Technical Guide

Site-to-Site VPN

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Table of Contents

1 Introduction

Virtual private networks (VPNs) provide a way for secure connections to be established across the public network by tunneling the traffic. VPNs generally fall into two types—remote-access VPN and site-to-site VPN. Remote-access VPNs can be used to securely connect a host to a private network. For example, companies can allow staff to remotely access the file servers or other resources on the headquarters' intranet from an outside network using remote VPNs. With site-to-site VPNs, separate private networks could be joined for data sharing or other purposes. For example, private networks of different office branches of a company or even private networks of different companies can be joined.

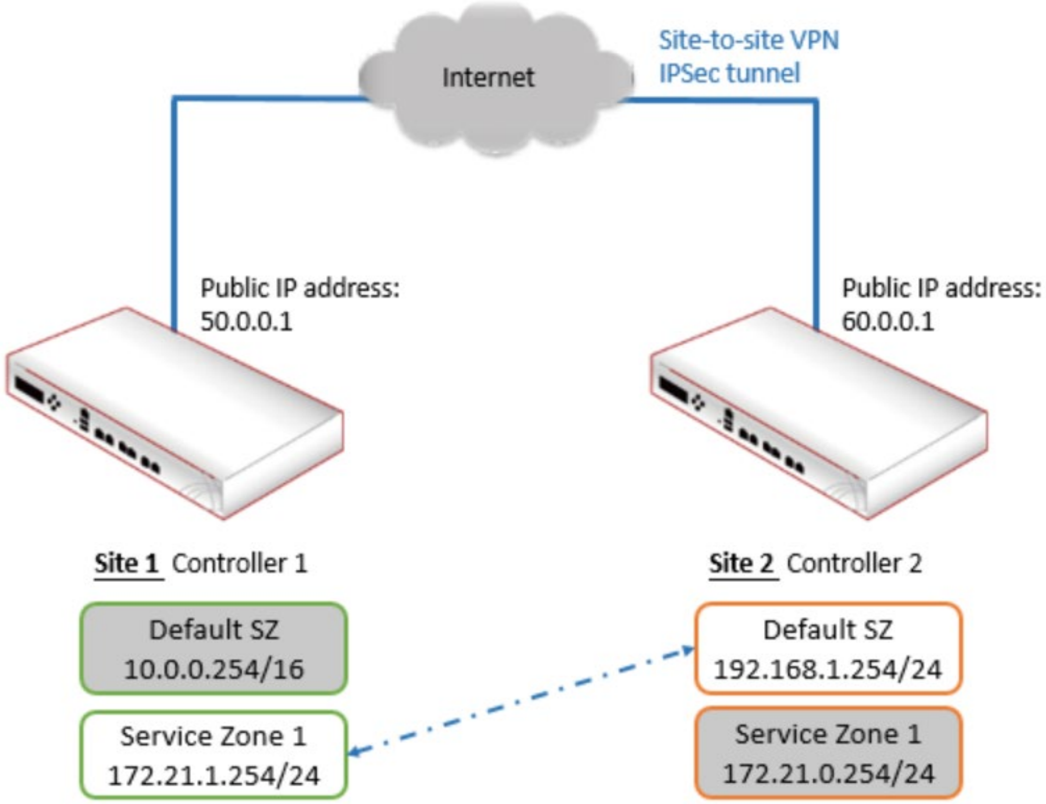
In this technical guide, the Site-to-Site VPN feature on the controller is introduced, and guidance on how to build and configure an exemplary site-to-site VPN is provided through step-by-step explanations.

1.1 Exemplary Site-to-Site VPN

The exemplary site-to-site VPN is to be established between Site 1 and Site 2, and at least one controller is placed at each site for establishing the VPN. On each controller, multiple Local Sites and Remote Sites can be added to create multiple site-to-site VPNs. The terms "local" and "remote" are with respect to the current controller. Careful prior planning of the Local Subnet – Remote Subnet mapping is advised.

An important thing to keep in mind is that any of the network segments used for Local and Remote Subnets cannot overlap. For example, if a site-to-site VPN is to be established between the network segment of Service Zone 1 on controller 1 at Site 1 and the network segment of Service Zone 1 on controller 2 at Site 2, the two Service Zones cannot be assigned the same network segment. Furthermore, the network segments of Remote Subnets also cannot overlap with the network segments of any of the Service Zones on the local controller even if these Service Zones are disabled.

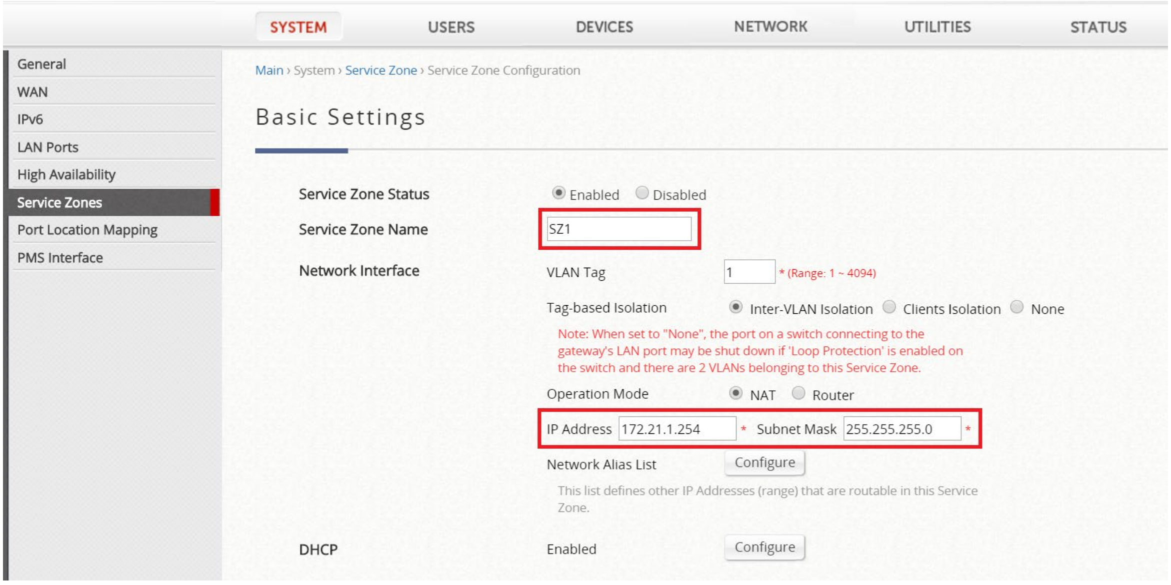
Here, the site-to-site VPN will be established between Service Zone 1 of the controller at Site 1 and the Default Service Zone of the controller at Site 2. See diagram below.



2 Configurations

2.1 Site 1 Controller

a. Go to *System > Service Zone > Service Zone Configuration*, configure the Network Interface as desired. Here, Service Zone 1 is chosen, with its Network Interface set to 172.21.1.254/255.255.255.0.



Basic Settings

Service Zone Status ● Enabled ○ Disabled

Service Zone Name SZ1

Network Interface

VLAN Tag 1 * (Range: 1 ~ 4094)

Tag-based Isolation ● Inter-VLAN Isolation ○ Clients Isolation ○ None

Note: When set to "None", the port on a switch connecting to the gateway's LAN port may be shut down if 'Loop Protection' is enabled on the switch and there are 2 VLANs belonging to this Service Zone.

