pfsense

- pfsense 2.4 with Always-On Load Balanced OpenVPN Connections
- PfSense, HAProxy, SoftEther VPN
- Setup WireGuard Site to Site VPN Tunnel on pfsense 2.7.2

pfsense 2.4 with Always-On Load Balanced OpenVPN Connections

Following this guide will allow you to create always-on load-balanced OpenVPN connections to your favorite VPN provider and force all your Internet traffic through the OpenVPN connections.

This guide was developed using Newshosting VPN account. The information contained will probably work with most other VPN providers with little or no modifications.

This guide is written for the privacy conscious who do not want their activities monitored by their ISP or other entities since the OpenVPN traffic is encrypted.

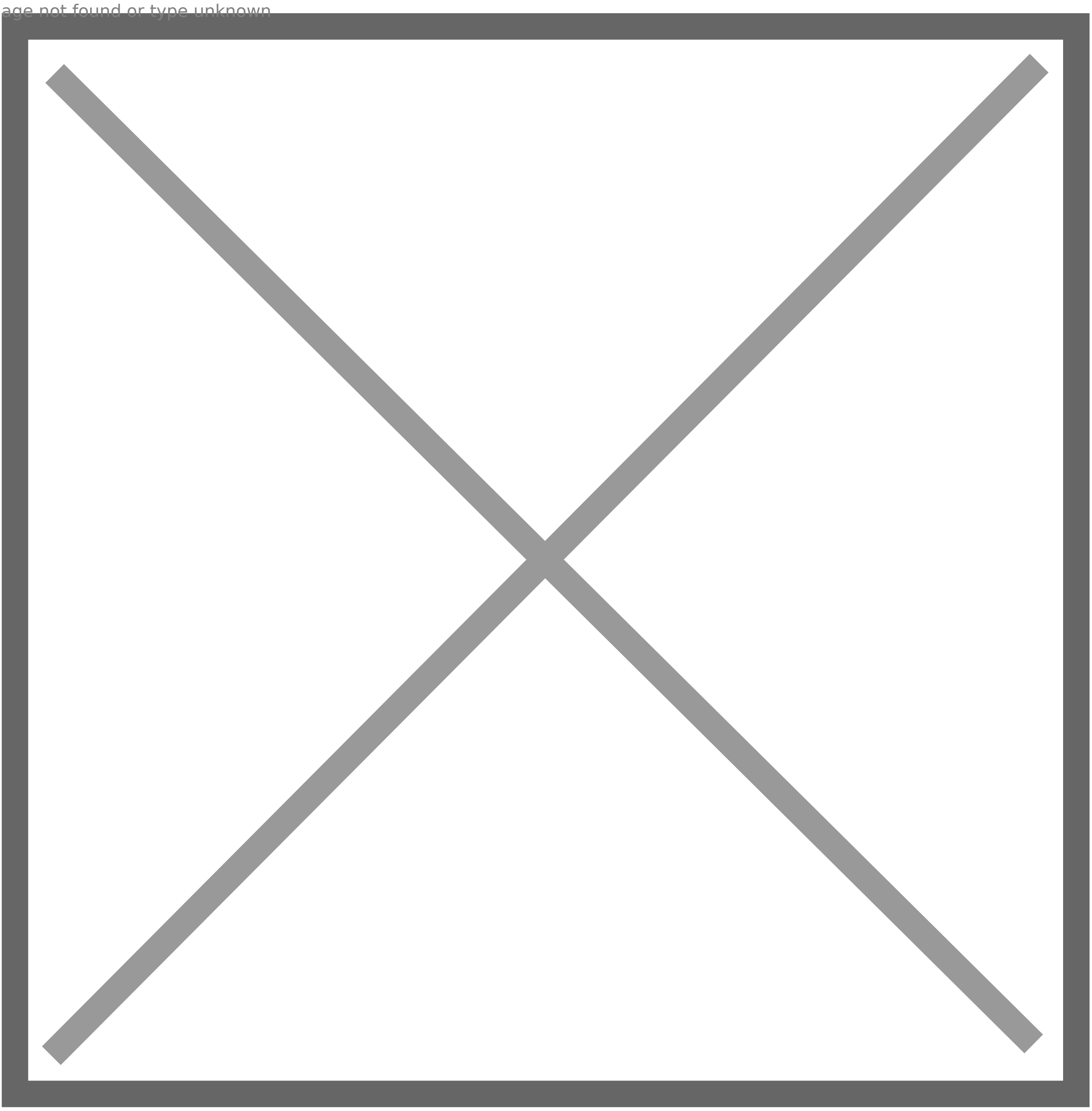
This guide is NOT written in order to assist you in conducting nefarious activities on the Internet undetected. A simple VPN connection is not enough to completely hide your digital tracks. Be warned!!

Import VPN Provider CA Certificate

1. Obtain the CA Certificate from the VPN Provider.
2. Navigate to **System --> Cert. Manager**.
3. Click the **Add** button.
4. Under the **Descriptive name** field, enter a description for the CA certificate your are importing.
5. Under the **Certificate data**, paste the certificate contents including the **-----BEGIN CERTIFICATE-----** and the ***-----END CERTIFICATE-----*** parts.
6. Click the **Save** button (**Figure 1**).

Figure 1

Image not found or type unknown



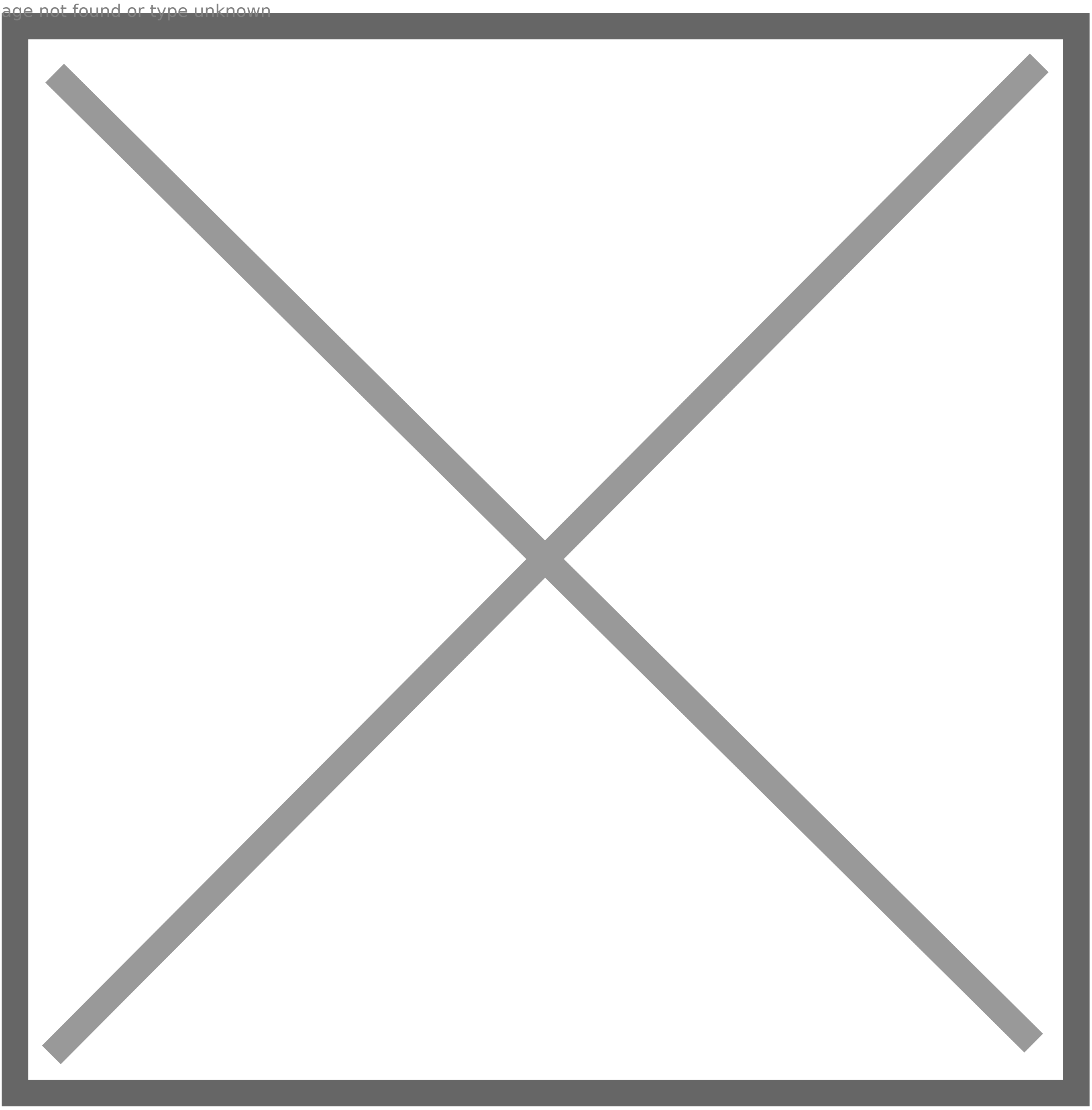
Create OpenVPN client connections

1. Navigate to **VPN --> OpenVPN --> Clients.**
2. Click the **Add** button.
3. In the **Server Mode** field, ensure **Peer to Peer (SSL/TLS)** is selected.
4. In the **Protocol** field, select either **UDP on IPv4 Only** or **TCP on IPv4 Only** depending on your VPN provider's requirements. Most of the time, UDP on port 1194 is used.
5. In the **Device mode** field, ensure **tun - Layer 3 Tunnel Mode** is selected.
6. In the **Interface** field, ensure **WAN** is selected.

7. In the **Server host or address field**, enter the address to your VPN provider's OpenVPN server.
8. In the **Server port** field, enter the port number to your VPN provider's OpenVPN server (most likely 1194).
9. In the **Description** field, enter a description for this connection if desired (**Figure 2)**.

Figure 2

Image not found or type unknown

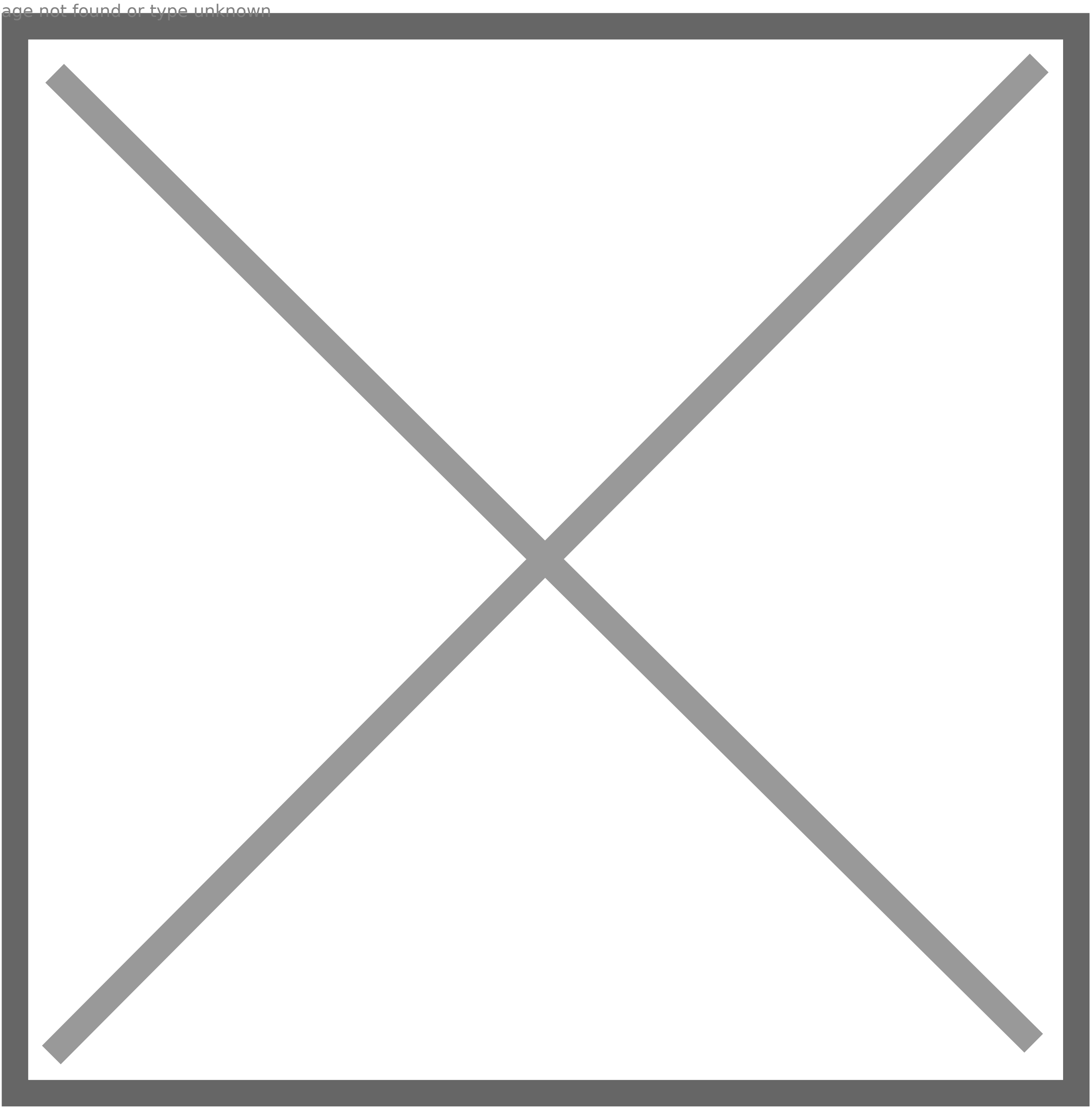


10. In the **Username** field, enter the username for your VPN Provider.
11. In the **Password** field, enter the password for your VPN Provider.
12. Ensure the **Use a TLS Key** field is **unchecked**.

13. In the **Peer Certificate Authority** field, ensure you select the CA that you created in the **import VPN Provider CA Certificate** section above.
14. In the **Client Certificate** field, ensure that **None (Username and/or Password required)** is selected. Please note that this field may need to be adjusted to your VPN provider's requirements, however most of the VPN providers I've used, Username/Password has been sufficient.
15. In the **Encryption Algorithm** field, select the highest encryption that your VPN provider supports. I've used **AES-256-CBC (256 bit key, 128 bit block)** with no problems (**Figure 3**).

Figure 3

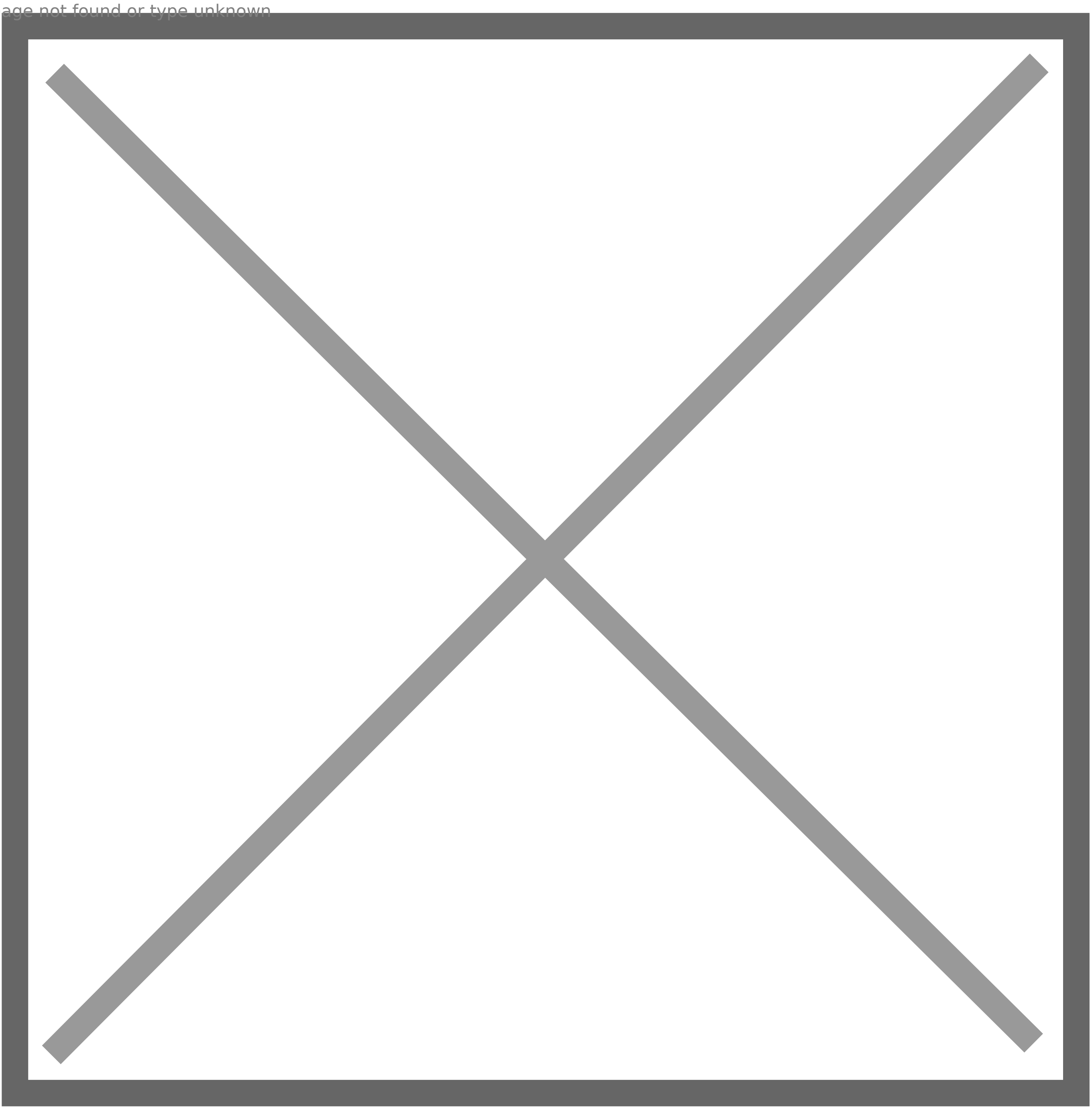
Image not found or type unknown



10. Ensure the **Enable NCP** field is **unchecked**.
11. In the **Auth digest algorithm** field, select the auth digest algorithm supported by your VPN provider. I've used **SHA256 (256-bit)** with no problems.
12. In the **Hardware Crypto** field, ensure **No Hardware Crypto Acceleration** is selected (**Figure 4**).

Figure 4

Image not found or type unknown

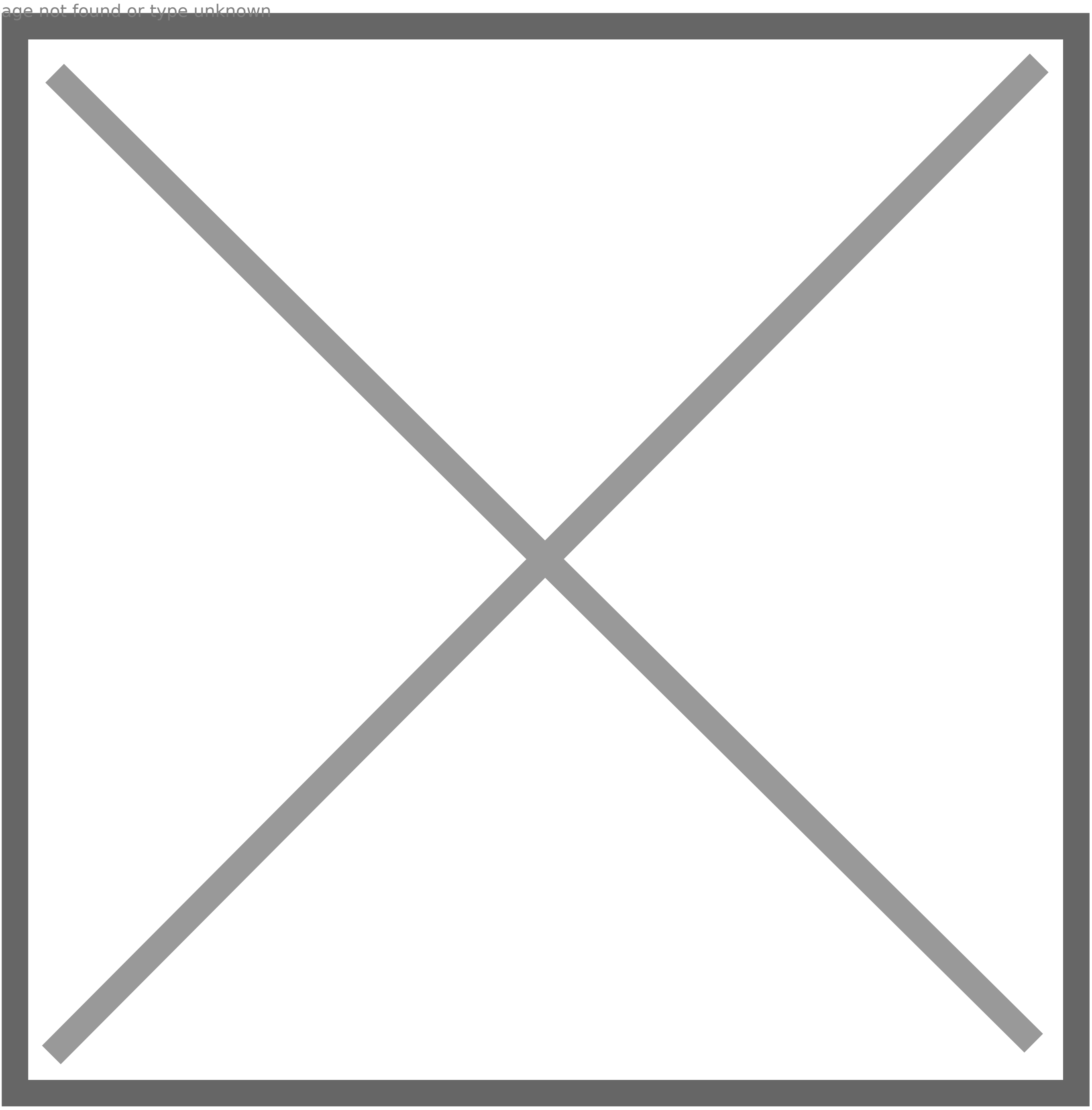


10. In the **Compression** field, ensure that **Adaptive LZO Compression [Legacy style, comp-lzo adaptive]** is selected.
11. Ensure **Don't add or remove routes** field is **checked**.
12. In the **Custom options** field, paste the following options (**Figure 5**):

```
persist-key;
persist-tun;
persist-remote-ip;
resolv-retry infinite;
```

Figure 5

Image not found or type unknown



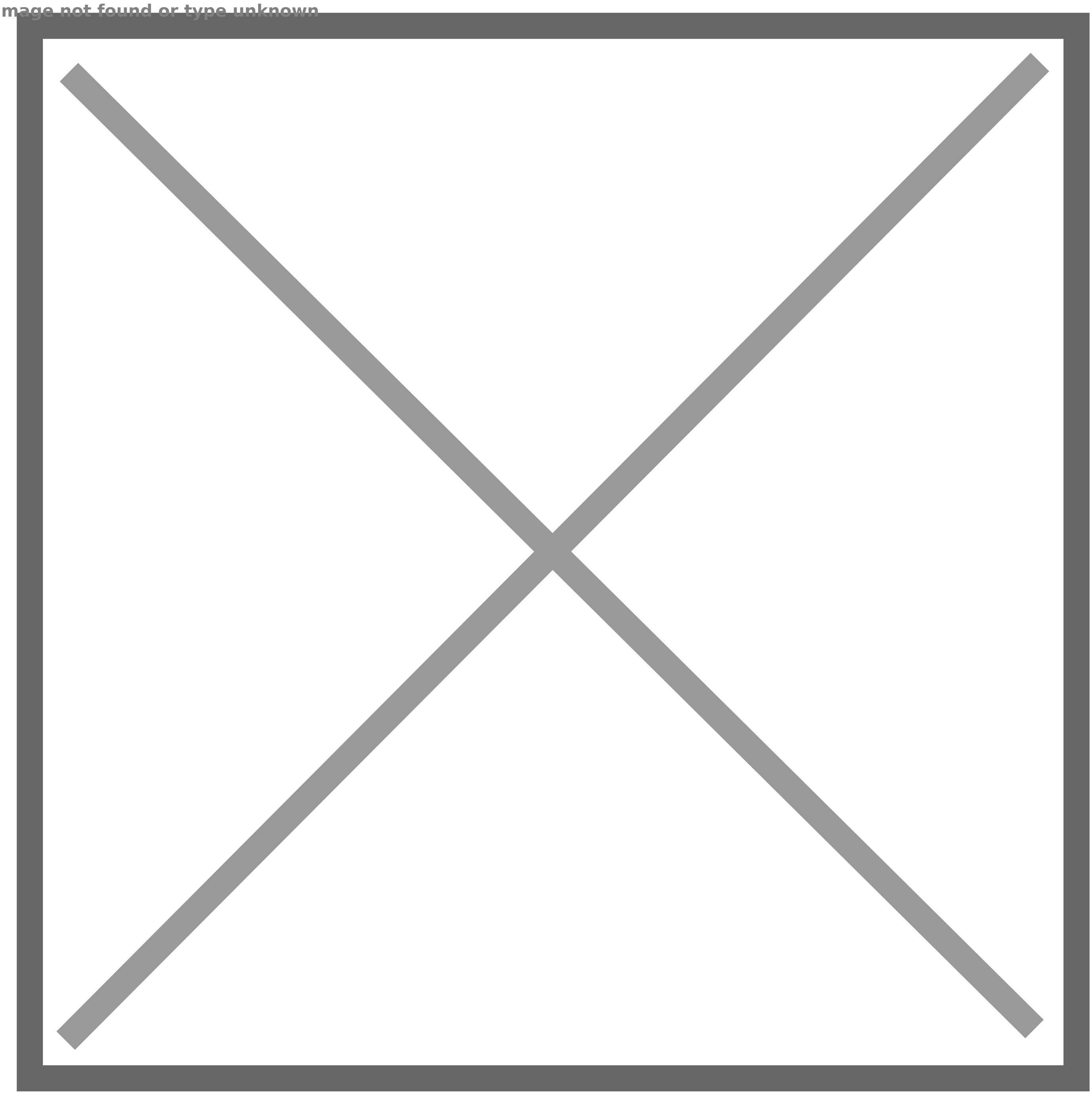
22. Click the **Save** button.
23. Create additional OpenVPN client connections as needed.

Verify OpenVPN Client Connections are Up

1. Navigate to **Status --> OpenVPN**. Under the **Client Instance Statistics** section, you should be able to see the connections you created and ideally if configured correctly, the status for each connections should be **up** (**Figure 6**).

Figure 6

Image not found or type unknown

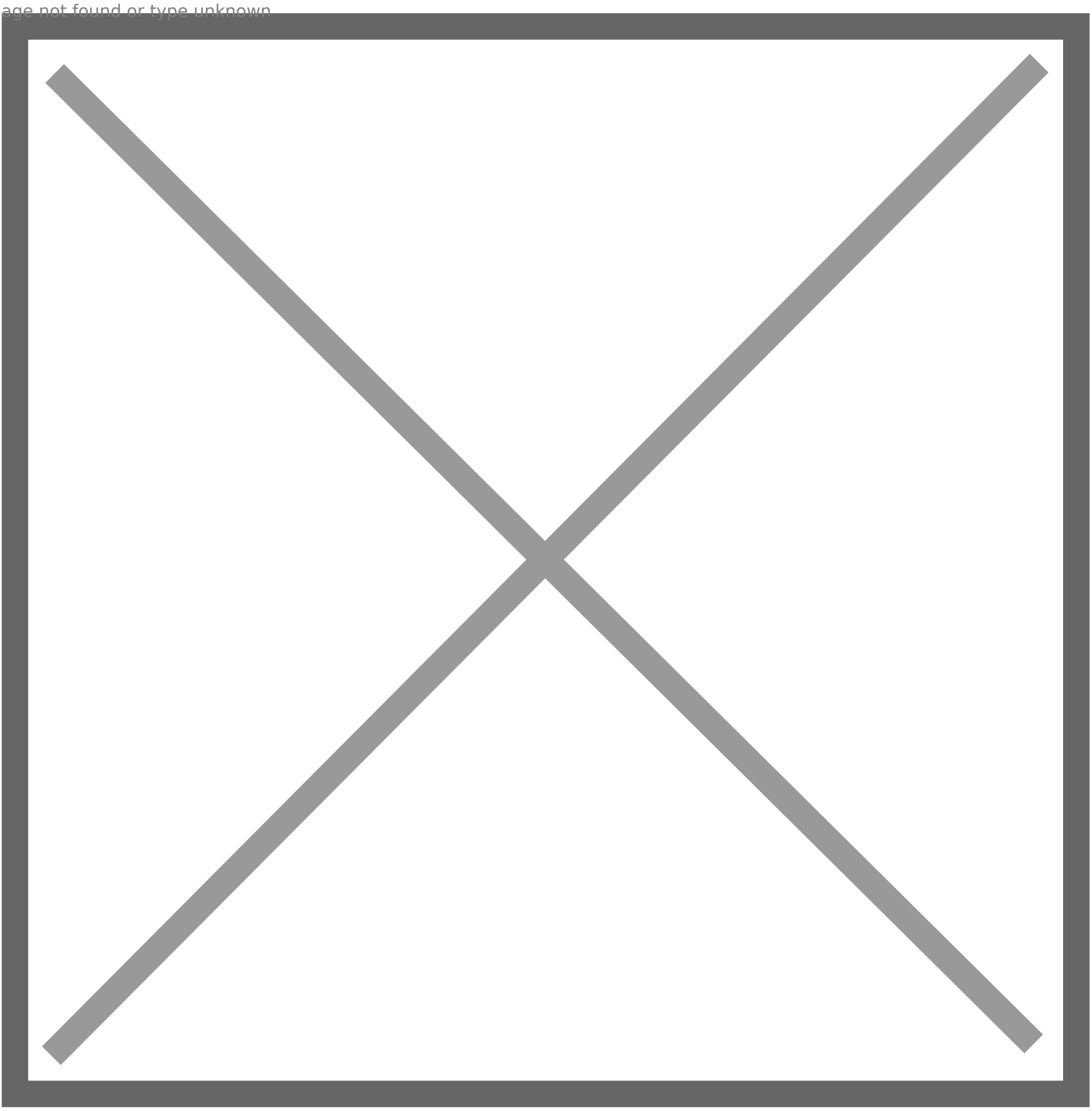


Assign Interfaces to each OpenVPN Connection

1. Navigate to **Interfaces --> Assignments**.
2. Next to the **Available network ports** field, select each of the OpenVPN connections you created earlier from the **Network port** drop-down field and click the **Add** button to assign the network port. The OpenVPN connections are named **ovpncX** where **X** is number assigned by the system. In this example, I created two OpenVPN connections and they are named **ovpnc4 for newshosting.com OpenVPN 1** connection and **ovpnc5 for newshosting.com OpenVPN 2** connection (**Figure 7**).

Figure 7

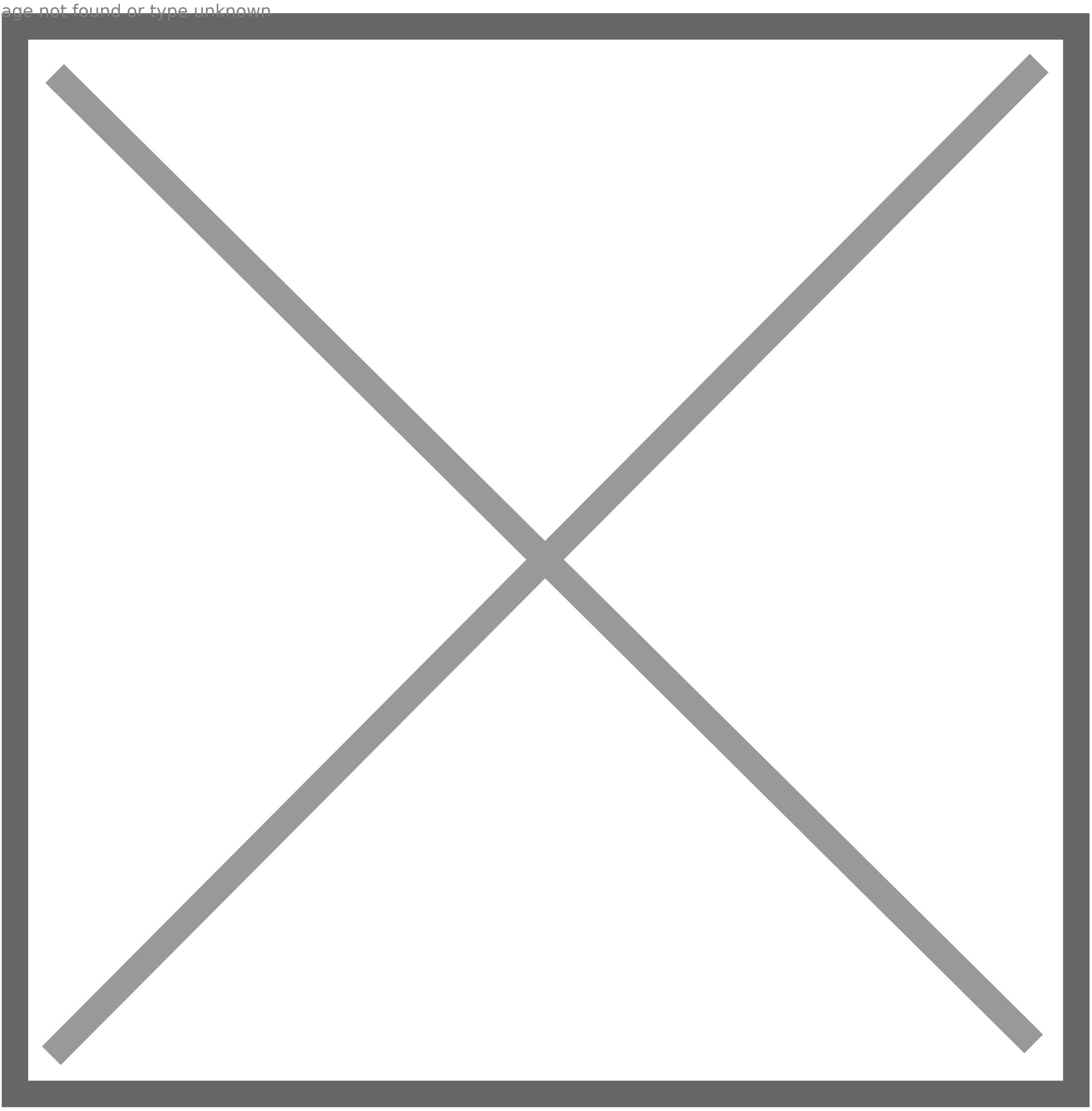
Image not found or type unknown



3. Assign all the OpenVPN connections you created and you will end up with your OpenVPN connections having been assigned an **OPTX** interface name where **X** is a number assigned by the system. Ensure you click the **Save** button at the bottom of the screen to save your changes. (**Figure 8**).

