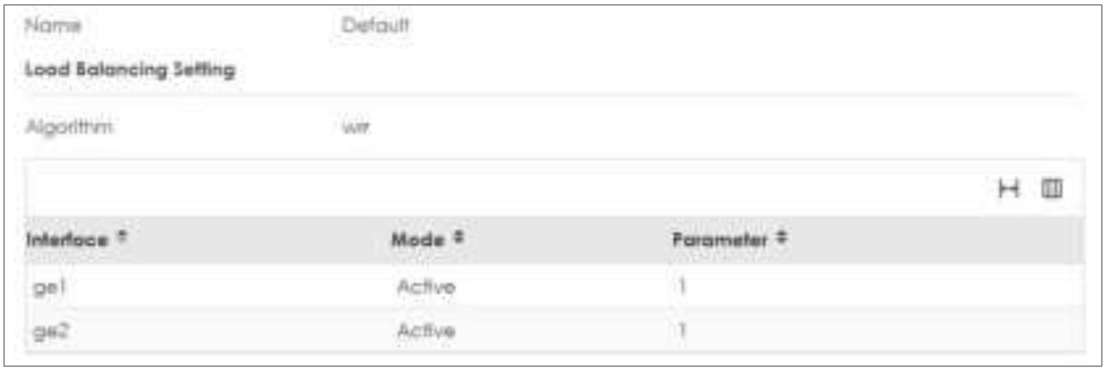
The Packet Flow Explorer is a powerful tool for analyzing and understanding routing-related issues. When used correctly, it offers a basic overview of your firewall's configuration without requiring an in-depth examination. This example demonstrates how to check the routing and SNAT status using the Packet Flow Explorer.



Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.31).

Scenario and Requirement

1. Dual WAN interfaces are in the default WRR mode, and both WANs are active.



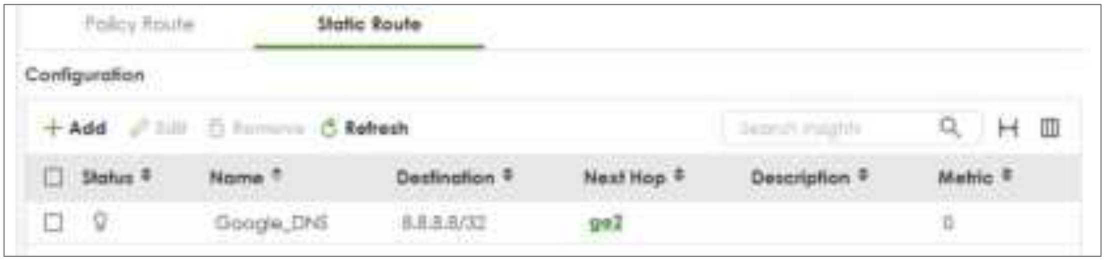
Name Default

Load Balancing Setting

Algorithm wrr

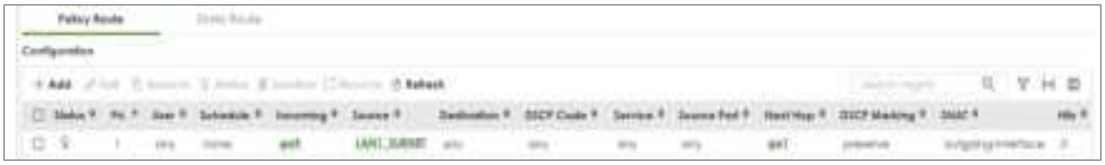
Interface	Mode	Parameter
ge1	Active	1
ge2	Active	1

2. A static route is configured to route traffic to 8.8.8.8 from the GE2 WAN interface.



☐	Status	Name	Destination	Next Hop	Description	Metric
☐	💡	Google_DNS	8.8.8.8/32	ge2		0

3. A policy route is configured to route all internet traffic through the GE1 WAN interface when source is LAN1 subnet.

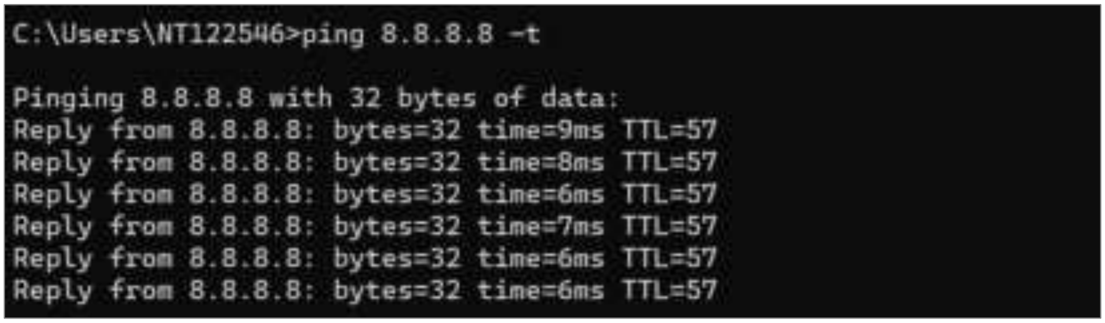


☐	Status	Pri	User	Schedule	Incoming	Source	Destination	DSCP Code	Service	Source Port	Next Hop	DSCP Marking	SNAT	Hits
☐	💡	1	any	none	ge3	LAN1_SUBNET	any	any	any	any	ge1	preserve	outgoing-interface	0

Based on the configuration above, we expect that if a host is placed in the LAN 1 subnet, all traffic will be routed through the GE1 WAN interface, except for traffic to 8.8.8.8, which will be routed through the GE2 WAN interface.

Verification

1. Place a host in the LAN1 subnet, then run the command ***ping 8.8.8.8 -t*** in the Windows Command Prompt to check for ICMP response from 8.8.8.8.

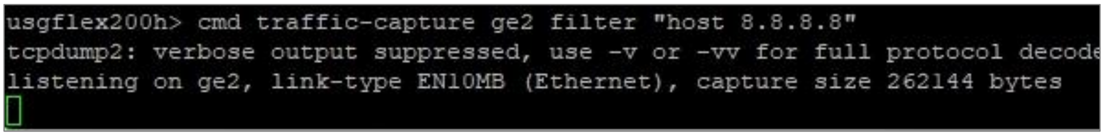


```
C:\Users\NT122546>ping 8.8.8.8 -t

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=9ms TTL=57
Reply from 8.8.8.8: bytes=32 time=8ms TTL=57
Reply from 8.8.8.8: bytes=32 time=6ms TTL=57
Reply from 8.8.8.8: bytes=32 time=7ms TTL=57
Reply from 8.8.8.8: bytes=32 time=6ms TTL=57
Reply from 8.8.8.8: bytes=32 time=6ms TTL=57
```

The host receives ICMP response.

2. Confirm that the traffic is being sent out through the GE2 WAN interface, as per the static route configuration.

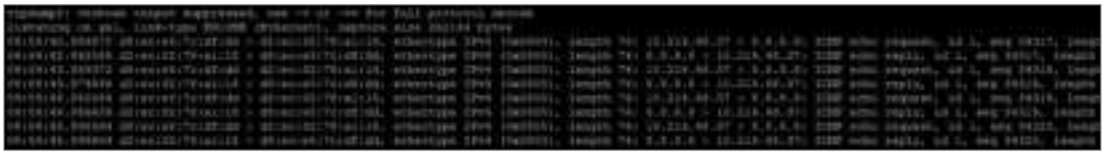
Type the command ***cmd traffic-capture ge2 filter "host 8.8.8.8"*** to capture packets on the GE2 WAN interface and verify that the traffic is being sent out through the GE2 WAN interface.



```
usgflex200h> cmd traffic-capture ge2 filter "host 8.8.8.8"
tcpdump2: verbose output suppressed, use -v or -vv for full protocol decode
listening on ge2, link-type EN10MB (Ethernet), capture size 262144 bytes
```

We're unable to see packets to 8.8.8.8. Let's capture the packets on the GE1 WAN interface instead.

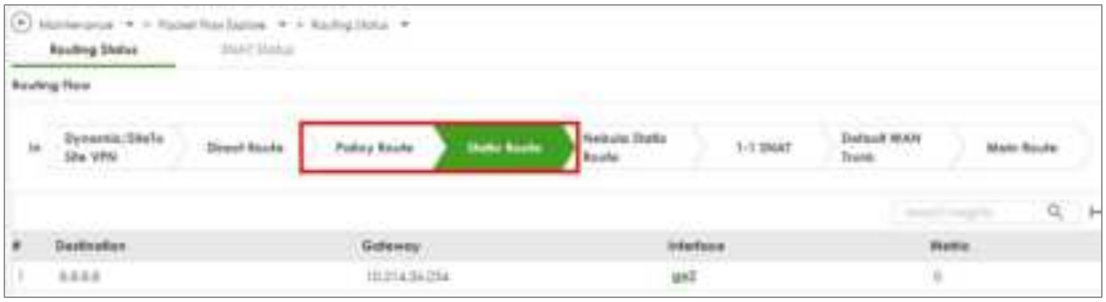
cmd traffic-capture ge1 filter "host 8.8.8.8"



```
tcpdump2: verbose output suppressed, use -v or -vv for full protocol decode
listening on ge1, link-type EN10MB (Ethernet), capture size 262144 bytes
[illegible]
```

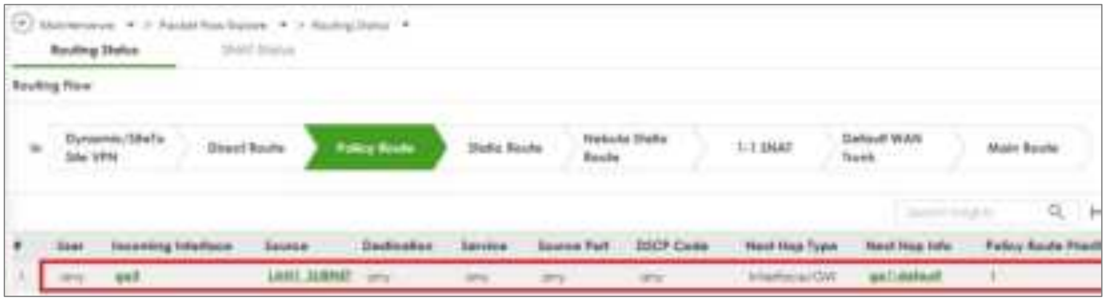
Traffic to 8.8.8.8 is being sent out through the GE1 WAN interface, indicating that the static route is not working as expected.

