



CYBERSECURITY FOUNDATION V2

Lab 1: Configuring TCP/IP and a Virtual Router

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Introduction

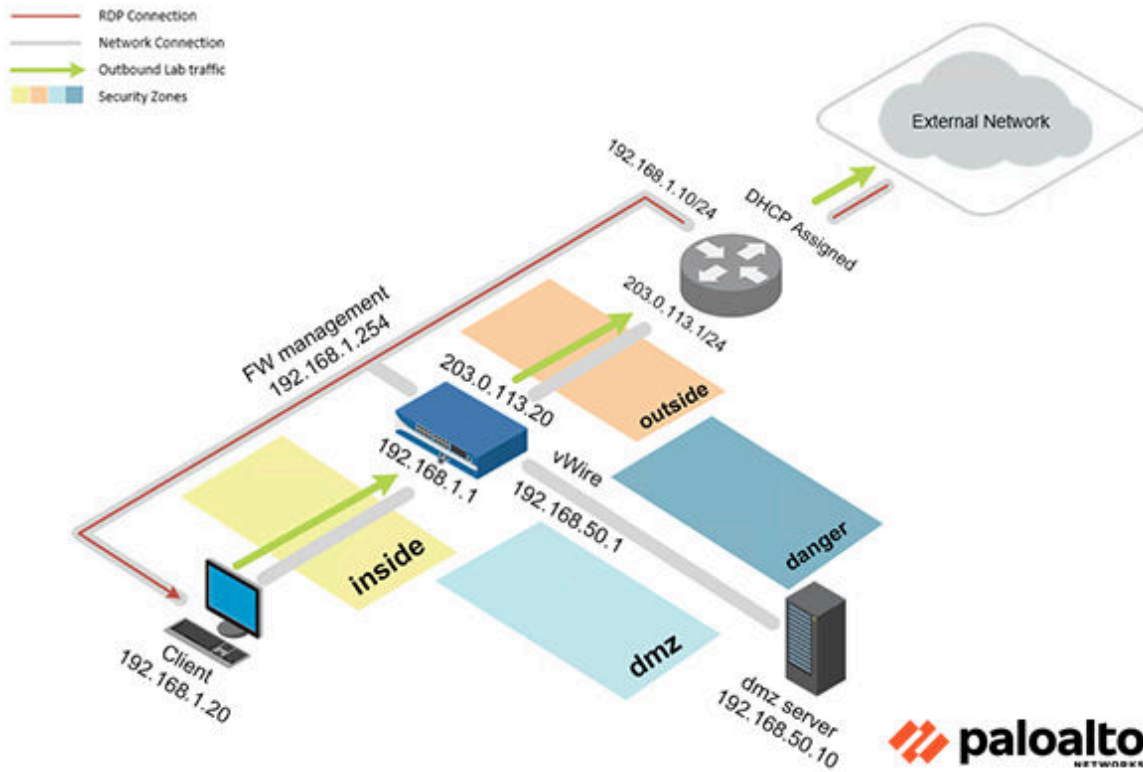
In this lab, you will configure Ethernet interfaces on the Palo Alto Networks Firewall with Layer 3 information, create a Virtual Router to allow traffic, and verify network connectivity.

Objective

In this lab, you will perform the following tasks:

- Configure Ethernet interfaces with Layer 3 Information
- Create a Virtual Router
- Verify the Network Connectivity

Lab Topology



Lab Settings

The information in the table below will be needed in order to complete the lab. The task sections below provide details on the use of this information.

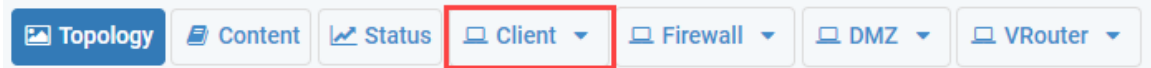
Virtual Machine	IP Address	Account (if needed)	Password (if needed)
Client	192.168.1.20	lab-user	Pal0Alt0!
DMZ	192.168.50.10	root	Pal0Alt0!
Firewall	192.168.1.254	admin	Pal0Alt0!

1 Configuring TCP/IP and a Virtual Router

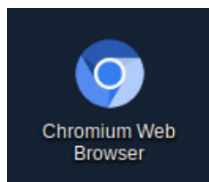
1.0 Load Lab Configuration

In this section, you will load the Firewall configuration file.

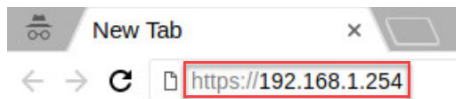
1. Click on the **Client** tab to access the Client PC.



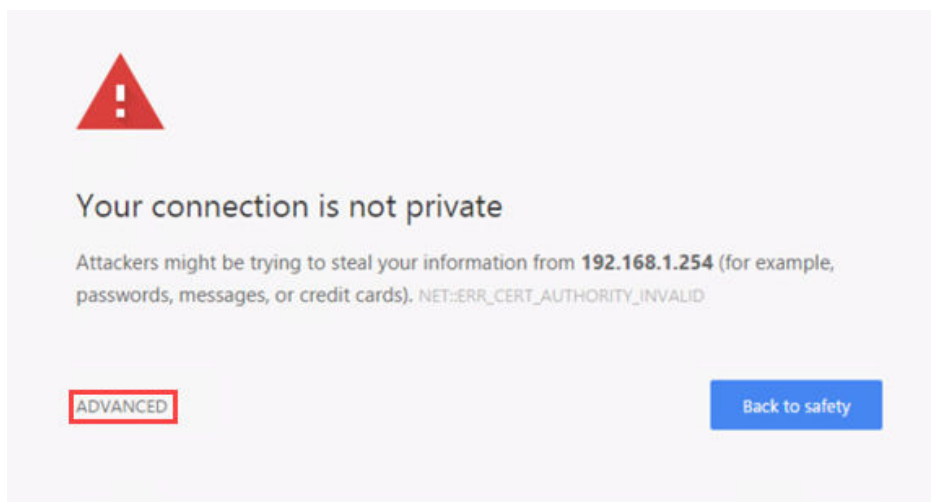
2. Log in to the Client PC as username `lab-user`, password `Pa10Alt0!`.
3. Double-click the **Chromium Web Browser** icon, located on the Desktop.



4. In the *Chromium* address field, type `https://192.168.1.254` and press **Enter**.

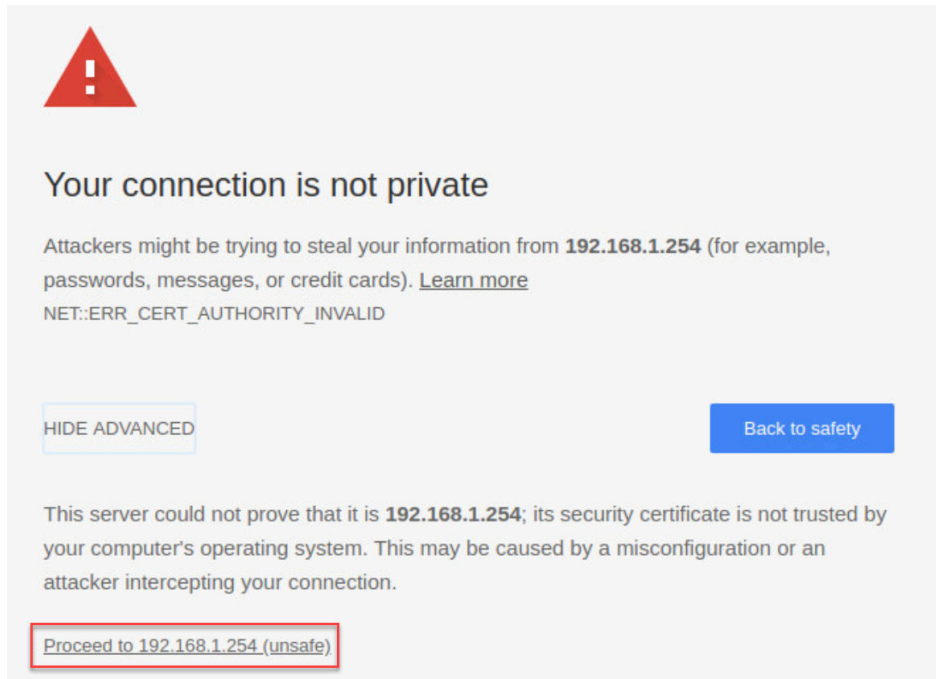


5. You will see a “Your connection is not private” message. Click on the **ADVANCED** link.



If you experience the “Unable to connect” or “502 Bad Gateway” message while attempting to connect to the specified IP above, please wait an additional 1-3 minutes for the Firewall to fully initialize. Refresh the page to continue.

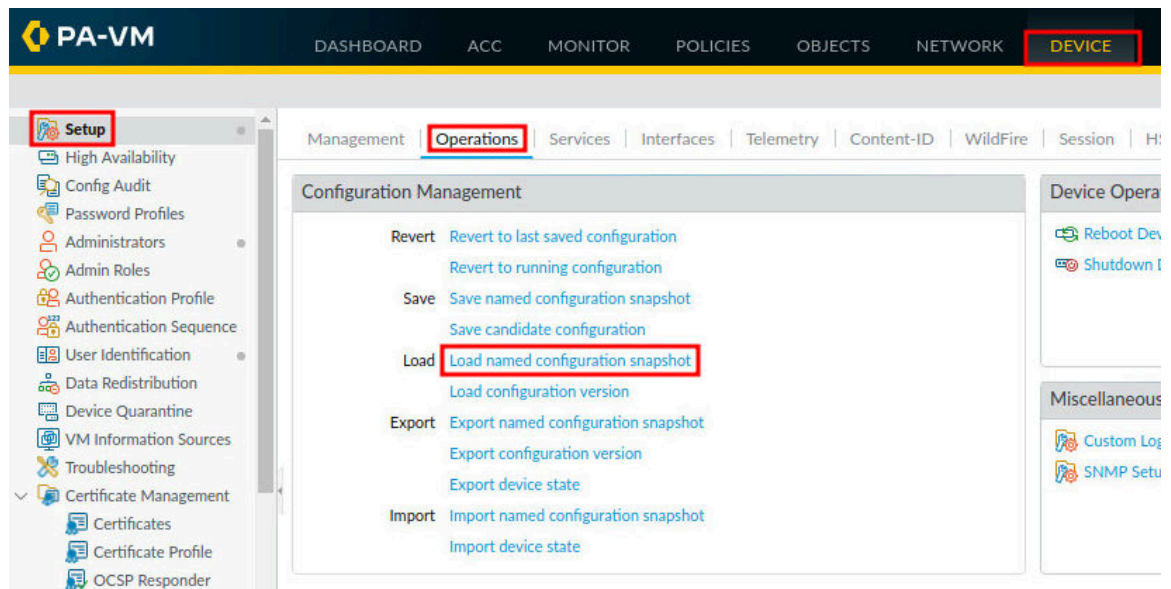
- Click on **Proceed to 192.168.1.254 (unsafe)**.