Figure 8

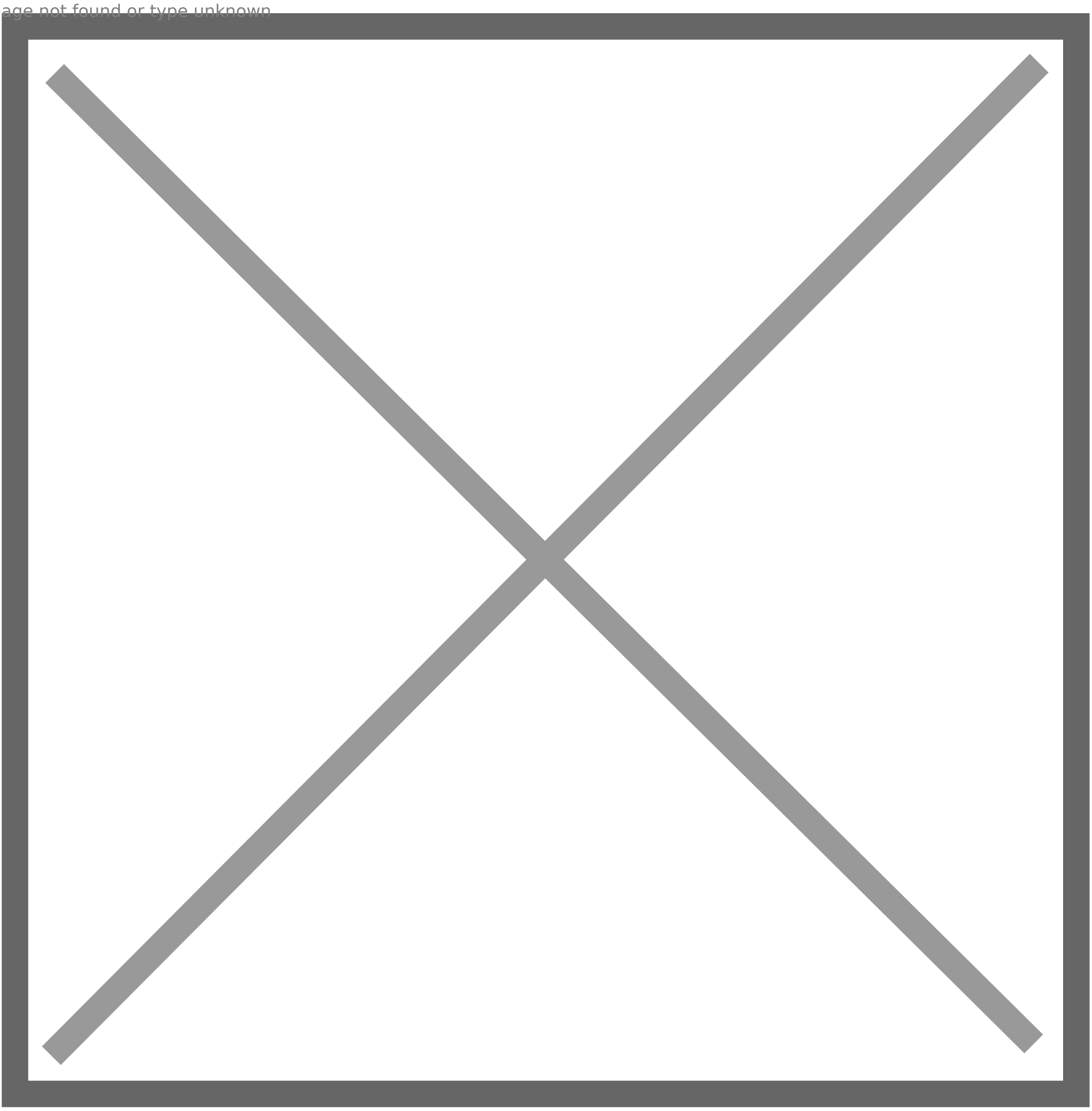
Image not found or type unknown



9. Next, click on each of the **OPTX** interfaces that were assigned to your OpenVPN connections and you will be re-directed to the **Interfaces / OPTX** configuration page where X is the interface number assigned by the system.
10. Ensure the **Enable** field is checked.
11. In the **Description** field enter a name for this connection (Ex: **NewsHostingOpenVPN1**).
12. Ensure **IPv4 Configuration Type** is set to None.
13. Ensure **IPv6 Configuration Type** is set to None (**Figure 9**).

Figure 9

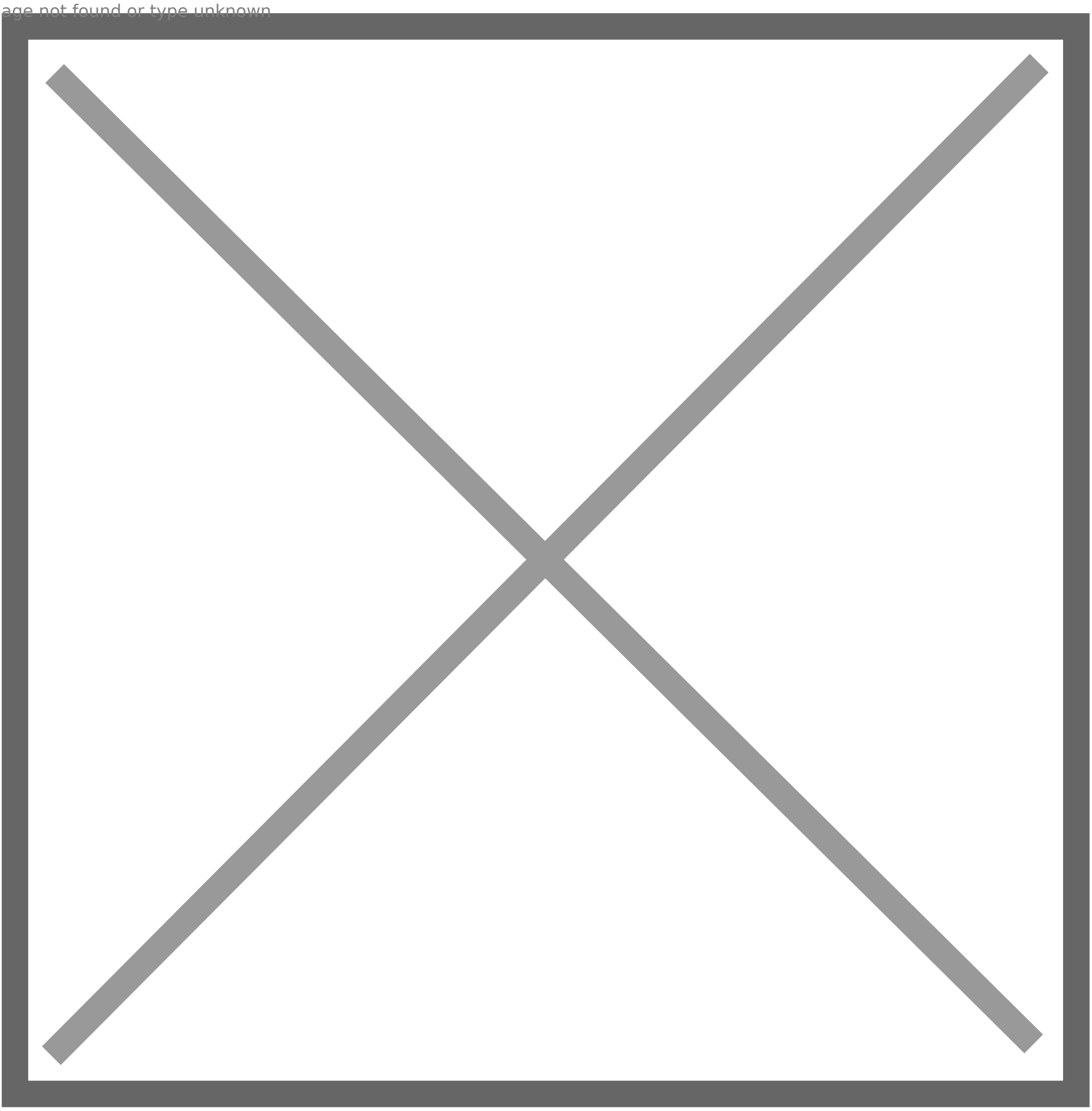
Image not found or type unknown



14. Click the **Save** button at the bottom of the page and then click the **Apply Changes** that appears on the top of the page after clicking the Save button.
15. Navigate back to **Interfaces --> Assignments** and repeat **Steps 9 through 14** from above to assign the rest of the OpenVPN connections.
16. In the end you should end up with a listing like below under **Interfaces -->Assignments** (**Figure 10**).

Figure 10

Image not found or type unknown



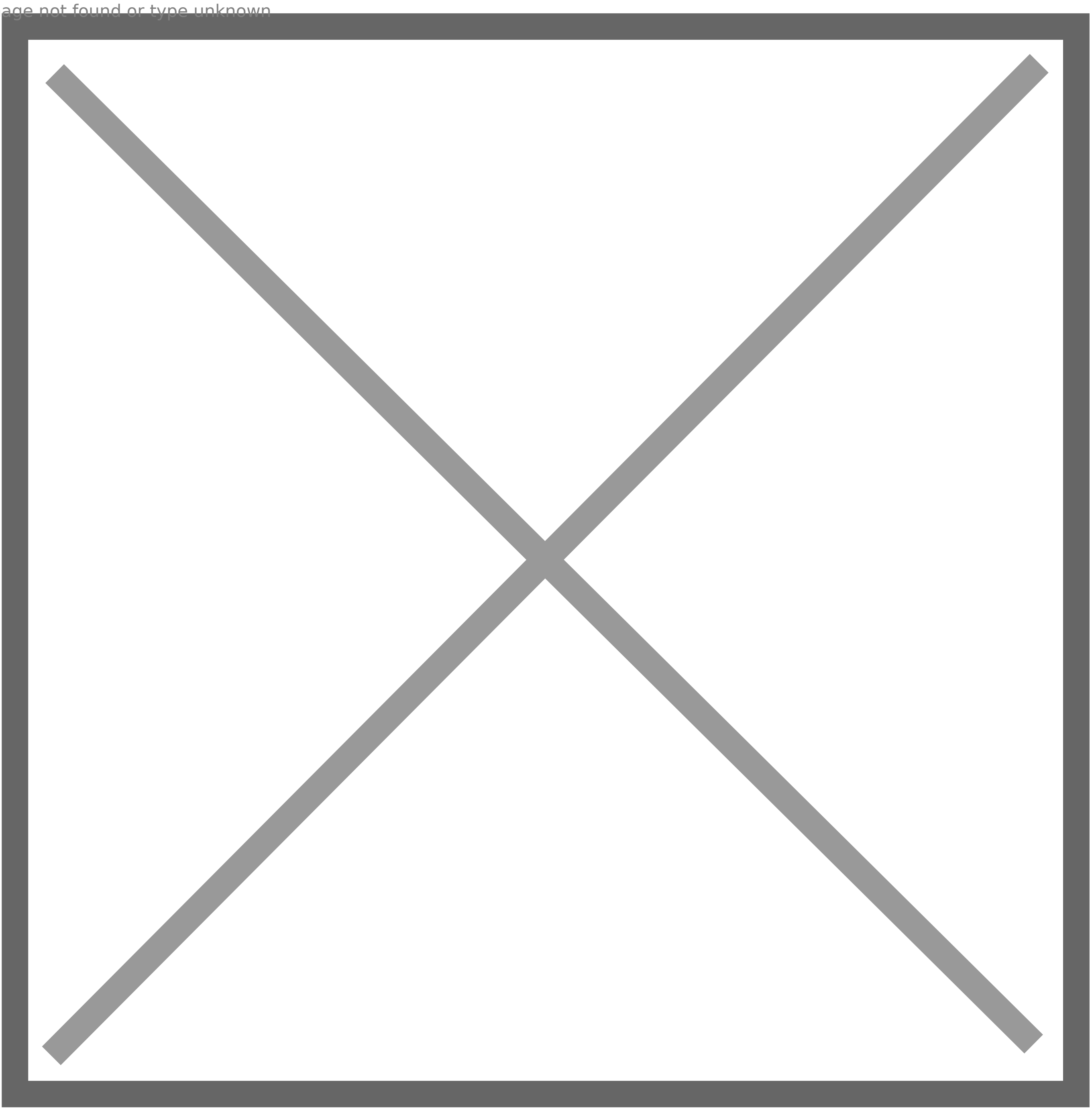
Create OpenVPN Gateway Group

In this section, we are going to be creating a Gateway Group that's going to include all the OpenVPN gateways that were automatcially created by the system when we assigned the OpenVPN connections to Interfaces in the previous section. Using this method, we willl be having more than one connection available for load balancing as well as failover in case one of the OpenVPN connections goes down. You will notice below that we will give both OpenVPN gateways the same priority (Tier 1) which will effectively create a load-balanced connection using multiple OpenVPN gateways.

1. Navigate to **System --> Routing** and ensure the **Gateways** tab is selected. You should be able to **IPv4** gateways, denoted by a **_VPNV4** suffix and **IPv6** gateways, denoted by a **_VPNV6** suffix entries for each interface you assigned to an OpenVPN connection from the section above. (**Figure 11**).

Figure 11

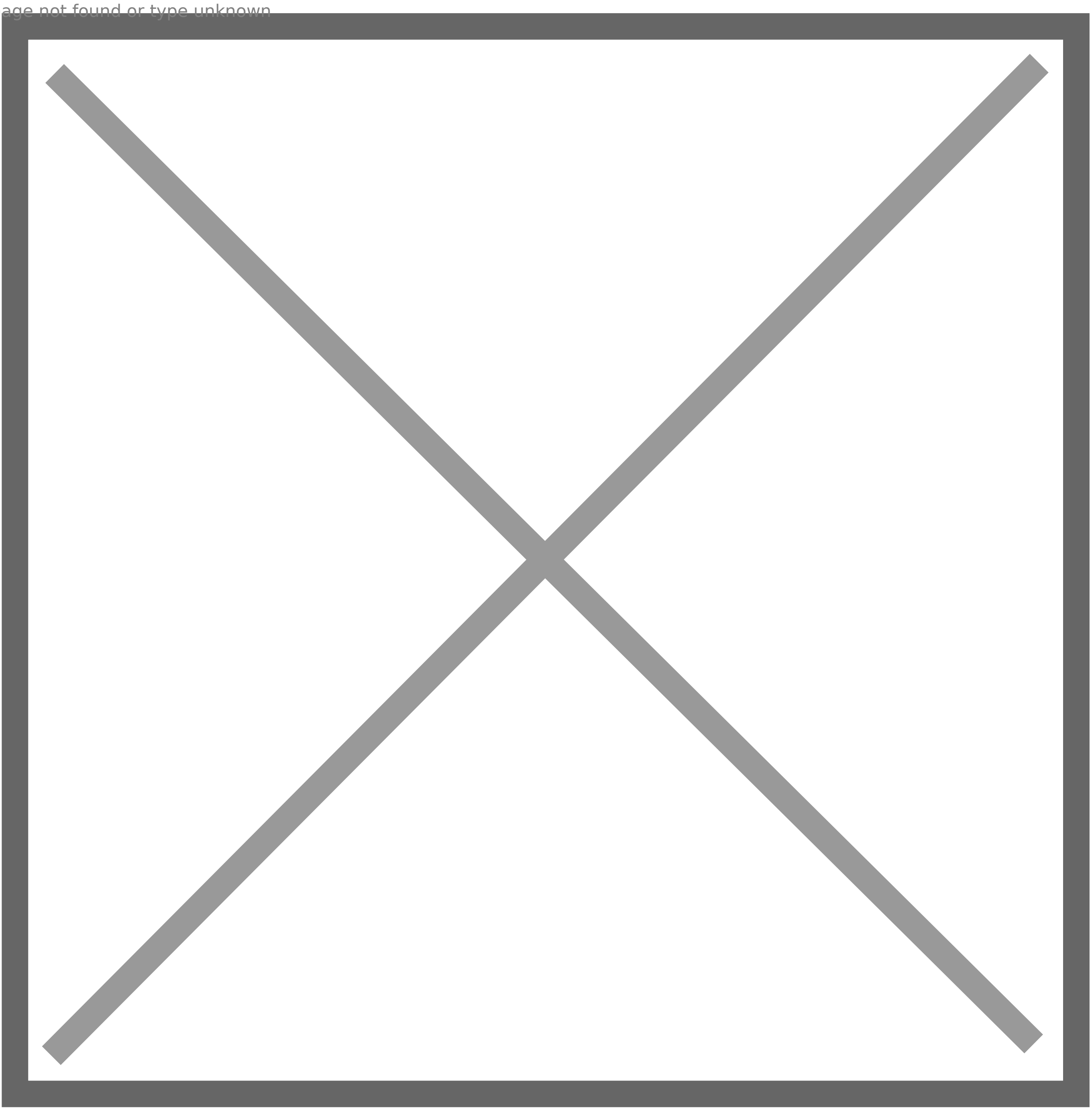
Image not found or type unknown



2. Next, click on the **Gateway Groups** tab and then click the **Add** button **(Figure 12**).

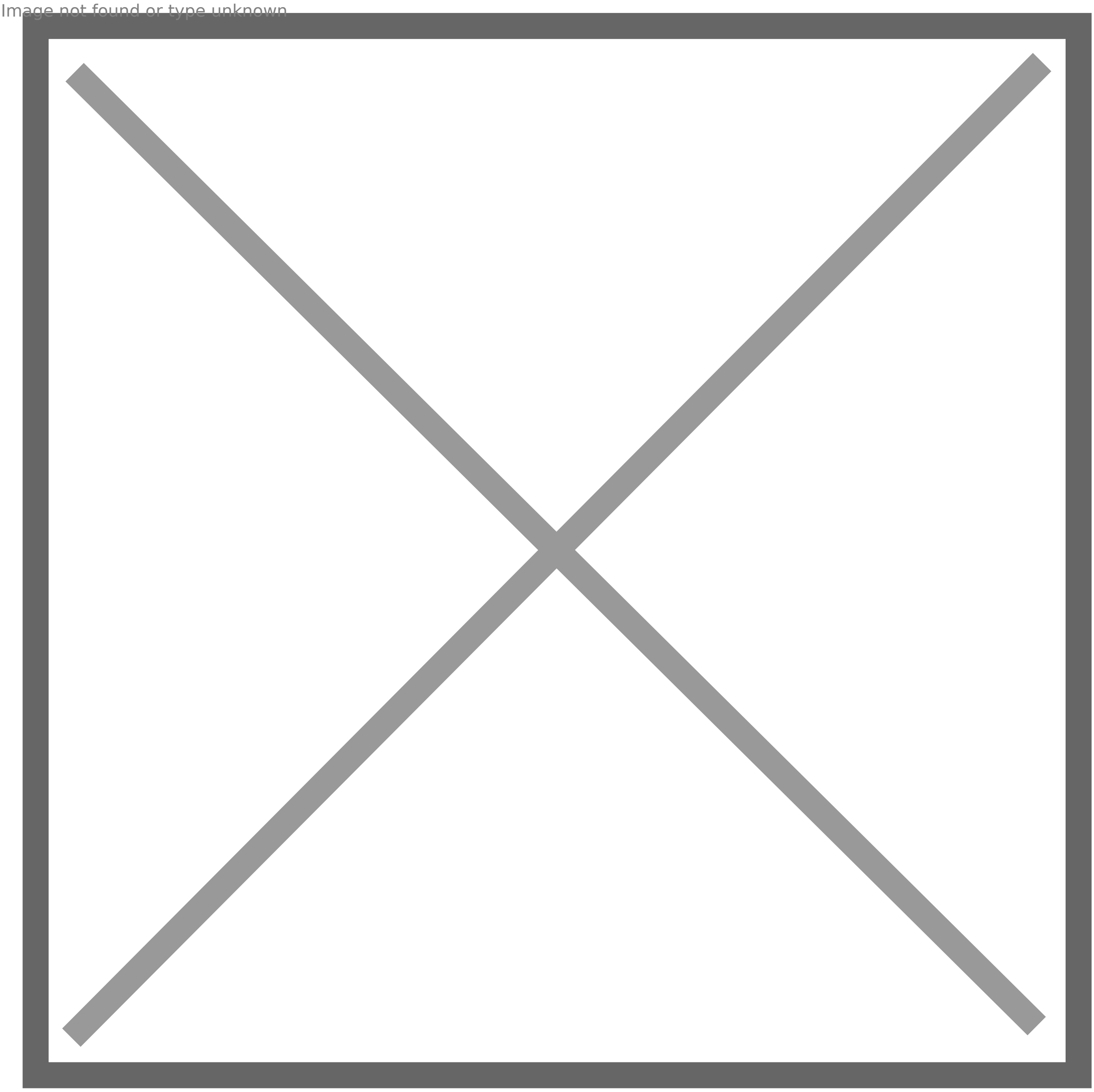
Figure 12

Image not found or type unknown



3. You will be re-directed to the **Edit Gateway Group Entry** page
4. In the **Group Name** field, enter a name for your Gateway Group (Ex: OpenVPNGatewayGroup).
5. Under the **Gateway Priority** section, ensure your **main WAN gateway is set to Never**.
6. Ensure all the *OpenVPN IPv4 gateways denoted with a _VPNV4 suffix are set to Tier 1*. **Ensure that any OpenVPN IPv6 gateways denoted with a _VPNV6 suffix are NOT set to Tier 1 and if necessary be set to Never just like the main WAN gateway.**
7. Ensure the **Trigger Level** field is set to Member down
8. Optionally, enter a description in the **Description** field.
9. Click the **Save** button (**Figure 13**).

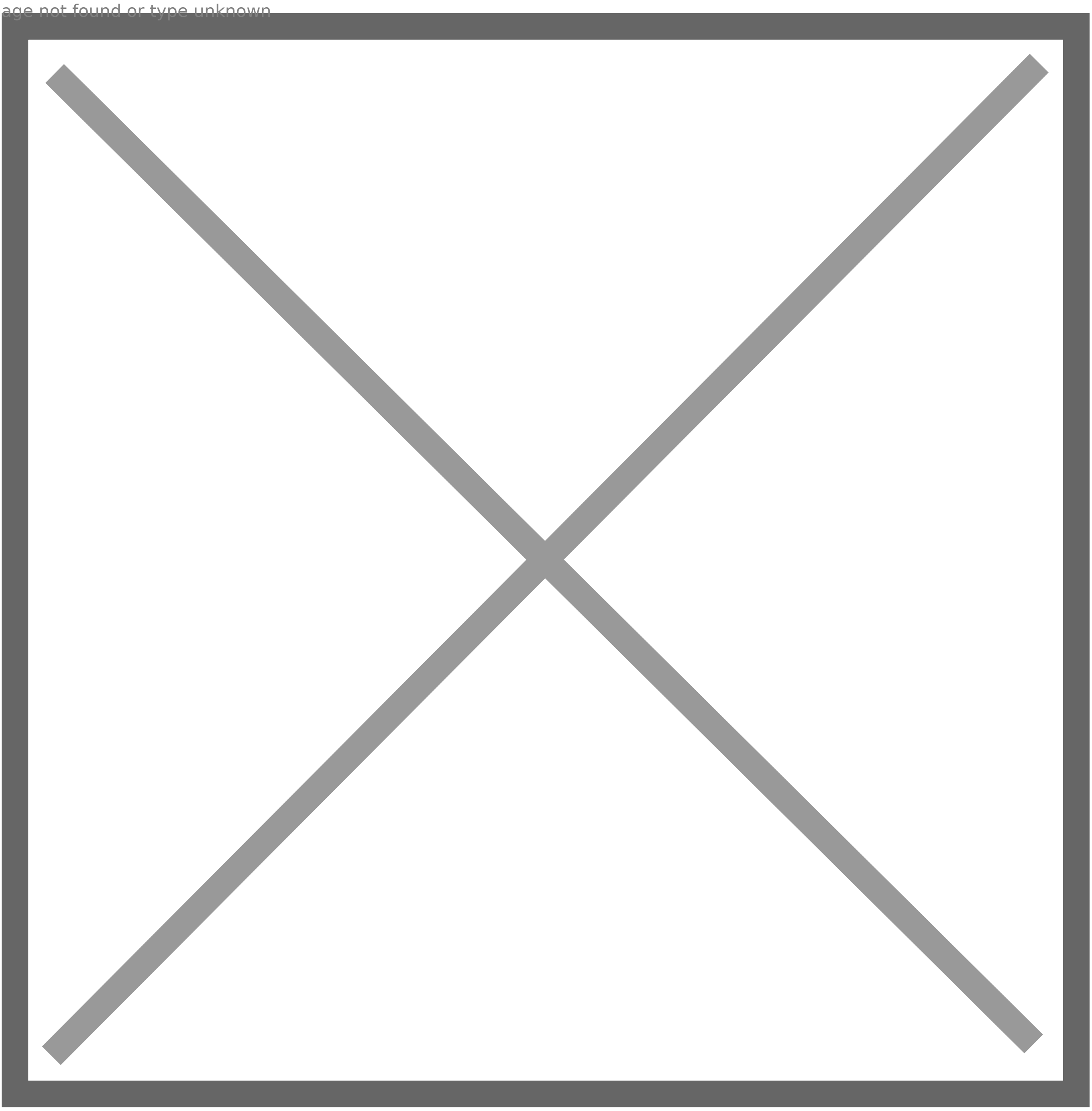
Figure 13



10. You will be re-directed back to **Gateway Groups** page where the you will be able to see the Gateway Group you just created. Click on the **Apply Changes** button on the top of the page to apply your changes (**Figure 14**).

Figure 14

Image not found or type unknown

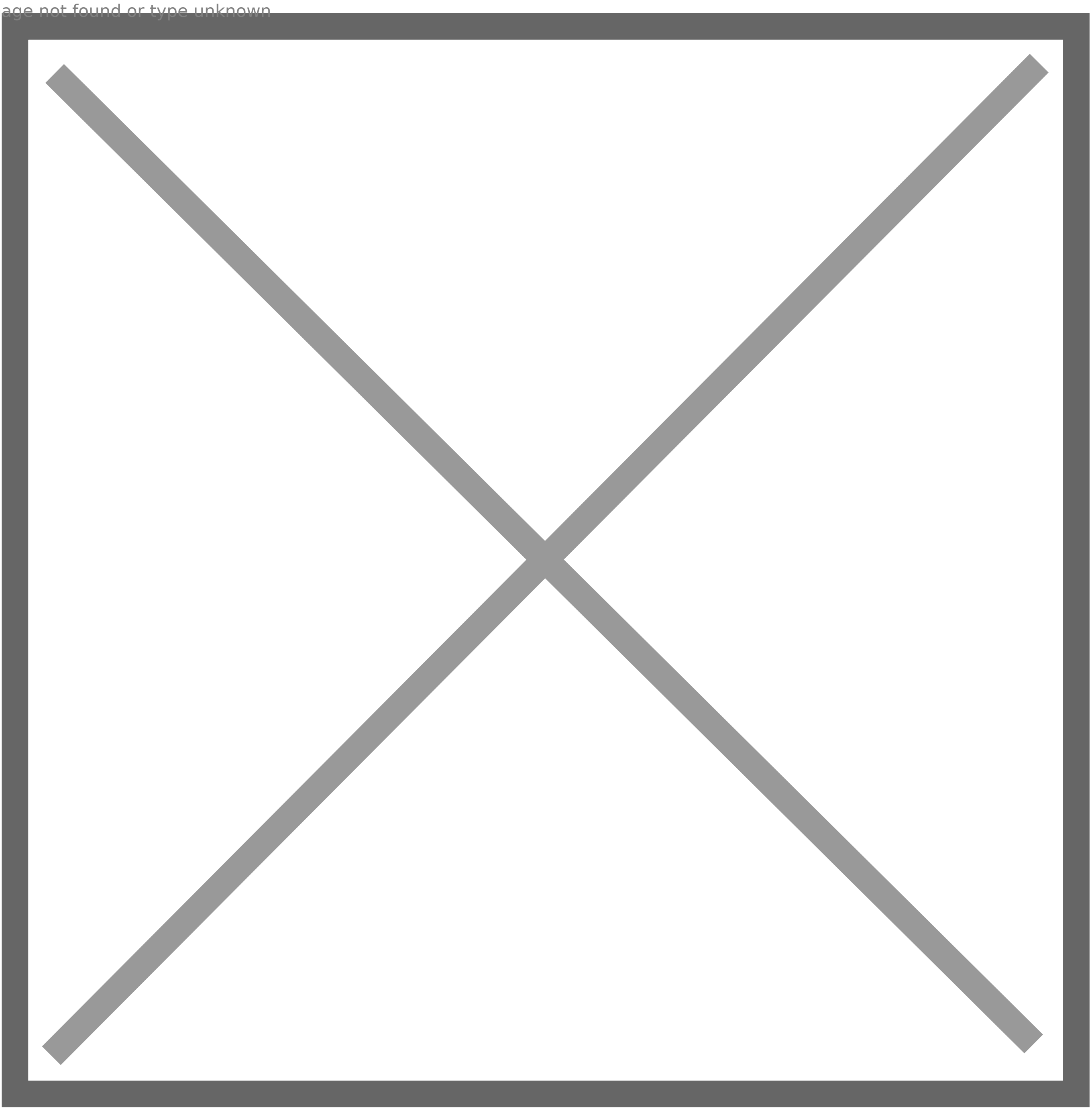


Create Firewall Rules

In this section, we are going to create a floating firewall rule to Reject any LAN outbound packets that are tagged as **NO_WAN_OUTBOUND** and then we are going to create a LAN rule that will tag all traffic as **NO_WAN_OUTBOUND** as well as use the OpenVPNGatewayGroup we created in the section above as the default gateway for that traffic. Using this method, we are going to ensure that ALL LAN traffic will ONLY go through the OpenVPN connections.

1. Navigate to **Firewall --> Rules** and ensure the **Floating** tab is selected. (**Figure 15**).

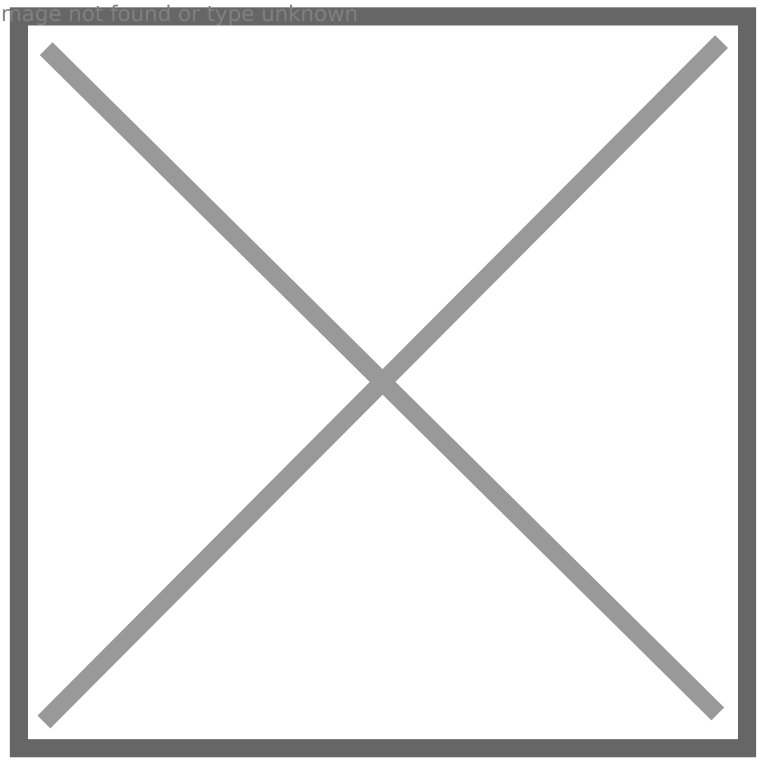
Figure 15



2. Click the Add button with the down arrow on the bottom of the page to add a rule to the end of the list (**Figure 16**).

Figure 16

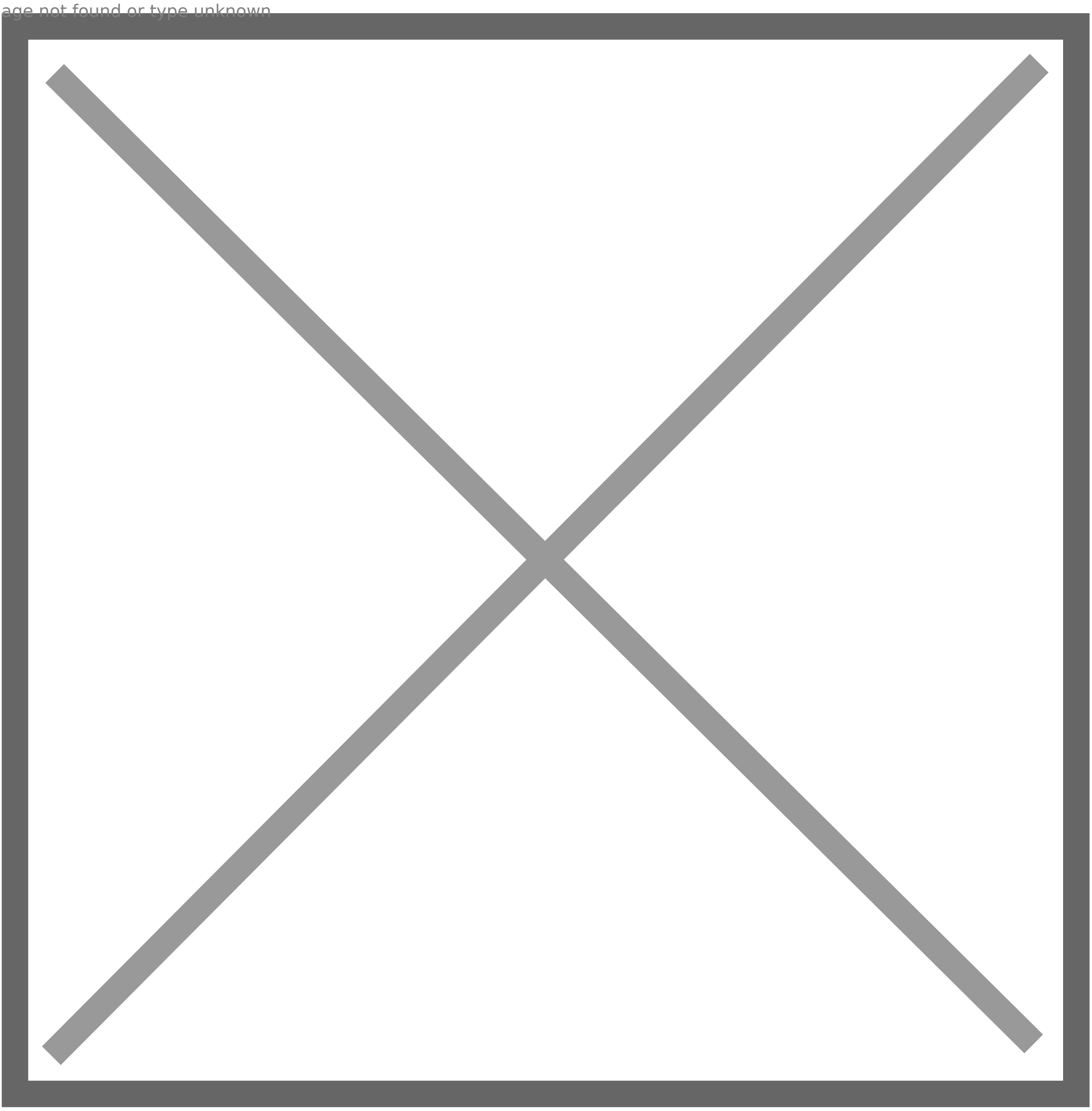
Image not found or type unknown



3. You will be re-directed to the **Edit firewall Rule** page.
4. In the **Action** field ensure **Reject** is selected.
5. In the **Interface** field ensure the **WAN** interface is selected.
6. In the **Direction** field ensure **out** is selected.
7. In the **Address Family** ensure **IPv4** is selected.
8. In the **Protocol** field ensure **Any** is selected(**Figure 17**).

Figure 17

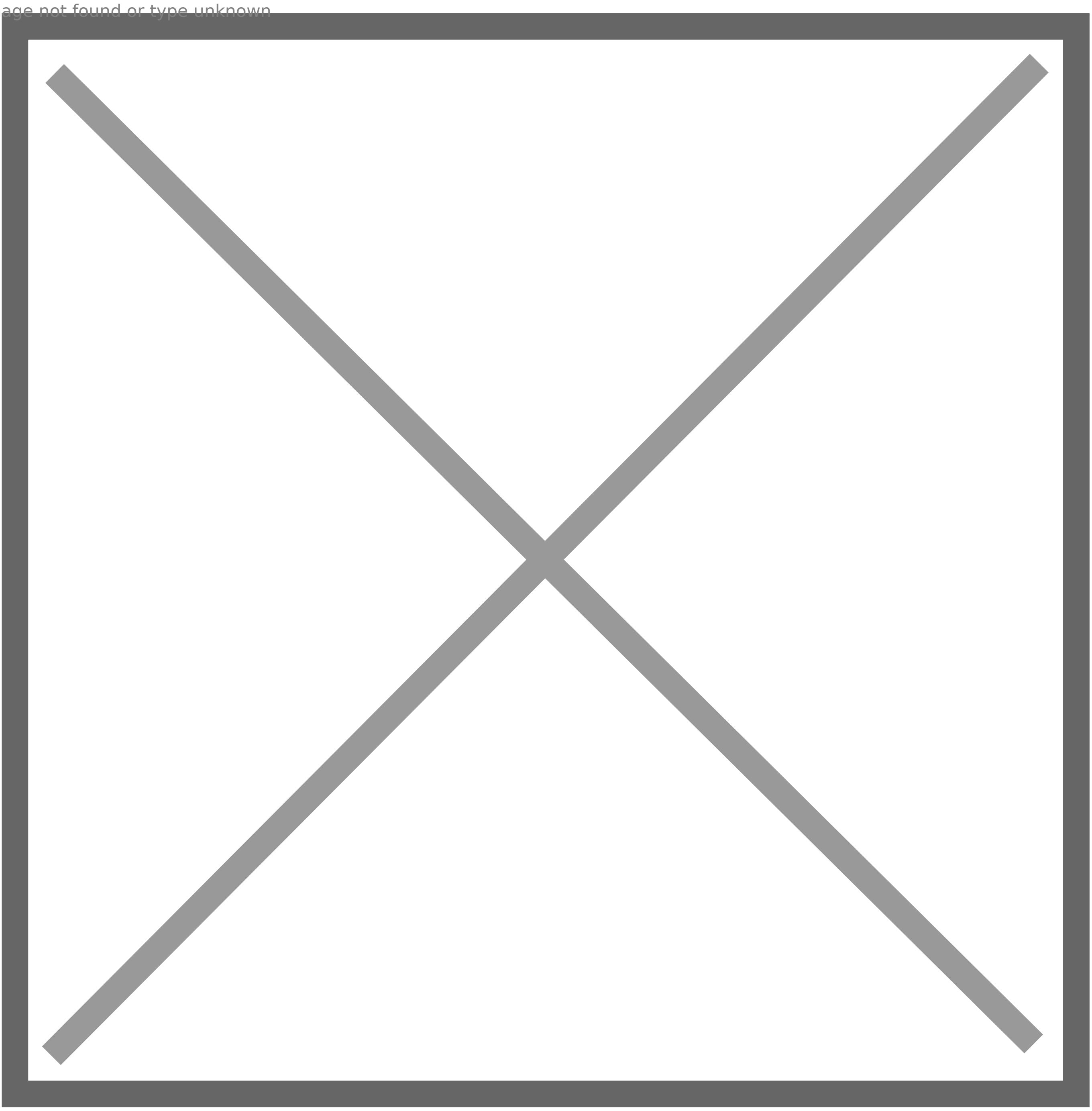
Image not found or type unknown



9. In the **Log** field, check the Log packets that are handled by this rule.
10. In the **Description** field, enter the following description: **Reject Packets tagged with NO_WAN_OUTBOUND**.
11. In the **Advanced Options** field, click **Display Advanced** button (**Figure 18**).