3. Go to ***"Maintenance > Packet Flow Explorer > Routing Status"*** to check for possible issues.



#	Destination	Gateway	Interface	Metric
1	8.8.8.8	10.214.34.254	ge2	0

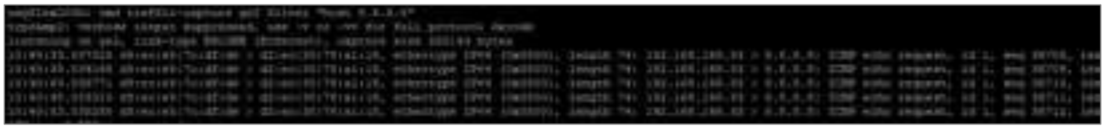
As we can see, the policy route has a higher priority than the static route, causing traffic to 8.8.8.8 to be affected by the policy route.



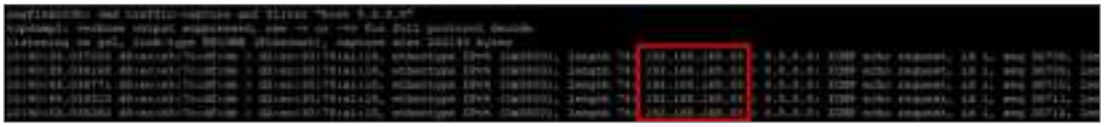
#	User	Incoming Interface	Source	Destination	Service	Source Port	DSCP Code	Next Hop Type	Next Hop Info	Policy Route Proxy
1	any	ge3	LAN1_SUBNET	any	any	any	any	Interface/GW	ge1:default	1

We can try temporarily disabling the policy route to see if traffic to 8.8.8.8 goes through the GE2 WAN interface.

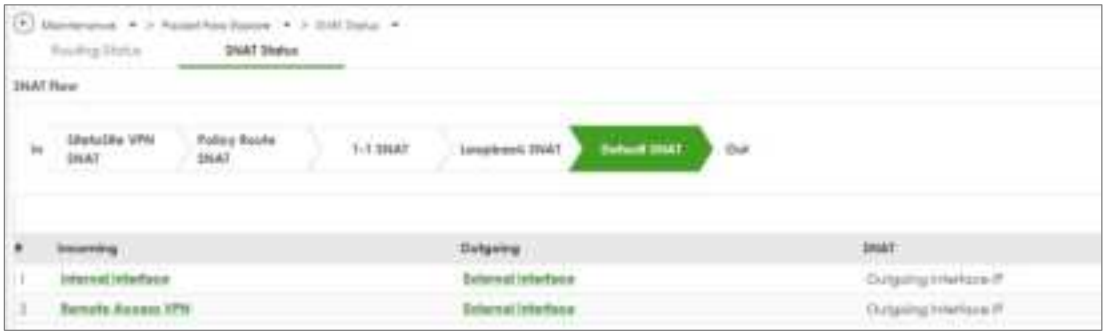
cmd traffic-capture ge2 filter "host 8.8.8.8"



Now we can see the traffic to 8.8.8.8 appearing on the GE2 WAN interface. However, there is no ICMP response from the uplink router. Upon checking the source IP, it is the LAN host's IP, but it should be the GE2 WAN interface IP. The result shows that the firewall GE2 WAN interface does not have source NAT.

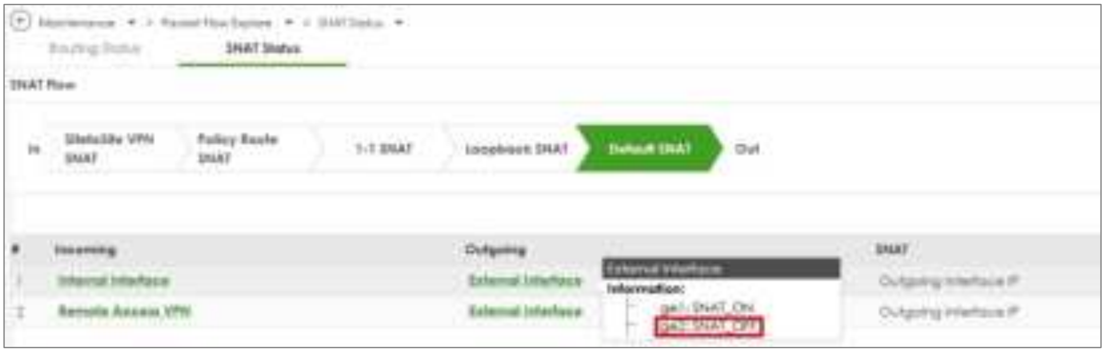


4. Go to ***“Maintenance > Packet Flow Explorer > SNAT Status”*** to check for possible issues.



#	Incoming	Outgoing	SNAT
1	Internal Interface	External Interface	Outgoing Interface IP
2	Remote Access VPN	External Interface	Outgoing Interface IP

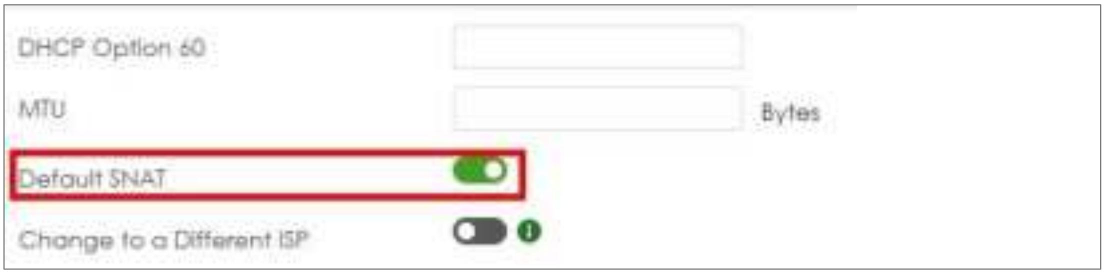
Mouse over the External interface. It indicates that SNAT is off on the GE2 WAN interface. This would be a misconfiguration on the GE2 WAN interface.



#	Incoming	Outgoing	SNAT
1	Internal Interface	External Interface	Outgoing Interface IP
2	Remote Access VPN	External Interface	Outgoing Interface IP

External Interface
Information:
ge1: SNAT_ON
ge2: SNAT_OFF

We can go to ***“Network > Interface > Interface”***, and double click ge2 to tick SNAT.



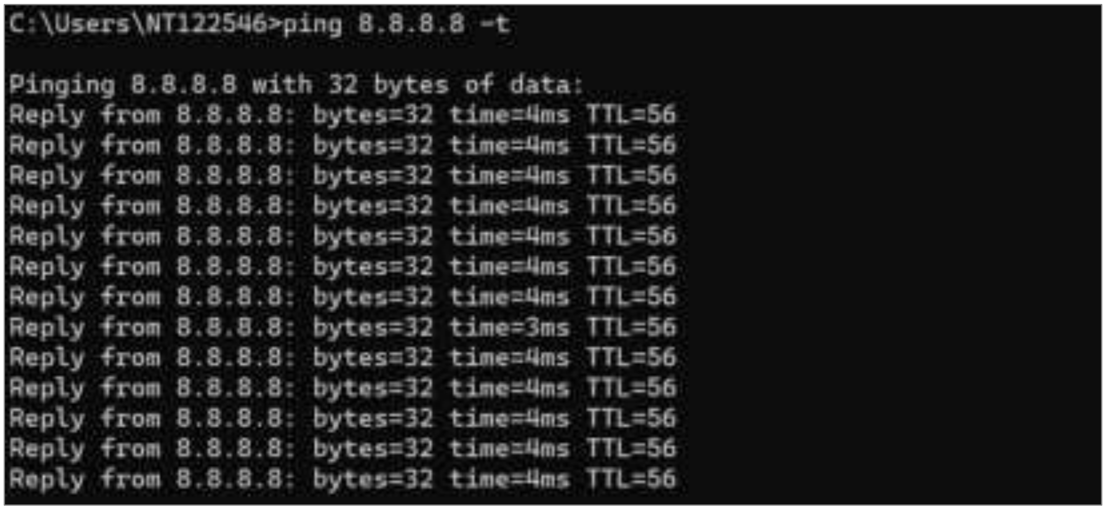
DHCP Option 60
MTU Bytes
Default SNAT ●
Change to a Different ISP ○

The above scenario is a simple example for checking routing and SNAT status in Packet Explorer.

Test the Result

Generate ICMP traffic from LAN hosts to 8.8.8.8 and confirm if the traffic is sent out through the GE2 WAN interface.

1. Run the command ***ping 8.8.8.8 -t*** in the Windows Command Prompt to check if it has an ICMP response from 8.8.8.8.



```
C:\Users\NT122546>ping 8.8.8.8 -t

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=3ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
Reply from 8.8.8.8: bytes=32 time=4ms TTL=56
```

2. Type the command ***cmd traffic-capture ge2 filter "host 8.8.8.8"*** to capture packets on the GE2 WAN interface and check if the traffic is sent out through the GE2 WAN interface.

How to set up a Link Aggregation Group (LAG) interface

A Link Aggregation Group (LAG) combines multiple Ethernet ports into a single logical link, LAG interface, between network devices. It helps to increase bandwidth and provide link redundancy.

The LAG interface of Zyxel USG FLEX H firewalls combines multiple Ethernet interfaces as members and supports three types of modes, Active-Backup, LACP (802.3ad), and Static.

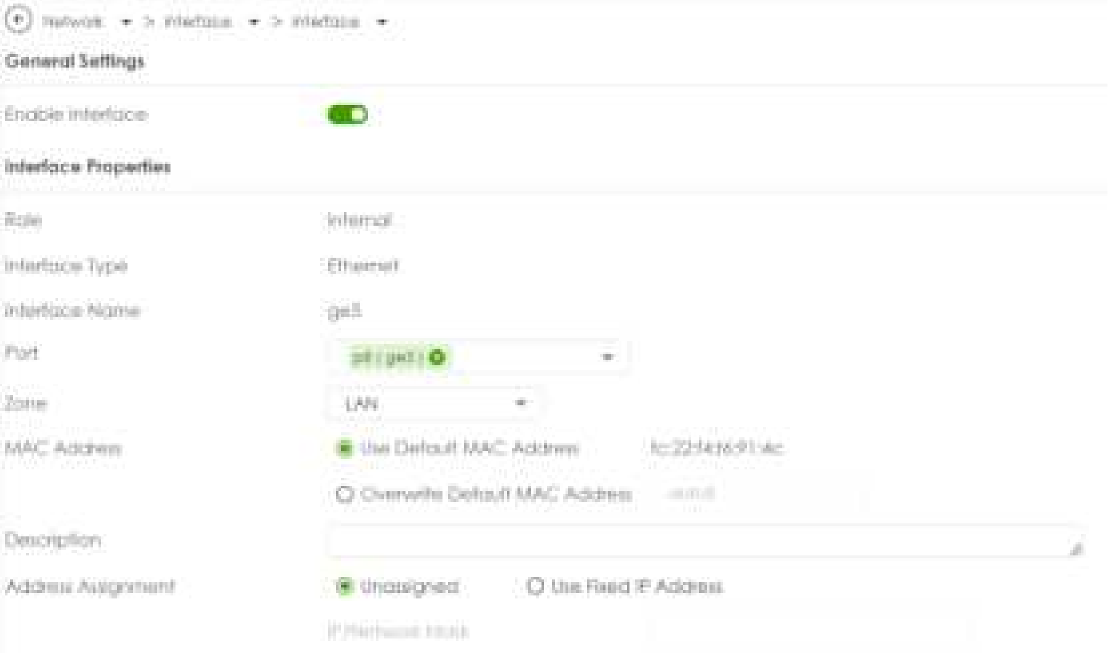
Prerequisites of Ethernet interface member

To be a member of LAG interface, the Ethernet interface must Meet all of the following conditions:

1. The Ethernet interface can only bind to one port. And the port cannot be used by other VLAN interface.
2. The Ethernet interface cannot be a member of other bridge, or LAG interface.
3. It does not have an IP address (must be set to unassigned).
4. It cannot have MAC address overwrite settings, must use default MAC address.
5. The interface must not be referenced by any other configurations except the Zone.