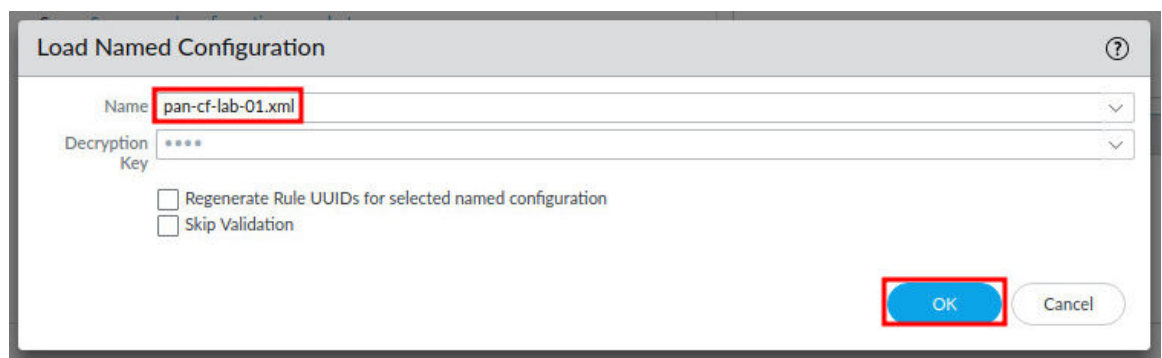
- Log in to the Firewall web interface as username admin, password Pal0Alt0!.



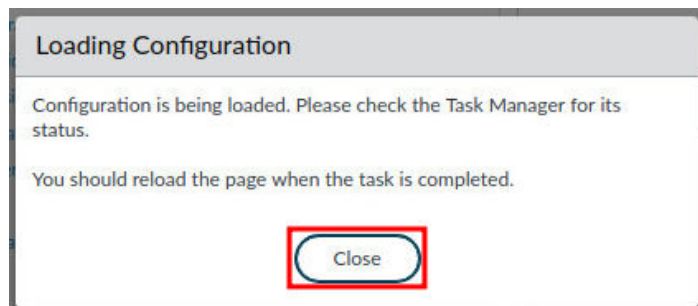
8. In the web interface, navigate to **Device > Setup > Operations** and click on **Load** named configuration snapshot underneath the *Configuration Management* section.



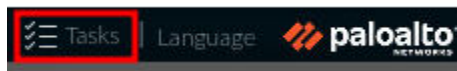
9. In the *Load Named Configuration* window, select **pan-cf-lab-01.xml** from the *Name* dropdown box and click **OK**.



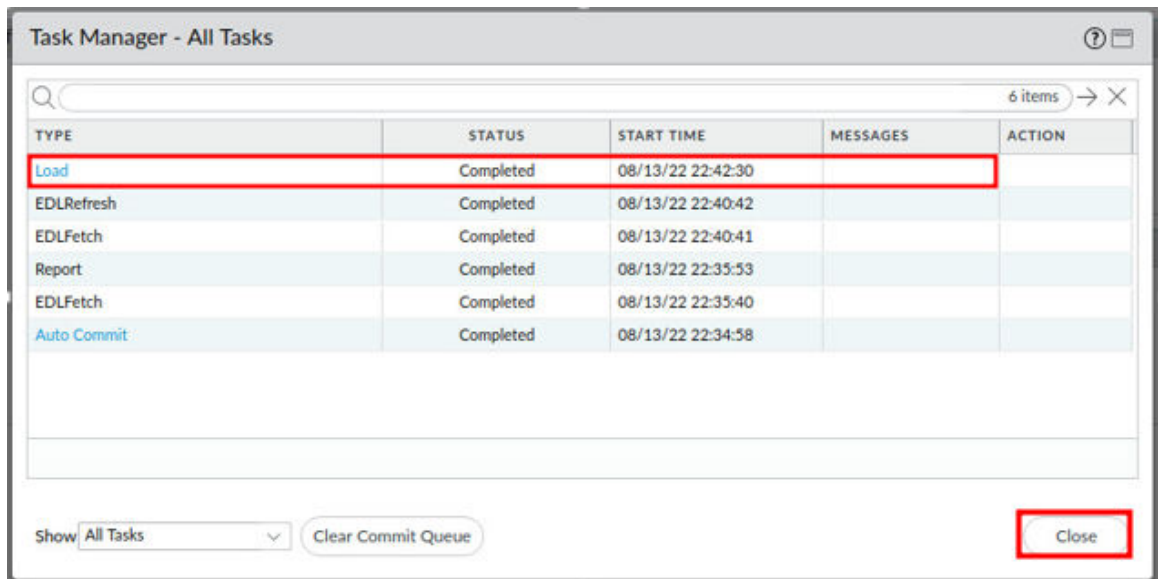
10. In the *Loading Configuration* window, a message will show *Configuration is being loaded*. Please check the Task Manager for its status. You should reload the page when the task is completed. Click **Close** to continue.



11. Click the **Tasks** icon located at the bottom-right of the web interface.



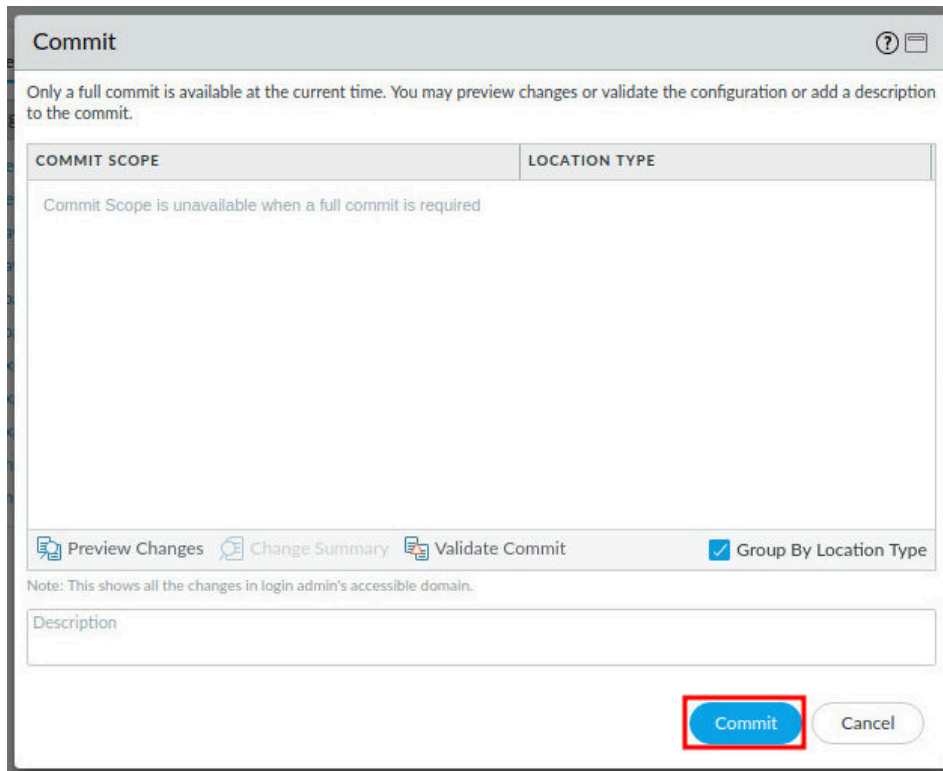
12. In the *Task Manager – All Tasks* window, verify the *Load* type has successfully completed. Click **Close**.



13. Click the **Commit** link located at the top-right of the web interface.

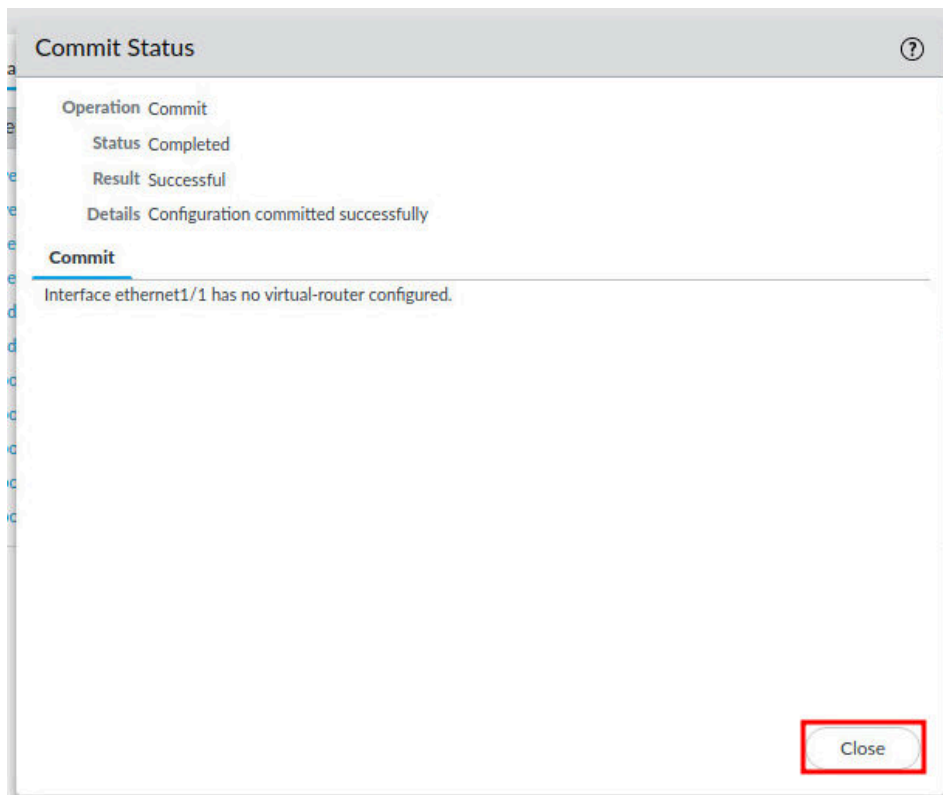


14. In the *Commit* window, click **Commit** to proceed with committing the changes.



The screenshot shows the 'Commit' window in a network management interface. The window title is 'Commit'. Below the title bar, there is a message: 'Only a full commit is available at the current time. You may preview changes or validate the configuration or add a description to the commit.' Below this message is a table with two columns: 'COMMIT SCOPE' and 'LOCATION TYPE'. The 'COMMIT SCOPE' column contains the text 'Commit Scope is unavailable when a full commit is required'. Below the table is a row of buttons: 'Preview Changes', 'Change Summary', 'Validate Commit', and a checked checkbox labeled 'Group By Location Type'. Below the buttons is a note: 'Note: This shows all the changes in login admin's accessible domain.' Below the note is a text input field labeled 'Description'. At the bottom right of the window are two buttons: 'Commit' (highlighted with a red rectangle) and 'Cancel'.

