Palo Alto Networks
Firewall 11.1 Essentials: Configuration and Management

Lab Guide

PAN-OS® 11.1
EDU-210
Courseware Version A

Palo Alto Networks, Inc.

https://www.paloaltonetworks.com

Table of Contents

Table of Contents 4

Typographical Conventions 20

Lab Guidance 21

Browsers 22

Lab 1: Palo Alto Networks Portfolio and Architecture 23

Lab 2: Configuring Initial Firewall Settings 24

Lab Objectives 24

High-Level Lab Steps 25

Connect to Your Student Firewall 25

Apply a Baseline configuration to the Firewall 25

Configure the DNS and NTP Servers 25

Configure General Settings 25

Modify Management Interface 25

Commit the configuration 25

Check for New PAN-OS Software 25

Detailed Lab Steps 26

Connect to Your Student Firewall 26

Apply a Baseline configuration to the Firewall 26

Configure the DNS and NTP Servers 29

Configure General Settings 30

Modify Management Interface 31

Check for New PAN-OS Software 33

Commit the configuration 34

Lab 3: Managing Firewall Configurations 36

Lab Objectives 36

High-Level Lab Steps 37

Apply a Baseline configuration to the Firewall 37

Save a Named configuration Snapshot 37
Export a Named configuration Snapshot 37
Revert Ongoing configuration Changes 37
Preview configuration Changes 37
Modify System Log File Columns 37
Create a System Log File Filter 38
Use the Filter Builder 38
Detailed Lab Steps 39
Apply a Baseline configuration to the Firewall 39
Save a Named configuration Snapshot 39
Export a Named configuration Snapshot 40
Revert Ongoing configuration Changes 42
Preview configuration Changes 45
Modify System Log File Columns 47
Create a System Log File Filter 49
Use the Filter Builder 51
Lab 4: Managing Firewall Administrator Accounts 56
Lab Objectives 56
High-Level Lab Steps 57
Apply a Baseline configuration to the Firewall 57
Create a Local Database Authentication Profile 57
Create a Local User Database Account 57
Create an Administrator Account 57
Commit the configuration 57
Log in With New Admin Account 57
Configure LDAP Authentication 57
Commit the configuration 58
Log in With New Admin Account 58
Configure RADIUS Authentication 58

Commit the configuration....59
Log in With New Admin Account....59
Configure an Authentication Sequence....59
Commit the configuration....59
Detailed Lab Steps....60
Apply a Baseline configuration to the Firewall....60
Create a Local Database Authentication Profile....60
Create a Local User Database Account....62
Create an Administrator Account....63
Commit the configuration....64
Log in With New Admin Account....64
Configure LDAP Authentication....65
Commit the configuration....69
Log in With New Admin Account....69
Configure RADIUS Authentication....70
Configure an Authentication Sequence....74
Commit the configuration....75
Lab 5: Connecting the Firewall to Production Networks with Security Zones....77
Lab Objectives....78
High-Level Lab Steps....78
Apply a Baseline configuration to the Firewall....78
Create Layer 3 Network Interfaces....78
Create a Layer 3 Interface on ethernet1/1....78
Create a Layer 3 Interface on ethernet1/2....78
Create a Layer 3 Interface on ethernet1/3....79
Create a Logical Router....79
Segment Your Production Network Using Security Zones....79
Commit the configuration....80
Test Connectivity to Each Zone....80

Test Interface Access before Management Profiles 80
Define Interface Management Profiles....80
Apply Allow-ping to ethernet1/1....81
Apply Allow-mgt to ethernet1/2....81
Apply Allow-mgt to ethernet1/3....81
Commit the configuration....81
Test Interface Access after Management Profiles 81
Detailed Lab Steps 82
Apply a Baseline configuration to the Firewall....82
Create Layer 3 Network Interfaces....82
Create a Layer 3 Interface on ethernet1/1 83
Create a Layer 3 Interface on ethernet1/2 85
Create a Layer 3 Interface on ethernet1/3 87
Create a Logical Router....90
Segment Your Production Network Using Security Zones....93
Commit the configuration....96
Test Connectivity to Each Zone 97
Create Interface Management Profiles 100
Test Interface Access before Management Profiles 101
Define Interface Management Profiles....102
Apply Allow-ping to ethernet1/1....103
Apply Allow-mgt to ethernet1/2....104
Apply Allow-mgt to ethernet1/3....105
Commit the configuration....106
Test Interface Access after Management Profiles 106
Lab 6: Creating and Managing Security Policy Rules.... 109
Lab Objectives.... 110
High-Level Lab Steps.... 110
Apply a Baseline configuration to the Firewall....110

Create Security Policy Rule....110
Commit the configuration....110
Modify Security Policy Table Columns....111
Test New Security Policy Rule....111
Examine Rule Hit Count....111
Reset the Rule Hit Counter....111
Examine the Traffic Log....111
Enable Logging for Default Interzone Rule....112
Commit the configuration....112
Ping a Host on the Internet....112
Create Block Rules for Known-Bad IP Addresses....112
Create Security Rules for Internet Access....113
Create Users to Internet Security Policy Rule....113
Create Extranet to Internet Security Policy Rule....114
Commit the configuration....114
Ping Internet Host from Client A....114
Detailed Lab Steps....115
Apply a Baseline configuration to the Firewall....115
Create a Security Policy Rule....115
Commit the configuration....120
Modify Security Policy Table Columns....120
Test New Security Policy Rule....122
Examine Rule Hit Count....124
Reset the Rule Hit Counter....125
Examine the Traffic Log....126
Enable Logging for Default Interzone Rule....129
Commit the configuration....130
Ping a Host on the Internet....130
Create Block Rules for Known-Bad IP Addresses....132

Create Security Policy Rules for Internet Access....136
Create Users to Internet Security Policy Rule....136
Create Extranet to Internet Security Policy Rule....140
Commit the configuration....144
Ping Internet Host from Client A....144
Lab 7: Creating and Managing NAT Policy Rules....147
Lab Objectives....147
High-Level Lab Steps....147
Apply a Baseline configuration to the Firewall....147
Create a Source NAT Policy Rule....147
Commit the configuration....148
Verify Internet Connectivity....148
Create a Destination NAT Policy....148
Commit the configuration....149
Test the Destination NAT Rule....149
Detailed Lab Steps....150
Apply a Baseline configuration to the Firewall....150
Create a Source NAT Policy Rule....150
Commit the configuration....153
Verify Internet Connectivity....154
Create a Destination NAT Policy....155
Commit the configuration....158
Test the Destination NAT Rule....158
Lab 8: Controlling Application Usage with App-ID....162
Lab Objectives....162
High-Level Lab Steps....162
Apply a Baseline configuration to the Firewall....162
Configure an Application Group....162
Configure a Security Policy Rule to Allow Update Traffic....163

Commit the configuration....163
Test the Allow-PANW-Apps Security Policy Rule....163
Identify Shadowed Rules....164
Modify the Security Policy to Function Properly....164
Commit the configuration....164
Test the Modified Security Policy Rule....164
Generate Application Traffic....164
Research Applications....165
Update Security Policy Rules....165
Commit the configuration....166
Test the Updated Security Policy Rules....166
Enable the Application Block Page....166
Commit the configuration....166
Test the Application Block Page....166
Detailed Lab Steps....167
Apply a Baseline configuration to the Firewall....167
Configure an Application Group....167
Configure a Security Policy Rule to Allow Firewall Update Traffic....168
Commit the configuration....171
Test the Allow-PANW-Apps Security Policy Rule....172
Identify Shadowed Rules....173
Modify the Security Policy to Function Properly....174
Commit the configuration....175
Test the Modified Security Policy....175
Generate Application Traffic....176
Research Applications....178
Update Security Policy Rules....181
Commit the configuration....185
Test the Updated Security Policy Rules....185

Enable the Application Block Page 186
Commit the configuration 187
Test the Application Block Page 188
Lab 9: Blocking Known Threats Using Security Profiles 190
Lab Objectives 190
High-Level Lab Steps 191
Apply a Baseline configuration to the Firewall 191
Generate Traffic Without Security Profiles 191
Create a Corporate Antivirus Profile 191
Create A Corporate Vulnerability Security Profile 192
Create a Corporate File Blocking Profile 192
Create a Corporate Data Filtering Profile 192
Create a Corporate Anti-Spyware Security Profile 193
Create an External Dynamic List for Malicious Domains 193
Update the Anti-Spyware Profile with EDL 193
Commit the configuration 193
Create a Security Profile Group 193
Apply the Corp-Profiles-Group to Security Policy Rules 194
Commit the configuration 194
Generate Attack Traffic to Test Security Profiles 194
Lab Clean-Up 195
Detailed Lab Steps 196
Apply a Baseline configuration to the Firewall 196
Generate Traffic Without Security Profiles 196
Create a Corporate Antivirus Profile 199
Create A Corporate Vulnerability Security Profile 201
Create a Corporate File Blocking Profile 202
Create a Corporate Data Filtering Profile 203
Create a Corporate Anti Spyware Profile 205

Create an External Dynamic List for Malicious Domains 206
Update the Anti-Spyware Profile with EDL....209
Commit the configuration....209
Create a Security Profile Group....210
Apply the Corp-Profiles-Group to Security Policy Rules 211
Commit the configuration....212
Generate Attack Traffic to Test Security Profiles 212
Lab Clean-Up 216
Lab 10: Blocking Inappropriate Web Traffic with Advanced URL Filtering 217
Lab Objectives.... 217
High-Level Lab Steps.... 217
Apply a Baseline configuration to the Firewall....217
Test Access to Inappropriate Web Content 217
Create a Security Policy Rule to Block Categories 217
Commit the configuration....218
Test Access to URLs Blocked by the Security Policy....218
Block Access to Inappropriate Web Content Using Security Profile....218
Add the URL Profile to the Corp-Profiles-Group 219
Disable Block-Bad-URLs Rule 219
Commit the configuration....219
Test Access to URLs Blocked by a URL Filtering Profile....219
Create a Custom URL Category....220
Use Custom Category to Block URL Access in Security Policy Rule....220
Commit the configuration....220
Test Access to Custom URLs Blocked by the Security Policy 220
Add Custom URL Category to URL Filtering Profile 220
Commit the configuration....220
Test Access to Custom URLs Blocked by the URL Filtering Profile 221
Create an EDL to Block Malicious URL Access 221

Block Access to the the URL List with a Security Policy Rule 221
Commit the configuration 221
Test Access to URLs Blocked by the EDL in the Security Policy 221
Commit the configuration 221
Detailed Lab Steps 222
Apply a Baseline configuration to the Firewall 222
Test Access to Inappropriate Web Content 222
Create a Security Policy Rule to Block Categories 223
Commit the configuration 225
Test Access to URLs Blocked by the Security Policy 226
Block Access to Inappropriate Web Content Using A Security Profile 228
Add the URL Profile to the Corp-Profiles-Group 230
Disable Block-Bad-URLs Rule 230
Commit the configuration 231
Test Access to URLs Blocked by a URL Filtering Profile 231
Create a Custom URL Category 233
Use Custom Category to Block URL Access in Security Policy Rule 235
Commit the configuration 235
Test Access to Custom URLs Blocked by the Security Policy 236
Add Custom URL Category to URL Filtering Profile 236
Commit the configuration 237
Test Access to Custom URLs Blocked by the URL Filtering Profile 237
Create an EDL to Block Malicious URL Access 238
Block Access to the URL List with a Security Policy Rule 240
Commit the configuration 240
Test Access to URLs Blocked by the EDL in the Security Policy 241
Commit the configuration 241
Lab 11: Blocking Unknown Threats with WildFire 243
Lab Objectives 244

High-Level Lab Steps 244
Apply a Baseline configuration to the Firewall 244
Create a WildFire Analysis Profile 244
Modify Security Profile Group 244
Update WildFire Settings 245
Set Monitor Log Interval 245
Commit the configuration 245
Test the WildFire Analysis Profile 245
Examine WildFire Analysis Details 245
Detailed Lab Steps 246
Apply a Baseline configuration to the Firewall 246
Create a WildFire Analysis Profile 246
Modify Security Profile Group 247
Update WildFire Settings 248
Set Monitor Log Interval 249
Commit the configuration 250
Test the WildFire Analysis Profile 250
Examine WildFire Analysis Details 251
Lab 12: Controlling Access to Network Resources with User-ID 255
Lab Objecti 256
High-Level Lab Steps 256
Apply a Baseline configuration to the Firewall 256
Examine Firewall configuration 256
Generate Traffic from the Acquisition Zone 257
Enable User-ID on the Acquisition Zone 257
Modify the Acquisition-Allow-All Security Policy Rule 258
Create Marketing Apps Rule 258
Create Deny Rule 258
Commit the configuration 259

Generate Traffic from the Acquisition Zone 259
Examine User-ID Logs 259
Examine Firewall Traffic Log 259
Examine Firewall Traffic Log 259
Clean Up the Desktop 260
Detailed Lab Steps 260
Apply a Baseline configuration to the Firewall 260
Examine Firewall Configuration 261
Generate Traffic from the Acquisition Zone 263
Enable User-ID on the Acquisition Zone 264
Modify the Acquisition-Allow-All Security Policy Rule 265
Create Marketing Apps Rule 266
Create Deny Rule 270
Commit the configuration 272
Generate Traffic from the Acquisition Zone 272
Examine User-ID Logs 272
Examine Firewall Traffic Log 273
Clean Up the Desktop 275
Lab 13: Using Decryption to Block Threats in Encrypted Traffic 276
Lab Objectives 277
High-Level Lab Steps 277
Apply a Baseline configuration to the Firewall 277
Test the Firewall Behavior Without Decryption 277
Create a Self-Signed Certificate for Trusted Connections 278
Create a Decryption Policy Rule for Outbound Traffic 278
Commit the configuration 279
Test Outbound Decryption Policy 279
Export the Firewall Certificate 279
Import the Firewall Certificate to configuration browser 279

Test Outbound Decryption Policy Again 279
Review Firewall Logs 279
Exclude URL Categories from Decryption 280
Commit the configuration 280
Test the No-Decryption Rule 280
Detailed Lab Steps 282
Apply a Baseline configuration to the Firewall 282
Test the Firewall Behavior Without Decryption 282
Create Certificate for Trusted Connections 284
Create a Certificate for Untrusted Connections 286
Create a Decryption Policy Rule for Outbound Traffic 288
Commit the configuration 291
Test Outbound Decryption Policy 291
Export the Firewall Certificate 293
Import the Firewall Certificate 295
Test Forward Untrust Certificate 299
Test Outbound Decryption Policy Again 301
Review Firewall Logs 302
Exclude URL Categories from Decryption 305
Commit the configuration 310
Test the No-Decryption Rule 310
Lab 14: Locating Valuable Information Using Logs and Reports 313
Lab Objectives 313
High-Level Lab Steps 313
Apply a Baseline configuration to the Firewall 313
Generate Traffic 313
Display Recent Threat Information in the Dashboard 314
Display Recent Application Information in the Dashboard 314
View Threat Information in the ACC 314

View Application Information in the ACC 314
View Threat Information in the Threat Log 315
View Application Information in the Traffic Log 316
View Threats Using App Scope Reports 317
View Threat Information Using Predefined Reports 317
View Application Information Using Predefined Reports 317
View Threat and Application Information Using Custom Reports 317
Detailed Lab Steps 319
Apply a Baseline configuration to the Firewall 319
Generate Traffic 319
Display Recent Threat Information in the Dashboard 319
Display Recent Application Information in the Dashboard 323
View Threat Information in the ACC 324
View Application Information in the ACC 327
View Threat Information in the Threat Log 333
View Application Information in the Traffic Log 338
View Threats Using App Scope Reports 341
View Threat Information Using Predefined Reports 343
View Application Information Using Predefined Reports 345
View Threat and Application Information Using Custom Reports 347
Lab 15: Capstone 352
Load a Lab configuration 353
Configure Networking 353
Configure Security Zones 353
Configure NAT Policy Rules 354
Configure Security Policy Rules 354
Create and Apply Security Profiles 355
Solutions 357
Firewall Interfaces 357

Logical Router 357
Firewall Default Route 358
Allow-ping Interface Management Profile 358
Allow-ping Interface Management Profile Assigned to ethernet1/2 358
Security Zones 359
NAT Policy Rules 359
Security Policy Rules 360
Security Profiles 361
Bonus Lab 364
Lab Objectives 364
Detailed Lab Steps 364
Apply a Baseline configuration to the Firewall 364
Modify Authentication Settings 365
Save the Configuration 369
Commit Your Changes and Verify Fix 369
Appendix A - GlobalProtect 372
Lab Objectives 372
11.0 Load the Lab Configuration 372
11.1 Configure a Loopback interface 374
11.2 Generate Self-Signed Certificates 375
11.3 Configure the SSL/TLS Service Profile 378
11.4 LDAP Server Profile Configuration 380
11.5 Authentication Profile Configuration 382
11.6 Configure the Tunnel Interface 384
11.7 Configure the Internal Gateway 385
11.8 Configure the External Gateway 388
11.9 Configure the Portal 393
11.10 Host the GlobalProtect Agent on the Portal 398
11.11 Create a Security Policy Rule 400
11.12 Create a No-NAT Rule 403

Appendix B - Active/Passive High Availability 406
Lab Objectives 406
14.0 Load a Lab Configuration 406
14.1 Display the HA Widget 408
14.2 Configure the HA Interface 408
14.3 Configure Active/Passive HA 410
14.4 Configure HA Monitoring 413
14.5 Observe the Behavior of the HA Widget 417
Appendix C - Site-to-Site VPN 420
Lab Objectives 420
12.0 Load a Lab Configuration 420
12.1 Configure the Tunnel Interface 422
12.2 Configure the IKE Gateway 423
12.3 Create an IPSec Crypto Profile 425
12.4 Configure the IPsec Tunnel 426
12.5 Test the Connectivity 428

Typographical Conventions

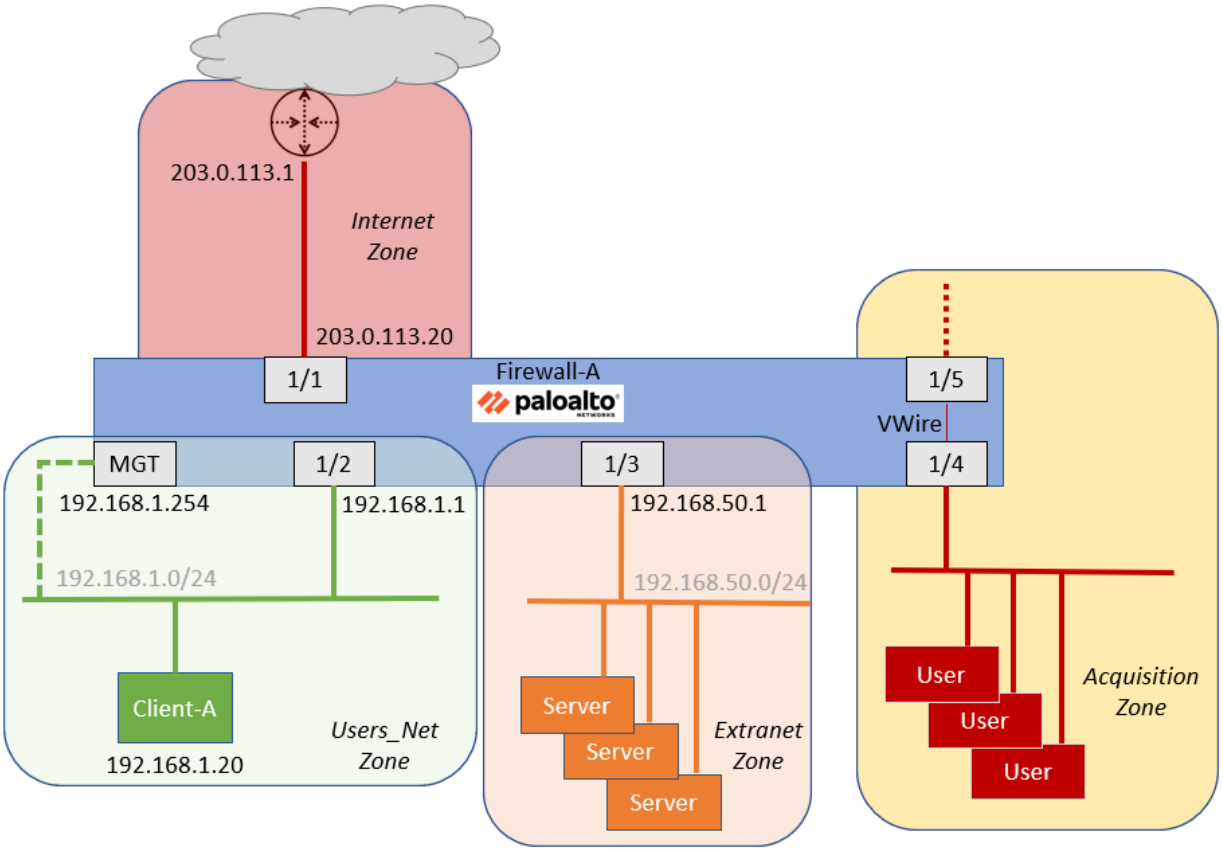
This guide uses the following typographical conventions for special terms and instructions.

