

Application Note

# Configure Full Mesh VPN with OSPF using Single Tunnel Interface

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Version 1.0



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## Introduction

Full mesh VPN is used for total redundancy between the Hub and Spoke VPN. Having a Hub and Spoke VPN with a point to multipoint might have a limited redundancy because the spokes have to pass through the hub firewall in terms of reaching any other spoke sites in the network. In other words, if the hub firewall is down all the spoke sites are down.

Configuring a Hub and Spoke with point to multipoint and full mesh VPN will overcome the limited redundancy problem as every site or every firewall will be “Hub and Spoke” to each other. So if one site is down the other sites can still communicate with other sites via point to point links. So, if a VPN between any 2 sites is down, the packet can be routed through a different site because of the full mesh configuration.

## Included Platforms and ScreenOS

This application note demonstrates firewall setup on ScreenOS 5.4r8. However, it also applies to following ScreenOS version:

- ScreenOS 5.1
- ScreenOS 5.2
- ScreenOS 5.3
- ScreenOS 5.4
- ScreenOS 6.0

The product list includes the following:

- NS5000
- ISG1000/2000
- NS500/200/50/25
- SSG550m/550/320/350/140
- NS5GT
- SSG5/20

## Overview

With OSPF, one gets the advantage of automatic routing updates for the reach-ability for specific networks at respective sites. Manually maintaining static route entries and Next Hop Tunnel Binding (NHTB) entries for the remote sites could add administrative overhead as the network grows. Using OSPF with full mesh VPN will override the administrative overhead in maintaining the static routes and NHTB entries for each site.

However, it is worth noting that the setup can be restricted by a firewall system limitation: maximum number of dedicated VPN tunnels allowed.

	Max no. dedicated VPN tunnels allowed
NS5GT`	10
SSG5/20	25/40*
NS25	50/125*
SSG140	250
NS50	150/500*
SSG520	500
NS204/NS208	500/1000*
SSG550	1000
NS500	1000/5000*
ISG1000	1000/2000*
ISG2000	1000/10k*
NS5200/NS5400	25k

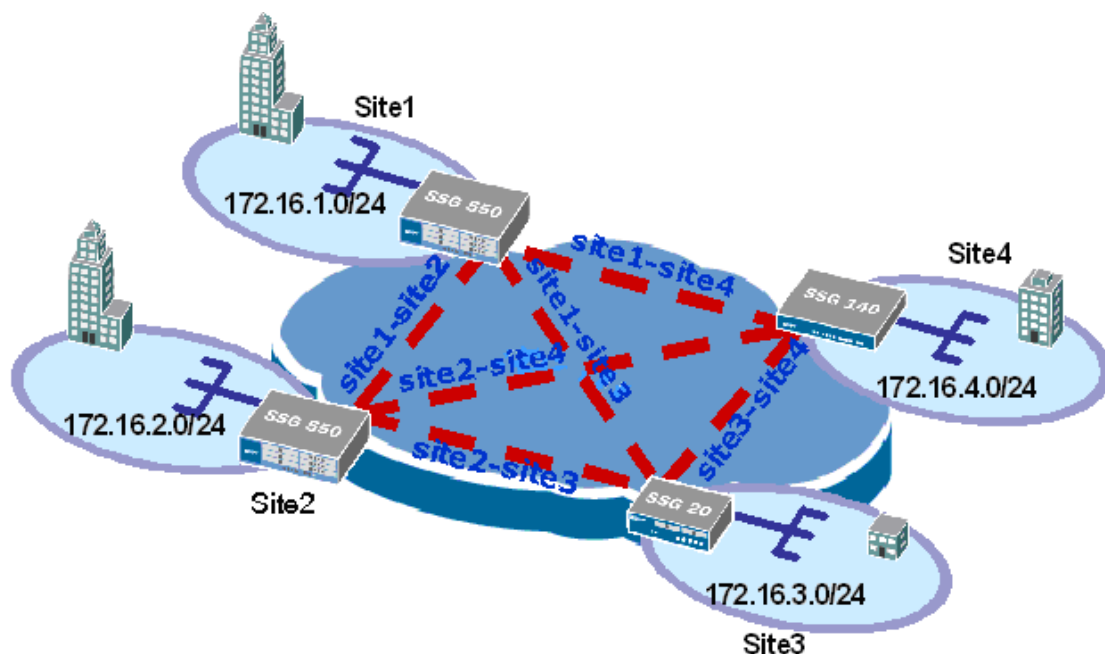
\*for advanced model

The maximum number of VPN tunnels is not limited by the number of tunnel interfaces that you can create, but by either route table capacity or the maximum number of dedicated VPN tunnels allowed – whichever is lower. For instance, if your security device supports 4000 routes and 1000 dedicated VPN tunnels, you can create 1000 VPN tunnels and bind them to a single tunnel interface. If your security device supports 8192 routes and 10,000 dedicated VPN tunnels, then you can create over 8000 VPN tunnels and bind them to a single tunnel interface. To see the maximum route and tunnel capacities for your security device, refer to the relevant product data sheet at [http://www.juniper.net/products\\_and\\_services/firewall\\_slash\\_ipsec\\_vpn/index.html](http://www.juniper.net/products_and_services/firewall_slash_ipsec_vpn/index.html)

## Network Diagram

Refer to Figure 1 below for Network Topology used for this configuration example.

Figure 1.



## Configuration Overview

- Configure one tunnel interface on each firewall. This will be bound to multiple VPNs.
- The tunnel interface is required to assign a unique IP address, which is used in NHTB entries to find the specific gateways to reach specific networks.
- In this example, there will be 6 VPNs created:
  - site1-site2
  - site1-site3
  - site1-site4
  - site2-site3
  - site2-site4
  - site3-site4
- Enable OSPF on the VR, containing the interface connecting to the down stream router and the tunnel interface.
- Configure p2mp OSPF on the tunnel interface for populating the NHTB entries automatically.
- Enable VPN Monitor with Rekey option for remote VPN connectivity detection.
- Configure a policy to control traffic entering or pumping out to the remote sites, as well as transit traffic between different sites over the VPN network.

Note: Starting with ScreenOS 5.1, OSPF point to multipoint is supported, which is required for automatic population of the NHTB entries between firewalls as this is a full mesh VPN.

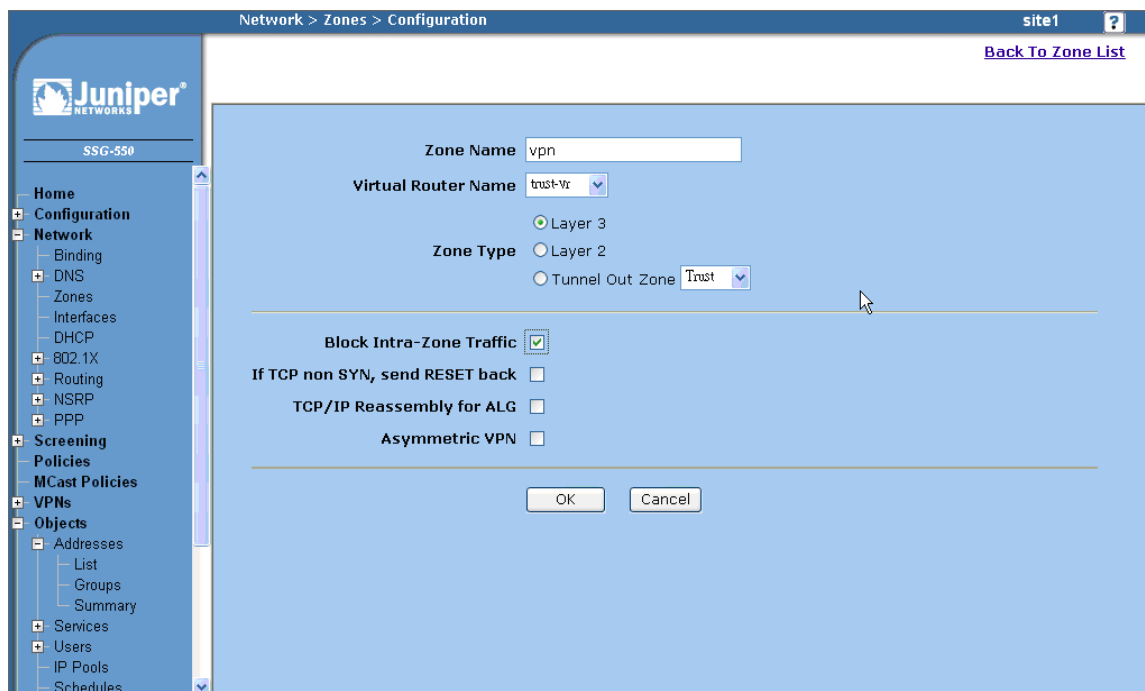
## Configuration Steps

### Step 1: Create the tunnel interface

In configuring the tunnel interface the administrator selects the zone to which the tunnel interface will be bound and the IP address to use.

When a tunnel terminates in the *vpn* zone and the target network is in the *trust* zone, a permit or deny policy will be required to move the traffic from the *vpn* zone to the *trust* zone. If the tunnel is terminated on the trust side (i.e. the tunnel interface is created in the trust zone), traffic to/from the trust zone is allowed without a policy, unless an intra-zone policy is defined specifying another action.

Before creating the tunnel interface, create the *vpn* zone:

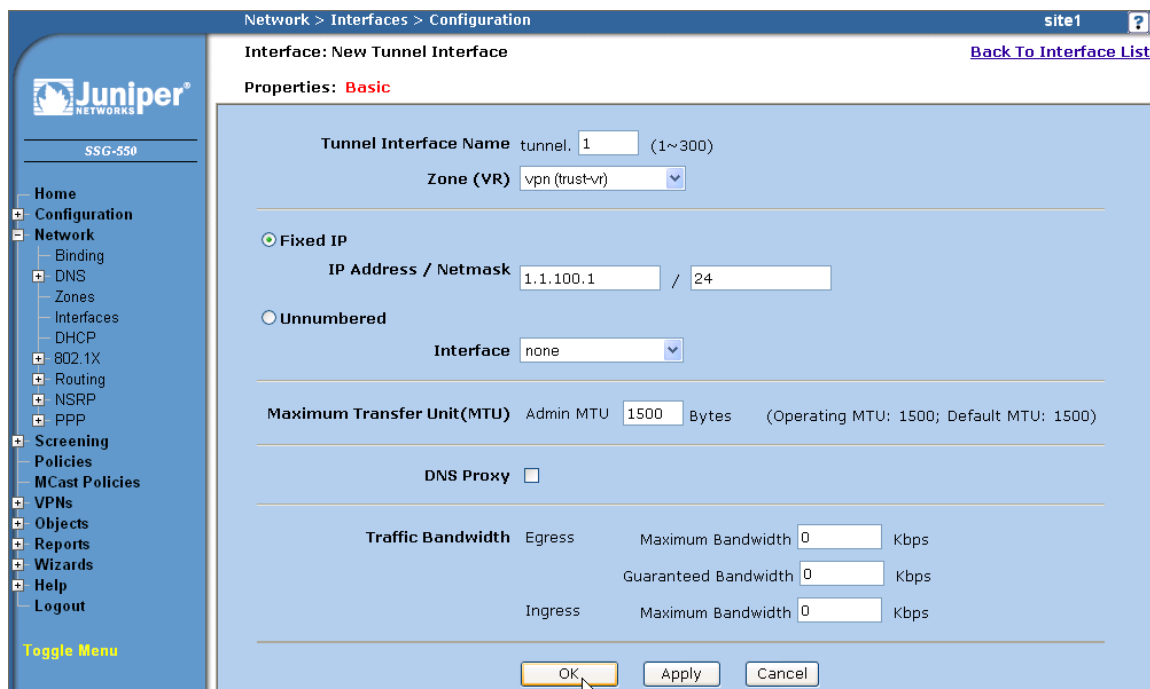


The screenshot shows the Juniper Network Configuration interface for creating a new zone. The breadcrumb trail at the top is "Network > Zones > Configuration". The page title is "site1". A "Back To Zone List" link is in the top right corner. The left sidebar shows the navigation tree with "Zones" selected under "Network". The main content area is titled "SSG-550" and contains the following configuration fields:

- Zone Name:** vpn
- Virtual Router Name:** trust-vr
- Zone Type:**
  - ☒ Layer 3
  - ☐ Layer 2
  - ☐ Tunnel Out Zone: Trust
- Block Intra-Zone Traffic:** ☒
- If TCP non SYN, send RESET back:** ☐
- TCP/IP Reassembly for ALG:** ☐
- Asymmetric VPN:** ☐

At the bottom of the configuration area are "OK" and "Cancel" buttons.

Then create the tunnel interface:



The screenshot shows the Juniper WebUI configuration page for a new tunnel interface. The breadcrumb trail is "Network > Interfaces > Configuration". The page title is "Interface: New Tunnel Interface" with a "Back To Interface List" link. The "Properties" tab is selected, showing "Basic" properties. The configuration fields are as follows:

- Tunnel Interface Name:** tunnel. 1 (range 1~300)
- Zone (VR):** vpn (trust-vr)
- Fixed IP:** Selected. IP Address / Netmask: 1.1.100.1 / 24
- Unnumbered:** Not selected. Interface: none
- Maximum Transfer Unit (MTU):** Admin MTU: 1500 Bytes (Operating MTU: 1500; Default MTU: 1500)
- DNS Proxy:** Unchecked
- Traffic Bandwidth:**
  - Egress: Maximum Bandwidth 0 Kbps, Guaranteed Bandwidth 0 Kbps
  - Ingress: Maximum Bandwidth 0 Kbps

At the bottom are "OK", "Apply", and "Cancel" buttons.

The WebUI and CLI 'Step 1' instructions for each firewall are as follows:

#### WebUI:

##### Site1 firewall

VPN zone:

- Select Network > Zones, select New
- Zone Name: vpn
- Block Intra-Zone Traffic: (selected)

Interface tunnel.1:

- Select Network > Interface
- Choose "Tunnel IF" and click New
- Tunnel Interface Name: tunnel.1
- Zone (VR): vpn (trust-vr)
- Fixed IP: (select), 1.1.100.1/24

##### Site2 firewall

VPN zone:

- Select Network > Zones, select New
- Zone Name: vpn
- Block Intra-Zone Traffic: (selected)

Interface tunnel.1:

Select Network > Interface  
Choose "Tunnel IF" and click New  
Tunnel Interface Name: tunnel.1  
Zone (VR): vpn (trust-vr)  
Fixed IP: (select), 1.1.100.2/24

#### Site3 firewall

VPN zone:  
Select Network > Zones, select New  
Zone Name: vpn  
Block Intra-Zone Traffic: (selected)  
Interface tunnel.1:  
Select Network > Interface  
Choose "Tunnel IF" and click New  
Tunnel Interface Name: tunnel.1  
Zone (VR): vpn (trust-vr)  
Fixed IP: (select), 1.1.100.3/24

#### Site4 firewall

VPN zone:  
Select Network > Zones, select New  
Zone Name: vpn  
Block Intra-Zone Traffic: (selected)  
Interface tunnel.1:  
Select Network > Interface  
Choose "Tunnel IF" and click New  
Tunnel Interface Name: tunnel.1  
Zone (VR): vpn (trust-vr)  
Fixed IP: (select), 1.1.100.4/24

#### CLI:

##### Site1 firewall

```
set zone name vpn
set interface tunnel.1 zone vpn
set interface tunnel.1 ip 1.1.100.1/24
```

##### Site2 firewall

```
set zone name vpn
set interface tunnel.1 zone vpn
set interface tunnel.1 ip 1.1.100.2/24
```

##### Site3 firewall

```
set zone name vpn
set interface tunnel.1 zone vpn
set interface tunnel.1 ip 1.1.100.3/24
```



### Site4 firewall

```
set zone name vpn
set interface tunnel.1 zone vpn
set interface tunnel.1 ip 1.1.100.4/24
```

## Step 2: Define the IKE Gateway

The IKE gateway defines the type of tunnel at the peer location, the outgoing interface to use, the Phase 1 proposals to use, and the key-exchange method. An IKE gateway is configured for each VPN tunnel.



The screenshot shows the Juniper SSG-550 configuration interface. The breadcrumb trail at the top reads: **VPNs > AutoKey Advanced > Gateway > Edit**. The page title is **site1**. The left sidebar contains a navigation menu with the following items: Home, Configuration, Network, Screening, Policies, MCast Policies, VPNs (expanded), AutoKey IKE, AutoKey Advanced (expanded), Gateway (selected), P1 Proposal, P2 Proposal, XAuth Settings, VPN Groups, Manual Key, L2TP, Monitor Status, Objects, Reports, Wizards, Help, and Logout. A **Toggle Menu** link is at the bottom of the sidebar.

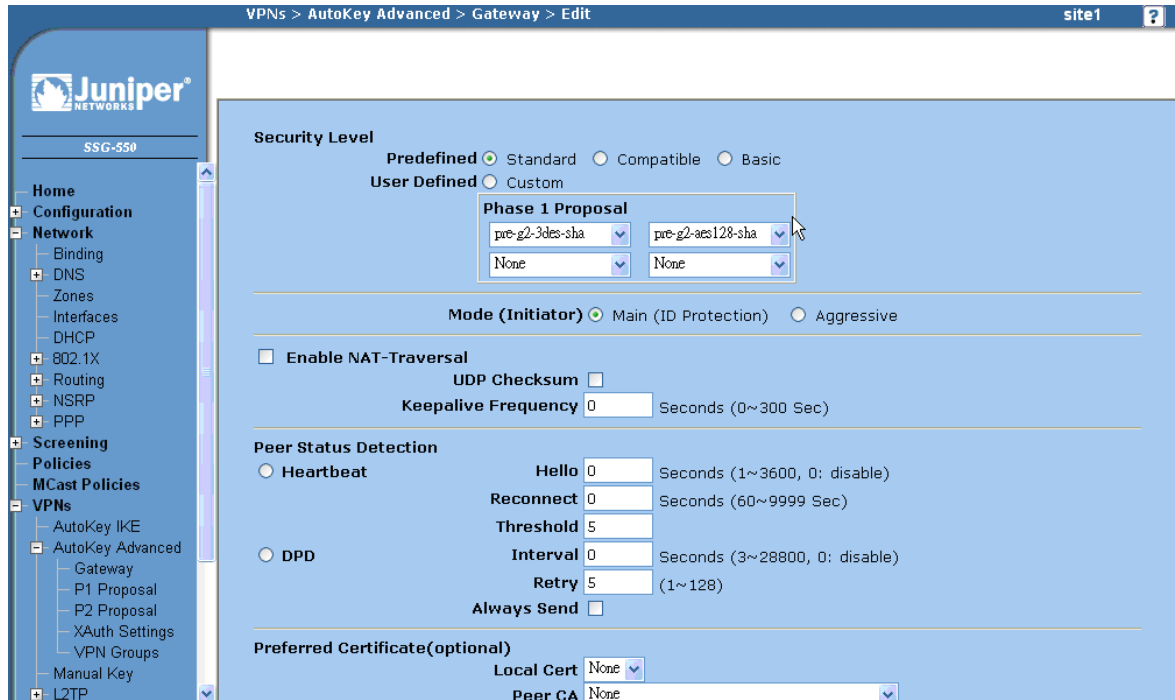
The main configuration area for the **Gateway** is titled **Gateway Name** **site1-site2**. Below this is the **Security Level** section with four radio buttons: **Standard** (selected), **Compatible**, **Basic**, and **Custom**.