Figure 18

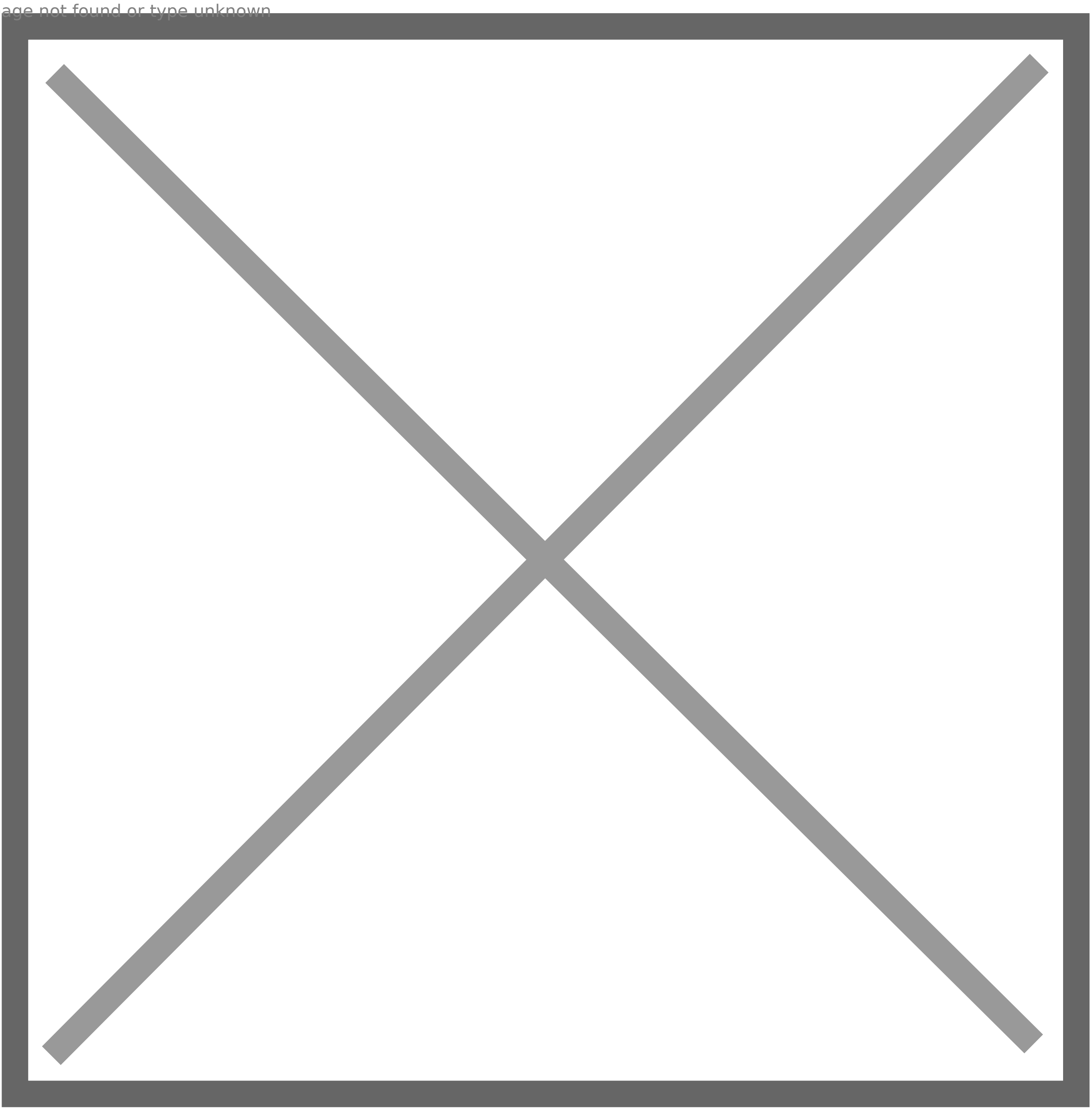
Image not found or type unknown



12. Clicking the Advanced Options button from the previous step, will display the Advanced Options section.
13. In the **Tagged** field, enter the following: **NO_WAN_OUTBOUND** (**Figure 19**)**.** Ensure you make a note of the **NO_WAN_OUTBOUND** tag because we are going to be using it in LAN rule we are going to be creating next.

Figure 19

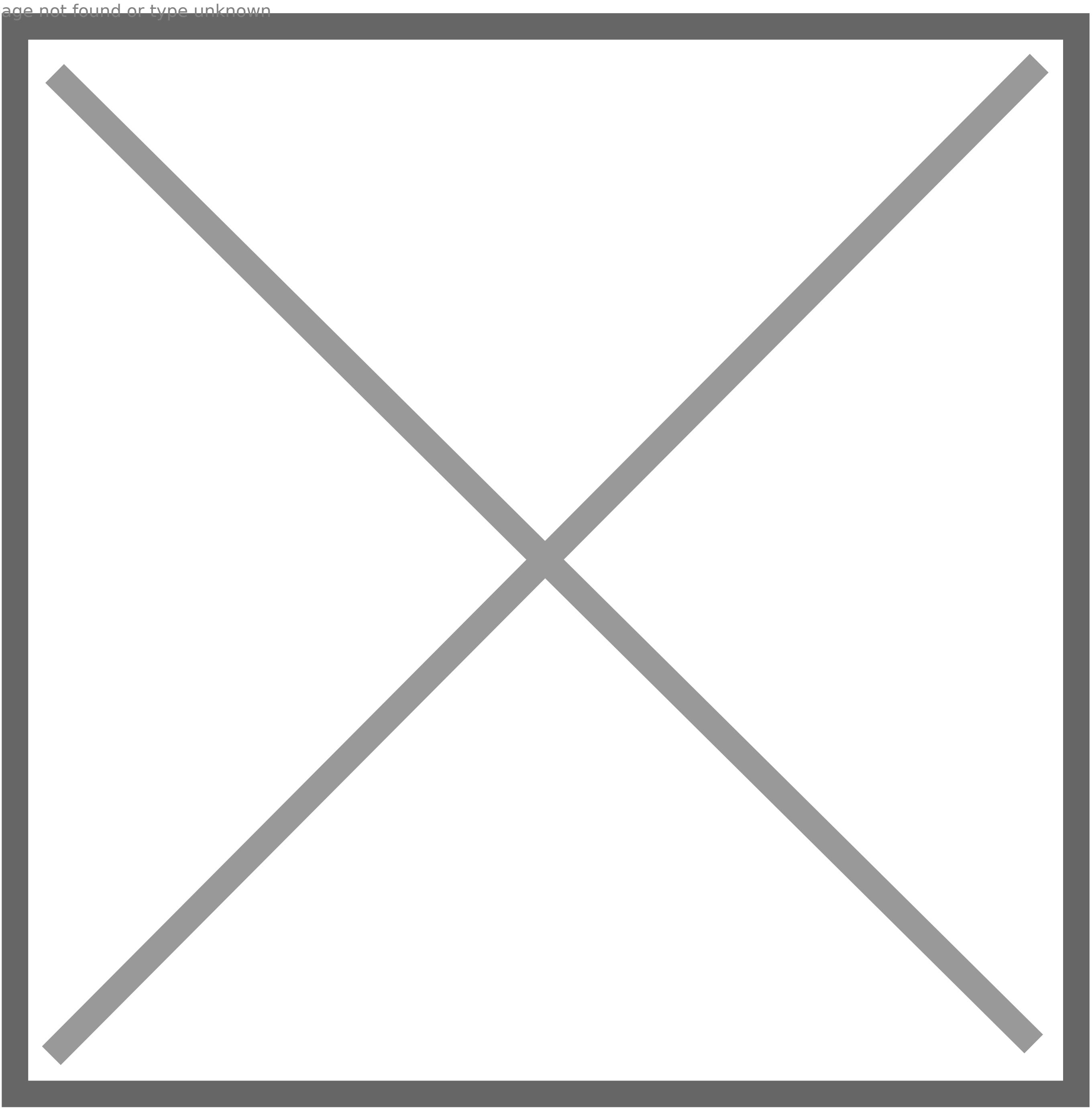
Image not found or type unknown



14. Click the **Save** button at the bottom of the page.
15. You will be re-directed back to the **Floating** rules tab page.
16. Click on the **Apply Changes** button on the top of the page to apply the changes (**Figure 20**).

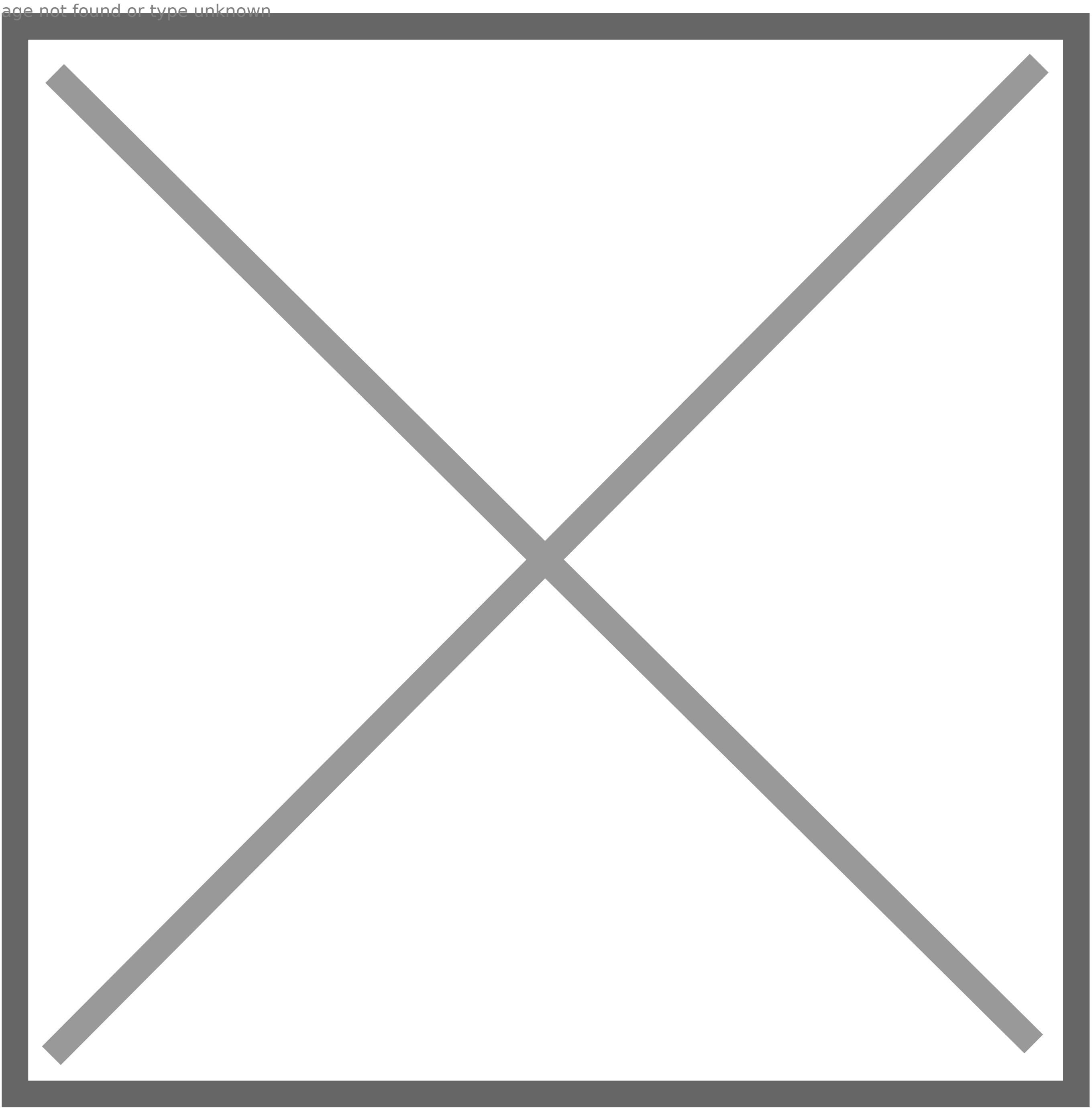
Figure 20

Image not found or type unknown



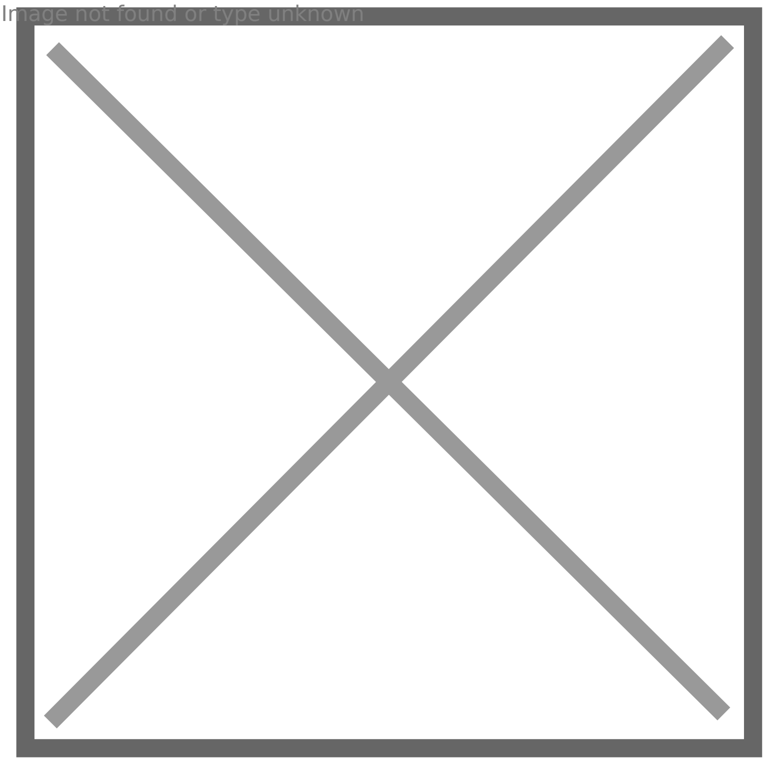
17. Next click on the **LAN** tab (**Figure 21**).

Figure 21



18. Click the Add button with the down arrow on the bottom of the page to add a rule to the end of the list (**Figure 22**).

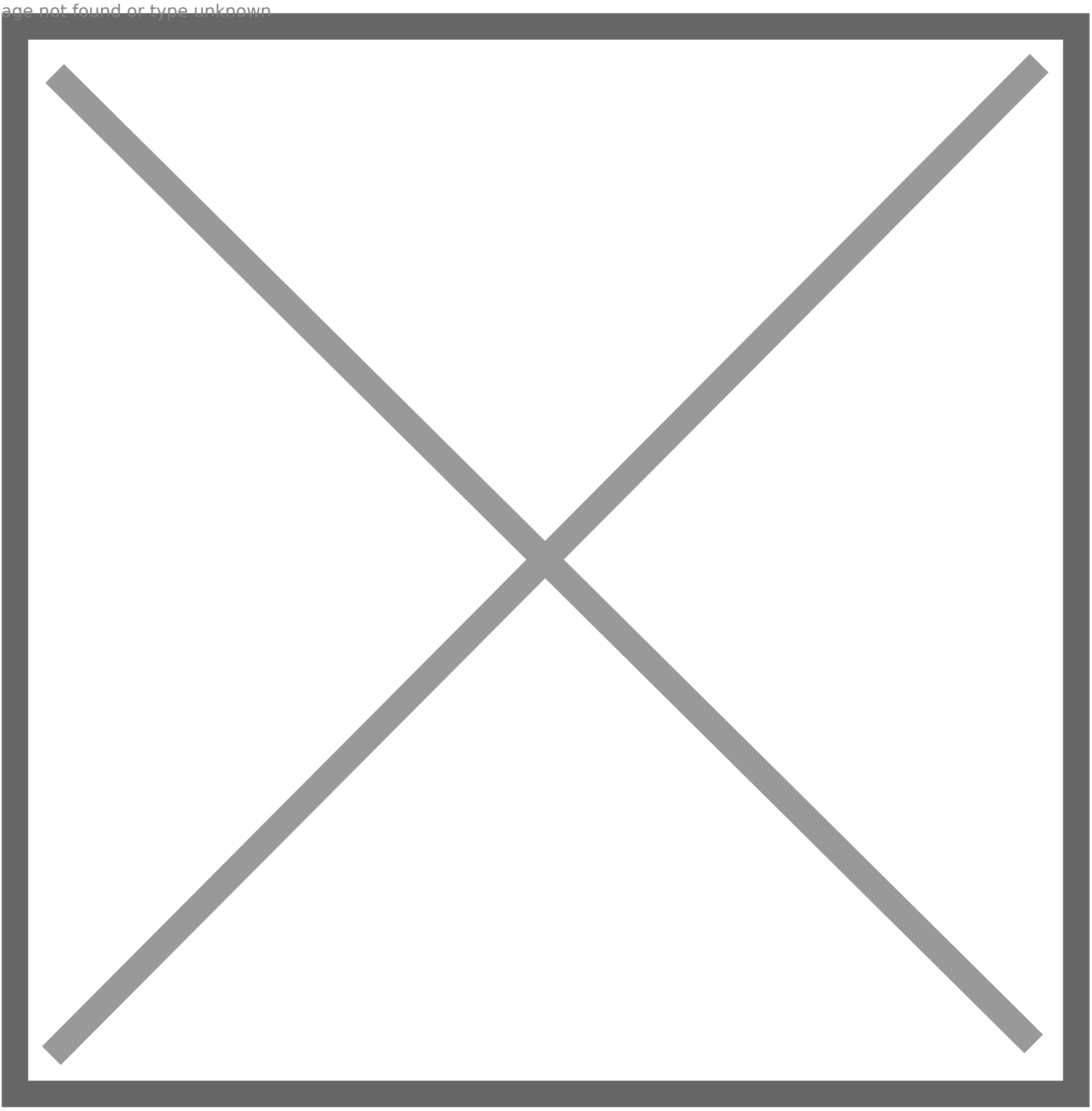
Figure 22



19. You will be re-directed to the **Edit firewall Rule** page.
20. In the **Action** field ensure **Pass** is selected.
21. In the **Disabled** field ensure **Disable this rule** is **Unchecked**.
22. In the **Interface** field ensure the **LAN** interface is selected.
23. In the **Address Family** ensure **IPv4** is selected.
24. In the **Protocol** field ensure **Any** is selected (**Figure 23**).

Figure 23

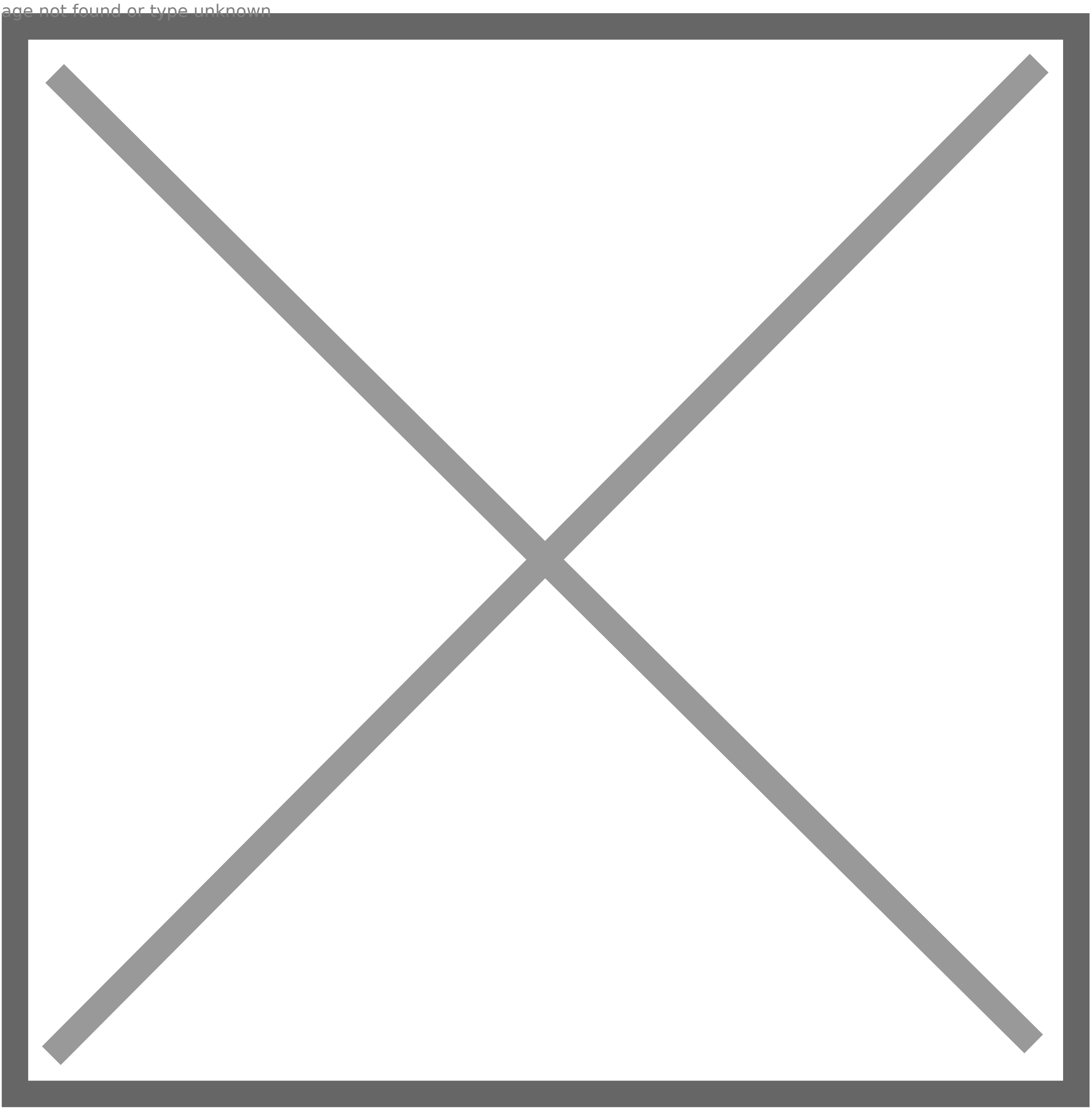
Image not found or type unknown



25. Under the **Source** section, in the **Source** field, ensure **LAN net** is selected.
26. Under the **Destination** section, in the **Destination** field, ensure **any** is selected.
27. Under the **Extra Options** section, in the **Log** field, ensure **Log packets that are handled by this rule** is checked.
28. Under the **Extra Options** section, in the **Description** field, enter a description for this rule (Ex: Allow LAN to any via VPN Only).
29. Under the **Extra Options** section, in the **Advanced Options** field, click the **Display Advanced** button (**Figure 24**).

Figure 24

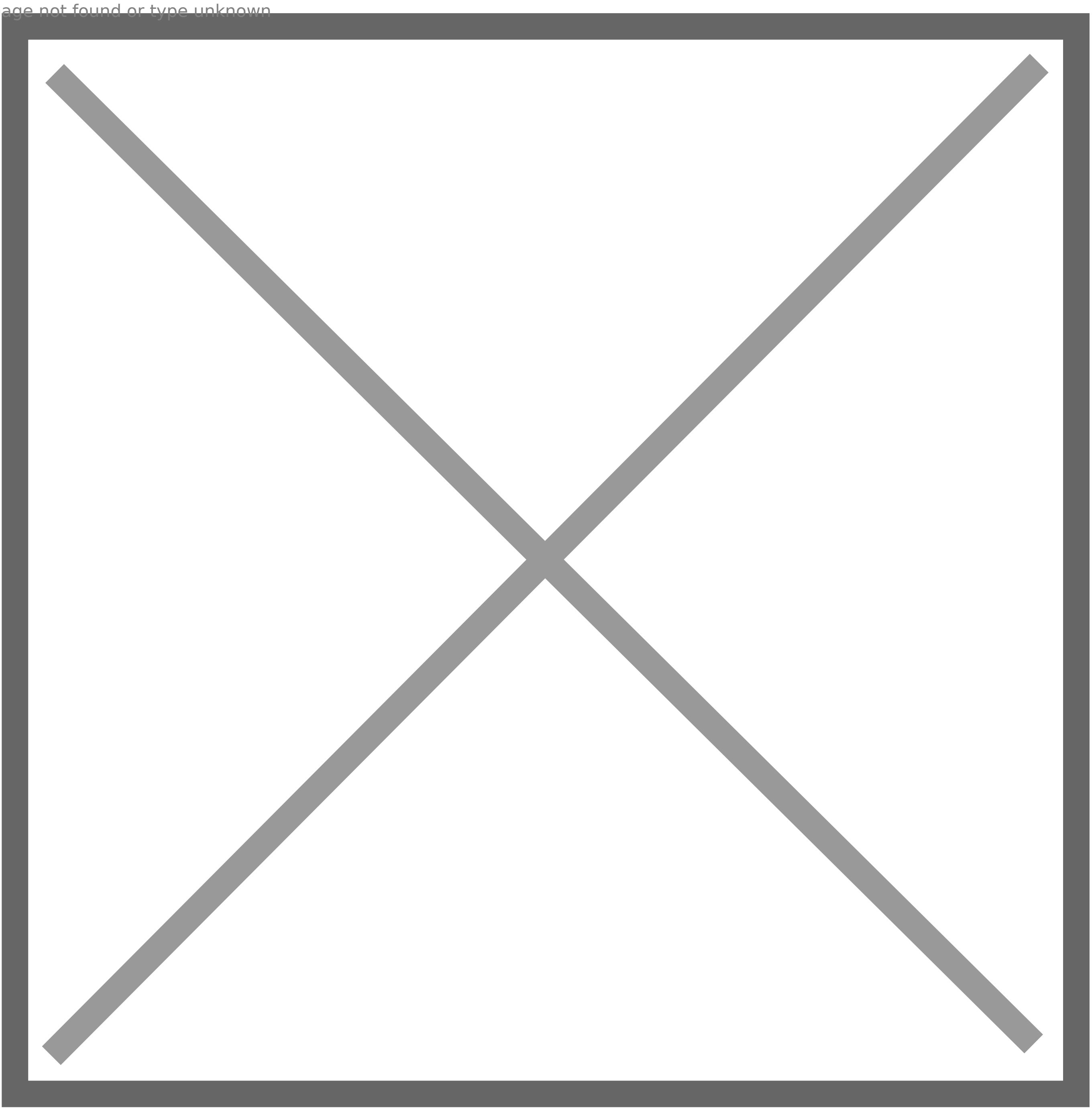
Image not found or type unknown



30. Clicking the Advanced Options button from the previous step, will display the Advanced Options section.
31. Under the **Advanced Options** section, in the **Tag** field, enter **NO_WAN_OUTBOUND** (**Figure 25**).

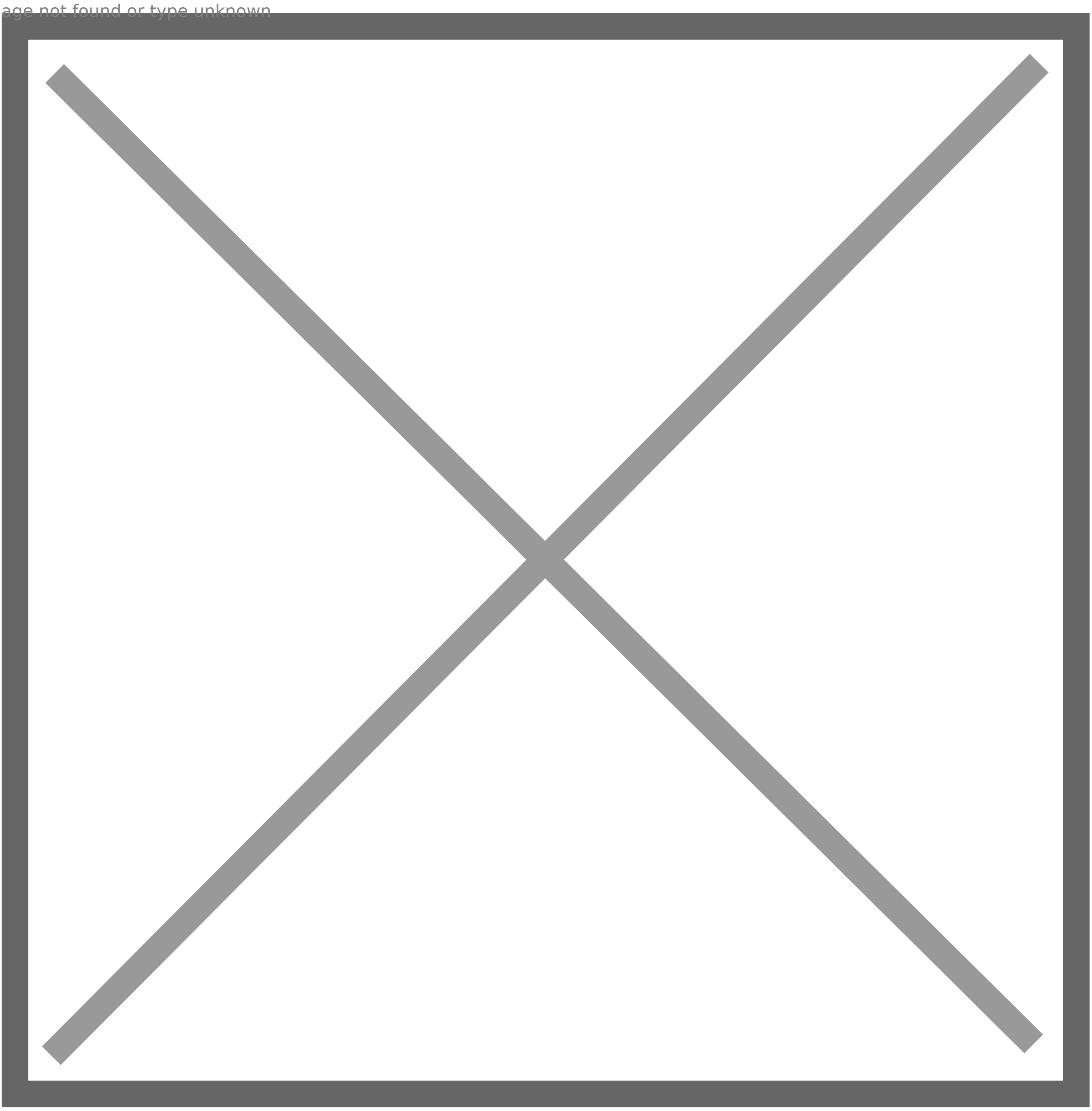
Figure 25

Image not found or type unknown



32. Under the A**dvanced Options** section, in the **Gateway** field, ensure the **OpenVPNGatewayGroup** gateway is selected (**Figure 26**).

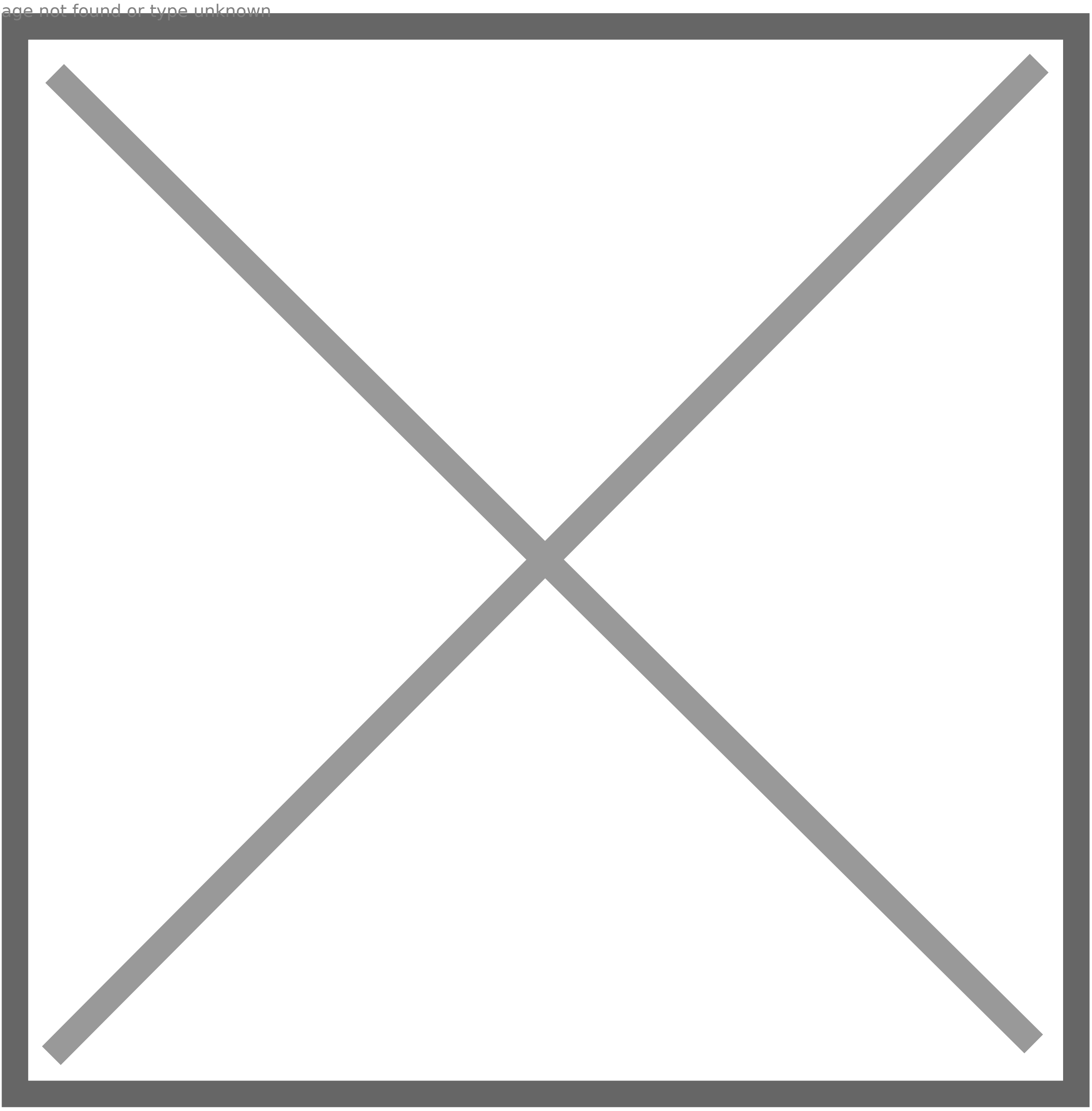
Figure 26



32. Click the **Save** button at the bottom of the page.
33. You will be re-directed back to the **LAN** rules tab page.
34. Click on the **Apply Changes** button on the top of the page to apply the changes (**Figure 27**).