Convention	Meaning	Example
Bolding	Names of selectable items in the web interface	Click **Security** to open the **Security Rule** Page
Consolas font	Text that you enter and coding examples	Enter the following command: **a:\setup** The **show arp all** command yields this output: **username@hostname> show arp** **<output>**
Calibri 11 pt. gray font	Lab step results and explanations	A new zone should appear in the web interface.
Click	Click the left mouse button	Click **Administrators** under the **Device** tab
Right-click	Click the right mouse button	Right-click the number of a rule you want to copy, and select **Clone Rule**
< > (text enclosed in angle brackets)	Denotes a variable parameter. Actual value to use is defined in the Lab Guide document.	Click **Add** again and select **<Internal Interface>**

How to Use This Lab Guide

The Lab Guide contains exercises that correspond to modules in the Student Guide. Each lab exercise consists of step-by-step, task-based labs. The final lab is based on a scenario that you will interpret and use to configure a comprehensive firewall solution.

The following diagram provides a basic overview of the lab environment:



Lab Guidance

There are two sections for each lab in this guide:

- High-Level Lab Steps
- Detailed Lab Steps

The High-Level Lab Steps section provides only general guidance and information about how to accomplish the lab objectives. This section is more challenging and is suited for students who have a working knowledge of Palo Alto Networks firewalls. If you have never worked with a Palo Alto Networks firewall, we strongly encourage you to use the Detailed Lab Steps section.

The instructions in the Detailed Lab Steps section provide guided, detailed steps and screenshots to accomplish the lab objectives.

If you decide to use the High-Level Lab Guide and get stuck, switch to the Detailed Lab Guide for guidance.

You do not need to complete both the High-Level Lab Guide and the Detailed Lab Guide for each lab. Use either one or the other.

Browsers

You will use two different browsers for these lab exercises:

- Configuration Browser - use this application to configure the firewall.
- Testing Browser - use this application to test features once you have configured the firewall.

There are three browsers available in the lab environment:

- Chromium
- Firefox

Note: For all lab exercises, we recommend always using the Chromium browser as the configuration browser when accessing the FireWall WebUI and Firefox as the testing browser. Chromium has been shown to produce fewer errors than other browsers like Firefox when navigating the FireWall WebUI. Please note that the FireWall WebUI requires a lot of memory, and having more than three browser windows or tabs open at the same time can consume the client's entire memory and consequently slow down the lab. We also recommend you restart your browser at least once a day.

The detailed lab guide sections will let you know which browser to use for each task. In some tasks it instruct you to use a specific browser if necessary.

Lab 1: Palo Alto Networks Portfolio and Architecture

No lab exercise is associated with this module.

Lab 2: Configuring Initial Firewall Settings

Your organization has just received a new Palo Alto Networks firewall, and you have been tasked with deploying it. The first steps will be to connect to the firewall's management interface address and configure basic settings to provide the firewall with network access.

Lab Objectives

- Connect to the firewall web interface
- Load a starting lab configuration
- Set DNS servers for the firewall
- Set NTP servers for the firewall
- Configure a login banner for the firewall
- Set Latitude and Longitude for the firewall
- Configure permitted IP addresses for firewall management

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

If you need more detailed guidance for the objectives, use the Detailed-Lab Steps section.

Connect to Your Student Firewall

- Use the configuration browser to connect to the firewall web interface

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-02.xml`** - to the Firewall

Configure the DNS and NTP Servers

- Set the **Primary DNS** Server to **`8.8.8.8`** and the **Secondary DNS Server** to **`192.168.50.53`**
- Set the **Primary NTP Server** to **`0.pool.ntp.org`** and the **Secondary NTP Server** to **`1.pool.ntp.org`**

Configure General Settings

- Set the **Domain** to **`panw.lab`**
- Create a **Login Banner** that says **`Authorized Access Only`**
- Set the **Latitude** and **Longitude** to reflect the firewall's geographical location in **`Santa Clara, CA, USA`**

Modify Management Interface

- Verify that the default gateway for the firewall management interface is set to **`192.168.1.1`**
- Allow access to the management interface only from the **`192.168.0.0/16`** network

Commit the configuration

- Commit the changes to the firewall before proceeding

Check for New PAN-OS Software

- Check for new PAN-OS software (but do not upgrade the firewall)

Detailed Lab Steps

Use this section if you prefer detailed guidance to complete the objectives for this lab. We strongly recommend that you use this section if you do not have extensive experience working with Palo Alto Networks firewalls.

Connect to Your Student Firewall

1. Launch the configuration browser and connect to **`https://192.168.1.254`**.

   Move past any security warnings until you see the web interface login window.

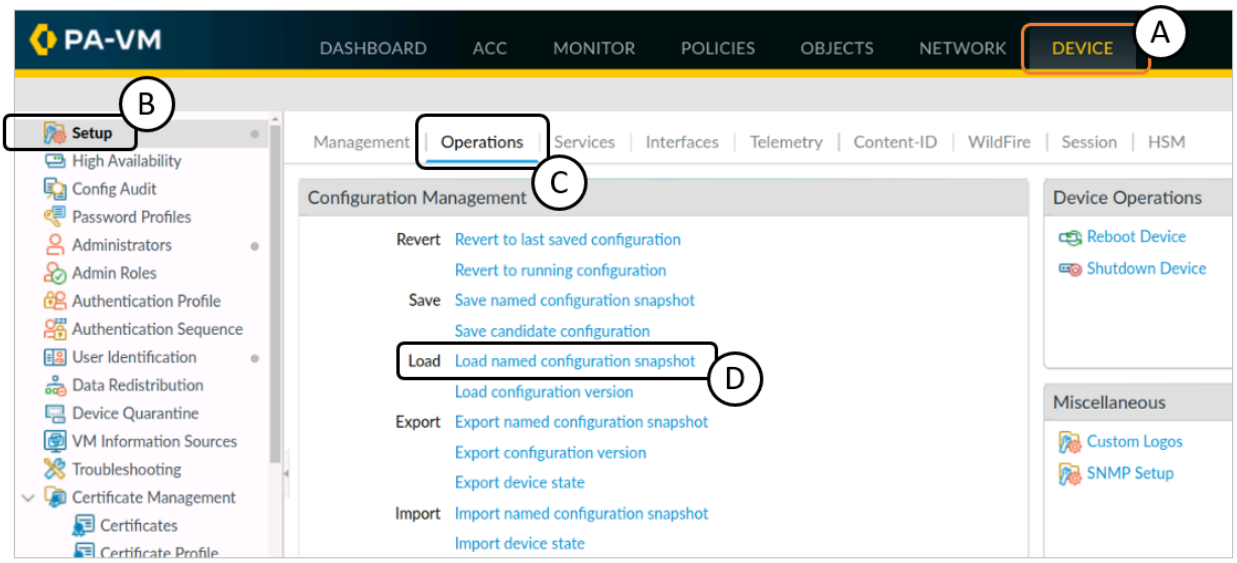
2. Log in to the Palo Alto Networks firewall using the following credentials:

Parameter	Value
Username	`admin`
Password	`Pal0Alt0!`

Apply a Baseline configuration to the Firewall

To start this lab exercise, you will load a preconfigured firewall configuration file.

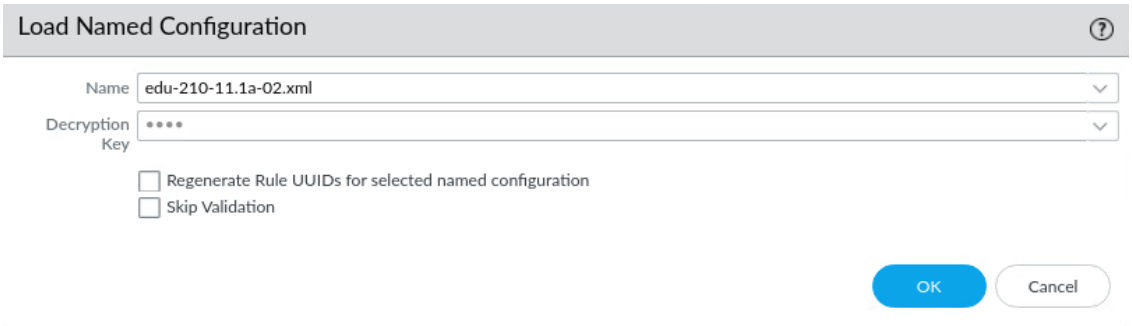
3. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
4. Click **Load named configuration snapshot**:



A **Load Named configuration** dialog box opens.

5. Click the drop-down arrow next to the **Name** field and select **edu-210-11.1a-02.xml**.

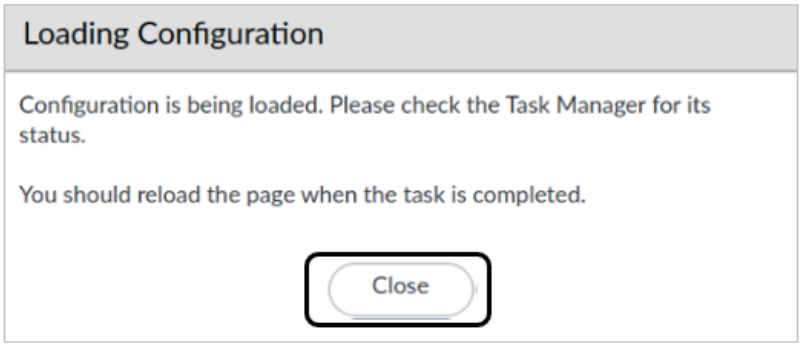
Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.



6. Click **OK** to close the **Load Named configuration** window.

   A window should open that confirms that the configuration is being loaded.

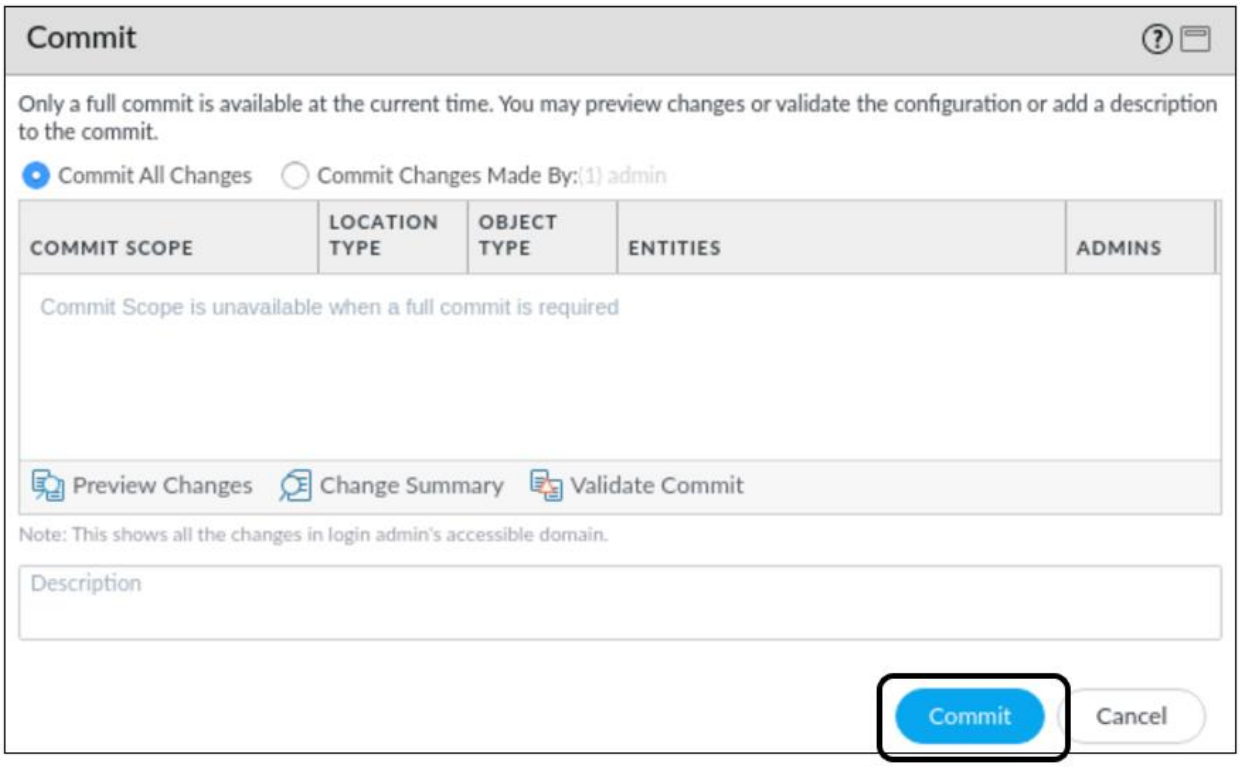
7. Click **Close** to close the **Loading configuration** window.



8. Click the **Commit** button at the upper right corner of the web interface:

   A **Commit** window should open.

9. Leave the remaining settings unchanged and click **Commit**.

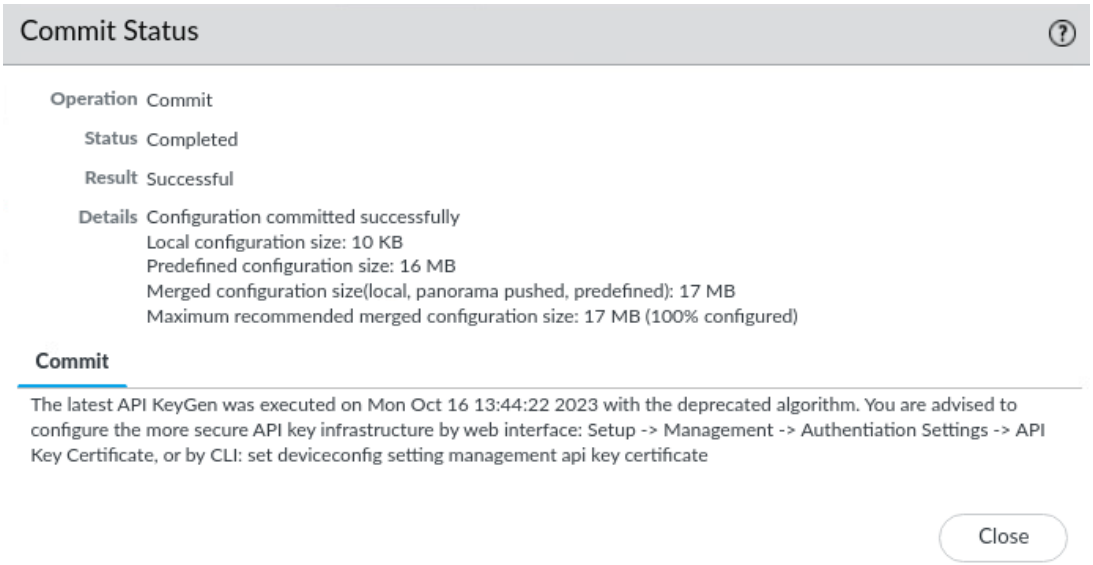


10. Wait until the Commit process is complete.

    A **Commit Status** window should open that confirms the configuration was committed successfully.

If you receive a message regarding the deprecated algorithm used to generate the API KeyGen, ignore it. This message will have no effect on the labs.

There is a Bonus Lab at the end of this guide that will show you how to address this issue.

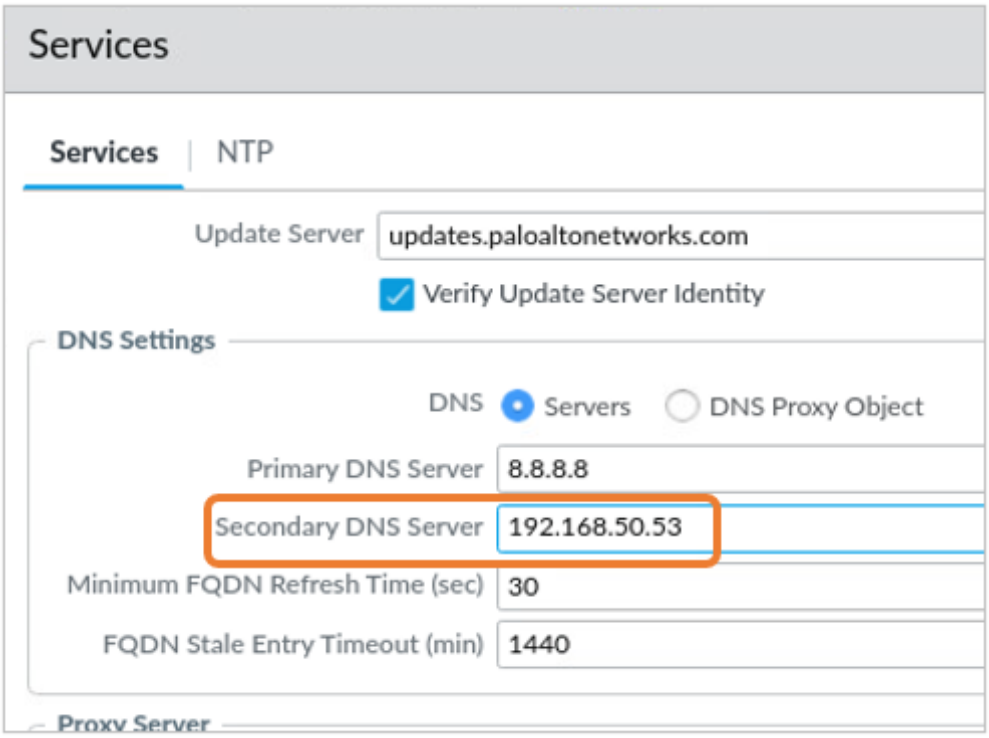


11. Click **Close** to continue.

Configure the DNS and NTP Servers

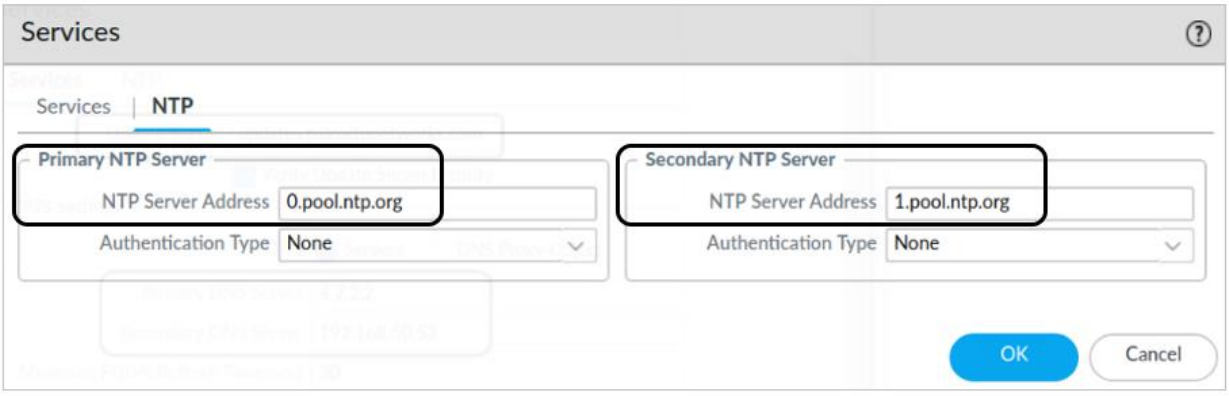
The DNS server configuration settings are used for all DNS queries that the firewall initiates in support of FQDN Address objects, logging, and firewall management.

12. In the web interface, select **Device > Setup > Services**.
13. Click the **Services** gear icon  to open the **Services** window.
14. Verify that the **Primary DNS Server** is set to **8.8.8.8**.
15. Set the **Secondary DNS Server** to **192.168.50.53**.
16. Verify that the Update Server is set to **updates.paloaltonetworks.com**.



The DNS server settings that you configure do not have to be public servers, but the firewall needs to be able to resolve hostnames such as updates.paloaltonetworks.com and wildfire.paloaltonetworks.com to provide various services such as WildFire® or URL filtering.

17. Select the **NTP** tab.
18. Set the **Primary NTP Server** to **`0.pool.ntp.org`**.
19. Set the **Secondary NTP Server** to **`1.pool.ntp.org`**.

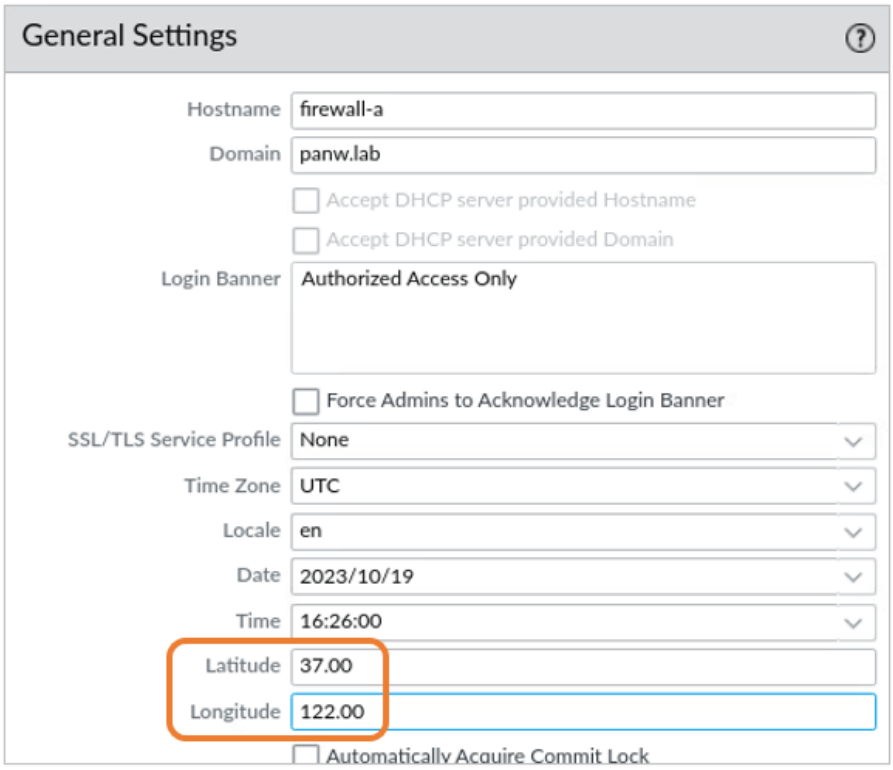


20. Leave the remaining settings unchanged and click **OK** to close the **Services** window.

Configure General Settings

21. Select **Device** > **Setup** > **Management**.

22. Click the **General Settings** gear icon  to open the **General Settings** window.
23. In the **Domain** field, enter **`panw.lab`**.
24. In the **Login Banner** area, enter **`Authorized Access Only`**.
25. In the **Latitude** field, enter **`37.00`**.
26. In the **Longitude** field, enter **`122.00`**.