15. When the commit operation successfully completes, click **Close** to continue.



The screenshot shows the 'Commit Status' window in a network management interface. The window title is 'Commit Status'. Below the title bar, there is a table with the following information:

Operation	Commit
Status	Completed
Result	Successful
Details	Configuration committed successfully

Below the table is a section titled 'Commit' with a sub-section 'Interface ethernet1/1 has no virtual-router configured.' At the bottom right of the window is a button labeled 'Close' (highlighted with a red rectangle).

16. The commit process takes changes made to the Firewall and copies them to the running configuration, which will activate all configuration changes since the last commit.



Notice the warnings in the **Commit** section. You will resolve those during this lab.

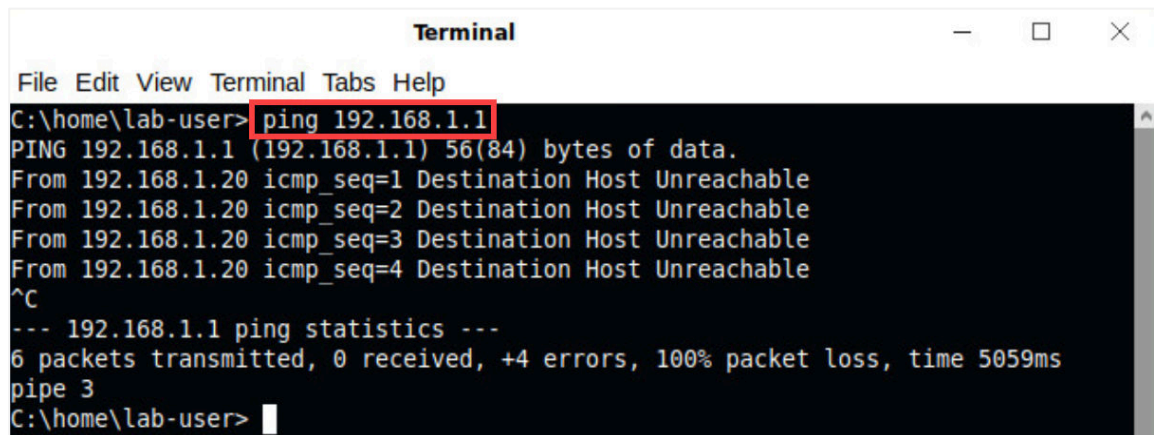
1.1 Configure Ethernet Interfaces with Layer 3 Information

In this section, you will confirm you have no connectivity to the Firewall from the inside network. Next, you will configure the Firewall with Layer 3 information.

1. Click on the **Xfce Terminal** icon in the taskbar.



2. In the *Terminal* window, type `ping 192.168.1.1` and press **Enter**. To stop the ping, click **Ctrl+C**.

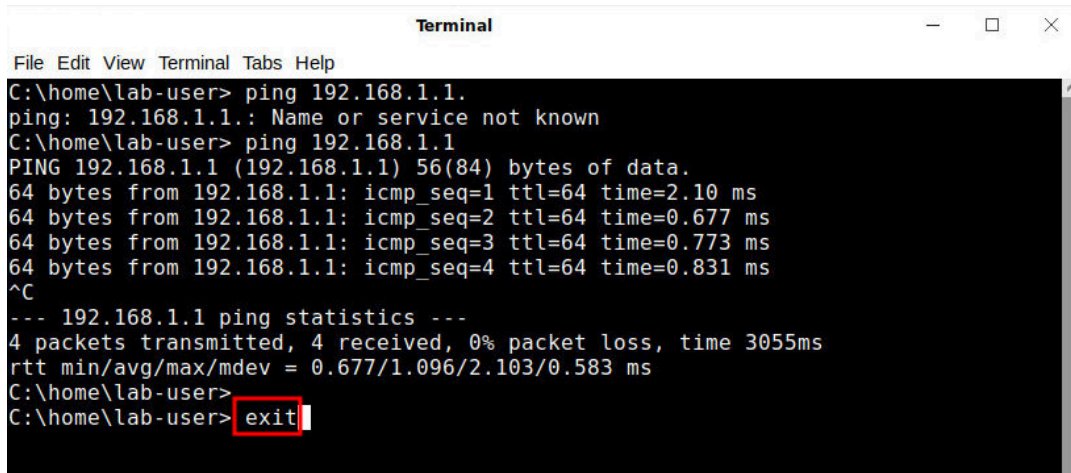


```
Terminal
File Edit View Terminal Tabs Help
C:\home\lab-user> ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
From 192.168.1.20 icmp_seq=1 Destination Host Unreachable
From 192.168.1.20 icmp_seq=2 Destination Host Unreachable
From 192.168.1.20 icmp_seq=3 Destination Host Unreachable
From 192.168.1.20 icmp_seq=4 Destination Host Unreachable
^C
--- 192.168.1.1 ping statistics ---
6 packets transmitted, 0 received, +4 errors, 100% packet loss, time 5059ms
pipe 3
C:\home\lab-user>
```



Ping is a network utility used to test the reachability of a host. In this instance, notice the response: “**Destination host unreachable.**” This indicates that there is no network connectivity between the Client and the Firewall.

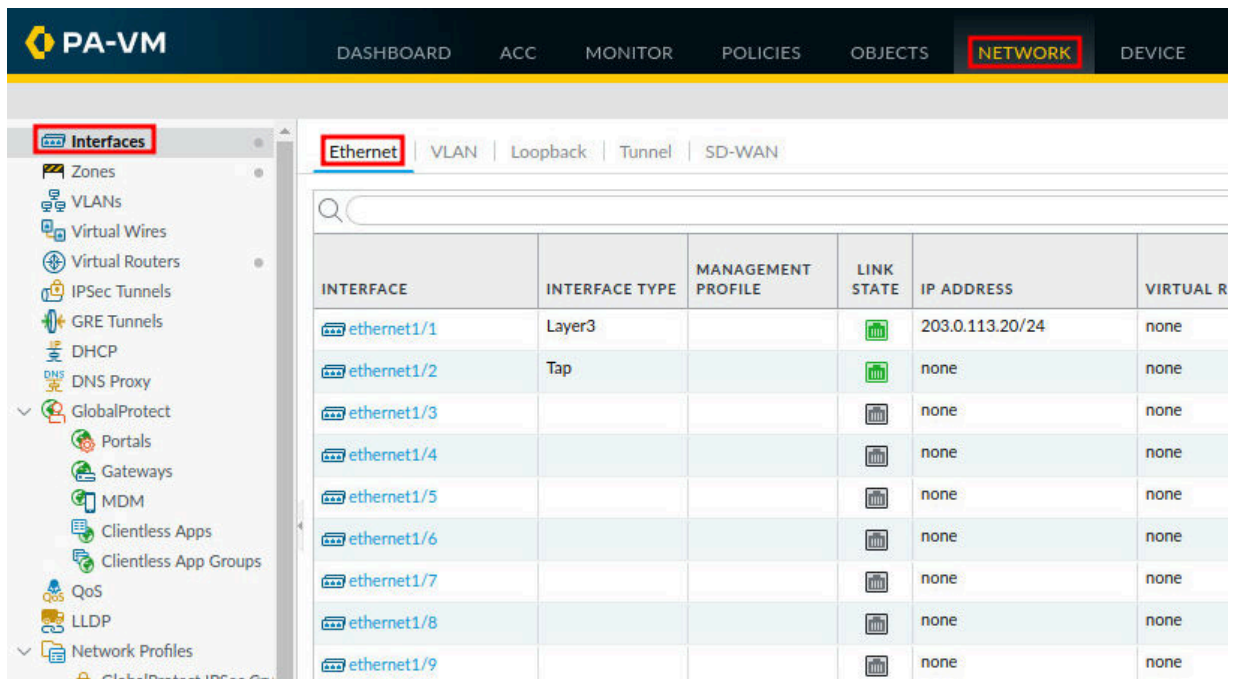
- Close the *Terminal* window by typing **exit** then press **Enter**.



```

Terminal
File Edit View Terminal Tabs Help
C:\home\lab-user> ping 192.168.1.1.
ping: 192.168.1.1.: Name or service not known
C:\home\lab-user> ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=2.10 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=0.677 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=64 time=0.773 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=64 time=0.831 ms
^C
--- 192.168.1.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3055ms
rtt min/avg/max/mdev = 0.677/1.096/2.103/0.583 ms
C:\home\lab-user>
C:\home\lab-user> exit
  
```



















- With the Firewall administrator page open, navigate to **Network > Interfaces > Ethernet**.



The screenshot shows the PA-VM Firewall administrator interface. The top navigation bar includes 'DASHBOARD', 'ACC', 'MONITOR', 'POLICIES', 'OBJECTS', 'NETWORK' (highlighted), and 'DEVICE'. The left sidebar shows a tree view with 'Interfaces' selected. The main content area displays the 'Ethernet' tab, showing a table of network interfaces.

INTERFACE	INTERFACE TYPE	MANAGEMENT PROFILE	LINK STATE	IP ADDRESS	VIRTUAL R
ethernet1/1	Layer3			203.0.113.20/24	none
ethernet1/2	Tap			none	none
ethernet1/3				none	none
ethernet1/4				none	none
ethernet1/5				none	none
ethernet1/6				none	none
ethernet1/7				none	none
ethernet1/8				none	none
ethernet1/9				none	none

- Click on the interface **ethernet1/2** from the list.

Ethernet VLAN Loopback Tunnel SD-WAN				
Q				
INTERFACE	INTERFACE TYPE	MANAGEMENT PROFILE	LINK STATE	IP ADDRESS
 ethernet1/1	Layer3			203.0.113.20/24
 ethernet1/2	Tap			none
 ethernet1/3				none
 ethernet1/4				none
 ethernet1/5				none
 ethernet1/6				none
 ethernet1/7				none
 ethernet1/8				none
 ethernet1/9				none

- In the *Ethernet Interface* window, in the *Interface Type* dropdown, select **Layer3**. In the *Security Zone* dropdown, select **inside**.