Create a LAG interface

1. Edit the member Ethernet interfaces and make sure the MAC address is set to use default MAC address and the Address Assignment is set to unassigned.



Network ▾ > Interface ▾ > Interface ▾

General Settings

Enable Interface: On

Interface Properties

Role: Internal

Interface Type: Ethernet

Interface Name: ge5

Port: p8 | ge5 |

Zone: LAN

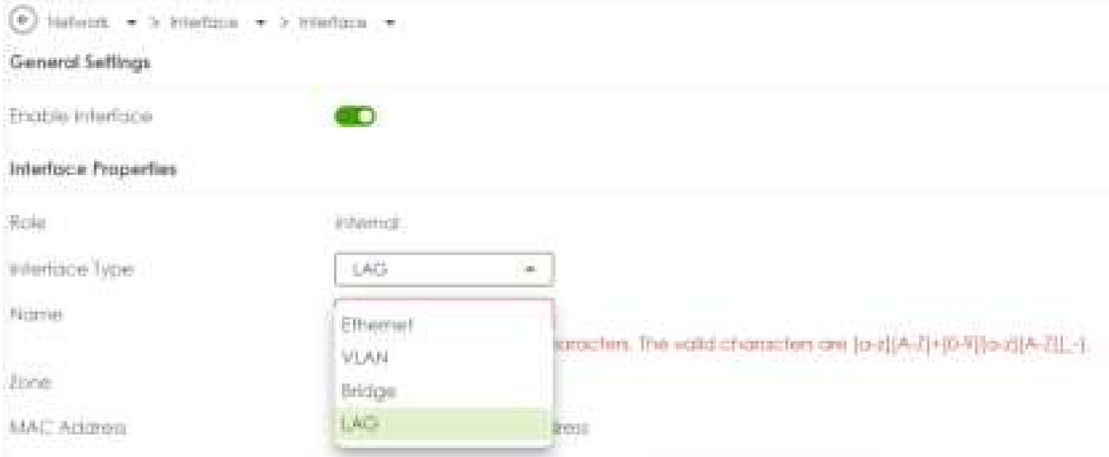
MAC Address: ● Use Default MAC Address fc:22:f4:f6:91:4c
○ Overwrite Default MAC Address

Description:

Address Assignment: ● Unassigned ○ Use Fixed IP Address

IP/Netmask Mask

2. Click +Add to create an interface and select the Interface Type as LAG.



Network ▾ > Interface ▾ > Interface ▾

General Settings

Enable Interface: On

Interface Properties

Role: Internal

Interface Type: LAG

Name

Zone

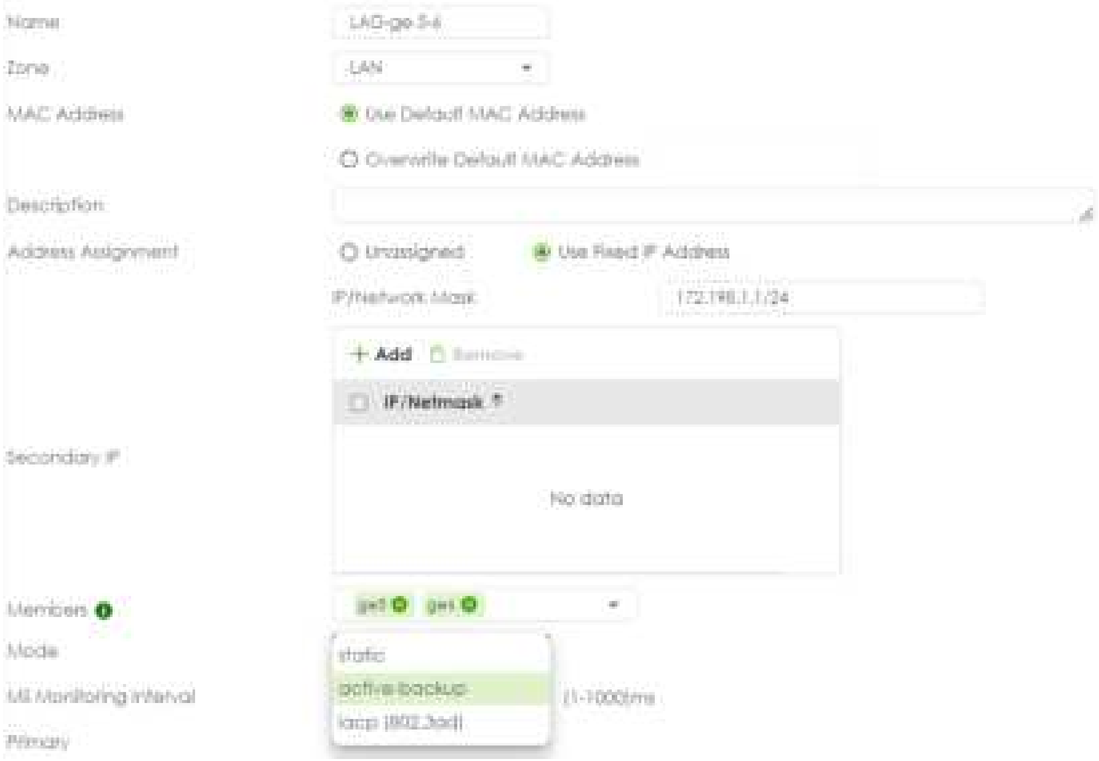
MAC Address

Ethernet
VLAN
Bridge
LAG
aracters. The valid characters are [a-z][A-Z]+[0-9][a-z][A-Z][_-].
ress

Note:

- LAG support interface Role: **External, Internal** and **General**
- When the interface role is external, the LAG IP address does not support PPPoE or PPPoE with a static IP

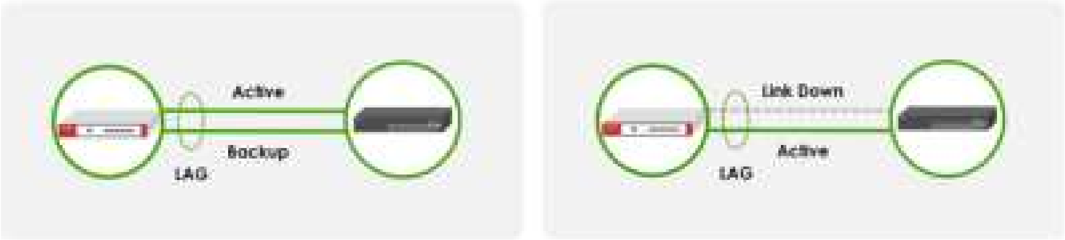
3. Select the LAG mode



Name	LAG-ge 5-6
Zone	LAN
MAC Address	● Use Default MAC Address ○ Overwrite Default MAC Address
Description	
Address Assignment	○ Unassigned ● Use Fixed IP Address
	IP/Network Mask 172.198.1.1/24
Secondary IP	+ Add Remove □ IP/Netmask No data
Members	ge5 ge6
Mode	static active-backup lacp (802.3ad)
MII Monitoring interval	(1-1000)ms
Primary	

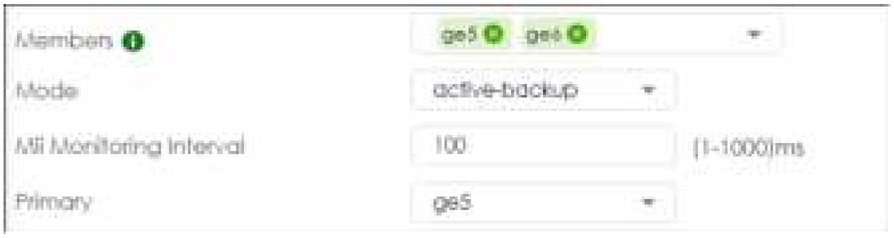
LAG mode: Active-Backup

Provides automatic link failover by keeping backup ports not transmitting traffic until the primary port experiences a link-down event.



Mii Monitoring Interval: Defines how frequently the system checks if a LAG member interface is active or down

Primary: Allows you to specify which member interface should be preferred as the active link

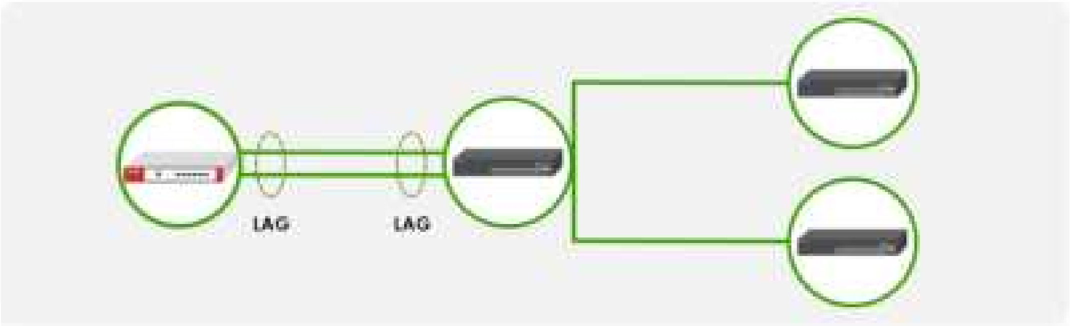


Members	ge5 ge6	
Mode	active-backup	
Mii Monitoring Interval	100	(1-1000)ms
Primary	ge5	

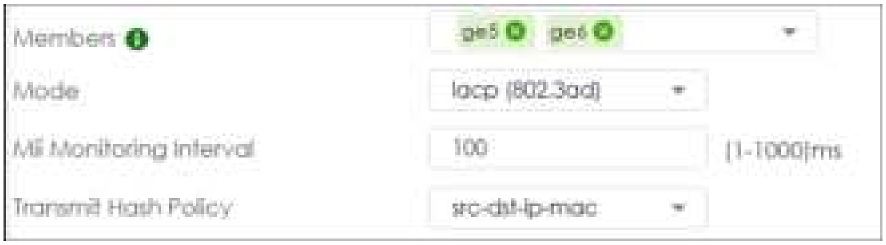
LAG mode: LACP (802.3ad)

Provides automatic link failover and load sharing by allowing all ports in the LAG group to transmit traffic. The LACP messages will be periodically sent.