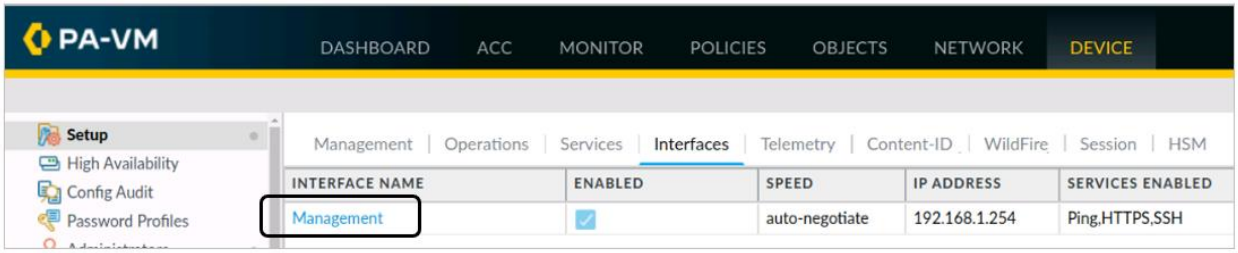


These coordinates are for Santa Clara, California – headquarters of Palo Alto Networks, Inc.

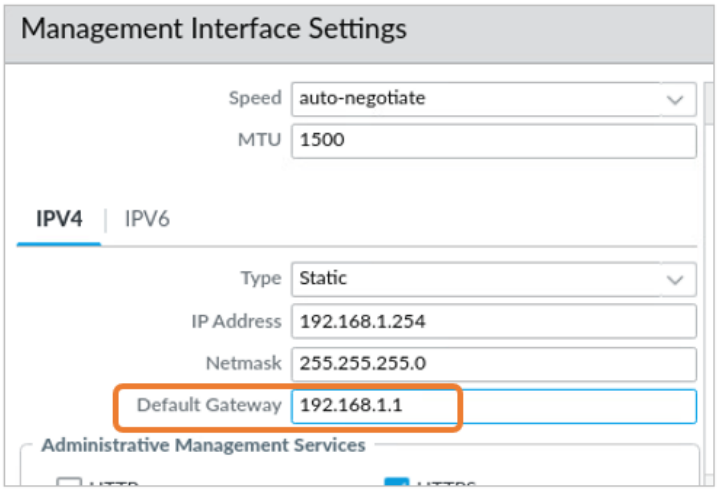
27. Leave the remaining settings unchanged and click **OK** to close the **General Settings** window.

Modify Management Interface

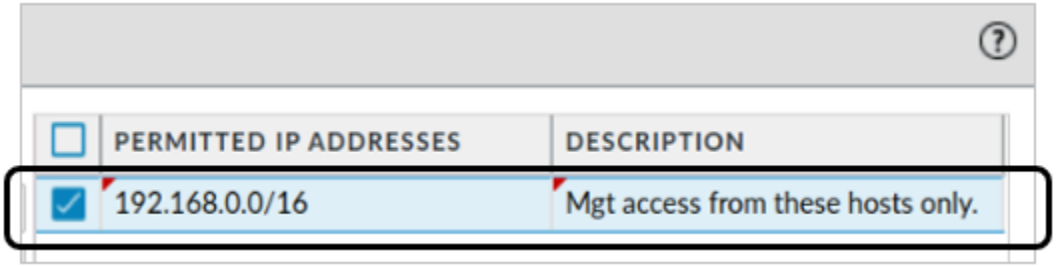
28. Select **Device** > **Setup** > **Interfaces**.
29. Click the link for **Management**.



30. Set the **Default Gateway** to **`192.168.1.1`**.
31. Leave the remaining settings unchanged.



32. At the bottom of the **Permitted IP Addresses** area, click **Add**.
33. In the **Permitted IP Addresses** field, enter **`192.168.0.0/16`**.
34. In the **Description** field, enter **`Mgt access from these hosts only`**.

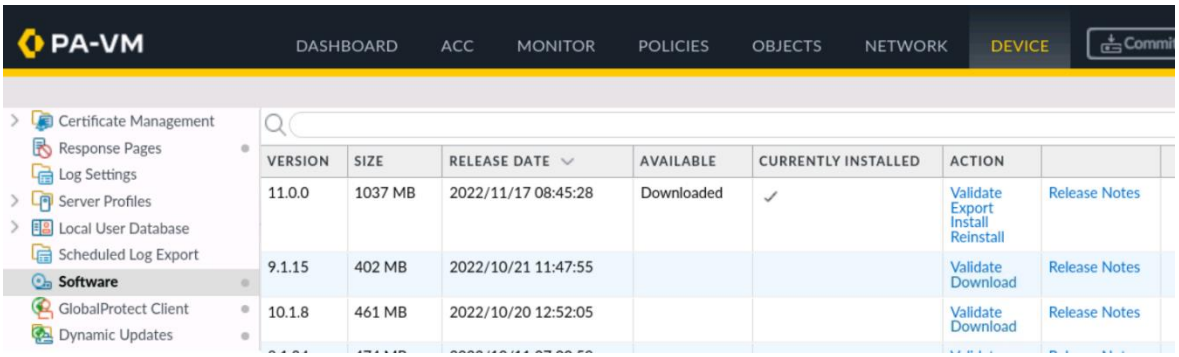


Verify that you have entered the correct address range in the Permitted IP Addresses field. If you make a mistake and enter the wrong information, you can lose network connectivity to your firewall.

35. Leave the remaining settings unchanged.
36. Click **OK**.

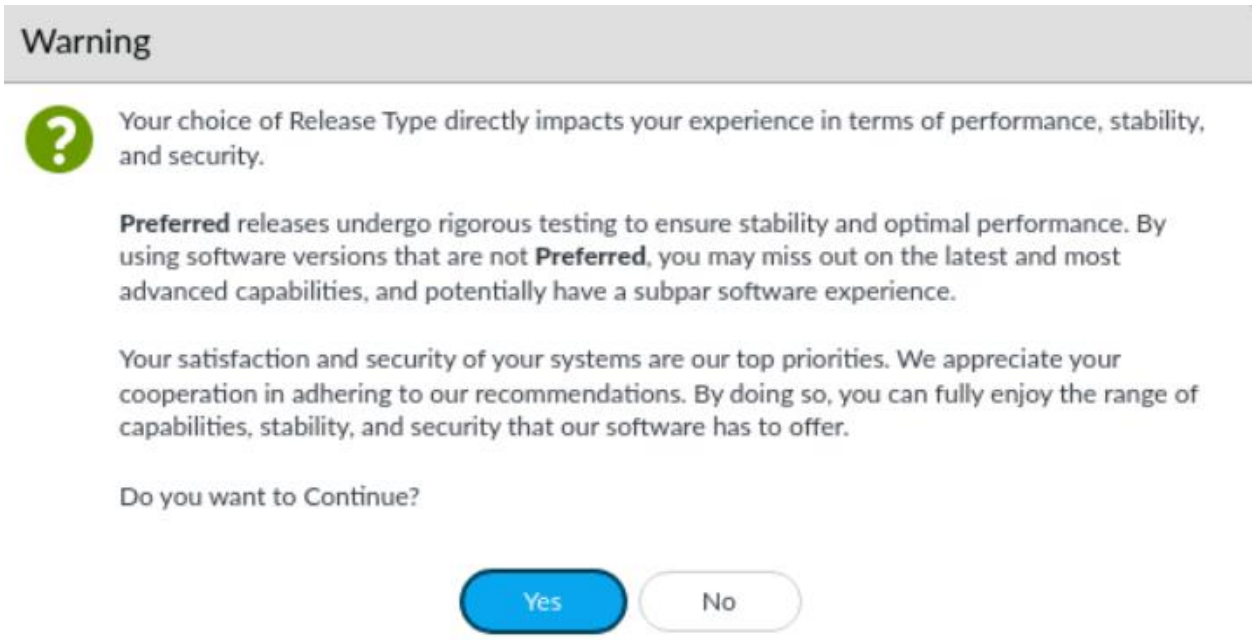
Check for New PAN-OS Software

37. Select **Device > Software**.



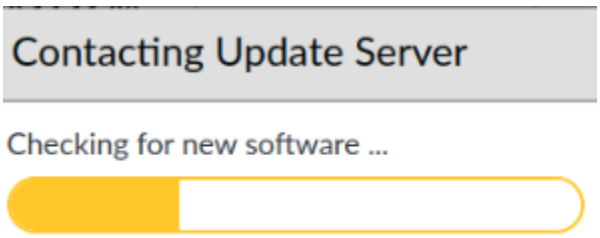
38. Uncheck **Preferred Releases** and **Base Releases** to see all available softwares.

39. Select **Yes** on the following Warning:



40. At the bottom of the window, click the **Check Now** button.

41. The firewall will perform a software check with the Palo Alto Networks update servers:



42. When the process is complete, the firewall displays an updated list of available software versions:

11.1.3	728 MB	e58427b247e5db9c10a6a...	2024/05/14 15:14:08	Downloaded	✓	Validate Export Reinstall	Release Notes
11.1.2	586 MB	4faaee165e2f79190c796...	2024/02/25 22:54:18			Validate Download	Release Notes
11.1.2-h12	677 MB	3b22796e5232e358db93...	2024/09/05 09:07:23			Validate Download	Release Notes
11.1.2-h9	677 MB	f5f6b106b6f7e6b0a38e2...	2024/07/31 08:34:44			Validate Download	Release Notes
11.1.2-h4	586 MB	91deabf4ee40b0f868fd3f...	2024/05/09 05:24:26			Validate Download	Release Notes
11.1.2-h3	585 MB	c88b08469c28103acd98c...	2024/04/14 08:09:19			Validate Download	Release Notes
11.1.2-h1	586 MB	ae21da966c0f075a479ce...	2024/03/13 07:07:45			Validate Download	Release Notes
11.1.1	559 MB	456b1bfb38f7e3b713f56...	2023/12/26 10:10:40			Validate Download	Release Notes
11.1.1-h1	565 MB	76bb8a6f821baff5ff6368...	2024/04/16 06:17:10			Validate Download	Release Notes
11.1.0-h3	446 MB	40cedfebaadfdf070f1ccb7...	2024/04/16 08:51:59			Validate Download	Release Notes
11.1.0-h2	439 MB	ae868344e90941f6cb386...	2024/01/07 16:52:41			Validate Download	Release Notes
11.1.0	1179 MB	c504e70e41209f35711a4...	2023/11/02 12:02:59	Downloaded		Validate Export Install	Release Notes

The list you see will vary from this example. Also, no newer versions of PAN-OS software may be available at the time you carry out these steps.

Do not upgrade your firewall!

Commit the configuration

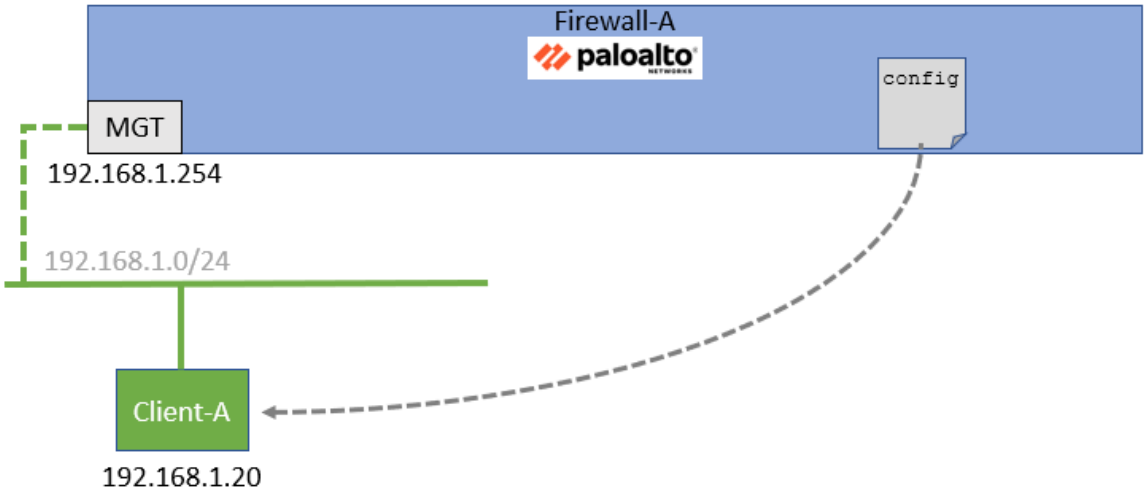
43. Click the **Commit** button at the upper right of the web interface.
44. Leave the settings unchanged and click **Commit**.
45. Wait until the **Commit** process is complete.
46. Click **Close** to continue.

Stop. This is the end of the lab.

Lab 3: Managing Firewall Configurations

Now that you have set up the firewall to allow management access, you need to make certain that you can save, load, and restore configurations to the device. You also need to familiarize yourself with the log files available, and with searching through the logs to find specific events.

Because the firewall is not scheduled to be deployed for a few days, you can spend some time on these tasks without worrying about affecting your production networks.



Lab Objectives

- Load a baseline configuration
- Save a named configuration snapshot
- Export a named configuration snapshot
- Save ongoing configuration changes before a commit
- Revert ongoing configuration changes
- Preview configuration changes
- Examine System and configuration log files
- Create a log file filter
- Use the Filter Builder

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

If you need more detailed guidance for the objectives, use the Detailed-Lab Steps section.

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-03.xml`** - to the Firewall

Save a Named configuration Snapshot

- Save the firewall's current configuration file as **`firewall-a-<Today's Date>`**.

Export a Named configuration Snapshot

- Export the **`firewall-a-<Today's Date>`** configuration file to the lab host's Downloads folder.

Revert Ongoing configuration Changes

- Change the value for the **Primary DNS Server** to **`88.8.8.8`** (an easy mistake to make).
- Verify the mistake in the **Services** section
- Use the Revert Changes option to restore the Primary DNS Server to its original setting (8.8.8.8)

Preview configuration Changes

- Modify the SNMP configuration with the following settings:
  - Set the **Physical Location** to **`Santa Clara, CA, USA`**.
  - Set the **Contact** to **`Sherlock Holmes`**.
  - Set the **SNMP Community String** to **`paloalto42`**.
- Use the **Preview Changes** option to compare the **Running** configuration to the **Candidate** configuration
- Do not commit changes at this stage

Modify System Log File Columns

- Hide the **Object** column in the System Log display
- Move the **Severity** column to the far left side of the System Log display

Create a System Log File Filter

- Create and apply a filter in the System Log that displays only entries with a **Severity** level of **informational**

Use the Filter Builder

- Use the Filter Builder to create a filter that will display all entries in the **System** log that have occurred in the last 60 minutes

Detailed Lab Steps

Use this section if you prefer detailed guidance to complete the objectives for this lab. We strongly recommend that you use this section if you do not have extensive experience working with Palo Alto Networks firewalls.

Apply a Baseline configuration to the Firewall

To start this lab exercise, you will load a preconfigured firewall configuration file.

1. In the firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down arrow next to the **Name** field and select **edu-210-11.1a-03.xml**.

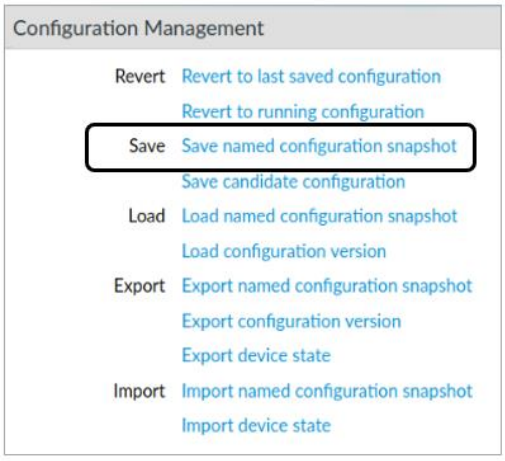
Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK** to close the **Load Named configuration** window.
5. Click **Close** to close the **Loading configuration** window.
6. Click the **Commit** button at the upper right of the web interface.
7. Leave the remaining settings unchanged and click **Commit**.
8. Wait until the **Commit** process is complete.
9. Click **Close** to continue.

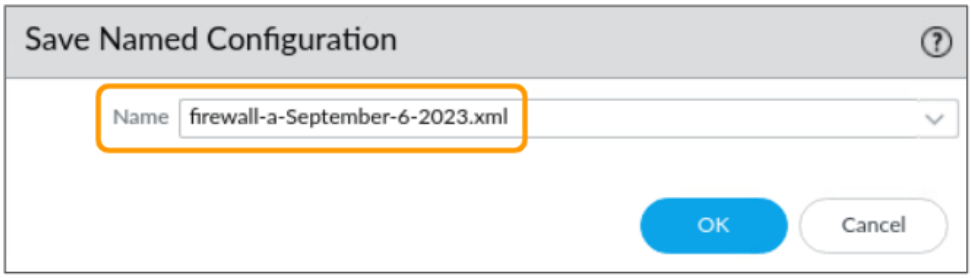
Save a Named configuration Snapshot

In this section, you will save the firewall configuration with a specific filename.

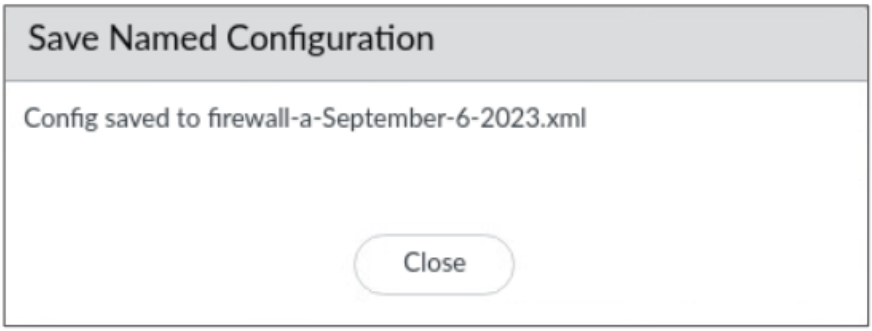
10. Select **Device > Setup > Operations**.
11. Click **Save named configuration snapshot**.



12. In the Save Named configuration window, enter **`firewall-a-<Today's Date>.xml`**



13. Click **OK**.
14. Click **Close** in the confirmation window.

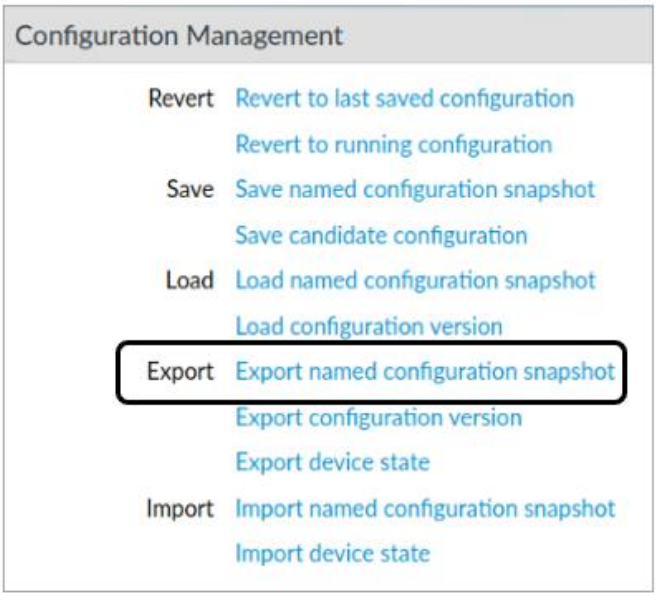


This process saves the configuration file to a location on the firewall itself.

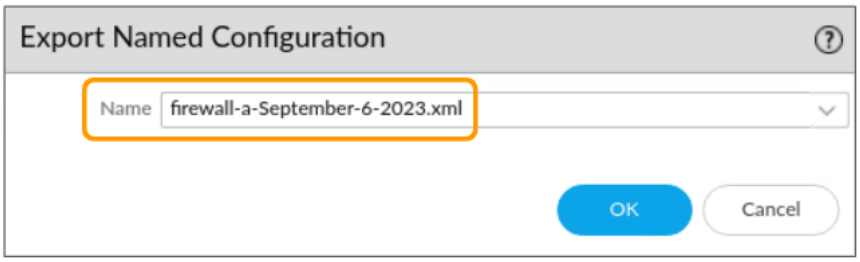
Export a Named configuration Snapshot

You will now export the saved configuration file **`firewall-a-<Today's Date>.xml`** from the firewall to your workstation.