The **Remote Gateway Type** section contains four radio buttons: **Static IP Address** (selected), **Dynamic IP Address**, **Dialup User**, and **Dialup User Group**. The **Static IP Address** option has a text field for **IP Address/Hostname** with the value **1.1.1.2**. The **Dynamic IP Address** option has a text field for **Peer ID**. The **Dialup User** option has a **User** dropdown menu with **None** selected. The **Dialup User Group** option has a **Group** dropdown menu with **None** selected.

The **Preshared Key** section has a text field with masked characters (dots) and a **Use As Seed** checkbox. The **Local ID** section has a text field with the value **1.1.1.1** and the text **(optional)**. The **Outgoing Interface** section has a dropdown menu with the value **ethernet0/2**.

At the bottom of the configuration area are three buttons: **OK**, **Cancel**, and **Advanced**.

Click the Advanced button to see more configuration options.



VPNs > AutoKey Advanced > Gateway > Edit site1 ?

**Security Level**

Predefined ☒ Standard ☐ Compatible ☐ Basic

User Defined ☐ Custom

**Phase 1 Proposal**

pre-g2-3des-sha pre-g2-aes128-sha

None None

**Mode (Initiator)** ☒ Main (ID Protection) ☐ Aggressive

☐ Enable NAT-Traversal

UDP Checksum ☐

Keepalive Frequency 0 Seconds (0~300 Sec)

**Peer Status Detection**

☒ Heartbeat

Hello 0 Seconds (1~3600, 0: disable)

Reconnect 0 Seconds (60~9999 Sec)

Threshold 5

☐ DPD

Interval 0 Seconds (3~28800, 0: disable)

Retry 5 (1~128)

Always Send ☐

**Preferred Certificate(optional)**

Local Cert None

Peer CA None

When the configuration of the Proposals and Mode is completed, select Return button of the screen. Then select OK or Apply to save the information.

In creating the IKE Gateway, the following options were selected:

- Remote Gateway Type of "Static IP Address" was chosen since this is a LAN-to LAN VPN and both ends of the tunnel have statically assigned addresses.
- Preshared key of "netscreen" was configured at both ends of the tunnel.
- The "Outgoing Interface" is that interface used in order to gain access to the other end of the tunnel. In this application note, the interface in the untrust zone was used for the full mesh VPNs.
- Main Mode was selected as the key-exchange method. In a LAN-to-LAN VPN, Main Mode is the preferred method since it conceals the identities of the parties during the key exchange. In a dynamically assigned IP environment, Aggressive mode is used. In aggressive mode, IKE key exchanges are initiated without ID protection.

The WebUI and CLI 'Step 2' instructions for each firewall are as follows:

WebUI:

**Site1 firewall**

Site1 to Site2:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:

Gateway Name: site1-site2

Security Level: Standard

Static IP Address: (selected)

IP Address/Hostname: 1.1.1.2

Preshare Key: netscreen

Local ID: 1.1.1.1

Outgoing Interface: ethernet0/2\*

Select Advanced:

Mode (Initiator): Main (ID Protection)

Select Return and OK

Site1 to Site3:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:

Gateway Name: site1-site3

Security Level: Standard

Static IP Address: (selected)

IP Address/Hostname: 1.1.1.3

Preshare Key: netscreen

Local ID: 1.1.1.1

Outgoing Interface: ethernet0/2\*

Select Advanced:

Mode (Initiator): Main (ID Protection)

Select Return and OK

Site1 to Site4:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:

Gateway Name: site1-site4

Security Level: Standard

Static IP Address: (selected)

IP Address/Hostname: 1.1.1.4

Preshare Key: netscreen

Local ID: 1.1.1.1

Outgoing Interface: ethernet0/2\*

Select Advanced:

Mode (Initiator): Main (ID Protection)

Select Return and OK

**Site2 firewall**

Site2 to Site1:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:

Gateway Name: site1-site2 (name was chosen to be same name of VPN configured on Site 1)

Security Level: Standard

Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.1  
Preshare Key: netscreen  
Local ID: 1.1.1.2  
Outgoing Interface: ethernet0/2\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

Site2 to Site3:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site2-site3  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.3  
Preshare Key: netscreen  
Local ID: 1.1.1.2  
Outgoing Interface: ethernet0/2\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

Site2 to Site4:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site2-site4  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.4  
Preshare Key: netscreen  
Local ID: 1.1.1.2  
Outgoing Interface: ethernet0/2\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

**Site3 firewall**

Site3 to Site1:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site1-site3 (name was chosen to be same name of VPN configured on Site 1)  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.1  
Preshare Key: netscreen  
Local ID: 1.1.1.3  
Outgoing Interface: ethernet0/0\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

Site3 to Site2:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site2-site3 (name was chosen to be same name of VPN configured on Site 2)  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.2  
Preshare Key: netscreen  
Local ID: 1.1.1.3  
Outgoing Interface: ethernet0/0\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

Site3 to Site4:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site3-site4  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.4  
Preshare Key: netscreen  
Local ID: 1.1.1.3  
Outgoing Interface: ethernet0/0\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

**Site4 firewall**

Site4 to Site1:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site1-site4 (name was chosen to be same name of VPN configured on Site 1)  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.1  
Preshare Key: netscreen  
Local ID: 1.1.1.4  
Outgoing Interface: ethernet0/0\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

Site4 to Site2:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site2-site4 (name was chosen to be same name of VPN configured on Site 2)  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.2  
Preshare Key: netscreen  
Local ID: 1.1.1.4  
Outgoing Interface: ethernet0/0\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)

Select Return and OK

Site4 to Site3:

Select VPNs > AutoKey Advanced > Gateway, select New and enter following:  
Gateway Name: site3-site4 (name was chosen to be same name of VPN configured on Site 3)  
Security Level: Standard  
Static IP Address: (selected)  
IP Address/Hostname: 1.1.1.3  
Preshare Key: netscreen  
Local ID: 1.1.1.4  
Outgoing Interface: ethernet0/0\*  
Select Advanced:  
Mode (Initiator): Main (ID Protection)  
Select Return and OK

#### CLI:

##### **Site1 firewall**

```
set ike gateway sitel-site2 address 1.1.1.2 main local-id 1.1.1.1 outgoing-  
interface ethernet0/2* preshare netscreen sec-level standard  
set ike gateway sitel-site3 address 1.1.1.3 main local-id 1.1.1.1 outgoing-  
interface ethernet0/2* preshare netscreen sec-level standard  
set ike gateway sitel-site4 address 1.1.1.4 main local-id 1.1.1.1 outgoing-  
interface ethernet0/2* preshare netscreen sec-level standard
```

##### **Site2 firewall**

```
set ike gateway sitel-site2 address 1.1.1.1 main local-id 1.1.1.2 outgoing-  
interface ethernet0/2* preshare netscreen sec-level standard  
set ike gateway site2-site3 address 1.1.1.3 main local-id 1.1.1.2 outgoing-  
interface ethernet0/2* preshare netscreen sec-level standard  
set ike gateway site2-site4 address 1.1.1.4 main local-id 1.1.1.2 outgoing-  
interface ethernet0/2* preshare netscreen sec-level standard
```

##### **Site3 firewall**

```
set ike gateway sitel-site3 address 1.1.1.1 main local-id 1.1.1.3 outgoing-  
interface ethernet0/0* preshare netscreen sec-level standard  
set ike gateway site2-site3 address 1.1.1.2 main local-id 1.1.1.3 outgoing-  
interface ethernet0/0* preshare netscreen sec-level standard  
set ike gateway site3-site4 address 1.1.1.4 main local-id 1.1.1.3 outgoing-  
interface ethernet0/0* preshare netscreen sec-level standard
```

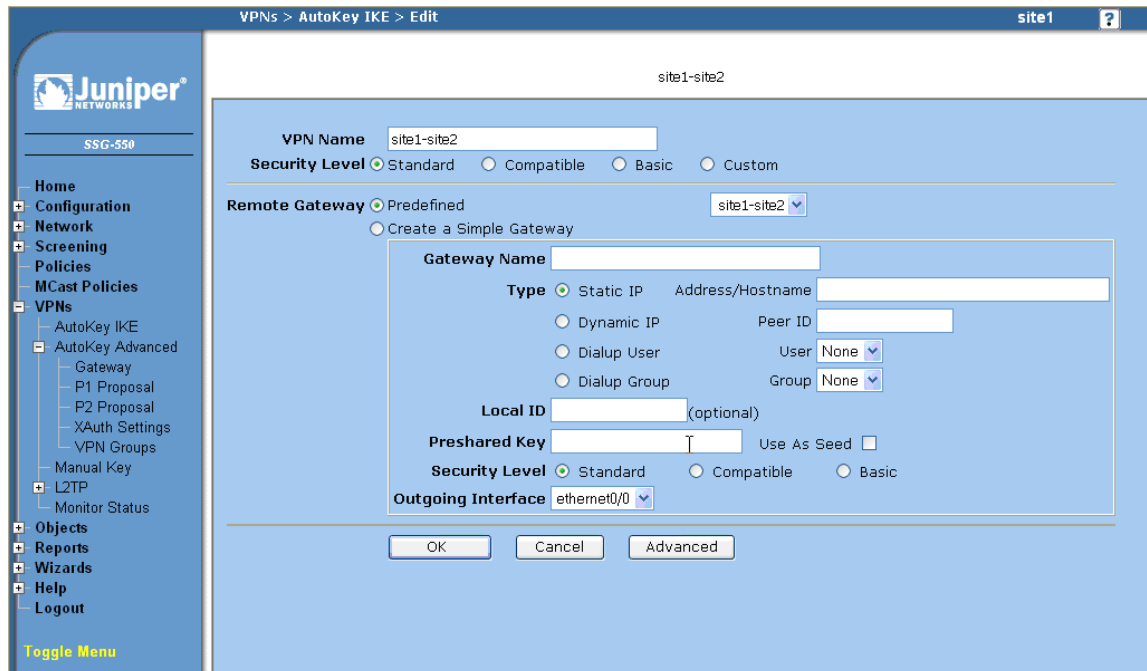
##### **Site4 firewall**

```
set ike gateway sitel-site4 address 1.1.1.1 main local-id 1.1.1.4 outgoing-  
interface ethernet0/0* preshare netscreen sec-level standard  
set ike gateway site2-site4 address 1.1.1.2 main local-id 1.1.1.4 outgoing-  
interface ethernet0/0* preshare netscreen sec-level standard  
set ike gateway site3-site4 address 1.1.1.3 main local-id 1.1.1.4 outgoing-  
interface ethernet0/0* preshare netscreen sec-level standard
```

\*note interface name may varies depends on the assignment of interface for untrust zone.

### Step 3: Define the VPN Tunnel

The VPN Tunnel (or AutoKey IKE as it is called in Screen OS) defines the Phase 2 proposals, how the tunnel is to be bound, proxy ids, and the IKE Gateway to be associated with the VPN Tunnel.



The screenshot shows the Juniper Screen OS configuration interface for defining a VPN Tunnel. The breadcrumb trail at the top reads "VPNs > AutoKey IKE > Edit". The page title is "site1". The main configuration area is titled "site1-site2".

**VPN Name:** site1-site2

**Security Level:** ☒ Standard ☐ Compatible ☐ Basic ☐ Custom

**Remote Gateway:** ☒ Predefined ☐ Create a Simple Gateway

**Gateway Name:** site1-site2

**Type:** ☒ Static IP ☐ Dynamic IP ☐ Dialup User ☐ Dialup Group

**Address/Hostname:** [text field]

**Peer ID:** [text field]

**User:** None (dropdown)

**Group:** None (dropdown)

**Local ID:** [text field] (optional)

**Preshared Key:** [text field] ☐ Use As Seed


**Security Level:** ☒ Standard ☐ Compatible ☐ Basic

**Outgoing Interface:** ethernet0/0 (dropdown)

Buttons at the bottom: OK, Cancel, Advanced.

In the example, site1-site2 is the name given to the tunnel from the Site1 device to the Site2 device. In the Remote Gateway section, use the pull down tab to select the predefined gateway created in the previous step.

Clicking the Advanced button displays more configuration options.



SFG-550

- Home
- Configuration
- Network
- Screening
- Policies
- MCast Policies
- VPNs
  - AutoKey IKE
  - AutoKey Advanced
    - Gateway
    - P1 Proposal
    - P2 Proposal
    - XAuth Settings
    - VPN Groups
  - Manual Key
  - L2TP
  - Monitor Status
- Objects
- Reports
- Wizards
- Help
- Logout

Toggle Menu

VPNs > AutoKey IKE > Edit

site1

nopfs-esp-des-md5

None

None

None

Replay Protection

Transport Mode

(For L2TP-over-IPSec only)

Bind to

None

Tunnel Interface

Tunnel Zone

tunnel.1

Untrust-Tun

Proxy-ID

Local IP / Netmask

/

Remote IP / Netmask

/

Service

ANY

VPN Group

None

Weight

1

VPN Monitor

Source Interface

default

Destination IP

Optimized

Rekey

Return

Cancel

In the LAN-to-LAN VPN route-based tunnel, the Tunnel is bound to the tunnel interface created in step 1. In addition, VPN Monitor, Optimized, and Rekey are recommended to set up the tunnel without having to wait for user-originated VPN traffic.

The WebUI and CLI ‘Step 3’ instructions for each firewall are as follows:

WebUI:

## Site1 firewall

Site1 to Site2:

Select VPNs > AutoKey IKE, select New and enter following:

VPN Name: site1-site2

Security Level: Standard

Remote Gateway: Predefined (selected), site1-site2 (select from pull down menu)

Select Advanced

Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)

VPN Monitor: (checked)

Optimized: (checked)

Rekey: (checked)

Select Return and OK

Site1 to Site3:

Select VPNs > AutoKey IKE, select New and enter following:



VPN Name: site1-site3  
Security Level: Standard  
Remote Gateway: Predefined (selected), site1-site3 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

Site1 to Site4:

Select VPNs > AutoKey IKE, select New and enter following:  
VPN Name: site1-site4  
Security Level: Standard  
Remote Gateway: Predefined (selected), site1-site4 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

**Site2 firewall**

Site2 to Site1:

Select VPNs > AutoKey IKE, select New and enter following:  
VPN Name: site1-site2  
Security Level: Standard  
Remote Gateway: Predefined (selected), site1-site2 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

Site2 to Site3:

Select VPNs > AutoKey IKE, select New and enter following:  
VPN Name: site2-site3  
Security Level: Standard  
Remote Gateway: Predefined (selected), site2-site3 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

Site2 to Site4:

Select VPNs > AutoKey IKE, select New and enter following:  
VPN Name: site2-site4

Security Level: Standard  
Remote Gateway: Predefined (selected), site2-site4 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

### Site3 firewall

Site3 to Site1:

Select VPNs > AutoKey IKE, select New and enter following:  
VPN Name: site1-site3  
Security Level: Standard  
Remote Gateway: Predefined (selected), site1-site3 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

Site3 to Site2:

Select VPNs > AutoKey IKE, select New and enter following:  
VPN Name: site2-site3  
Security Level: Standard  
Remote Gateway: Predefined (selected), site2-site3 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

Site3 to Site4:

Select VPNs > AutoKey IKE, select New and enter following:  
VPN Name: site3-site4  
Security Level: Standard  
Remote Gateway: Predefined (selected), site3-site4 (select from pull down menu)  
Select Advanced  
Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)  
VPN Monitor: (checked)  
Optimized: (checked)  
Rekey: (checked)  
Select Return and OK

### Site4 firewall

Site4 to Site1:

Select VPNs > AutoKey IKE, select New and enter following:

VPN Name: site1-site4

Security Level: Standard

Remote Gateway: Predefined (selected), site1-site4 (select from pull down menu)

Select Advanced

Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)

VPN Monitor: (checked)

Optimized: (checked)

Rekey: (checked)

Select Return and OK

Site4 to Site2:

Select VPNs > AutoKey IKE, select New and enter following:

VPN Name: site2-site4

Security Level: Standard

Remote Gateway: Predefined (selected), site2-site4 (select from pull down menu)

Select Advanced

Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)

VPN Monitor: (checked)

Optimized: (checked)

Rekey: (checked)

Select Return and OK

Site4 to Site3:

Select VPNs > AutoKey IKE, select New and enter following:

VPN Name: site3-site4

Security Level: Standard

Remote Gateway: Predefined (selected), site3-site4 (select from pull down menu)

Select Advanced

Bind to: Tunnel Interface (checked), tunnel.1 (select from pull down menu)

VPN Monitor: (checked)

Optimized: (checked)

Rekey: (checked)

Select Return and OK

### CLI:

#### **Site1 firewall**

Site1 to Site2:

```
set vpn sitel-site2 gateway sitel-site2 sec-level standard
set vpn sitel-site2 bind interface tunnel.1
set vpn sitel-site2 monitor optimized rekey
```

Site1 to Site3:

```
set vpn sitel-site3 gateway sitel-site3 sec-level standard
set vpn sitel-site3 bind interface tunnel.1
set vpn sitel-site3 monitor optimized rekey
```

Site1 to Site4:

```
set vpn sitel-site4 gateway sitel-site4 sec-level standard
set vpn sitel-site4 bind interface tunnel.1
set vpn sitel-site4 monitor optimized rekey
```

**Site2 firewall****Site2 to Site1:**

```
set vpn sitel-site2 gateway sitel-site2 sec-level standard
set vpn sitel-site2 bind interface tunnel.1
set vpn sitel-site2 monitor optimized rekey
```

**Site2 to Site3:**

```
set vpn site2-site3 gateway site2-site3 sec-level standard
set vpn site2-site3 bind interface tunnel.1
set vpn site2-site3 monitor optimized rekey
```