When in LACP mode, the connected Switch must also configure LACP mode for the physical ports that connect to the USG FLEX H Firewall.



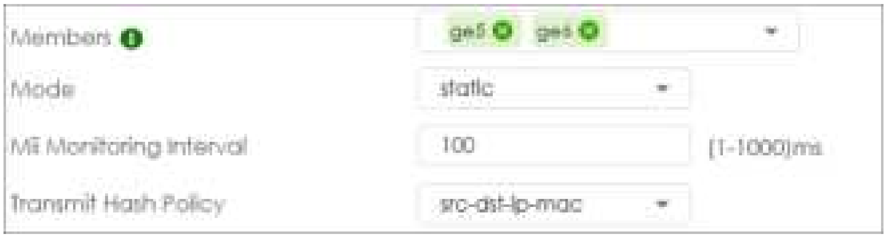
Transmit Hash Policy: Determine how outgoing traffic is distributed across the aggregated links. The default option is **src-dst-ip-mac**. Select **src-dst-ip-mac** to distribute traffic more efficiently by considering both source-destination IP and MAC.



Members	ge5 ge6	
Mode	lacp (802.3ad)	
MII Monitoring Interval	100	(1-1000)ms
Transmit Hash Policy	src-dst-ip-mac	

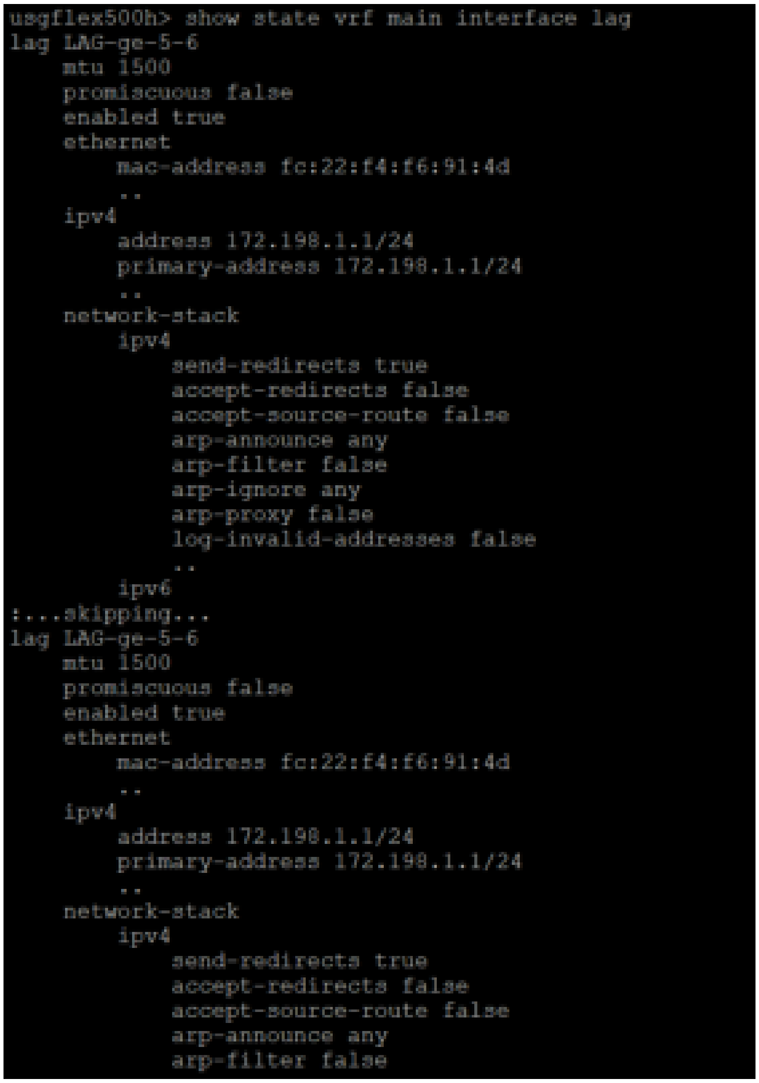
LAG Mode: Static

All ports in the LAG group will be always active for link failover and load balancing. The use case is when using legacy networking equipment that doesn't support LACP. When in LACP mode, the connected Switch must also configure LACP mode for the physical ports that connect to the USG FLEX H Firewall. When in Static mode, the connected Switch must also configure Static Trunk mode for the physical ports that connect to the USG FLEX H Firewall.



Members	ge5 ge6	
Mode	static	
MII Monitoring Interval	100	(1-1000)ms
Transmit Hash Policy	src-dst-ip-mac	

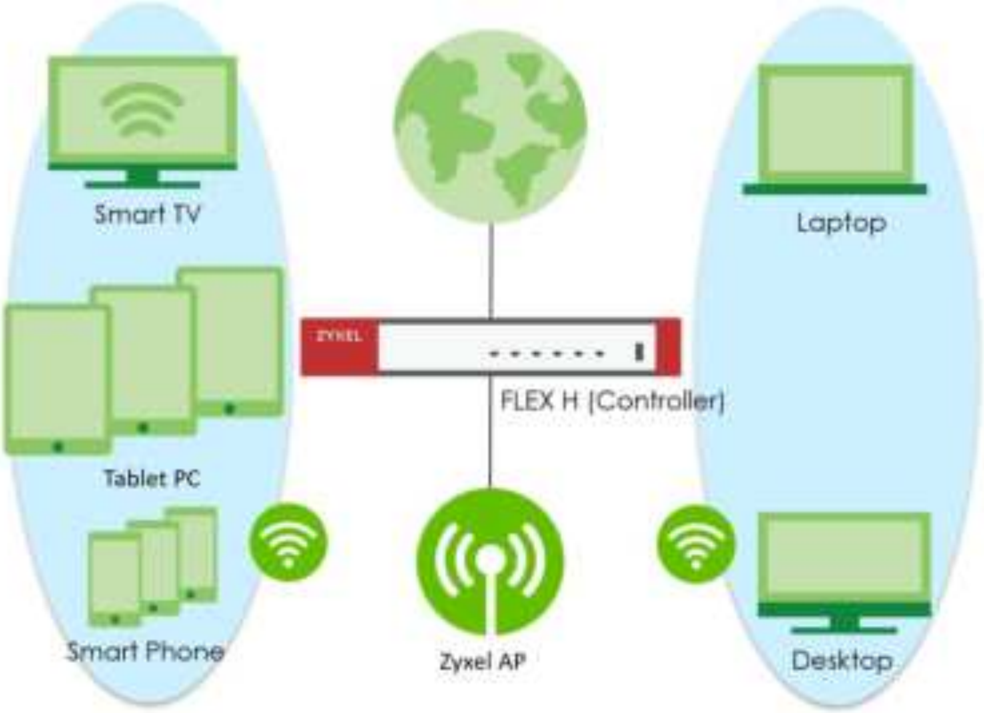
Checked by CLI: show state vrf main interface lag



```
usgflex500h> show state vrf main interface lag
lag LAG-ge-5-6
    mtu 1500
    promiscuous false
    enabled true
    ethernet
        mac-address fc:22:f4:f6:91:4d
        ..
    ipv4
        address 172.198.1.1/24
        primary-address 172.198.1.1/24
        ..
    network-stack
        ipv4
            send-redirects true
            accept-redirects false
            accept-source-route false
            arp-announce any
            arp-filter false
            arp-ignore any
            arp-proxy false
            log-invalid-addresses false
            ..
        ipv6
:...skipping...
lag LAG-ge-5-6
    mtu 1500
    promiscuous false
    enabled true
    ethernet
        mac-address fc:22:f4:f6:91:4d
        ..
    ipv4
        address 172.198.1.1/24
        primary-address 172.198.1.1/24
        ..
    network-stack
        ipv4
            send-redirects true
            accept-redirects false
            accept-source-route false
            arp-announce any
            arp-filter false
```

How to Set Up AP Control Service for Zyxel APs

In today's digital landscape, wireless networks have become a critical infrastructure for businesses and organizations. As the number of connected devices continues to rise and network demands grow, managing and optimizing wireless environments has become increasingly challenging. Serving as the backbone of centralized Wi-Fi management, wireless controllers play a vital role in enhancing network stability, security, and operational efficiency. This article delves into the key functions of wireless controllers, their application scenarios, and their importance in enterprise network architecture. This is an example of using USG FLEX H series to manage the Zyxel Access Points (APs) and allow wireless access to the network.

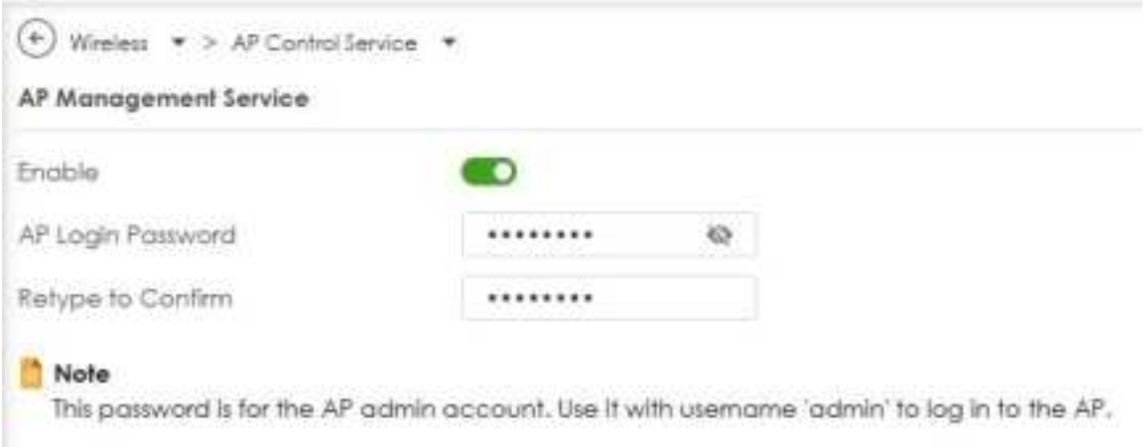


Note: All network IP addresses and subnet masks are used as examples in this article. Please replace them with your actual network IP addresses and subnet masks. This example was tested using USG FLEX 200H (Firmware Version: uOS 1.32).