Ethernet Interface

Interface Name ethernet1/2

Comment

Interface Type Layer3

Netflow Profile None

Config | IPv4 | IPv6 | SD-WAN | Advanced

Assign Interface To

Virtual Router None

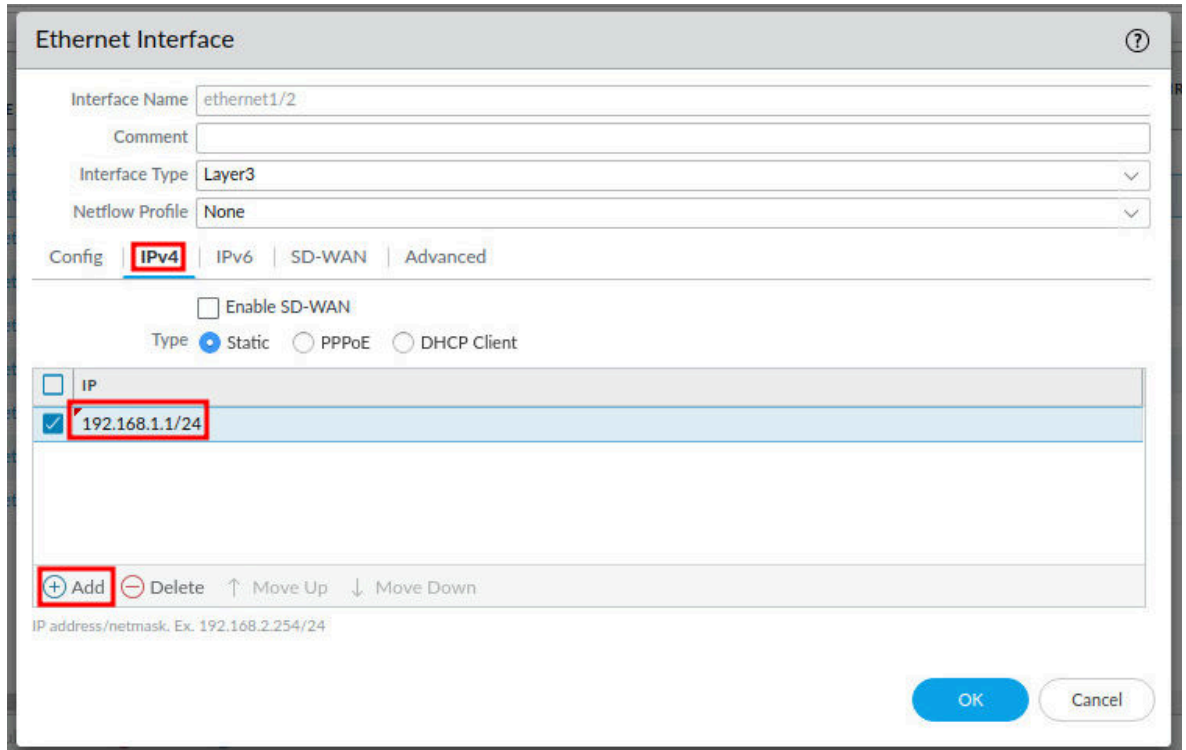
Security Zone inside

OK Cancel



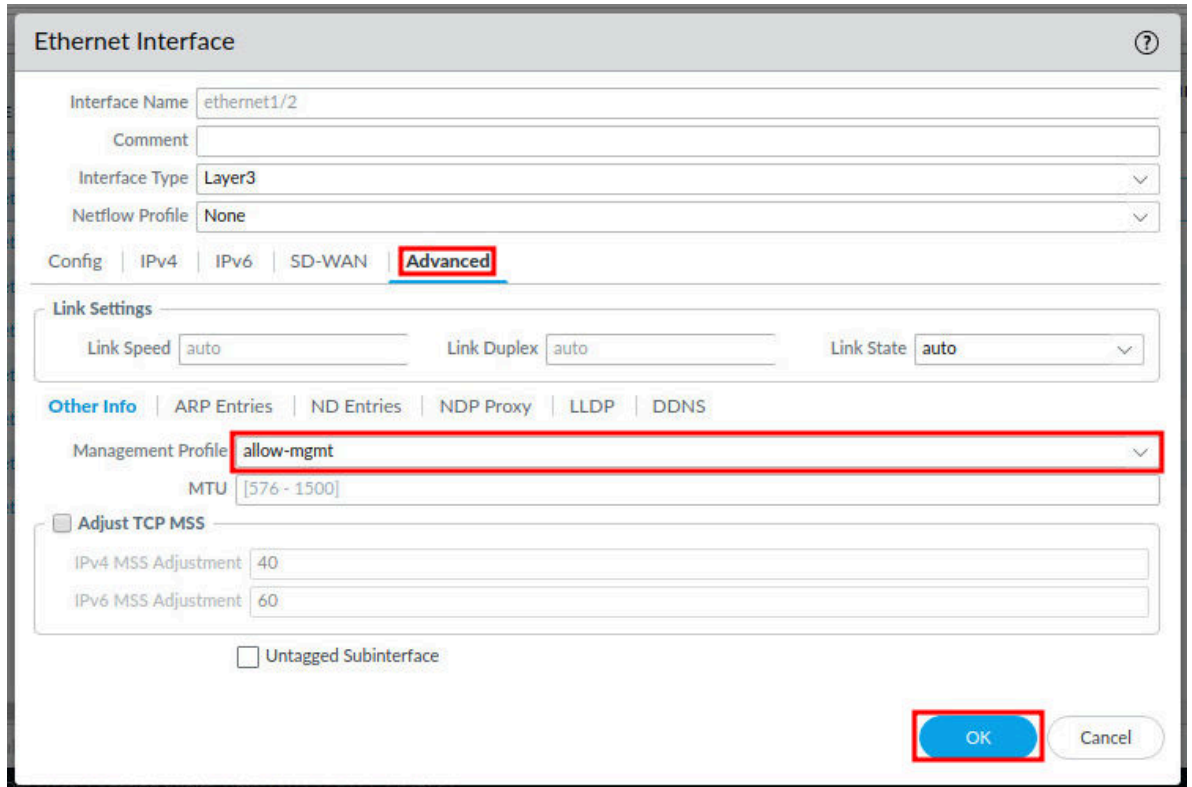
Layer 3 is selected so that the Firewall interface can be given an IP address, assigned a zone, and a virtual router.

7. In the *Ethernet Interface* window, click on the **IPv4** tab and click on the **Add** button at the bottom-left. Type `192.168.1.1/24` in the address field.



The screenshot shows the 'Ethernet Interface' configuration window with the 'IPv4' tab selected. The 'Interface Name' is 'ethernet1/2', 'Interface Type' is 'Layer3', and 'Netflow Profile' is 'None'. The 'Type' is set to 'Static'. Under the 'IP' section, the address '192.168.1.1/24' is entered and highlighted with a red box. The '+ Add' button at the bottom left is also highlighted with a red box. The 'OK' button is at the bottom right.

8. Click on the **Advanced** tab, and under the *Management Profile* dropdown, select **allow-mgmt** and click **OK**.

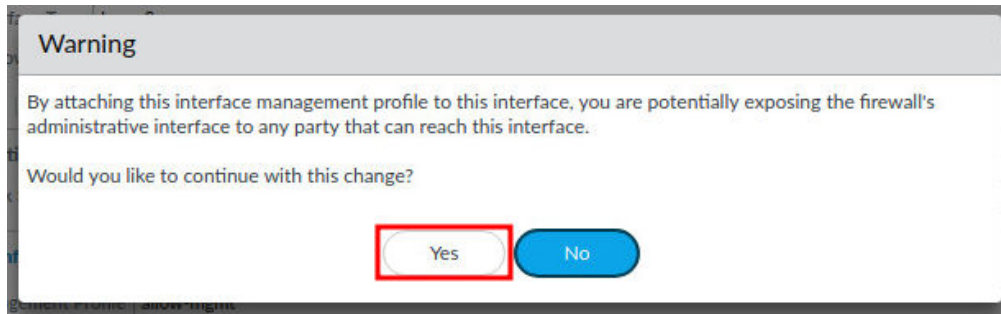


The screenshot shows the 'Ethernet Interface' configuration window with the 'Advanced' tab selected. The 'Link Settings' section shows 'Link Speed' as 'auto', 'Link Duplex' as 'auto', and 'Link State' as 'auto'. The 'Management Profile' dropdown is set to 'allow-mgmt' and is highlighted with a red box. The 'MTU' is set to '[576 - 1500]'. The 'Adjust TCP MSS' section shows 'IPv4 MSS Adjustment' as 40 and 'IPv6 MSS Adjustment' as 60. The 'Untagged Subinterface' checkbox is unchecked. The 'OK' button at the bottom right is highlighted with a red box.



The **allow-mgmt** Management Profile allows the interface to accept pings and to accept management functions such as configuring the Firewall with SSH or a web browser.

9. In the *Warning* window, click **Yes**.

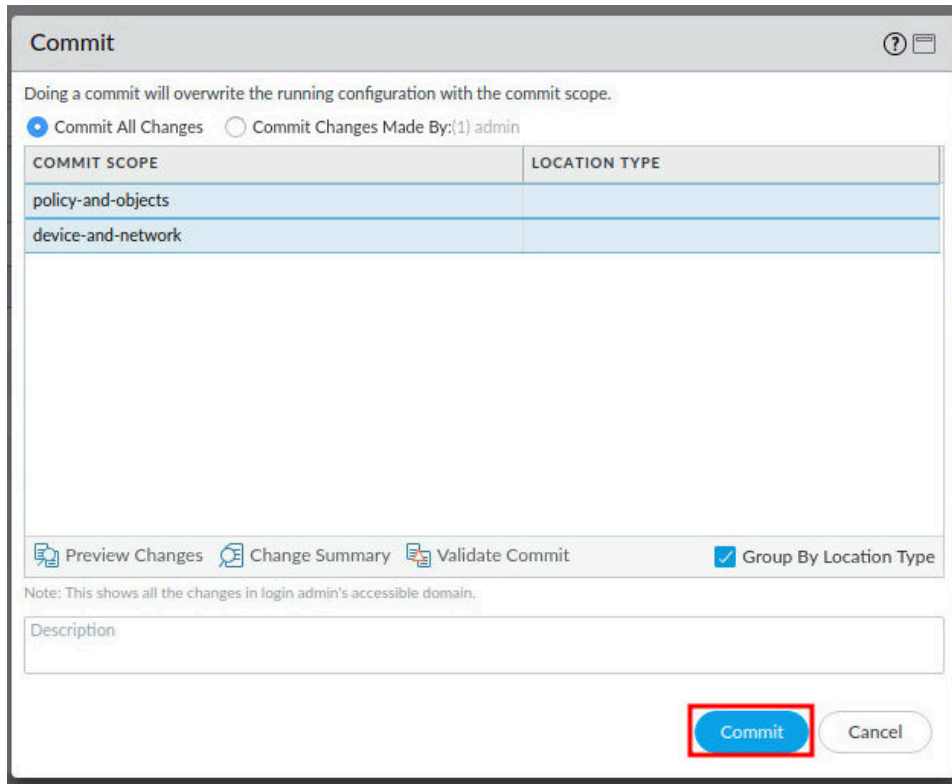


The Warning advises that if you attach this interface management profile to this interface, you are potentially exposing the firewall's administrative interface to any party that can reach this interface. For the purpose of this lab, you will bypass this warning knowing that it is not good practice to attach a management profile to a production interface.