**Site2 to Site4:**

```
set vpn site2-site4 gateway site2-site4 sec-level standard
set vpn site2-site4 bind interface tunnel.1
set vpn site2-site4 monitor optimized rekey
```

**Site3 firewall****Site3 to Site1:**

```
set vpn sitel-site3 gateway sitel-site3 sec-level standard
set vpn sitel-site3 bind interface tunnel.1
set vpn sitel-site3 monitor optimized rekey
```

**Site3 to Site2:**

```
set vpn site2-site3 gateway site2-site3 sec-level standard
set vpn site2-site3 bind interface tunnel.1
set vpn site2-site3 monitor optimized rekey
```

**Site3 to Site4:**

```
set vpn site3-site4 gateway site3-site4 sec-level standard
set vpn site3-site4 bind interface tunnel.1
set vpn site3-site4 monitor optimized rekey
```

**Site4 firewall****Site4 to Site1:**

```
set vpn sitel-site4 gateway sitel-site4 sec-level standard
set vpn sitel-site4 bind interface tunnel.1
set vpn sitel-site4 monitor optimized rekey
```

**Site4 to Site2:**

```
set vpn site2-site4 gateway site2-site4 sec-level standard
set vpn site2-site4 bind interface tunnel.1
set vpn site2-site4 monitor optimized rekey
```

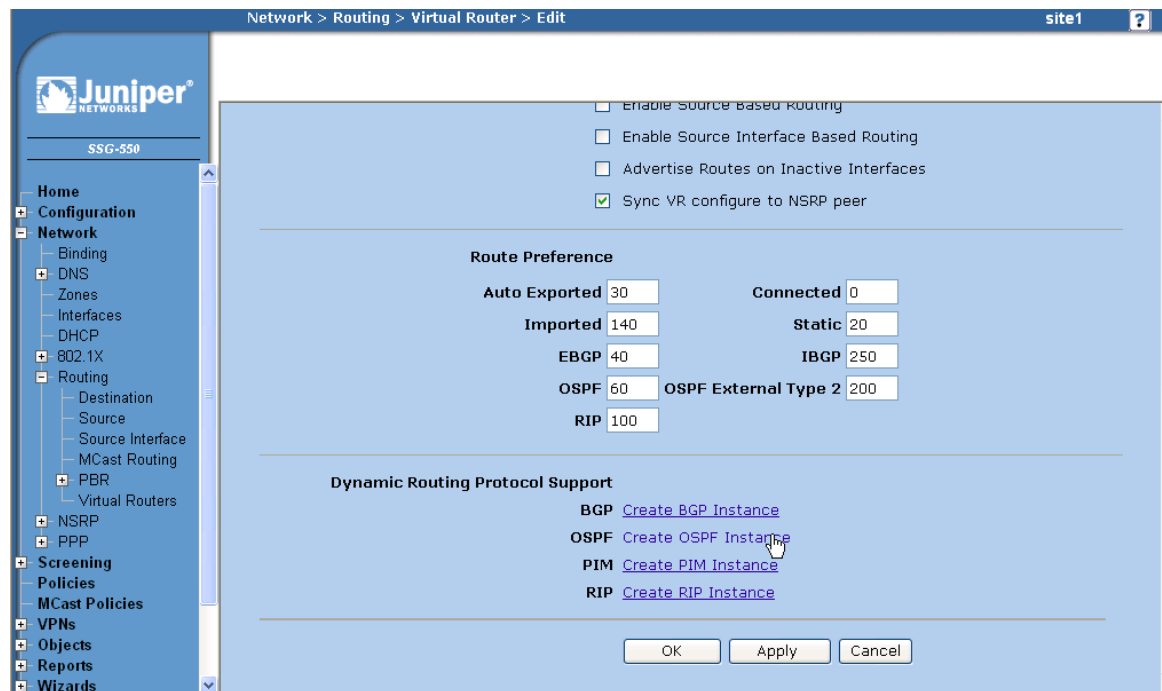
**Site4 to Site3:**

```
set vpn site3-site4 gateway site3-site4 sec-level standard
set vpn site3-site4 bind interface tunnel.1
set vpn site3-site4 monitor optimized rekey
```

## Step 4: Configuring OSPF protocol

OSPF is the routing protocol that used in this application note to demonstrate how routing information can be integrated in the Full Mesh VPN scenario. With OSPF, the local routes will be automatically learned by remote gateways. This is a way to minimize administrative overhead in maintaining large VPN network.

Create OSPF routing instance:



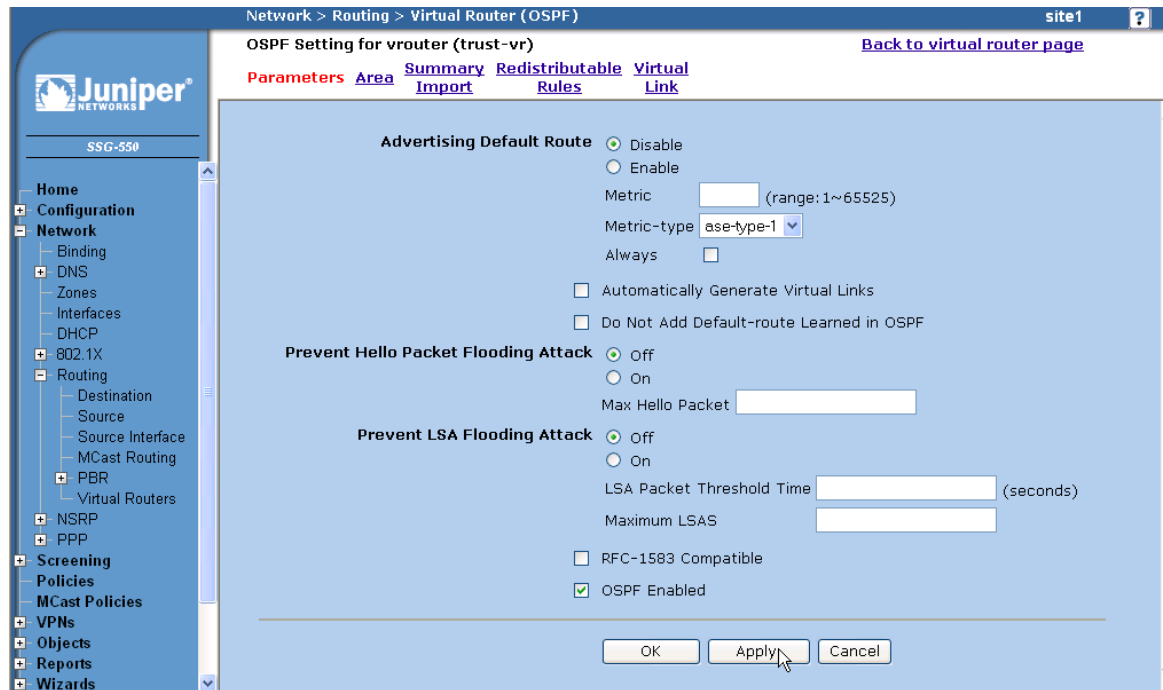
The screenshot shows the Juniper J-Web configuration interface for a Virtual Router. The breadcrumb trail at the top indicates the path: Network > Routing > Virtual Router > Edit. The left sidebar shows the configuration tree with 'Routing' expanded. The main content area is divided into sections:

- Enable Source Based Routing**
  - ☐ Enable Source Based Routing
  - ☐ Enable Source Interface Based Routing
  - ☐ Advertise Routes on Inactive Interfaces
  - ☒ Sync VR configure to NSRP peer
- Route Preference**

Auto Exported	30	Connected	0
Imported	140	Static	20
EBGP	40	IBGP	250
OSPF	60	OSPF External Type 2	200
RIP	100		
- Dynamic Routing Protocol Support**
  - BGP [Create BGP Instance](#)
  - OSPF [Create OSPF Instance](#)
  - PIM [Create PIM Instance](#)
  - RIP [Create RIP Instance](#)

At the bottom right, there are three buttons: OK, Apply, and Cancel.

Enable OSPF and select Apply.



Network > Routing > Virtual Router (OSPF) site1 ?

OSPF Setting for vrrouter (trust-vr) [Back to virtual router page](#)

[Parameters](#) [Area](#) [Summary](#) [Redistributable](#) [Virtual Link](#)

SSG-550

Home Configuration Network Binding DNS Zones Interfaces DHCP 802.1X Routing Destination Source Source Interface MCast Routing PBR Virtual Routers NSRP PPP Screening Policies MCast Policies VPNs Objects Reports Wizards

**Advertising Default Route**

☒ Disable  
☐ Enable  
Metric  (range:1~65525)  
Metric-type ase-type-1  
Always ☐

☐ Automatically Generate Virtual Links  
☐ Do Not Add Default-route Learned in OSPF

**Prevent Hello Packet Flooding Attack**

☒ Off  
☐ On  
Max Hello Packet

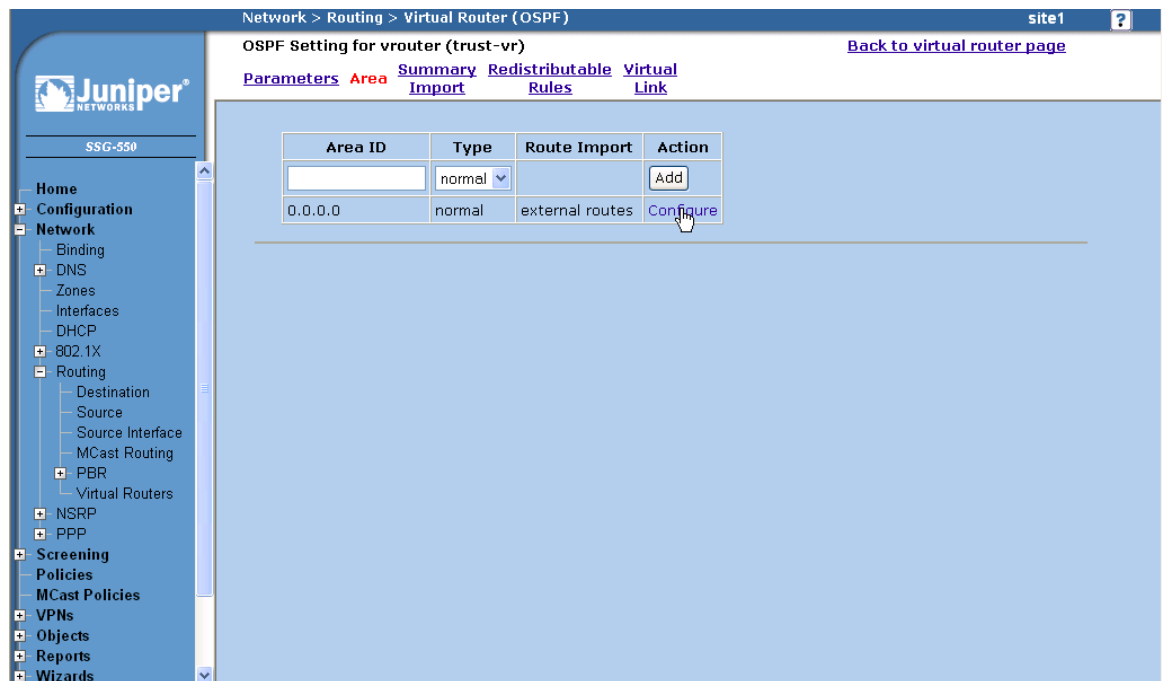
**Prevent LSA Flooding Attack**

☒ Off  
☐ On  
LSA Packet Threshold Time  (seconds)  
Maximum LSAS

☐ RFC-1583 Compatible  
☒ OSPF Enabled

OK Apply Cancel

Select Area and configure area "0.0.0.0".



Network > Routing > Virtual Router (OSPF) site1 ?

OSPF Setting for vrrouter (trust-vr) [Back to virtual router page](#)

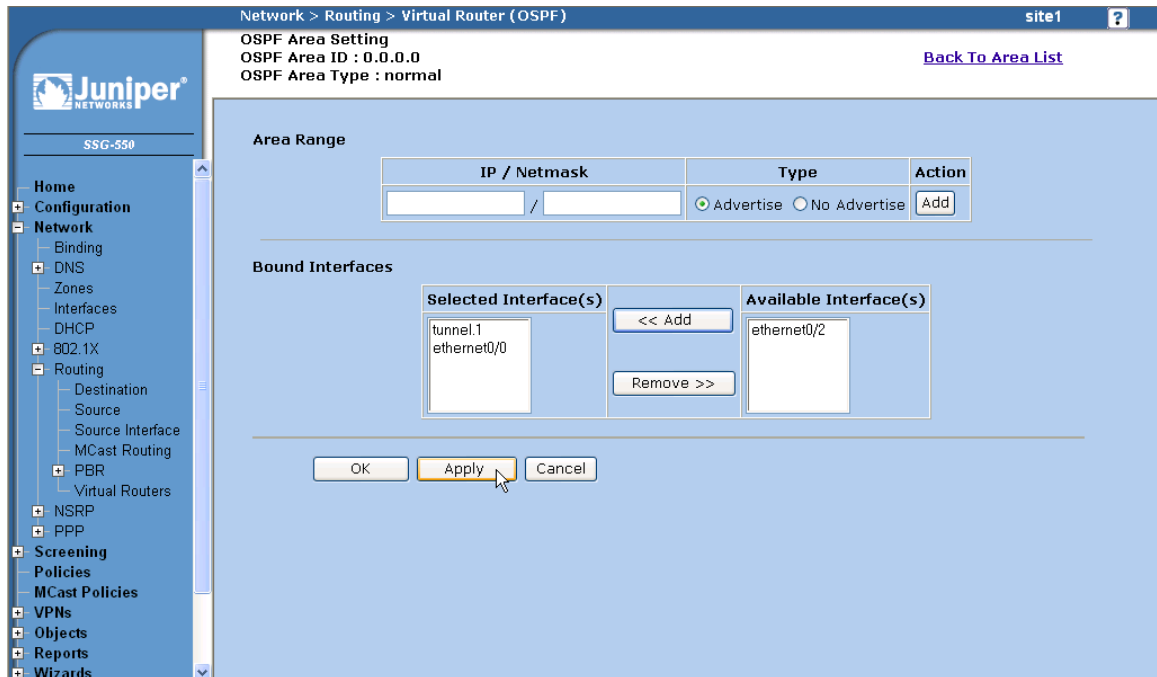
[Parameters](#) [Area](#) [Summary](#) [Redistributable](#) [Virtual Link](#)

SSG-550

Home Configuration Network Binding DNS Zones Interfaces DHCP 802.1X Routing Destination Source Source Interface MCast Routing PBR Virtual Routers NSRP PPP Screening Policies MCast Policies VPNs Objects Reports Wizards

Area ID	Type	Route Import	Action
<input type="text"/>	normal		Add
0.0.0.0	normal	external routes	Configure

Select interfaces that participate on area “0.0.0.0” and Apply.



Network > Routing > Virtual Router (OSPF) site1

OSPF Area Setting  
OSPF Area ID : 0.0.0.0  
OSPF Area Type : normal [Back To Area List](#)

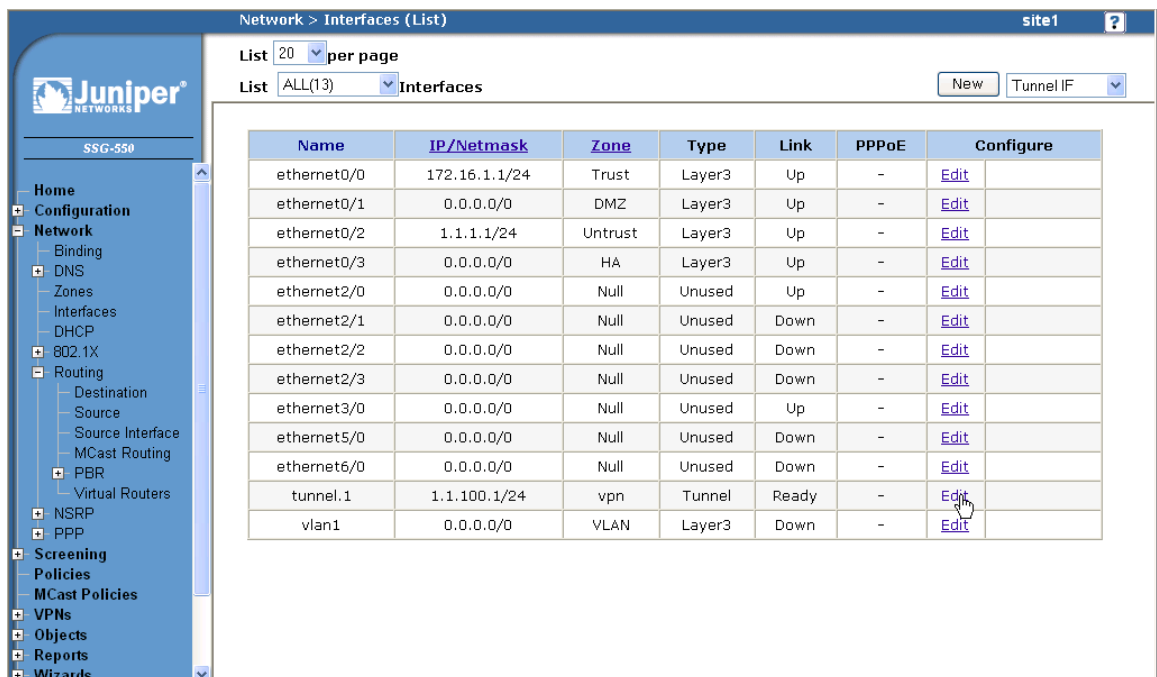
Area Range

IP / Netmask	Type	Action
<input type="text"/> / <input type="text"/>	<input checked="" type="radio"/> Advertise <input type="radio"/> No Advertise	<input type="button" value="Add"/>

Bound Interfaces

Selected Interface(s)		Available Interface(s)
tunnel.1 ethernet0/0	<input type="button" value=" &lt;&lt; Add"/>  <input type="button" value=" Remove &gt;&gt;"/>	ethernet0/2

Then select OK back to the virtual router page. Select OK.  
Select Interface > tunnel.1.