Figure 27

Image not found or type unknown

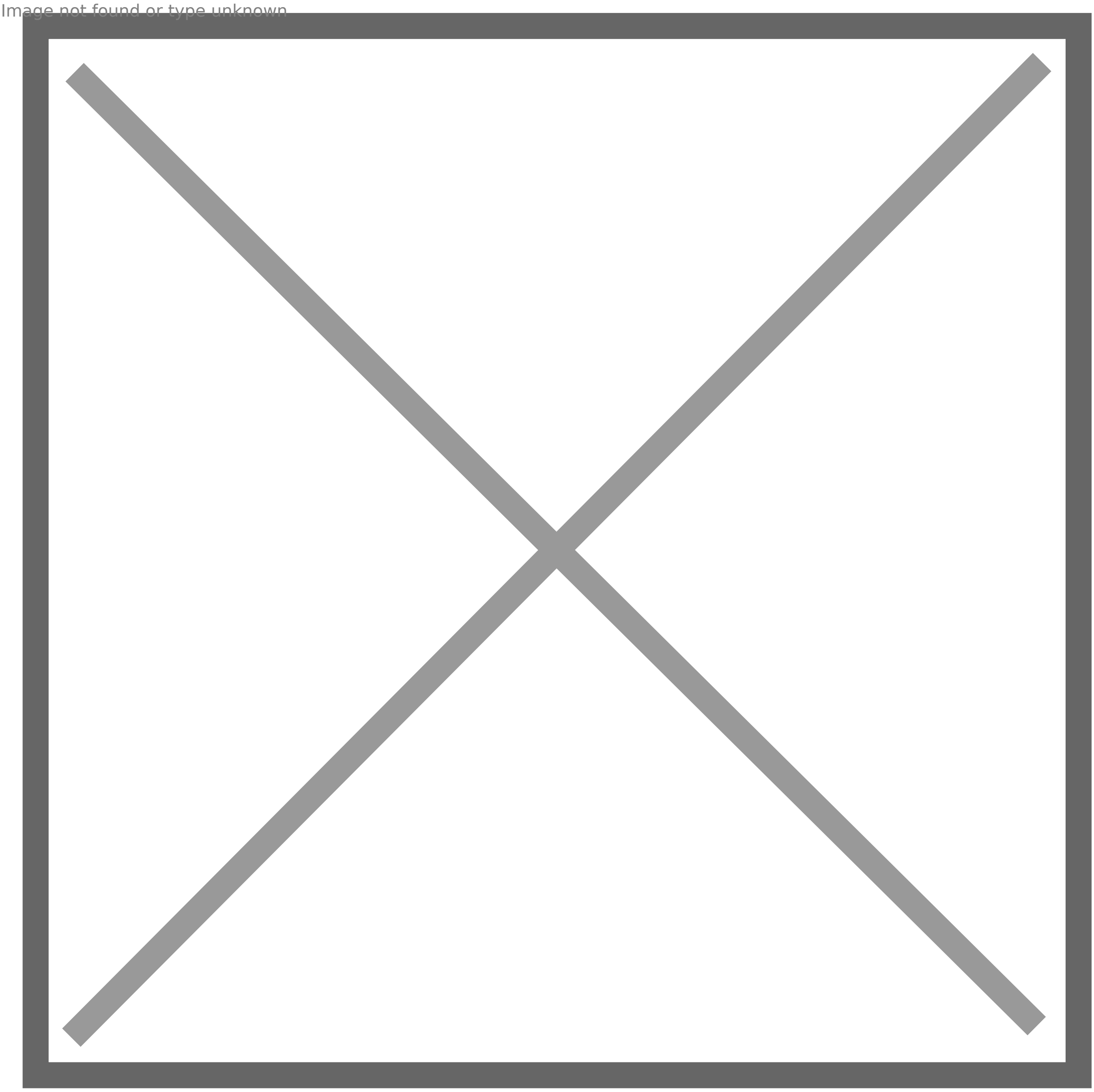


Create a Rule to Bypass OpenVPN Connections

If you have a need for certain IPs inside your LAN to bypass the OpenVPN connections and go through the WAN gateway like normally, you would simply create a LAN rule and place it **ABOVE** the **Allow LAN to any via VPN Only** rule we created above.

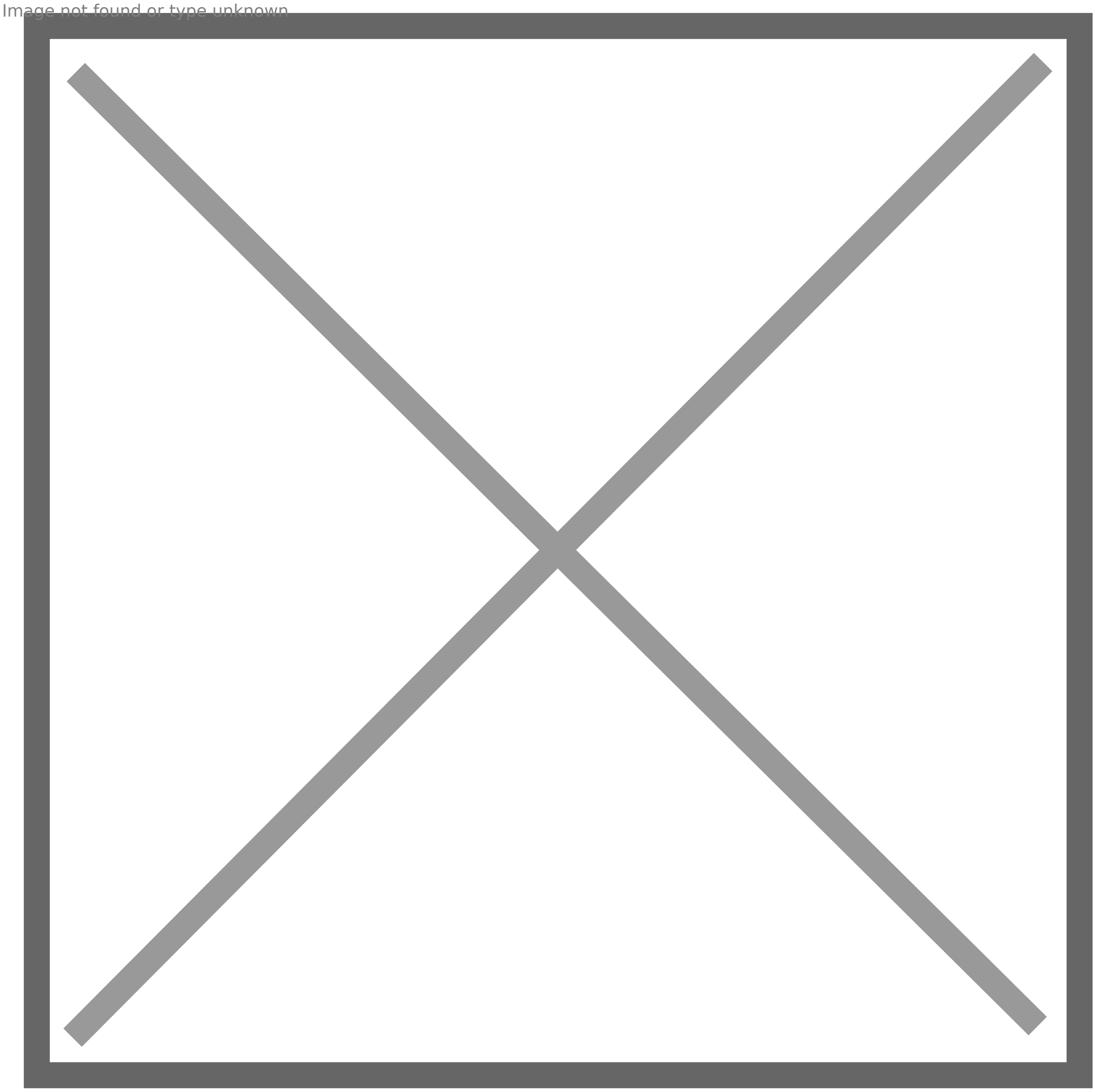
1. Navigate to **Firewall --> Aliases** and ensure **IP** tab is selected (**Figure 28**).

Figure 28



2. Click the **Add** button at the bottom of the page.
3. You will be re-directed to the **Firewall / Aliases / Edit** page.
4. Under the **Properties** section, in the **Name** field, enter a name for this alias (Ex: **Outbound_Direct_NO_VPN**). Ensure you take note of the alias name you assigned because we are going to use it in the LAN rule we will be creating below.
5. Under the **Properties section**, in the **Type** field, ensure **Host(s)** is selected (**Figure 29**).

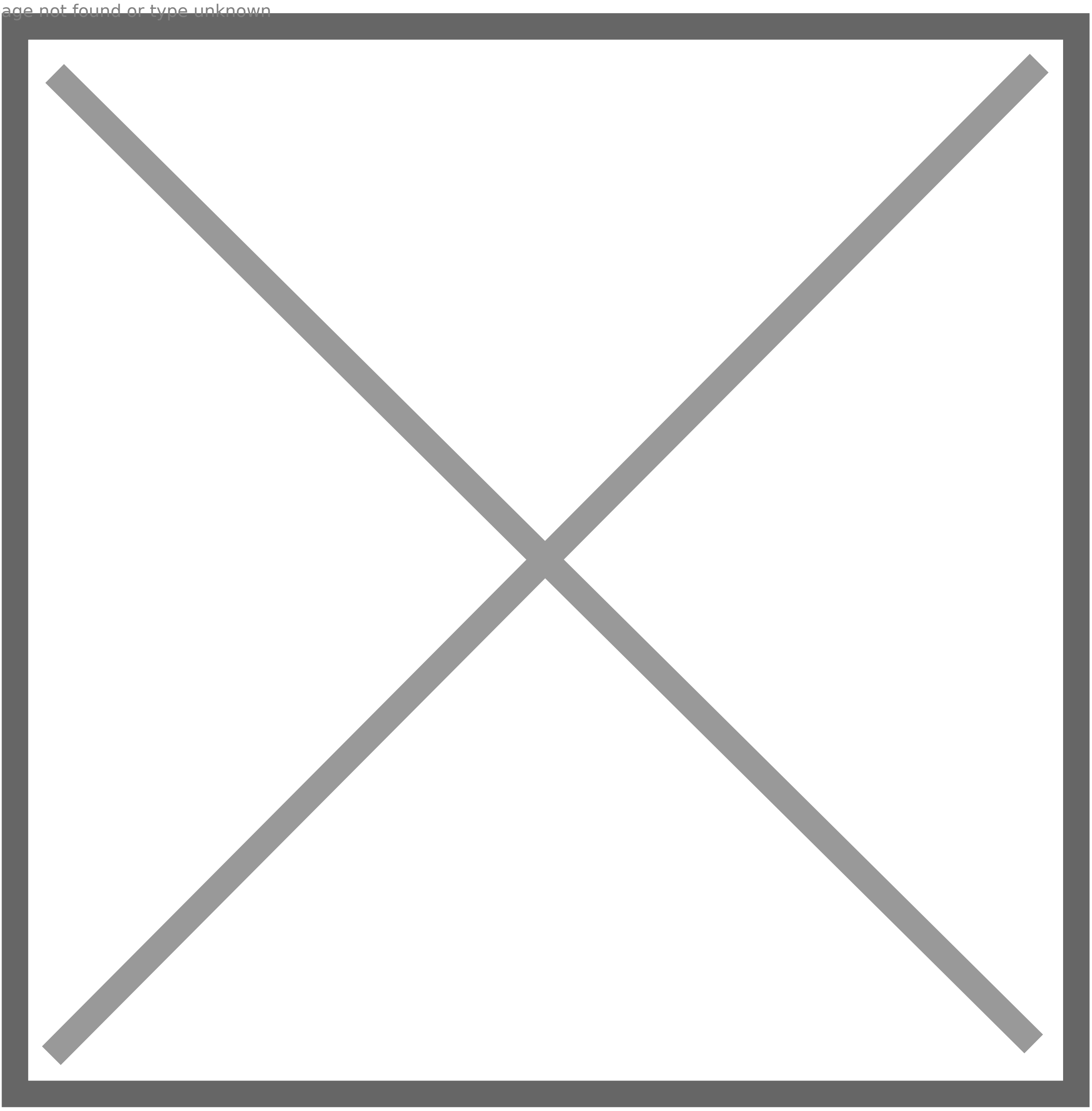
Figure 29



2. Under the **Host(s)** section, enter any LAN IPs (one per line) that you want to bypass the OpenVPN connections (You can add more lines by clicking the **Add Host** button at the bottom of the page).
3. When finished, click the **Save** button at the bottom of the page (**Figure 30**).

Figure 30

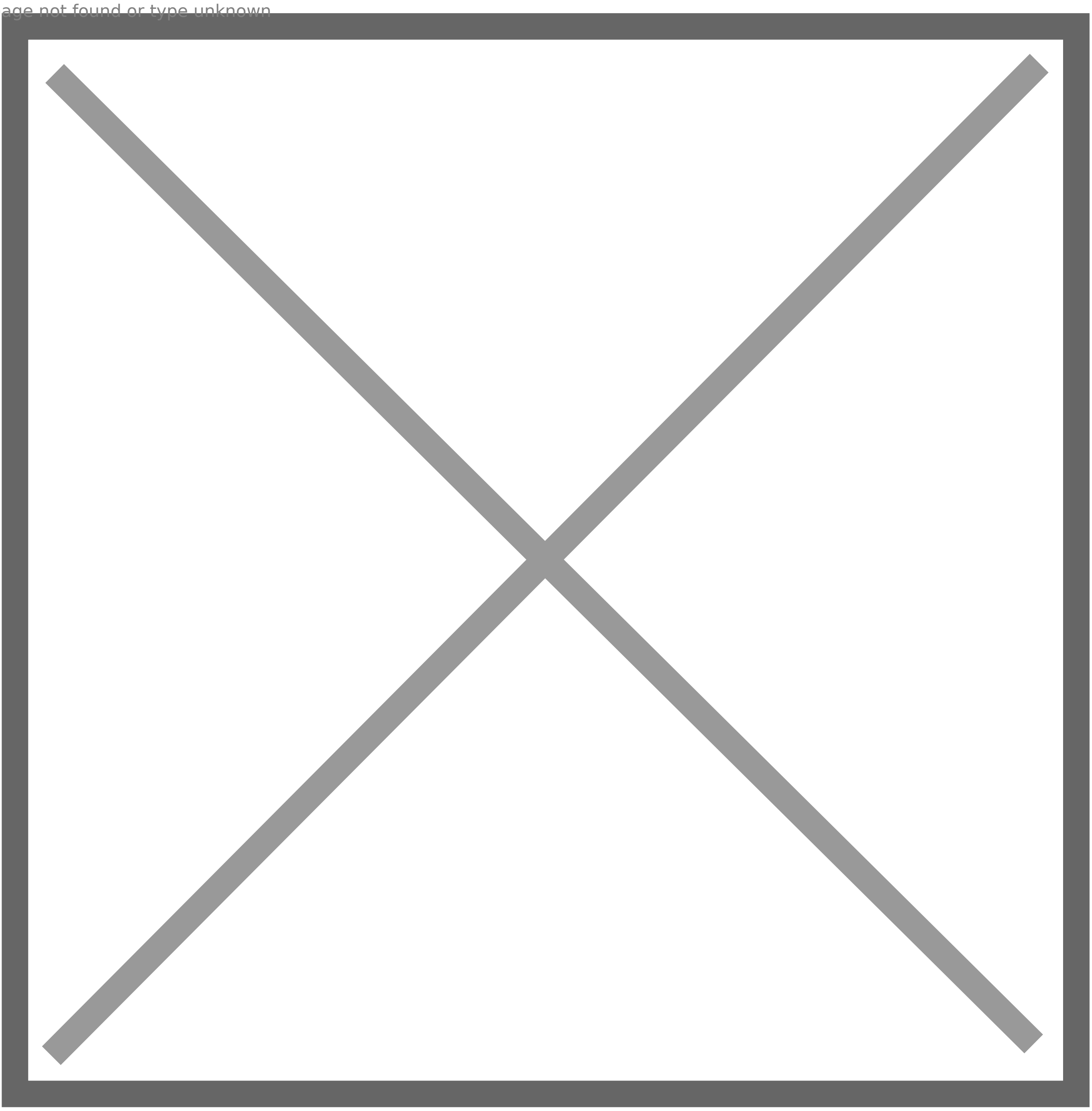
Image not found or type unknown



4. You will be re-directed back to the **Aliases IP** tab page.
5. Click on the **Apply Changes** button on the top of the page to apply the changes (**Figure 31**).

Figure 31

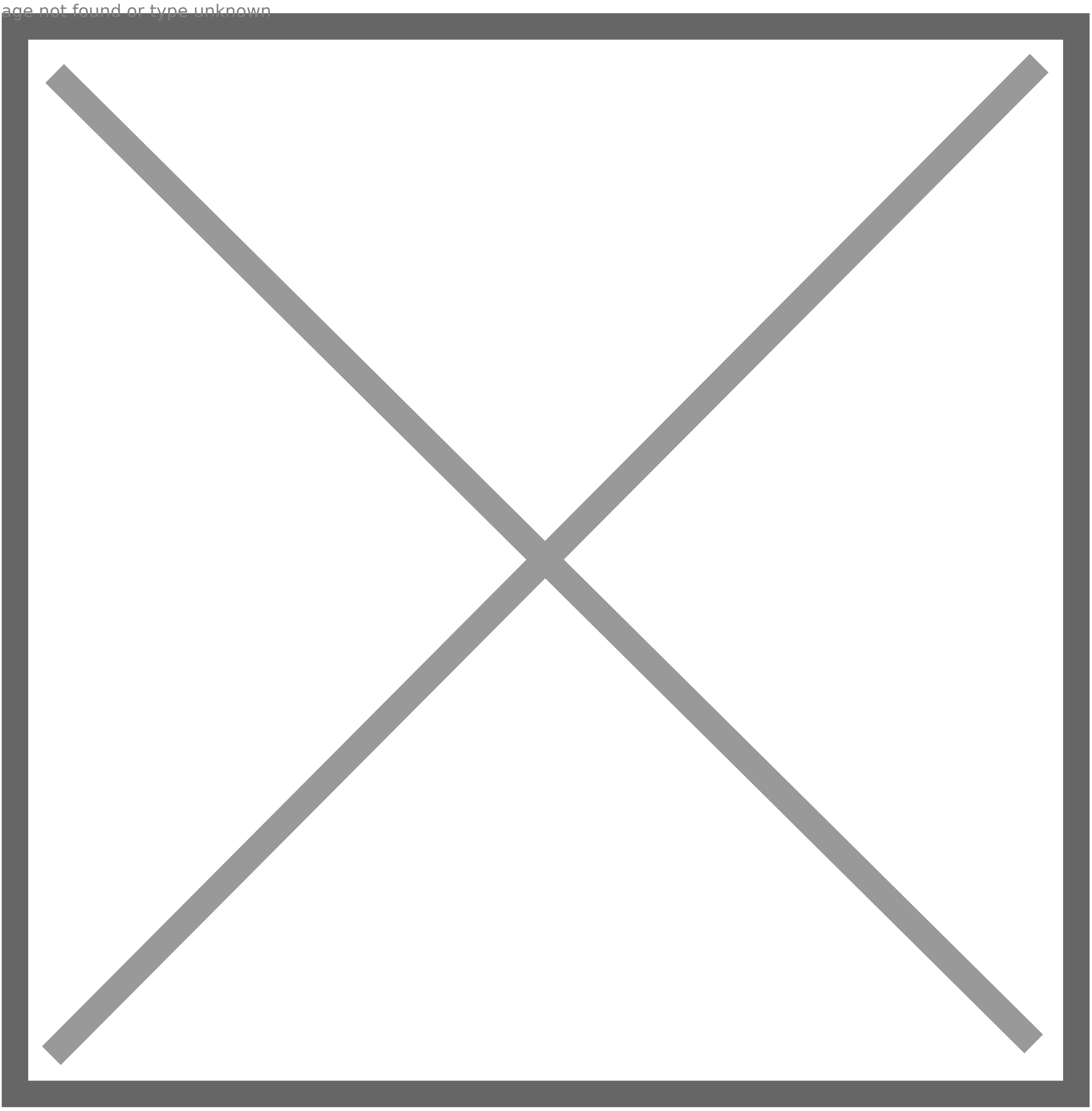
Image not found or type unknown



4. Next, navigate to **Firewall --> Rules** and ensure the **LAN** tab is selected. (**Figure 32**).

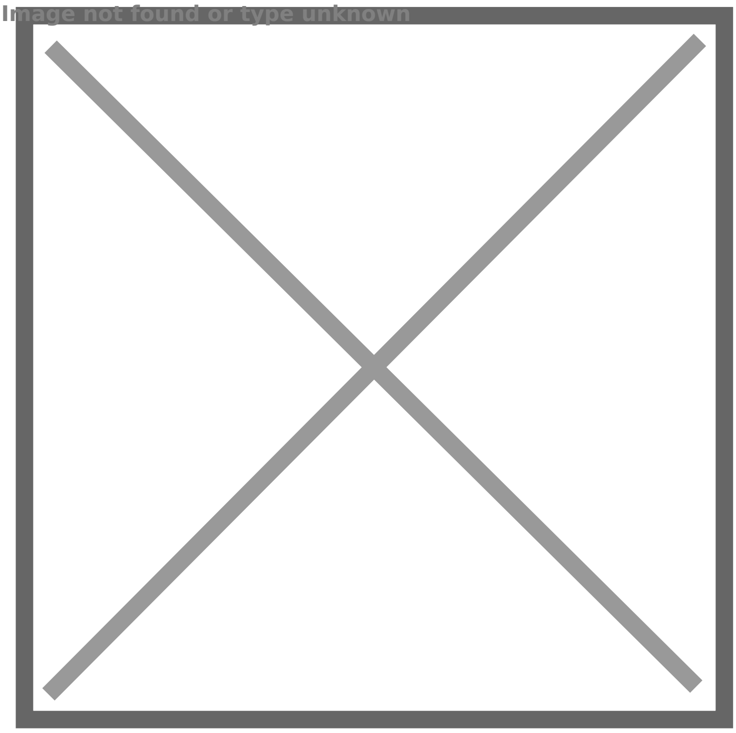
Figure 32

Image not found or type unknown



2. Click the Add button with the up arrow on the bottom of the page to add a rule to the top of the list (**Figure 33**).

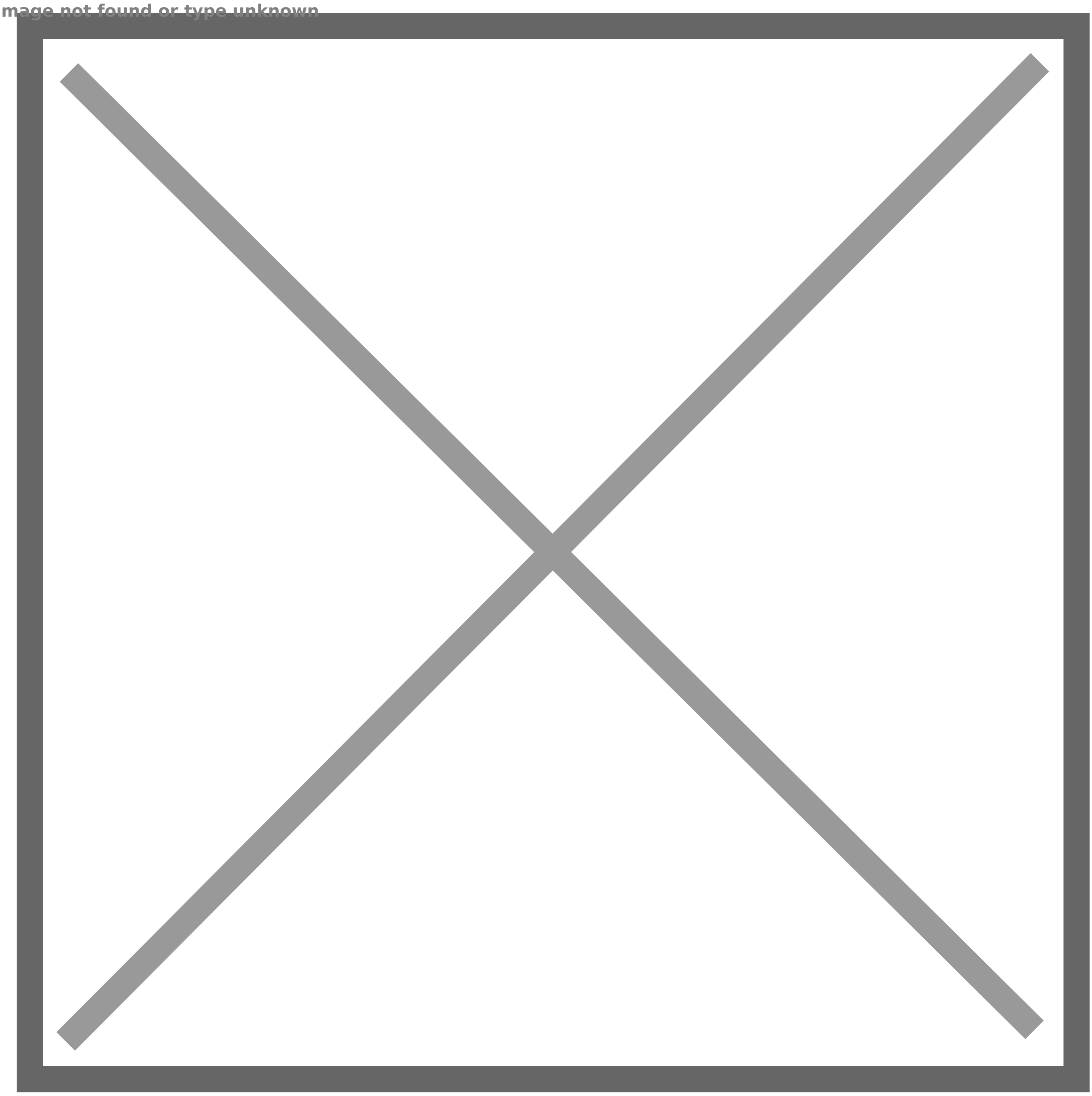
Figure 33



19. You will be re-directed to the **Edit firewall Rule** page.
20. In the **Action** field ensure **Pass** is selected.
21. In the **Disabled** field ensure **Disable this rule** is **Unchecked**.
22. In the **Interface** field ensure the **LAN** interface is selected.
23. In the **Address Family** ensure **IPv4** is selected.
24. In the **Protocol** field ensure **Any** is selected.
25. Uder the **Source** section, in the **Source** field, ensure **Single host or alias** is selected and then enter the name of the alias you created above (**Outbound_Direct_NO_VPN**).
26. Under the **Destination** section, in the **Destination** field, ensure **any** is selected (**Figure 34**).

Figure 34

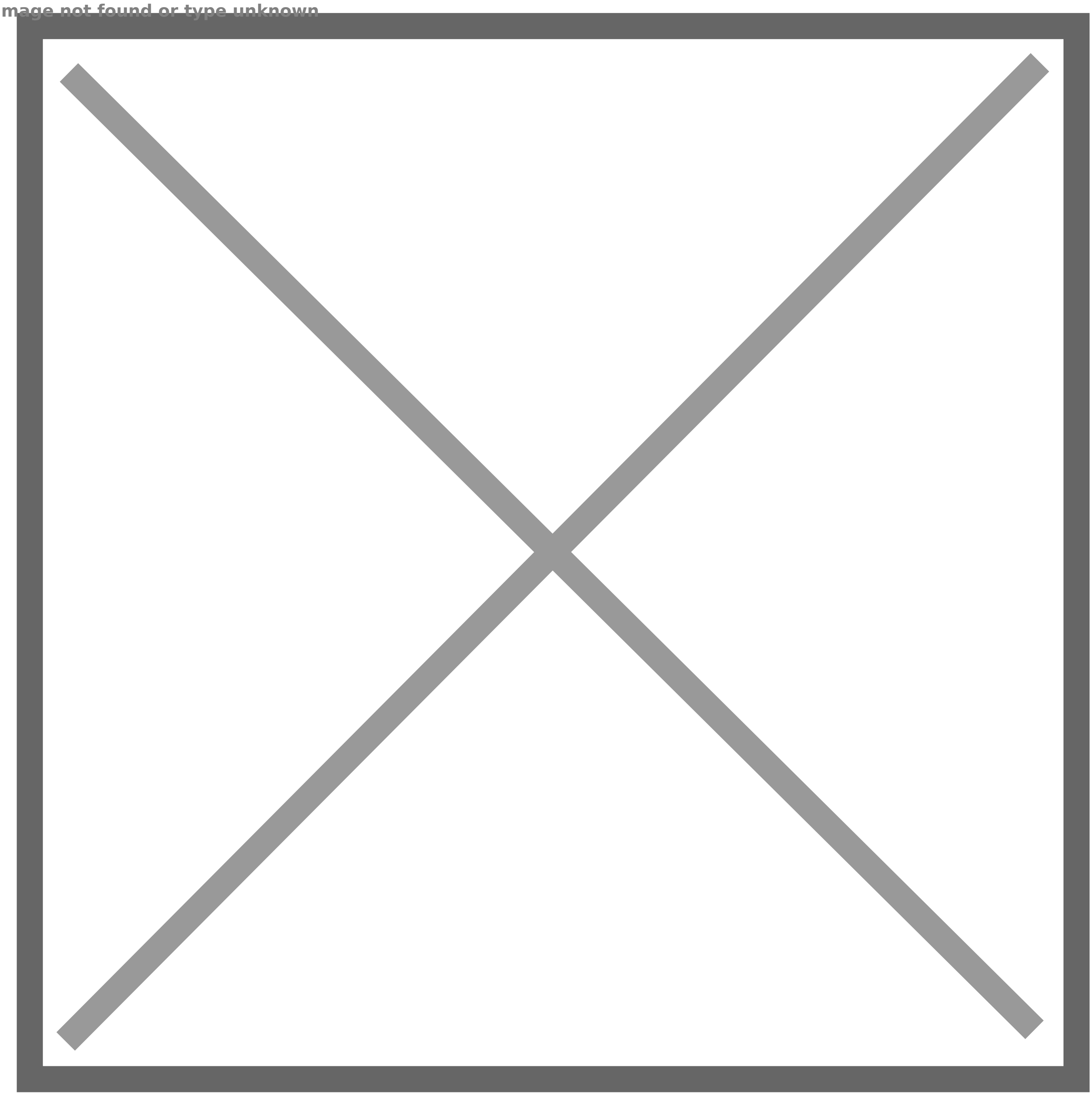
Image not found or type unknown



25. Under the **Extra Options** section, in the **Log** field, ensure **Log packets that are handled by this rule** is checked.
26. Under the **Extra Options** section, in the **Description** field, enter a description for this rule (Ex: Allow LAN to any rule NO VPN) (**Figure 35**).

Figure 35

Image not found or type unknown



27. Click the **Save** button at the bottom of the page.
28. You will be re-directed back to the **LAN** rules tab page.
29. Click on the **Apply Changes** button on the top of the page to apply the changes (**Figure 36**).

Figure 36

PfSense, HAProxy, SoftEther VPN

Introduction

This guide was written in order to assist in setting up HAProxy in PfSense in order to route SSL (443) traffic to either a SoftEther SSL VPN server or a webserver listening on port 443 based on SNI. In actuality, any SSL VPN server will suffice, however SoftEther VPN is the server of choice in this example.

Software Used

- PfSense Version 2.4.4
- HAProxy Version 17-1.7.11_1 for PfSense

Install HAProxy in Pfsense

1. In the PfSense Web GUI, click on **System --> Package Manager --> Available Packages**.
2. Locate the **haproxy** package, click on the **Install** button and wait for the installation to complete.
3. After **haproxy** succesfully installs, click on **Services --> HAProxy --> Backend**

Add SoftEther VPN Backend

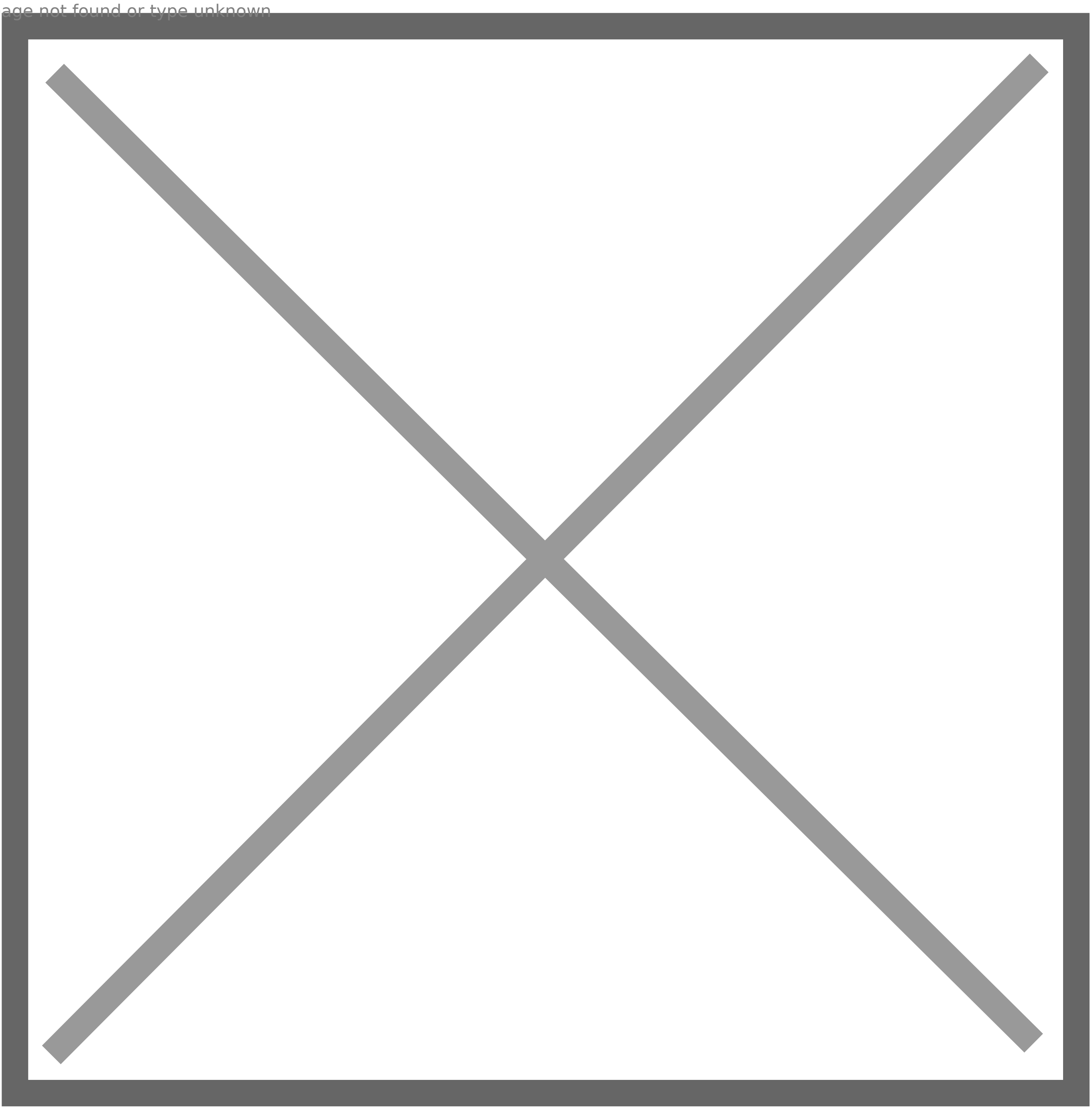
1. In the **Backend** tab, click the Add button.
2. In the **Edit HAProxy Backend server pool** page set the following:

- In the **Name** field, enter a name Ex: SoftEtherVPN.
- In the **Server list** section, click the down arror icon ☒ Image not found or type unknown to add a new server entry.
- In the **Mode** field ensure **active** is selected
- In the **Name** field enter a name Ex: SoftEtherVPN
- In the **Forwardto** field ensure **Address+Port** is selected
- In the **Address** field enter the IP address of your SoftEther VPN Server Ex: 192.168.0.100
- In the **Port** field enter **443**

- Ensure **Encrypt(SSL)** is **unchecked**
- Ensure **SSL checks** is **unchecked**
- Ensure **Weight** is empty
- Scroll down to the **Health checking** section and ensure **None** is selected in the **Health check method** field
- Click the **Save** button at the bottom of the page (**Figure 1**)

Figure 1

Image not found or type unknown



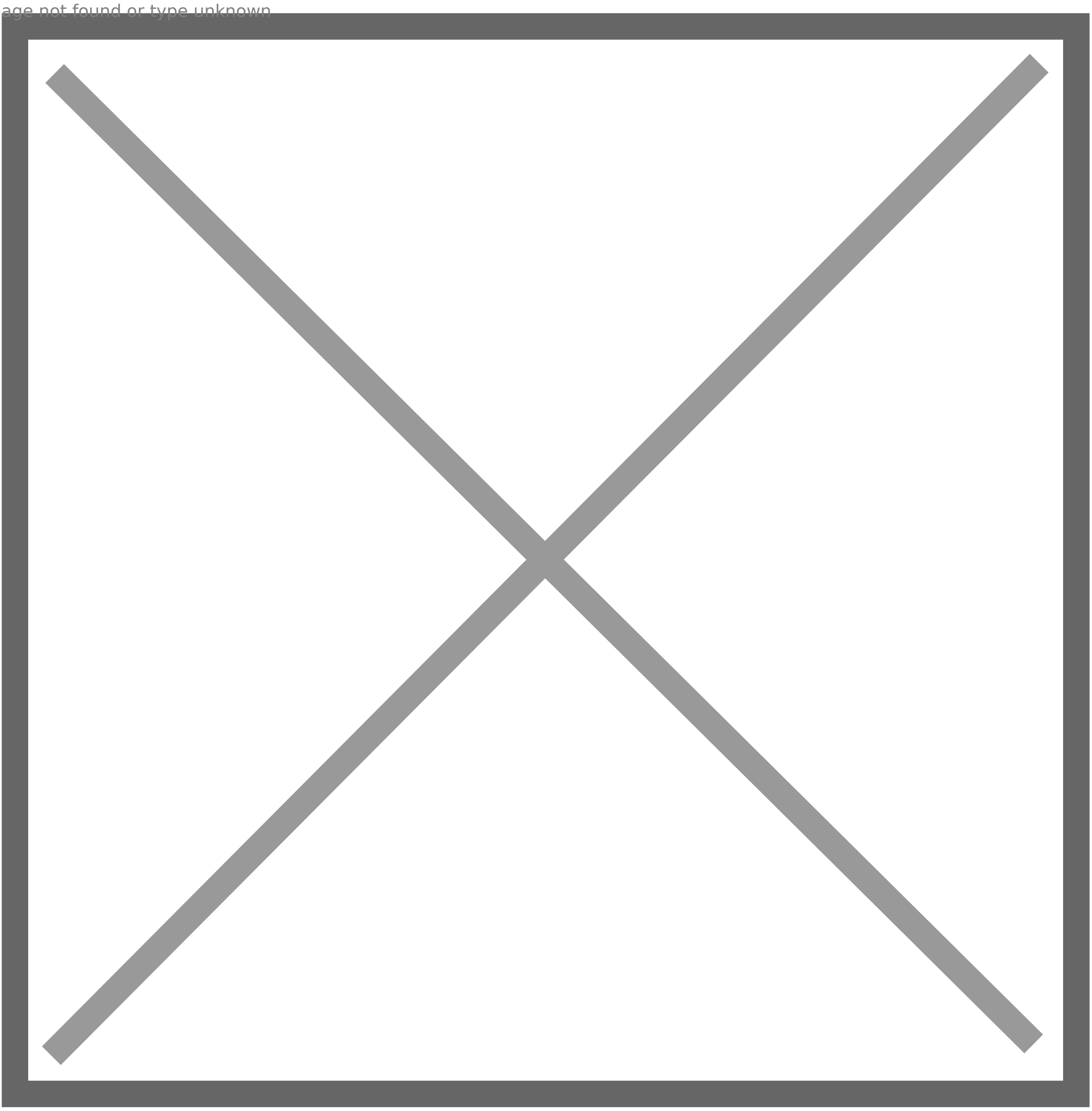
Add Webserver Backend

1. Back the **Backend** tab, click the Add button.
2. In the **Edit HAProxy Backend server pool** page set the following:

- In the **Name** field, enter a name Ex: Webserver.
- In the **Server list** section, click the down arrow icon ☒ Image not found or type unknown to add a new server entry.
- In the **Mode** field ensure **active** is selected
- In the **Name** field enter a name Ex: Webserver
- In the **Forwardto** field ensure **Address+Port** is selected
- In the **Address** field enter the IP address of your SoftEther VPN Server Ex: 192.168.0.200
- In the **Port** field enter **443**
- Ensure **Encrypt(SSL)** is **unchecked**
- Ensure **SSL checks** is **unchecked**
- Ensure **Weight** is empty
- Scroll down to the **Health checking** section and ensure **None** is selected in the **Health check method** field
- Click the **Save** button at the bottom of the page (**Figure 2**)

Figure 2

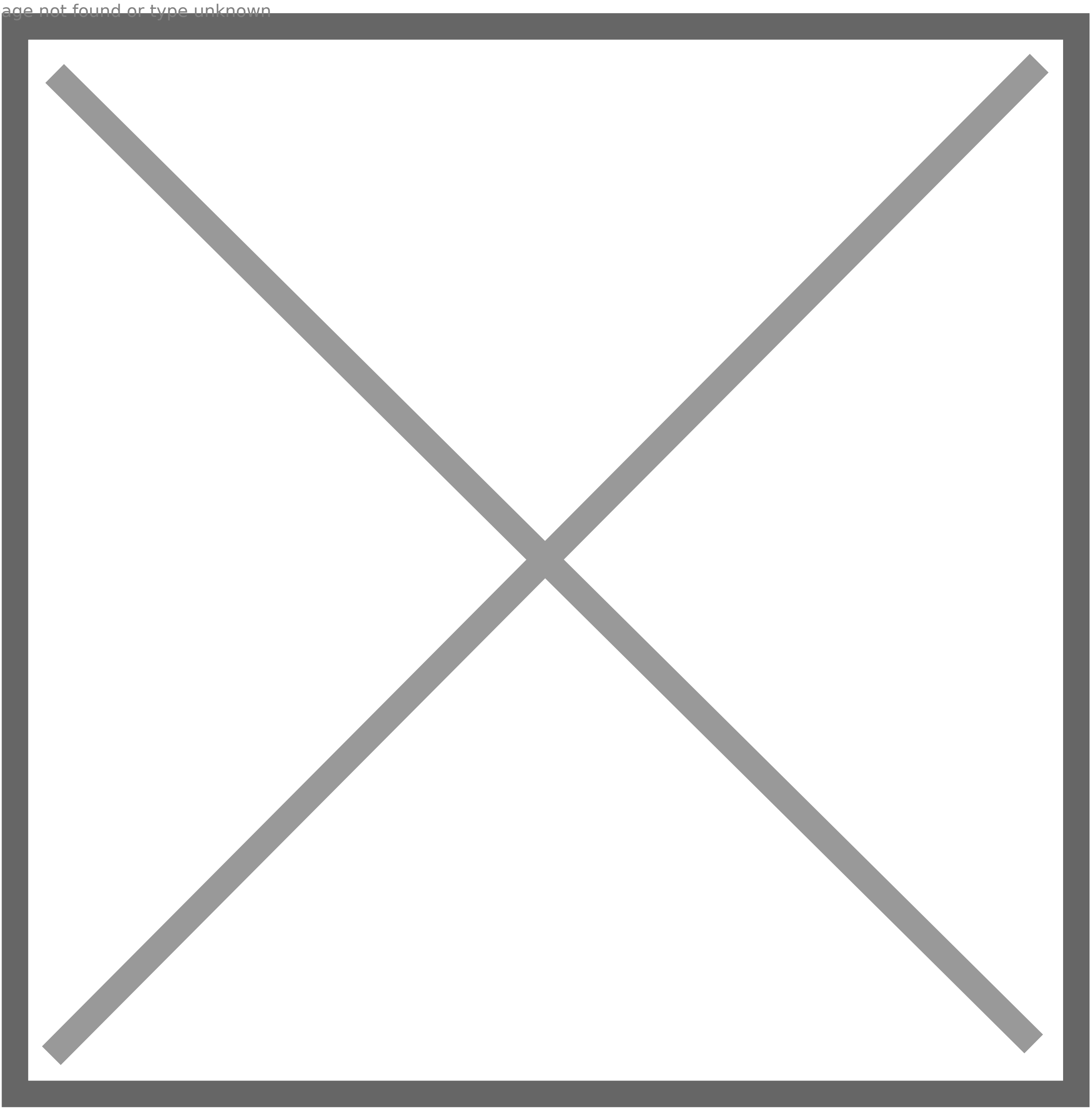
Image not found or type unknown



14. Back in the **Backend** tab, click on the **Apply Changes** button (**Figure 3**)

Figure 3

Image not found or type unknown



Add Frontend

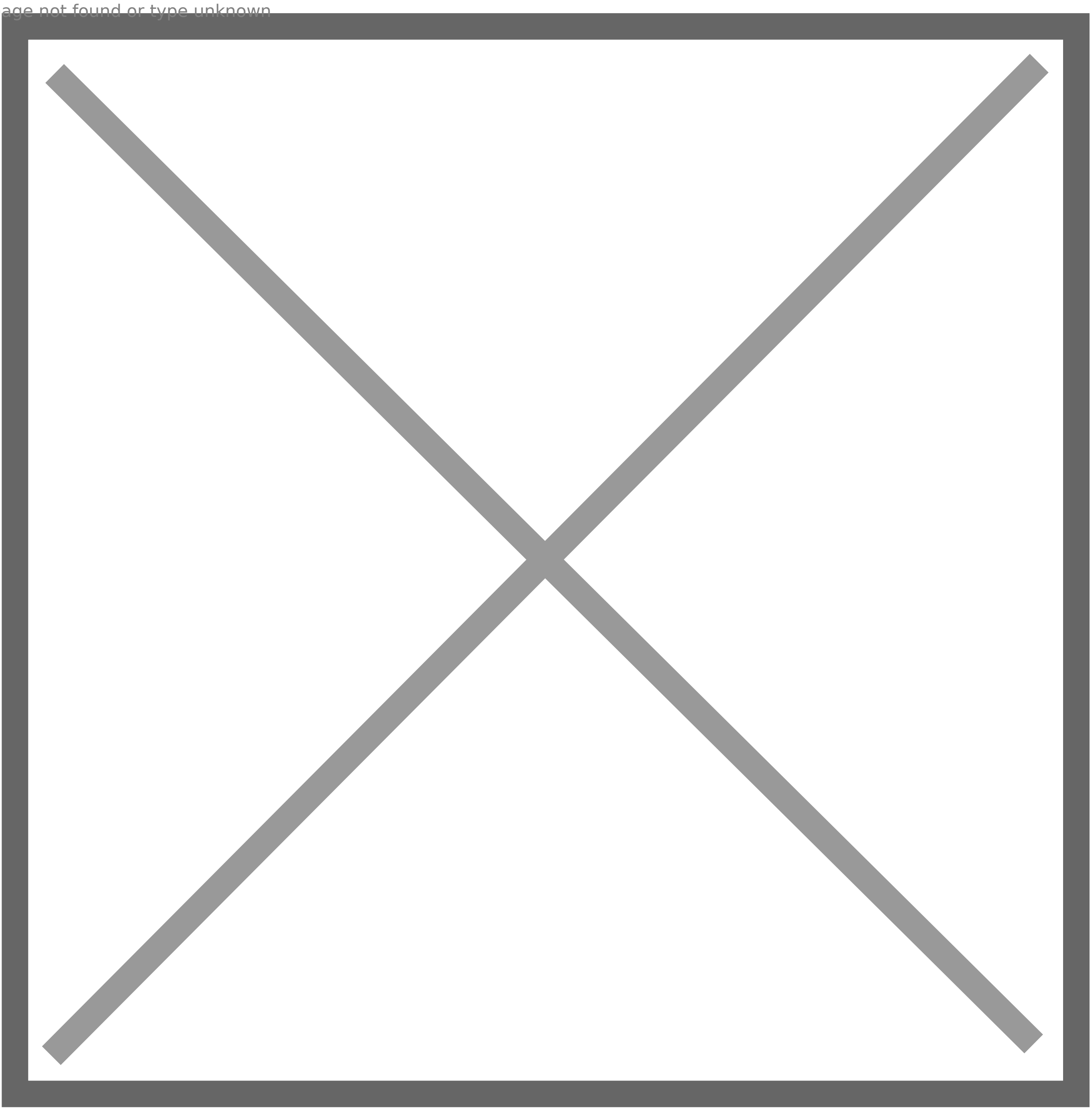
1. Click on **Services --> HAProxy --> Frontend**
2. Click the **Add** button
3. In the **Edit HAProxy Frontend** page set the following:

- In the **Name** field enter a friendlyname Ex: widgetsinc-frontend
- Ensure the **Status** field is set to **Active**
- Under the **External Address --> Table** section, ensure the **Listen Address** field is set to **WAN address (IPv4)**
- Ensure the **Type** field is set to **ssl /https(TCP mode)**

- Under the **External Address --> Table** section, ensure the **Port** field is set to **443**
- Under the **External Address --> Table** section, ensure the **SSL Offloading** field is **unchecked**
- Under the **External Address --> Table** section, ensure the **Advanced** field is **empty**
- Under the **Type** section, ensure **ssl/https(TCP mode)** is selected
- Under the **Default backend, access control lists and actions --> Access Control lists** section, click the down arrow icon ☒ Image not found or type unknown to add an ACL entry for the SoftEther VPN Server
- In the **Name** field enter a name for this ACL Ex: SoftetherACL
- In the **Expression** field ensure **Server Name Indication TLS extension matches** is selected
- Ensure the **CS** field is unchecked
- Ensure the **Not** field is unchecked
- In the **Value** field, enter the FQDN to reach your SoftEther VPN server Ex: vpn.domain.tld
- Again, click the down arrow icon ☒ Image not found or type unknown to add an ACL entry for the Webserver
- In the **Name** field enter a name for this ACL Ex: WebserverACL
- In the **Expression** field ensure **Server Name Indication TLS extension matches** is selected
- Ensure the **CS** field is unchecked
- Ensure the **Not** field is unchecked
- In the **Value** field, enter the FQDN to reach your Webserver Ex: www.domain.tld
- Under the **Default backend, access control lists and actions --> Actions** section, click the down arrow icon ☒ Image not found or type unknown to add an action for the SoftEther VPN ACL we created above
- In the **Action** field, ensure **Use Backend** is selected and ensure the SoftetherVPN backend we created earlier is selected
- In the **Condition acl names** field, enter the ACL name you set for the Softether ACL Ex: SoftetherACL
- Again, click the down arrow icon ☒ Image not found or type unknown to add an action for the Webserver ACL we created above
- In the **Action** field, ensure **Use Backend** is selected and ensure the Webserver backend we created earlier is selected
- In the **Condition acl names** field, enter the ACL name you set for the Webserver ACL Ex: WebserverACL (**Figure 4**)

Figure 4

Image not found or type unknown

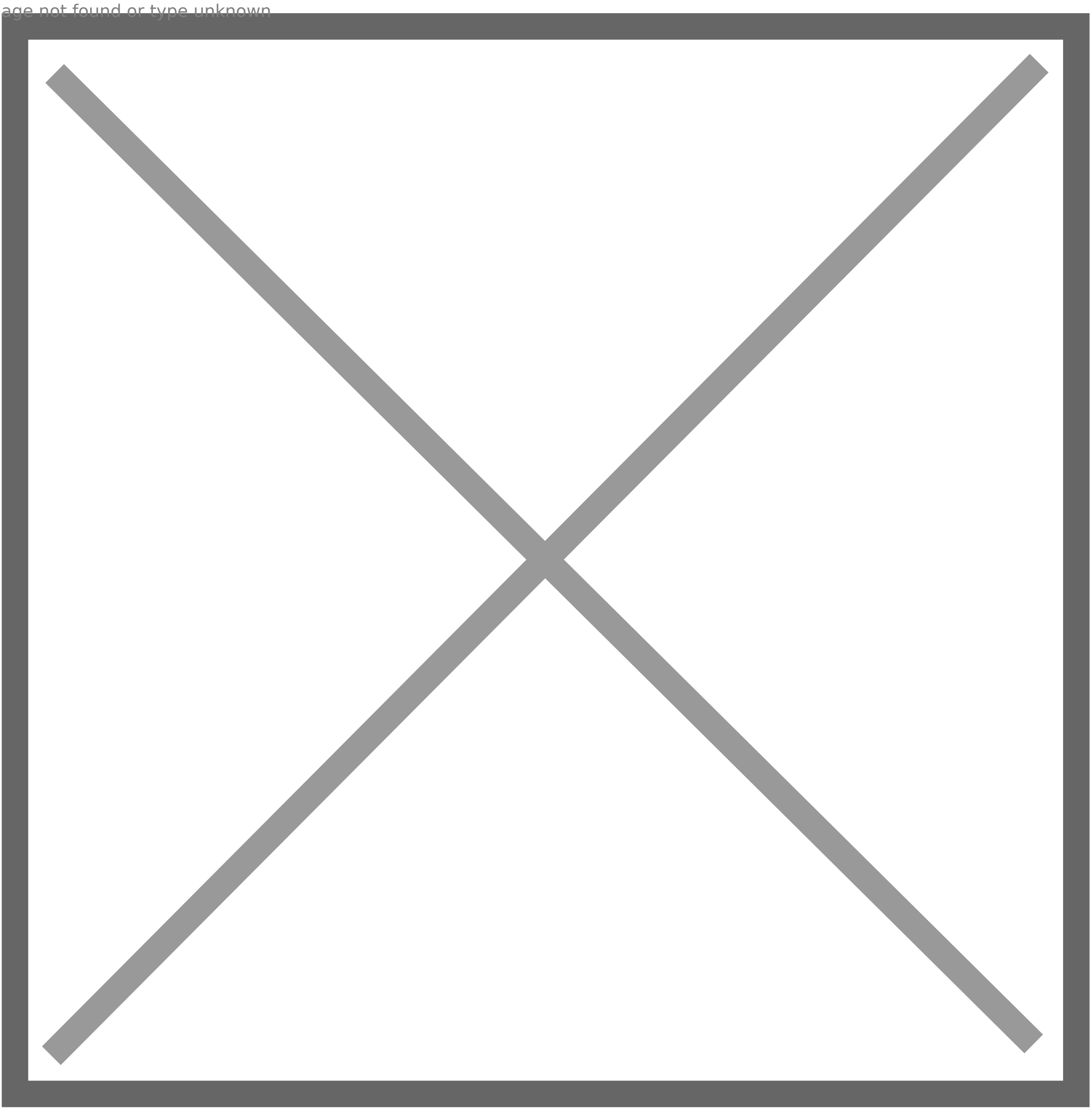


Enable HAProxy

1. Click on **Services --> HAProxy --> Settings**
2. Under **General Settings --> Enable HAProxy** field is checked
3. In the **General Settings --> Maximum Connections** field, enter the number of connections per process Ex: 1000
4. Click the **Save** button on the bottom of the page (**Figure 5**)

Figure 5

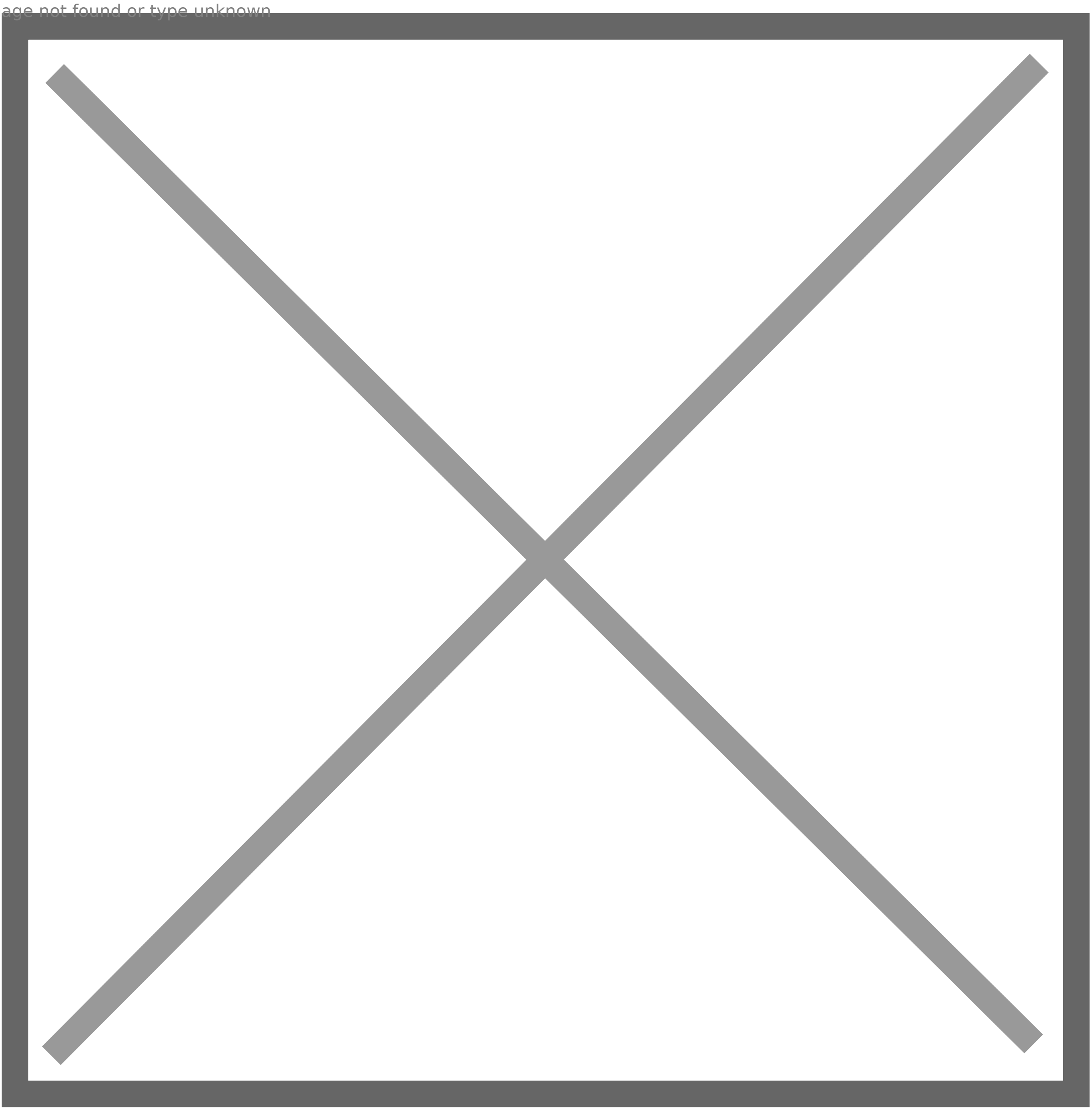
Image not found or type unknown



5. Back in the **Settings** tab, click on the **Apply Changes** button (**Figure 6**)

Figure 6

Image not found or type unknown



Add Firewall Rule

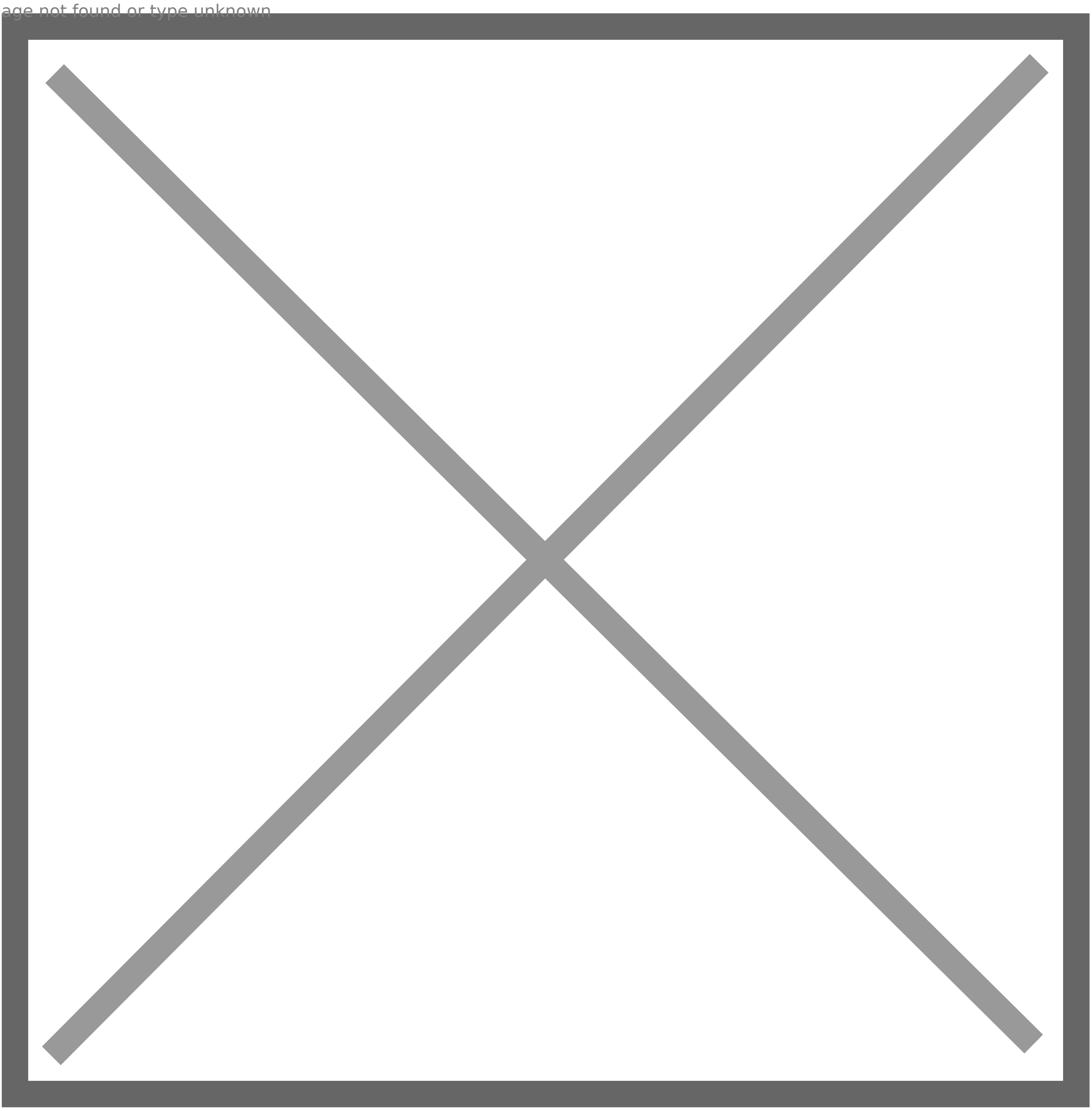
1. Click on **Firewall --> Rules**
2. Click the **Add** button
3. n the **Edit Firewall Rule** page set the following:

- Ensure the **Interface** field is set to **WAN**
- Ensure the **Address Family** field is set to **IPv4**
- Ensure the **Protocol** field is set to **TCP**
- Under the **Source** section, ensure **Source** field is set to **any**
- Under the **Destination** section, ensure **Destination** is set to **WAN address**

- Under the **Destination** section, ensure **Destination Port Range From** is set to **HTTPS (443)** and **To** is set **HTTPS (443)**
- Under **Extra Options** section, set the **Description** field
- Click the **Save** button at the bottom of the page (**Figure 7**)

Figure 7

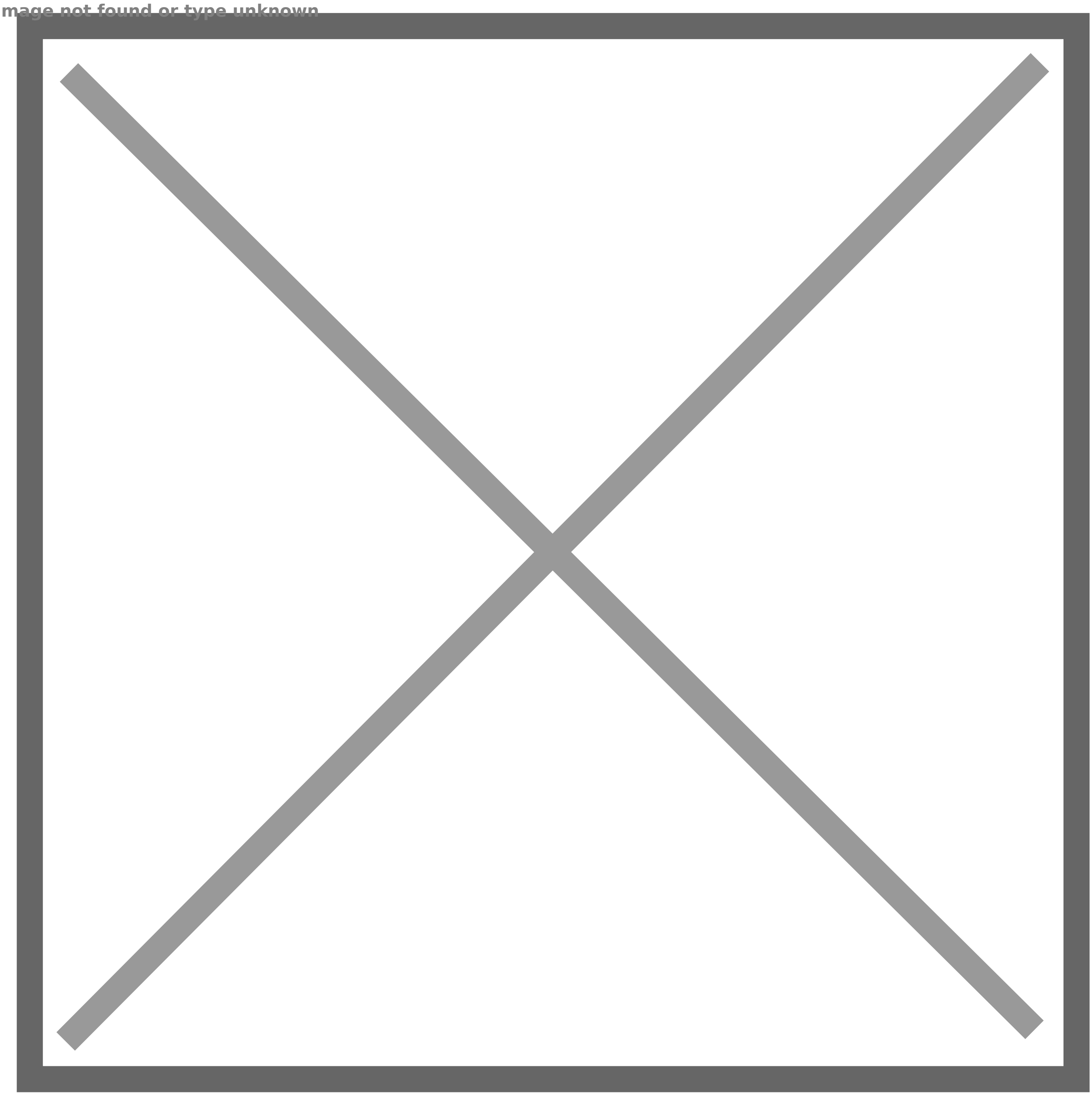
Image not found or type unknown



4. Back in the **Firewall/ Rules / Wan** tab, click on the **Apply Changes** button (**Figure 8**)

Figure 8

Image not found or type unknown



Install Service Watchdog in PfSense

This setup has the potential to expose the PfSense Web GUI to the Internet if the HAProxy service ever fails. In order to mitigate this issue, it's a good idea to install the Service Watchdog package in PfSense so that it can monitor the HAProxy service and start it automatically if it ever fails.

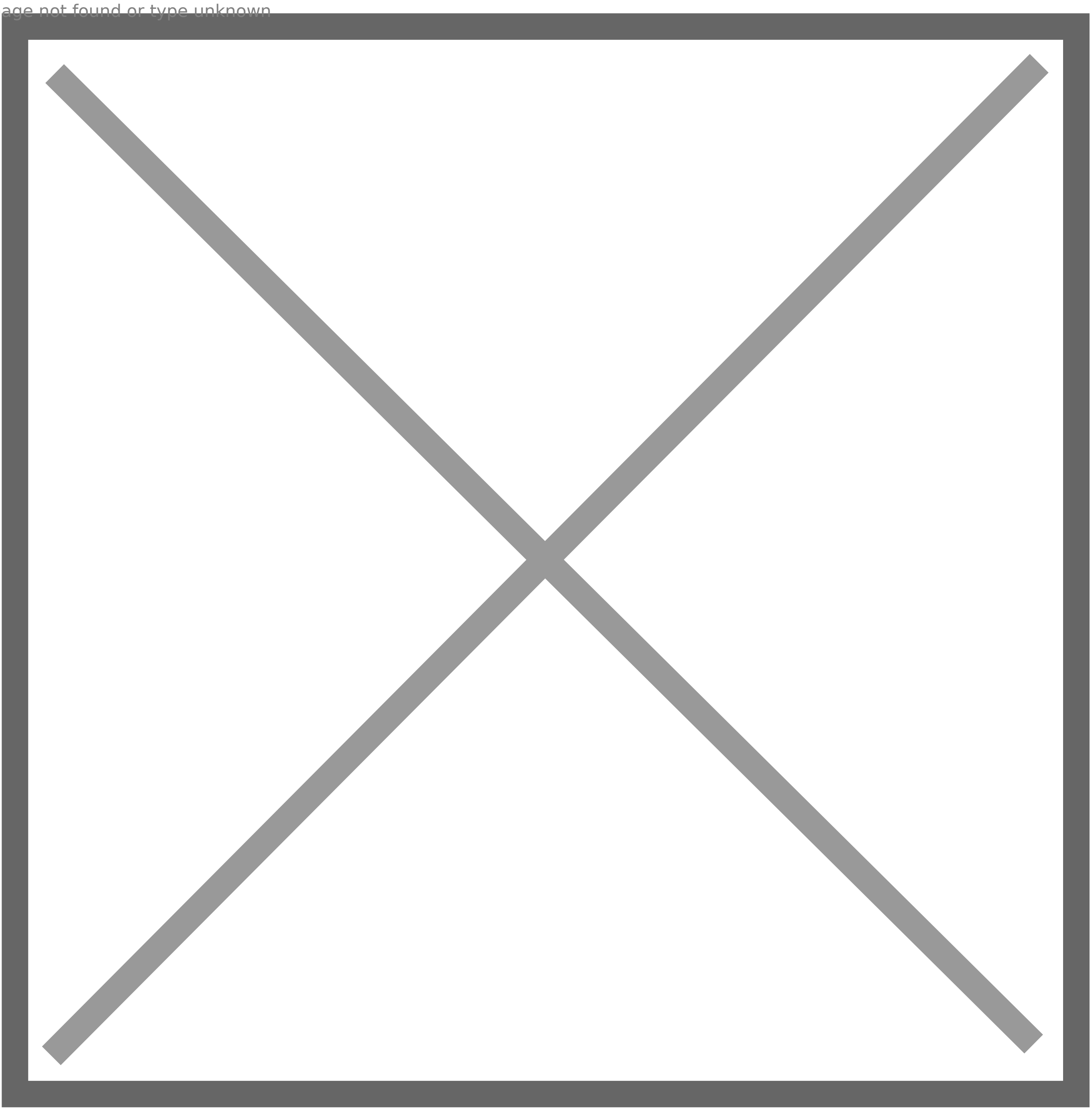
Alternatively, you can change the PfSense Web GUI to another port other than 443.

1. In the PfSense Web GUI, click on **System --> Package Manager --> Available Packages**.
2. Locate the **Service_Watchdog** package, click on the **Install** button and wait for the installation to complete.

3. After **Service_Watchdog** succesfully installs, click on **Services --> Service Watchdog**
4. Click on the **Add New Service** button
5. In the A**dd Service to Monitor** page, in the **Service to Add** field, select **haproxy: TCP/HTTP(S) Load Balancer** from the drop-down and click the **Add** button (**Figure 9**)

Figure 9

Image not found or type unknown



If you are NOT using HAProxy on PfSense

If you are trying to implement HAProxy standalone i.e. not part of PfSense, below is the configuration generated by the PfSense package. Hopefully it will assist someone in their own

HAProxy implementation. Ensure you change **widgetsinc-frontend**, **PUBLIC_IP_ADDRESS**, **vpn.domain.tld** and **www.domain.tld** to fit your needs.

```
global
    maxconn            1000
    stats socket /tmp/haproxy.socket level admin
    uid            80
    gid            80
    nbproc            1
    hard-stop-after        15m
    chroot                /tmp/haproxy_chroot
    daemon
    server-state-file /tmp/haproxy_server_state
frontend widgetsinc-frontend
    bind            PUBLIC_IP_ADDRESS:443 name PUBLIC_IP_ADDRESS:443
    mode            tcp
    log            global
    timeout client        30000
    tcp-request inspect-delay    5s
    acl            SoftetherACL    req.ssl_sni -i vpn.domain.tld
    acl            WebserverACL    req.ssl_sni -i www.domain.tld
    tcp-request content accept if { req.ssl_hello_type 1 }
    use_backend SoftetherVPN_ipvANY  if  SoftetherACL
    use_backend Webserver_ipvANY  if  WebserverACL
backend SoftetherVPN_ipvANY
    mode            tcp
    id            100
    log            global
    timeout connect        30000
    timeout server        30000
    retries            3
    server            SoftEtherVPN 192.168.0.100:443 id 101
backend Webserver_ipvANY
    mode            tcp
    id            102
    log            global
    timeout connect        30000
    timeout server        30000
    retries            3
```

server	Webserver 192.168.0.200:443 id 103/

Setup WireGuard Site to Site VPN Tunnel on pfsense 2.7.2

> This guide was inspired by Marcus Rath

Introduction

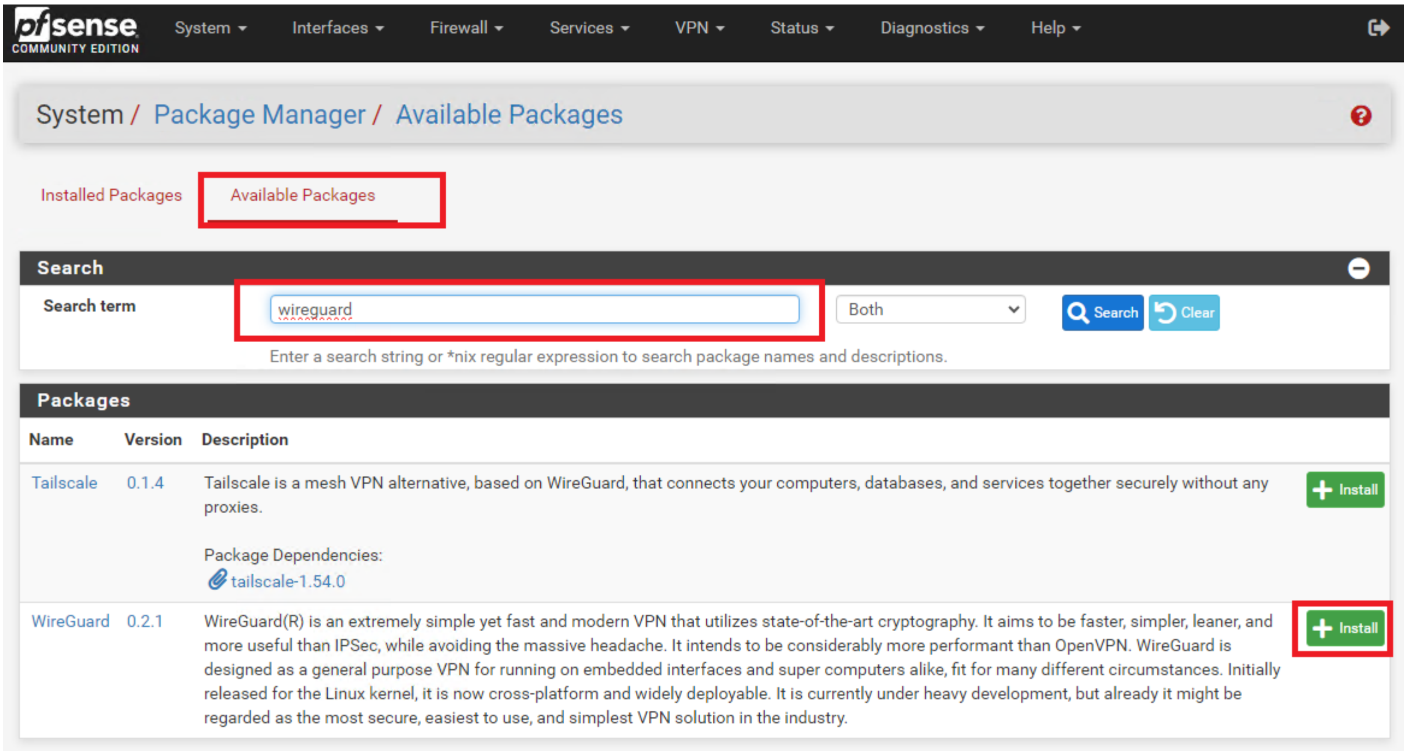
This guide will walk you through setting up a WireGuard site to site VPN tunnel on pfsense 2.7.2. For this guide we assume **Site A** with a **network subnet of 192.168.1.0/24**, **Site B with a network subnet of 192.168.24.0/24** and a **Tunnel Subnet of 10.10.12.0/30**. Obviously adjust these settings to your specific needs.