Set Up the AP Management on the FLEX H series

In the USG FLEX H, go to Wireless > AP Control Service, enable the AP Management Service, and set the AP login password.

Wireless > AP Control Service



Wireless > AP Control Service

AP Management Service

Enable: ●

AP Login Password: ••••••••

Retype to Confirm: ••••••••

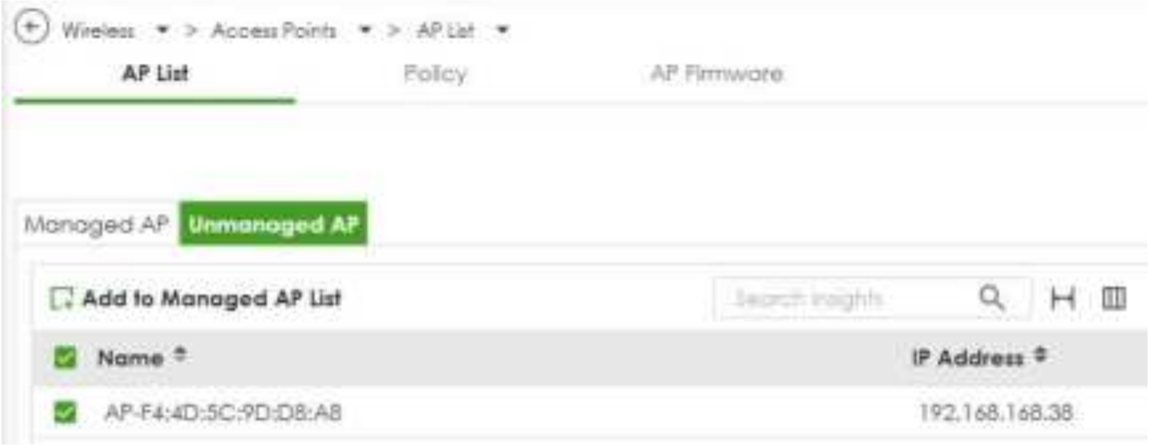
Note

This password is for the AP admin account. Use it with username 'admin' to log in to the AP.

Connect the Zyxel AP unit to the lan interface.

Go to Wireless > Access Points > AP List. The Zyxel AP will be listed under Unmanaged AP tab. Tick the AP and click "Add to Managed AP List.

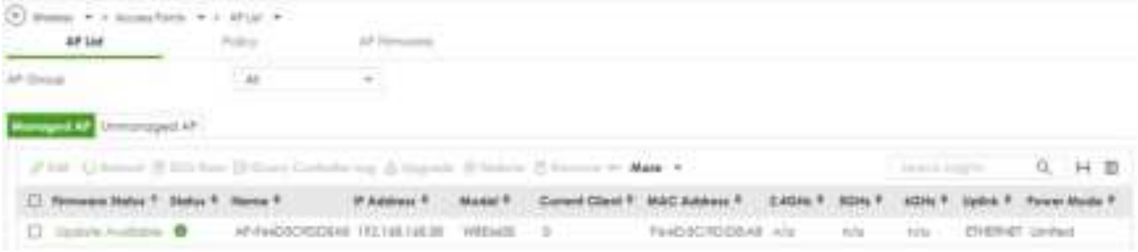
Wireless > Access Points > AP List > Unmanaged AP



☑ Name	IP Address
☑ AP-F4:4D:5C:9D:D8:A8	192.168.168.38

Once the actions above are completed, the AP will be listed in the Managed AP tab.

Wireless > Access Points > AP List > Managed AP



Wireless > Access Points > AP List

AP List | Policy | AP Firmware

AP Group: All

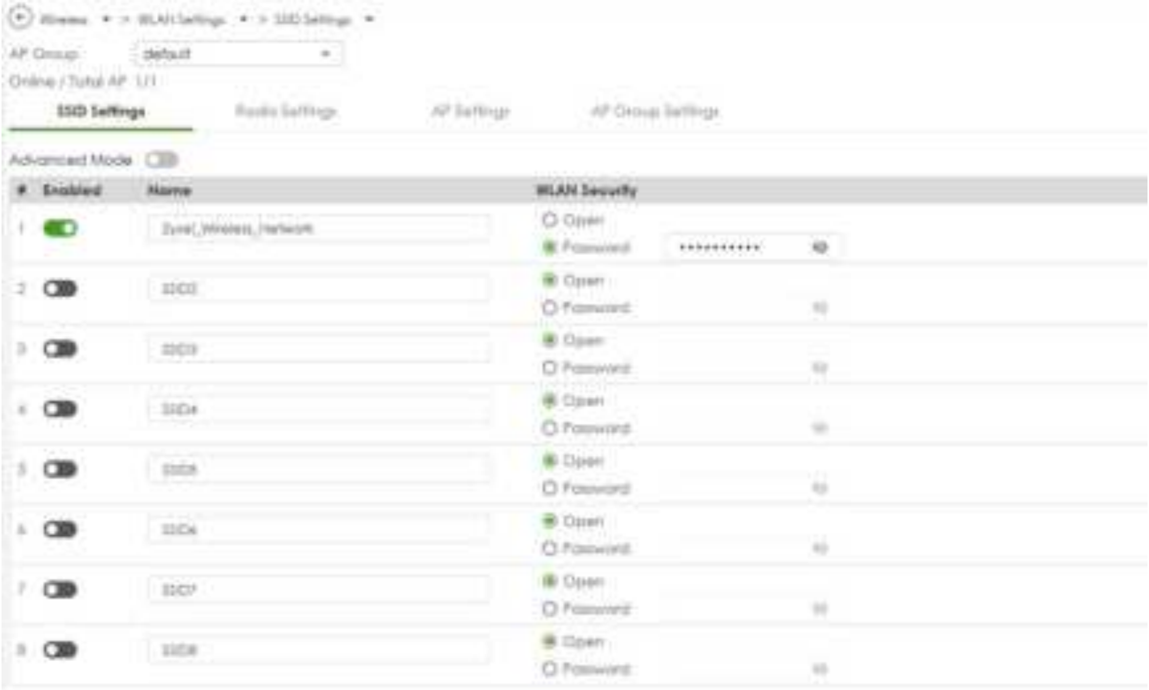
Managed AP | Unmanaged AP

□	Firmware Status	Status	Name	IP Address	Model	Current Client	MAC Address	2.4GHz	5GHz	6GHz	Uplink	Power Mode
□	Update Available	●	AP-F44D5C9DD8A8	192.168.168.38	WBE660S	0	F44D5C9DD8A8	n/a	n/a	n/a	ETHERNET	Limited

Note: The APs may take few minutes to appear in the Managed AP List.

Go to Wireless > WLAN Settings > SSID Settings to configure a name for the SSID and set a password for WLAN security.

Wireless > WLAN Settings > SSID Settings



Wireless > WLAN Settings > SSID Settings

AP Group: default

Online / Total AP: 1/1

SSID Settings | Radio Settings | AP Settings | AP Group Settings

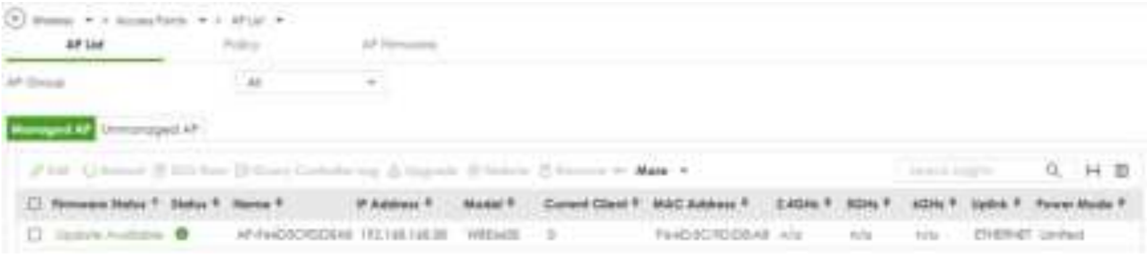
Advanced Mode

#	Enabled	Name	WLAN Security
1	On	Zyxel_Wireless_Network	○ Open ● Password ***********
2	Off	SSID2	● Open ○ Password
3	Off	SSID3	● Open ○ Password
4	Off	SSID4	● Open ○ Password
5	Off	SSID5	● Open ○ Password
6	Off	SSID6	● Open ○ Password
7	Off	SSID7	● Open ○ Password
8	Off	SSID8	● Open ○ Password

Test the Result

Go to Wireless > Access Points > AP List > Managed AP tab. You can check the list of APs currently connected, along with detailed information such as IP address, model name, current clients, MAC address, and radio information.

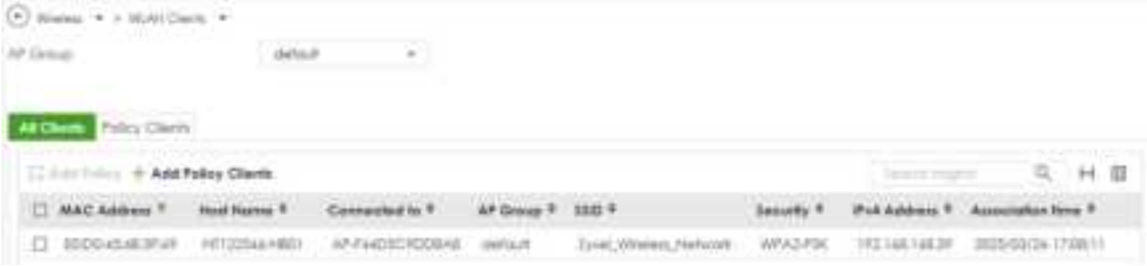
Wireless > Access Points > AP List > Managed AP



□	Firmware Status	Status	Name	IP Address	Model	Current Client	MAC Address	2.4GHz	5GHz	6GHz	Uplink	Power Mode
□	Update Available	●	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	n/a	n/a	n/a	ETHERNET	Limited

Go to the Wireless > WLAN clients, you can check the list of wireless stations associated with a managed AP and the details information such as SSID Name, Security, IPv4 Address, and association time.