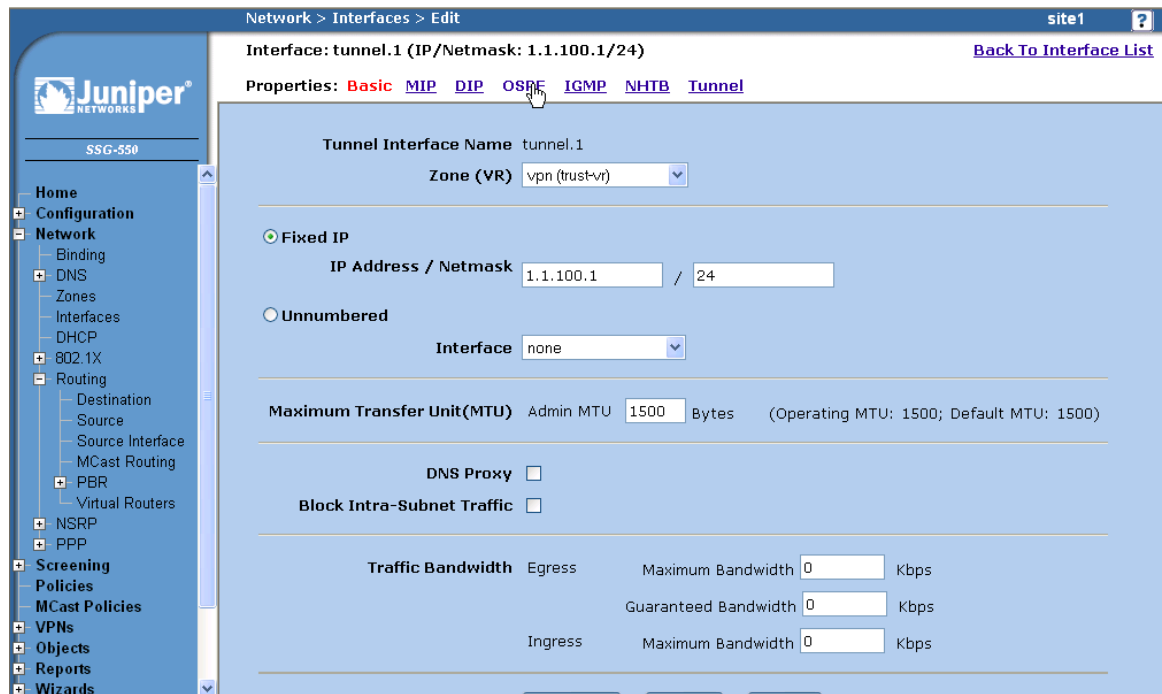


Network > Interfaces (List) site1

List  per page  
List  Interfaces

Name	IP/Netmask	Zone	Type	Link	PPPoE	Configure
ethernet0/0	172.16.1.1/24	Trust	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/1	0.0.0.0/0	DMZ	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/2	1.1.1.1/24	Untrust	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/3	0.0.0.0/0	HA	Layer3	Up	-	<a href="#">Edit</a>
ethernet2/0	0.0.0.0/0	Null	Unused	Up	-	<a href="#">Edit</a>
ethernet2/1	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet2/2	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet2/3	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet3/0	0.0.0.0/0	Null	Unused	Up	-	<a href="#">Edit</a>
ethernet5/0	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet6/0	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
tunnel.1	1.1.100.1/24	vpn	Tunnel	Ready	-	<a href="#">Edit</a>
vlan1	0.0.0.0/0	VLAN	Layer3	Down	-	<a href="#">Edit</a>

Select OSPF.



Network > Interfaces > Edit site1 ?

Interface: tunnel.1 (IP/Netmask: 1.1.100.1/24) [Back To Interface List](#)

Properties: **Basic** MIP DIP **OSPF** IGMP NHTB Tunnel

Tunnel Interface Name: tunnel.1

Zone (VR): vpn (trust-vr)

☒ Fixed IP

IP Address / Netmask: 1.1.100.1 / 24

☐ Unnumbered

Interface: none

Maximum Transfer Unit(MTU): Admin MTU 1500 Bytes (Operating MTU: 1500; Default MTU: 1500)

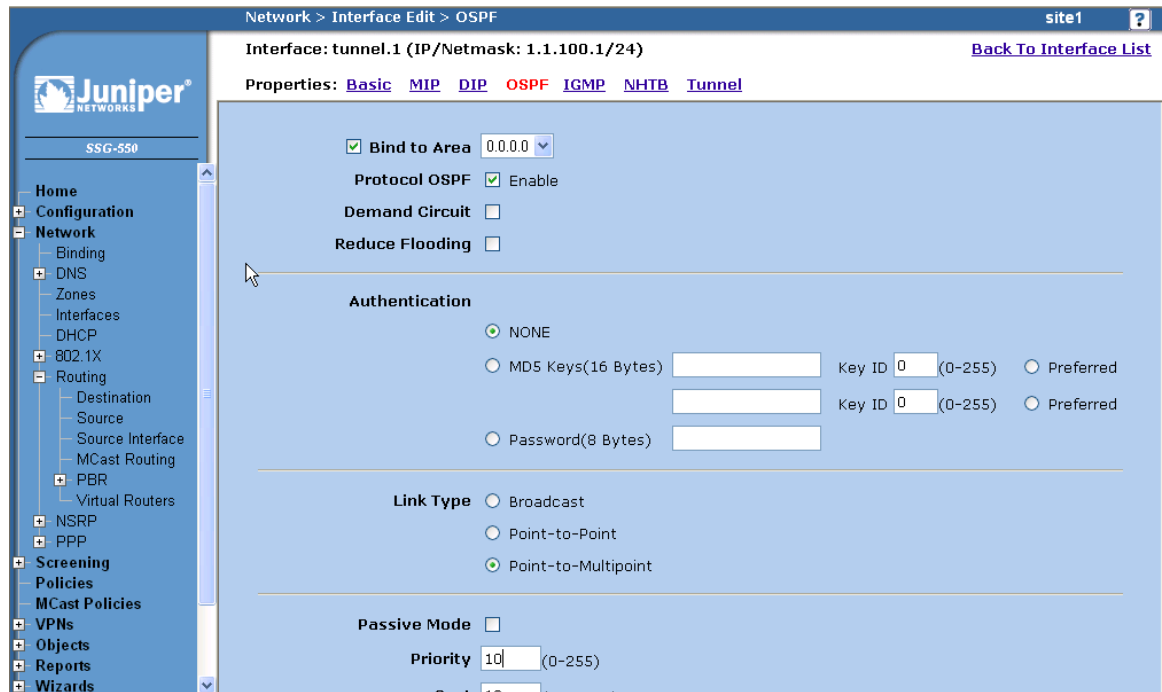
DNS Proxy ☐

Block Intra-Subnet Traffic ☐

Traffic Bandwidth

	Egress	Maximum Bandwidth	Guaranteed Bandwidth
		0 Kbps	0 Kbps
	Ingress	0 Kbps	

Enable OSPF and select Point-to-Multipoint link type. Edit Priority and Cost, if needed. Then select Apply.



Network > Interface Edit > OSPF site1 ?

Interface: tunnel.1 (IP/Netmask: 1.1.100.1/24) [Back To Interface List](#)

Properties: **Basic** MIP DIP **OSPF** IGMP NHTB Tunnel

☒ Bind to Area 0.0.0.0

Protocol OSPF ☒ Enable

Demand Circuit ☐

Reduce Flooding ☐

Authentication

☒ NONE

☐ MD5 Keys(16 Bytes) Key ID 0 (0-255) ☐ Preferred

☐ Password(8 Bytes)

Link Type

☐ Broadcast

☐ Point-to-Point

☒ Point-to-Multipoint

Passive Mode ☐

Priority 10 (0-255)

Cost 10 (1-65535)



Select interface and edit interface connecting to local OSPF network.

Network > Interfaces (List) site1

List 20 per page

List ALL(13) Interfaces New Tunnel IF

Name	IP/Netmask	Zone	Type	Link	PPPoE	Configure
ethernet0/0	172.16.1.1/24	Trust	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/1	0.0.0.0/0	DMZ	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/2	1.1.1.1/24	Untrust	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/3	0.0.0.0/0	HA	Layer3	Up	-	<a href="#">Edit</a>
ethernet2/0	0.0.0.0/0	Null	Unused	Up	-	<a href="#">Edit</a>
ethernet2/1	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet2/2	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet2/3	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet3/0	0.0.0.0/0	Null	Unused	Up	-	<a href="#">Edit</a>
ethernet5/0	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet6/0	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
tunnel.1	1.1.100.1/24	vpn	Tunnel	Ready	-	<a href="#">Edit</a>
vlan1	0.0.0.0/0	VLAN	Layer3	Down	-	<a href="#">Edit</a>

Select OSPF.

Network > Interfaces > Edit site1

Interface: ethernet0/0 (IP/Netmask: 172.16.1.1/24) [Back To Interface List](#)

Properties: [Basic](#) [MIP](#) [DIP](#) [Secondary IP](#) [OSPF](#) [IGMP](#) [Monitor](#) [802.1X](#)

Interface Name ethernet0/0 0012.1ea8.fb00

As member of group none

Zone Name Trust

☐ Obtain IP using DHCP ☐ Automatic update DHCP server parameters  
☐ Obtain IP using PPPoE None [Create new pppoe setting](#)  
☒ Static IP

IP Address / Netmask 172.16.1.1 / 24 ☒ Manageable

Manage IP \* 172.16.1.1 0012.1ea8.fb00

Interface Mode ☐ NAT ☒ Route

Block Intra-Subnet Traffic ☐

Service Options

Management Services ☒ Web UI ☒ Telnet ☒ SSH

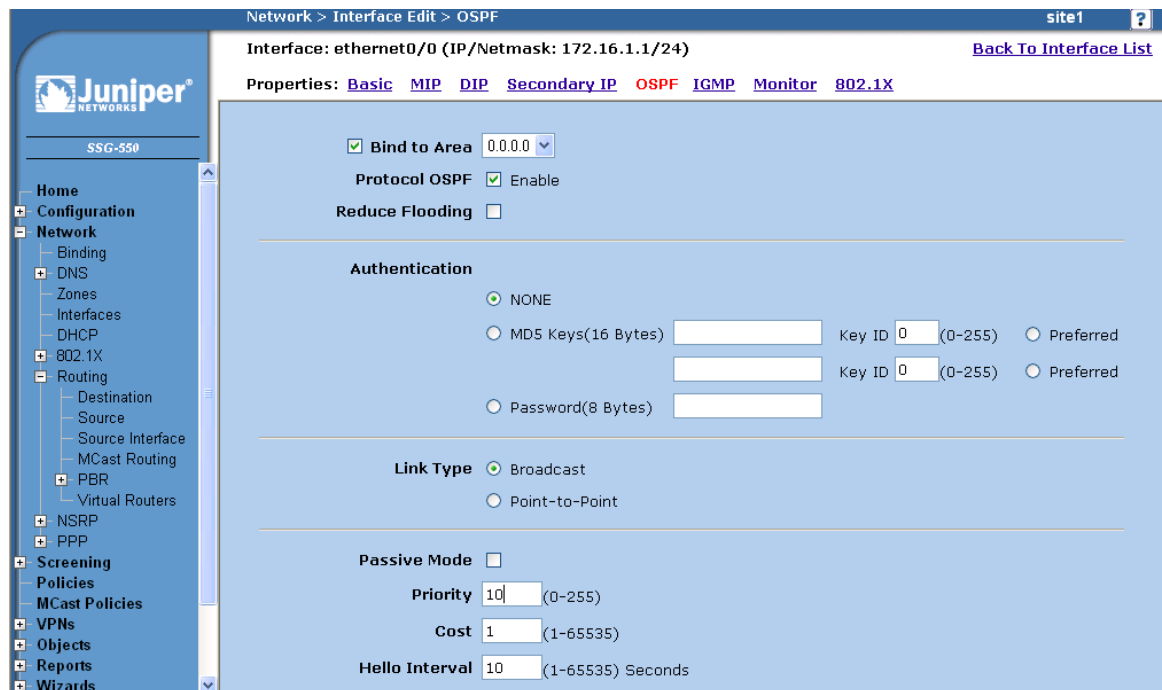
☒ SNMP ☒ SSL

Other Services ☒ Ping ☐ Path MTU(IPv4) ☐ Ident-reset

Maximum Transfer Unit(MTU) Admin MTU 0 Bytes (Operating MTU: 1500; Default MTU: 1500)

DNS Proxy ☐

Enable OSPF and edit priority and cost (if needed), then Apply.



Network > Interface Edit > OSPF site1 ?

Interface: ethernet0/0 (IP/Netmask: 172.16.1.1/24) [Back To Interface List](#)

Properties: [Basic](#) [MIP](#) [DIP](#) [Secondary IP](#) [OSPF](#) [IGMP](#) [Monitor](#) [802.1X](#)

☒ Bind to Area 0.0.0.0

Protocol OSPF ☒ Enable

Reduce Flooding ☐

**Authentication**

☒ NONE

☐ MD5 Keys(16 Bytes)  Key ID 0 (0-255) ☐ Preferred

☐ Password(8 Bytes)  Key ID 0 (0-255) ☐ Preferred

**Link Type** ☒ Broadcast

☐ Point-to-Point

**Passive Mode** ☐

Priority 10 (0-255)

Cost 1 (1-65535)

Hello Interval 10 (1-65535) Seconds

The WebUI and CLI ‘Step 4’ instructions for each firewall are as follows:

### WebUI:

#### **Site1 firewall**

Enable OSPF Instance:

- Select Network > Routing > Virtual Routers, select trust-vr and then Edit.
- Select Create OSPF Instance.
- Select OSPF Enable and then Apply.
- Choose Area ID “0.0.0.0”, then Configure.
- Select interface “tunnel.1” and “ethernet0/0” to add to Bound Interfaces list, then Apply and OK to exit.

Enable OSPF on tunnel interface:

- Select Network > Interfaces, the select tunnel.1 and Edit.
- Select OSPF.
- Enter the following, then select Apply.
- Protocol OSPF: Enable (selected)
- Link Type: Point-to-Multipoint (selected)
- Priority: 10
- Cost: 1

Enable OSPF on interface connecting to local OSPF network:

Select Network > Interfaces, the select ethernet0/0 and Edit.  
Select OSPF.  
Enter the following, then select Apply.  
Protocol OSPF: Enable (selected)  
Priority: 10  
Cost: 1

### Site2 firewall

Enable OSPF Instance:

Select Network > Routing > Virtual Routers, select trust-vr and then Edit.  
Select Create OSPF Instance.  
Select OSPF Enable and then Apply.  
Choose Area ID "0.0.0.0", then Configure.  
Select interface "tunnel.1" and "ethernet0/0" to add to Bound Interfaces list, then Apply and OK to exit.

Enable OSPF on tunnel interface:

Select Network > Interfaces, the select tunnel.1 and Edit.  
Select OSPF.  
Enter the following, then select Apply.  
Protocol OSPF: Enable (selected)  
Link Type: Point-to-Multipoint (selected)  
Priority: 10  
Cost: 1

Enable OSPF on interface connecting to local OSPF network:

Select Network > Interfaces, the select ethernet0/0 and Edit.  
Select OSPF.  
Enter the following, then select Apply.  
Protocol OSPF: Enable (selected)  
Priority: 10  
Cost: 1

### Site3 firewall

Enable OSPF Instance:

Select Network > Routing > Virtual Routers, select trust-vr and then Edit.  
Select Create OSPF Instance.  
Select OSPF Enable and then Apply.  
Choose Area ID "0.0.0.0", then Configure.  
Select interface "tunnel.1" and "bgroup0" to add to Bound Interfaces list, then Apply and OK to exit.

Enable OSPF on tunnel interface:

Select Network > Interfaces, the select tunnel.1 and Edit.  
Select OSPF.  
Enter the following, then select Apply.  
Protocol OSPF: Enable (selected)  
Link Type: Point-to-Multipoint (selected)  
Priority: 10

Cost: 1

Enable OSPF on interface connecting to local OSPF network:

Select Network > Interfaces, the select bggroup0 and Edit.  
Select OSPF.  
Enter the following, then select Apply.  
Protocol OSPF: Enable (selected)  
Priority: 10  
Cost: 1

#### **Site4 firewall**

Enable OSPF Instance:

Select Network > Routing > Virtual Routers, select trust-vr and then Edit.  
Select Create OSPF Instance.  
Select OSPF Enable and then Apply.  
Choose Area ID "0.0.0.0", then Configure.  
Select interface "tunnel.1" and "ethernet0/2" to add to Bound Interfaces list, then Apply and OK to exit.