> Ensure that the **Tunnel Subnet** you choose does NOT overlap with any other network subnets currently in use in your network environment.

Install WireGuard Package on Both Sites

On **BOTH** site pfsense installations, install the **WireGuard package from System ---> Package Manager ---> Available Package**s. Enter **Wireguar**d in the **Search term** field, click search and then click on the **Install** button next to WireGuard package (**Figure 1**).

Figure 1



System / Package Manager / Available Packages

Search

Search term: wireguard — Both

Enter a search string or *nix regular expression to search package names and descriptions.

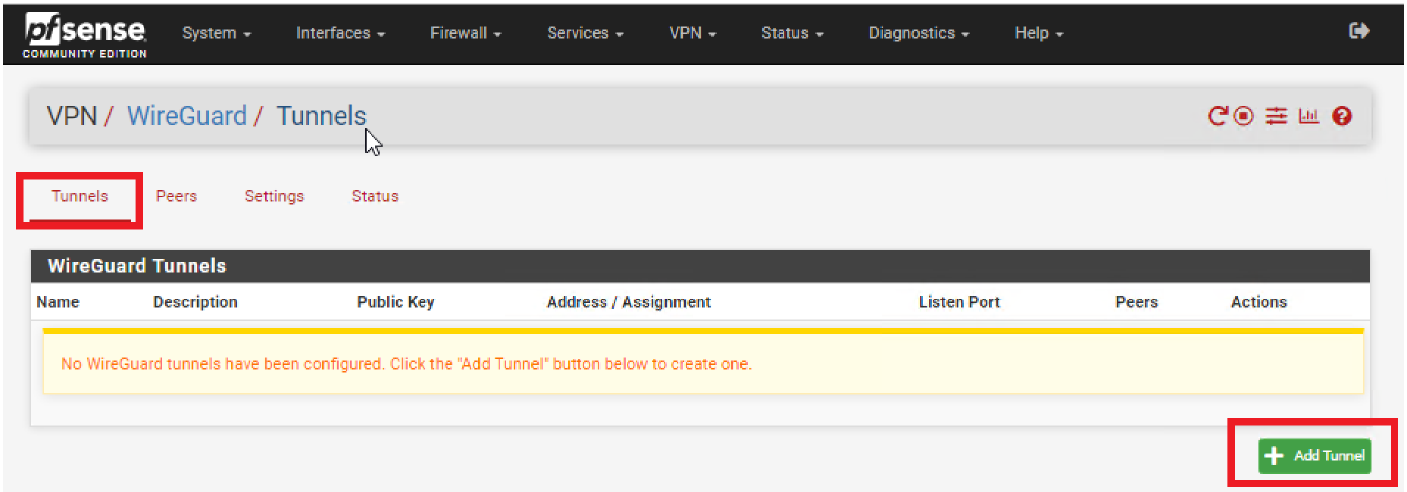
Packages

Name	Version	Description
Tailscale	0.1.4	Tailscale is a mesh VPN alternative, based on WireGuard, that connects your computers, databases, and services together securely without any proxies. Package Dependencies: tailscale-1.54.0
WireGuard	0.2.1	WireGuard(R) is an extremely simple yet fast and modern VPN that utilizes state-of-the-art cryptography. It aims to be faster, simpler, leaner, and more useful than IPSec, while avoiding the massive headache. It intends to be considerably more performant than OpenVPN. WireGuard is designed as a general purpose VPN for running on embedded interfaces and super computers alike, fit for many different circumstances. Initially released for the Linux kernel, it is now cross-platform and widely deployable. It is currently under heavy development, but already it might be regarded as the most secure, easiest to use, and simplest VPN solution in the industry.

Create Tunnel on Site A

On **Site A**, refresh the pfsense web GUI and navigate to **VPN ---> Wireguard,** click on the **Tunnels** tab and then click on **Add Tunnel** button (**Figure 2**).

Figure 2



VPN / WireGuard / Tunnels

WireGuard Tunnels

Name	Description	Public Key	Address / Assignment	Listen Port	Peers	Actions

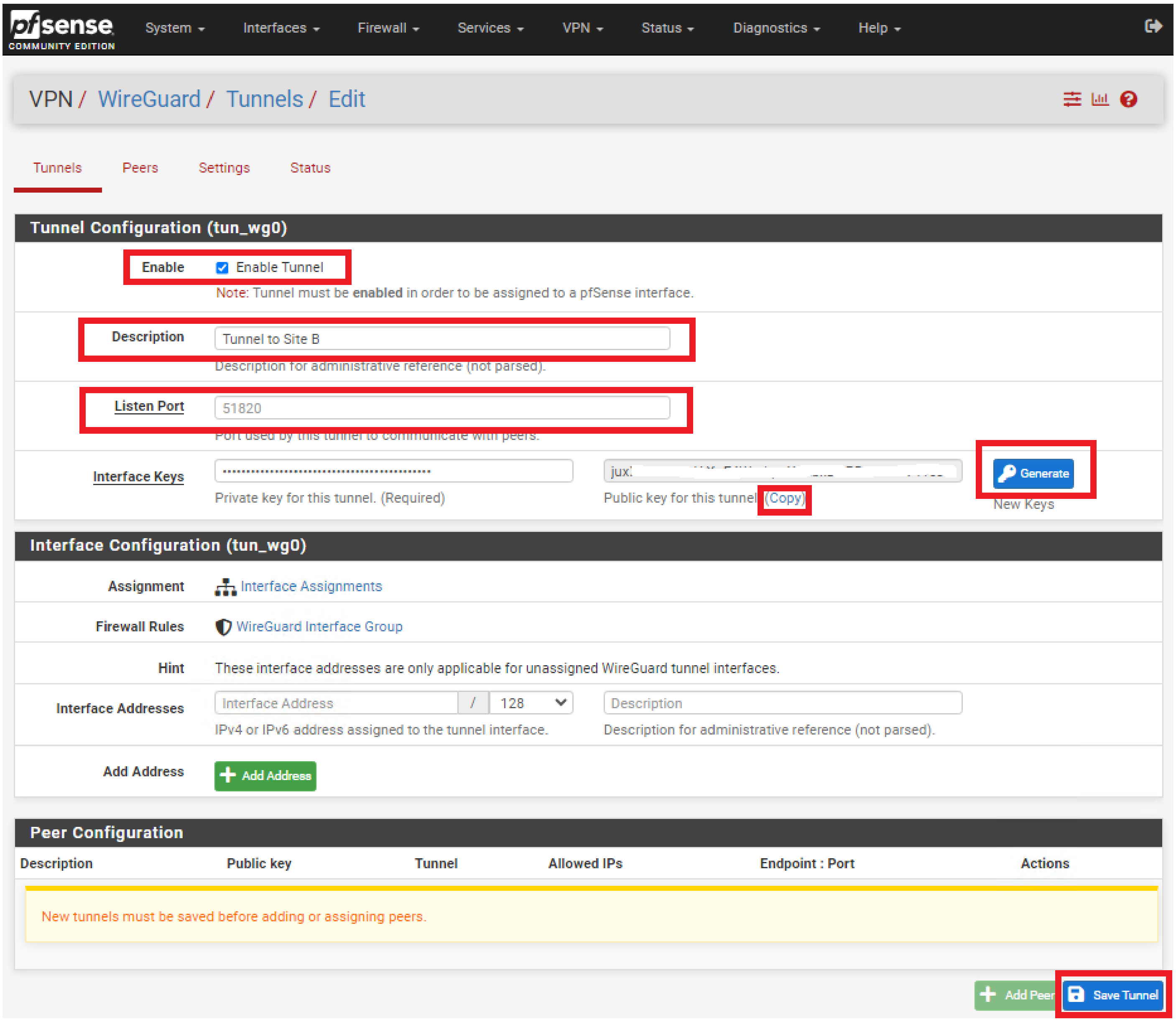
No WireGuard tunnels have been configured. Click the "Add Tunnel" button below to create one.

In the **Tunnel Configuration** fill/set in the following fields (**Figure 3**):

- **Enable:** Checked
- **Description:** Optionally, describe the purpose of this tunnel (Ex: Tunnel to Site B)
- **Listen Port:** Leave blank to use port UDP/51820 or enter a specific port number you with to use

- **Interface Keys:** click the **Generate** button to create a new Private/Public key pair and copy the **Public Key** that's generated in order to enter it in the Public Key field on Site B.
- Click the **Save Tunnel** button

Figure 3



Tunnel Configuration (tun_wg0)

Enable ☑ Enable Tunnel

Note: Tunnel must be **enabled** in order to be assigned to a pfSense interface.

Description: Tunnel to Site B

Description for administrative reference (not parsed).

Listen Port: 51820

Port used by this tunnel to communicate with peers.

Interface Keys: •• jux[redacted]

Private key for this tunnel. (Required)

Public key for this tunnel (Copy)

Generate

New Keys

Interface Configuration (tun_wg0)

Assignment: Interface Assignments

Firewall Rules: WireGuard Interface Group

Hint: These interface addresses are only applicable for unassigned WireGuard tunnel interfaces.

Interface Addresses: Interface Address / 128 Description

IPv4 or IPv6 address assigned to the tunnel interface.

Description for administrative reference (not parsed).

Add Address: Add Address

Peer Configuration

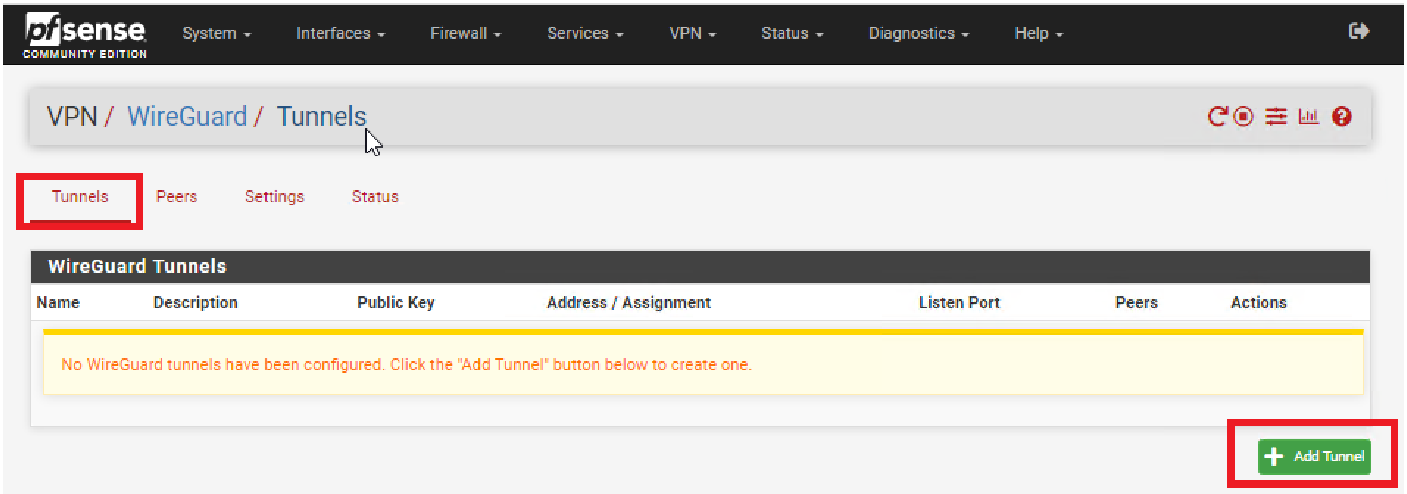
Description	Public key	Tunnel	Allowed IPs	Endpoint : Port	Actions

New tunnels must be saved before adding or assigning peers.

Create Tunnel on Site B

On **Site B**, refresh the pfsense web GUI and navigate to **VPN ---> Wireguard,** click on the **Tunnels** tab and then click on **Add Tunnel** button (**Figure 4**).

Figure 4



WireGuard Tunnels

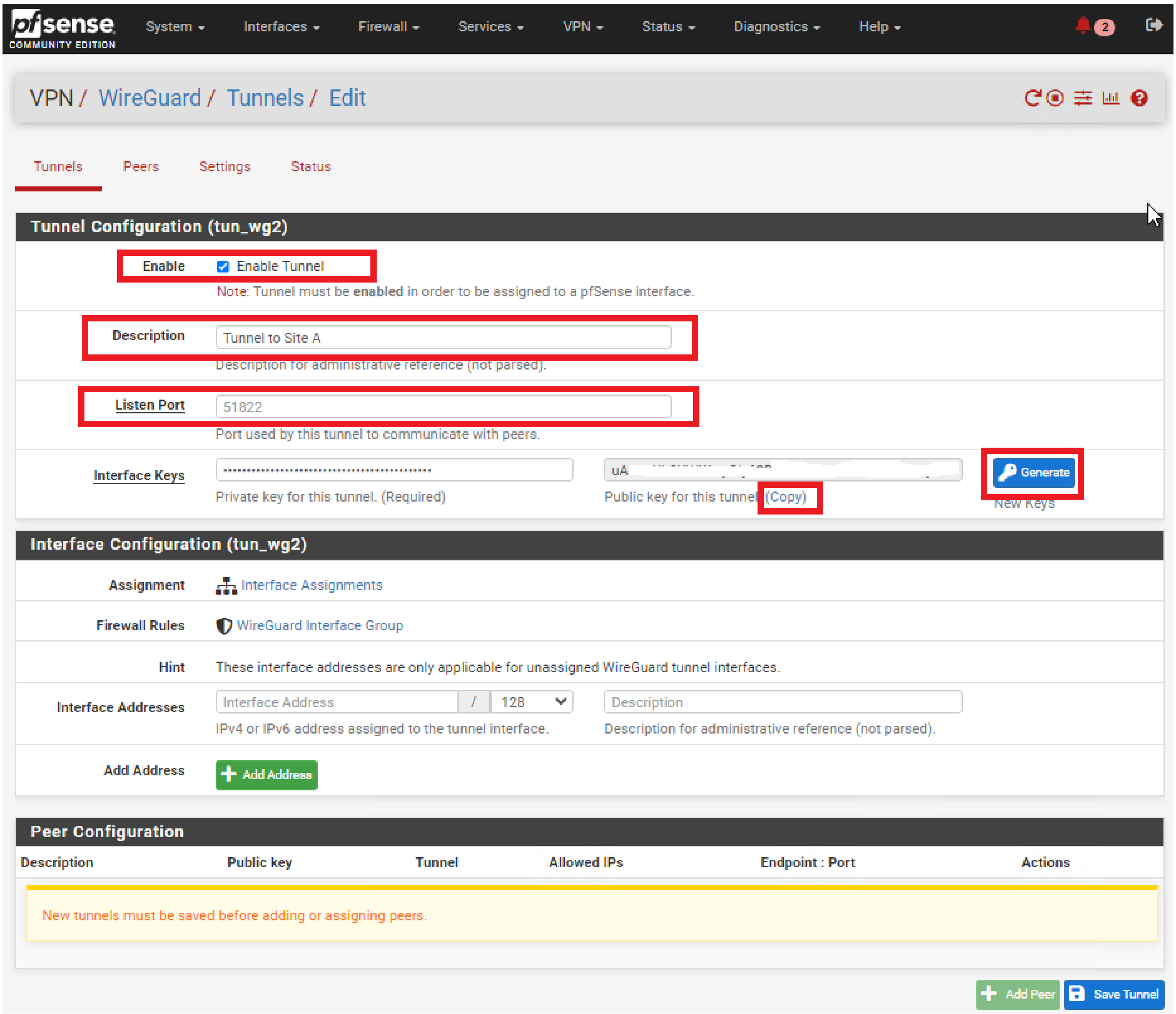
Name	Description	Public Key	Address / Assignment	Listen Port	Peers	Actions

No WireGuard tunnels have been configured. Click the "Add Tunnel" button below to create one.

In the **Tunnel Configuration** fill/set in the following fields (**Figure 5**):

- **Enable:** Checked
- **Description:** Optionally, describe the purpose of this tunnel(Ex: Tunnel to Site A)
- **Listen Port:** Leave blank to use port UDP/51820 or enter a specific port number you with to use
- **Interface Keys:** click the **Generate** button to create a new Private/Public key pair and copy the **Public Key** that's generated in order to enter it in the Public Key field on Site B.
- Click the **Save Tunnel** button

Figure 5



VPN / WireGuard / Tunnels / Edit

Tunnel Configuration (tun_wg2)

Enable ☑ Enable Tunnel
Note: Tunnel must be **enabled** in order to be assigned to a pfSense interface.

Description Tunnel to Site A
Description for administrative reference (not parsed).

Listen Port 51822
Port used by this tunnel to communicate with peers.

Interface Keys ••• | uA[redacted] | Generate
Private key for this tunnel. (Required) | Public key for this tunnel (Copy) | New Keys

Interface Configuration (tun_wg2)

Assignment Interface Assignments

Firewall Rules WireGuard Interface Group

Hint These interface addresses are only applicable for unassigned WireGuard tunnel interfaces.

Interface Addresses Interface Address / 128 | Description
IPv4 or IPv6 address assigned to the tunnel interface. | Description for administrative reference (not parsed).

Add Address + Add Address

Peer Configuration

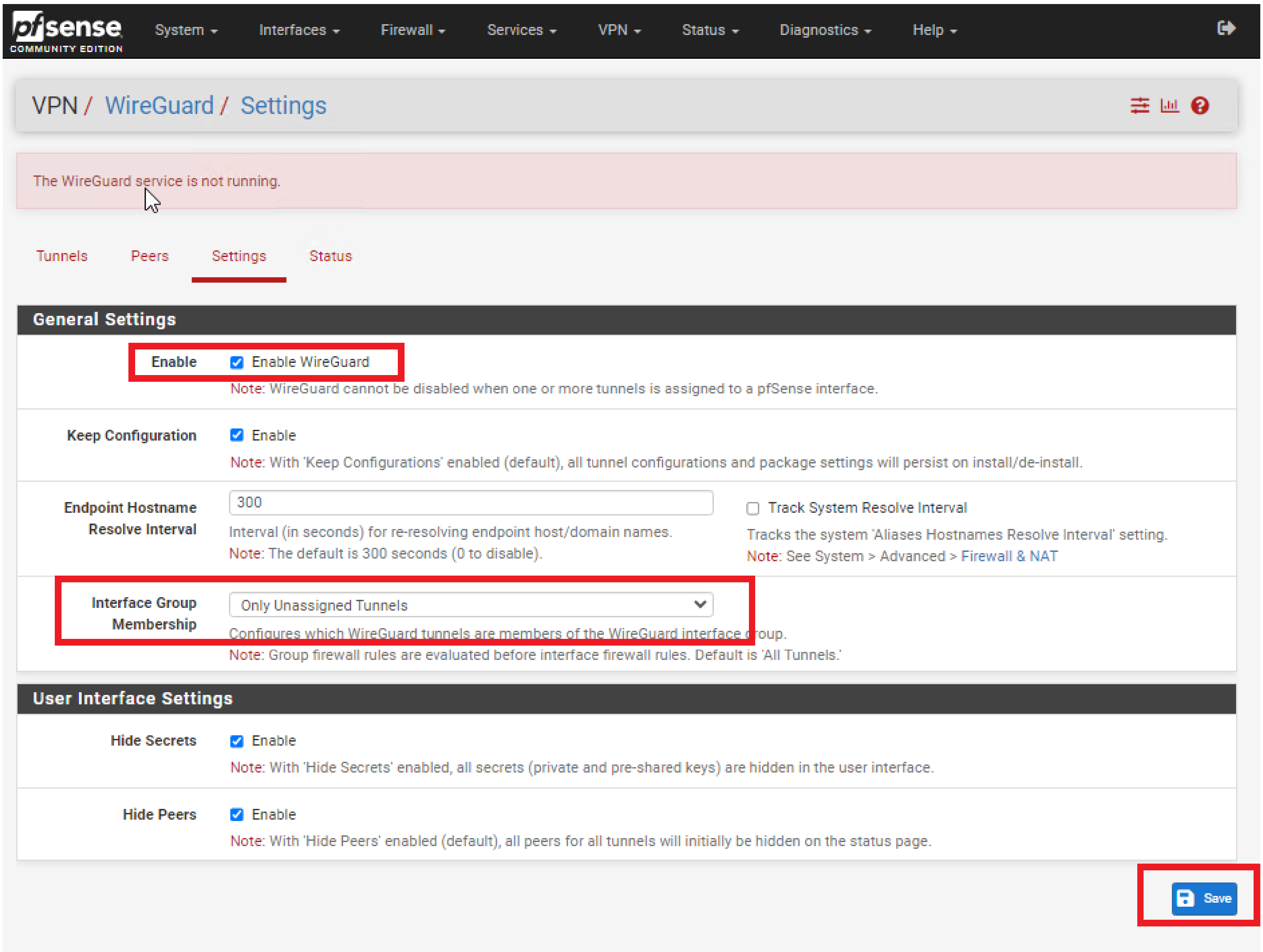
Description	Public key	Tunnel	Allowed IPs	Endpoint : Port	Actions

New tunnels must be saved before adding or assigning peers.

Enable WireGuard on Both Sites

On **BOTH** sites, navigate to **VPN ---> WireGuard**, click on the **Settings** tab and click on the **Enable WireGuard** checkbox, select **Only Unassigned Tunnels** on the **Interface Group Membership** drop-down and then click on the **Save** button (**Figure 6**).

Figure 6


System Interfaces Firewall Services VPN Status Diagnostics Help

VPN / WireGuard / Settings

The WireGuard service is not running.

Tunnels | Peers | Settings | Status

General Settings

Enable: ☑ Enable WireGuard
Note: WireGuard cannot be disabled when one or more tunnels is assigned to a pfSense interface.

Keep Configuration: ☑ Enable
Note: With 'Keep Configurations' enabled (default), all tunnel configurations and package settings will persist on install/de-install.

Endpoint Hostname Resolve Interval: 300
Interval (in seconds) for re-resolving endpoint host/domain names.
Note: The default is 300 seconds (0 to disable).
□ Track System Resolve Interval
Tracks the system 'Aliases Hostnames Resolve Interval' setting.
Note: See System > Advanced > Firewall & NAT

Interface Group Membership: Only Unassigned Tunnels
Configures which WireGuard tunnels are members of the WireGuard interface group.
Note: Group firewall rules are evaluated before interface firewall rules. Default is 'All Tunnels.'

User Interface Settings

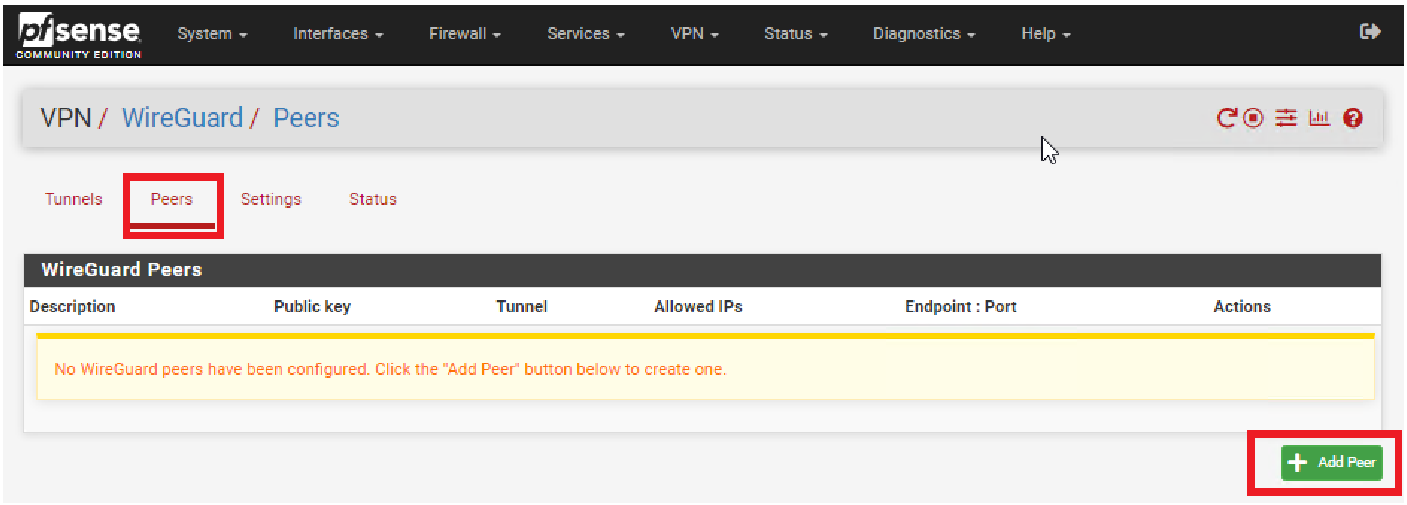
Hide Secrets: ☑ Enable
Note: With 'Hide Secrets' enabled, all secrets (private and pre-shared keys) are hidden in the user interface.

Hide Peers: ☑ Enable
Note: With 'Hide Peers' enabled (default), all peers for all tunnels will initially be hidden on the status page.

Add Peer on Site A

On **Site A**, navigate to **VPN ---> WireGuard**, click on the **Peers** tab and then click on the **Add Peer** button (**Figure 7**).

Figure 7


System Interfaces Firewall Services VPN Status Diagnostics Help

VPN / WireGuard / Peers

Tunnels | Peers | Settings | Status

WireGuard Peers

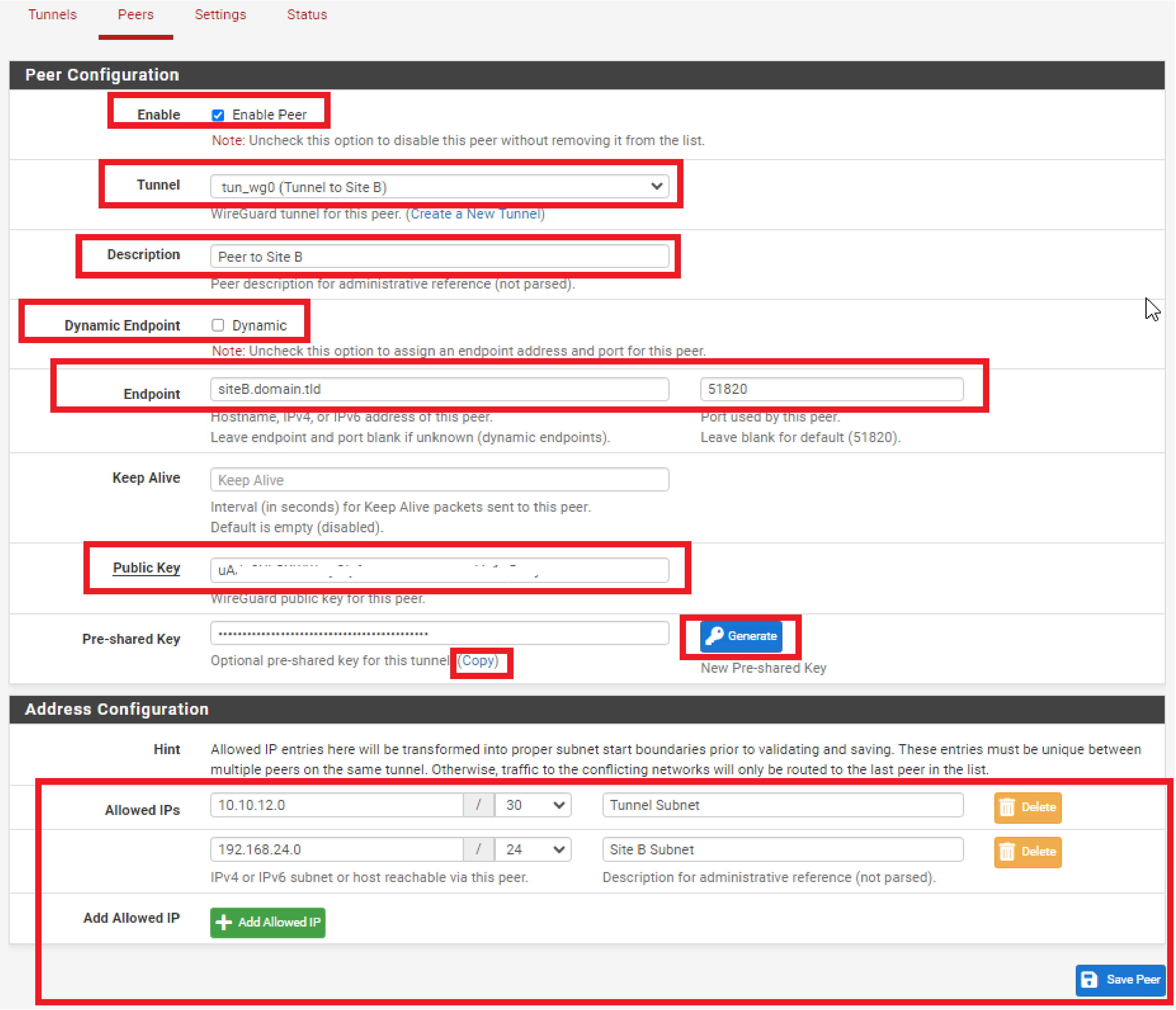
Description	Public key	Tunnel	Allowed IPs	Endpoint : Port	Actions

No WireGuard peers have been configured. Click the "Add Peer" button below to create one.

In the **Peer Configuration** fill/set in the following fields (**Figure 8**):

- **Enable:** Checked
- **Tunnel**: Select the Tunnel previously configured from the drop-down list
- **Description:** Optionally, describe the purpose of this Peer (Ex: Peer to Site B)
- **Dynamic Endpoint:** Unchecked
- **Endpoint**: Fill in the Internet IP or Hostname as well as the port number for **Site B**
- **Public Key**: Paste the previously copied **Public Key** from the **Tunnel** on **Site B**
- **Pre-shared Key:** Click the Generate button to generate a new pre-shared key and copy it in order to paste in the Peer configuration of **Site B**
- **Allowed IPs**: Enter an **UNUSED** Network address (Example: 10.10.12.0) with a CIDR of **30** (For a total of two IPs) in the first field, click the **Add Allowed IP** and then enter the Network Address and corresponding CIDR of the subnet for **Site B**
- Click the **Save Peer** button

Figure 8



Peer Configuration

Enable ☑ Enable Peer
Note: Uncheck this option to disable this peer without removing it from the list.

Tunnel: tun_wg0 (Tunnel to Site B)
WireGuard tunnel for this peer. (Create a New Tunnel)

Description: Peer to Site B
Peer description for administrative reference (not parsed).

Dynamic Endpoint ☐ Dynamic
Note: Uncheck this option to assign an endpoint address and port for this peer.

Endpoint: siteB.domain.tld — 51820
Hostname, IPv4, or IPv6 address of this peer.
Leave endpoint and port blank if unknown (dynamic endpoints).
Port used by this peer.
Leave blank for default (51820).

Keep Alive: Keep Alive
Interval (in seconds) for Keep Alive packets sent to this peer.
Default is empty (disabled).

Public Key: uA[redacted]
WireGuard public key for this peer.

Pre-shared Key: ••
Optional pre-shared key for this tunnel. (Copy)
Generate
New Pre-shared Key

Address Configuration

Hint: Allowed IP entries here will be transformed into proper subnet start boundaries prior to validating and saving. These entries must be unique between multiple peers on the same tunnel. Otherwise, traffic to the conflicting networks will only be routed to the last peer in the list.

Allowed IPs	10.10.12.0	/ 30	Tunnel Subnet	Delete
	192.168.24.0	/ 24	Site B Subnet	Delete

IPv4 or IPv6 subnet or host reachable via this peer.
Description for administrative reference (not parsed).

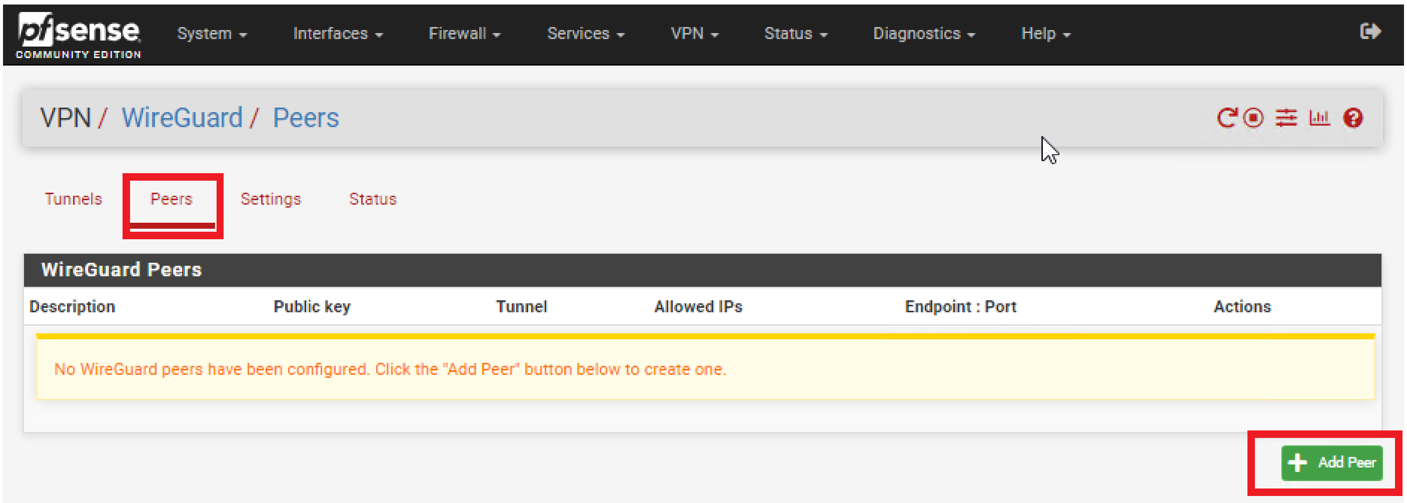
Add Allowed IP: + Add Allowed IP

Save Peer

Add Peer on Site B

On **Site B**, navigate to **VPN ---> WireGuard**, click on the **Peers** tab and then click on the **Add Peer** button (**Figure 9**).