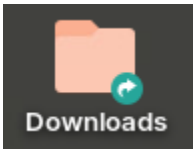
15. Under **Device > Setup > Operations > Configuration Management**, click the link for **Export named configuration snapshot**.



16. In the Export Named configuration window, use the drop-down list to locate the **`firewall-a-<Today's Date>.xml`** configuration file.



17. Click **OK**.
18. The workstation will prompt you to save the file to the Downloads folder.
19. On the workstation desktop, open the **Downloads** folder:



20. The saved file **`firewall-a-<Today's Date>.xml`** appears in the folder.

21. Close the **Downloads** folder on the workstation.

Revert Ongoing configuration Changes

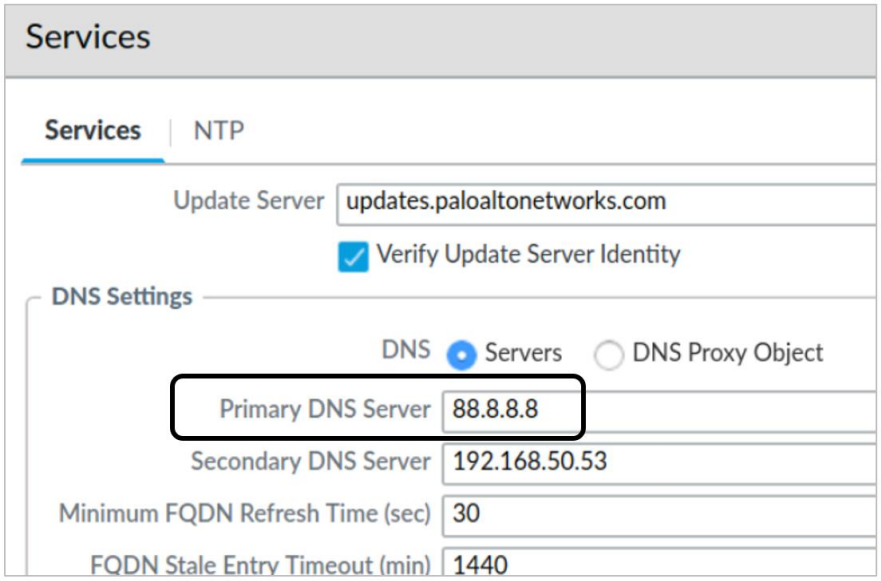
As you work on a firewall configuration, it is theoretically possible to make a mistake. In such a situation, you may not remember exactly which changes you have made or where the mistake exists in the configuration, particularly if you have made multiple changes (or multiple mistakes).

Fortunately, you can revert the firewall to the current running configuration. This process essentially erases any of the changes you have made to the working candidate configuration and puts the firewall back at the starting point before you made changes.

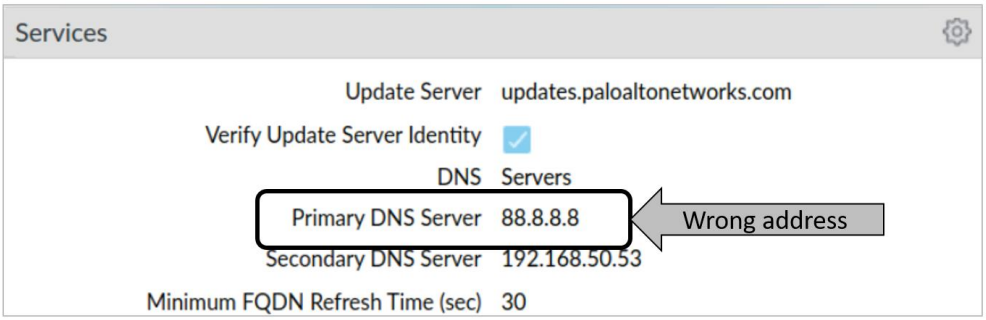
In this section, you will change the IP address for one of the firewall's DNS servers. You will then use **Revert Changes** to reset the firewall to the running configuration and remove the mistake.

22. In the firewall web interface, select **Device > Setup > Services**.

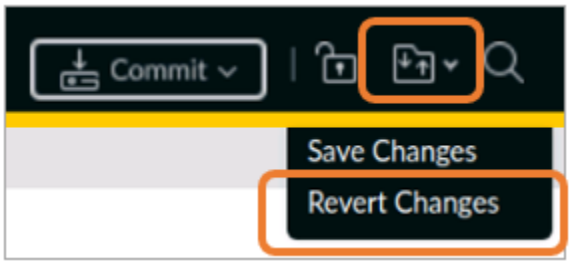
23. Edit the **Services** section by clicking the gear icon.



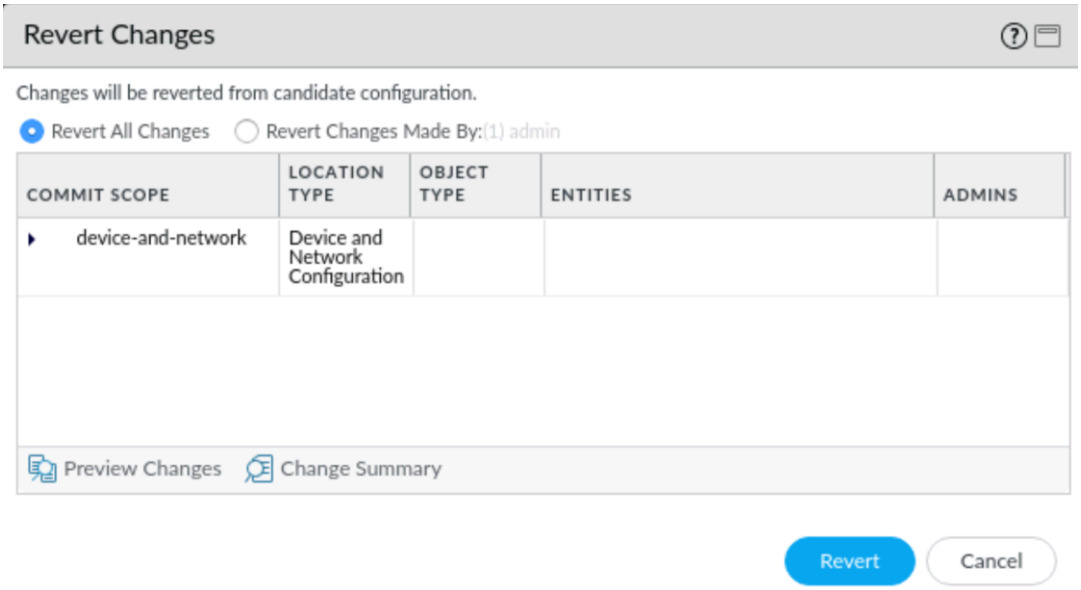
24. Change the value for the **Primary DNS Server** to **`88.8.8.8`** (an easy mistake to make).
25. Click **OK** to close the **Services** window.
26. You can see the mistake in place under the **Services** section:



27. In the upper right corner of the web interface, click the **Changes** button and select **Revert Changes**:

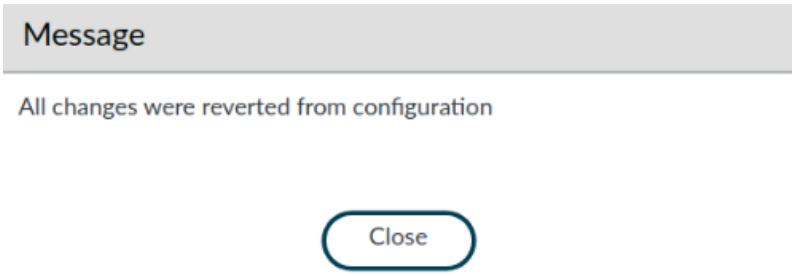


28. In the **Revert Changes** window, leave the settings unchanged:

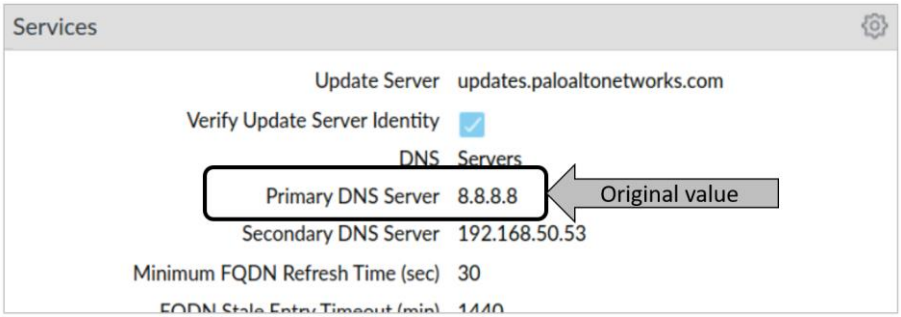


The **Revert Changes** window allows you to select specific elements of the configuration that you can revert. In this case, because you only made a single change, the **Commit Scope** shows `device-and-network` (which is the portion of the configuration that contains the changes to the DNS server).

29. Click **Revert**.
30. Click **Close** in the **Message** window:



31. In the **Services** window, notice that the **Primary DNS Server** has been reset to the original value before you mistakenly changed it.



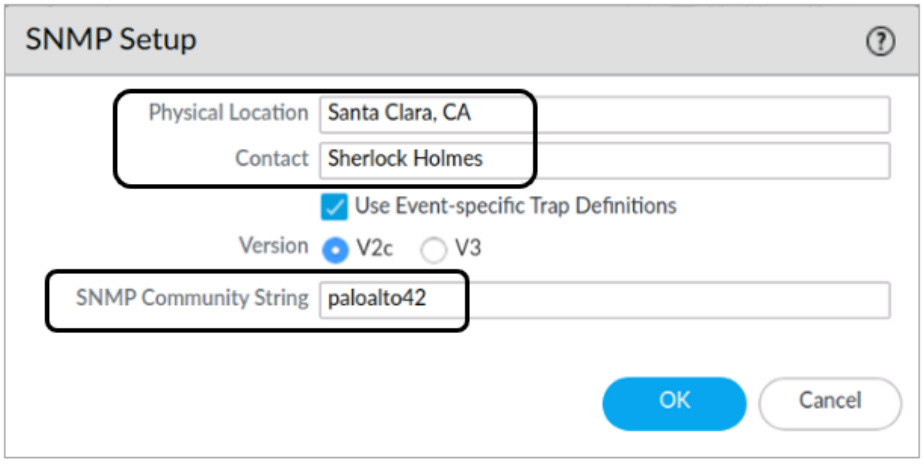
Preview configuration Changes

Before you commit changes to the firewall, you can compare the impending changes with the current configuration settings. This process can be useful to make certain you have the right changes in place before they are implemented on the firewall.

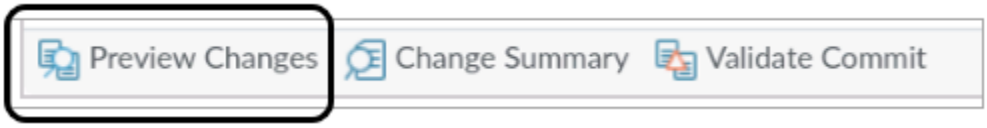
In this section, you will make a minor modification to the firewall and use **Preview Changes** to compare the candidate config to the running config.

32. Modify the SNMP configuration by going to **Device > Setup > Operations** and clicking **SNMP Setup** under the **Miscellaneous** section:

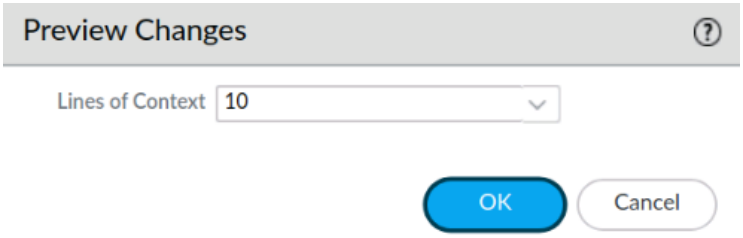
33. In the **SNMP Setup** window, set the **Physical Location** to **`Santa Clara, CA, USA`**.
34. For **Contact**, enter **`Sherlock Holmes`**.
35. For **SNMP Community String**, enter **`paloalto42`**.
36. Leave the remaining settings unchanged:



37. Click **OK**.
38. Click the **Commit** button.
39. In the **Commit** window, click **Preview Changes**:

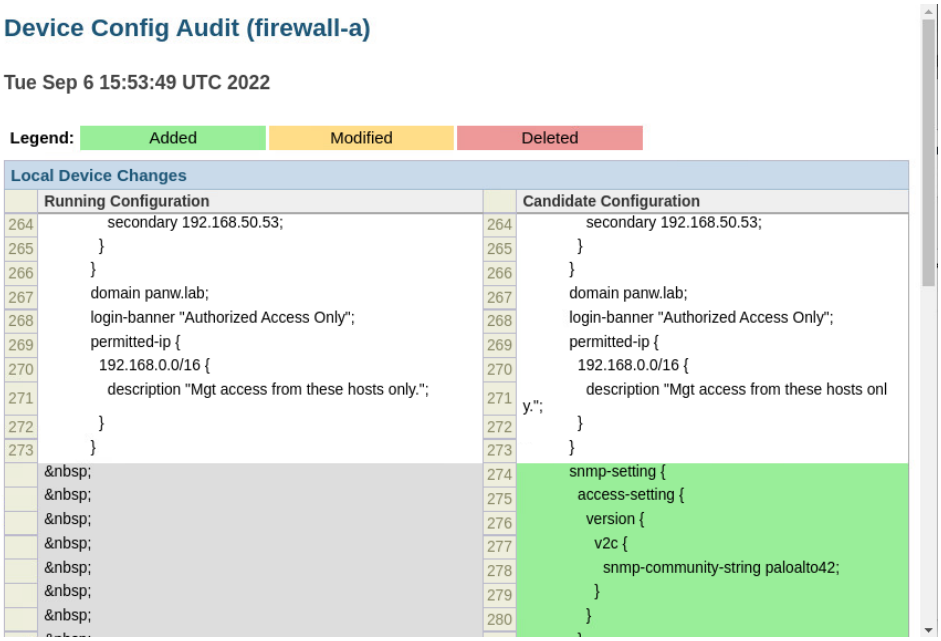


40. In the **Preview Changes** window, leave the **Lines of Context** set to **10**:



The **Lines of Context** setting determines how many lines are displayed before and after a change in the configuration file.

41. Click **OK**.
42. A new browser window appears that displays a side-by-side comparison of the current running configuration (on the left) and the proposed changes in the candidate configuration (on the right):



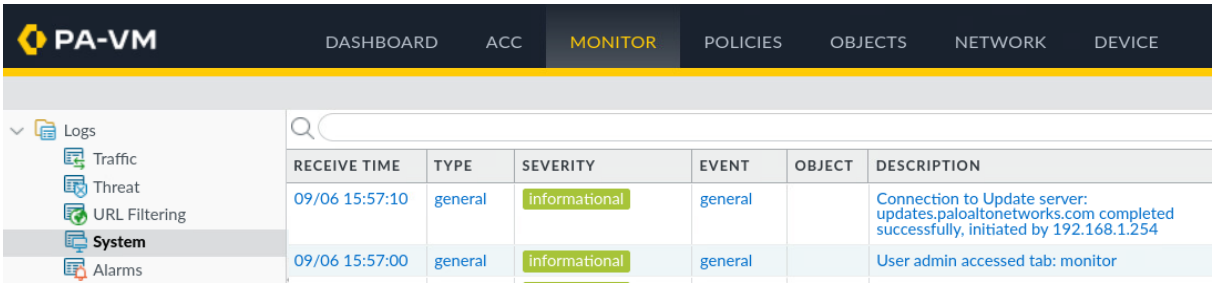
Changes are color coded. Green indicates new elements that have been added. Yellow indicates existing elements that have been modified. Red indicates existing elements that have been deleted.

43. Close the configuration comparison window by clicking the **X** in the upper right corner.
44. Click **Cancel** in the **Commit** window.

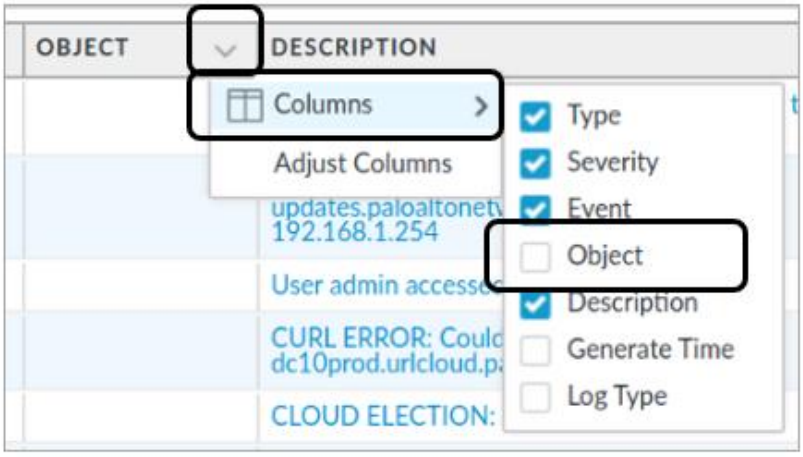
Modify System Log File Columns

Although the information in log files varies, the process of examining and searching log files on the firewall is the same. In this section, you will examine and navigate the firewall **`System`** log. You can later apply the same tasks and techniques while examining any other log file on the firewall, such as the Traffic or Threat logs.

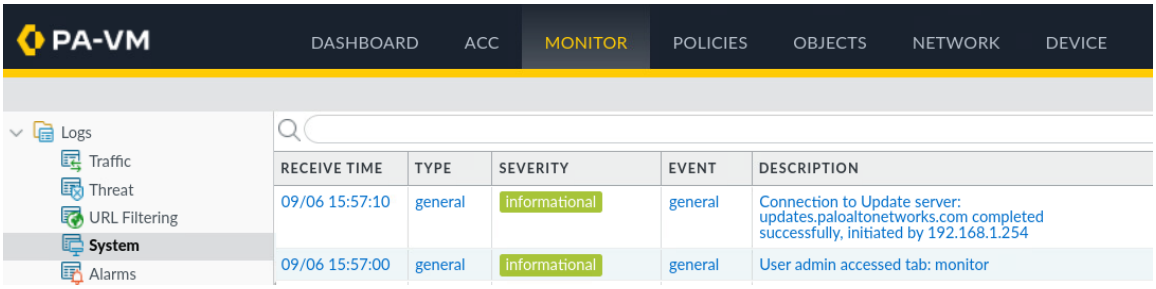
45. Select **Monitor > Logs > System**:



46. Hide the **Object** column by clicking the small **drop-down arrow** in the right portion of any column header.
47. Choose **Columns**.
48. Uncheck **Object**:

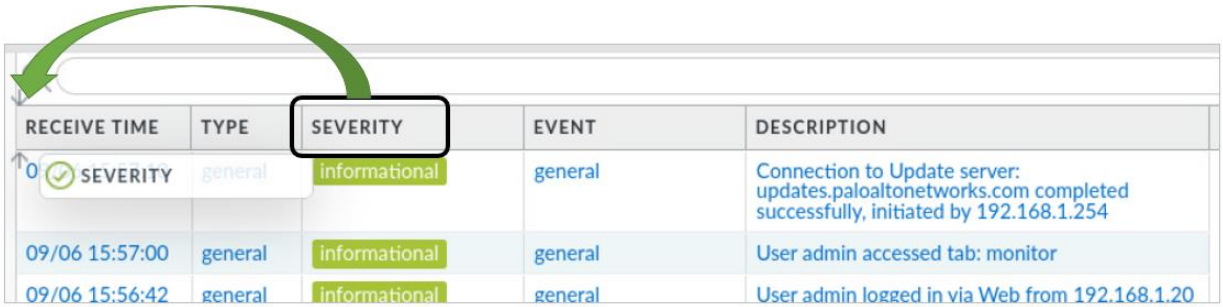


49. The **Object** column is now hidden:



Hiding and displaying log columns is optional but quite useful. Each log file contains different columns, some of which you may not need so you can hide them. There may be columns in certain log tables that are not shown by default, and you can use this process to display hidden columns that you want to view.

50. Drag and drop the **Severity** column to the left-most position in the table:



51. The table now displays **Severity** as the first column:

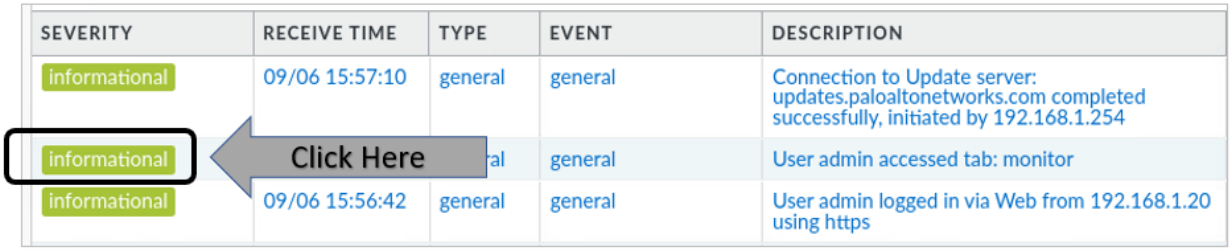
SEVERITY	RECEIVE TIME	TYPE	EVENT	DESCRIPTION
informational	09/06 15:57:10	general	general	Connection to Update server: updates.paloaltonetworks.com completed successfully, initiated by 192.168.1.254
informational	09/06 15:57:00	general	general	User admin accessed tab: monitor
informational	09/06 15:56:42	general	general	User admin logged in via Web from 192.168.1.20 using https

Reordering columns is also optional; however, you may discover that the information in a specific log file is easier for you to analyze after you customize the columns.