Enable OSPF on tunnel interface:

Select Network > Interfaces, the select tunnel.1 and Edit.  
Select OSPF.  
Enter the following, then select Apply.  
Protocol OSPF: Enable (selected)  
Link Type: Point-to-Multipoint (selected)  
Priority: 10  
Cost: 1

Enable OSPF on interface connecting to local OSPF network:

Select Network > Interfaces, the select ethernet0/2 and Edit.  
Select OSPF.  
Enter the following, then select Apply.  
Protocol OSPF: Enable (selected)  
Priority: 10  
Cost: 1

#### CLI:

##### **Site1 firewall**

Enable OSPF instance:

```
set vrouter trust-vr protocol ospf
set vrouter trust-vr protocol ospf enable
```

Enable OSPF on tunnel interface:

```
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf link-type p2mp
set interface tunnel.1 protocol ospf enable
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
```

Enable OSPF on interface connecting local OSPF network:

```
set interface ethernet0/0 protocol ospf area 0.0.0.0
set interface ethernet0/0 protocol ospf enable
set interface ethernet0/0 protocol ospf priority 10
set interface ethernet0/0 protocol ospf cost 1
```

### Site2 firewall

Enable OSPF instance:

```
set vrouter trust-vr protocol ospf
set vrouter trust-vr protocol ospf enable
```

Enable OSPF on tunnel interface:

```
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf link-type p2mp
set interface tunnel.1 protocol ospf enable
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
```

Enable OSPF on interface connecting local OSPF network:

```
set interface ethernet0/0 protocol ospf area 0.0.0.0
set interface ethernet0/0 protocol ospf enable
set interface ethernet0/0 protocol ospf priority 10
set interface ethernet0/0 protocol ospf cost 1
```

### Sit3 firewall

Enable OSPF instance:

```
set vrouter trust-vr protocol ospf
set vrouter trust-vr protocol ospf enable
```

Enable OSPF on tunnel interface:

```
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf link-type p2mp
set interface tunnel.1 protocol ospf enable
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
```

Enable OSPF on interface connecting local OSPF network:

```
set interface bgroup0 protocol ospf area 0.0.0.0
set interface bgroup0 protocol ospf enable
set interface bgroup0 protocol ospf priority 10
set interface bgroup0 protocol ospf cost 1
```

### Site4 firewall

Enable OSPF instance:

```
set vrouter trust-vr protocol ospf
set vrouter trust-vr protocol ospf enable
```

Enable OSPF on tunnel interface:

```
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf link-type p2mp
set interface tunnel.1 protocol ospf enable
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
```

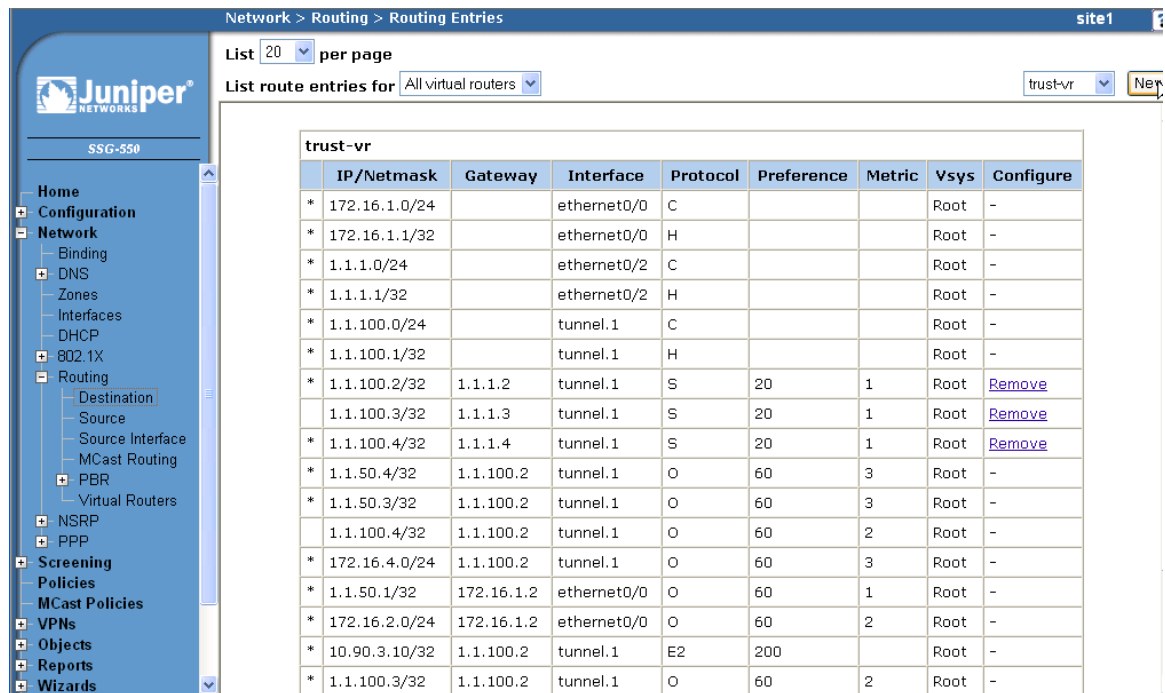
Enable OSPF on interface connecting local OSPF network:

```
set interface ethernet0/2 protocol ospf area 0.0.0.0
set interface ethernet0/2 protocol ospf enable
set interface ethernet0/2 protocol ospf priority 10
set interface ethernet0/2 protocol ospf cost 1
```

## Step 5: Add Static Routes and Static NHTB entries

Static route is required to maintain the reachability between tunnel interfaces among firewalls. In addition, to ensure multicast OSPF traffic is using the correct tunnel, static NHTB entries are required. (Otherwise, the OSPF neighbor state may get stuck in “Exstart” as the multicast OSPF traffic may use the incorrect tunnel.)

Configure static route entries, select New from trust-vr.



Network > Routing > Routing Entries

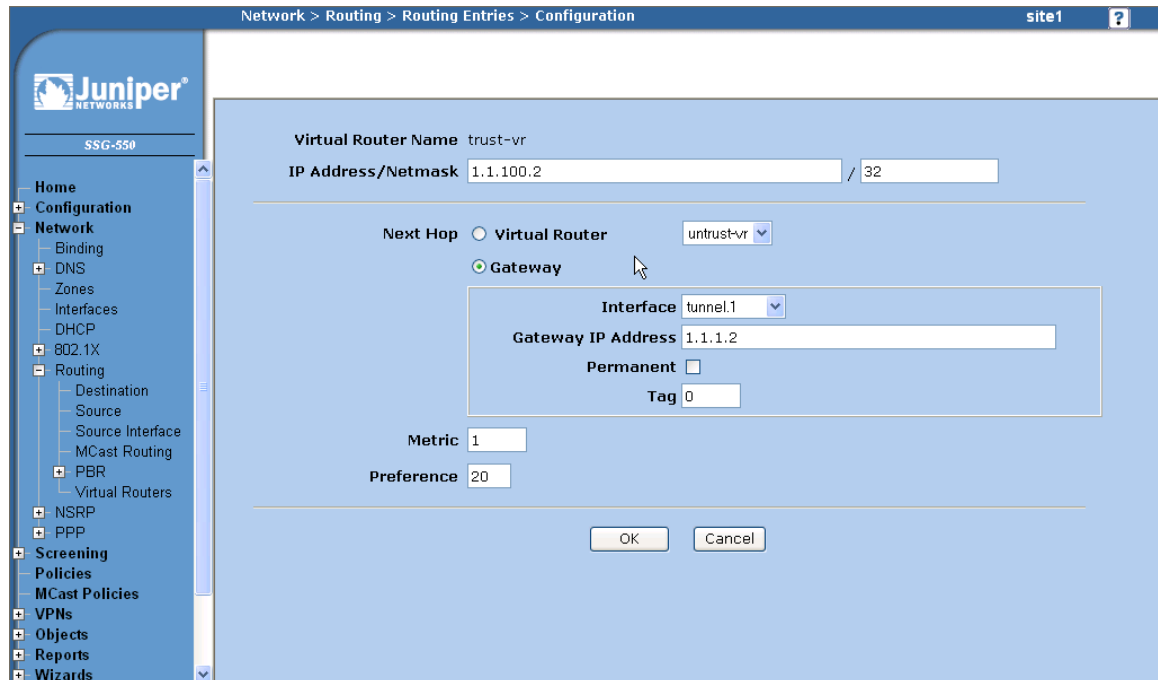
List 20 per page

List route entries for All virtual routers

trust-vr

	IP/Netmask	Gateway	Interface	Protocol	Preference	Metric	Vsys	Configure
*	172.16.1.0/24		ethernet0/0	C			Root	-
*	172.16.1.1/32		ethernet0/0	H			Root	-
*	1.1.1.0/24		ethernet0/2	C			Root	-
*	1.1.1.1/32		ethernet0/2	H			Root	-
*	1.1.100.0/24		tunnel.1	C			Root	-
*	1.1.100.1/32		tunnel.1	H			Root	-
*	1.1.100.2/32	1.1.1.2	tunnel.1	S	20	1	Root	<a href="#">Remove</a>
	1.1.100.3/32	1.1.1.3	tunnel.1	S	20	1	Root	<a href="#">Remove</a>
*	1.1.100.4/32	1.1.1.4	tunnel.1	S	20	1	Root	<a href="#">Remove</a>
*	1.1.50.4/32	1.1.100.2	tunnel.1	O	60	3	Root	-
*	1.1.50.3/32	1.1.100.2	tunnel.1	O	60	3	Root	-
	1.1.100.4/32	1.1.100.2	tunnel.1	O	60	2	Root	-
*	172.16.4.0/24	1.1.100.2	tunnel.1	O	60	3	Root	-
*	1.1.50.1/32	172.16.1.2	ethernet0/0	O	60	1	Root	-
*	172.16.2.0/24	172.16.1.2	ethernet0/0	O	60	2	Root	-
*	10.90.3.10/32	1.1.100.2	tunnel.1	E2	200		Root	-
*	1.1.100.3/32	1.1.100.2	tunnel.1	O	60	2	Root	-

Enter address of remote tunnel interface, then enters correct interface and gateway IP.  
 Select OK when done.



Network > Routing > Routing Entries > Configuration site1

Virtual Router Name: trust-vr

IP Address/Netmask: 1.1.100.2 / 32

Next Hop: ☐ Virtual Router (untrust-vr) ☒ Gateway

Interface: tunnel.1

Gateway IP Address: 1.1.1.2

Permanent: ☐

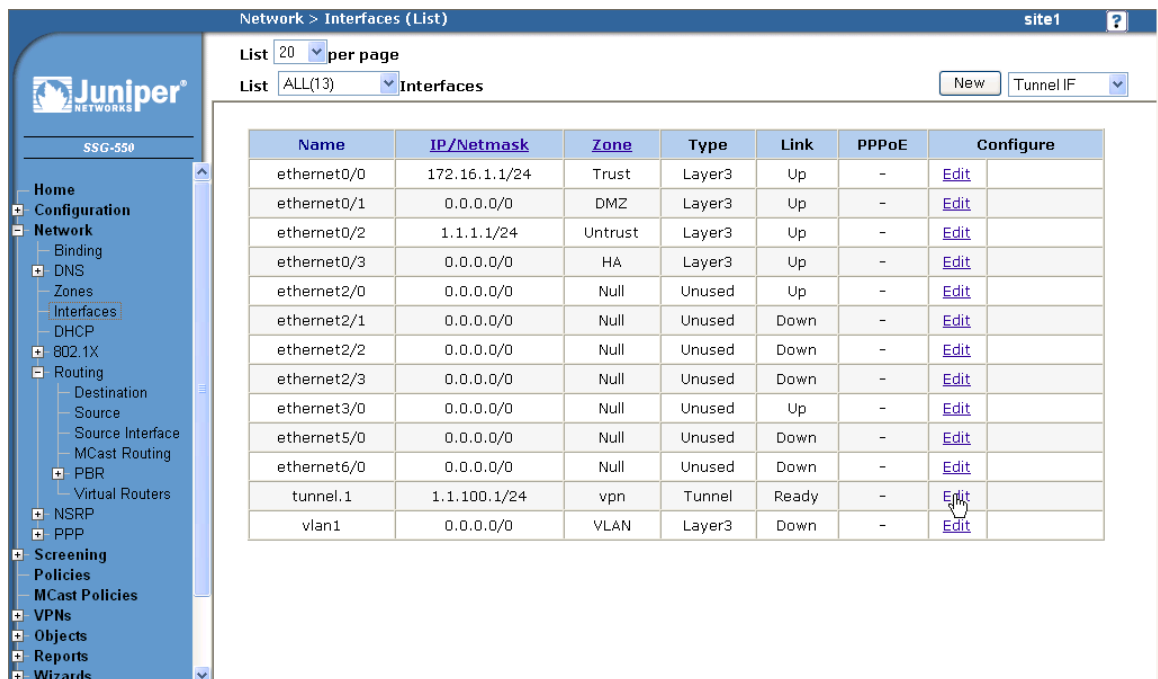
Tag: 0

Metric: 1

Preference: 20

OK Cancel

To configure static NHTB entries, select edit on tunnel interface.



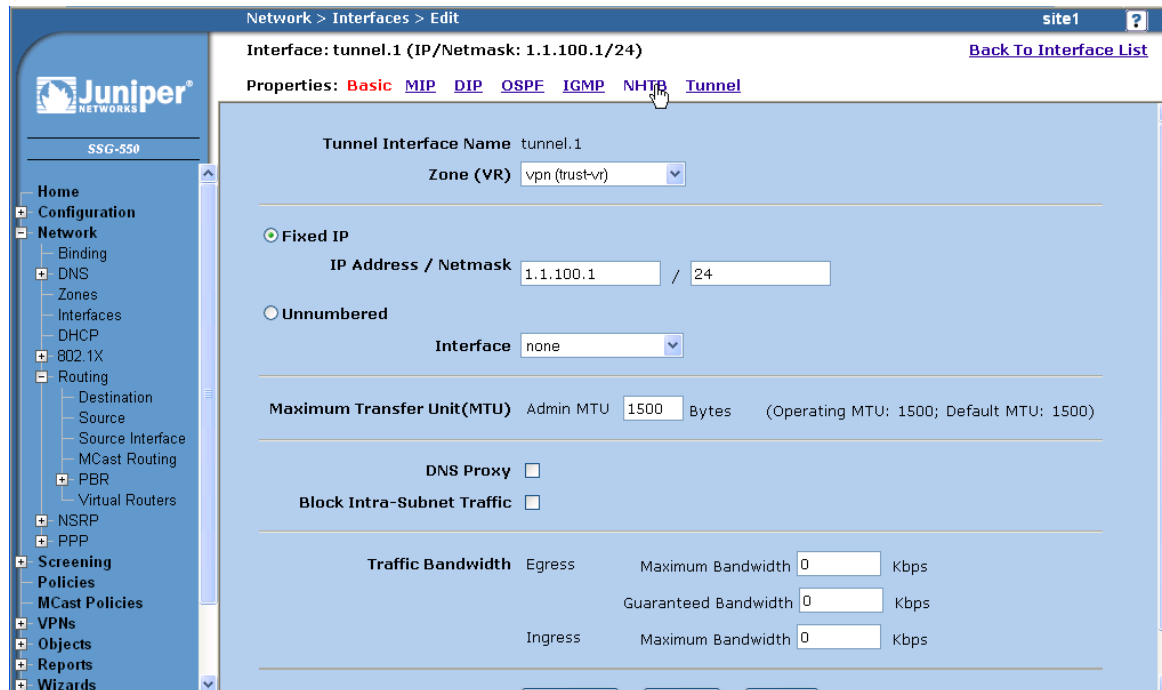
Network > Interfaces (List) site1

List: 20 per page

List: ALL(13) Interfaces New Tunnel IF

Name	IP/Netmask	Zone	Type	Link	PPPoE	Configure
ethernet0/0	172.16.1.1/24	Trust	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/1	0.0.0.0/0	DMZ	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/2	1.1.1.1/24	Untrust	Layer3	Up	-	<a href="#">Edit</a>
ethernet0/3	0.0.0.0/0	HA	Layer3	Up	-	<a href="#">Edit</a>
ethernet2/0	0.0.0.0/0	Null	Unused	Up	-	<a href="#">Edit</a>
ethernet2/1	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet2/2	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet2/3	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet3/0	0.0.0.0/0	Null	Unused	Up	-	<a href="#">Edit</a>
ethernet5/0	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
ethernet6/0	0.0.0.0/0	Null	Unused	Down	-	<a href="#">Edit</a>
tunnel.1	1.1.100.1/24	vpn	Tunnel	Ready	-	<a href="#">Edit</a>
vlan1	0.0.0.0/0	VLAN	Layer3	Down	-	<a href="#">Edit</a>

Select NHTB (which allows one to bind multiple VPNs to one tunnel interface):



Network > Interfaces > Edit site1 ?

Interface: tunnel.1 (IP/Netmask: 1.1.100.1/24) [Back To Interface List](#)

Properties: [Basic](#) [MIP](#) [DIP](#) [OSPF](#) [IGMP](#) [NHTB](#) [Tunnel](#)

**Tunnel Interface Name** tunnel.1

**Zone (VR)** vpn (trust-vr)

☒ **Fixed IP**

**IP Address / Netmask** 1.1.100.1 / 24

☐ **Unnumbered**

**Interface** none

**Maximum Transfer Unit(MTU)** Admin MTU 1500 Bytes (Operating MTU: 1500; Default MTU: 1500)

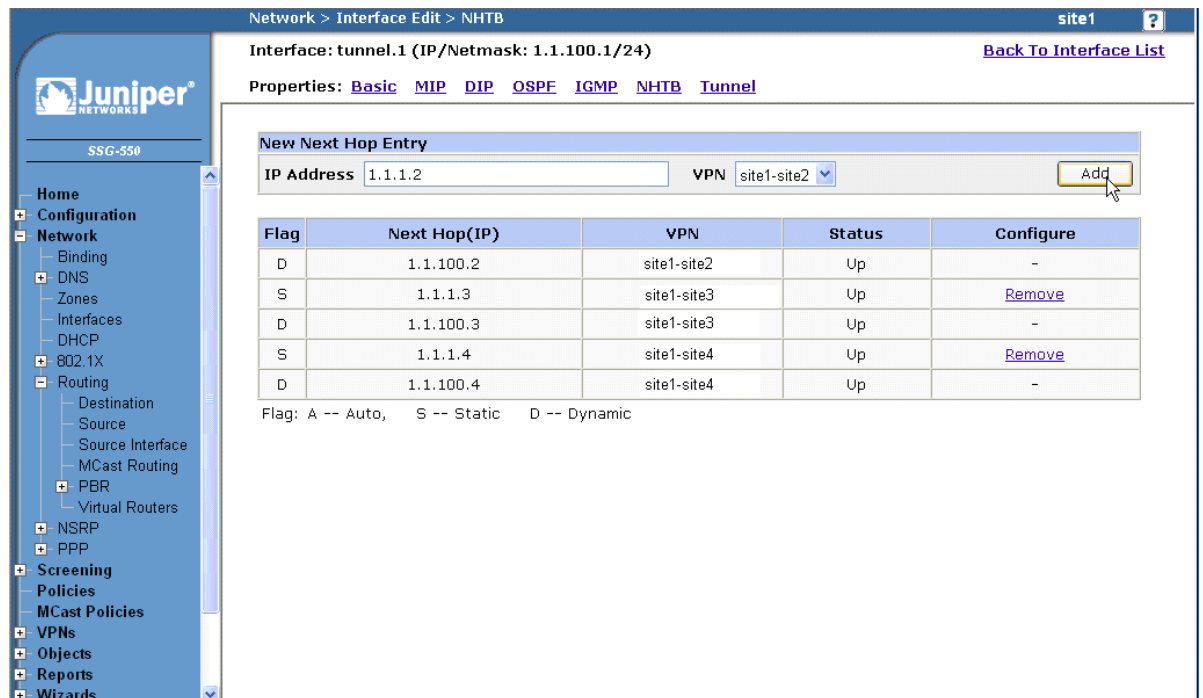
**DNS Proxy** ☐

**Block Intra-Subnet Traffic** ☐

**Traffic Bandwidth**

	Egress	Maximum Bandwidth	Guaranteed Bandwidth
		0 Kbps	0 Kbps
	Ingress	0 Kbps	

Enter remote gateway IP address and corresponding vpn tunnel name, then select Add.



Network > Interface Edit > NHTB site1 ?