10. Click the **Commit** link located at the top-right of the web interface.



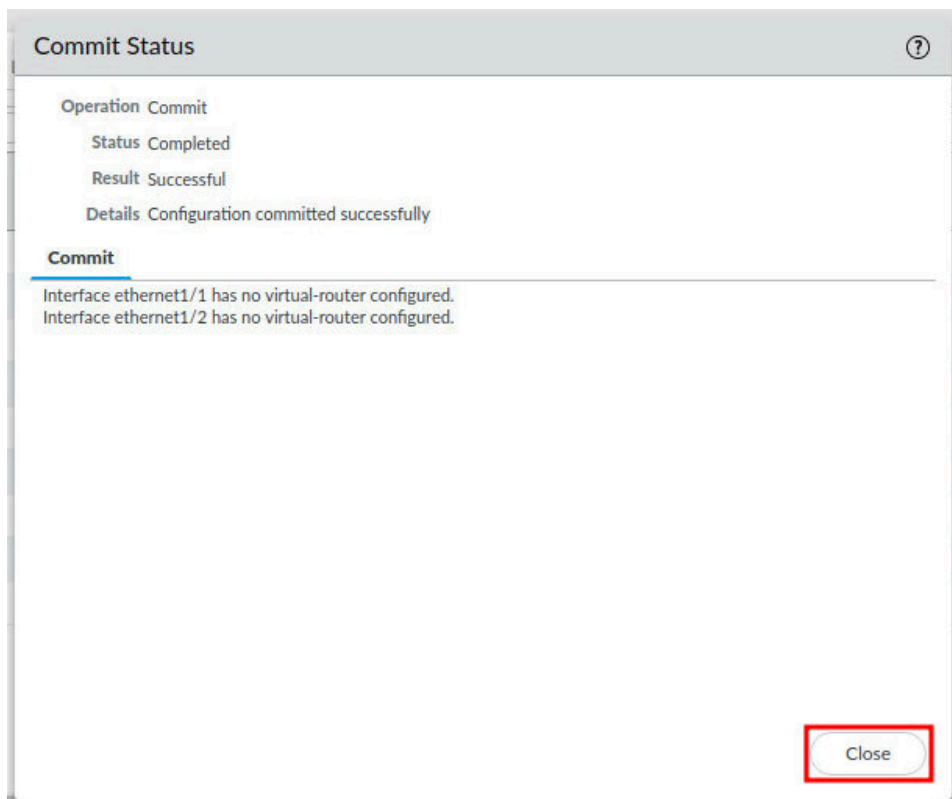
11. In the *Commit* window, click **Commit** to proceed with committing the changes.



The screenshot shows the 'Commit' window in a network management interface. At the top, it says 'Doing a commit will overwrite the running configuration with the commit scope.' Below this, there are two radio buttons: 'Commit All Changes' (selected) and 'Commit Changes Made By:(1) admin'. A table with two columns, 'COMMIT SCOPE' and 'LOCATION TYPE', lists 'policy-and-objects' and 'device-and-network'. Below the table are icons for 'Preview Changes', 'Change Summary', and 'Validate Commit', along with a checked checkbox for 'Group By Location Type'. A note states: 'Note: This shows all the changes in login admin's accessible domain.' At the bottom right, the 'Commit' button is highlighted with a red rectangle, next to a 'Cancel' button.

COMMIT SCOPE	LOCATION TYPE
policy-and-objects	
device-and-network	

12. When the commit operation successfully completes, click **Close** to continue.



The screenshot shows the 'Commit Status' window. It displays the following information: Operation: Commit, Status: Completed, Result: Successful, and Details: Configuration committed successfully. Below this, under the 'Commit' section, it lists: 'Interface ethernet1/1 has no virtual-router configured.' and 'Interface ethernet1/2 has no virtual-router configured.' At the bottom right, the 'Close' button is highlighted with a red rectangle.

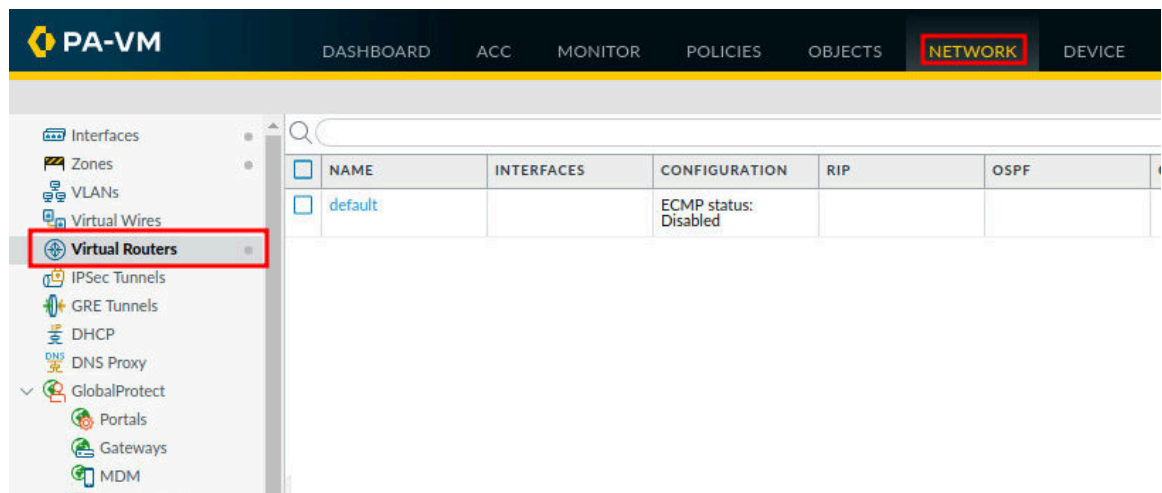


Notice the warnings in the **Commit** section. You will resolve this in the next section.

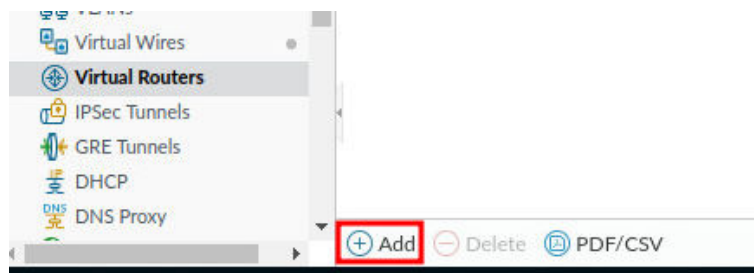
1.2 Create a Virtual Router

In this section, you will create a Virtual Router. Creating a virtual router allows the Firewall to do routing functions so that the Firewall and devices behind it can access other networks and the Internet.

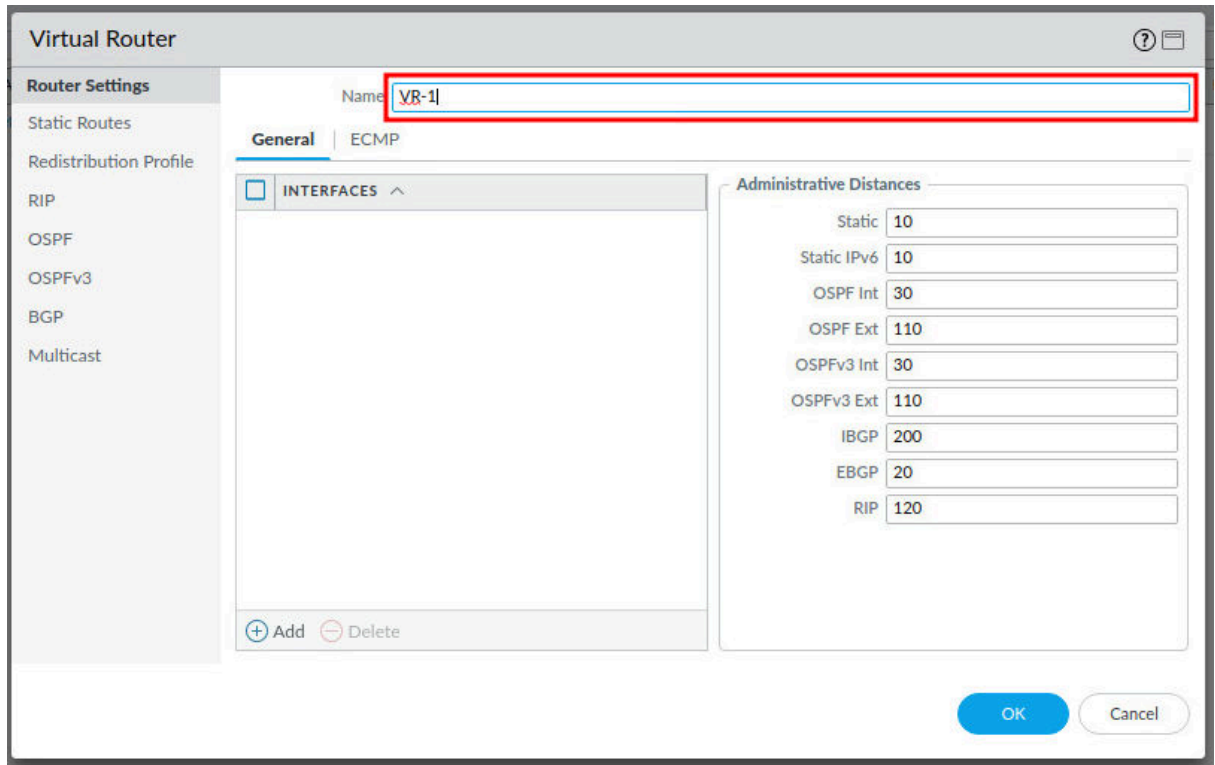
1. Navigate to **Network > Virtual Routers**.