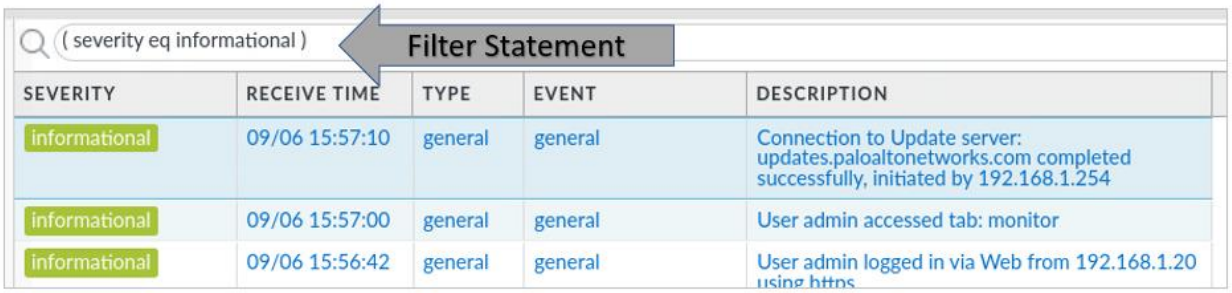
Create a System Log File Filter

Scanning through log files row-by-row is tedious. If you are looking for specific information, you can create filters quickly to display only entries that match certain criteria. All log files support filters.

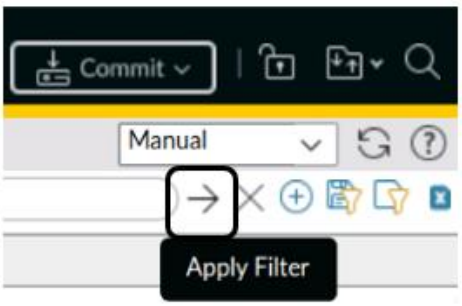
52. In the **System** log file, click any entry under the **Severity** column that contains **`informational`**:



53. The web interface will automatically build a filter statement with the appropriate syntax to search for all entries that contain **`informational`** in the **Severity** field:



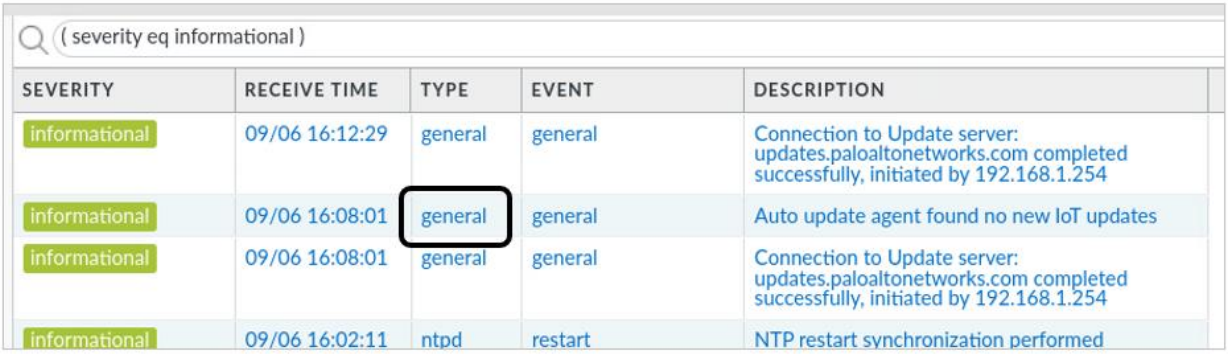
54. Click the **Apply Filter** button in the upper right corner of the window:



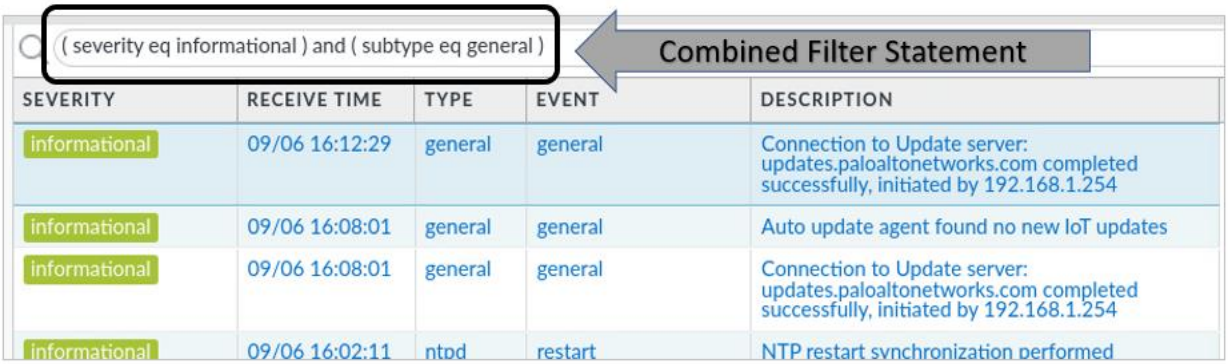
55. The System log display will update to show only those entries that contain **informational** as the **Severity** level.

    Note that your firewall may only have informational entries in the System log at this point.

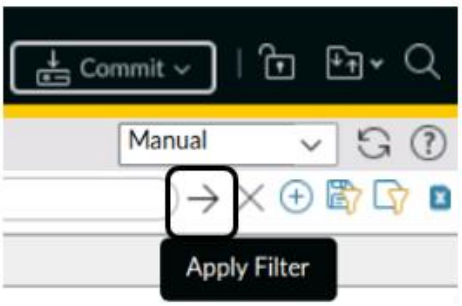
56. Under the **Type** column, click any entry that contains the word **general**:



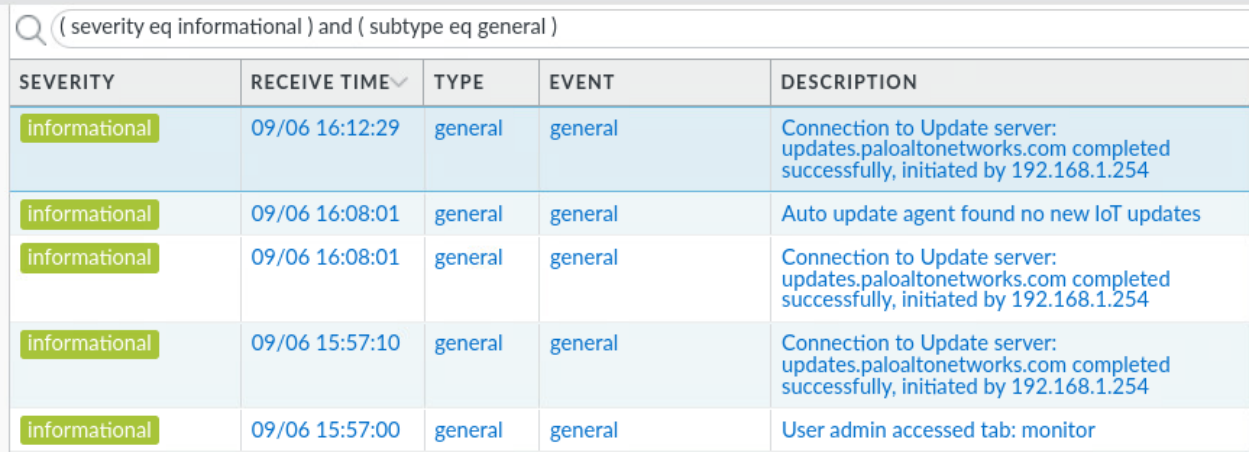
57. The interface will update the syntax to create a combined filter:



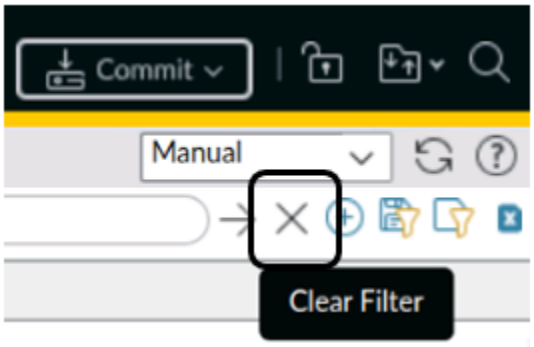
58. Click the **Apply Filter** button in the upper right corner of the window:



59. The interface will update the log file to display only those entries that match both conditions:



60. Remove the filter by clicking the **Clear Filter** button in the upper right corner of the window:



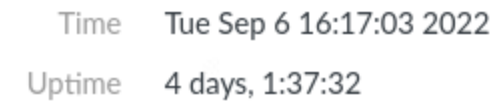
A good practice is to clear any filters from log file displays before you move to other portions of the web interface. The next time you examine the same log, it will display all results instead of only ones you have previously filtered.

Use the Filter Builder

Clicking the link for a specific entry in a log file will automatically create a simple filter. You can create more complex filters by clicking multiple conditions; however, there are some situations in which this process will not provide you with the kind of criteria you need to complete a search. For long or sophisticated searches, you can use the Filter Builder.

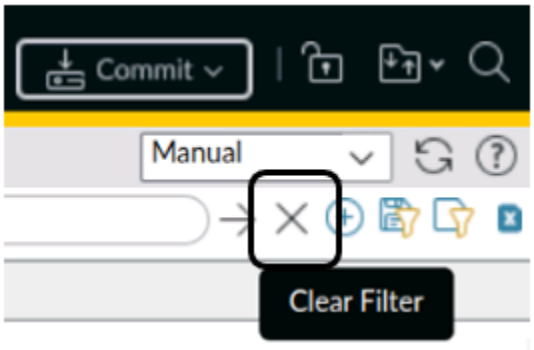
In this section, you will use the Filter Builder to search the **System** log for all entries that have occurred in the last 60 minutes.

61. Note the current time on the firewall by selecting the **Dashboard** tab.
62. Under the **General Information** section, scroll to the bottom and locate the **Time**:

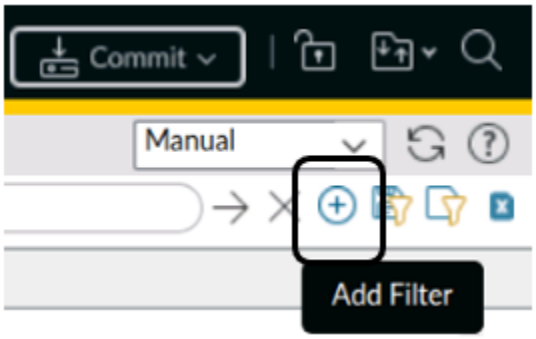


In this example, the firewall time is 16:17:03.

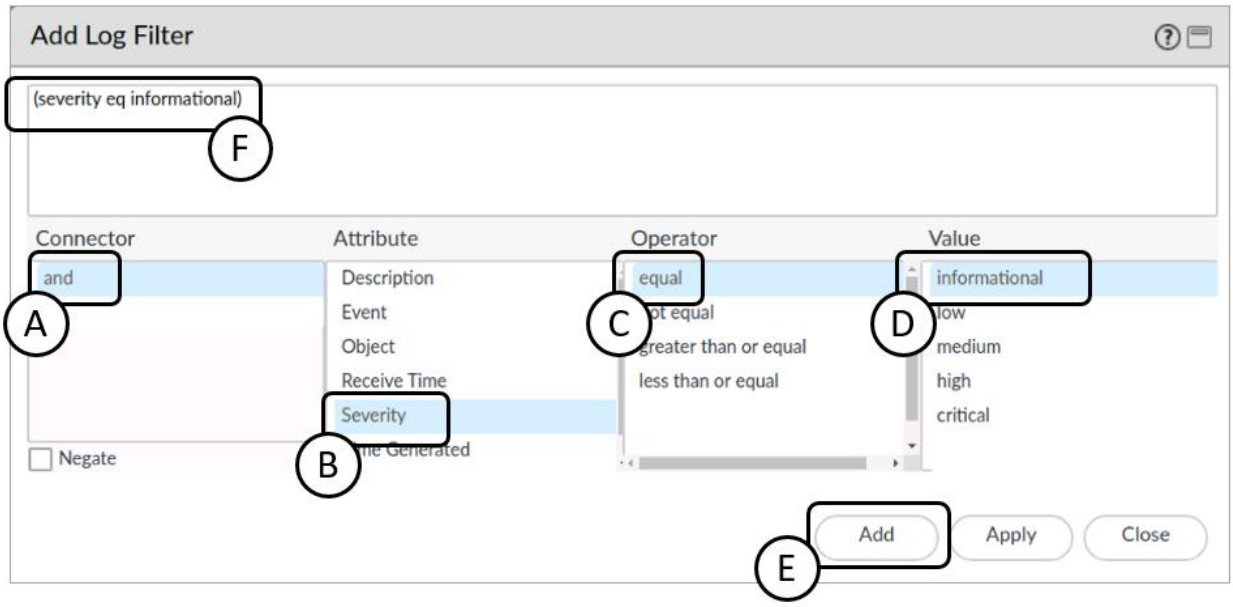
63. Write the current time down so you do not forget it.
64. Select **Monitor > Logs > System**.
65. Clear any filters you may have in place by clicking the **Clear Filter** button in the upper right corner of the window:



66. Click the **Add Filter** button in the upper right corner of the window:



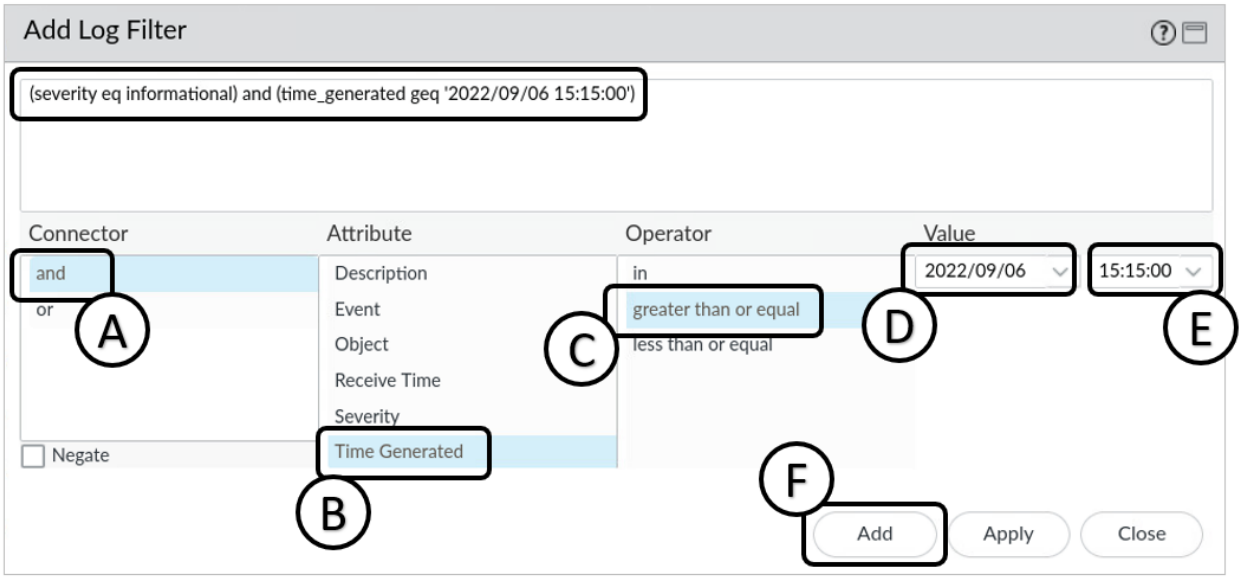
67. In the **Add Log Filter** window:
    A. Under the **Connector** column, click **and**.
    B. Under the **Attribute** column, click **Severity**.
    C. Under the **Operator** column, click **equal**.
    D. Under the **Value** column, click **informational**.
    E. Click **Add**.
    F. Note that the filter field at the top of the window updates to display the correct syntax for this filter:



Do not close this window yet!

68. With the same window open, build the second part of the filter:
    A. Under the **Connector** column, select **and**.
    B. Under the **Attribute** column, select **Time Generated**.
    C. Under **Operator**, select **greater than or equal to**.
    D. Under the **Value** column, use the first drop-down list to select today.
    E. Under the **Value** column, use the second drop-down list to select a time approximately sixty minutes ago (round up or down if you need to).
    F. Click **Add**.

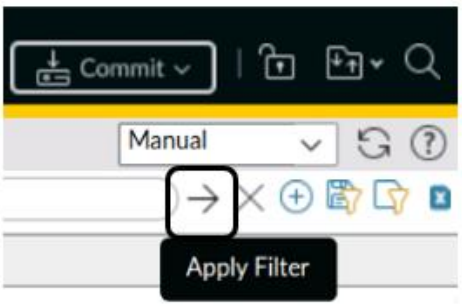
G. Note that the filter is updated to reflect the additional syntax:



69. In the **Add Log Filter** window, click **Apply**.
70. Your filter will appear in the System log syntax field:

The time and date for your filter will differ from the example shown here.

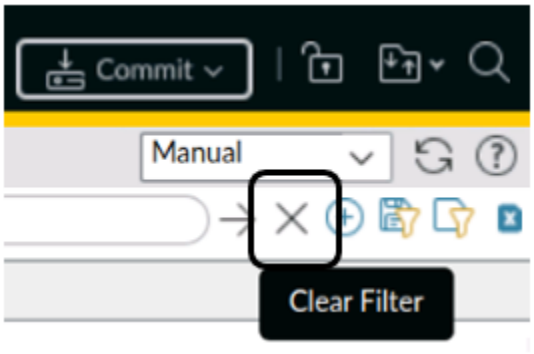
71. Click the **Apply Filter** button in the upper right corner of the window:



72. The System log display will update to show you only entries that have been generated after the time you specified.

Although you used the System log as the basis for this exercise, the process of creating filters is the same throughout all Palo Alto Networks firewall log databases. The Filter Builder is available to use in all log tables.

73. Clear the filter by clicking the **Clear Filter** button in the upper right corner of the window:



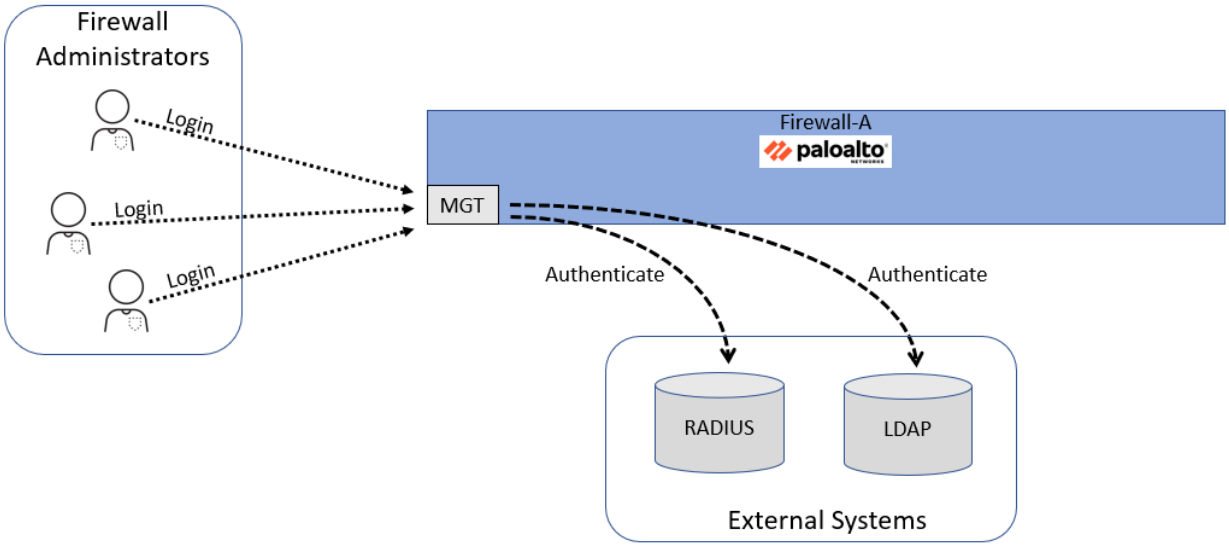
74. Click the **Commit** button at the upper right of the web interface

Stop. This is the end of the lab.

Lab 4: Managing Firewall Administrator Accounts

When you deploy the firewall into your production network, you need to make sure that other members of your team have administrative access to the device. You want to leverage an existing LDAP server that maintains account and password information for members of your team. However, your organization recently merged with another company whose administrative accounts are maintained in a RADIUS database.

No one has had time yet to migrate all the accounts from RADIUS into LDAP, so you need to configure the firewall to check both LDAP and RADIUS to authenticate an account when an administrator logs in.



Lab Objectives

- Load a baseline configuration
- Create a local firewall administrator account
- Configure an LDAP Server Profile
- Configure a RADIUS Server Profile
- Configure an LDAP Authentication Profile
- Configure a RADIUS Authentication Profile
- Configure an Authentication Sequence
- Create non-local firewall administrator accounts

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

If you need more detailed guidance for the objectives, use the Detailed-Lab Steps section.