Figure 9



WireGuard Peers

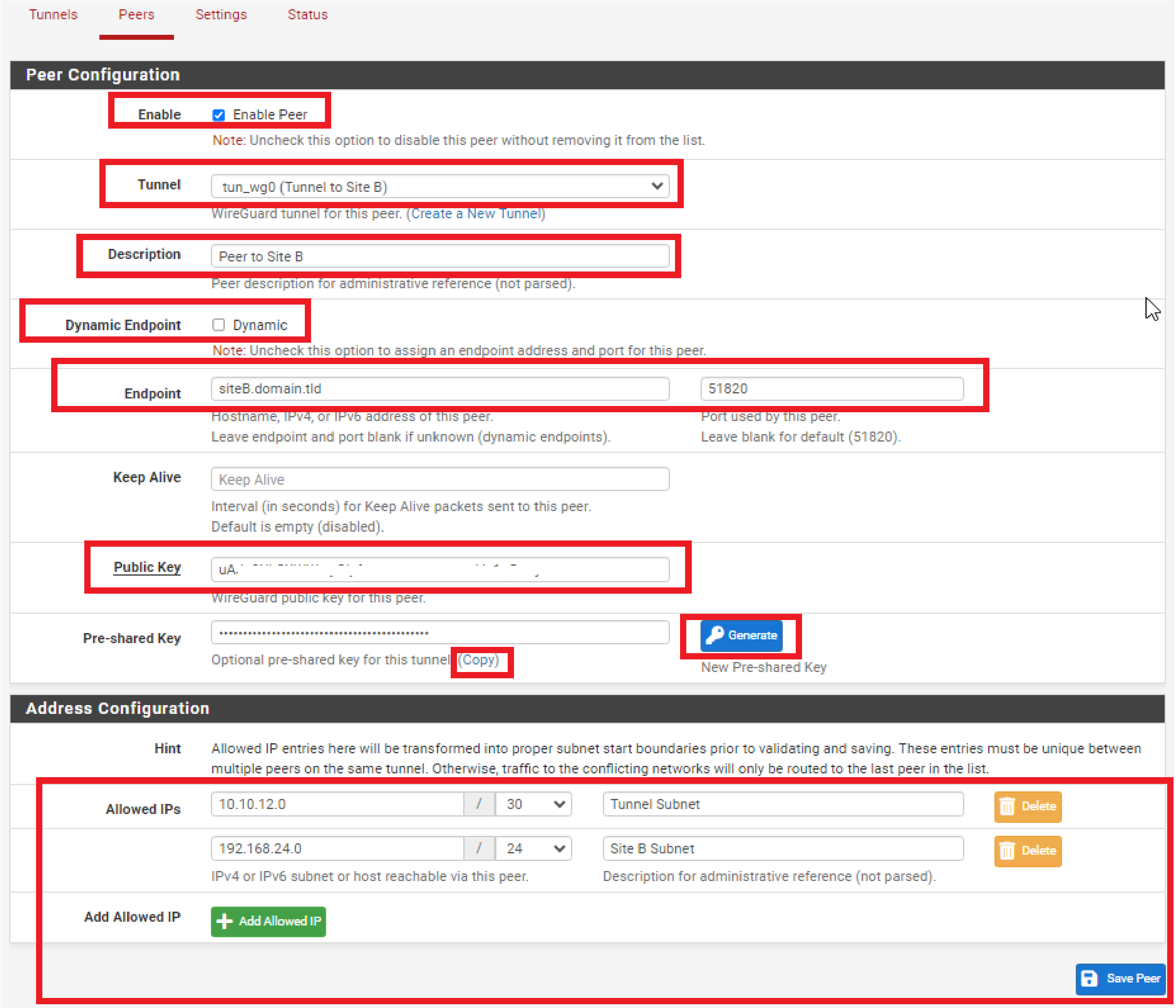
Description	Public key	Tunnel	Allowed IPs	Endpoint : Port	Actions

No WireGuard peers have been configured. Click the "Add Peer" button below to create one.

In the **Peer Configuration** fill/set in the following fields (**Figure 10**):

- **Enable:** Checked
- **Tunnel**: Select the Tunnel previously configured from the drop-down list
- **Description:** Optionally, describe the purpose of this Peer (Ex: Peer to Site A)
- **Dynamic Endpoint:** Unchecked
- **Endpoint**: Fill in the Internet IP or Hostname as well as the port number for **Site A**
- **Public Key**: Paste the previously copied **Public Key** from the **Tunnel** on **Site A**
- **Pre-shared Key:** Paste the previously copied **Pre-Shared key** from the **Peer** on **Site A**
- **Allowed IPs**: Enter the **SAME Tunnel Subnet Network address and CIDR** you set on the **Peer** on **Site A**, click the **Add Allowed IP** and then enter the Network Address and corresponding CIDR of the subnet for **Site A**
- Click the **Save Peer** button

Figure 10



Peer Configuration

Enable ☑ Enable Peer

Note: Uncheck this option to disable this peer without removing it from the list.

Tunnel: tun_wg0 (Tunnel to Site B)

WireGuard tunnel for this peer. (Create a New Tunnel)

Description: Peer to Site B

Peer description for administrative reference (not parsed).

Dynamic Endpoint ☐ Dynamic

Note: Uncheck this option to assign an endpoint address and port for this peer.

Endpoint: siteB.domain.tld | 51820

Hostname, IPv4, or IPv6 address of this peer.
Leave endpoint and port blank if unknown (dynamic endpoints).

Port used by this peer.
Leave blank for default (51820).

Keep Alive: Keep Alive

Interval (in seconds) for Keep Alive packets sent to this peer.
Default is empty (disabled).

Public Key: uA.[redacted]

WireGuard public key for this peer.

Pre-shared Key: ••

Optional pre-shared key for this tunnel. (Copy)

New Pre-shared Key

Address Configuration

Hint: Allowed IP entries here will be transformed into proper subnet start boundaries prior to validating and saving. These entries must be unique between multiple peers on the same tunnel. Otherwise, traffic to the conflicting networks will only be routed to the last peer in the list.

Allowed IPs:

10.10.12.0	/ 30	Tunnel Subnet	Delete
192.168.24.0	/ 24	Site B Subnet	Delete

IPv4 or IPv6 subnet or host reachable via this peer.

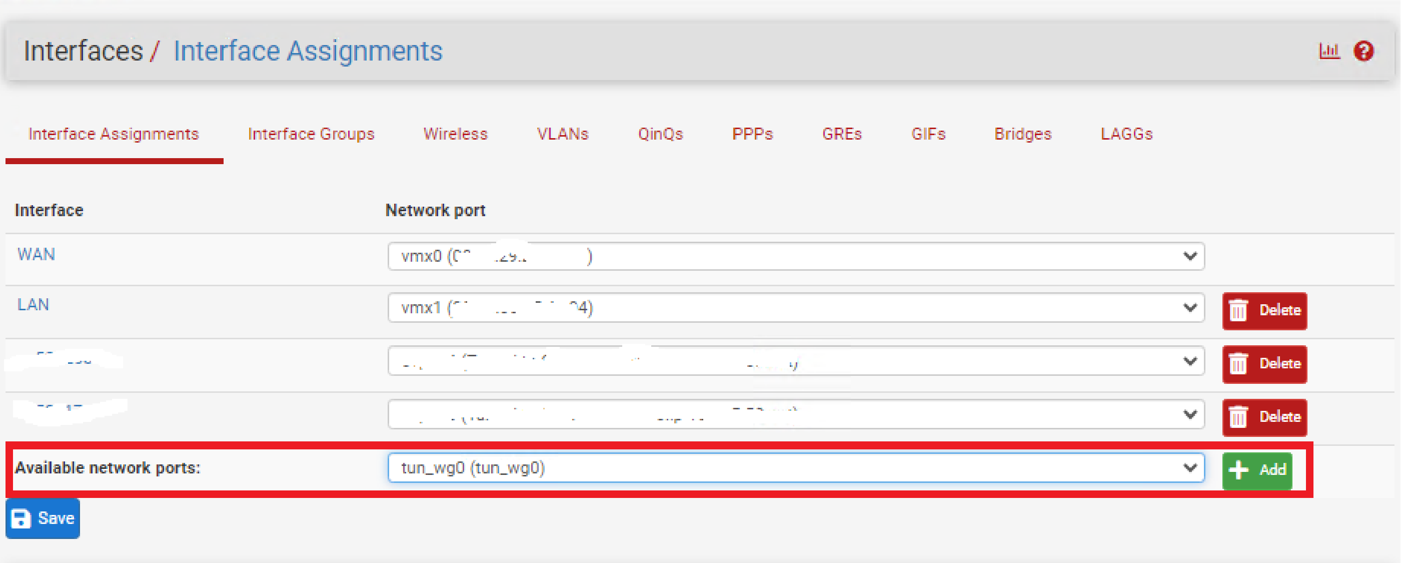
Description for administrative reference (not parsed).

Add Allowed IP

Configure Interface for Site A

On **Site A**, navigate to **Interfaces ---> Assignments** and under **Available network ports** drop-down select the WireGuard tunnel you previously created and click the **Add** button (**Figure 11**).

Figure 11

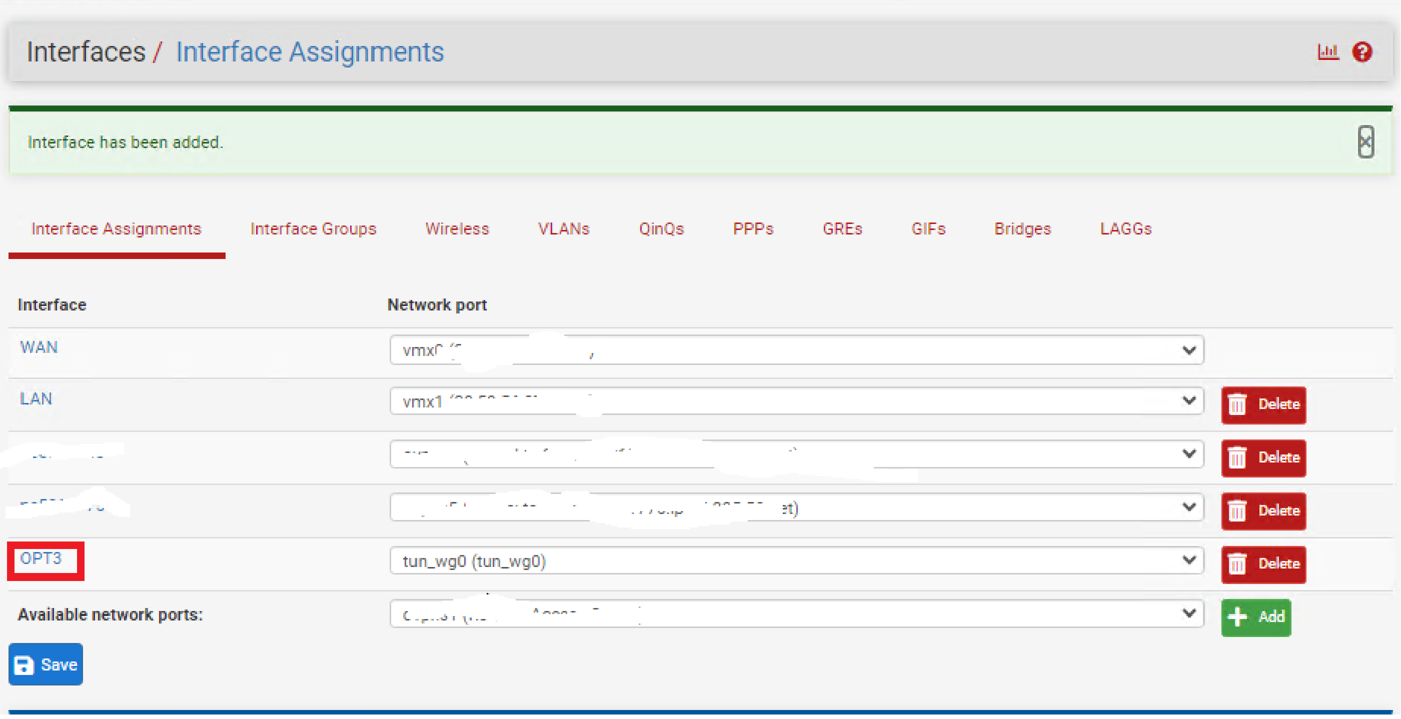


Interfaces / Interface Assignments

Interface	Network port
WAN	vmx0 ([illegible])
LAN	vmx1 ([illegible])
[illegible]	[illegible]
[illegible]	[illegible]
Available network ports:	tun_wg0 (tun_wg0)

Click on the new **OPT(X)** interface that was just created (**Figure 12**).

Figure 12



Interfaces / Interface Assignments

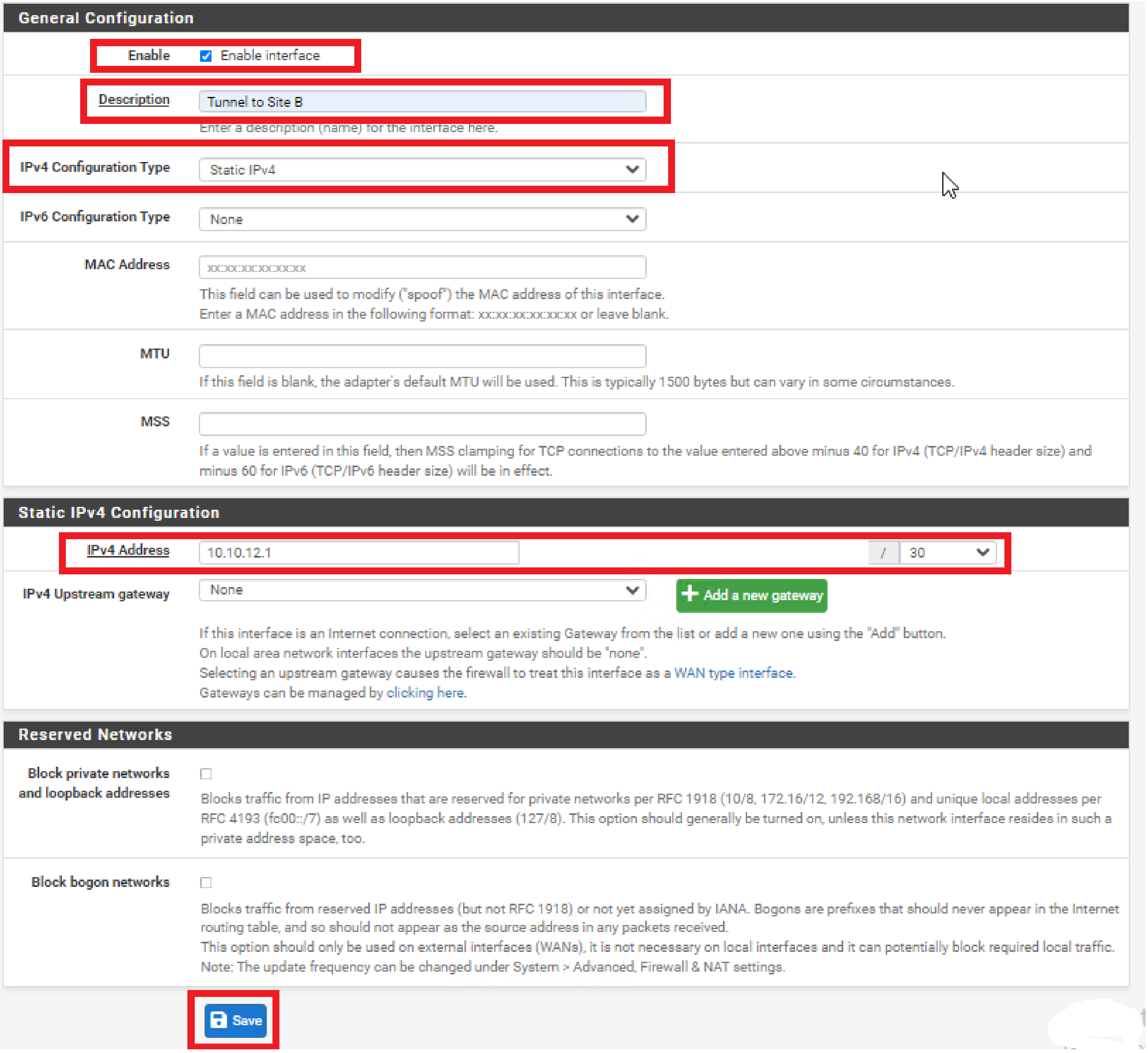
Interface has been added.

Interface	Network port
WAN	vmx0 ([illegible])
LAN	vmx1 ([illegible])
[illegible]	[illegible]
[illegible]	[illegible]
OPT3	tun_wg0 (tun_wg0)
Available network ports:	[illegible]

In the **General Configuration** page fill/set the following fields (**Figure 13**):

- **Enable:** Checked
- **Description:** Optionally, describe the purpose of this Interface (Ex: Tunnel to Site B)
- **IPv4 Configuration Type:** Static IPv4
- **IPv4 Address:** Enter an IP address for **Site A**. The IP address you enter here will be one of two possible IP addresses you can use from the /30 Tunnel Subnet you chose earlier. For this example, we used the Subnet Tunnel of **10.10.12.0/30** which gives us **10.10.12.1** and **10.10.12.2** as the only two usable IPs for this subnet. So, for this example we will use **10.10.12.1 for Site A**.
- Click the **Save** button and then click the **Apply Changes** button.

Figure 13



General Configuration

Enable ☑ Enable interface

Description: Tunnel to Site B

Enter a description (name) for the interface here.

IPv4 Configuration Type: Static IPv4

IPv6 Configuration Type: None

MAC Address: xx:xx:xx:xx:xx:xx

This field can be used to modify ("spoof") the MAC address of this interface.
Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.

MTU

If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS

If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 for IPv4 (TCP/IPv4 header size) and minus 60 for IPv6 (TCP/IPv6 header size) will be in effect.

Static IPv4 Configuration

IPv4 Address: 10.10.12.1 / 30

IPv4 Upstream gateway: None

If this interface is an Internet connection, select an existing Gateway from the list or add a new one using the "Add" button.
On local area network interfaces the upstream gateway should be "none".
Selecting an upstream gateway causes the firewall to treat this interface as a WAN type interface.
Gateways can be managed by clicking here.

Reserved Networks

Block private networks and loopback addresses □

Blocks traffic from IP addresses that are reserved for private networks per RFC 1918 (10/8, 172.16/12, 192.168/16) and unique local addresses per RFC 4193 (fc00::/7) as well as loopback addresses (127/8). This option should generally be turned on, unless this network interface resides in such a private address space, too.

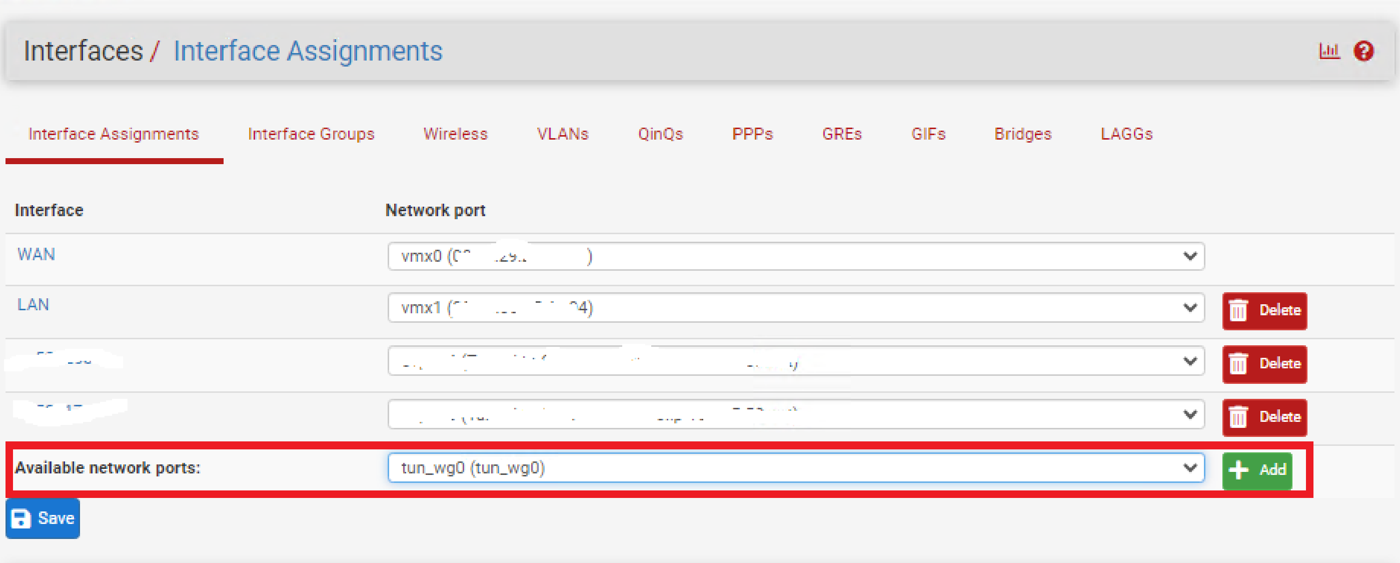
Block bogon networks □

Blocks traffic from reserved IP addresses (but not RFC 1918) or not yet assigned by IANA. Bogons are prefixes that should never appear in the Internet routing table, and so should not appear as the source address in any packets received.
This option should only be used on external interfaces (WANs), it is not necessary on local interfaces and it can potentially block required local traffic.
Note: The update frequency can be changed under System > Advanced, Firewall & NAT settings.

Configure Interface for Site B

On **Site B**, navigate to **Interfaces ---> Assignments** and under **Available network ports** drop-down select the WireGuard tunnel you previously created and click the **Add** button (**Figure 14**).

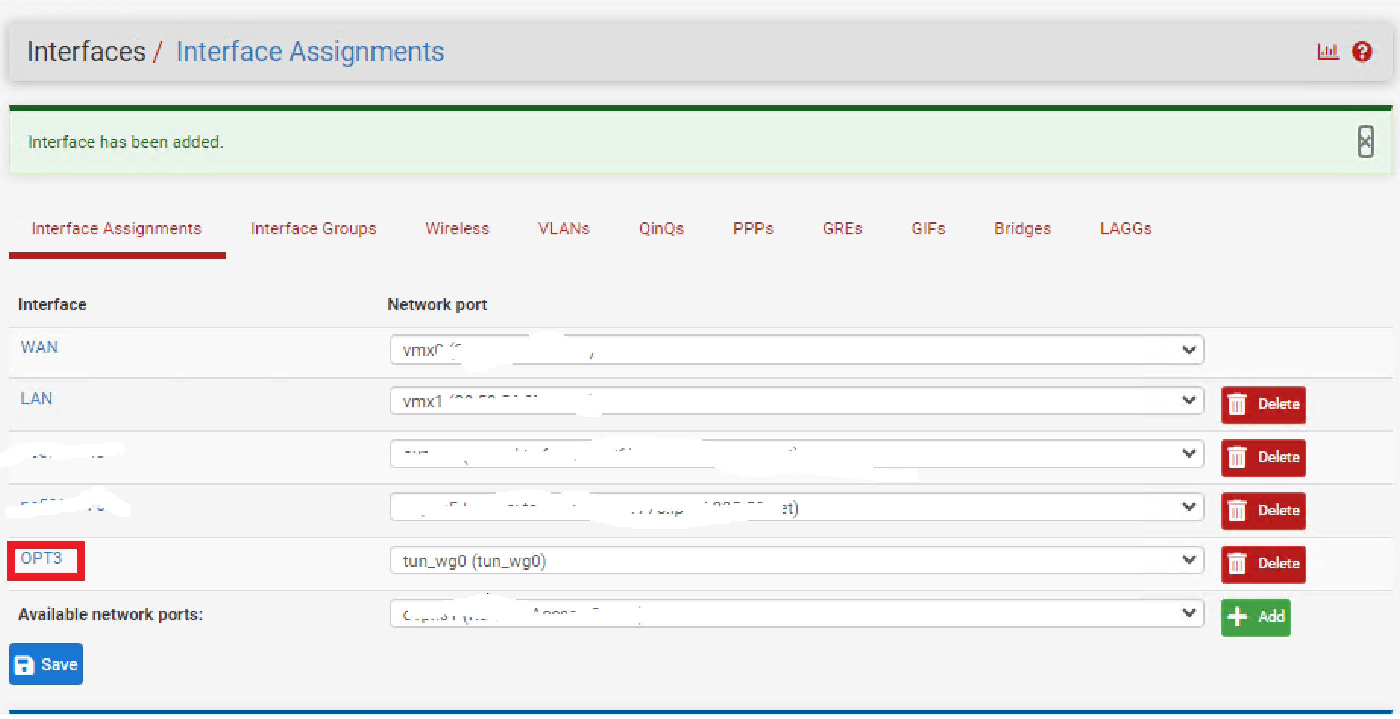
Figure 14



Interface	Network port	
WAN	vmx0 ([redacted])	
LAN	vmx1 ([redacted])	Delete
[redacted]	[redacted]	Delete
[redacted]	[redacted]	Delete
Available network ports:	tun_wg0 (tun_wg0)	Add

Click on the new **OPT(X)** interface that was just created (**Figure 15**).

Figure 15



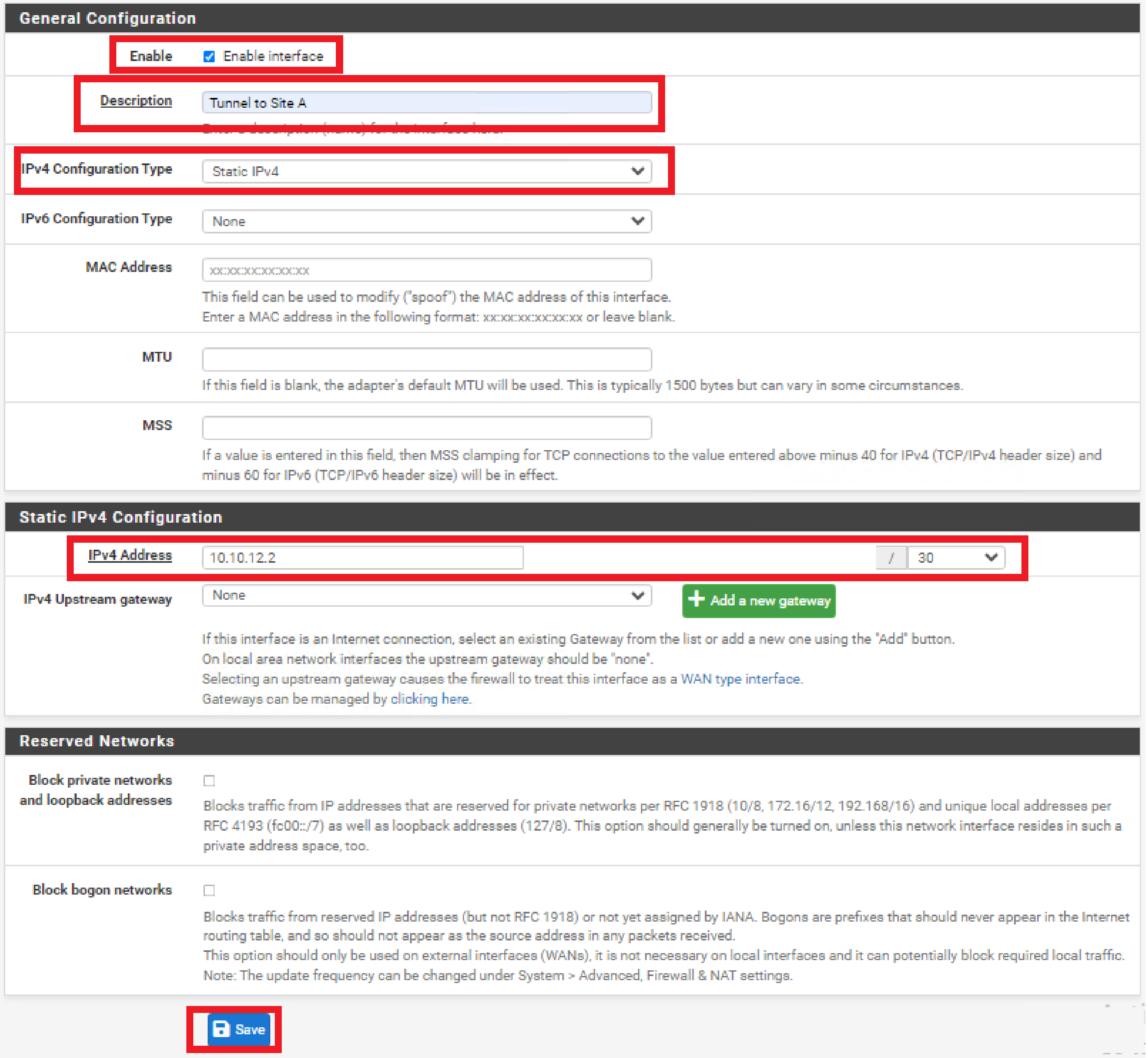
Interface has been added.

Interface	Network port	
WAN	vmx0 ([redacted])	
LAN	vmx1 ([redacted])	Delete
[redacted]	[redacted]	Delete
[redacted]	[redacted]	Delete
OPT3	tun_wg0 (tun_wg0)	Delete
Available network ports:	[redacted]	Add

In the **General Configuration** page fill/set the following fields (**Figure 16**):

- **Enable:** Checked
- **Description:** Optionally, describe the purpose of this Interface (Ex: Tunnel to Site A)
- **IPv4 Configuration Type:** Static IPv4
- **IPv4 Address:** Enter an IP address for **Site B**. The IP address you enter here will be one of two possible IP addresses you can use from the /30 Tunnel Subnet you chose earlier. For this example, we used the Subnet Tunnel of **10.10.12.0/30** which gives us **10.10.12.1** and **10.10.12.2** as the only two usable IPs for this subnet. So, for this example we will use **10.10.12.2 for Site B**.
- Click the **Save** button and then click the **Apply Changes** button.

Figure 16



General Configuration

Enable ☑ Enable interface

Description: Tunnel to Site A

Enter a description (name) for the interface here.

IPv4 Configuration Type: Static IPv4

IPv6 Configuration Type: None

MAC Address: xx:xx:xx:xx:xx:xx

This field can be used to modify ("spoof") the MAC address of this interface.
Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.

MTU:

If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS:

If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 for IPv4 (TCP/IPv4 header size) and minus 60 for IPv6 (TCP/IPv6 header size) will be in effect.

Static IPv4 Configuration

IPv4 Address: 10.10.12.2 / 30

IPv4 Upstream gateway: None

If this interface is an Internet connection, select an existing Gateway from the list or add a new one using the "Add" button.
On local area network interfaces the upstream gateway should be "none".
Selecting an upstream gateway causes the firewall to treat this interface as a WAN type interface.
Gateways can be managed by clicking here.

Reserved Networks

Block private networks and loopback addresses □

Blocks traffic from IP addresses that are reserved for private networks per RFC 1918 (10/8, 172.16/12, 192.168/16) and unique local addresses per RFC 4193 (fc00::/7) as well as loopback addresses (127/8). This option should generally be turned on, unless this network interface resides in such a private address space, too.

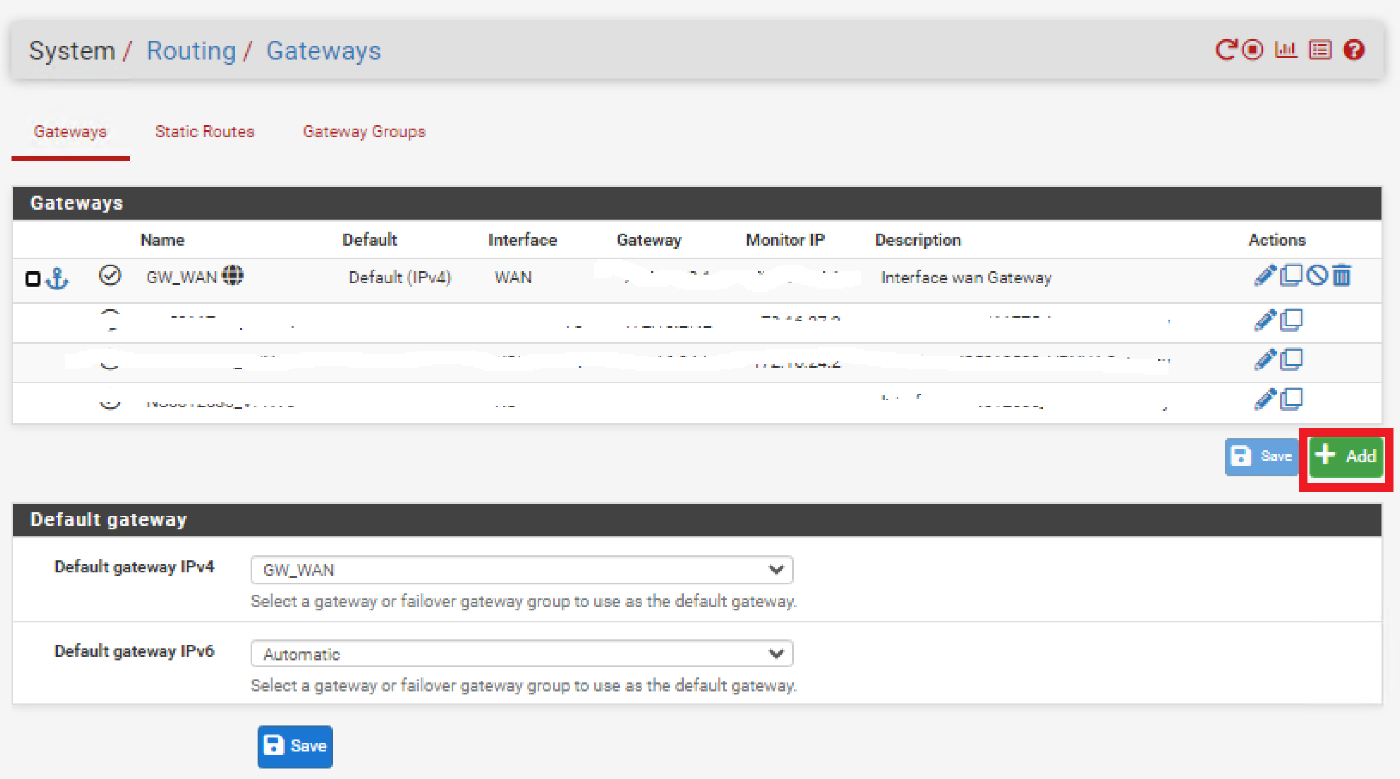
Block bogon networks □

Blocks traffic from reserved IP addresses (but not RFC 1918) or not yet assigned by IANA. Bogons are prefixes that should never appear in the Internet routing table, and so should not appear as the source address in any packets received.
This option should only be used on external interfaces (WANs), it is not necessary on local interfaces and it can potentially block required local traffic.
Note: The update frequency can be changed under System > Advanced, Firewall & NAT settings.

Create Gateway and Route on Site A

On **Site A** navigate to **System ---> Routing** and under the **Gateways** tab click the **Add** button (**Figure 17**).

Figure 17



System / Routing / Gateways

Gateways

	Name	Default	Interface	Gateway	Monitor IP	Description	Actions
⚓	GW_WAN	Default (IPv4)	WAN	[redacted]	[redacted]	Interface wan Gateway	
	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	
	[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	
	[redacted]		[redacted]			[redacted]	

Default gateway

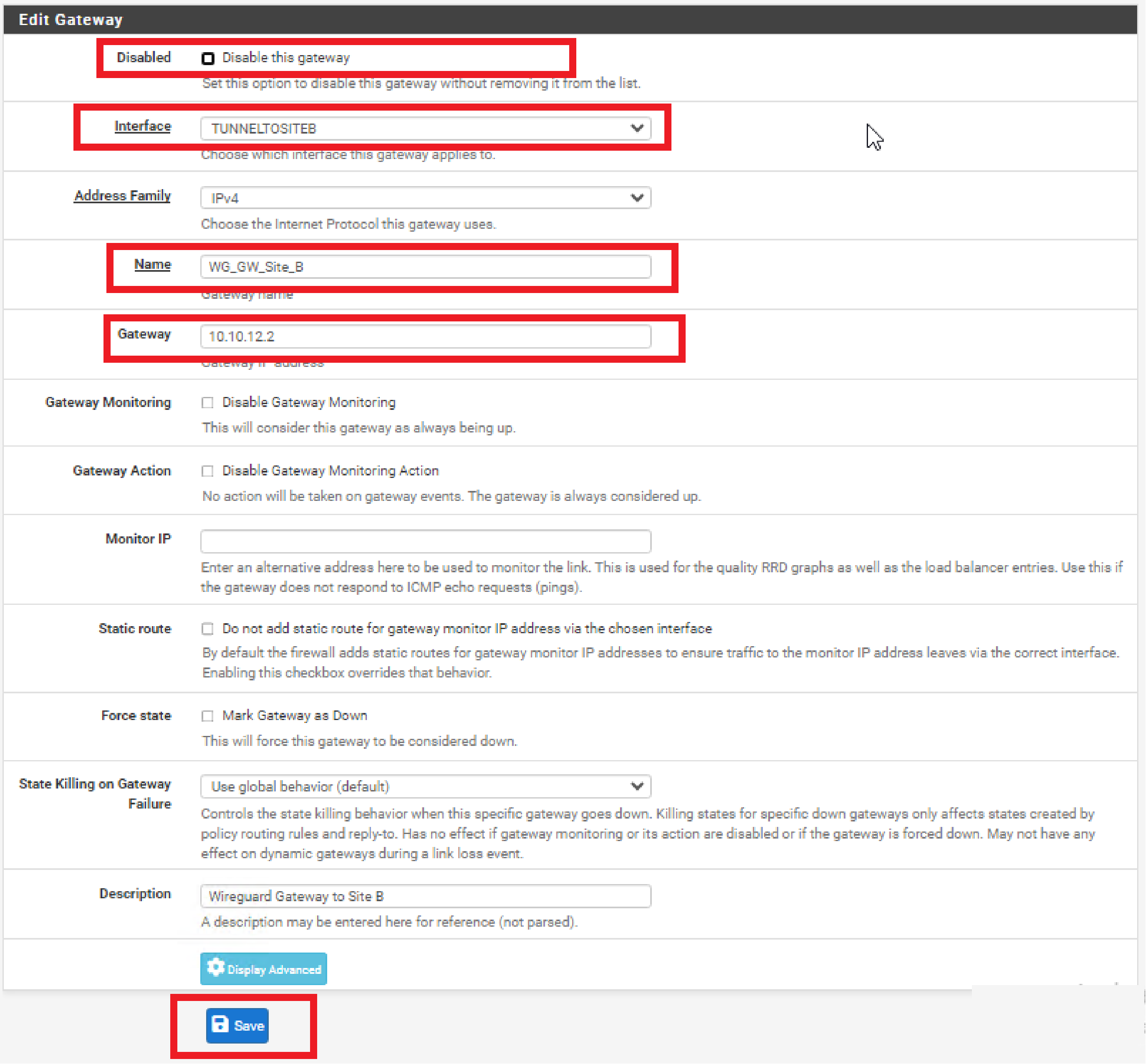
Default gateway IPv4: GW_WAN
Select a gateway or failover gateway group to use as the default gateway.