2. Click on **Add**, located at the bottom-left of the window, to create a new virtual router.



3. In the *Virtual Router* window, type VR-1 in the *Name* field.



Virtual Router

Router Settings

Static Routes

Redistribution Profile

RIP

OSPF

OSPFv3

BGP

Multicast

Name: VR-1

General | ECMP

INTERFACES

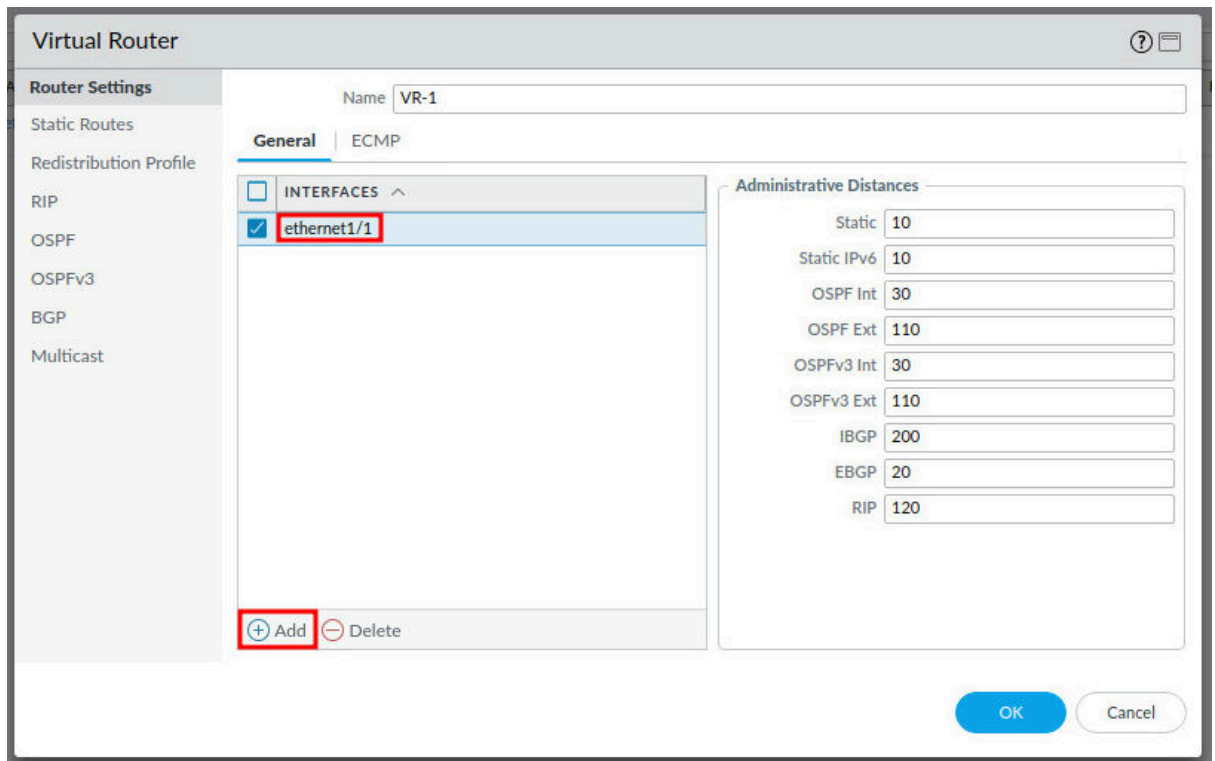
Administrative Distances

Static	10
Static IPv6	10
OSPF Int	30
OSPF Ext	110
OSPFv3 Int	30
OSPFv3 Ext	110
IBGP	200
EBGP	20
RIP	120

+ Add - Delete

OK Cancel

4. Click on the **Add** button and select **ethernet1/1** from the dropdown.



Virtual Router

Router Settings

Static Routes

Redistribution Profile

RIP

OSPF

OSPFv3

BGP

Multicast

Name: VR-1

General | ECMP

INTERFACES

ethernet1/1

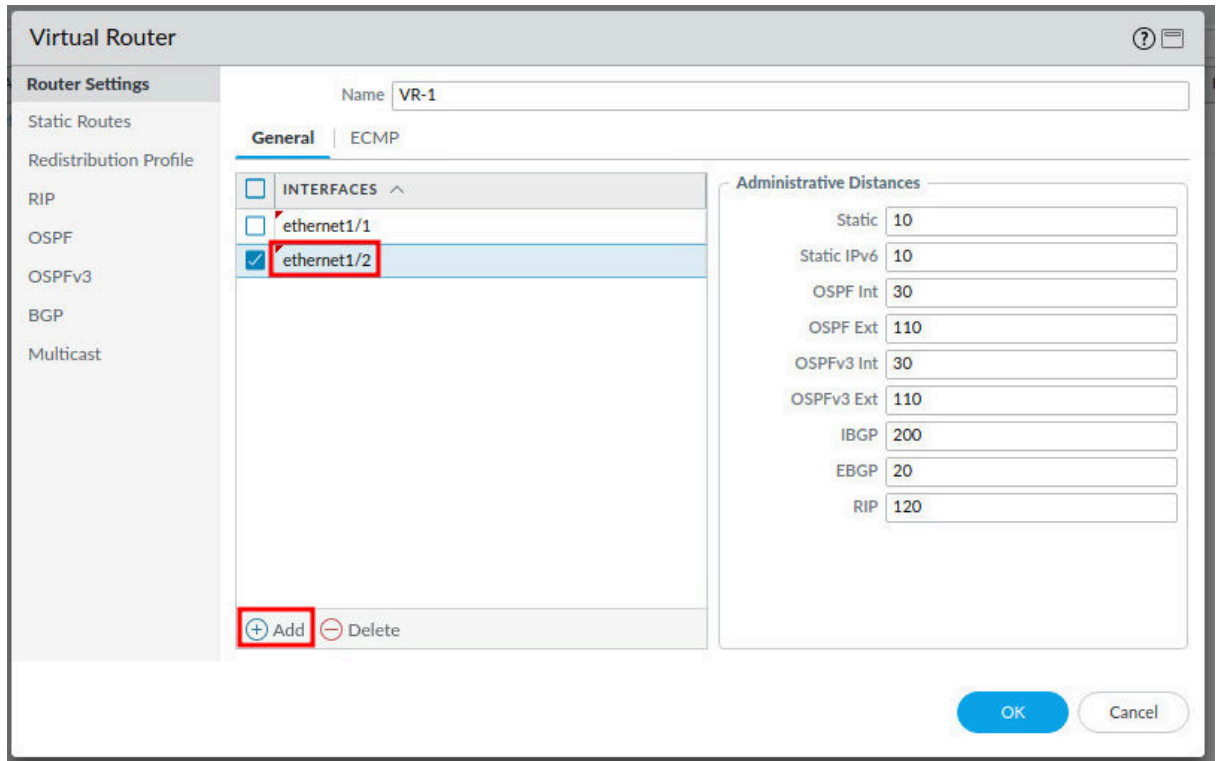
Administrative Distances

Static	10
Static IPv6	10
OSPF Int	30
OSPF Ext	110
OSPFv3 Int	30
OSPFv3 Ext	110
IBGP	200
EBGP	20
RIP	120

+ Add - Delete

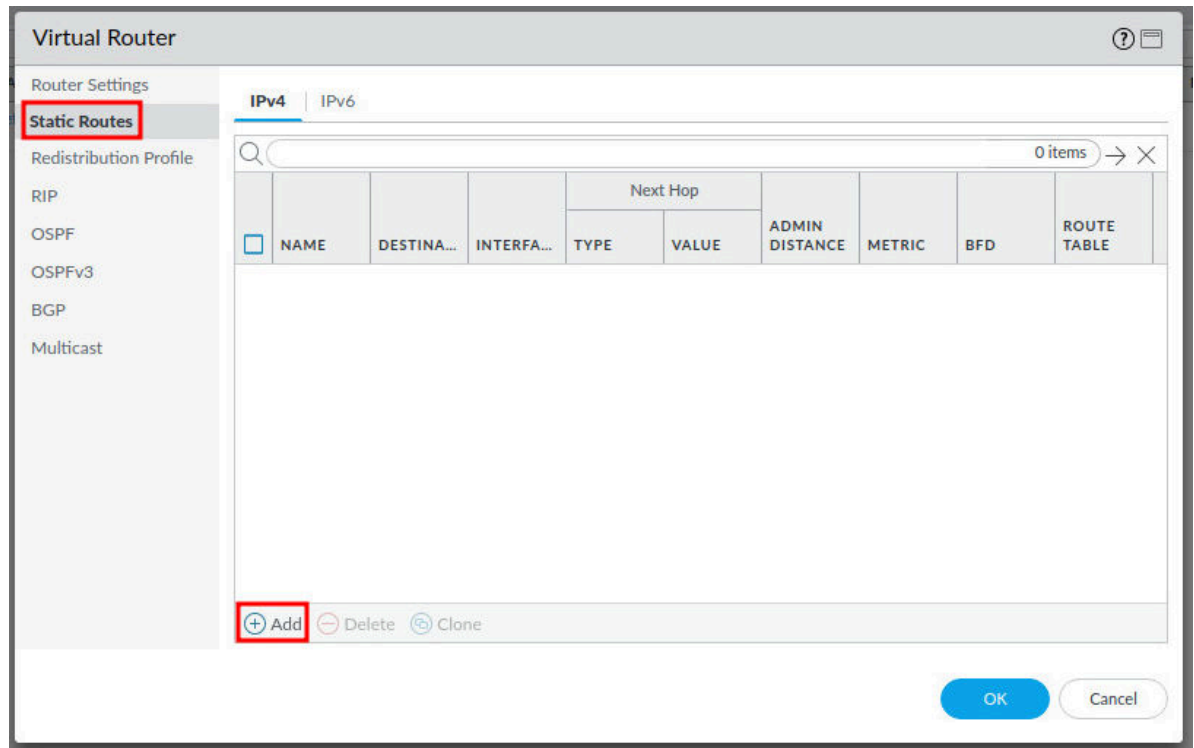
OK Cancel

- Click on the **Add** button and select **ethernet1/2**.