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-04.xml`** to the Firewall

Create a Local Database Authentication Profile

- Create a **Local Database Authentication Profile** called **`Local-database`**
- Set the **Allow List** for the **Local-database** Profile to **`all`**

Create a Local User Database Account

- Create an entry in the **Local User Database** called **`adminBob`** with **`Pal0Alt0!`** as the **Password**

Create an Administrator Account

- Create an **Administrator** account using the **Local Database** entry for **adminBob**
- Set the **Authentication Profile** to **`Local-database`**

Commit the configuration

- Commit the changes to the firewall before proceeding

Log in With New Admin Account

- Log out of the firewall web interface and log back into the firewall with **`adminBob`** as the **Username** and **`Pal0Alt0!`** as the **Password**.
- Use the System log to verify that the adminBob account was authenticated by the local-database
- Log out of the firewall and log back into the firewall with the **`admin/Pal0Alt0!`** credentials.

Configure LDAP Authentication

- Use the information in the table below to configure an LDAP Server Profile

Profile Name	**`LDAP-Server-Profile`**
Server Name	**`ldap.panw.lab`**

LDAP Server IP Address	`192.168.50.89`
Port field	`389`
Server Settings Type	`Other`
Base DN	`dc=panw,dc=lab`
Bind DN	`cn=admin,dc=panw,dc=lab`
Password / Confirm Password	`Pal0Alt0!`
Require SSL/TLS secured connection	`unchecked`

- Use the information in the table below to create an LDAP Authentication Profile.

Name	`LDAP-Auth-Profile`
Type	`LDAP`
Server Profile	`LDAP-Server-Profile`
Allow List (Advanced Tab)	`all`

- Use the information in the table below to create a new administrator account that will be authenticated by LDAP

Name	`adminSally`
Authentication Profile	`LDAP-Auth-Profile`

Commit the configuration

- Commit the changes to the firewall before proceeding

Log in With New Admin Account

- Test LDAP Authentication by logging in with the **adminSally/Pal0Alt0!** credentials
- Use the System log to verify that the **adminSally** account was authenticated using LDAP

Configure RADIUS Authentication

- Use the information in the table below to configure a RADIUS Server Profile

Profile Name	`RADIUS-Server-Profile`
Authentication Protocol	`CHAP`
Server Name	`radius.panw.lab`

RADIUS Server	**192.168.50.150**
Secret / Confirm Secret	**Pal0Alt0!**
Port	**1812**

- Use the information in the table below to create an RADIUS Authentication Profile

Name	**RADIUS-Auth-Profile**
Type	**RADIUS**
Server Profile	**RADIUS-Server-Profile**
Allow List (Advanced Tab)	**all**

- Use the information in the table below to create a new administrator account that will be authenticated by RADIUS

Name	**adminHelga**
Authentication Profile	**RADIUS-Auth-Profile**

Commit the configuration

- Commit the changes to the firewall before proceeding

Log in With New Admin Account

- Test RADIUS Authentication by logging in with the **adminHelga/Pal0Alt0!** credentials
- Use the System log to verify that the **adminHelga** account was authenticated using RADIUS

Configure an Authentication Sequence

- Create an authentication sequence called **LDAP-then-RADIUS** that uses the **LDAP-Auth-Profile** first and the **RADIUS-Auth-Profile** second.

Commit the configuration

Commit the changes to the firewall before proceeding

Detailed Lab Steps

Use this section if you prefer detailed guidance to complete the objectives for this lab. We strongly recommend that you use this section if you do not have extensive experience working with Palo Alto Networks firewalls.

Apply a Baseline configuration to the Firewall

To start this lab exercise, you will load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down arrow next to the **Name** field and select **edu-210-11.1a-04.xml**.

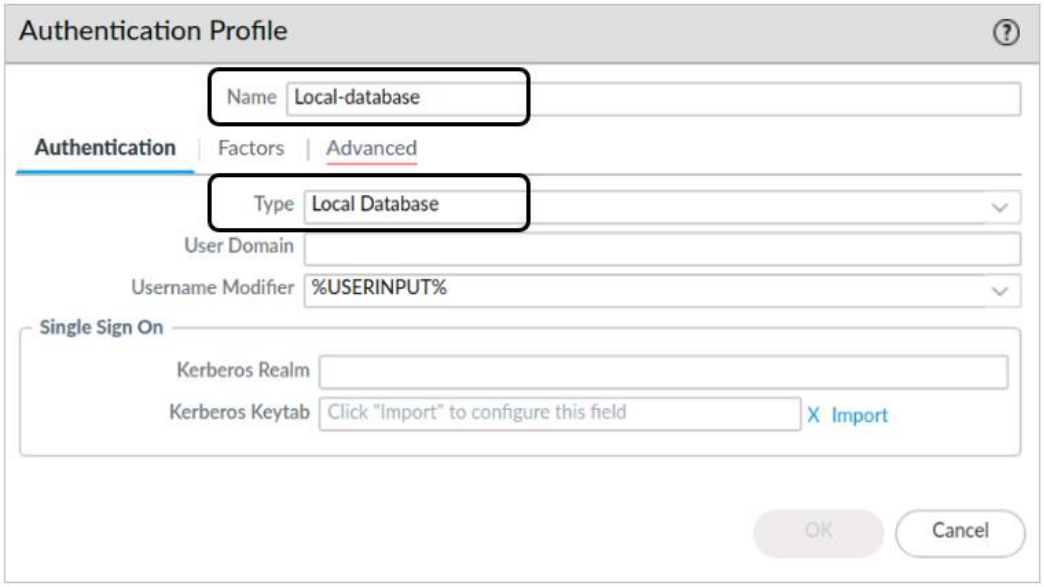
Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK** to close the **Load Named configuration** window.
5. Click **Close** to close the **Loading configuration** window.
6. Click the **Commit** button at the upper right of the web interface.
7. Leave the remaining settings unchanged and click **Commit**.
8. Wait until the **Commit** process is complete.
9. Click **Close** to continue.

Create a Local Database Authentication Profile

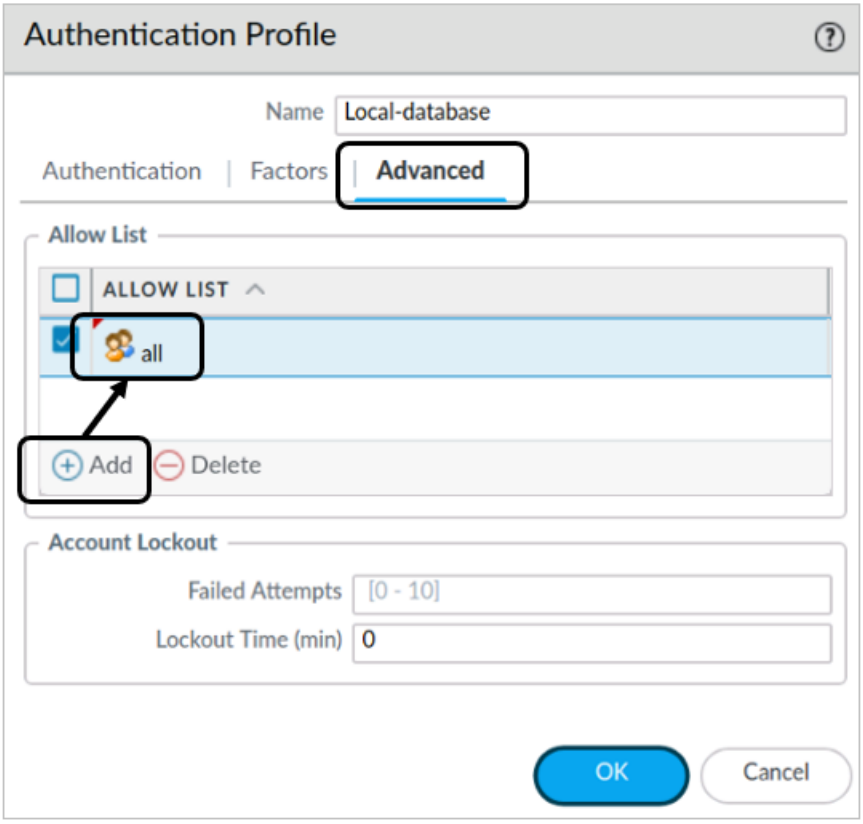
10. Create a Local Database Authentication Profile by selecting **Device > Authentication Profile**.
11. Click **Add** at the bottom of the window.
12. Under the **Authentication** tab, enter **`Local-database`** for the **Name**.
13. For **Type**, use the drop-down list to select **Local Database**.

14. Leave the remaining settings unchanged.



15. Select the tab for **Advanced**.
16. In the **Allow List** section, click **Add**.
17. Select **all**.

18. Leave the remaining settings unchanged.



The **Allow List** entries let you to select individual members of the local database if you wish to limit access to the firewall by specific administrators. By selecting **all**, you allow any administrator accounts in the local database to access the firewall.

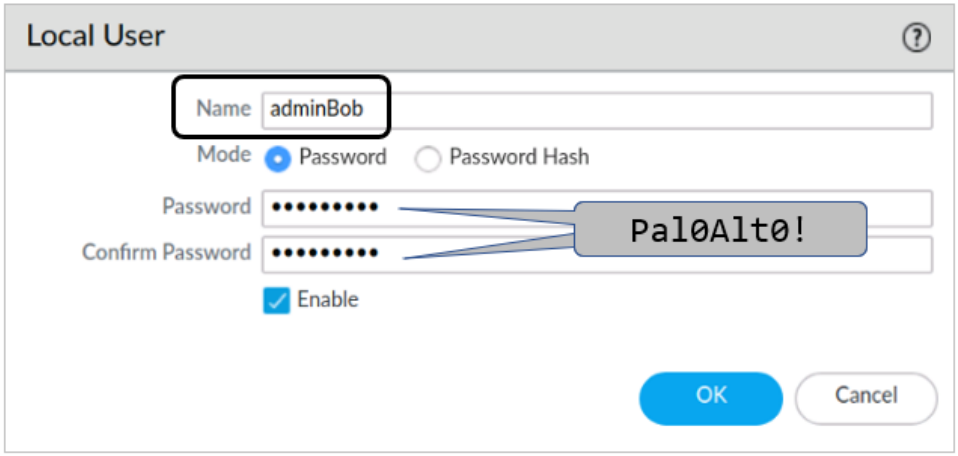
19. Click **OK**.

Create a Local User Database Account

In this section, you will create a new entry in the Local User Database on the firewall. This entry will be for a new team member, **`adminBob`**.

20. Select **Device > Local User Database > Users**.
21. In the bottom left corner of the window, click **Add**.
22. For **Name**, enter **`adminBob`**.
23. Enter **`Pal0Alt0!`** for **Password** and **Confirm Password**.

24. Leave the remaining settings unchanged.

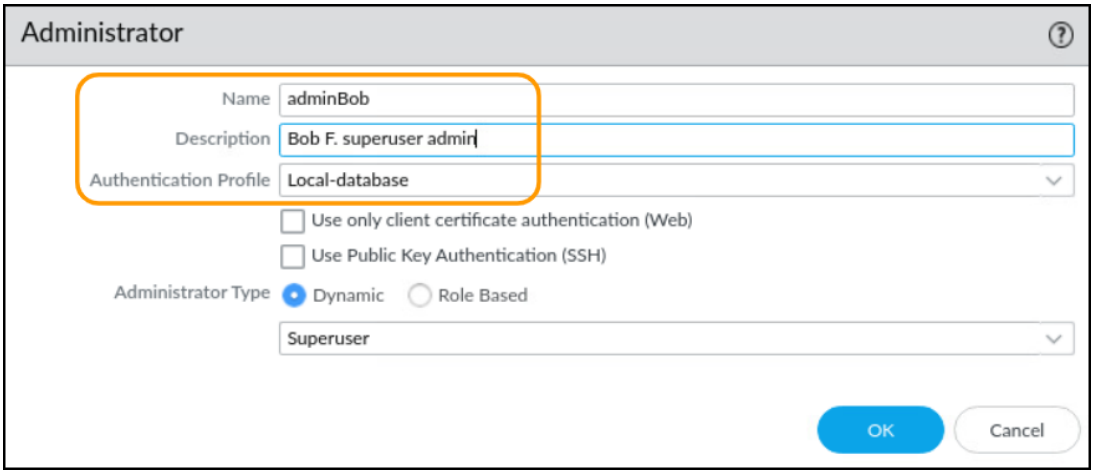


25. Click **OK**.

Create an Administrator Account

In this section, you will create an administrator account for **`adminBob`**. The **`adminBob`** account will use the **`Local-database`** Authentication Profile.

26. Create an Administrator Account from a Local Database user by selecting **Device** > **Administrators**.
27. Click **Add** at the bottom of the window.
28. For **Name**, enter **`adminBob`**.
29. For **Description**, enter **`Bob F. superuser admin`**.
30. For **Authentication Profile**, use the drop-down list to select **Local-database**.
31. Leave the remaining settings unchanged.



When you select Local-database for the Authentication Profile, there is no option to enter a Password for the administrator. The password information for this account is maintained in the Local-database on the firewall.

32. Click **OK**.

Commit the configuration

33. Click the **Commit** button at the upper right of the web interface.
34. Leave the settings unchanged and click **Commit**.
35. Wait until the **Commit** process is complete.
36. Click **Close** to continue.

Log in With New Admin Account

37. Log out of the firewall web interface by clicking the **Logout** button in the bottom left corner of the window.

38. Log back into the firewall with **`adminBob`** as the **Username** and **`Pal0Alt0!`** as the **Password**.
39. Close any Welcome windows that appear.
40. Select **Monitor** > **System**.
41. Look for an entry with **Type `auth`**.

RECEIVE TIME	TYPE	SEVERITY	EVENT	DESCRIPTION
09/06 16:42:48	general	informational	general	User adminBob logged in via Web from 192.168.1.20 using https
09/06 16:42:48	auth	informational	auth-success	authenticated for user 'adminBob'. auth profile 'Local-database', vsys 'shared', From: 192.168.1.20.

If you do not see an entry in the System log indicating a successful authentication for adminBob, you can create and apply a filter with **`( subtype eq auth )`** as the syntax.

42. Note that the entry in the firewall system log indicates that adminBob was successfully authenticated against the **`Local-database`**.
43. Log out of the firewall.

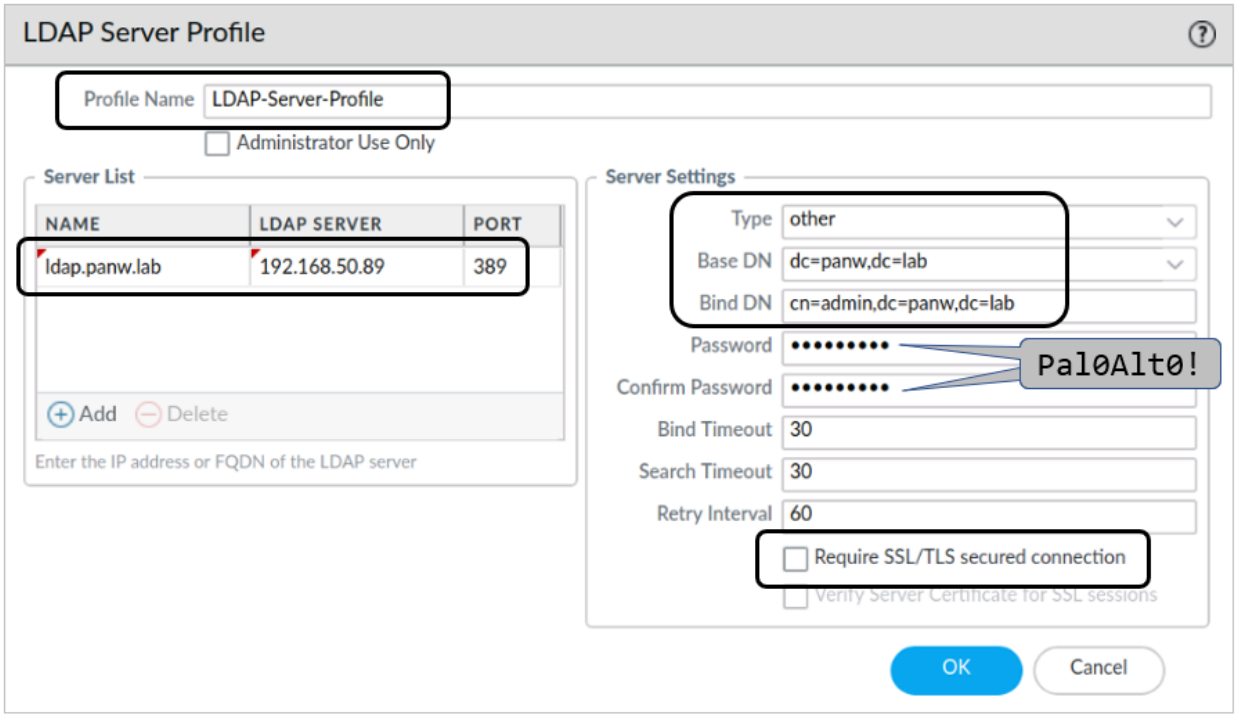
44. Log back into the firewall with the **admin/Pal0Alt0!** credentials.

Configure LDAP Authentication

Your organization uses an LDAP server to maintain a database of users, including network administrators. Your team of security personnel is growing each month and you want to leverage the existing LDAP server to authenticate administrators when they attempt to log into the firewall.

The first step in this process is to define an LDAP Server Profile that contains specific information that the firewall can use when sending queries for authentication.

45. Select **Device** > **Server Profiles** > **LDAP**.
46. At the bottom of the window, click **Add**.
47. For **Profile Name**, enter **LDAP-Server-Profile**.
48. Under the **Server List** section, click **Add**.
49. In the **Name** field, enter **ldap.panw.lab**.
50. In the **LDAP Server** field, enter **192.168.50.89**.
51. Leave the **Port** field set to **389**.
52. Under the **Server Settings** section, verify that the **Type** is set to **other**.
53. Enter **dc=panw,dc=lab** for **Base DN**.
54. Enter **cn=admin,dc=panw,dc=lab** for **Bind DN**.
55. Enter **Pal0Alt0!** for **Password** and **Confirm Password**.
56. **Uncheck** the option for **Require SSL/TLS secured connection**.
57. Leave the remaining settings unchanged.



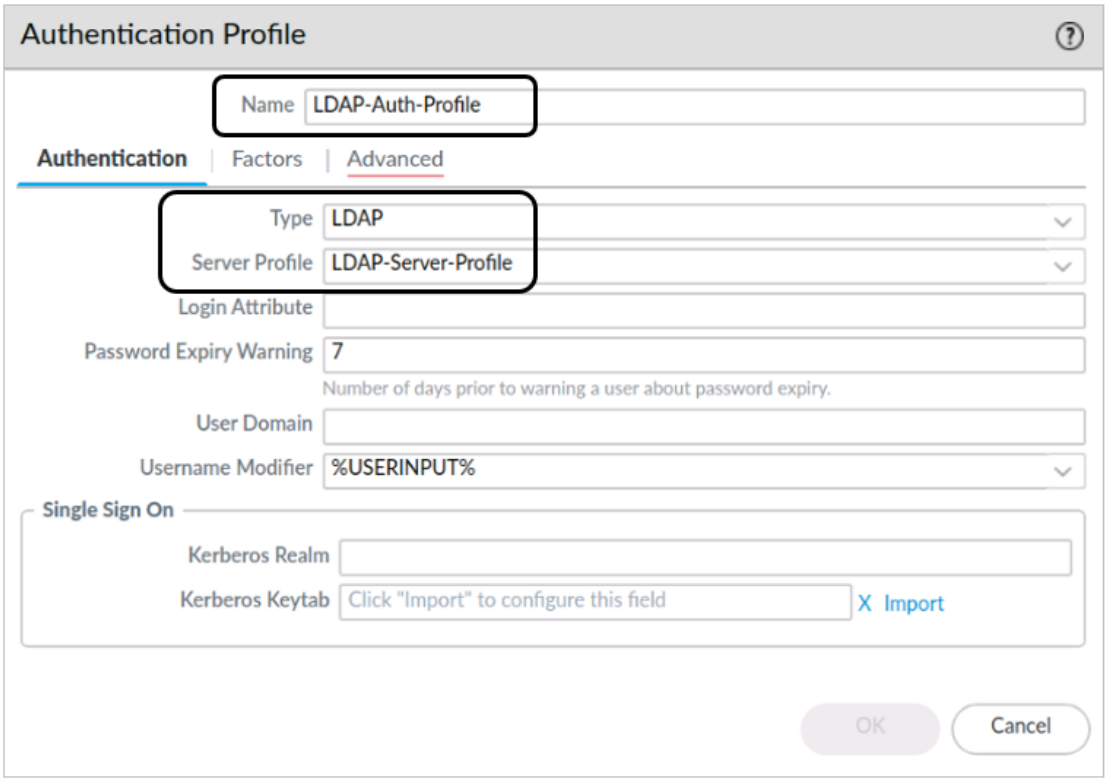
Note that there are no spaces between values in the Base DN and Bind DN fields.

58. Click **OK** to create the LDAP Server Profile.

    With your LDAP Server Profile in place, you will now create an Authentication Profile and reference the LDAP Server Profile you just created.