Operation Mode ● NAT ○ Router

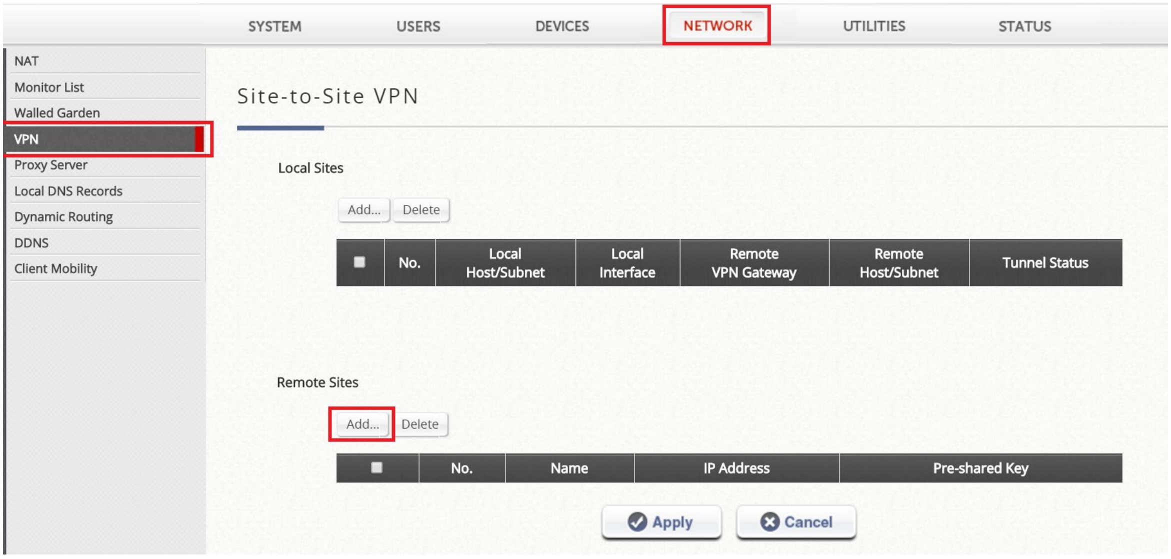
IP Address 172.21.1.254 * Subnet Mask 255.255.255.0 *

Network Alias List

This list defines other IP Addresses (range) that are routable in this Service Zone.

DHCP Enabled

b. Go to *Network > VPN*, click Add under Remote Sites.



Site-to-Site VPN

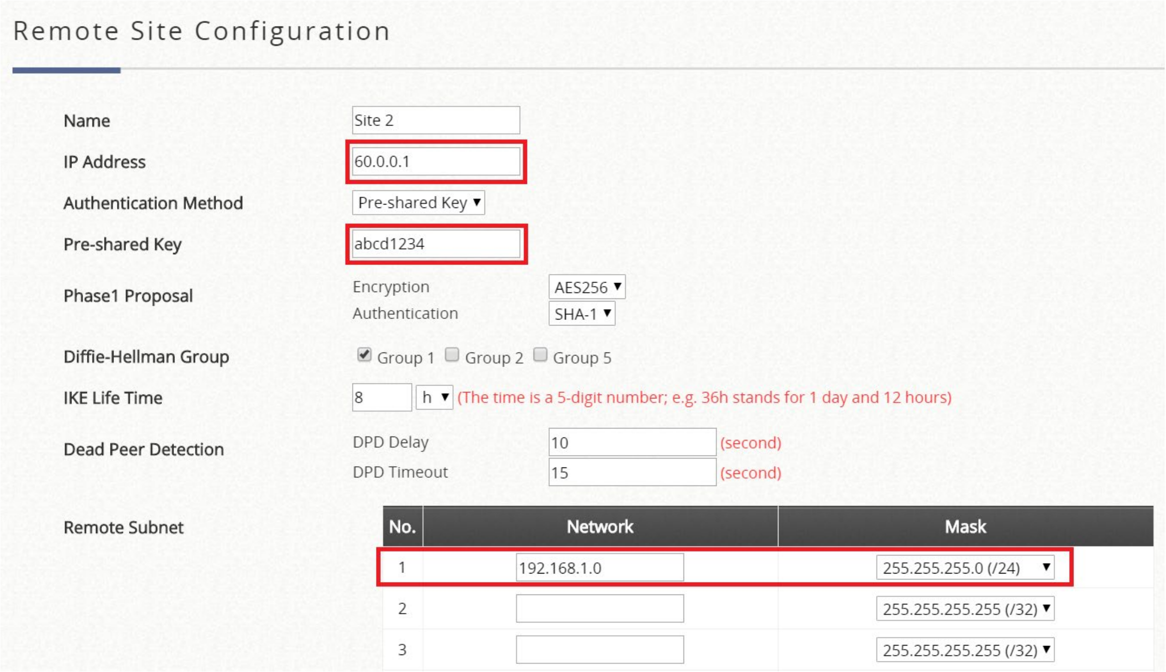
Local Sites

■	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status

Remote Sites

■	No.	Name	IP Address	Pre-shared Key

c. Enter the public IP address of Site 2. 60.0.0.1 is used for this example. Enter a pre-shared key and select the Diffie-Hellman Group. Configure other settings as desired. Enter the network segments to be accessed at Site 2 into Remote Subnet. Here the entire network segment assigned to Default Service Zone of Site 2 is entered, which is 192.168.1.0/24. Click Apply.



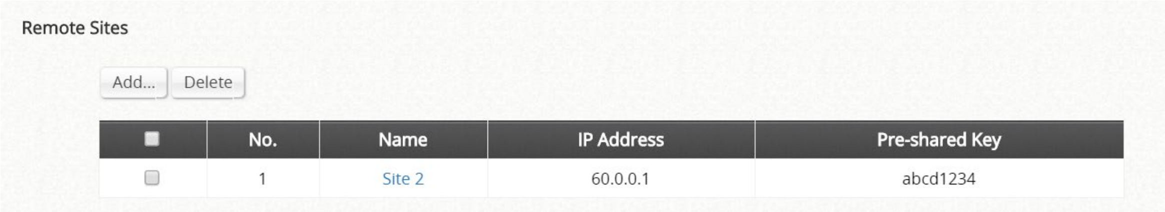
Remote Site Configuration

Name	Site 2
IP Address	60.0.0.1
Authentication Method	Pre-shared Key ▾
Pre-shared Key	abcd1234
Phase1 Proposal	Encryption AES256 ▾ Authentication SHA-1 ▾
Diffie-Hellman Group	☑ Group 1 ☐ Group 2 ☐ Group 5
IKE Life Time	8 h ▾ (The time is a 5-digit number; e.g. 36h stands for 1 day and 12 hours)
Dead Peer Detection	DPD Delay 10 (second) DPD Timeout 15 (second)

Remote Subnet

No.	Network	Mask
1	192.168.1.0	255.255.255.0 (/24) ▾
2		255.255.255.255 (/32) ▾
3		255.255.255.255 (/32) ▾

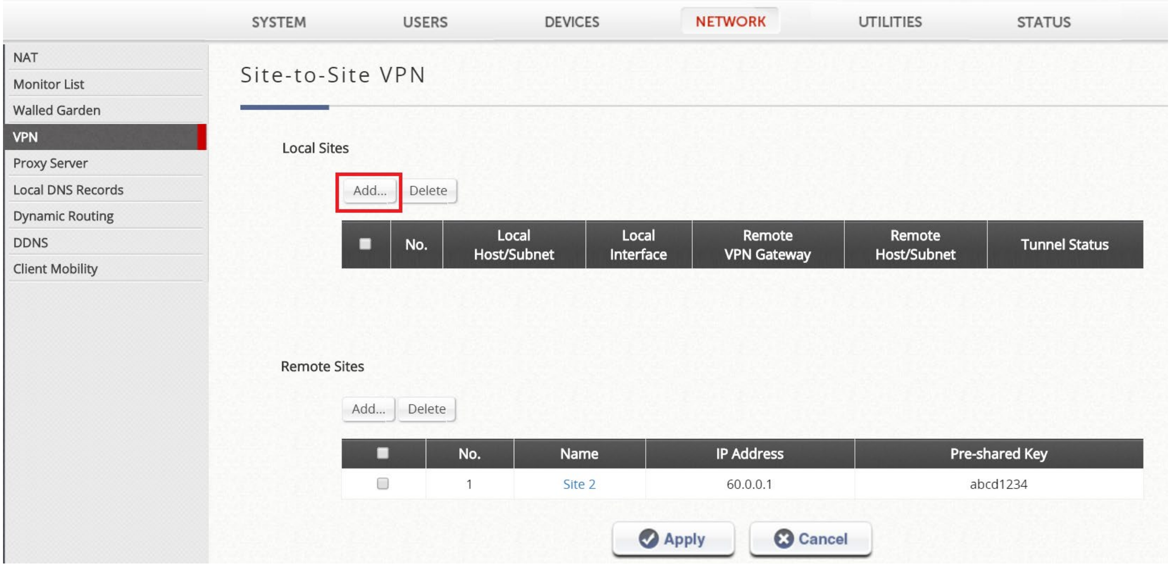
After applying the settings, the added entry will show on the list of Remote sites.