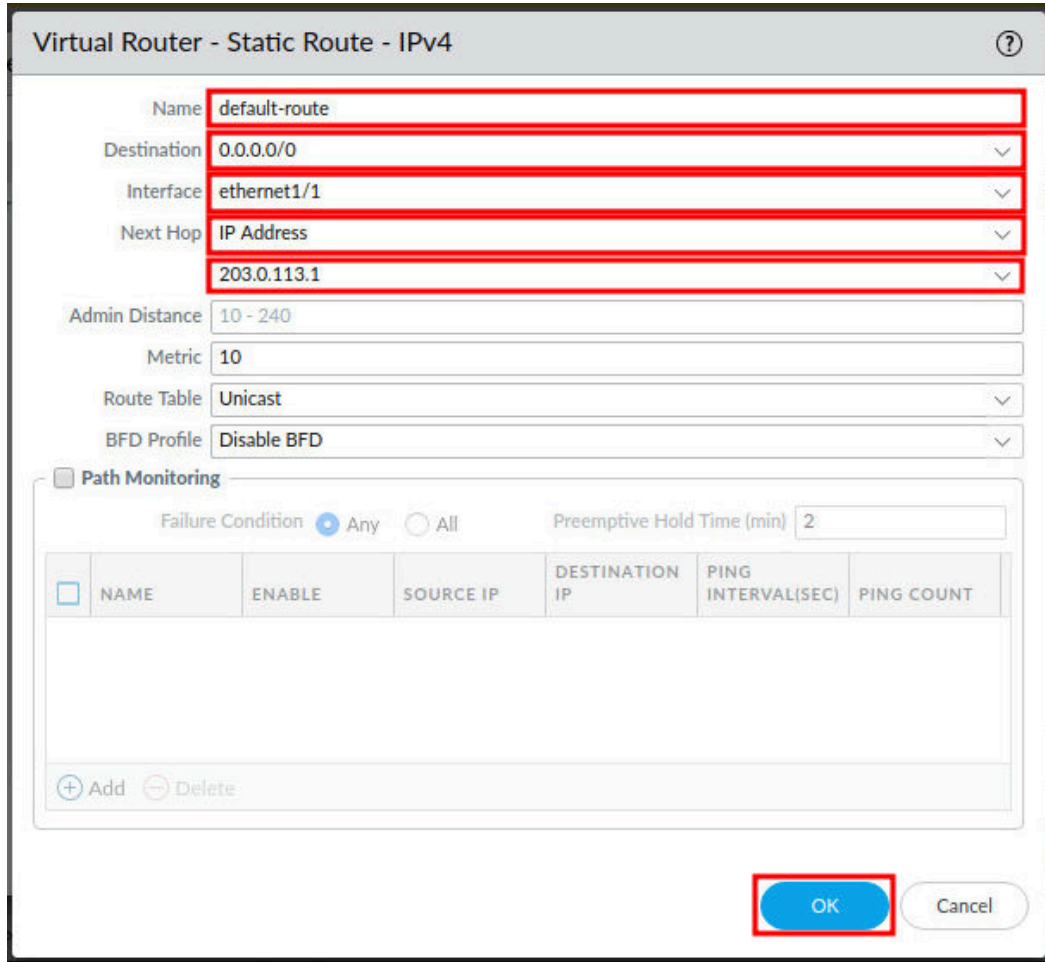


Adding interfaces to the virtual router will allow the networks assigned to these interfaces to route between one another.

- Click on the **Static Routes** tab and then click on the **Add** button at the bottom-left.



7. In the *Virtual Router – Static Route – Ipv4* window, type default-route in the *Name* field. Next, type 0.0.0.0/0 in the *Destination* field. Then, in the *Interface* dropdown, select **ethernet1/1**. Finally, in the *Next Hop* dropdown, ensure **IP Address** is selected, and in the field below it, type 203.0.113.1, and then click **OK**.



Virtual Router - Static Route - IPv4

Name: default-route

Destination: 0.0.0.0/0

Interface: ethernet1/1

Next Hop: IP Address

203.0.113.1

Admin Distance: 10 - 240

Metric: 10

Route Table: Unicast

BFD Profile: Disable BFD

☐ Path Monitoring

Failure Condition: ☒ Any ☐ All

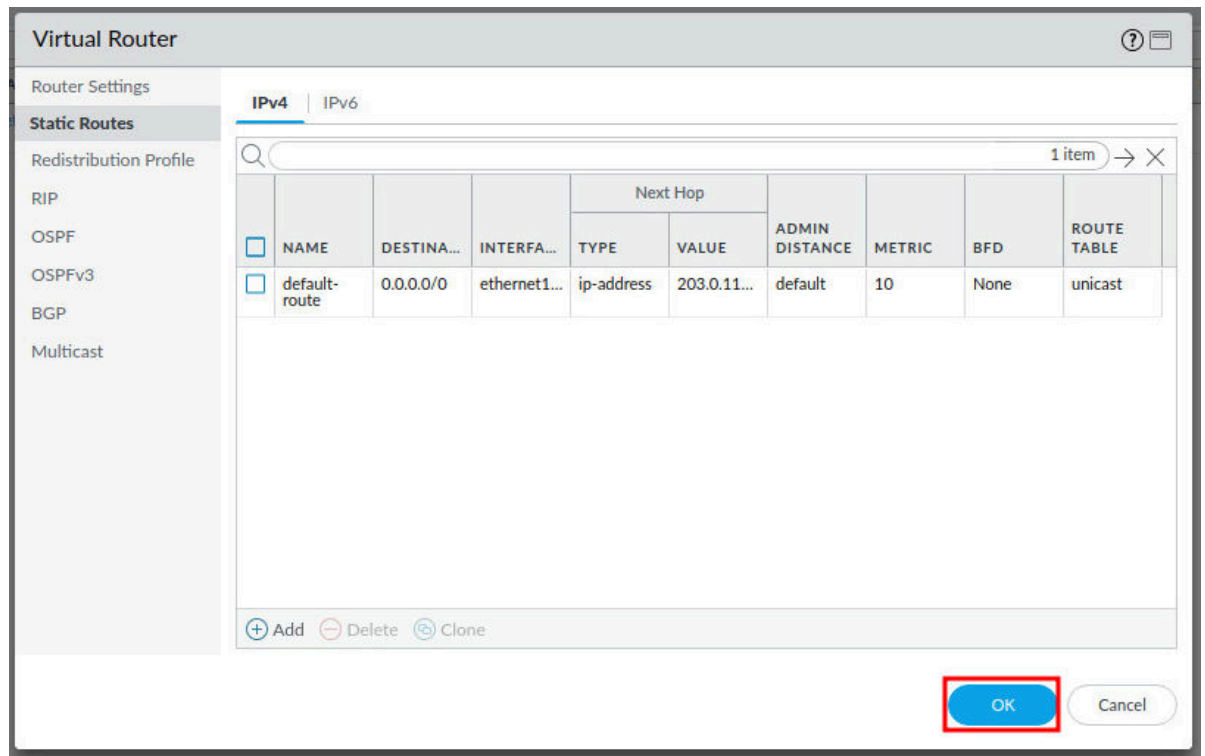
Preemptive Hold Time (min): 2

<input type="checkbox"/>	NAME	ENABLE	SOURCE IP	DESTINATION IP	PING INTERVAL(SEC)	PING COUNT
--------------------------	------	--------	-----------	----------------	--------------------	------------

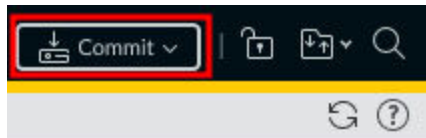
+ Add - Delete

OK Cancel

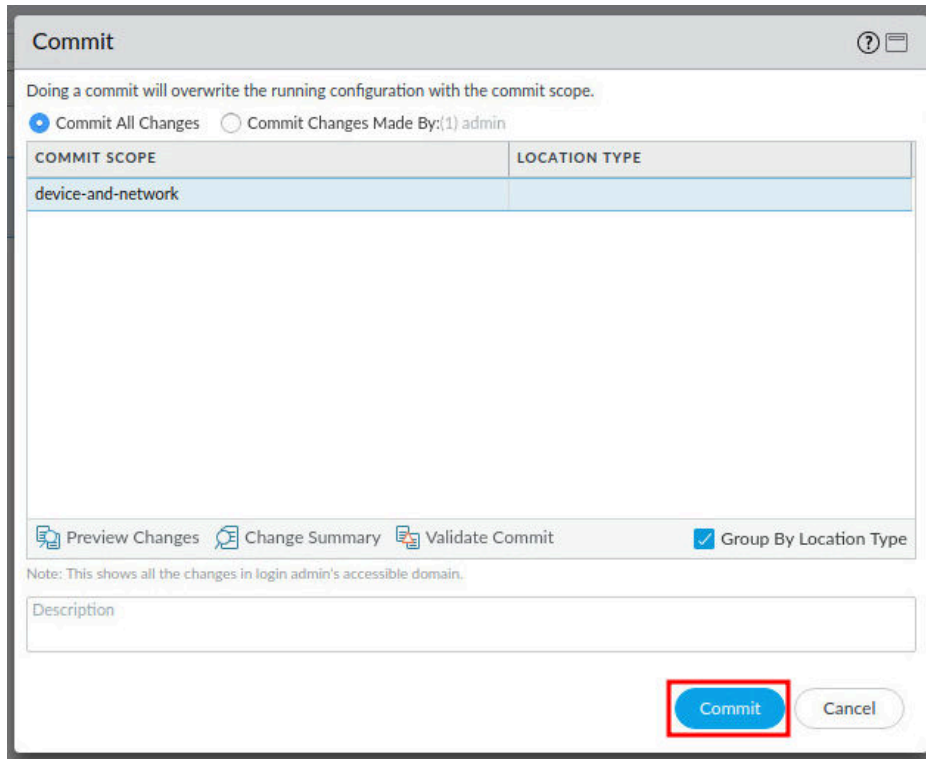
8. Adding a static route of 0.0.0.0/0 is sometimes called *the gateway of last resort*. By adding this static route, if there is a network that the Firewall does not know about, it will forward the packets to this address. Click **OK** to close the *Virtual Router* window.



9. Click the **Commit** link located at the top-right of the web interface.



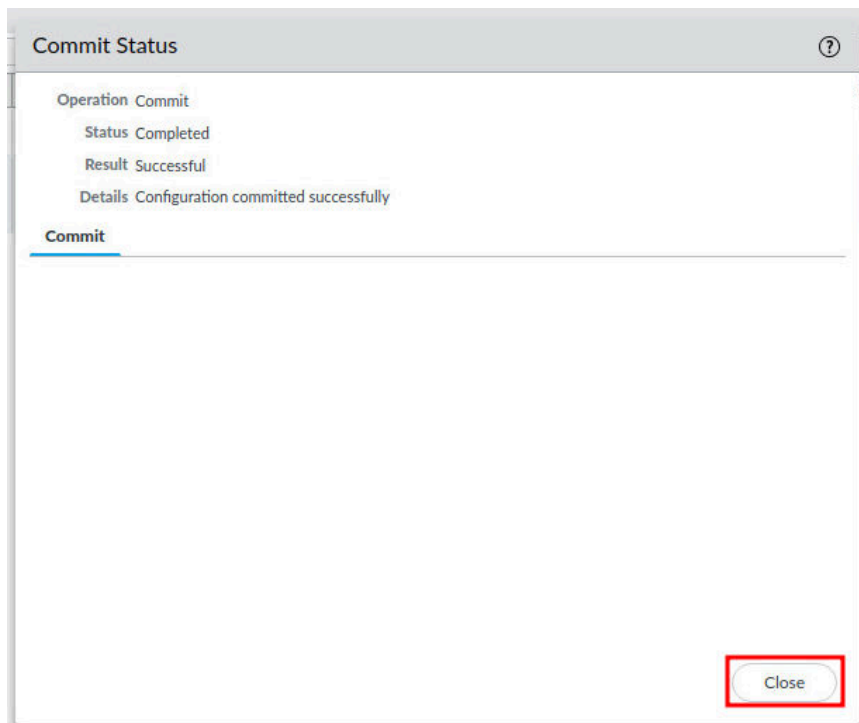
10. In the *Commit* window, click **Commit** to proceed with committing the changes.