Default gateway IPv6: Automatic
Select a gateway or failover gateway group to use as the default gateway.

In the **Edit Gateway** page fill/set the following fields (**Figure 18**):

- **Disabled:** Unchecked
- **Interface:** Select the interface for **Site A** you created earlier
- **Name:** Enter a name for this gateway (Ex: WG_GW_Site_B)
- **Gateway:** Enter the **Tunnel Subnet IP** address for **Site B**. For this example we used **10.10.12.2** for **Site B**.
- **Description:** Optionally, enter a description (Ex: Wireguard Gateway to Site B)
- Click the **Save** button and then click the **Apply Changes** button.

Figure 18



Edit Gateway

Disabled ☐ Disable this gateway
Set this option to disable this gateway without removing it from the list.

Interface: TUNNELTOSITEB
Choose which interface this gateway applies to.

Address Family: IPv4
Choose the Internet Protocol this gateway uses.

Name: WG_GW_Site_B
Gateway name

Gateway: 10.10.12.2
Gateway IP address

Gateway Monitoring ☐ Disable Gateway Monitoring
This will consider this gateway as always being up.

Gateway Action ☐ Disable Gateway Monitoring Action
No action will be taken on gateway events. The gateway is always considered up.

Monitor IP:
Enter an alternative address here to be used to monitor the link. This is used for the quality RRD graphs as well as the load balancer entries. Use this if the gateway does not respond to ICMP echo requests (pings).

Static route ☐ Do not add static route for gateway monitor IP address via the chosen interface
By default the firewall adds static routes for gateway monitor IP addresses to ensure traffic to the monitor IP address leaves via the correct interface. Enabling this checkbox overrides that behavior.

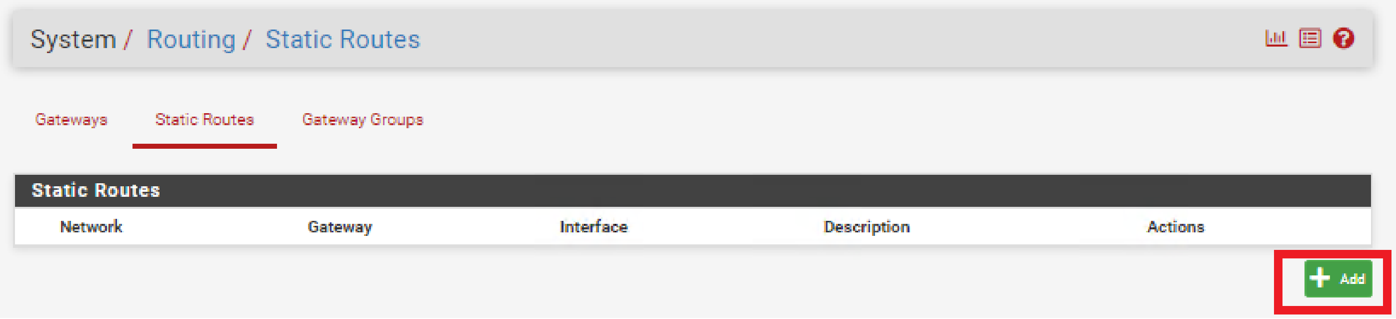
Force state ☐ Mark Gateway as Down
This will force this gateway to be considered down.

State Killing on Gateway Failure: Use global behavior (default)
Controls the state killing behavior when this specific gateway goes down. Killing states for specific down gateways only affects states created by policy routing rules and reply-to. Has no effect if gateway monitoring or its action are disabled or if the gateway is forced down. May not have any effect on dynamic gateways during a link loss event.

Description: Wireguard Gateway to Site B
A description may be entered here for reference (not parsed).

Next, on **Site A** navigate to **System ---> Routing** and under the **Static Routes** tab click the **Add** button (**Figure 19**).

Figure 19



System / Routing / Static Routes

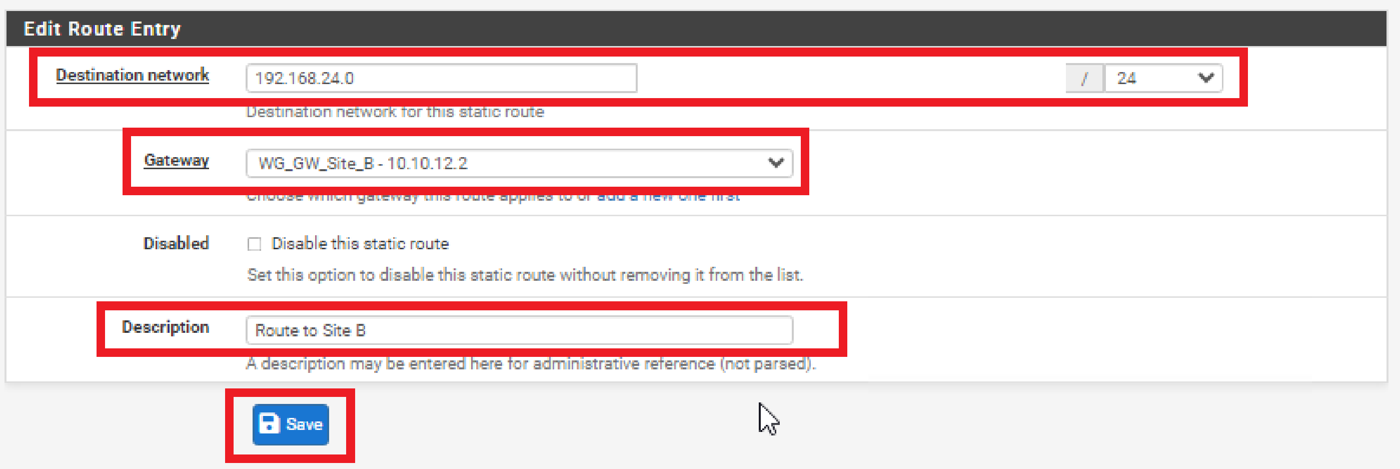
Static Routes

Network	Gateway	Interface	Description	Actions

In the **Edit Route Entry** page, fill/set the following fields (**Figure 20**):

- **Destination network:** Enter the network subnet for **Site B** (**NOT the tunnel subnet**). In this example, the network subnet we used for Site B was **192.168.24.0/24**.
- **Gateway:** Select the Gateway to **Site B** you created earlier
- **Description:** Optionally, enter a description (Ex: Route to Site B)
- Click the **Save** button and then click the **Apply Changes** button.

Figure 20



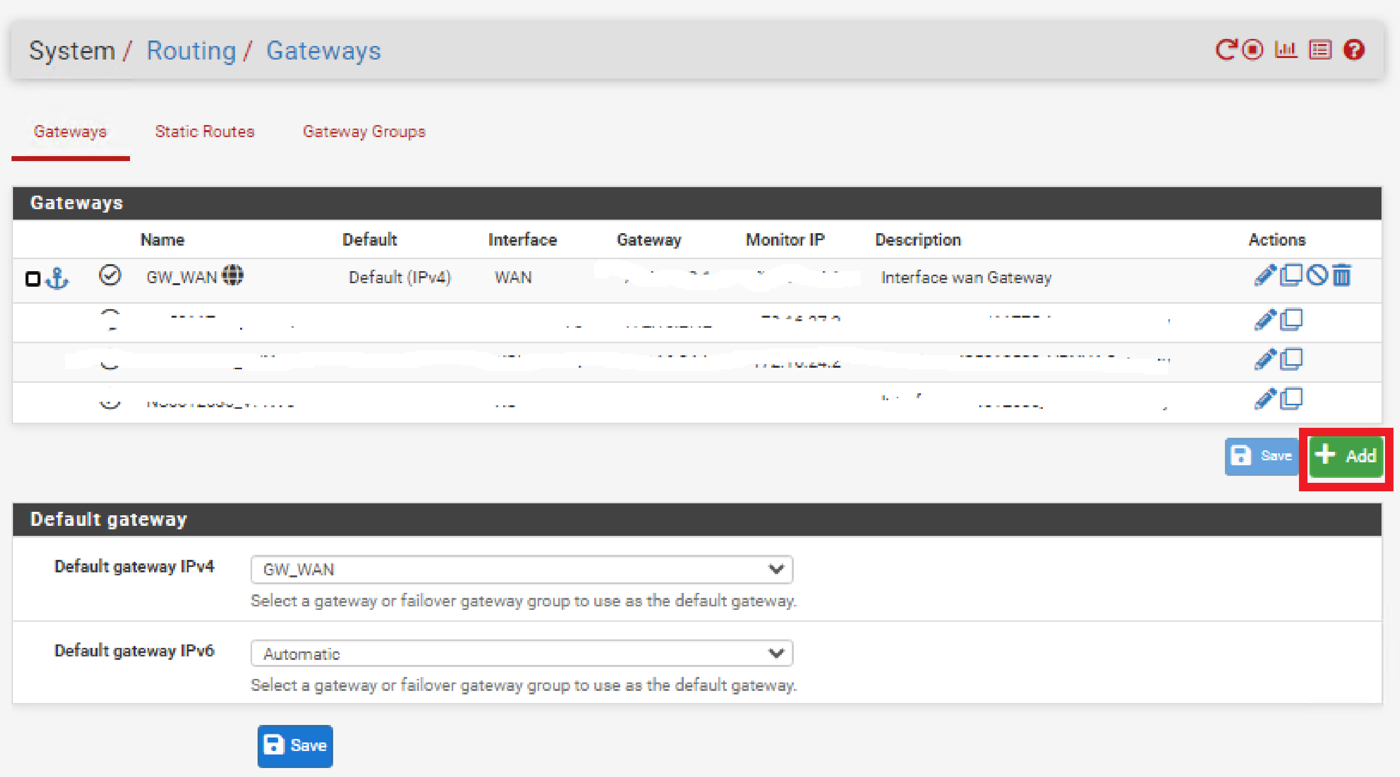
Edit Route Entry

Destination network	192.168.24.0 / 24 Destination network for this static route
Gateway	WG_GW_Site_B - 10.10.12.2 Choose which gateway this route applies to or add a new one first
Disabled	□ Disable this static route Set this option to disable this static route without removing it from the list.
Description	Route to Site B A description may be entered here for administrative reference (not parsed).

Create Gateway and Route on Site B

On **Site B** navigate to **System ---> Routing** and under the **Gateways** tab click the **Add** button (**Figure 21**).

Figure 21



System / Routing / Gateways

Gateways

		Name	Default	Interface	Gateway	Monitor IP	Description	Actions
□ ⚓	✓	GW_WAN 🌐	Default (IPv4)	WAN	[redacted]	[redacted]	Interface wan Gateway	
		[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	
		[redacted]		[redacted]	[redacted]	[redacted]	[redacted]	
		[redacted]		[redacted]			[redacted]	

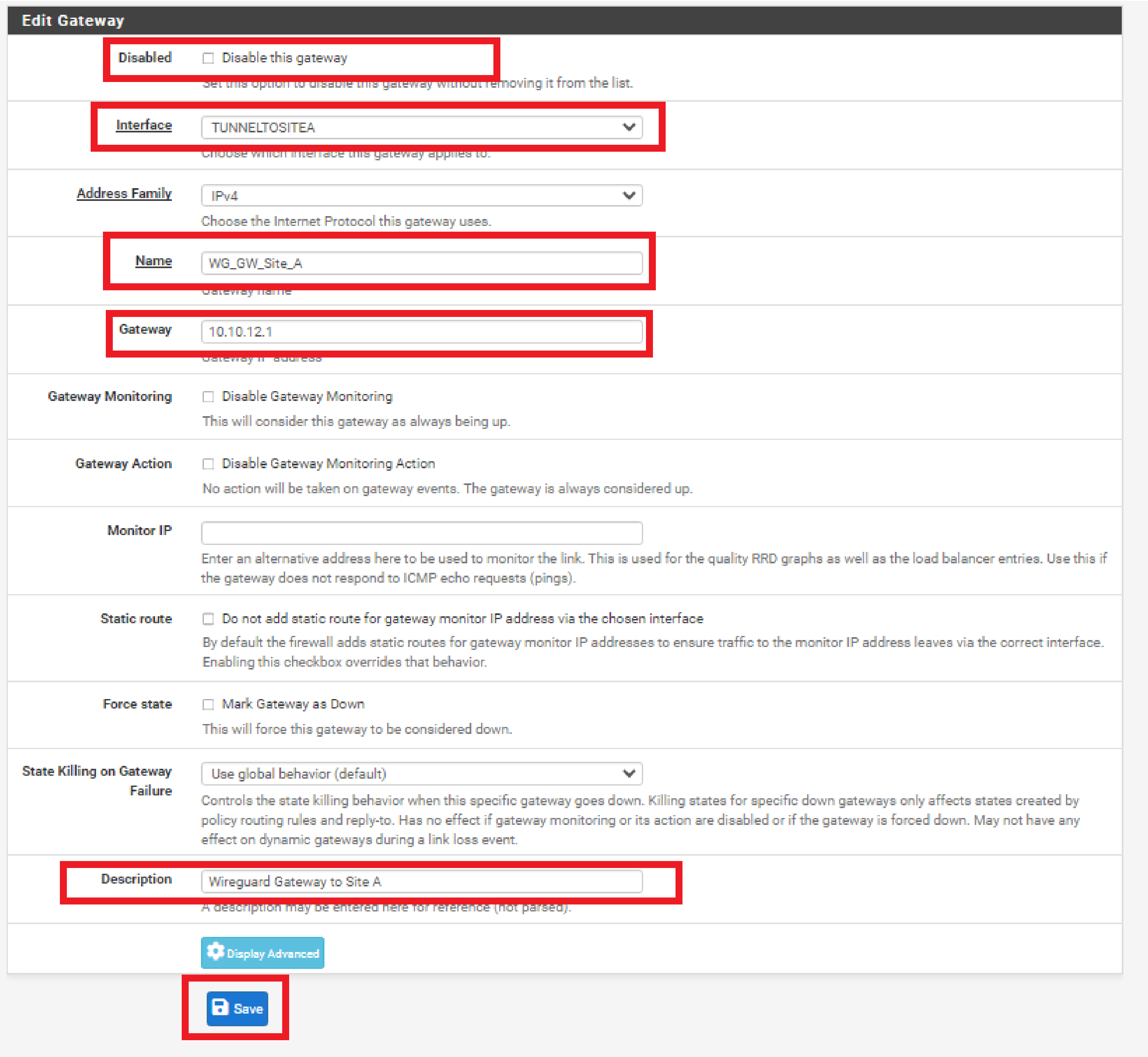
Default gateway

Default gateway IPv4	GW_WAN Select a gateway or failover gateway group to use as the default gateway.
Default gateway IPv6	Automatic Select a gateway or failover gateway group to use as the default gateway.

In the **Edit Gateway** page fill/set the following fields (**Figure 22**):

- **Disabled:** Unchecked
- **Interface:** Select the interface for **Site A** you created earlier
- **Name:** Enter a name for this gateway (Ex: WG_GW_Site_A)
- **Gateway:** Enter the **Tunnel Subnet IP** address for **Site A**. For this example we used **10.10.12.1** for **Site A**.
- **Description:** Optionally, enter a description (Ex: Wireguard Gateway to Site A)
- Click the **Save** button and then click the **Apply Changes** button.

Figure 22



Edit Gateway

Disabled: □ Disable this gateway
Set this option to disable this gateway without removing it from the list.

Interface: TUNNELTOSITEA
Choose which interface this gateway applies to.

Address Family: IPv4
Choose the Internet Protocol this gateway uses.

Name: WG_GW_Site_A
Gateway name

Gateway: 10.10.12.1
Gateway IP address

Gateway Monitoring: □ Disable Gateway Monitoring
This will consider this gateway as always being up.

Gateway Action: □ Disable Gateway Monitoring Action
No action will be taken on gateway events. The gateway is always considered up.

Monitor IP:
Enter an alternative address here to be used to monitor the link. This is used for the quality RRD graphs as well as the load balancer entries. Use this if the gateway does not respond to ICMP echo requests (pings).

Static route: □ Do not add static route for gateway monitor IP address via the chosen interface
By default the firewall adds static routes for gateway monitor IP addresses to ensure traffic to the monitor IP address leaves via the correct interface. Enabling this checkbox overrides that behavior.

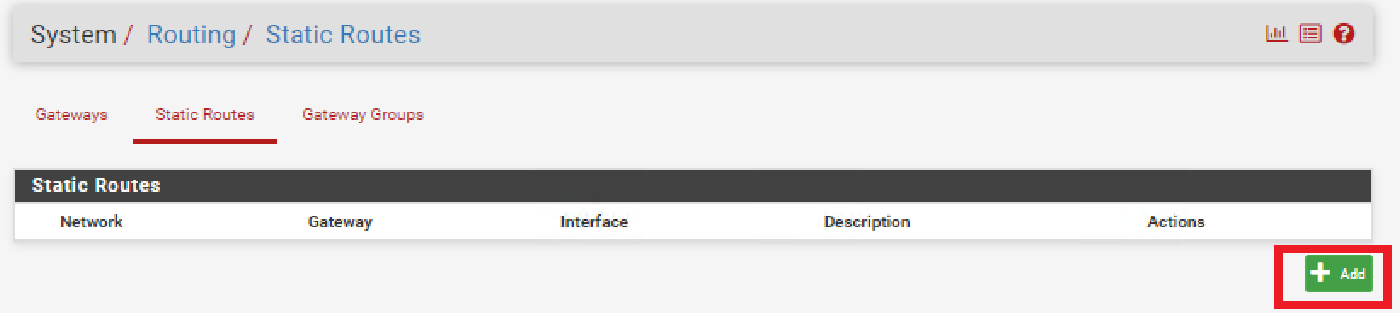
Force state: □ Mark Gateway as Down
This will force this gateway to be considered down.

State Killing on Gateway Failure: Use global behavior (default)
Controls the state killing behavior when this specific gateway goes down. Killing states for specific down gateways only affects states created by policy routing rules and reply-to. Has no effect if gateway monitoring or its action are disabled or if the gateway is forced down. May not have any effect on dynamic gateways during a link loss event.

Description: Wireguard Gateway to Site A
A description may be entered here for reference (not parsed).

Next, on **Site B** navigate to **System ---> Routing** and under the **Static Routes** tab click the **Add** button (**Figure 23**).

Figure 23



System / Routing / Static Routes

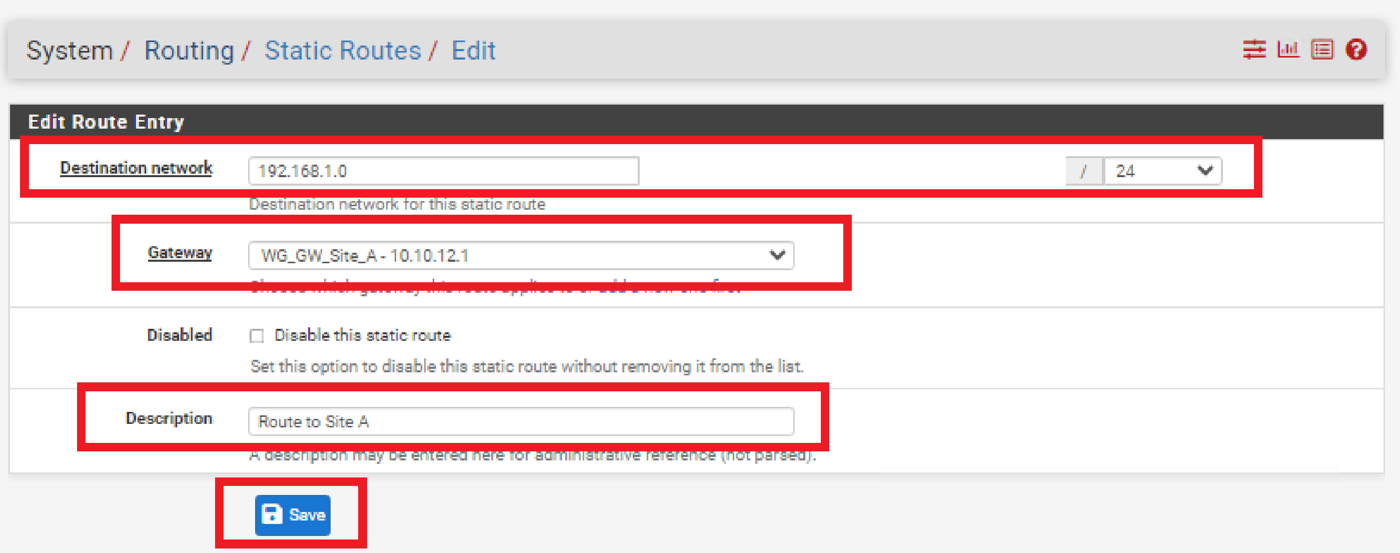
Static Routes

Network	Gateway	Interface	Description	Actions

In the **Edit Route Entry** page, fill/set the following fields (**Figure 24**):

- **Destination network:** Enter the network subnet for **Site A** (**NOT the tunnel subnet**). In this example, the network subnet we used for **Site A** was **192.168.1.0/24**.
- **Gateway:** Select the Gateway to **Site A** you created earlier
- **Description:** Optionally, enter a description (Ex: Route to Site A)
- Click the **Save** button and then click the **Apply Changes** button.

Figure 24



System / Routing / Static Routes / Edit

Edit Route Entry

Destination network	192.168.1.0 / 24 Destination network for this static route
Gateway	WG_GW_Site_A - 10.10.12.1 Choose which gateway this route applies to or add a new one first.
Disabled	□ Disable this static route Set this option to disable this static route without removing it from the list.
Description	Route to Site A A description may be entered here for administrative reference (not parsed).

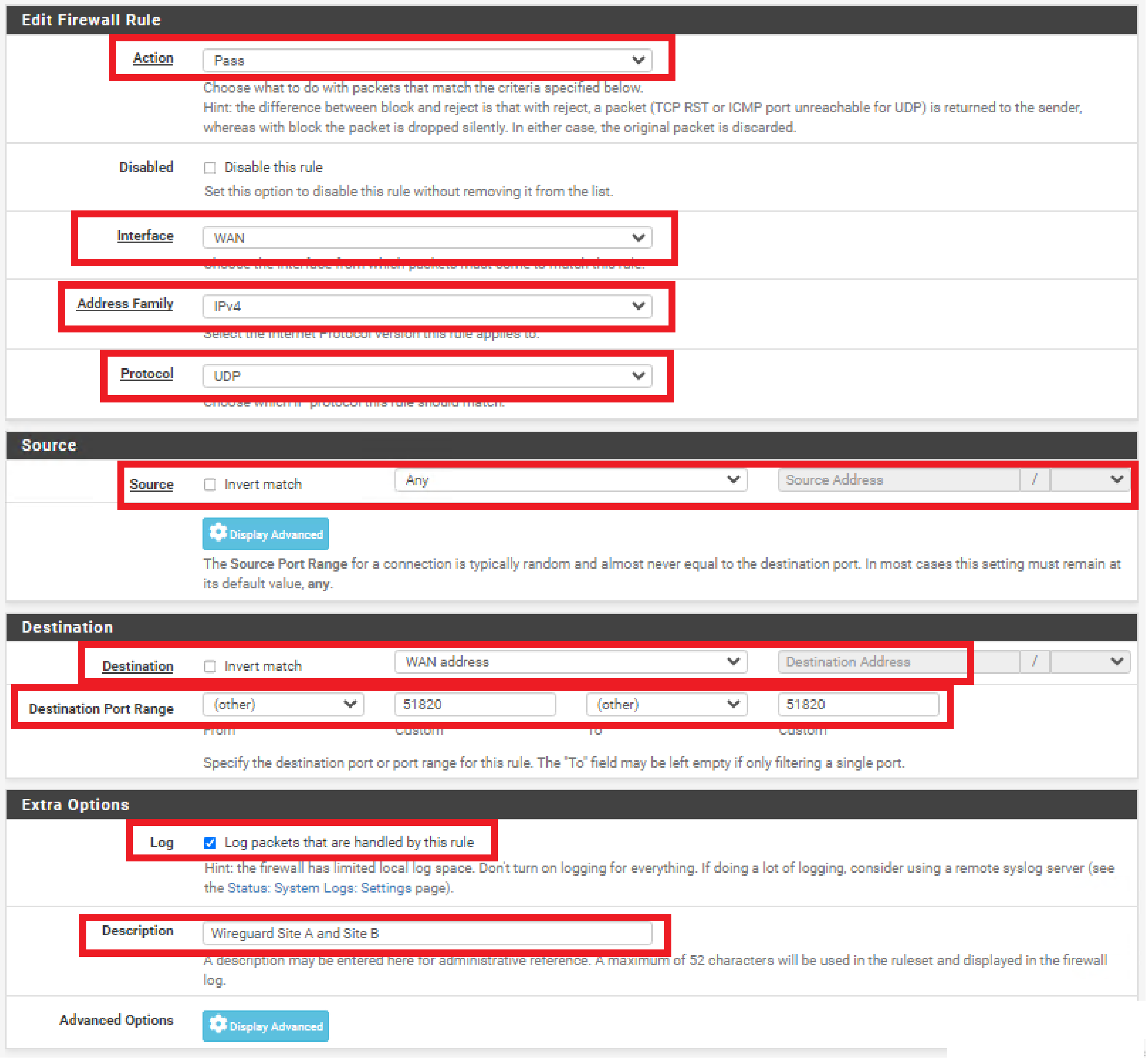
Add Firewall Rules on BOTH Firewalls

On **BOTH** firewalls, navigate to **Firewall ---> Rules** and under the **WAN** tab, click the **Add** button. In the **Edit Firewall Rule** page, fill/set the following fields (**Figure 25**).

- **Action:** Pass
- **Interface:** WAN
- **Address Family:** IPv4
- **Protocol:** UDP
- **Source:** Any
- **Destination:** WAN address

- **Destination Port Range:** (other) 51820 to (other) 51820
- **Log:** Optionally, check to Log packets that are handled by this rule
- **Description:** Optionally, enter a description (Ex: Wireguard Site A and Site B)
- Click the **Save** button and then click the **Apply Changes** button.

Figure 25



Edit Firewall Rule

Action: Pass

Choose what to do with packets that match the criteria specified below.
Hint: the difference between block and reject is that with reject, a packet (TCP RST or ICMP port unreachable for UDP) is returned to the sender, whereas with block the packet is dropped silently. In either case, the original packet is discarded.

Disabled: ☐ Disable this rule

Set this option to disable this rule without removing it from the list.

Interface: WAN

Choose the interface from which packets must come to match this rule.

Address Family: IPv4

Select the Internet Protocol version this rule applies to.

Protocol: UDP

Choose which IP protocol this rule should match.

Source

Source: ☐ Invert match | Any | Source Address | /

Display Advanced

The **Source Port Range** for a connection is typically random and almost never equal to the destination port. In most cases this setting must remain at its default value, **any**.

Destination

Destination: ☐ Invert match | WAN address | Destination Address | /

Destination Port Range: (other) From | 51820 Custom | (other) To | 51820 Custom

Specify the destination port or port range for this rule. The "To" field may be left empty if only filtering a single port.

Extra Options

Log: ☑ Log packets that are handled by this rule

Hint: the firewall has limited local log space. Don't turn on logging for everything. If doing a lot of logging, consider using a remote syslog server (see the Status: System Logs: Settings page).

Description: Wireguard Site A and Site B

A description may be entered here for administrative reference. A maximum of 52 characters will be used in the ruleset and displayed in the firewall log.

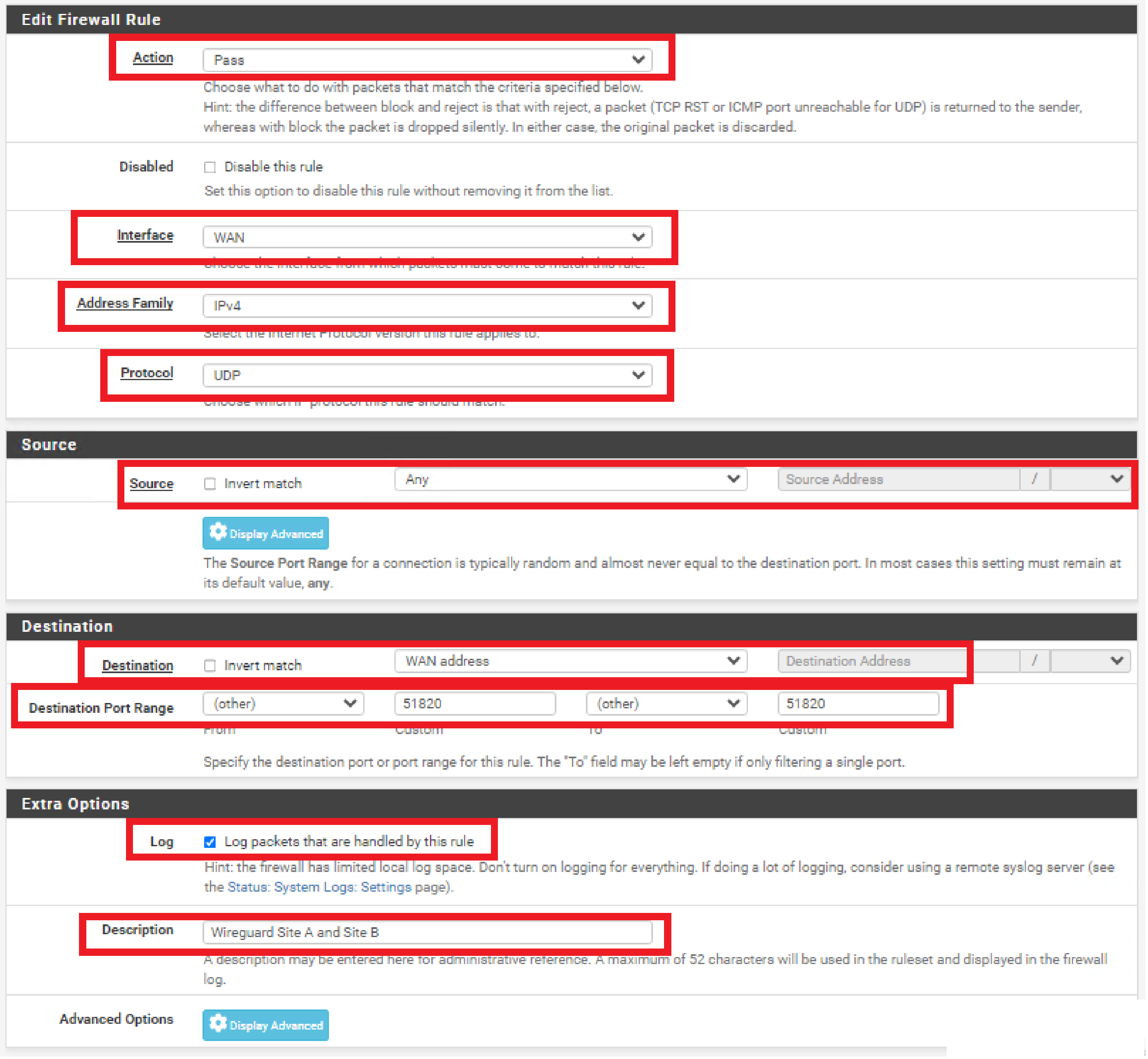
Advanced Options: Display Advanced

On **BOTH** firewalls, navigate to **Firewall ---> Rules** and under the **TUNNELTOSITE(X)** tab, click the **Add** button. In the **Edit Firewall Rule** page, fill/set the following fields (**Figure 25**).

- **Action:** Pass
- **Interface:** Ensure the interface you created earlier for each site is already selected
- **Address Family:** IPv4
- **Protocol:** Any (Start with **Any** and then you can tighten the rules further after you ensure tunnel is working properly)

- **Source:** Any (Start with **Any** and then you can tighten the rules further after you ensure tunnel is working properly)
- **Destination:** Any (Start with **Any** and then you can tighten the rules further after you ensure tunnel is working properly)
- **Destination Port Range:** Any (Start with **Any** and then you can tighten the rules further after you ensure tunnel is working properly)
- **Log:** Optionally, check to Log packets that are handled by this rule
- **Description:** Optionally, enter a description (Ex: Wireguard Traffic Site A and Site B)
- Click the **Save** button and then click the **Apply Changes** button.

Figure 25



Edit Firewall Rule

Action: Pass

Choose what to do with packets that match the criteria specified below.
Hint: the difference between block and reject is that with reject, a packet (TCP RST or ICMP port unreachable for UDP) is returned to the sender, whereas with block the packet is dropped silently. In either case, the original packet is discarded.

Disabled: ☐ Disable this rule

Set this option to disable this rule without removing it from the list.

Interface: WAN

Choose the interface from which packets must come to match this rule.

Address Family: IPv4

Select the Internet Protocol version this rule applies to.

Protocol: UDP

Choose which IP protocol this rule should match.

Source

Source: ☐ Invert match | Any | Source Address | /

The **Source Port Range** for a connection is typically random and almost never equal to the destination port. In most cases this setting must remain at its default value, **any**.

Destination

Destination: ☐ Invert match | WAN address | Destination Address | /

Destination Port Range: From (other) | Custom 51820 | To (other) | Custom 51820

Specify the destination port or port range for this rule. The "To" field may be left empty if only filtering a single port.

Extra Options

Log: ☑ Log packets that are handled by this rule

Hint: the firewall has limited local log space. Don't turn on logging for everything. If doing a lot of logging, consider using a remote syslog server (see the Status: System Logs: Settings page).

Description: Wireguard Site A and Site B

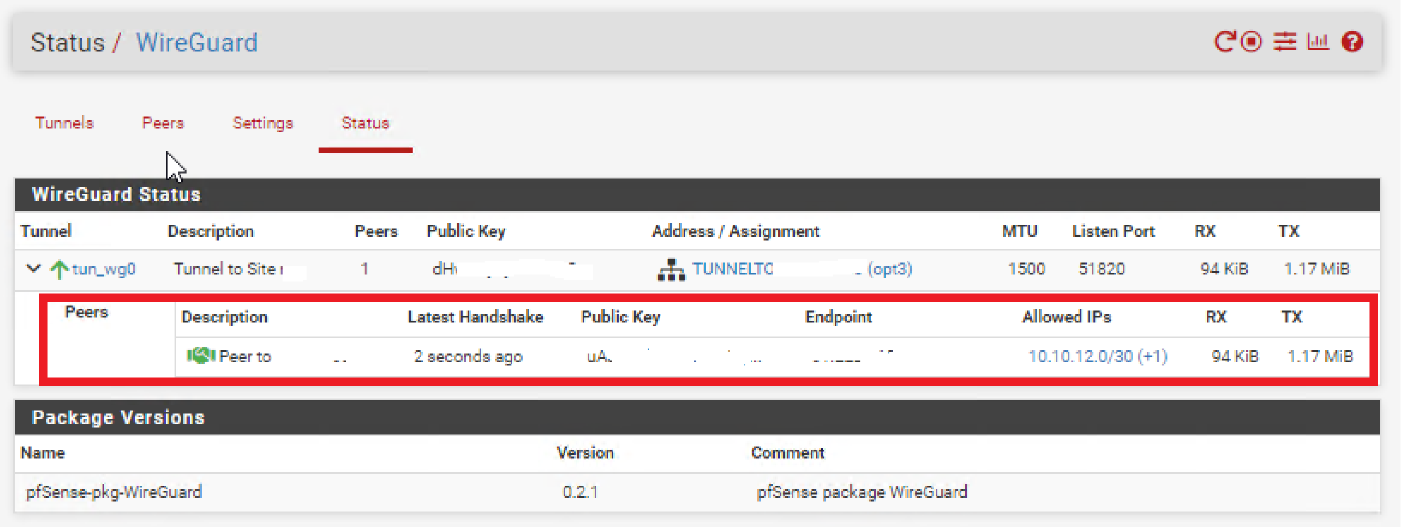
A description may be entered here for administrative reference. A maximum of 52 characters will be used in the ruleset and displayed in the firewall log.

Advanced Options

Check the Wireguard Status

On **BOTH** firewalls navigate to **Status ---> Wireguard**, locate the WireGuard tunnel you created, expand it and ensure the Peers are connected on BOTH firewalls (**Figure 26**).

Figure 26



WireGuard Status

Tunnel	Description	Peers	Public Key	Address / Assignment	MTU	Listen Port	RX	TX
tun_wg0	Tunnel to Site [redacted]	1	dH [redacted]	TUNNELTO [redacted] (opt3)	1500	51820	94 KiB	1.17 MiB

Peers	Description	Latest Handshake	Public Key	Endpoint	Allowed IPs	RX	TX
	Peer to [redacted]	2 seconds ago	uA [redacted]	[redacted]	10.10.12.0/30 (+1)	94 KiB	1.17 MiB

Package Versions

Name	Version	Comment
pfSense-pkg-WireGuard	0.2.1	pfSense package WireGuard

Additionally, ensure you can ping and access resources on each remote network from the corresponding site.