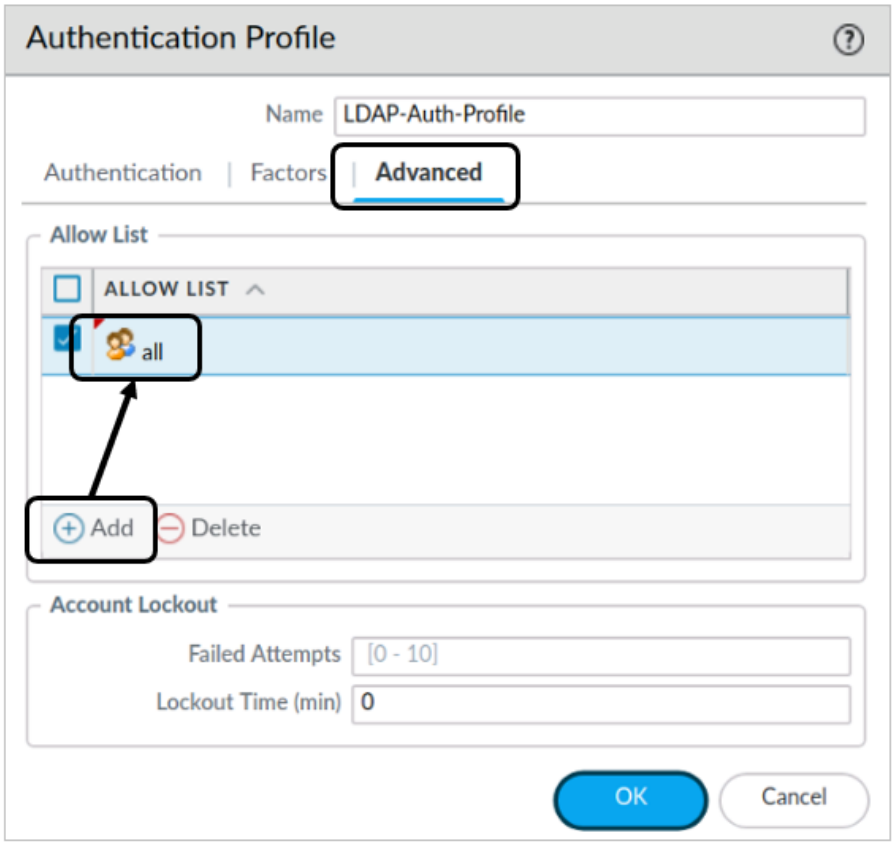
59. Select **Device** > **Authentication Profile**.
60. Click the **Add** button at the bottom of the window.
61. For **Name**, enter **`LDAP-Auth-Profile`**.
62. Under the **Authentication** tab, use the **Type** drop-down list to select **LDAP**.

63. Under **Server Profile**, use the drop-down list to select **LDAP-Server-Profile**.

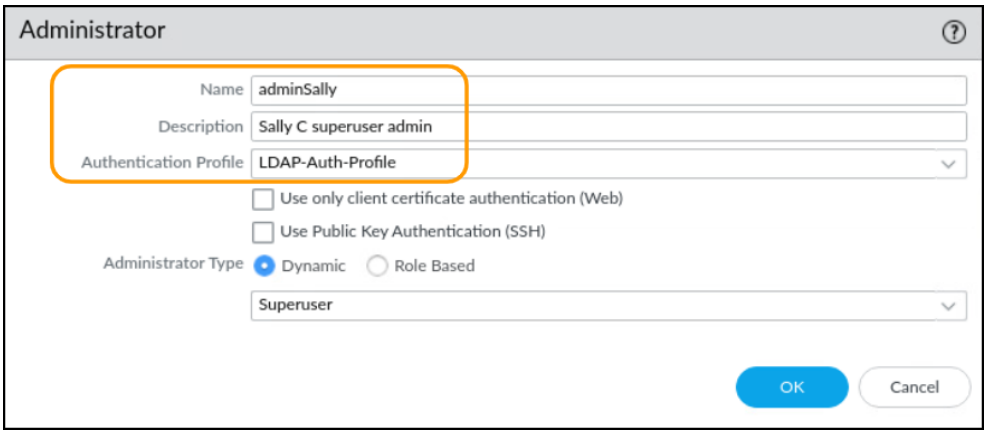


64. Select the **Advanced** tab.
65. Under the **Allow List** section, click **Add**.
66. Select **all**.

67. Leave the remaining settings unchanged.



68. Click **OK**.
69. Create a new administrator by selecting **Device** > **Administrators**.
70. Click **Add**.
71. For **Name**, enter **`adminSally`**.
72. For **Description**, enter **`Sally C superuser admin`**.
73. For **Authentication Profile**, use the drop-down list to select **LDAP-Auth-Profile**.
74. Leave the remaining settings unchanged.



The adminSally account is one that exists in the LDAP server.

75. Click **OK**.

Commit the configuration

76. Click the **Commit** button at the upper right of the web interface.
77. Leave the settings unchanged and click **Commit**.
78. Wait until the **Commit** process is complete.
79. Click **Close** to continue.

Log in With New Admin Account

80. Log out of the firewall by clicking the **Logout** button in the bottom left corner of the window.
81. Log back into the firewall with **`adminSally`** as the **Username** and **`Pal0Alt0!`** as the **Password**.
82. Close any **Welcome** windows that appear.
83. Select **Monitor > System**.
84. Look for an entry with **Type `auth`**.

RECEIVE TIME	TYPE	SEVERITY	EVENT	OBJECT	DESCRIPTION
09/06 16:52:38	general	informational	general		User adminSally logged in via Web from 192.168.1.20 using https
09/06 16:52:38	auth	informational	auth-success	LDAP-Auth-Profile	authenticated for user 'adminSally'. auth profile 'LDAP-Auth-Profile', vsys 'shared', server profile 'LDAP-Server-Profile', server address '192.168.50.89'. From: 192.168.1.20.
09/06 16:52:38	auth	medium	auth-server-up		LDAP auth server 192.168.50.89 is up !!!

If you do not see an entry in the System log indicating a successful authentication for adminSally, you can use a filter **`( subtype eq auth )`** as the syntax.

85. Note that the entry in the firewall system log indicates that **`adminSally`** was successfully authenticated against the **`LDAP-Auth-Profile`**.
86. Log out of the firewall.
87. Log back into the firewall with the **`admin/Pal0Alt0!`** credentials.

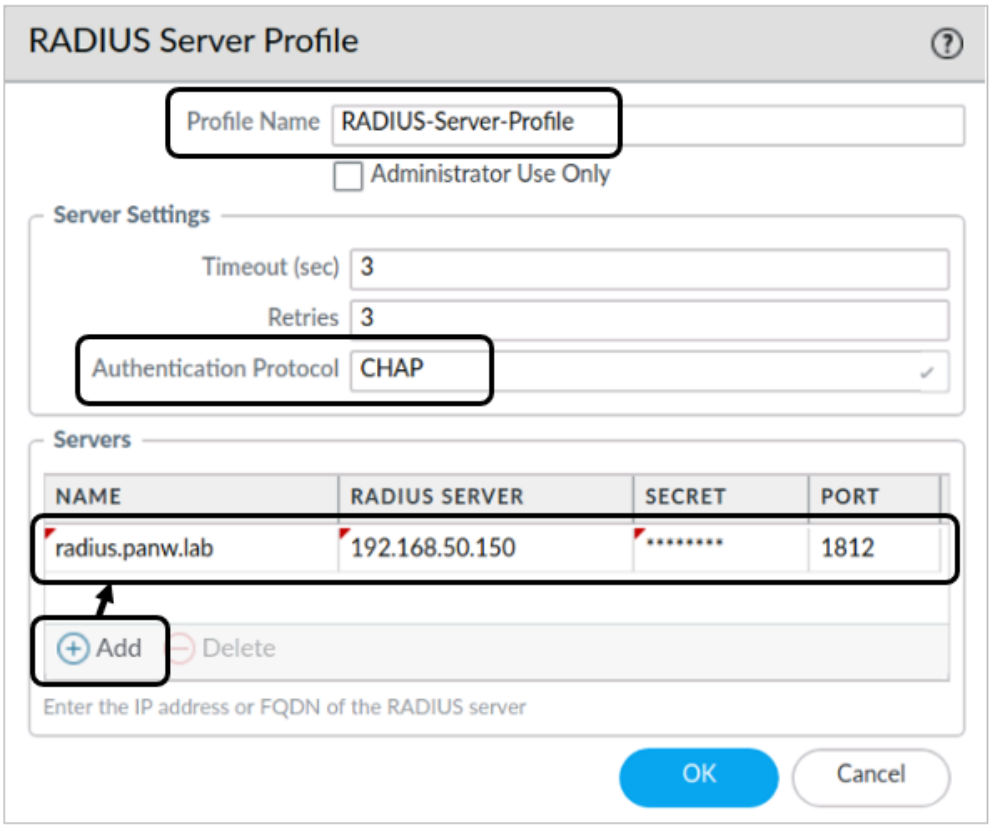
Configure RADIUS Authentication

Your organization has recently acquired another company. The newly acquired company maintains all network administrator accounts in a RADIUS server. You need to incorporate RADIUS authentication for the firewall so the new network administrators who have joined your team can access the firewall for management purposes.

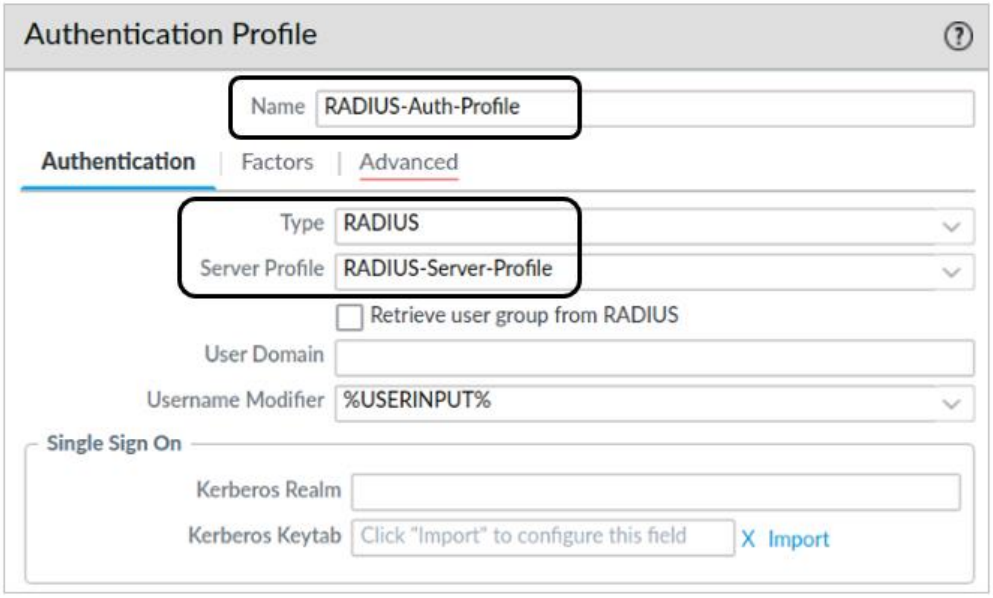
88. Create a RADIUS Server Profile by selecting **Device** > **Server Profiles** > **RADIUS**.
89. Click **Add**.
90. For **Name**, enter **`RADIUS-Server-Profile`**.
91. For **Authentication Protocol**, use the drop-down list to select **CHAP**.

Note: Never use CHAP in a production environment because it is not secure. We are using it in the lab for the sake of simplicity.

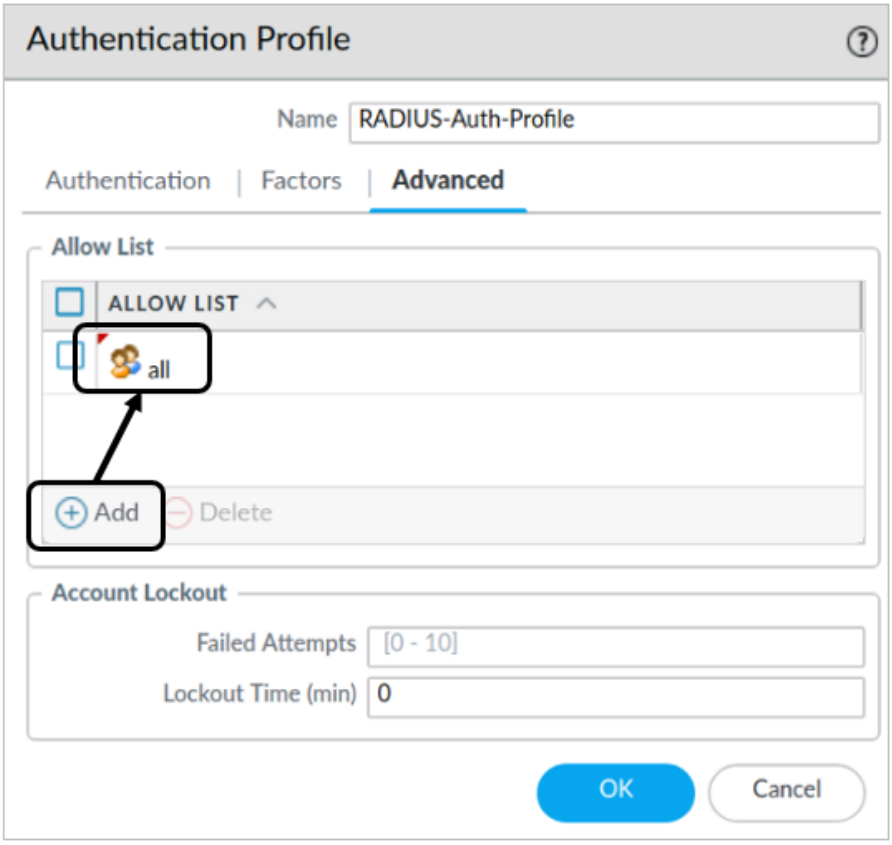
92. Under the **Servers** section, click **Add**.
93. For the server **Name** field, enter **`radius.panw.lab`**.
94. For the **RADIUS Server** field, enter **`192.168.50.150`**.
95. Enter **`Pal0Alt0!`** for **Secret** and **Confirm Secret**.
96. Leave the **Port** set to **1812**.
97. Leave the remaining settings unchanged.



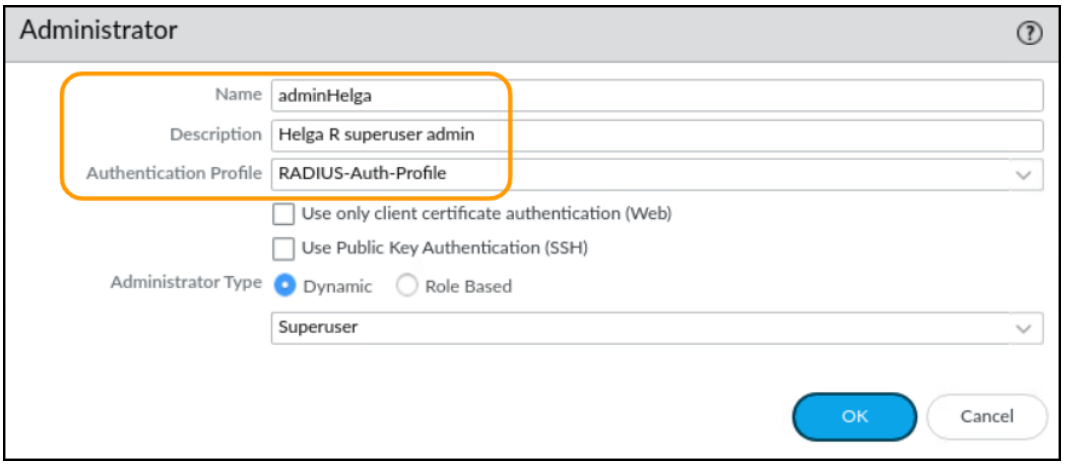
98. Click **OK**.
99. Create a **RADIUS Authentication Profile** by selecting **Device > Authentication Profile**.
100. Click **Add**.
101. For **Name**, enter **`RADIUS-Auth-Profile`**.
102. For **Type**, select **RADIUS**.
103. For **Server Profile**, select **RADIUS-Server-Profile**.
104. Leave the remaining settings unchanged.



105. Select the **Advanced** tab.
106. Under the **Allow List** section, click **Add**.
107. Select **all**.
108. Leave the remaining settings unchanged.



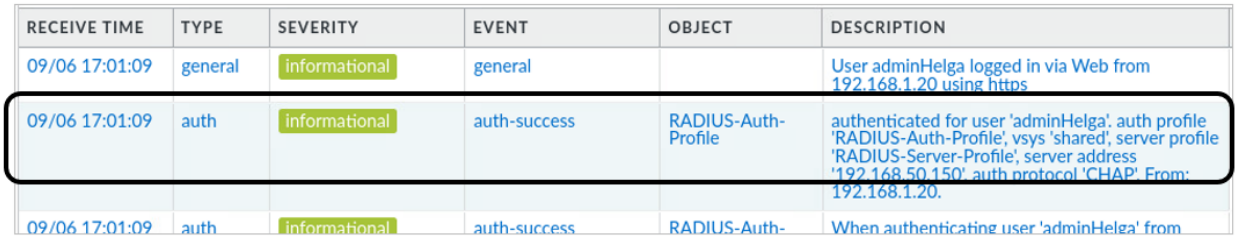
109. Click **OK**.
110. Create an administrator account for adminHelga (who has recently joined your team from the acquired company) by selecting **Device** > **Administrators**.
111. Click **Add**.
112. For **Name**, enter **`adminHelga`**.
113. For Description, enter **`Helga R superuser admin`**.
114. For **Authentication Profile**, select **RADIUS-Auth-Profile**.
115. Leave the remaining settings unchanged.



116. Click **OK**.
117. Click the **Commit** button at the upper right of the web interface:

A **Commit** window should open.

118. Leave the settings unchanged and click **Commit**.
119. Wait until the **Commit** process is complete.
120. Log out of the firewall by clicking the **Logout** button in the bottom left corner of the window.
121. Log back into the firewall with **`adminHelga`** as the **Username** and **`Pal0Alt0!`** as the **Password**.
122. Close any **Welcome** windows that appear.
123. Select **Monitor** > **System**.
124. Look for an entry with **Type auth**.



RECEIVE TIME	TYPE	SEVERITY	EVENT	OBJECT	DESCRIPTION
09/06 17:01:09	general	informational	general		User adminHelga logged in via Web from 192.168.1.20 using https
09/06 17:01:09	auth	informational	auth-success	RADIUS-Auth-Profile	authenticated for user 'adminHelga'. auth profile 'RADIUS-Auth-Profile', vsys 'shared', server profile 'RADIUS-Server-Profile', server address '192.168.50.150', auth protocol 'CHAP'. From: 192.168.1.20.
09/06 17:01:09	auth	informational	auth-success	RADIUS-Auth-	When authenticating user 'adminHelga' from

If you do not see an entry in the System log indicating a successful authentication for adminHelga, you can use a filter `( subtype eq auth )` as the syntax.

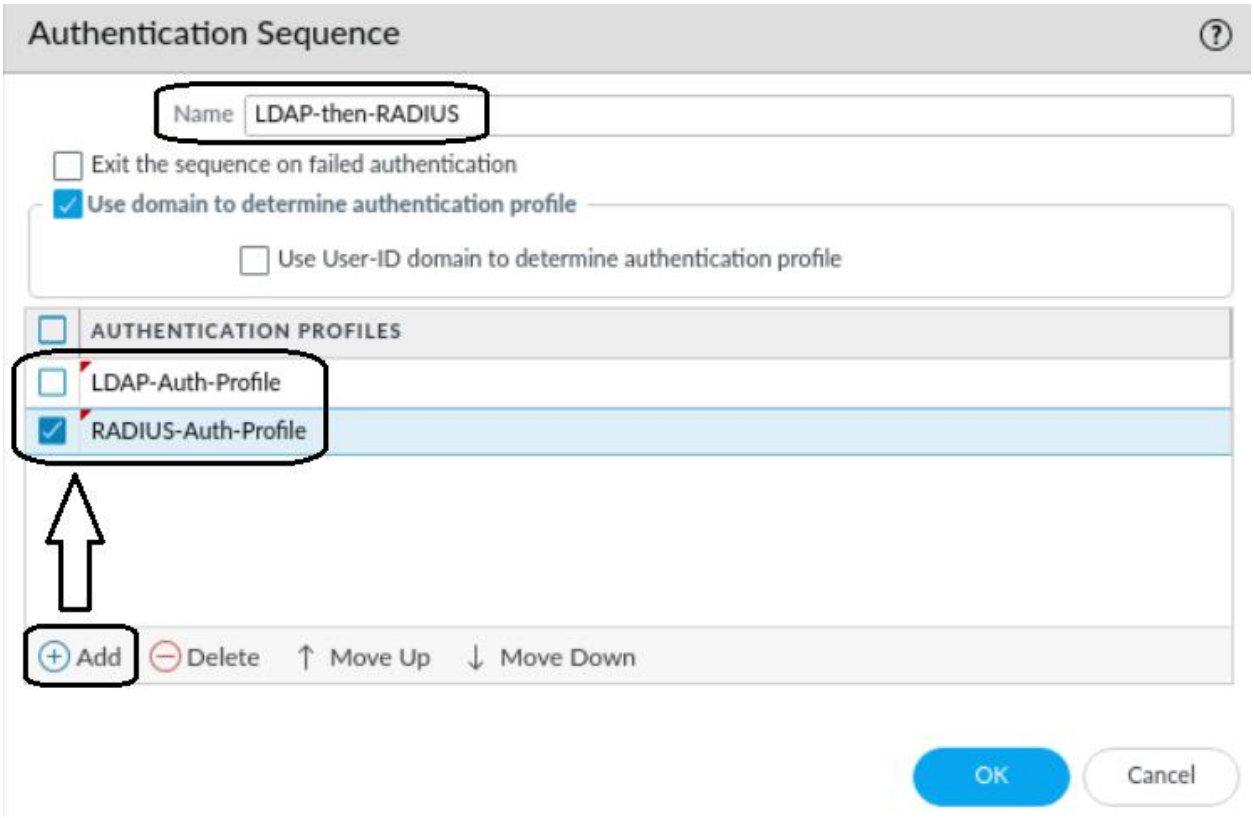
125. Note that the entry in the firewall system log indicates that **`adminHelga`** was successfully authenticated against the **`RADIUS-Auth-Profile`**.
126. Log out of the firewall.
127. Log back into the firewall with the **`admin/Pal0Alt0!`** credentials.