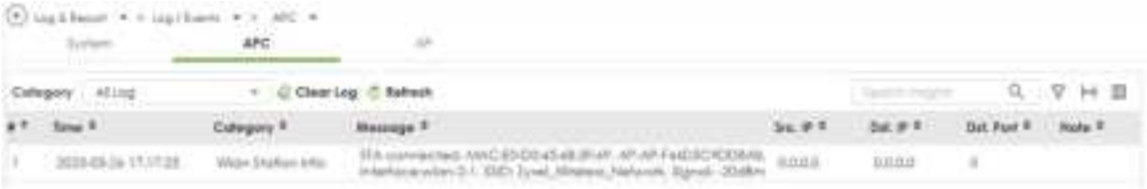
Wireless > WLAN clients



□	MAC Address	Host Name	Connected to	AP Group	SSID	Security	IPv4 Address	Association time
□	[illegible]	[illegible]	[illegible]	default	Zyxel_Wireless_Network	WPA2-PSK	[illegible]	[illegible]

Using a laptop to connect to SSID: Zyxel_Wireless_Network and type the password for authentication. Go to the Log & Report > Log / Events > APC, you will see WLAN Station Info as shown below.

Log & Report > Log / Events > APC



#	Time	Category	Message	Src. IP	Dst. IP	Dst. Port	Note
1	[illegible]	Wlan Station Info	[illegible]	0.0.0.0	0.0.0.0	0	

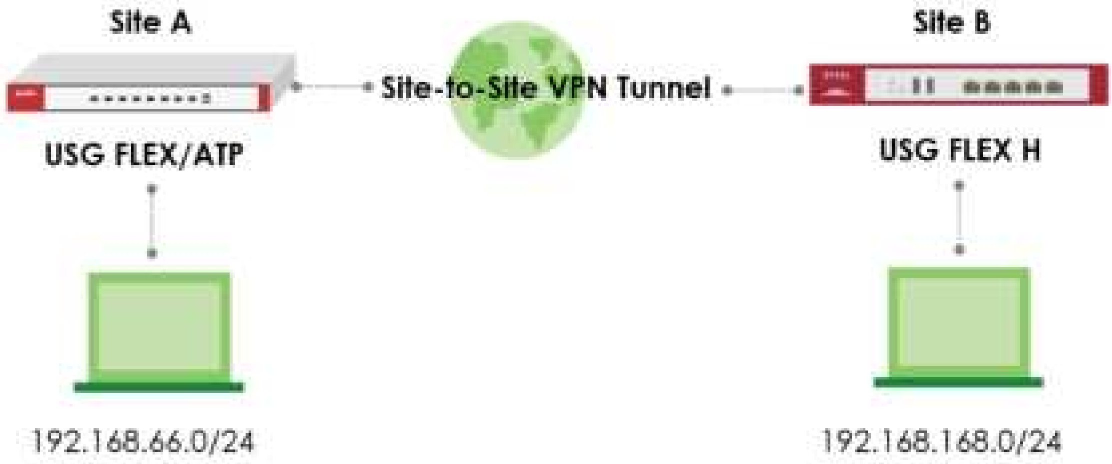
What Could Go Wrong?

If you can't see AP information in the AP List, please check the number of APs connected to the USG FLEX H firewall has exceeded the maximum Managed AP number it can support. If your mobile device can't access to the Internet via AP connects to the USG FLEX H firewall, please check if the LAN outgoing security policy allow access to the Internet.

Chapter 6- Nebula

How to Set Up Nebula site-to-site VPN on the USG FLEX H?

This example shows how to use Nebula VPN to establish Site to Site VPN tunnel between USG FLEX H and USG FLEX/ATP. The example instructs how to configure the Nebula Site-to-Site VPN using the Nebula Control Center. Once the Site-to-Site VPN tunnel is established, LAN hosts can communicate with each other through the VPN tunnel seamlessly.

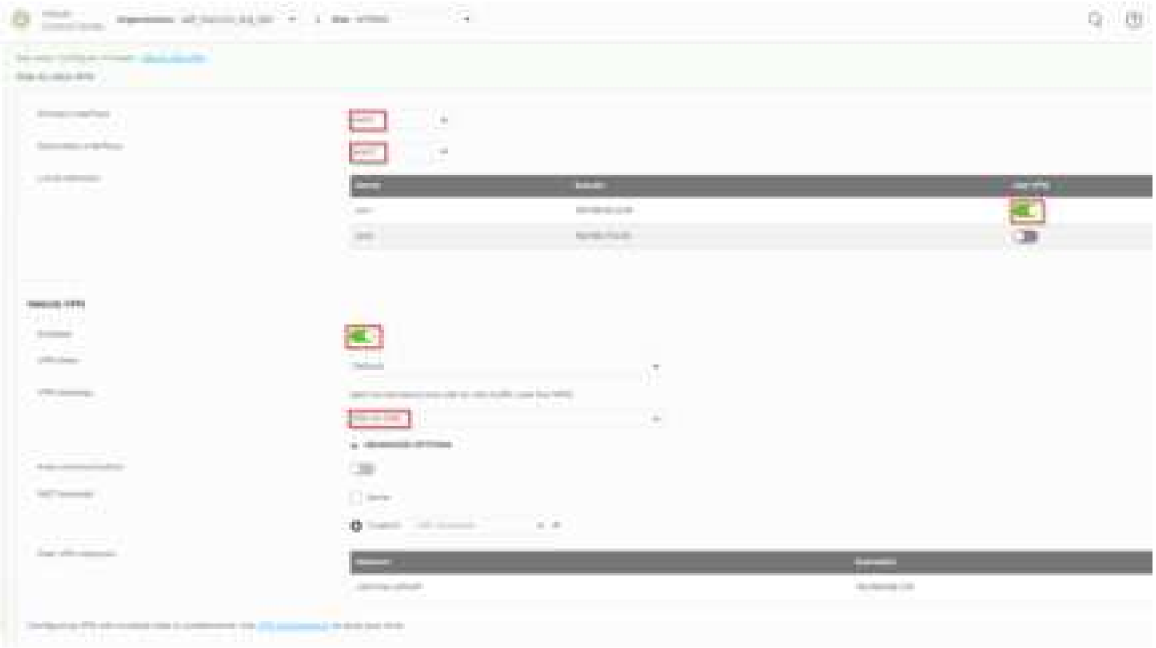


Note: Please ensure that Nebula firewalls are already connected to the Nebula Control Center. Additionally, ensure that all network IP addresses and subnet masks do not overlap, as show in the examples provided in this article. USG FLEX H series supported firmware version with uOS 1.31 and above.

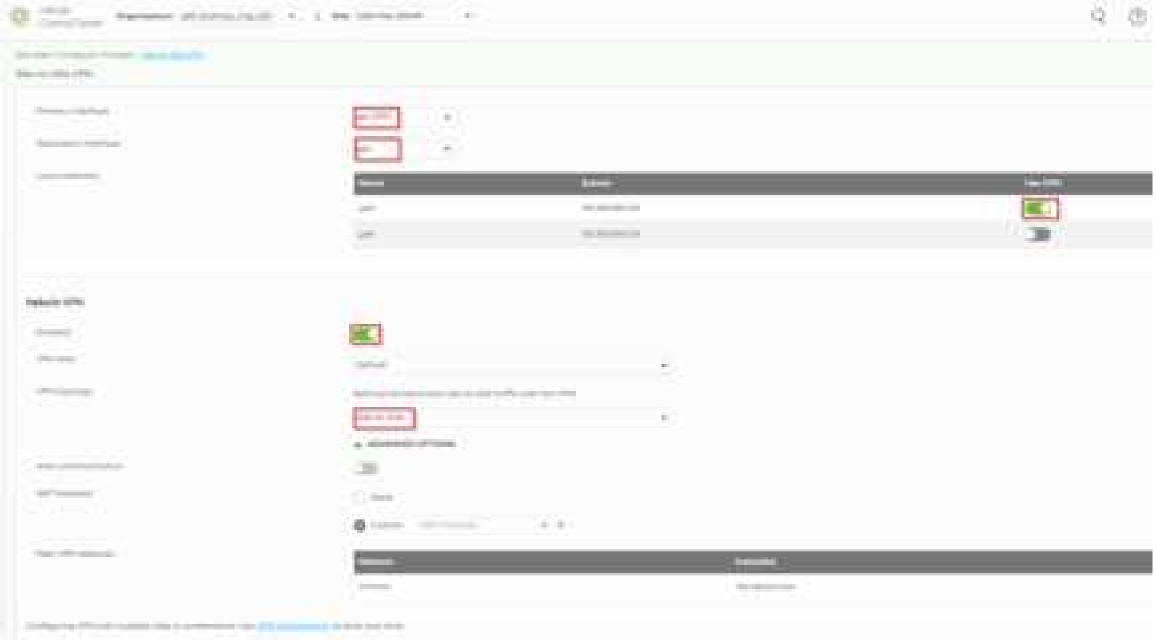
Set Up the Site-to-Site VPN settings on the Nebula Firewall

On Nebula (https://nebula.zyxel.com/) Navigate to Side-wide > Configure > Firewall > Site-to-Site VPN > Configure the Primary interface, Secondary interface (backup interface), on the local networks, enabling the interface will require routing through the VPN. Enable the Nebula VPN and choose the Site-to-Site VPN topology.

USG FLEX/ATP site

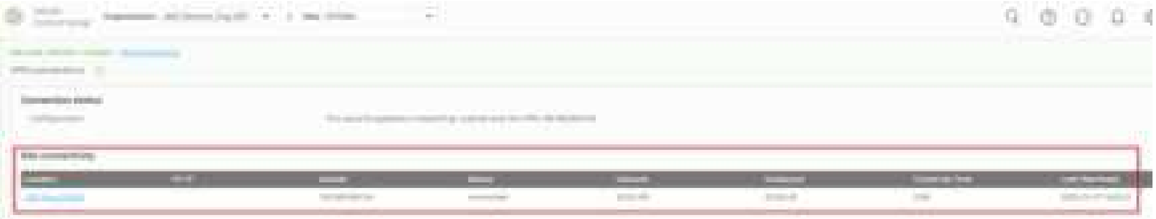


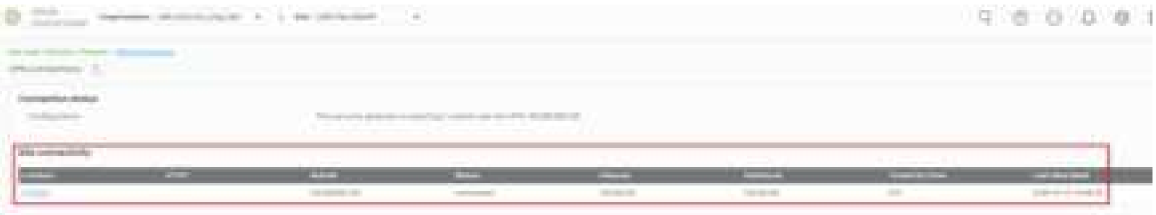
USG FLEX H site



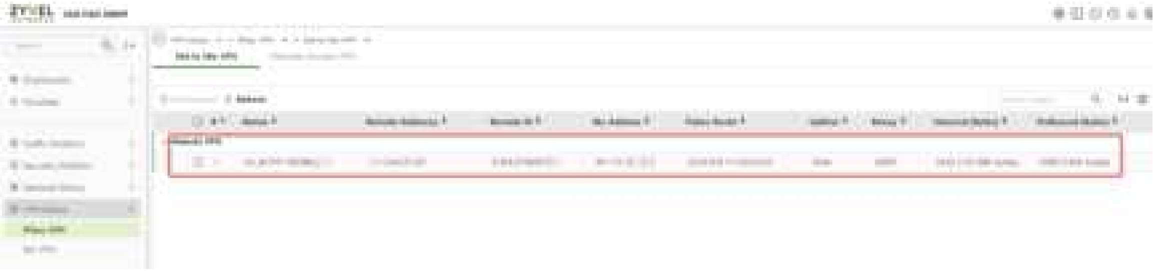
Verify the VPN Connection

Navigate to Side-wide > Firewall > VPN connections to check the site-to-site VPN connection was connected successfully on both sites.