Remote Sites

□	No.	Name	IP Address	Pre-shared Key
□	1	Site 2	60.0.0.1	abcd1234

d. Click Add under Local Sites.



Site-to-Site VPN

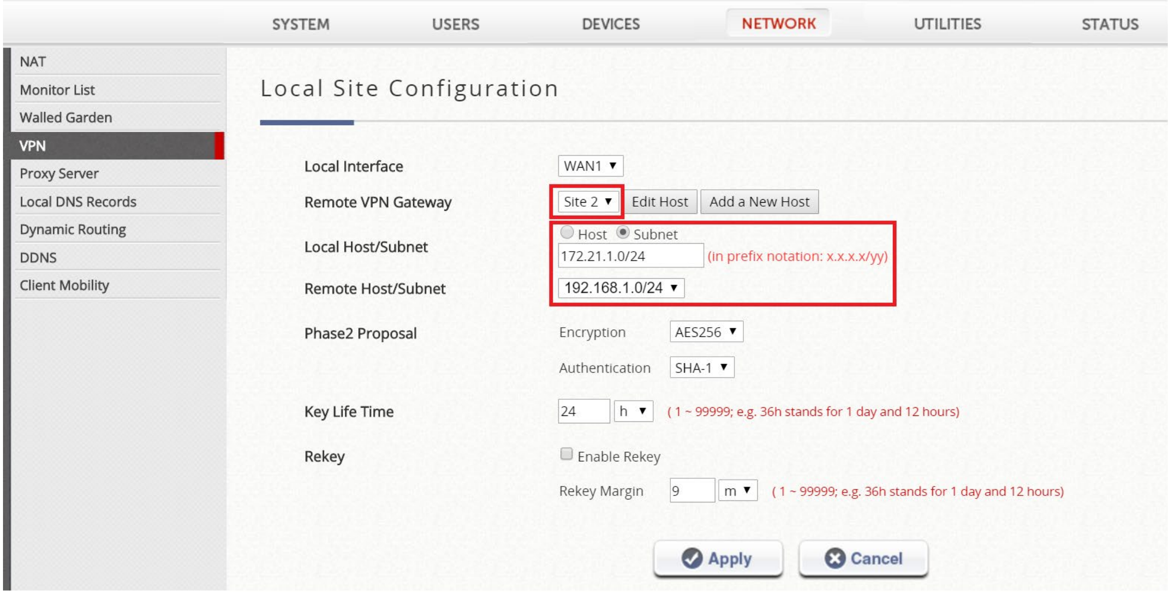
Local Sites

□	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status

Remote Sites

□	No.	Name	IP Address	Pre-shared Key
□	1	Site 2	60.0.0.1	abcd1234

e. Choose the desired WAN for Local Interface. Select Site 2 as the Remote VPN Gateway. For Local Host/Subnet, choose Subnet and enter the network segment of Service Zone 1 of Site 1 (172.21.1.0/24). For Remote Host/Subnet, choose the network segment of Default Service Zone of Site 2 (192.168.1.0/24). Configure other settings as desired. Click Apply.



Local Site Configuration

Local Interface: WAN1 ▾

Remote VPN Gateway: Site 2 ▾ Edit Host Add a New Host

Local Host/Subnet: ○ Host ● Subnet
172.21.1.0/24 (in prefix notation: x.x.x.x/yy)

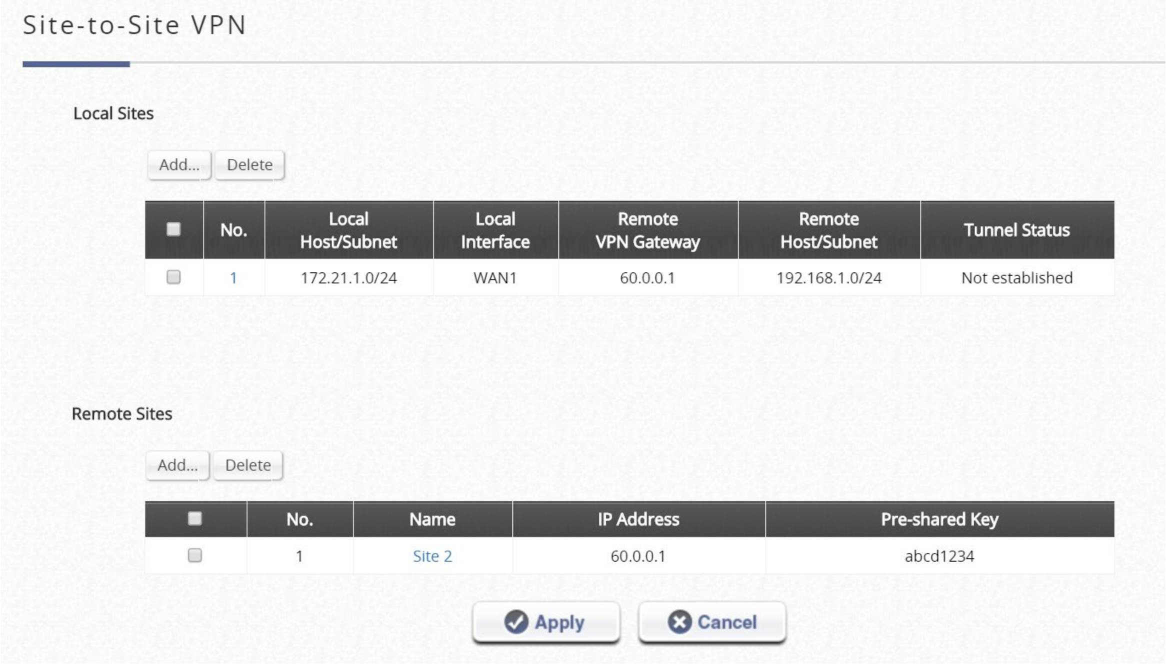
Remote Host/Subnet: 192.168.1.0/24 ▾

Phase2 Proposal: Encryption AES256 ▾
Authentication SHA-1 ▾

Key Life Time: 24 h ▾ (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)

Rekey: □ Enable Rekey
Rekey Margin 9 m ▾ (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)

After applying the settings, the added entry will show on the list of Local sites.