Interface: tunnel.1 (IP/Netmask: 1.1.100.1/24) [Back To Interface List](#)

Properties: [Basic](#) [MIP](#) [DIP](#) [OSPF](#) [IGMP](#) [NHTB](#) [Tunnel](#)

**New Next Hop Entry**

**IP Address** 1.1.1.2 **VPN** site1-site2 [Add](#)

Flag	Next Hop(IP)	VPN	Status	Configure
D	1.1.100.2	site1-site2	Up	-
S	1.1.1.3	site1-site3	Up	<a href="#">Remove</a>
D	1.1.100.3	site1-site3	Up	-
S	1.1.1.4	site1-site4	Up	<a href="#">Remove</a>
D	1.1.100.4	site1-site4	Up	-

Flag: A -- Auto, S -- Static D -- Dynamic



The WebUI and CLI 'Step 5' instructions for each firewall are as follows:

WebUI:

**Site1 firewall**

Static route to tunnel interface of Site2:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.2 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.2  
Select OK

Static route to tunnel interface of Site3:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.3 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.3  
Select OK

Static route to tunnel interface of Site4:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.4 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.4  
Select OK

Static NHTB entry to Site2 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.2  
VPN: site1-site2  
Select Add

Static NHTB entry to Site3 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.3  
VPN: site1-site3  
Select Add

Static NHTB entry to Site4 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:

IP Address: 1.1.1.4  
VPN: site1-site4  
Select Add

### Site2 firewall

Static route to tunnel interface of Site1:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.1 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.1  
Select OK

Static route to tunnel interface of Site3:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.3 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.3  
Select OK

Static route to tunnel interface of Site4:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.4 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.4  
Select OK

Static NHTB entry to Site1 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.1  
VPN: site1-site2  
Select Add

Static NHTB entry to Site3 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.3  
VPN: site2-site3  
Select Add

Static NHTB entry to Site4 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.4

VPN: site2-site4  
Select Add

### Site3 firewall

Static route to tunnel interface of Site1:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.1 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.1  
Select OK

Static route to tunnel interface of Site2:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.2 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.2  
Select OK

Static route to tunnel interface of Site4:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.4 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.4  
Select OK

Static NHTB entry to Site1 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.1  
VPN: site1-site3  
Select Add

Static NHTB entry to Site2 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.2  
VPN: site2-site3  
Select Add

Static NHTB entry to Site4 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.4

VPN: site3-site4  
Select Add

#### Site4 firewall

Static route to tunnel interface of Site1:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.1 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.1  
Select OK

Static route to tunnel interface of Site2:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.2 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.2  
Select OK

Static route to tunnel interface of Site3:

Select Network > Routing > Destination, select New and enter following:  
IP Address / Netmask: 1.1.100.3 / 32  
Next Hop: Gateway (selected)  
Interface: tunnel.1 (select from pull down menu)  
Gateway IP Address: 1.1.1.3  
Select OK

Static NHTB entry to Site1 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.1  
VPN: site1-site4  
Select Add

Static NHTB entry to Site2 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.2  
VPN: site2-site4  
Select Add

Static NHTB entry to Site3 firewall:

Select Network > Interfaces, select Edit on tunnel.1.  
Select NHTB and enter the following:  
IP Address: 1.1.1.3  
VPN: site3-site4

Select Add

CLI:

**Site1 firewall**

```
set route 1.1.100.2/32 interface tunnel.1 gateway 1.1.1.2
set route 1.1.100.3/32 interface tunnel.1 gateway 1.1.1.3
set route 1.1.100.4/32 interface tunnel.1 gateway 1.1.1.4
set interface tunnel.1 nhtb 1.1.1.2 vpn sitel-site2
set interface tunnel.1 nhtb 1.1.1.3 vpn sitel-site3
set interface tunnel.1 nhtb 1.1.1.4 vpn sitel-site4
```

**Site2 firewall**

```
set route 1.1.100.1/32 interface tunnel.1 gateway 1.1.1.1
set route 1.1.100.3/32 interface tunnel.1 gateway 1.1.1.3
set route 1.1.100.4/32 interface tunnel.1 gateway 1.1.1.4
set interface tunnel.1 nhtb 1.1.1.1 vpn sitel-site2
set interface tunnel.1 nhtb 1.1.1.3 vpn site2-site3
set interface tunnel.1 nhtb 1.1.1.4 vpn site2-site4
```

**Site3 firewall**

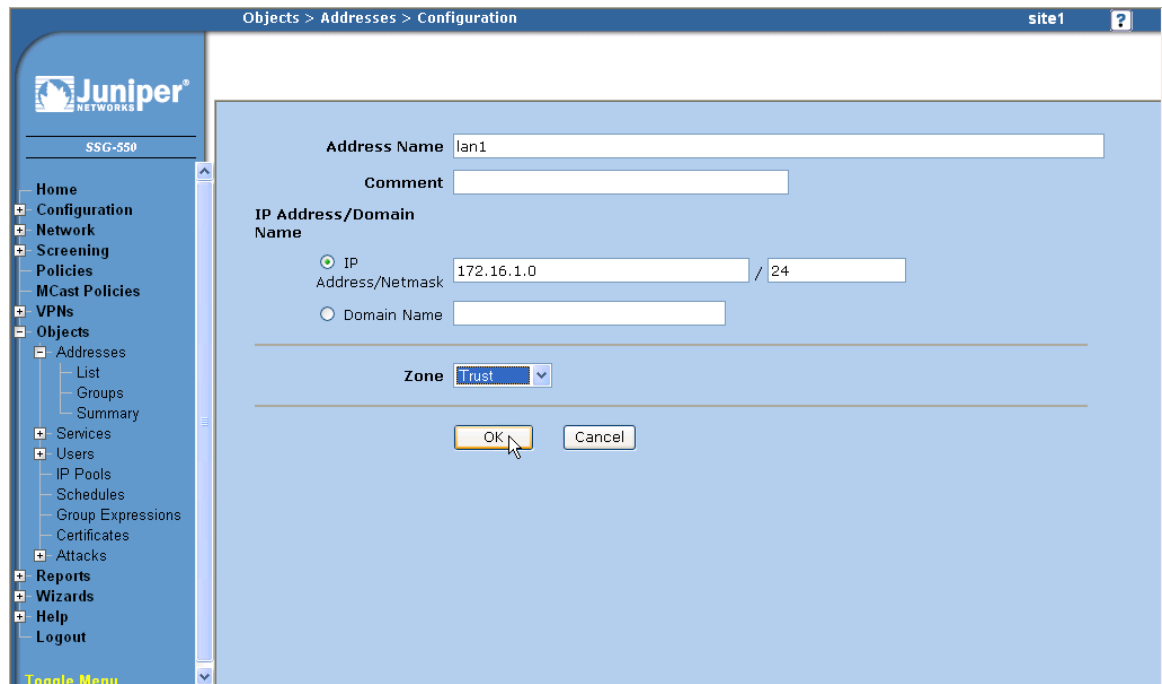
```
set route 1.1.100.1/32 interface tunnel.1 gateway 1.1.1.1
set route 1.1.100.2/32 interface tunnel.1 gateway 1.1.1.2
set route 1.1.100.4/32 interface tunnel.1 gateway 1.1.1.4
set interface tunnel.1 nhtb 1.1.1.1 vpn sitel-site3
set interface tunnel.1 nhtb 1.1.1.2 vpn twp2three
set interface tunnel.1 nhtb 1.1.1.4 vpn site3-site4
```

**Site4 firewall**

```
set route 1.1.100.1/32 interface tunnel.1 gateway 1.1.1.1
set route 1.1.100.2/32 interface tunnel.1 gateway 1.1.1.2
set route 1.1.100.3/32 interface tunnel.1 gateway 1.1.1.3
set interface tunnel.1 nhtb 1.1.1.1 vpn sitel-site4
set interface tunnel.1 nhtb 1.1.1.2 vpn site2-site4
set interface tunnel.1 nhtb 1.1.1.3 vpn site3-site4
```

## Step 6: Configure policy to allow traffic between sites

To create policy, firstly we need to define address objects. Then, define policies to allow traffic from and to spokes.



Objects > Addresses > Configuration site1

**Address Name**

**Comment**

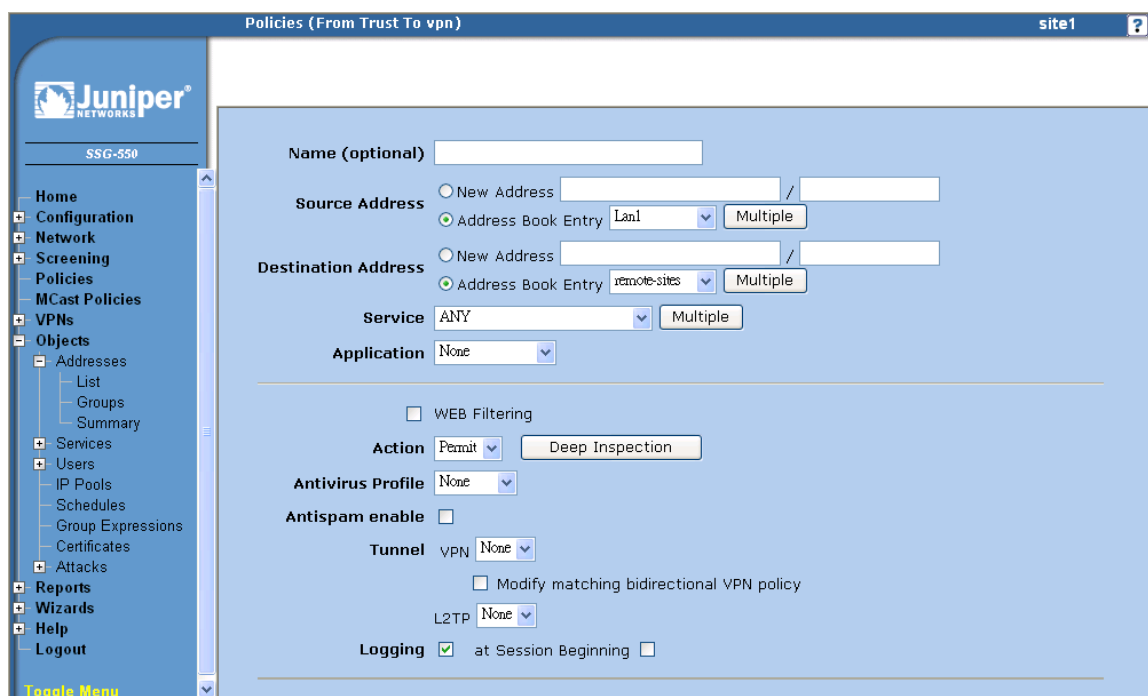
**IP Address/Domain Name**

☒ IP  /

☐ Domain Name

**Zone**

After all the required address objects are defined, select Policies to define policies.



The screenshot shows the Juniper WebUI configuration page for a policy named 'vpn'. The left sidebar contains a navigation tree with options: Home, Configuration, Network, Screening, Policies, MCast Policies, VPNs, Objects (Addresses, List, Groups, Summary, Services, Users, IP Pools, Schedules, Group Expressions, Certificates, Attacks), Reports, Wizards, Help, and Logout. The main configuration area is titled 'Policies (From Trust To vpn)' and 'site1'. It includes fields for Name (optional), Source Address (New Address or Address Book Entry: Lan1), Destination Address (New Address or Address Book Entry: remote-sites), Service (ANY), and Application (None). Below these are checkboxes for WEB Filtering, Action (Permit or Deep Inspection), Antivirus Profile (None), Antispam enable, Tunnel (VPN, None), and L2TP (None). A checkbox for 'Modify matching bidirectional VPN policy' is also present. The Logging section is checked with 'at Session Beginning'.

The WebUI and CLI 'Step 6' instructions for each firewall are as follows:

### WebUI:

#### **Site1 firewall**

Define address objects:

Select Objects > Addresses > List > vpn (pull down menu).  
 Select New then enter following:  
 Address Name: Site2  
 IP Address/Domain Name: IP Address/Netmask (checked), 172.16.2.0/24  
 Select OK

Select Objects > Addresses > List > vpn (pull down menu)  
 Select New then enter following:  
 Address Name: Site3  
 IP Address/Domain Name: IP Address/Netmask (checked), 172.16.3.0/24  
 Select OK

Select Objects > Addresses > List > vpn (pull down menu)  
 Select New then enter following:  
 Address Name: Site4  
 IP Address/Domain Name: IP Address/Netmask (checked), 172.16.4.0/24  
 Select OK

Select Objects > Addresses > Groups > vpn (pull down menu)  
 Select New then enter following:  
 Group Name: Remote-sites  
 Group Members: Site2, Site3, Site4

Select OK

Select Objects > Addresses > List > trust (pull down menu)

Select New then enter following:

Address Name: Lan1

IP Address/Domain Name: IP Address/Netmask (checked), 172.16.1.0/24

Select OK

Define policy: (Lan to remote)

Select Policies

From: Trust (pull down menu)

To: vpn (pull down menu)

Select New

Source Address: Address Book Entry: Lan1 (pull down menu)

Destination Address: Address Book Entry: Remote-sites2 (pull down menu)

Select OK

Define policy: (remote to Lan)

Select Policies

From: vpn (pull down menu)

To: Trust (pull down menu)

Select New

Source Address: Address Book Entry: Remote-sites (pull down menu)

Destination Address: Address Book Entry: Lan1 (pull down menu)

Select OK

Define policy: (interconnect between remote sites)

Select Policies

From: vpn (pull down menu)

To: vpn (pull down menu)

Select New

Source Address: Address Book Entry: Remote-sites (pull down menu)

Destination Address: Address Book Entry: Remote-sites (pull down menu)

Select OK

### **Site2 firewall**

Define address objects:

Select Objects > Addresses > List > vpn (pull down menu).

Select New then enter following:

Address Name: Site1

IP Address/Domain Name: IP Address/Netmask (checked), 172.16.1.0/24

Select OK

Select Objects > Addresses > List > vpn (pull down menu)

Select New then enter following:

Address Name: Site3

IP Address/Domain Name: IP Address/Netmask (checked), 172.16.3.0/24

Select OK



Select Objects > Addresses > List > vpn (pull down menu)  
Select New then enter following:  
Address Name: Site4  
IP Address/Domain Name: IP Address/Netmask (checked), 172.16.4.0/24  
Select OK

Select Objects > Addresses > Groups > vpn (pull down menu)  
Select New then enter following:  
Group Name: Remote-sites  
Group Members: Site1, Site3, Site4  
Select OK

Select Objects > Addresses > List > trust (pull down menu)  
Select New then enter following:  
Address Name: Lan2  
IP Address/Domain Name: IP Address/Netmask (checked), 172.16.2.0/24  
Select OK

Define policy: (Lan to remote)

Select Policies  
From: Trust (pull down menu)  
To: vpn (pull down menu)  
Select New  
Source Address: Address Book Entry: Lan2 (pull down menu)  
Destination Address: Address Book Entry: Remote-sites2 (pull down menu)  
Select OK

Define policy: (remote to Lan)

Select Policies  
From: vpn (pull down menu)  
To: Trust (pull down menu)  
Select New  
Source Address: Address Book Entry: Remote-sites (pull down menu)  
Destination Address: Address Book Entry: Lan2 (pull down menu)  
Select OK

Define policy: (interconnect between remote sites)

Select Policies  
From: vpn (pull down menu)  
To: vpn (pull down menu)  
Select New  
Source Address: Address Book Entry: Remote-sites (pull down menu)  
Destination Address: Address Book Entry: Remote-sites (pull down menu)  
Select OK

### Site3 firewall

Define address objects:

Select Objects > Addresses > List > vpn (pull down menu).  
Select New then enter following:

Address Name: Site1

IP Address/Domain Name: IP Address/Netmask (checked), 172.16.1.0/24

Select OK

Select Objects > Addresses > List > vpn (pull down menu)

Select New then enter following:

Address Name: Site2

IP Address/Domain Name: IP Address/Netmask (checked), 172.16.2.0/24

Select OK

Select Objects > Addresses > List > vpn (pull down menu)

Select New then enter following:

Address Name: Site4

IP Address/Domain Name: IP Address/Netmask (checked), 172.16.4.0/24

Select OK

Select Objects > Addresses > Groups > vpn (pull down menu)

Select New then enter following:

Group Name: Remote-sites

Group Members: Site1, Site2, Site4

Select OK

Select Objects > Addresses > List > trust (pull down menu)

Select New then enter following:

Address Name: Lan3

IP Address/Domain Name: IP Address/Netmask (checked), 172.16.3.0/24

Select OK

Define policy: (Lan to remote)

Select Policies

From: Trust (pull down menu)

To: vpn (pull down menu)

Select New

Source Address: Address Book Entry: Lan3 (pull down menu)

Destination Address: Address Book Entry: Remote-sites2 (pull down menu)

Select OK

Define policy: (remote to Lan)

Select Policies

From: vpn (pull down menu)

To: Trust (pull down menu)

Select New

Source Address: Address Book Entry: Remote-sites (pull down menu)

Destination Address: Address Book Entry: Lan3 (pull down menu)

Select OK

Define policy: (interconnect between remote sites)

Select Policies

From: vpn (pull down menu)

To: vpn (pull down menu)

Select New  
Source Address: Address Book Entry: Remote-sites (pull down menu)  
Destination Address: Address Book Entry: Remote-sites (pull down menu)  
Select OK

#### Site4 firewall

Define address objects:

Select Objects > Addresses > List > vpn (pull down menu).  
Select New then enter following:  
Address Name: Site1  
IP Address/Domain Name: IP Address/Netmask (checked), 172.16.1.0/24  
Select OK

Select Objects > Addresses > List > vpn (pull down menu)  
Select New then enter following:  
Address Name: Site2  
IP Address/Domain Name: IP Address/Netmask (checked), 172.16.2.0/24  
Select OK

Select Objects > Addresses > List > vpn (pull down menu)  
Select New then enter following:  
Address Name: Site3  
IP Address/Domain Name: IP Address/Netmask (checked), 172.16.3.0/24  
Select OK

Select Objects > Addresses > Groups > vpn (pull down menu)  
Select New then enter following:  
Group Name: Remote-sites  
Group Members: Site1, Site2, Site3  
Select OK

Select Objects > Addresses > List > trust (pull down menu)  
Select New then enter following:  
Address Name: Lan4  
IP Address/Domain Name: IP Address/Netmask (checked), 172.16.4.0/24  
Select OK

Define policy: (Lan to remote)

Select Policies  
From: Trust (pull down menu)  
To: vpn (pull down menu)  
Select New  
Source Address: Address Book Entry: Lan4 (pull down menu)  
Destination Address: Address Book Entry: Remote-sites2 (pull down menu)  
Select OK

Define policy: (remote to Lan)

Select Policies  
From: vpn (pull down menu)

To: Trust (pull down menu)  
Select New  
Source Address: Address Book Entry: Remote-sites (pull down menu)  
Destination Address: Address Book Entry: Lan4 (pull down menu)  
Select OK

Define policy: (interconnect between remote sites)

Select Policies  
From: vpn (pull down menu)  
To: vpn (pull down menu)  
Select New  
Source Address: Address Book Entry: Remote-sites (pull down menu)  
Destination Address: Address Book Entry: Remote-sites (pull down menu)  
Select OK

#### CLI:

##### **Site1 firewall**

```
set address vpn site2 172.16.2.0/24
set address vpn site3 172.16.3.0/24
set address vpn site4 172.16.4.0/24
set address trust lan1 172.16.1.0/24
set group address vpn remote-sites add site2
set group address vpn remote-sites add site3
set group address vpn remote-sites add site4
set policy from trust to vpn lan1 remote-sites any permit
set policy from vpn to trust remote-sites lan1 any permit
set policy from vpn to vpn remote-sites remote-sites any permit
```

##### **Site2 firewall**

```
set address vpn site1 172.16.1.0/24
set address vpn site3 172.16.3.0/24
set address vpn site4 172.16.4.0/24
set address trust lan2 172.16.2.0/24
set group address vpn remote-sites add site1
set group address vpn remote-sites add site3
set group address vpn remote-sites add site4
set policy from trust to vpn lan2 remote-sites any permit
set policy from vpn to trust remote-sites lan2 any permit
set policy from vpn to vpn remote-sites remote-sites any permit
```

##### **Site3 firewall**

```
set address vpn site1 172.16.1.0/24
set address vpn site2 172.16.2.0/24
set address vpn site4 172.16.4.0/24
set address trust lan3 172.16.3.0/24
set group address vpn remote-sites add site1
set group address vpn remote-sites add site2
set group address vpn remote-sites add site4
```

```
set policy from trust to vpn lan3 remote-sites any permit
set policy from vpn to trust remote-sites lan3 any permit
set policy from vpn to vpn remote-sites remote-sites any permit
```

#### **Site4 firewall**

```
set address vpn site1 172.16.1.0/24
set address vpn site2 172.16.2.0/24
set address vpn site3 172.16.3.0/24
set address trust lan4 172.16.4.0/24
set group address vpn remote-sites add site1
set group address vpn remote-sites add site2
set group address vpn remote-sites add site3
set policy from trust to vpn lan4 remote-sites any permit
set policy from vpn to trust remote-sites lan4 any permit
set policy from vpn to vpn remote-sites remote-sites any permit
```

## Verifying Configuration

To check connectivity over the VPN between the different sites, use traffic to test it. Normally, if ICMP is permitted by policy to go through tunnel, it is most convenient to use “ping” as a tool to verify the configuration. Here we use ping to test the vpn between the following sites:

(Remember to specify the source interface by using “from” option in the ping, otherwise ping traffic will be source from interface nearest to the next hop interface.)