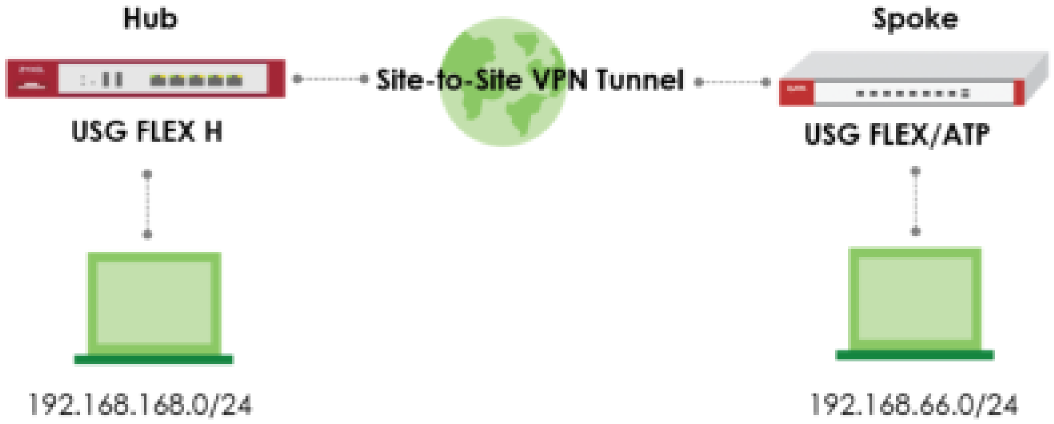


Navigate to the Web-GUI path VPN Status > IPsec VPN > Site to Site VPN of the USG FLEX H to check the Nebula VPN connection was connected successfully.



How to Set Up Nebula Hub-and-Spoke VPN on USG FLEX H (Hub site)?

This example shows how to establish Hub-and-Spoke VPN tunnel between USG FLEX H and USG FLEX/ATP. The example instructs how to configure the Nebula Site-to-Site VPN using the Nebula Control Center. Once the Hub-and-Spoke VPN tunnel is established, LAN hosts can communicate with each other through the VPN tunnel seamlessly.

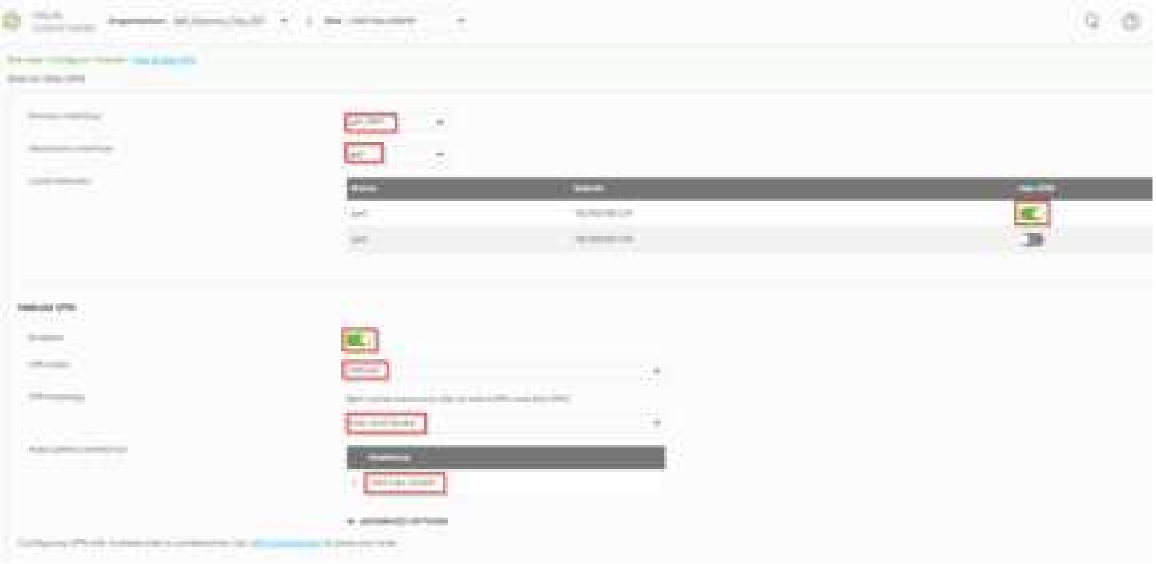


Note: Please ensure that Nebula firewalls are already connected to the Nebula Control Center. Additionally, ensure that all network IP addresses and subnet masks do not overlap, as show in the examples provided in this article. USG FLEX H series supported firmware version with uOS 1.31 and above.

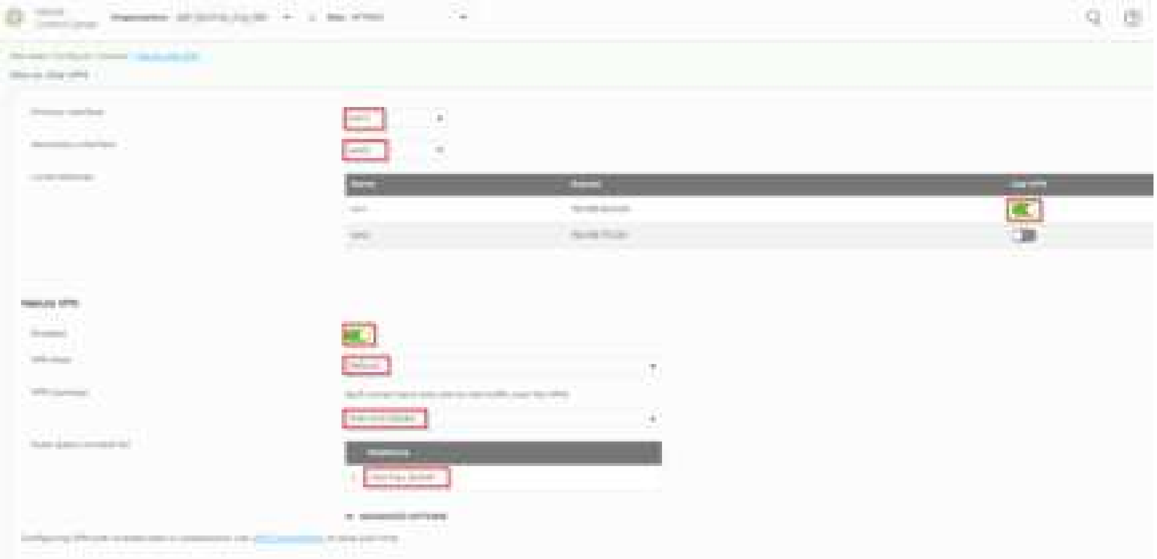
Set Up the Hub-and-Spoke VPN settings on the Nebula Firewall

On Nebula (https://nebula.zyxel.com/) Navigate to Side-wide > Configure > Firewall > Site-to-Site VPN > Configure the Primary interface, Secondary interface (backup interface), on the local networks, enabling the interface will require routing through the VPN. Enable the Nebula VPN and choose the Hub-and-Spoke VPN topology and ensure that the USG FLEX H is set as the Hub site.

USG FLEX H site

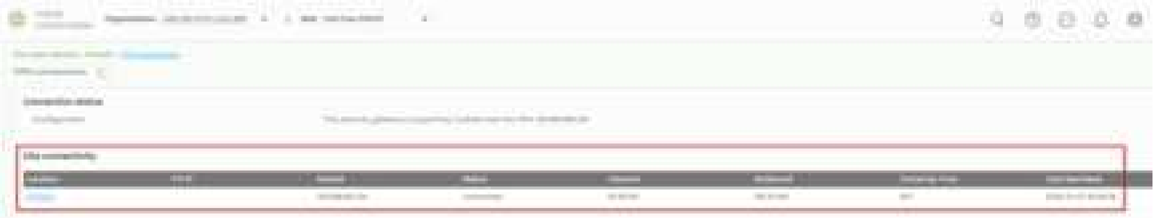


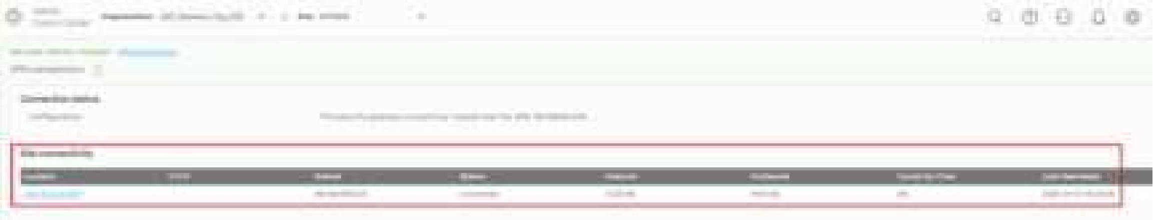
USG FLEX/ATP site



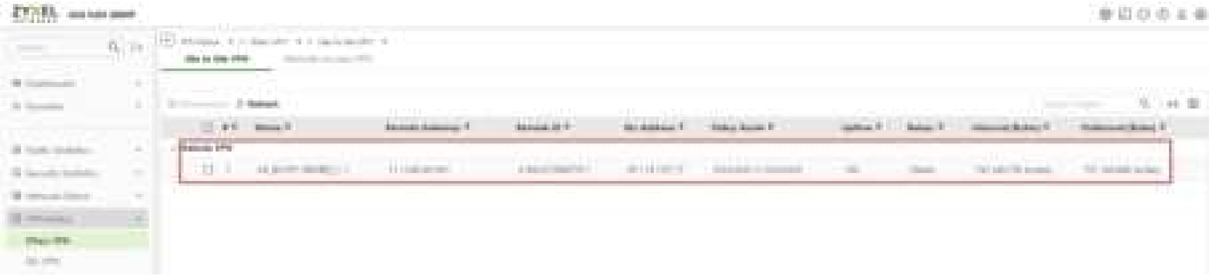
Verify The VPN Connection

Navigate to Side-wide > Firewall > VPN connections to check the site-to-site VPN connection was connected successfully on both sites.