Local Sites

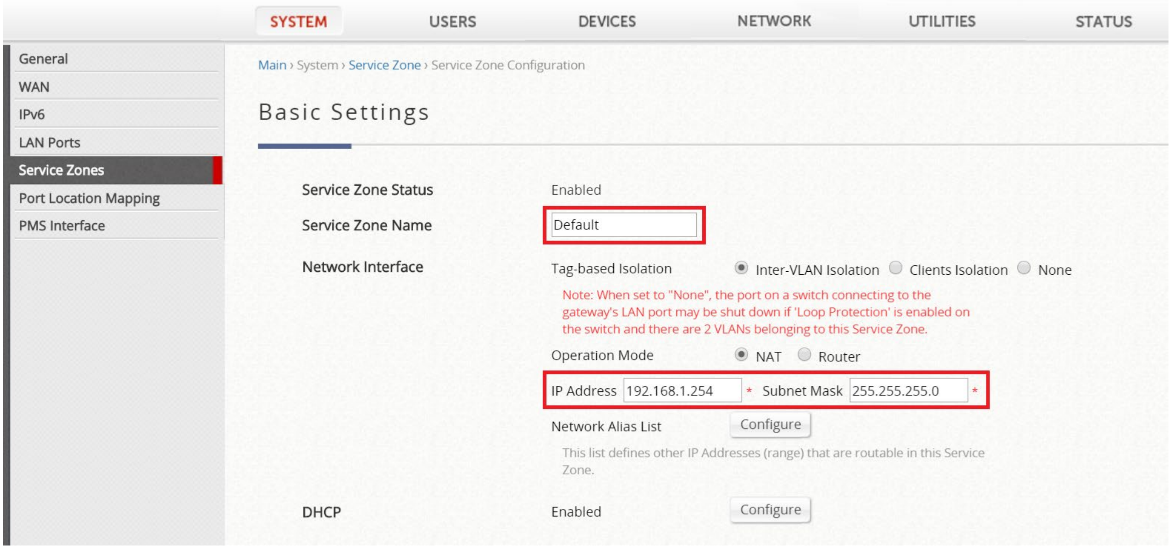
■	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status
□	1	172.21.1.0/24	WAN1	60.0.0.1	192.168.1.0/24	Not established

Remote Sites

■	No.	Name	IP Address	Pre-shared Key
□	1	Site 2	60.0.0.1	abcd1234

2.2 Site 2 Controller

a. Go to *System > Service Zone > Service Zone Configuration*, configure the Network Interface as desired. Here, Default Service Zone is chosen, with its Network Interface set to 192.168.1.254/24.



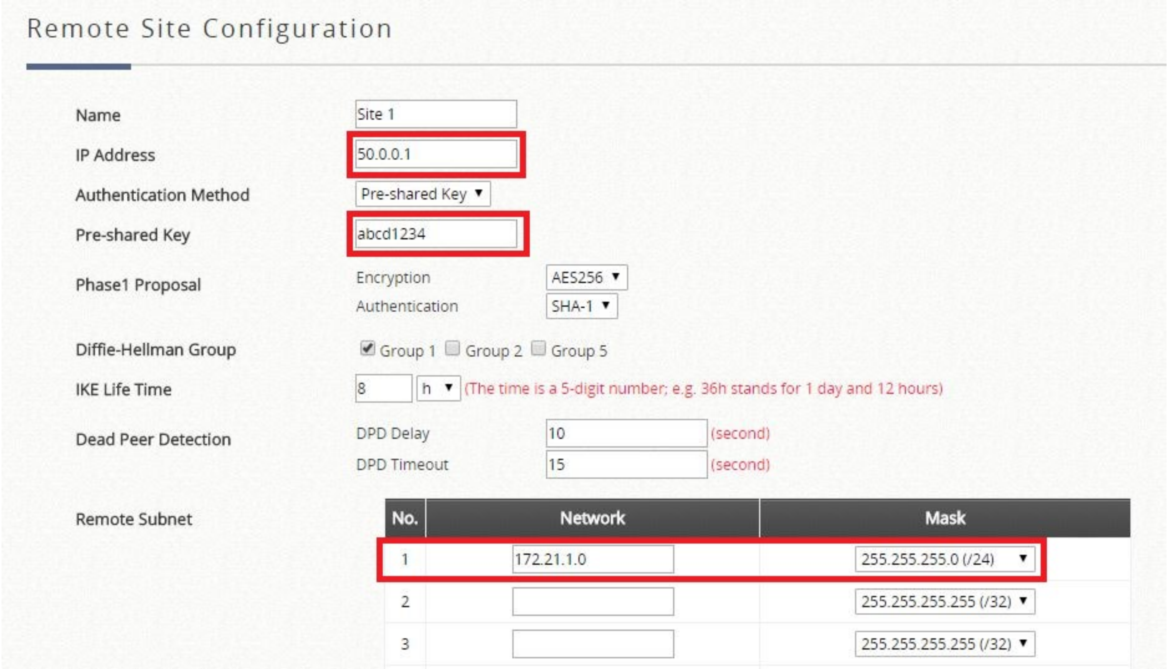
Service Zone Status: Enabled

Service Zone Name: Default

Network Interface:
Tag-based Isolation ● Inter-VLAN Isolation ○ Clients Isolation ○ None
Note: When set to "None", the port on a switch connecting to the gateway's LAN port may be shut down if 'Loop Protection' is enabled on the switch and there are 2 VLANs belonging to this Service Zone.
Operation Mode ● NAT ○ Router
IP Address 192.168.1.254 * Subnet Mask 255.255.255.0 *
Network Alias List Configure
This list defines other IP Addresses (range) that are routable in this Service Zone.

DHCP: Enabled Configure

a. Go to *Network > VPN*, click Add under Remote Sites and enter the public IP address of Site 1. 50.0.0.1 is used in this example. Enter the same pre-shared key as that on controller 1 and select the Diffie-Hellman Group. Configure other settings as desired. Enter the network segments to be accessed at Site 1 into Remote Subnet. Here the entire network segment assigned to Service Zone 1 of Site 1 is entered, which is 172.21.1.0/24. Click Apply.

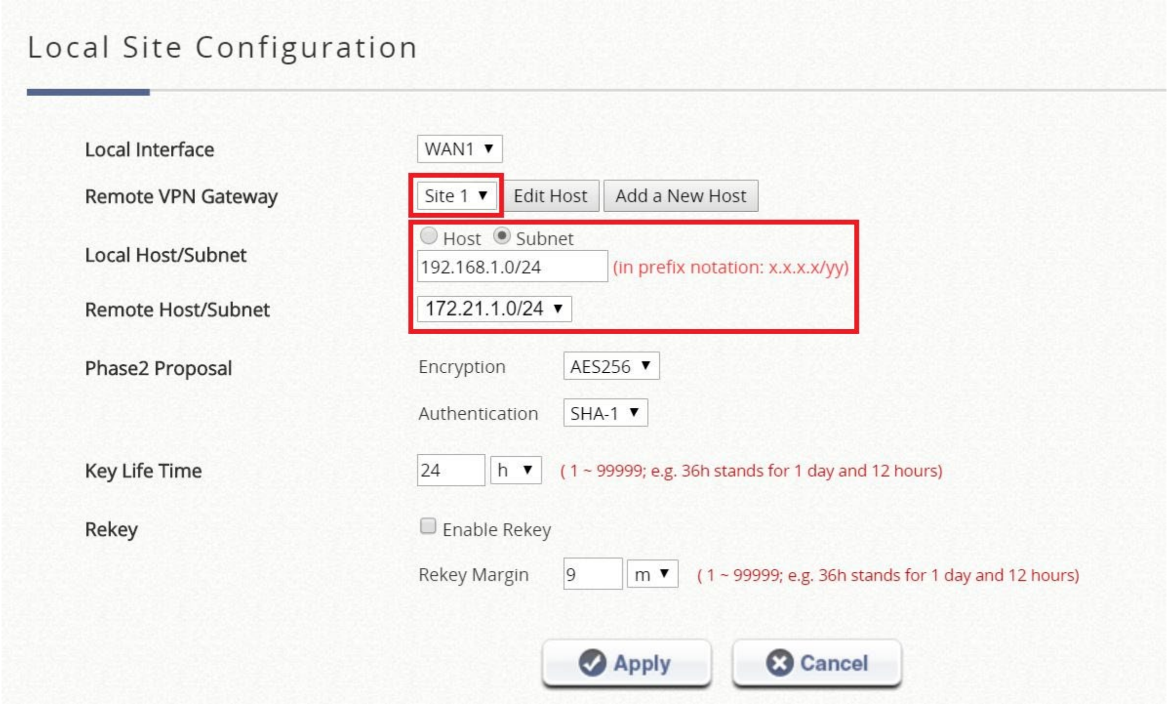


Remote Site Configuration

Name: Site 1
IP Address: 50.0.0.1
Authentication Method: Pre-shared Key ▼
Pre-shared Key: abcd1234
Phase1 Proposal: Encryption AES256 ▼; Authentication SHA-1 ▼
Diffie-Hellman Group: ☑ Group 1 □ Group 2 □ Group 5
IKE Life Time: 8 h ▼ (The time is a 5-digit number; e.g. 36h stands for 1 day and 12 hours)
Dead Peer Detection: DPD Delay 10 (second); DPD Timeout 15 (second)
Remote Subnet:

No.	Network	Mask
1	172.21.1.0	255.255.255.0 (/24) ▼
2		255.255.255.255 (/32) ▼
3		255.255.255.255 (/32) ▼

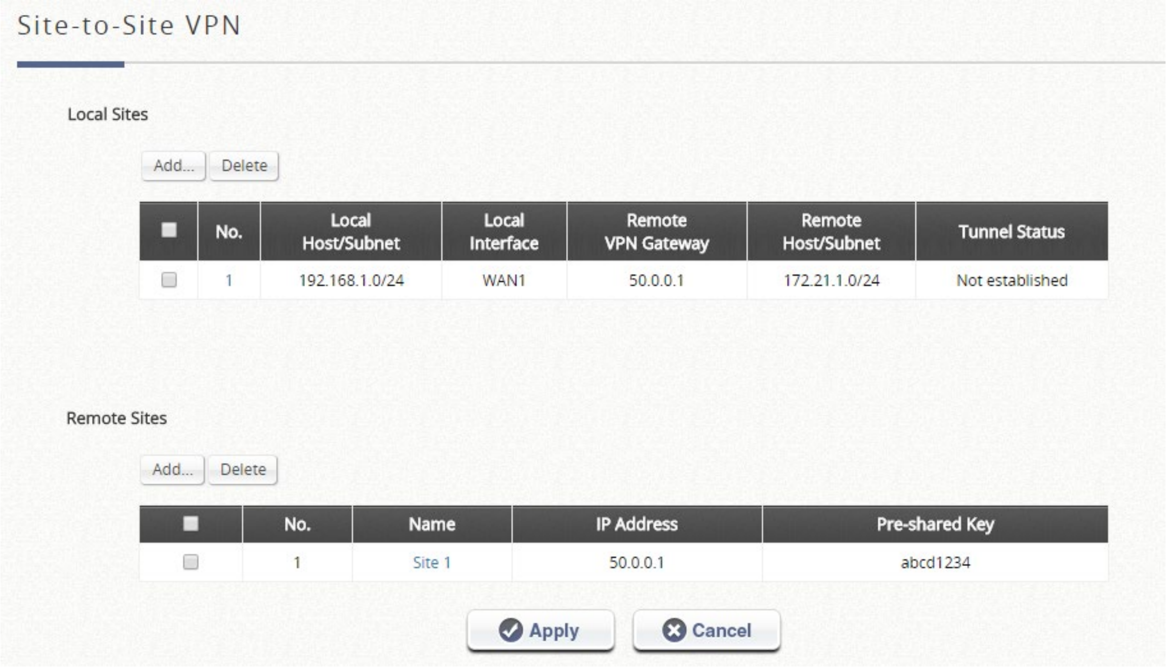
b. Choose the desired WAN for Local Interface. Select Site 1 as the Remote VPN Gateway. For Local Host/Subnet, choose Subnet and enter the network segment of Default Service Zone of Site 2 (192.168.1.0/24). For Remote Host/Subnet, choose the network segment of Service Zone 1 of Site 1 (172.21.1.0/24). Configure other settings as desired. Click Apply.



Local Site Configuration

Local Interface: WAN1 ▼
Remote VPN Gateway: Site 1 ▼ Edit Host Add a New Host
Local Host/Subnet: ○ Host ● Subnet; 192.168.1.0/24 (in prefix notation: x.x.x.x/yy)
Remote Host/Subnet: 172.21.1.0/24 ▼
Phase2 Proposal: Encryption AES256 ▼; Authentication SHA-1 ▼
Key Life Time: 24 h ▼ (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)
Rekey: □ Enable Rekey; Rekey Margin 9 m ▼ (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)

After applying the settings, the added entries should show on the main configuration page for Site-to-Site VPN.



Site-to-Site VPN

Local Sites

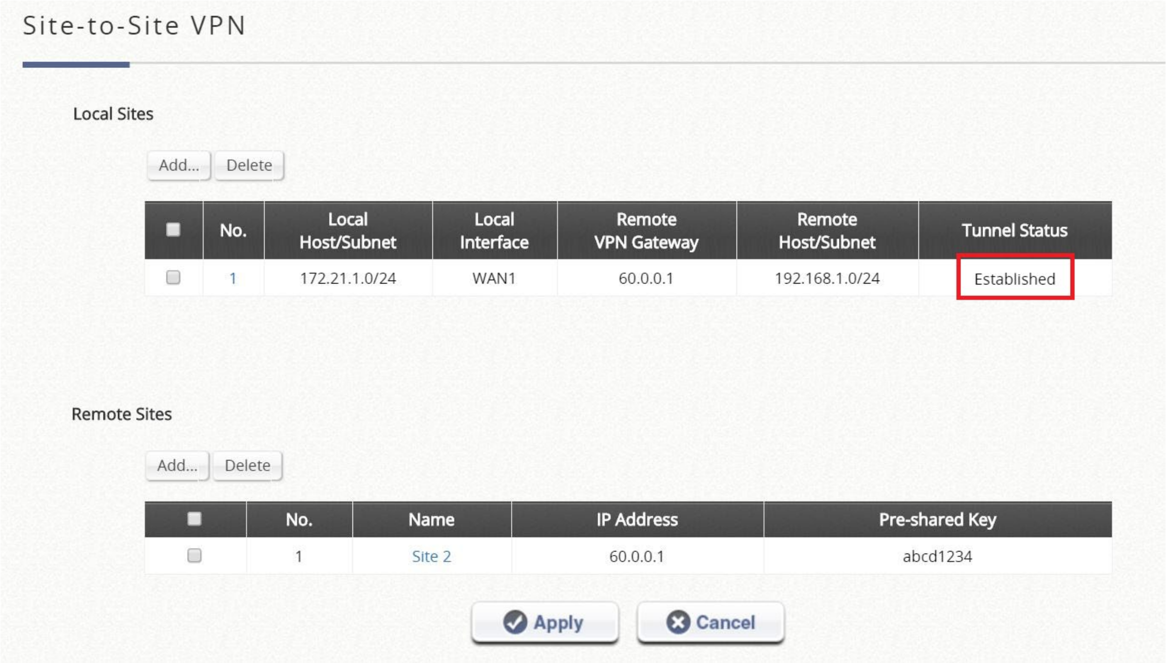
■	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status
□	1	192.168.1.0/24	WAN1	50.0.0.1	172.21.1.0/24	Not established

Remote Sites

■	No.	Name	IP Address	Pre-shared Key
□	1	Site 1	50.0.0.1	abcd1234

2.3 Verifying Network Connection

a. Go to *Network > VPN* or refresh the page on both controllers to check the tunnel status. The tunnel status should show "Established".