- Site1 and Site2

```
site1-> ping 172.16.2.1 from e0/0
Type escape sequence to abort

Sending 5, 100-byte ICMP Echos to 172.16.2.1, timeout is 1 seconds from
ethernet0/0
!!!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=1/1/2 ms
```

- Site2 and Site3

```
site2-> ping 172.16.3.1 from e0/0
Type escape sequence to abort

Sending 5, 100-byte ICMP Echos to 172.16.3.1, timeout is 1 seconds from
ethernet0/0
!!!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=2/2/3 ms
```

- Site3 and Site4

```
site3-> ping 172.16.4.1 from bgroup0
Type escape sequence to abort

Sending 5, 100-byte ICMP Echos to 172.16.4.1, timeout is 1 seconds from bgroup0
!!!!!!
Success Rate is 100 percent (5/5), round-trip time min/avg/max=3/3/4 ms
```

In addition, check with Security Association (SA) to ensure the VPNs are in good status:

```
site3-> get sa
total configured sa: 3


| HEX ID    | Gateway | Port | Algorithm     | SPI      | Life:sec | kb    | Sta | PID | vsys |
|-----------|---------|------|---------------|----------|----------|-------|-----|-----|------|
| 00000001< | 1.1.1.1 | 500  | esp:3des/sha1 | b42415ca | 2781     | unlim | A/U | -1  | 0    |
| 00000001> | 1.1.1.1 | 500  | esp:3des/sha1 | 94568c36 | 2781     | unlim | A/U | -1  | 0    |
| 00000002< | 1.1.1.2 | 500  | esp:3des/sha1 | b42415cc | 3310     | unlim | A/U | -1  | 0    |
| 00000002> | 1.1.1.2 | 500  | esp:3des/sha1 | 0523a7e5 | 3310     | unlim | A/U | -1  | 0    |
| 00000003< | 1.1.1.4 | 500  | esp:3des/sha1 | b42415cd | 3311     | unlim | A/U | -1  | 0    |
| 00000003> | 1.1.1.4 | 500  | esp:3des/sha1 | 9356ab4b | 3311     | unlim | A/U | -1  | 0    |


```

Check with SA for the corresponding gateway (reference by IP address) , status A/U means the VPN is Active and VPN Monitor is Up.

Furthermore, you can check with “get interface tunnel.1” the NHTB entries and VPN binding.

```
site3-> get int t.1
Interface tunnel.1:
  description tunnel.1
  number 20, if_info 8168, if_index 1, mode route
  link ready
  vsys Root, zone vpn, vr trust-vr
  admin mtu 1500, operating mtu 1500, default mtu 1500
```

```

*ip 1.1.100.3/24
*manage ip 1.1.100.3
route-deny disable
bound vpn:
  site1-site3
  site2-site3
  site3-site4

Next-Hop Tunnel Binding table
Flag Status Next-Hop(IP)      tunnel-id VPN
S      U      1.1.1.1 0x00000001 site1-site3
      U      1.1.100.1 0x00000001 site1-site3
S      U      1.1.1.2 0x00000002 site2-site3
      U      1.1.100.2 0x00000002 site2-site3
S      U      1.1.1.4 0x00000003 site3-site4
      U      1.1.100.4 0x00000003 site3-site4

pmtu-v4 disabled
ping disabled, telnet disabled, SSH disabled, SNMP disabled
web disabled, ident-reset disabled, SSL disabled
DNS Proxy disabled
OSPF enabled BGP disabled RIP disabled RIPng disabled mtrace disabled
PIM: not configured IGMP not configured
bandwidth: physical 0kbps, configured egress [gbw 0kbps mbw 0kbps]
           configured ingress mbw 0kbps, current bw 0kbps
           total allocated gbw 0kbps
Number of SW session: 8043, hw sess err cnt 0

```

When checking the OSPF neighbor status, make sure all of them are in "Full" state.

```

site3-> get vrouter trust-vr protocol ospf neighbor
VR: trust-vr RouterId: 172.16.3.1
-----
Neighbor(s) on interface tunnel.1 (Area 0.0.0.0)
IpAddr/IfIndex RouterId      Pri State  Opt Up      StateChg
-----
1.1.100.1      172.16.1.1      10 Full    E   00:10:16 (+14 -2)
1.1.100.4      172.16.4.1      10 Full    E   02:00:00 (+6 -0)
1.1.100.2      172.16.2.1      10 Full    E   02:00:02 (+6 -0)
-----
Neighbor(s) on interface bgroup0 (Area 0.0.0.0)
IpAddr/IfIndex RouterId      Pri State  Opt Up      StateChg
-----
172.16.3.2     172.16.3.2     128 Full    E   01:59:58 (+7 -0)

```

Also, check with session table for the multicast OSPF traffic, make sure the correct tunnel is used.

```

site3-> get sess src-ip 1.1.100.1
alloc 23/max 8064, alloc failed 0, mcast alloc 0, di alloc failed 0
total reserved 0, free sessions in shared pool 8041
Total 2 sessions according filtering criteria.
id 8047/s**,vsys 0,flag 00000040/0080/0021,policy 320002,time 5, dip 0 module 0
  if 20(nspflag 800601):1.1.100.1/1->1.1.100.3/1,89,00121ea8fb06, sess token 27,vlan
0,tun 40000001,vsd 0,route 7
  if 3(nspflag 0010):1.1.100.1/1<-1.1.100.3/1,89,0000000000000, sess token 8,vlan
0,tun 0,vsd 0,route 0

site3-> get sess src-ip 1.1.100.2
alloc 23/max 8064, alloc failed 0, mcast alloc 0, di alloc failed 0
total reserved 0, free sessions in shared pool 8041
Total 2 sessions according filtering criteria.
id 8045/s**,vsys 0,flag 00000040/0080/0021,policy 320002,time 6, dip 0 module 0
  if 20(nspflag 800601):1.1.100.2/1->1.1.100.3/1,89,00121ea82b86, sess token 27,vlan
0,tun 40000002,vsd 0,route 8
  if 3(nspflag 0010):1.1.100.2/1<-1.1.100.3/1,89,0000000000000, sess token 8,vlan
0,tun 0,vsd 0,route 0

site3-> get sess src-ip 1.1.100.4
alloc 23/max 8064, alloc failed 0, mcast alloc 0, di alloc failed 0

```

```

total reserved 0, free sessions in shared pool 8041
Total 2 sessions according filtering criteria.
id 8046/s**,vsys 0,flag 00000040/0080/0021,policy 320002,time 5, dip 0 module 0
  if 20(nspflag 800601):1.1.100.4/1->1.1.100.3/1,89,0017cb404680,sess token 27,vlan
0,tun 40000003,vsd 0,route 9
  if 3(nspflag 0010):1.1.100.4/1<-1.1.100.3/1,89,0000000000000,sess token 8,vlan
0,tun 0,vsd 0,route 0
  
```

Finally, check with routing table, verify that remote network is learned from OSPF.

```
site3-> get route
```

```
IPv4 Dest-Routes for <untrust-vr> (0 entries)
```

```

-----
H: Host C: Connected S: Static A: Auto-Exported
I: Imported R: RIP P: Permanent D: Auto-Discovered
iB: IBGP eB: EBGP O: OSPF E1: OSPF external type 1
E2: OSPF external type 2
  
```

```
IPv4 Dest-Routes for <trust-vr> (18 entries)
```

```

-----
      ID      IP-Prefix      Interface      Gateway      P Pref      Mtr      Vsys
-----
* 2          1.1.1.3/32          eth0/0          0.0.0.0      H    0        0      Root
* 22         1.1.50.3/32         bgroup0        172.16.3.2    O   60        1      Root
* 10         1.1.50.4/32         tun.1          1.1.100.4    O   60        2      Root
* 3          172.16.3.0/24         bgroup0          0.0.0.0      C    0        0      Root
* 21         172.16.2.0/24         tun.1          1.1.100.2    O   60        2      Root
* 20         172.16.1.0/24         tun.1          1.1.100.1    O   60        2      Root
* 14         172.16.4.0/24         tun.1          1.1.100.4    O   60        2      Root
* 17         10.90.3.10/32         tun.1          1.1.100.4    E2  200        0      Root
* 9          1.1.100.4/32         tun.1          1.1.1.4      S   20        1      Root
* 11         1.1.100.4/32         tun.1          1.1.100.4    O   60        1      Root
* 7          1.1.100.1/32         tun.1          1.1.1.1      S   20        1      Root
* 18         1.1.100.1/32         tun.1          1.1.100.1    O   60        1      Root
* 8          1.1.100.2/32         tun.1          1.1.1.2      S   20        1      Root
* 19         1.1.100.2/32         tun.1          1.1.100.2    O   60        1      Root
* 6          1.1.100.3/32         tun.1          0.0.0.0      H    0        0      Root
* 5          1.1.100.0/24         tun.1          0.0.0.0      C    0        0      Root
* 4          172.16.3.1/32         bgroup0          0.0.0.0      H    0        0      Root
* 1          1.1.1.0/24          eth0/0          0.0.0.0      C    0        0      Root
  
```



## Sample configuration

- Site1 Firewall

```
sitel-> get config
Total Config size 5509:
set clock timezone 0
set vrouter trust-vr sharable
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset auto-route-export
set protocol ospf
set enable
exit
exit
set auth-server "Local" id 0
set auth-server "Local" server-name "Local"
set auth default auth server "Local"
set auth radius accounting port 27911
set admin name "netscreen"
set admin password "nKVUM2rwMUzPcrkG5sWIHdCtqkAibn"
set admin auth timeout 10
set admin auth server "Local"
set admin format dos
set zone "Trust" vrouter "trust-vr"
set zone "Untrust" vrouter "trust-vr"
set zone "DMZ" vrouter "trust-vr"
set zone "VLAN" vrouter "trust-vr"
set zone id 100 "vpn"
set zone "Untrust-Tun" vrouter "trust-vr"
set zone "Trust" tcp-rst
set zone "Untrust" block
unset zone "Untrust" tcp-rst
set zone "MGT" block
set zone "DMZ" tcp-rst
set zone "VLAN" block
unset zone "VLAN" tcp-rst
set zone "vpn" tcp-rst
set zone "Untrust" screen tear-drop
set zone "Untrust" screen syn-flood
set zone "Untrust" screen ping-death
set zone "Untrust" screen ip-filter-src
set zone "Untrust" screen land
set zone "V1-Untrust" screen tear-drop
set zone "V1-Untrust" screen syn-flood
set zone "V1-Untrust" screen ping-death
set zone "V1-Untrust" screen ip-filter-src
set zone "V1-Untrust" screen land
set interface "ethernet0/0" zone "Trust"
set interface "ethernet0/1" zone "DMZ"
set interface "ethernet0/2" zone "Untrust"
set interface "tunnel.1" zone "vpn"
unset interface vlan1 ip
set interface ethernet0/0 ip 172.16.1.1/24
set interface ethernet0/0 route
set interface ethernet0/2 ip 1.1.1.1/24
set interface ethernet0/2 route
set interface tunnel.1 ip 1.1.100.1/24
unset interface vlan1 bypass-others-ipsec
unset interface vlan1 bypass-non-ip
set interface ethernet0/0 ip manageable
set interface ethernet0/2 ip manageable
set interface ethernet0/2 manage ping
set interface ethernet0/2 manage web
unset flow no-tcp-seq-check
set flow tcp-syn-check
set console timeout 0
set console page 0
set hostname sitel
```

```
set pki authority default scep mode "auto"
set pki x509 default cert-path partial
set address "Trust" "Lan1" 172.16.1.0 255.255.255.0
set address "vpn" "Site2" 172.16.2.0 255.255.255.0
set address "vpn" "Site3" 172.16.3.0 255.255.255.0
set address "vpn" "Site4" 172.16.4.0 255.255.255.0
set group address "vpn" "remote-sites"
set group address "vpn" "remote-sites" add "Site2"
set group address "vpn" "remote-sites" add "Site3"
set group address "vpn" "remote-sites" add "Site4"
set ike gateway "sitel-site2" address 1.1.1.2 id "1.1.1.2" Main local-id "1.1.1.1"
outgoing-interface "ethernet0/2" preshare "LJELr7HpNMyC4fsb5DCbws1TGinb+SLR1A=="
sec-level standard
set ike gateway "sitel-site3" address 1.1.1.3 id "1.1.1.3" Main local-id "1.1.1.1"
outgoing-interface "ethernet0/2" preshare "5PGwAcISNORUohsKtWCLXY5OYinTvJ/9eQ=="
sec-level standard
set ike gateway "sitel-site4" address 1.1.1.4 id "1.1.1.4" Main local-id "1.1.1.1"
outgoing-interface "ethernet0/2" preshare "EUPgEFrlNlqTHzsJTWc5JMym1RngAveEWA=="
sec-level standard
set ike respond-bad-spi 1
unset ike ikeid-enumeration
unset ike dos-protection
unset ipsec access-session enable
set ipsec access-session maximum 5000
set ipsec access-session upper-threshold 0
set ipsec access-session lower-threshold 0
set ipsec access-session dead-p2-sa-timeout 0
unset ipsec access-session log-error
unset ipsec access-session info-exch-connected
unset ipsec access-session use-error-log
set vpn "sitel-site2" gateway "sitel-site2" no-replay tunnel idletime 0 sec-level
standard
set vpn "sitel-site2" monitor optimized rekey
set vpn "sitel-site2" id 1 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.2 vpn "sitel-site2"
set vpn "sitel-site3" gateway "sitel-site3" no-replay tunnel idletime 0 sec-level
standard
set vpn "sitel-site3" monitor optimized rekey
set vpn "sitel-site3" id 2 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.3 vpn "sitel-site3"
set vpn "sitel-site4" gateway "sitel-site4" no-replay tunnel idletime 0 sec-level
standard
set vpn "sitel-site4" monitor optimized rekey
set vpn "sitel-site4" id 3 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.4 vpn "sitel-site4"
set url protocol websense
exit
set anti-spam profile ns-profile
set sbl default-server enable
exit
set policy id 4 from "vpn" to "Trust" "remote-sites" "Lan1" "ANY" permit log
set policy id 4
exit
set policy id 3 from "Trust" to "vpn" "Lan1" "remote-sites" "ANY" permit log
set policy id 3
exit
set policy id 5 from "vpn" to "vpn" "remote-sites" "remote-sites" "ANY" permit
log
set policy id 5
exit
set nsmgmt bulkcli reboot-timeout 60
set nsmgmt bulkcli reboot-wait 0
set ssh version v2
set config lock timeout 5
set snmp port listen 161
set snmp port trap 162
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset add-default-route
set route 1.1.100.2/32 interface tunnel.1 gateway 1.1.1.2
set route 1.1.100.3/32 interface tunnel.1 gateway 1.1.1.3
set route 1.1.100.4/32 interface tunnel.1 gateway 1.1.1.4
```

```
exit
set interface ethernet0/0 protocol ospf area 0.0.0.0
set interface ethernet0/0 protocol ospf enable
set interface ethernet0/0 protocol ospf priority 10
set interface ethernet0/0 protocol ospf cost 1
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf link-type p2mp
set interface tunnel.1 protocol ospf enable
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
exit
site1->
```