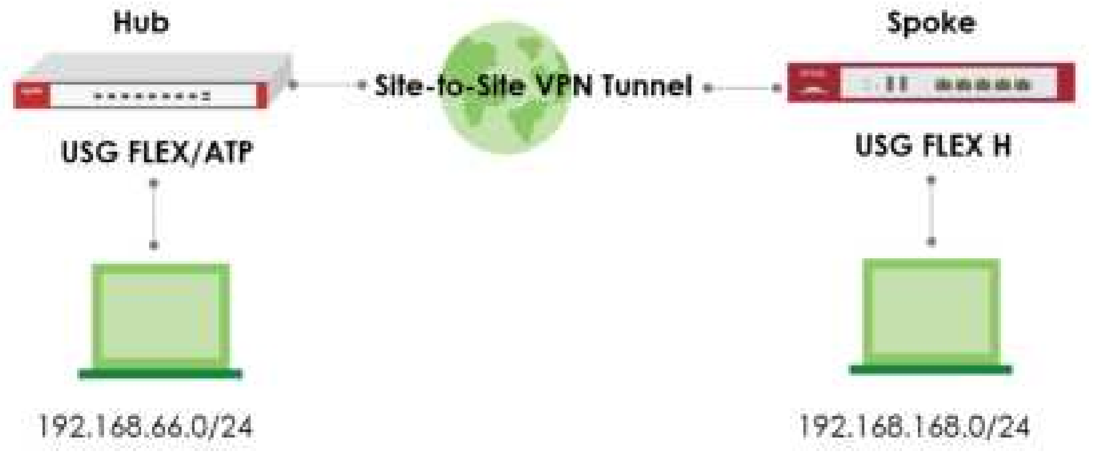


Navigate to the Web-GUI path VPN Status > IPsec VPN > Site to Site VPN of the USG FLEX H to check the Nebula VPN connection was connected successfully.



How to Set Up Nebula Hub-and-Spoke VPN on USG FLEX H (Spoke site)?

This example shows how to use Nebula VPN to establish Hub-and-Spoke VPN tunnel between USG FLEX/ATP and USG FLEX H. The example instructs how to configure the Nebula Site-to-Site VPN using the Nebula Control Center. Once the Hub-and-Spoke VPN tunnel is established, LAN hosts can communicate with each other through the VPN tunnel seamlessly.

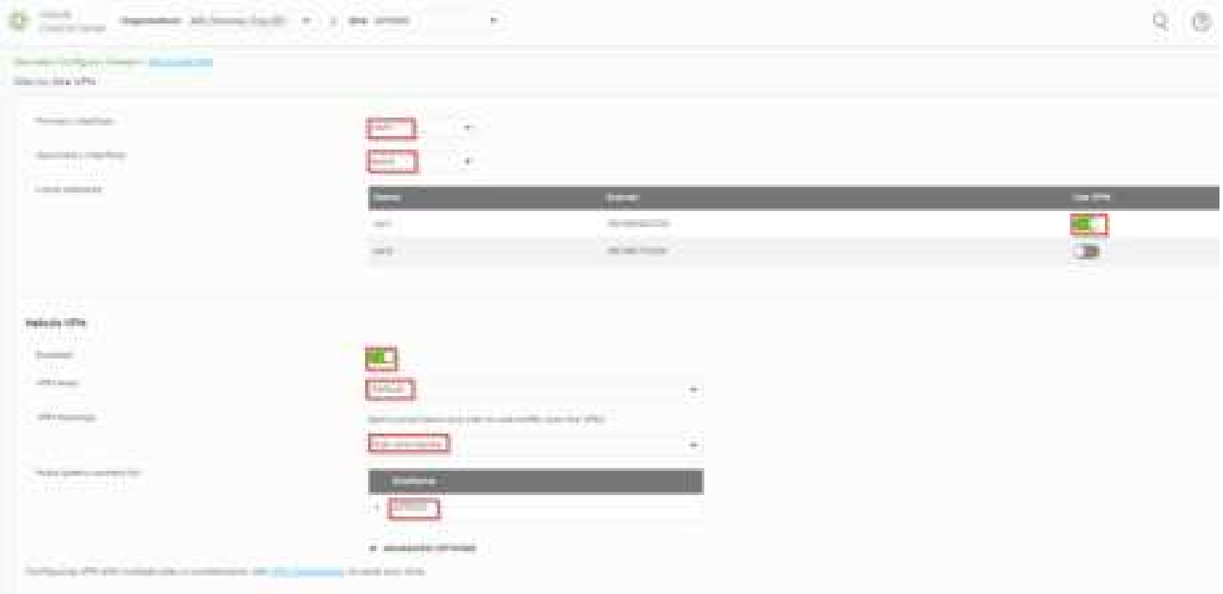


💡 Note: Please ensure that Nebula firewalls are already connected to the Nebula Control Center. Additionally, ensure that all network IP addresses and subnet masks do not overlap, as show in the examples provided in this article. USG FLEX H series supported firmware version with uOS 1.31 and above.

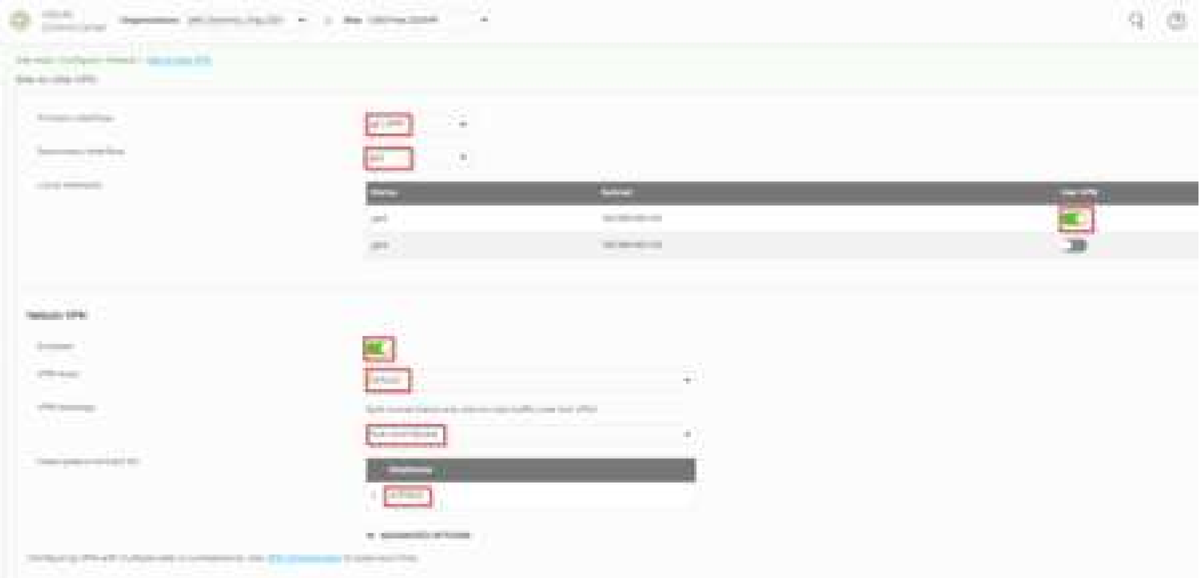
Set Up the Hub-and-Spoke VPN settings on the Nebula Firewall

On Nebula (https://nebula.zyxel.com/) Navigate to Side-wide > Configure > Firewall > Site-to-Site VPN > Configure the Primary interface, Secondary interface (backup interface), on the local networks, enabling the interface will require routing through the VPN. Enable the Nebula VPN and choose the Hub-and-Spoke VPN topology and ensure that the USG FLEX H series is set as the Spoke site.

USG FLEX/ATP site

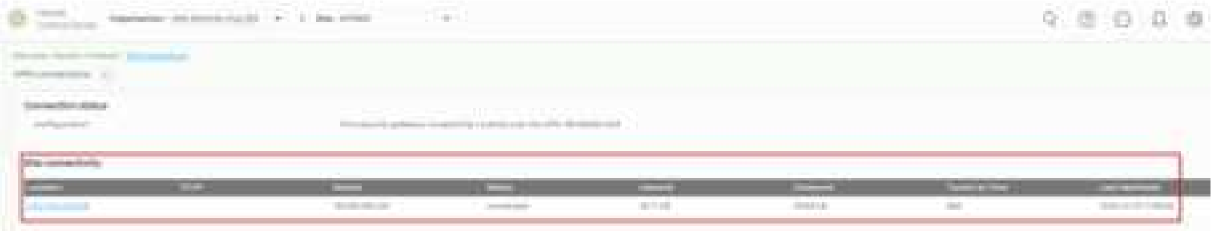


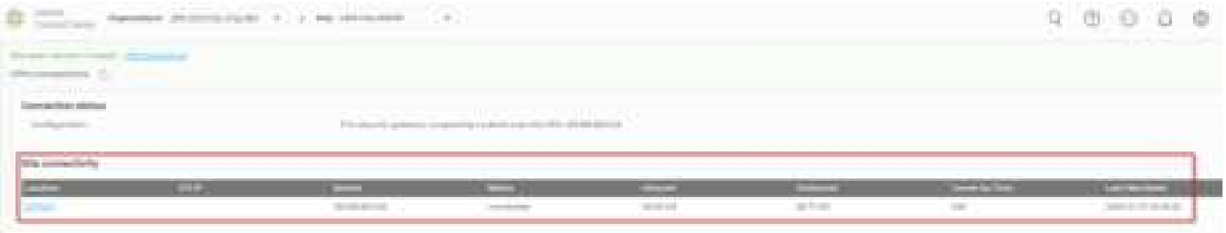
USG FLEX H site



Verify The VPN connection

Navigate to Side-wide > Firewall > VPN connections to check the site-to-site VPN connection was connected successfully on both sites.





Navigate to the Web-GUI path VPN Status > IPsec VPN > Site to Site VPN of the USG FLEX H to check the Nebula VPN connection was connected successfully.