The screenshot shows the 'Commit' window. At the top, it says 'Doing a commit will overwrite the running configuration with the commit scope.' Below this are two radio buttons: 'Commit All Changes' (selected) and 'Commit Changes Made By: {1} admin'. A table with two columns, 'COMMIT SCOPE' and 'LOCATION TYPE', is shown. The first row has 'device-and-network' under 'COMMIT SCOPE'. Below the table are three icons: 'Preview Changes', 'Change Summary', and 'Validate Commit'. To the right of these icons is a checked checkbox labeled 'Group By Location Type'. Below this is a note: 'Note: This shows all the changes in login admin's accessible domain.' At the bottom right, there are two buttons: 'Commit' (highlighted with a red box) and 'Cancel'.

COMMIT SCOPE	LOCATION TYPE
device-and-network	

11. When the commit operation successfully completes, click **Close** to continue.



The screenshot shows the 'Commit Status' window. It displays the following information: 'Operation Commit', 'Status Completed', 'Result Successful', and 'Details Configuration committed successfully'. Below this is a tab labeled 'Commit' (highlighted with a blue underline). At the bottom right, there is a button labeled 'Close' (highlighted with a red box).

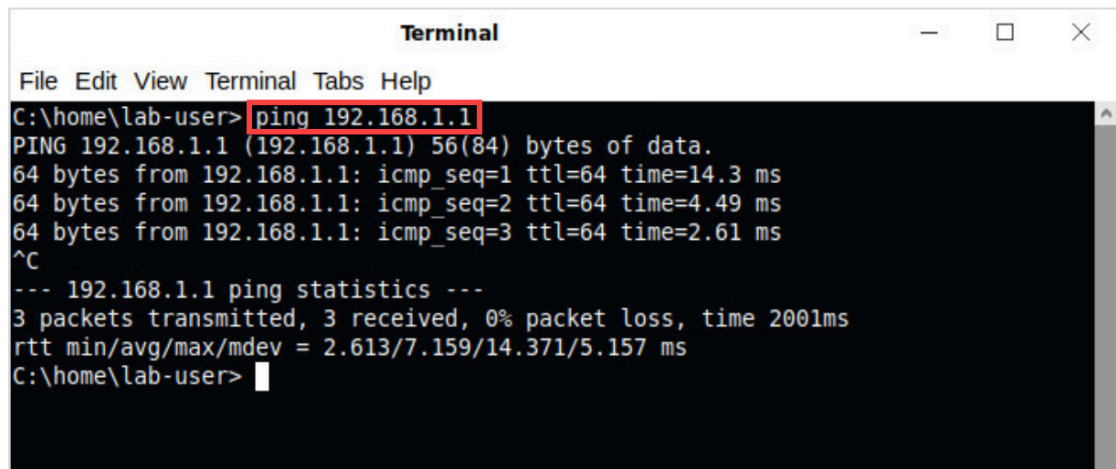
1.3 Verify Network Connectivity

In this section, you will confirm you now have connectivity to the Firewall from the inside network by utilizing *ping* and connecting to the web interface.

1. Click on the **Xfce Terminal** icon in the taskbar.



2. In the *Terminal* window, ping the Firewall inside interface by typing `ping 192.168.1.1` and press **Enter**. To stop the ping, click **Ctrl+C**.

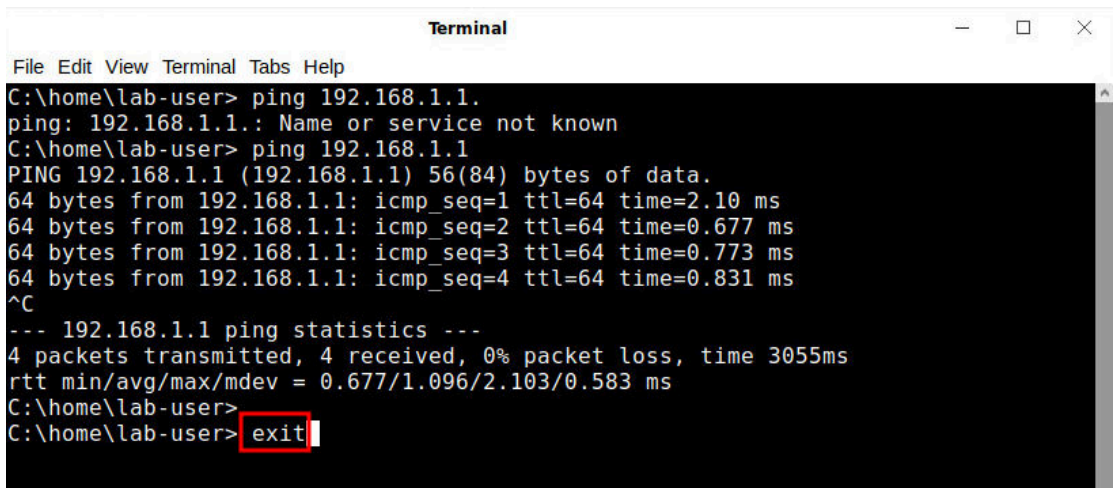


```
Terminal
File Edit View Terminal Tabs Help
C:\home\lab-user> ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=14.3 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=4.49 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=64 time=2.61 ms
^C
--- 192.168.1.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2001ms
rtt min/avg/max/mdev = 2.613/7.159/14.371/5.157 ms
C:\home\lab-user>
```



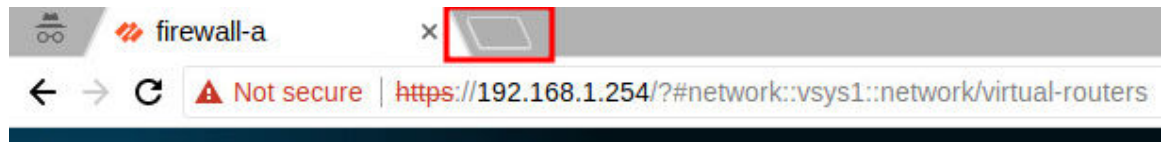
Notice the *ping* command will receive replies from **192.168.1.1**. This means that packets can be sent and received between the Client and the Firewall.

13. Close the *Terminal* window by typing `exit` then press **Enter**.



```
Terminal
File Edit View Terminal Tabs Help
C:\home\lab-user> ping 192.168.1.1.
ping: 192.168.1.1.: Name or service not known
C:\home\lab-user> ping 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=2.10 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=0.677 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=64 time=0.773 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=64 time=0.831 ms
^C
--- 192.168.1.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3055ms
rtt min/avg/max/mdev = 0.677/1.096/2.103/0.583 ms
C:\home\lab-user>
C:\home\lab-user> exit
```

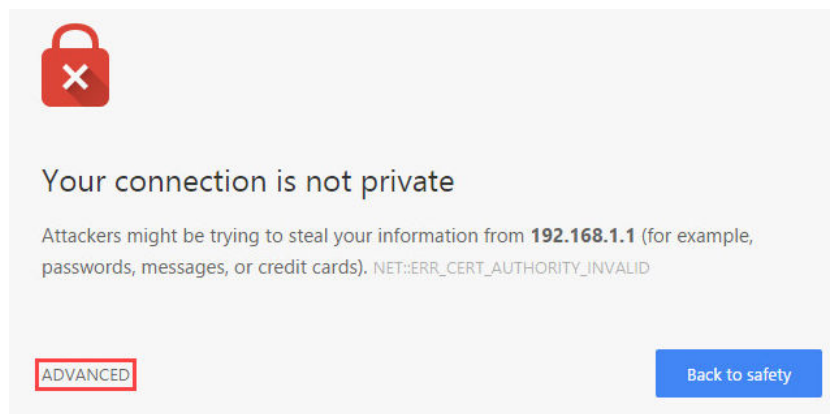

3. In *Chromium*, click on the **New tab** button.



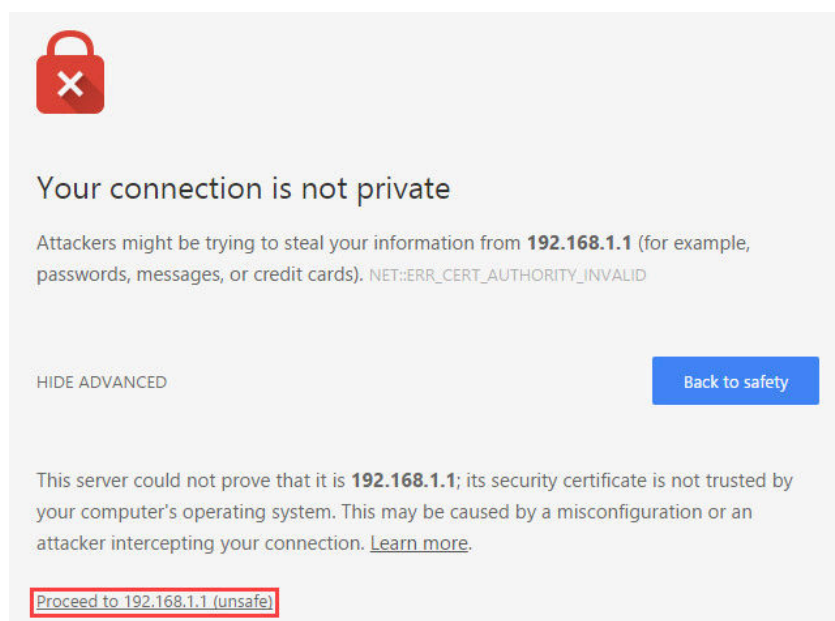
4. In the *address bar*, type `https://192.168.1.1` and press **Enter**.



5. You will see a "Your connection is not private" message. Click on the **ADVANCED** link.



6. Click on **Proceed to 192.168.1.1 (unsafe)**.



7. You should see the Firewall login web interface on the *192.168.1.1* IP address that was configured earlier.



8. The lab is now complete; you may end the reservation.