Site-to-Site VPN

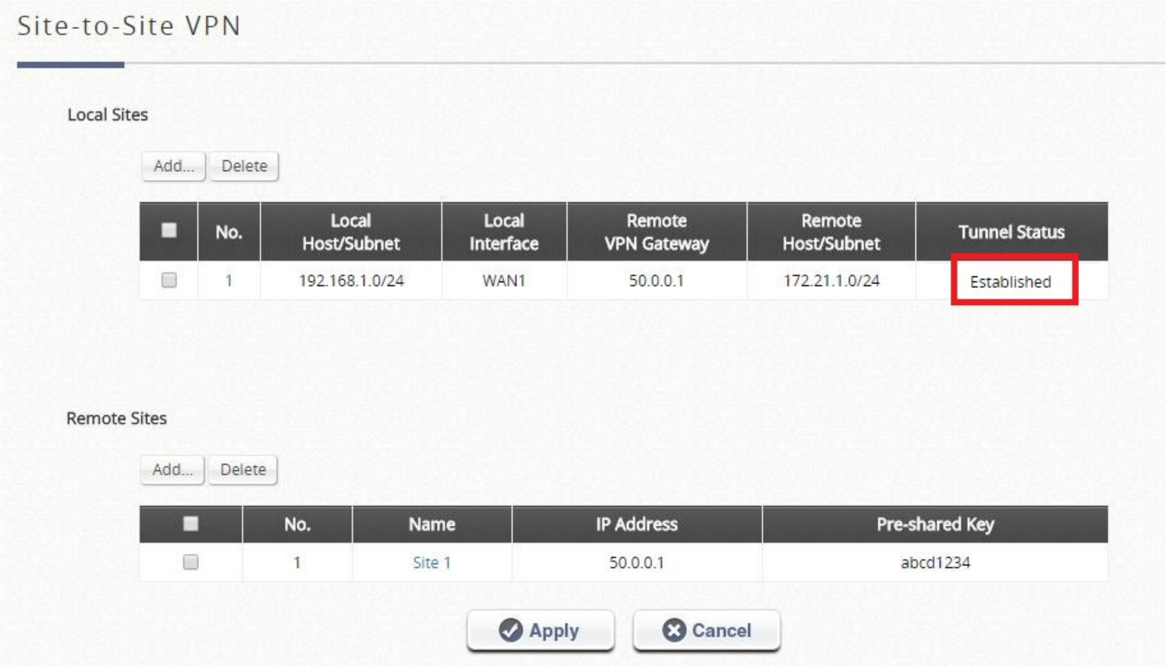
Local Sites

■	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status
□	1	172.21.1.0/24	WAN1	60.0.0.1	192.168.1.0/24	Established

Remote Sites

■	No.	Name	IP Address	Pre-shared Key
□	1	Site 2	60.0.0.1	abcd1234

Site 1



Site-to-Site VPN

Local Sites

■	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status
□	1	192.168.1.0/24	WAN1	50.0.0.1	172.21.1.0/24	Established

Remote Sites

■	No.	Name	IP Address	Pre-shared Key
□	1	Site 1	50.0.0.1	abcd1234

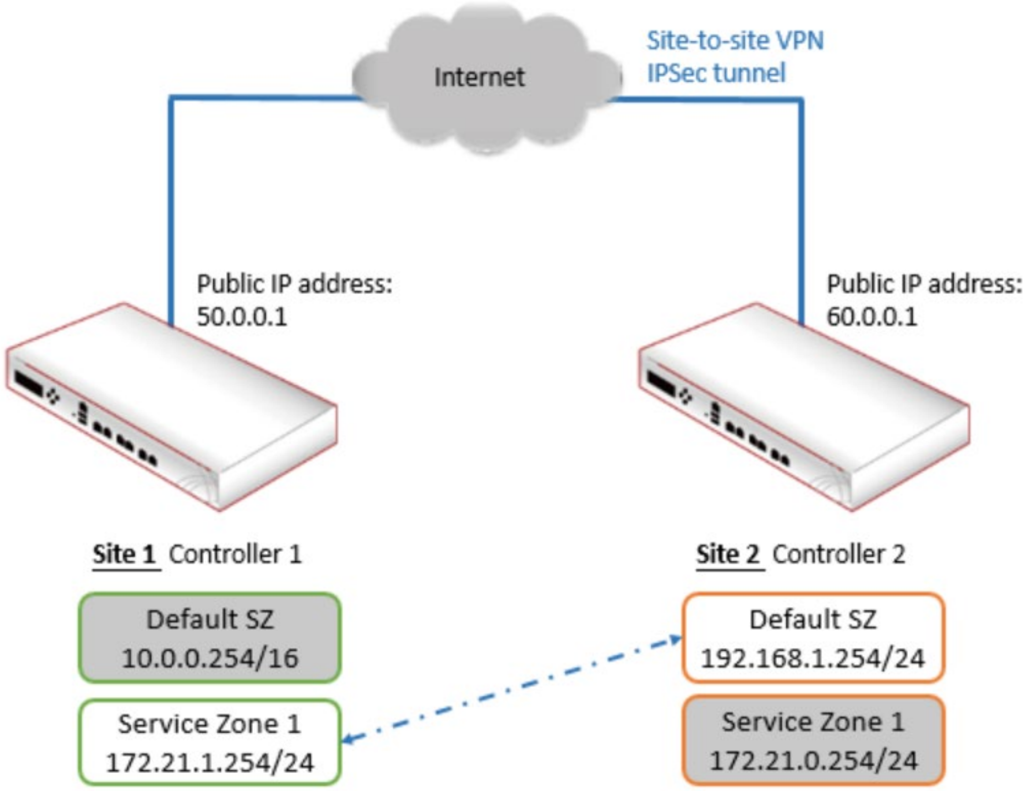
Site 2

b. Prepare two client devices and turn off the firewall on the devices.

c. Perform ping tests on the client devices using any ping tool to see if the two devices could ping each other.

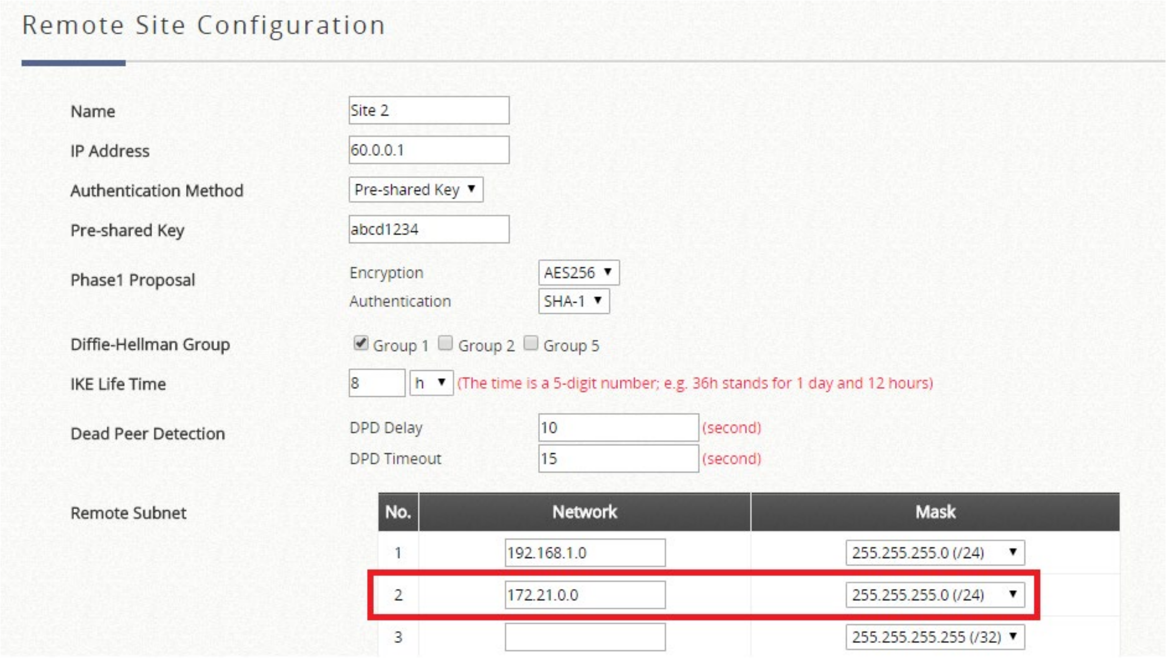
2.4 Variation of the Exemplary Site-to-Site VPN

As mentioned previously, multiple Local Sites and Remote Sites can be added to create multiple site-to-site VPNs. Diagram below shows a variation of the exemplary site-to-site VPN, where an additional site-to-site VPN is to be created between the network segments of Service Zone 1 on both controllers.