- Site2 Firewall

```
site2-> get config
Total Config size 5491:
set clock timezone 0
set vrouter trust-vr sharable
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset auto-route-export
set protocol ospf
set enable
exit
exit
set auth-server "Local" id 0
set auth-server "Local" server-name "Local"
set auth default auth server "Local"
set auth radius accounting port 27911
set admin name "netscreen"
set admin password "nKVUM2rwMUzPcrkG5sWIHdCtqkAibn"
set admin auth timeout 10
set admin auth server "Local"
set admin format dos
set zone "Trust" vrouter "trust-vr"
set zone "Untrust" vrouter "trust-vr"
set zone "DMZ" vrouter "trust-vr"
set zone "VLAN" vrouter "trust-vr"
set zone id 100 "vpn"
set zone "Untrust-Tun" vrouter "trust-vr"
set zone "Trust" tcp-rst
set zone "Untrust" block
unset zone "Untrust" tcp-rst
set zone "MGT" block
set zone "DMZ" tcp-rst
set zone "VLAN" block
unset zone "VLAN" tcp-rst
set zone "vpn" tcp-rst
set zone "Untrust" screen tear-drop
set zone "Untrust" screen syn-flood
set zone "Untrust" screen ping-death
set zone "Untrust" screen ip-filter-src
set zone "Untrust" screen land
set zone "Vl-Untrust" screen tear-drop
set zone "Vl-Untrust" screen syn-flood
set zone "Vl-Untrust" screen ping-death
set zone "Vl-Untrust" screen ip-filter-src
set zone "Vl-Untrust" screen land
set interface "ethernet0/0" zone "Trust"
set interface "ethernet0/1" zone "DMZ"
set interface "ethernet0/2" zone "Untrust"
set interface "tunnel.1" zone "vpn"
unset interface vlan1 ip
set interface ethernet0/0 ip 172.16.2.1/24
set interface ethernet0/0 route
set interface ethernet0/2 ip 1.1.1.2/24
set interface ethernet0/2 route
set interface tunnel.1 ip 1.1.100.2/24
unset interface vlan1 bypass-others-ipsec
unset interface vlan1 bypass-non-ip
set interface ethernet0/0 ip manageable
set interface ethernet0/2 ip manageable
set interface ethernet0/0 manage mtrace
set interface ethernet0/2 manage web
unset flow no-tcp-seq-check
set flow tcp-syn-check
set console timeout 0
set console page 0
set hostname site2
set pki authority default scep mode "auto"
set pki x509 default cert-path partial
set address "Trust" "lan2" 172.16.2.0 255.255.255.0
set address "vpn" "site1" 172.16.1.0 255.255.255.0
set address "vpn" "site3" 172.16.3.0 255.255.255.0
```

```
set address "vpn" "site4" 172.16.4.0 255.255.255.0
set group address "vpn" "remote-sites"
set group address "vpn" "remote-sites" add "site1"
set group address "vpn" "remote-sites" add "site3"
set group address "vpn" "remote-sites" add "site4"
set ike gateway "site1-site2" address 1.1.1.1 id "1.1.1.1" Main outgoing-interface
"ethernet0/2" preshare "cxFqOrojNJAgHsoOpCSux2nwUnTwDyE5Q==" sec-level standard
set ike gateway "site2-site3" address 1.1.1.3 id "1.1.1.3" Main outgoing-interface
"ethernet0/2" preshare "Um6JUY0XNhh9Izs5iiCr1Lfg0jnezYidpw==" sec-level standard
set ike gateway "site2-site4" address 1.1.1.4 id "1.1.1.4" Main outgoing-interface
"ethernet0/2" preshare "xr+6GzjqNHXfjMsQgZCq47sWn7nges/10A==" sec-level standard
set ike respond-bad-spi 1
unset ike ikeid-enumeration
unset ike dos-protection
unset ipsec access-session enable
set ipsec access-session maximum 5000
set ipsec access-session upper-threshold 0
set ipsec access-session lower-threshold 0
set ipsec access-session dead-p2-sa-timeout 0
unset ipsec access-session log-error
unset ipsec access-session info-exch-connected
unset ipsec access-session use-error-log
set vpn "site1-site2" gateway "site1-site2" no-replay tunnel idletime 0 sec-level
standard
set vpn "site1-site2" monitor optimized rekey
set vpn "site1-site2" id 1 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.1 vpn "site1-site2"
set vpn "site2-site3" gateway "site2-site3" no-replay tunnel idletime 0 sec-level
standard
set vpn "site2-site3" monitor optimized rekey
set vpn "site2-site3" id 2 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.3 vpn "site2-site3"
set vpn "site2-site4" gateway "site2-site4" no-replay tunnel idletime 0 sec-level
standard
set vpn "site2-site4" monitor optimized rekey
set vpn "site2-site4" id 3 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.4 vpn "site2-site4"
set url protocol websense
exit
set anti-spam profile ns-profile
set sbl default-server enable
exit
set policy id 1 from "Trust" to "vpn" "lan2" "remote-sites" "ANY" permit
set policy id 1
exit
set policy id 2 from "vpn" to "Trust" "remote-sites" "lan2" "ANY" permit
set policy id 2
exit
set policy id 3 from "vpn" to "vpn" "remote-sites" "remote-sites" "ANY" permit
set policy id 3
exit
set nsmgmt bulkcli reboot-timeout 60
set nsmgmt bulkcli reboot-wait 0
set ssh version v2
set config lock timeout 5
set snmp port listen 161
set snmp port trap 162
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset add-default-route
set route 1.1.100.1/32 interface tunnel.1 gateway 1.1.1.1
set route 1.1.100.3/32 interface tunnel.1 gateway 1.1.1.3
set route 1.1.100.4/32 interface tunnel.1 gateway 1.1.1.4
exit
set interface ethernet0/0 protocol ospf area 0.0.0.0
set interface ethernet0/0 protocol ospf enable
set interface ethernet0/0 protocol ospf priority 10
set interface ethernet0/0 protocol ospf cost 1
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf ignore-mtu
set interface tunnel.1 protocol ospf link-type p2mp
set interface tunnel.1 protocol ospf enable
```

```
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
exit
site2->
```

**Site3 Firewall**

```
site3-> get config
Total Config size 6163:
set clock timezone 0
set vrouter trust-vr sharable
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset auto-route-export
set protocol ospf
set enable
exit
exit
set auth-server "Local" id 0
set auth-server "Local" server-name "Local"
set auth default auth server "Local"
set auth radius accounting port 1646
set admin name "netscreen"
set admin password "nKVUM2rwMUzPcrkG5sWIHdCtqkAibn"
set admin auth timeout 10
set admin auth server "Local"
set admin format dos
set zone "Trust" vrouter "trust-vr"
set zone "Untrust" vrouter "trust-vr"
set zone "DMZ" vrouter "trust-vr"
set zone "VLAN" vrouter "trust-vr"
set zone id 100 "vpn"
set zone "Untrust-Tun" vrouter "trust-vr"
set zone "Trust" tcp-rst
set zone "Untrust" block
unset zone "Untrust" tcp-rst
set zone "DMZ" tcp-rst
set zone "VLAN" block
unset zone "VLAN" tcp-rst
set zone "vpn" tcp-rst
set zone "Untrust" screen tear-drop
set zone "Untrust" screen syn-flood
set zone "Untrust" screen ping-death
set zone "Untrust" screen ip-filter-src
set zone "Untrust" screen land
set zone "V1-Untrust" screen tear-drop
set zone "V1-Untrust" screen syn-flood
set zone "V1-Untrust" screen ping-death
set zone "V1-Untrust" screen ip-filter-src
set zone "V1-Untrust" screen land
set interface adsl2/0 phy operating-mode auto
set interface "ethernet0/0" zone "Untrust"
set interface "ethernet0/1" zone "DMZ"
set interface "wireless0/0" zone "Null"
set interface "bgroup0" zone "Trust"
set interface "adsl2/0" pvc 8 35 mux llc protocol bridged qos ubr zone "Untrust"
set interface "tunnel.1" zone "vpn"
set interface bgroup0 port ethernet0/2
set interface bgroup0 port ethernet0/3
set interface bgroup0 port ethernet0/4
unset interface vlan1 ip
set interface ethernet0/0 ip 1.1.1.3/24
set interface ethernet0/0 route
set interface bgroup0 ip 172.16.3.1/24
set interface bgroup0 nat
set interface tunnel.1 ip 1.1.100.3/24
unset interface vlan1 bypass-others-ipsec
unset interface vlan1 bypass-non-ip
set interface ethernet0/0 ip manageable
set interface bgroup0 ip manageable
set interface ethernet0/0 manage ping
set interface ethernet0/0 manage web
set interface "serial0/0" modem settings "USR" init "AT&F"
set interface "serial0/0" modem settings "USR" active
set interface "serial0/0" modem speed 115200
set interface "serial0/0" modem retry 3
set interface "serial0/0" modem interval 10
set interface "serial0/0" modem idle-time 10
```

```
set flow tcp-mss
unset flow no-tcp-seq-check
set flow tcp-syn-check
set console timeout 0
set console page 0
set hostname site3
set pki authority default scep mode "auto"
set pki x509 default cert-path partial
set address "Trust" "lan3" 172.16.3.0 255.255.255.0
set address "vpn" "site1" 172.16.1.0 255.255.255.0
set address "vpn" "site2" 172.16.2.0 255.255.255.0
set address "vpn" "site4" 172.16.4.0 255.255.255.0
set group address "vpn" "remote-sites"
set group address "vpn" "remote-sites" add "site1"
set group address "vpn" "remote-sites" add "site2"
set group address "vpn" "remote-sites" add "site4"
set ike gateway "site1-site3" address 1.1.1.1 id "1.1.1.1" Main local-id "1.1.1.3"
outgoing-interface "ethernet0/0" preshare "50bS1H7KNuZWNZssdxCNOxhO3ln9OYV2yA=="
sec-level standard
set ike gateway "site2-site3" address 1.1.1.2 id "1.1.1.2" Main local-id "1.1.1.3"
outgoing-interface "ethernet0/0" preshare "2WqMVUWdNtHKARsvarC8BTeZi5nh5rtQ5w=="
sec-level standard
set ike gateway "site3-site4" address 1.1.1.4 id "1.1.1.4" Main local-id "1.1.1.3"
outgoing-interface "ethernet0/0" preshare "jdYSWfgONVsLYxstKdCAdcTIZMn6ZZnNcg=="
sec-level standard
set ike respond-bad-spi 1
unset ike ikeid-enumeration
unset ike dos-protection
unset ipsec access-session enable
set ipsec access-session maximum 5000
set ipsec access-session upper-threshold 0
set ipsec access-session lower-threshold 0
set ipsec access-session dead-p2-sa-timeout 0
unset ipsec access-session log-error
unset ipsec access-session info-exch-connected
unset ipsec access-session use-error-log
set vpn "site1-site3" gateway "site1-site3" no-replay tunnel idletime 0 sec-level
standard
set vpn "site1-site3" monitor optimized rekey
set vpn "site1-site3" id 1 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.1 vpn "site1-site3"
set vpn "site2-site3" gateway "site2-site3" no-replay tunnel idletime 0 sec-level
standard
set vpn "site2-site3" monitor optimized rekey
set vpn "site2-site3" id 2 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.2 vpn "site2-site3"
set vpn "site3-site4" gateway "site3-site4" no-replay tunnel idletime 0 sec-level
standard
set vpn "site3-site4" monitor optimized rekey
set vpn "site3-site4" id 3 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.4 vpn "site3-site4"
set url protocol websense
exit
set anti-spam profile ns-profile
set sbl default-server enable
exit
set policy id 1 from "Trust" to "vpn" "lan3" "remote-sites" "ANY" permit
set policy id 1
exit
set policy id 2 from "vpn" to "Trust" "remote-sites" "lan3" "ANY" permit
set policy id 2
exit
set policy id 3 from "vpn" to "vpn" "remote-sites" "remote-sites" "ANY" permit
set policy id 3
exit
set nsmgmt bulkcli reboot-timeout 60
set nsmgmt bulkcli reboot-wait 0
set ssh version v2
set config lock timeout 5
set wlan 0 channel auto
set wlan 1 channel auto
set snmp port listen 161
set snmp port trap 162
```



```
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset add-default-route
set route 1.1.100.1/32 interface tunnel.1 gateway 1.1.1.1
set route 1.1.100.2/32 interface tunnel.1 gateway 1.1.1.2
set route 1.1.100.4/32 interface tunnel.1 gateway 1.1.1.4
exit
set interface bgroup0 protocol ospf area 0.0.0.0
set interface bgroup0 protocol ospf enable
set interface bgroup0 protocol ospf priority 10
set interface bgroup0 protocol ospf cost 1
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf ignore-mtu
set interface tunnel.1 protocol ospf link-type p2mp
set interface tunnel.1 protocol ospf enable
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
exit
site3->
```

- Site4 Firewall

```
site4-> get config
Total Config size 5522:
set clock timezone 0
set vrouter trust-vr sharable
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset auto-route-export
set protocol ospf
set enable
exit
exit
set auth-server "Local" id 0
set auth-server "Local" server-name "Local"
set auth default auth server "Local"
set auth radius accounting port 1646
set admin name "netscreen"
set admin password "nKVUM2rwMUzPcrkG5sWIHdCtqkAibn"
set admin auth timeout 10
set admin auth server "Local"
set admin format dos
set zone "Trust" vrouter "trust-vr"
set zone "Untrust" vrouter "trust-vr"
set zone "DMZ" vrouter "trust-vr"
set zone "VLAN" vrouter "trust-vr"
set zone id 100 "vpn"
set zone "Untrust-Tun" vrouter "trust-vr"
set zone "Trust" tcp-rst
set zone "Untrust" block
unset zone "Untrust" tcp-rst
set zone "MGT" block
set zone "DMZ" tcp-rst
set zone "VLAN" block
unset zone "VLAN" tcp-rst
set zone "vpn" tcp-rst
set zone "Untrust" screen tear-drop
set zone "Untrust" screen syn-flood
set zone "Untrust" screen ping-death
set zone "Untrust" screen ip-filter-src
set zone "Untrust" screen land
set zone "Vl-Untrust" screen tear-drop
set zone "Vl-Untrust" screen syn-flood
set zone "Vl-Untrust" screen ping-death
set zone "Vl-Untrust" screen ip-filter-src
set zone "Vl-Untrust" screen land
set interface "ethernet0/0" zone "Untrust"
set interface "ethernet0/1" zone "DMZ"
set interface "ethernet0/2" zone "Trust"
set interface "bril/0" zone "Untrust"
set interface "tunnel.1" zone "vpn"
set interface ethernet0/0 ip 1.1.1.4/24
set interface ethernet0/0 route
unset interface vlan1 ip
set interface ethernet0/2 ip 172.16.4.1/24
set interface ethernet0/2 nat
set interface tunnel.1 ip 1.1.100.4/24
unset interface vlan1 bypass-others-ipsec
unset interface vlan1 bypass-non-ip
set interface ethernet0/0 ip manageable
set interface ethernet0/2 ip manageable
set interface ethernet0/0 manage ping
set interface ethernet0/0 manage web
unset flow no-tcp-seq-check
set flow tcp-syn-check
set console timeout 0
set console page 0
set hostname site4
set pki authority default scep mode "auto"
set pki x509 default cert-path partial
set address "Trust" "lan4" 172.16.4.0 255.255.255.0
set address "vpn" "site1" 172.16.1.0 255.255.255.0
```

```
set address "vpn" "site2" 172.16.2.0 255.255.255.0
set address "vpn" "site3" 172.16.3.0 255.255.255.0
set group address "vpn" "remote-sites"
set group address "vpn" "remote-sites" add "site1"
set group address "vpn" "remote-sites" add "site2"
set group address "vpn" "remote-sites" add "site3"
set ike gateway "site1-site4" address 1.1.1.1 id "1.1.1.1" Main local-id "1.1.1.4"
outgoing-interface "ethernet0/0" preshare "hja8q3MjNUesMns7DgCGLwWJmpnlHcbw9w=="
sec-level standard
set ike gateway "site2-site4" address 1.1.1.2 id "1.1.1.2" Main local-id "1.1.1.4"
outgoing-interface "ethernet0/0" preshare "p7Kypti9NYiJIRs4X2CqOn3BERn2q+H8wA=="
sec-level standard
set ike gateway "site3-site4" address 1.1.1.3 id "1.1.1.3" Main local-id "1.1.1.4"
outgoing-interface "ethernet0/0" preshare "MqBQaaJGNcAqmjsP9PC6V/6c2Bn6yiGMCQ=="
sec-level standard
set ike respond-bad-spi 1
unset ike iketid-enumeration
unset ike dos-protection
unset ipsec access-session enable
set ipsec access-session maximum 5000
set ipsec access-session upper-threshold 0
set ipsec access-session lower-threshold 0
set ipsec access-session dead-p2-sa-timeout 0
unset ipsec access-session log-error
unset ipsec access-session info-exch-connected
unset ipsec access-session use-error-log
set vpn "site1-site4" gateway "site1-site4" no-replay tunnel idletime 0 sec-level
standard
set vpn "site1-site4" monitor optimized rekey
set vpn "site1-site4" id 1 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.1 vpn "site1-site4"
set vpn "site2-site4" gateway "site2-site4" no-replay tunnel idletime 0 sec-level
standard
set vpn "site2-site4" monitor optimized rekey
set vpn "site2-site4" id 2 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.2 vpn "site2-site4"
set vpn "site3-site4" gateway "site3-site4" no-replay tunnel idletime 0 sec-level
standard
set vpn "site3-site4" monitor optimized rekey
set vpn "site3-site4" id 3 bind interface tunnel.1
set interface tunnel.1 nhtb 1.1.1.3 vpn "site3-site4"
set url protocol websense
exit
set policy id 1 from "Trust" to "vpn" "lan4" "remote-sites" "ANY" permit
set policy id 1
exit
set policy id 2 from "vpn" to "Trust" "remote-sites" "lan4" "ANY" permit
set policy id 2
exit
set policy id 3 from "vpn" to "vpn" "remote-sites" "remote-sites" "ANY" permit
set policy id 3
exit
set nsmgmt bulkcli reboot-timeout 60
set nsmgmt bulkcli reboot-wait 0
set ssh version v2
set config lock timeout 5
set snmp port listen 161
set snmp port trap 162
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
unset add-default-route
set route 1.1.100.1/32 interface tunnel.1 gateway 1.1.1.1
set route 1.1.100.2/32 interface tunnel.1 gateway 1.1.1.2
set route 1.1.100.3/32 interface tunnel.1 gateway 1.1.1.3
exit
set interface ethernet0/2 protocol ospf area 0.0.0.0
set interface ethernet0/2 protocol ospf enable
set interface ethernet0/2 protocol ospf priority 10
set interface ethernet0/2 protocol ospf cost 1
set interface tunnel.1 protocol ospf area 0.0.0.0
set interface tunnel.1 protocol ospf ignore-mtu
set interface tunnel.1 protocol ospf link-type p2mp
```

```
set interface tunnel.1 protocol ospf enable
set interface tunnel.1 protocol ospf priority 10
set interface tunnel.1 protocol ospf cost 1
set vrouter "untrust-vr"
exit
set vrouter "trust-vr"
exit
site4->
```

---

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