2.4.1 Site 1 Controller

a. Click on the existing entry. Under Remote Subnet, add the network segment assigned to Service Zone 1 of Site 2, which is 172.21.0.0/24. Do not add a Remote Site.



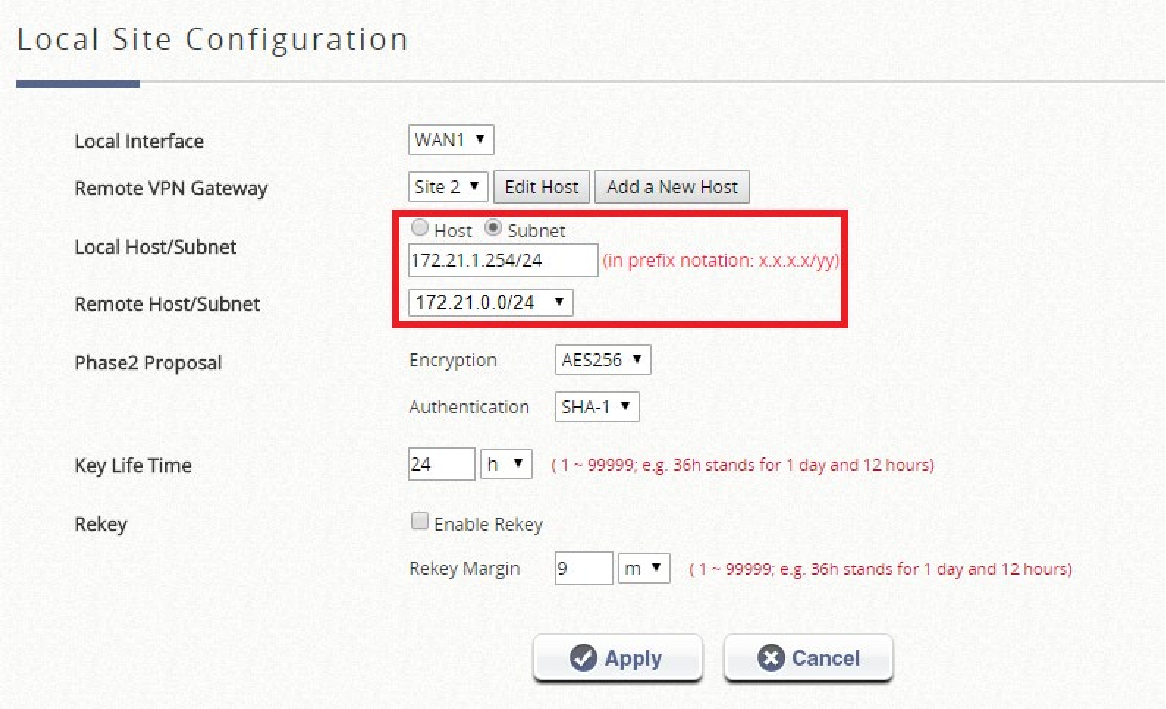
Remote Site Configuration

Name	Site 2	
IP Address	60.0.0.1	
Authentication Method	Pre-shared Key	
Pre-shared Key	abcd1234	
Phase1 Proposal	Encryption	AES256
	Authentication	SHA-1
Diffie-Hellman Group	☑ Group 1 □ Group 2 □ Group 5	
IKE Life Time	8 h (The time is a 5-digit number; e.g. 36h stands for 1 day and 12 hours)	
Dead Peer Detection	DPD Delay	10 (second)
	DPD Timeout	15 (second)

Remote Subnet

No.	Network	Mask
1	192.168.1.0	255.255.255.0 (/24)
2	172.21.0.0	255.255.255.0 (/24)
3		255.255.255.255 (/32)

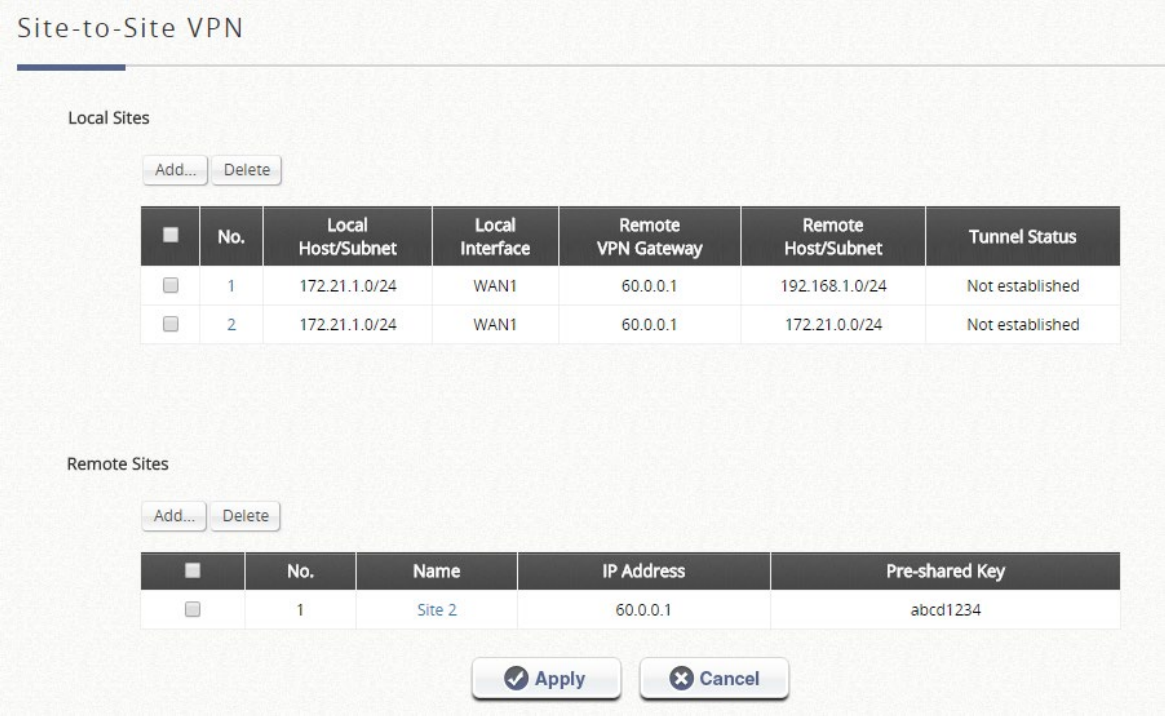
b. Add a Local Site. The Remote VPN Gateway is still Site 2. For Remote Host/Subnet, select the Remote Subnet just added.



Local Site Configuration

Local Interface	WAN1 ▼
Remote VPN Gateway	Site 2 ▼ Edit Host Add a New Host
Local Host/Subnet	○ Host ● Subnet 172.21.1.254/24 (in prefix notation: x.x.x.x/yy)
Remote Host/Subnet	172.21.0.0/24 ▼
Phase2 Proposal	Encryption AES256 ▼ Authentication SHA-1 ▼
Key Life Time	24 h ▼ (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)
Rekey	□ Enable Rekey Rekey Margin 9 m ▼ (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)

Return to the main configuration page, there should be two entries under Local Sites and one entry under Remote Site.



Site-to-Site VPN

Local Sites

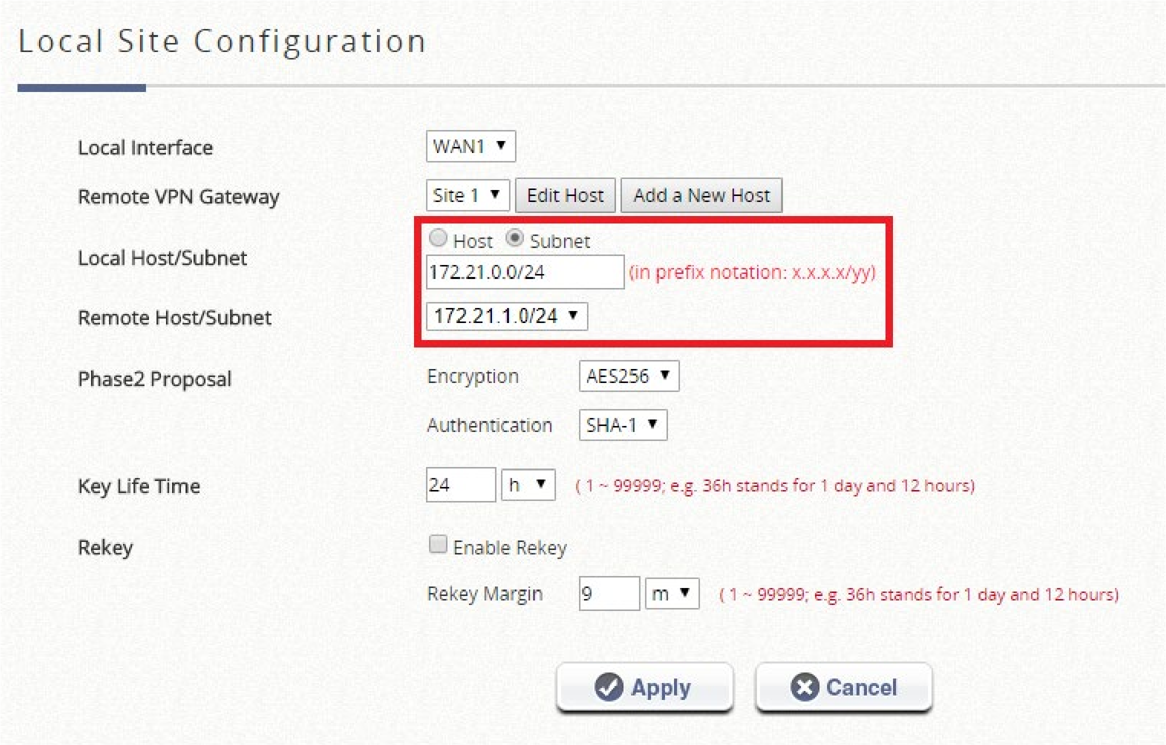
□	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status
□	1	172.21.1.0/24	WAN1	60.0.0.1	192.168.1.0/24	Not established
□	2	172.21.1.0/24	WAN1	60.0.0.1	172.21.0.0/24	Not established

Remote Sites

□	No.	Name	IP Address	Pre-shared Key
□	1	Site 2	60.0.0.1	abcd1234

2.4.2 Site 2 Controller

a. Add a Local Site. For Local Host/Subnet, choose Subnet and enter the network segment of Default Service Zone of Site 2 (172.21.1.0/24). For Remote Host/Subnet, choose the network segment of Service Zone 1 of Site 1 (172.21.1.0/24).



Local Site Configuration

Local Interface: WAN1

Remote VPN Gateway: Site 1

Local Host/Subnet: ○ Host ● Subnet
172.21.0.0/24 (in prefix notation: x.x.x.x/yy)

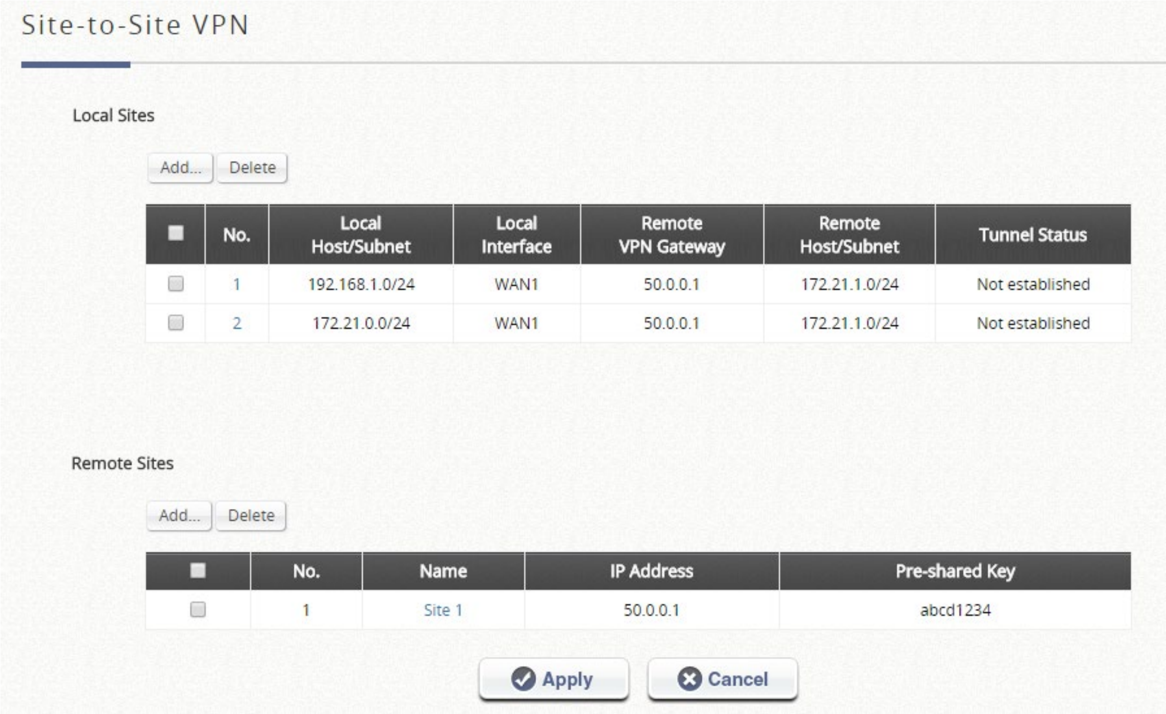
Remote Host/Subnet: 172.21.1.0/24

Phase2 Proposal: Encryption AES256
Authentication SHA-1

Key Life Time: 24 h (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)

Rekey: □ Enable Rekey
Rekey Margin 9 m (1 ~ 99999; e.g. 36h stands for 1 day and 12 hours)

Return to the main configuration page, there should be two entries under Local Sites and one entry under Remote Site.



■	No.	Local Host/Subnet	Local Interface	Remote VPN Gateway	Remote Host/Subnet	Tunnel Status
□	1	192.168.1.0/24	WAN1	50.0.0.1	172.21.1.0/24	Not established
□	2	172.21.0.0/24	WAN1	50.0.0.1	172.21.1.0/24	Not established

■	No.	Name	IP Address	Pre-shared Key
□	1	Site 1	50.0.0.1	abcd1234

3 Conclusion

In this technical guide, the Site-to-Site VPN feature on the controller is introduced, and guidance on how to build and configure an exemplary site-to-site VPN is also through step-by-step explanations.

4 Remarks

Please contact Edgecore’s Technical Support Team at ecwifi@edge-core.com for additional inquiries.