Configure an Authentication Sequence

Since the acquisition, some administrator accounts exist in LDAP and other accounts exist in RADIUS. With administrator accounts in these two different systems, you need to configure the firewall so that it can check both external databases when an administrator attempts to log in.

You will accomplish this by creating an Authentication Sequence. The sequence will instruct the firewall to check an account against LDAP first and then against RADIUS if the account does not exist in LDAP (or if the LDAP server is unavailable).

128. Select **Device** > **Authentication Sequence**.
129. Click **Add**.
130. For **Name**, enter **`LDAP-then-RADIUS`**.
131. Under the **Authentication Profiles** section, click **Add**.
132. Select **LDAP-Auth-Profile**.
133. Click **Add** again.
134. Select **RADIUS-Auth-Profile**.
135. Leave the remaining settings unchanged.



Note the **Move Up** and **Move Down** buttons. These allow you to change the order of the Authentication Profiles if necessary. In this example, the firewall will use the LDAP-Auth-Profile first when an administrator logs in to attempt authentication; if the user account does not exist in LDAP (or if the LDAP server is unavailable), the firewall will use the RADIUS-Auth-Profile to attempt authentication.

136. Click **OK**.

Commit the configuration

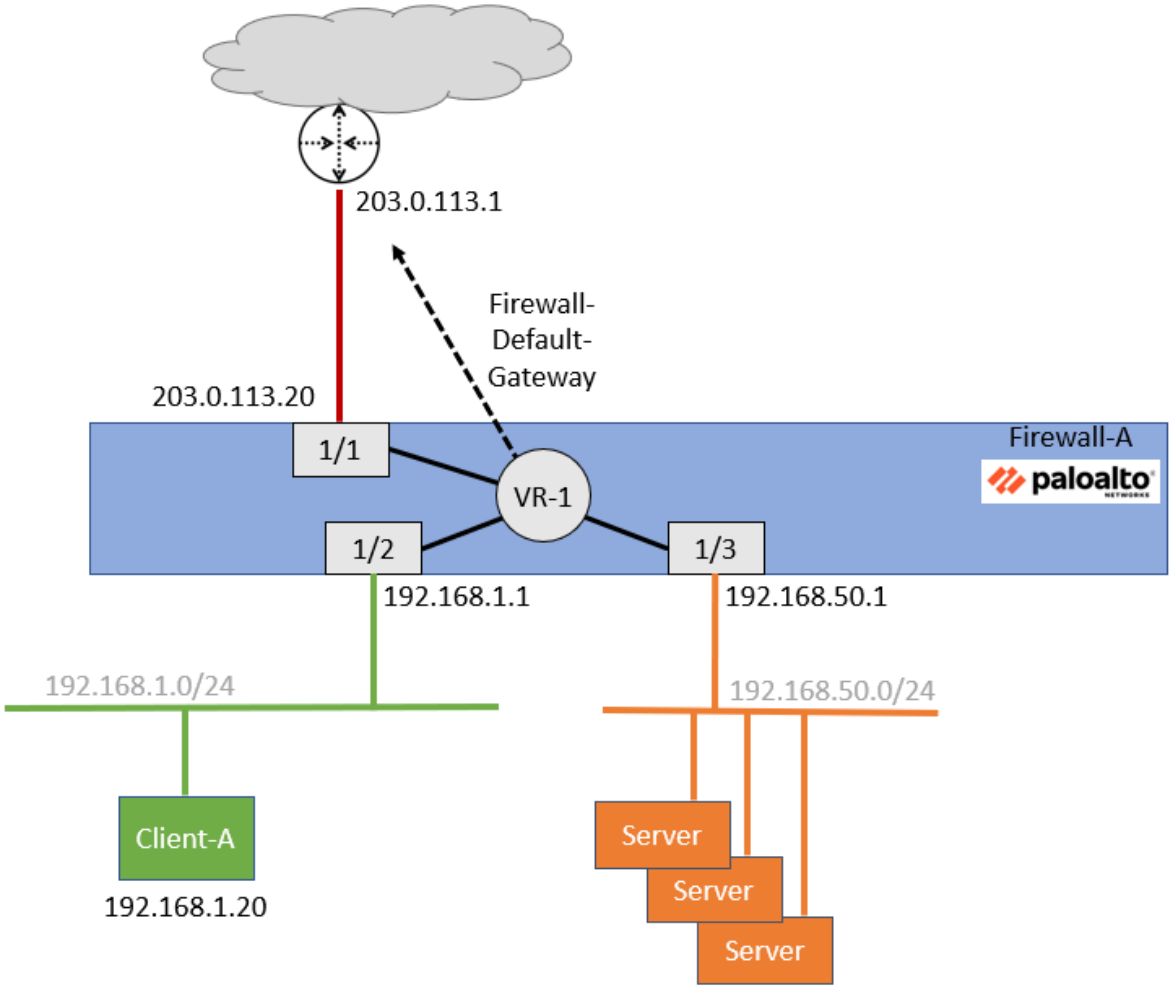
137. Click the **Commit** button at the upper right of the web interface.
138. Leave the settings unchanged and click **Commit**.
139. Wait until the **Commit** process is complete.
140. Click **Close** to continue.

Stop. This is the end of the lab.

Lab 5: Connecting the Firewall to Production Networks with Security Zones

In preparation for deployment, you need to connect the firewall to the appropriate production networks. You already have cabled the firewall interfaces to the appropriate switch ports in the data center. In this section, you will configure the firewall with Layer 3 IP addresses and a logical router. You also will create security zones that divide your network into separate logical areas so that you have more control over traffic from one segment to another.

When you have the configuration in place on the firewall, you will use ping from different devices to verify connectivity between all the segments.



Lab Objectives

- Load a baseline configuration
- Create Layer 3 interfaces
- Create a Logical router
- Segment your production network using security zones
- Test connectivity from firewall to hosts in each security zone
- Create Interface Management Profiles

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

If you need more detailed guidance for the objectives, use the Detailed-Lab Steps section.

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-05.xml`** to the Firewall

Create Layer 3 Network Interfaces

Use the information in the tables below to create Layer 3 network interfaces.

Create a Layer 3 Interface on ethernet1/1

Ethernet Interface	`ethernet1/1`
Comment	`Internet connection`
Type	`Layer 3`
IPv4 Type	`Static`
IP	`203.0.113.20/24`

Create a Layer 3 Interface on ethernet1/2

Ethernet Interface	`ethernet1/2`
Comment	`Users network connection`
Type	`Layer 3`
IPv4 Type	`Static`
IP	`192.168.1.1/24`

Create a Layer 3 Interface on ethernet1/3

Ethernet Interface	`ethernet1/3`
Comment	`Extranet servers connection`
Type	`Layer 3`
IPv4 Type	`Static`
IP	`192.168.50.1/24`

Create a Logical Router

Use the information in the table below to create a Logical Router and a firewall default gateway.

Name	`LR-1`

Interfaces (General Tab)	`ethernet1/1`
	`ethernet1/2`
	`ethernet1/3`

IPv4 Static Route Name	`Firewall-Default-Gateway`
Destination	`0.0.0.0/0`
Interface	`ethernet1/1`
Next Hop	`IP Address`
Next Hop IP	`203.0.113.1`

Segment Your Production Network Using Security Zones

Use the information in the tables below to create three Security Zones with the appropriate interface in each Zone.

Zone Name	`Internet`
Type	`Layer 3`
Interface	`ethernet1/1`

Zone Name	`Users_Net`
Type	`Layer 3`
Interface	`ethernet1/2`

Zone Name	`Extranet`

Type	`Layer 3`
Interface	`ethernet1/3`

Commit the configuration

- Commit the changes to the firewall before proceeding

Test Connectivity to Each Zone

- Use the Remmina SSH application on the Client-A desktop to connect to Firewall-A
- In the firewall CLI, use the **`ping`** command to check network connectivity from the firewall to a host in each Security Zone.
    - From **192.168.1.1** (ethernet1/2) to **192.168.1.20**
    - From **192.168.50.1** (ethernet1/3) to **192.168.50.150**
    - From **203.0.113.20** (ethernet1/1) to **8.8.8.8**

Test Interface Access before Management Profiles

- Ping the firewall interface on ethernet1/2 from a terminal connection on Client-A. You will not get a response.
- Attempt to connect to the firewall for CLI management through an SSH connection from Client-A. The firewall will not accept the connection.

Define Interface Management Profiles

Use the information below to create two Interface Management Profiles

Name	`Allow-ping`
Enabled Administrative Management Services	`None`
Enabled Network Services	`Ping`

Name	`Allow-mgt`
Enabled Administrative Management Services	`HTTPS` `SSH`

Enabled Network Services	`Ping`
	`SNMP`
	`Response Pages`

Apply Allow-ping to ethernet1/1

- Apply the **`Allow-ping`** Interface Management Profile to **ethernet1/1**

Apply Allow-mgt to ethernet1/2

- Apply the **`Allow-mgt`** Interface Management Profile to **ethernet1/2**

Apply Allow-mgt to ethernet1/3

- Apply the **`Allow-mgt`** Interface Management Profile to **ethernet1/3**

Commit the configuration

- Commit the changes before testing Interface Management Profiles

Test Interface Access after Management Profiles

- Ping the firewall interface on ethernet1/2 from a terminal connection on Client-A. You should now get a response.
- Attempt to connect to the firewall for CLI management through an SSH connection from Client-A. The firewall will now accept the connection.

Detailed Lab Steps

Use this section if you prefer detailed guidance to complete the objectives for this lab. We strongly recommend that you use this section if you do not have extensive experience working with Palo Alto Networks firewalls.

Apply a Baseline configuration to the Firewall

To start this lab exercise, you will load a preconfigured firewall configuration file.

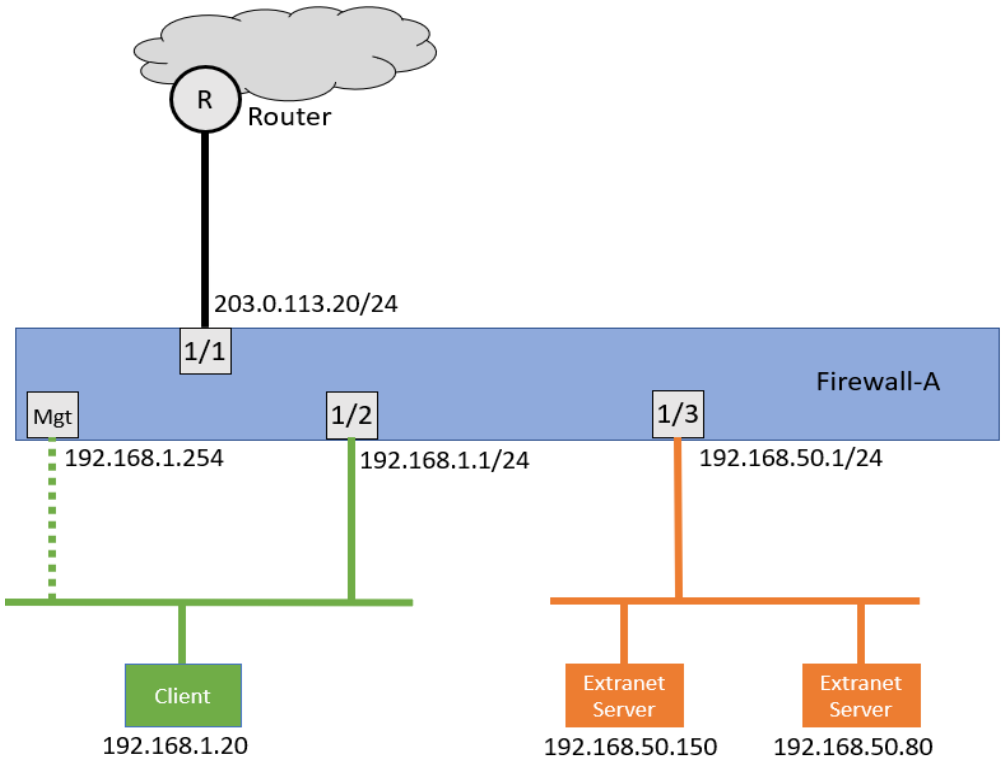
1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down arrow next to the **Name** field and select **edu-210-11.1a-05.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK** to close the **Load Named configuration** window.
5. Click **Close** to close the **Loading configuration** window.
6. Click the **Commit** button at the upper right of the web interface.
7. Leave the remaining settings unchanged and click **Commit**.
8. Wait until the **Commit** process is complete.
9. Click **Close** to continue.

Create Layer 3 Network Interfaces

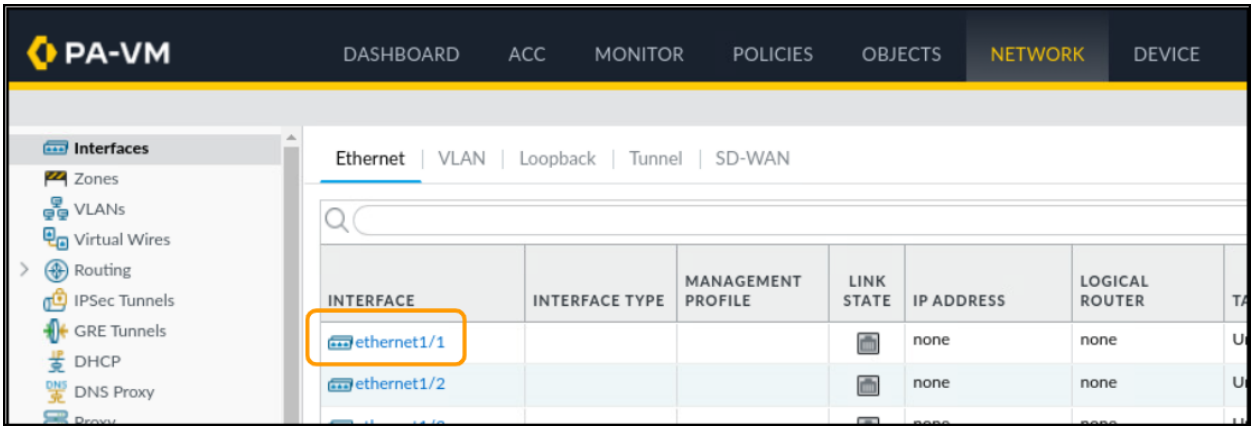
In the following sections, you will create Layer 3 interfaces on the firewall that will provide basic network connectivity to your production networks. You have a network with users (192.168.1.0/24), a network with production servers (192.168.50.0/24) and a network connecting the firewall to an upstream internet router (203.0.113.0/24). The following diagram provides details.



Create a Layer 3 Interface on ethernet1/1

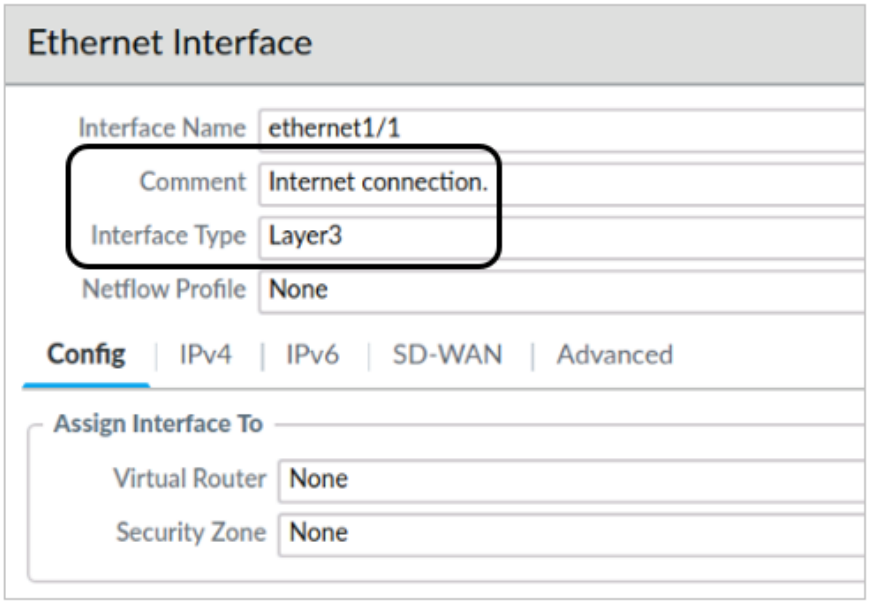
This interface will provide network connectivity to the Internet.

10. Select **Network** > **Interfaces** > **Ethernet**.
11. Click the link for **ethernet1/1**.



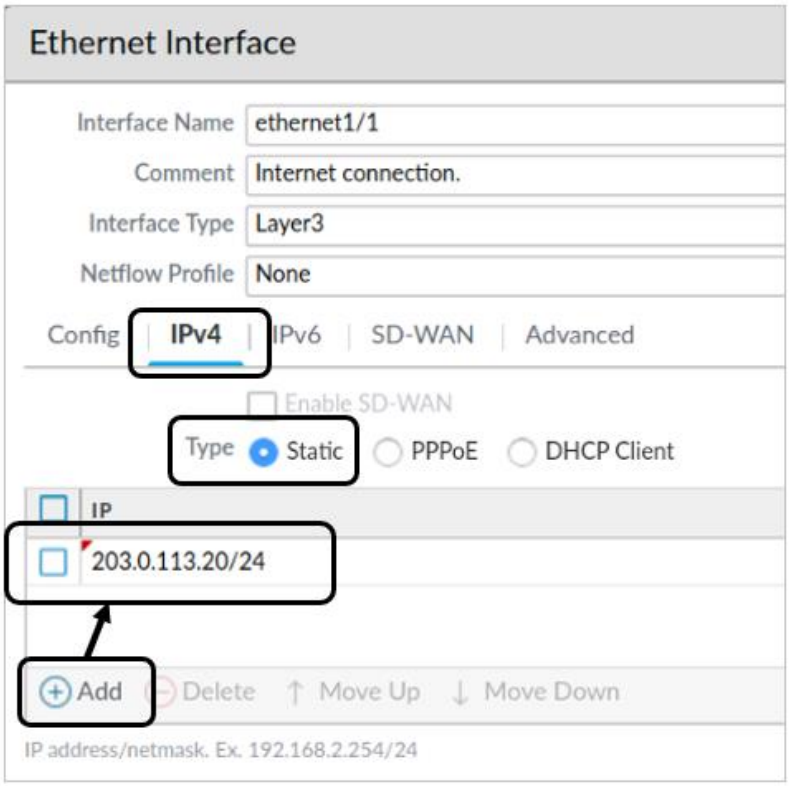
12. For **Comment**, enter **`Internet connection`**.
13. For **Interface Type**, select **Layer3**.

14. Leave the other settings unchanged but do not close this window.



15. Select the tab for **IPv4**.
16. Leave the **Type** set to **Static**.
17. Under the **IP** heading, click **Add**.
18. Enter **`203.0.113.20/24`**

19. Leave the remaining settings unchanged.



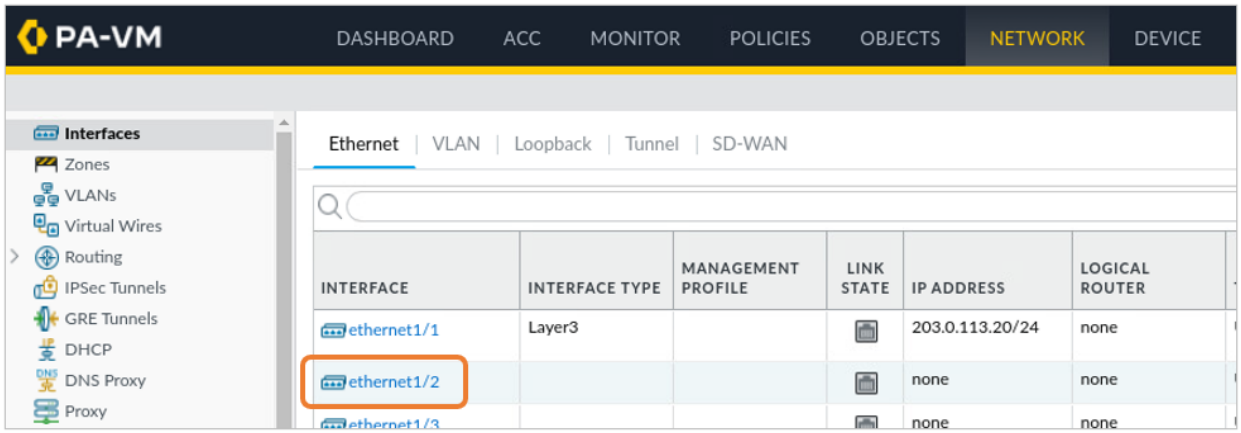
Be sure to include /24 in the address!

20. Click **OK**.

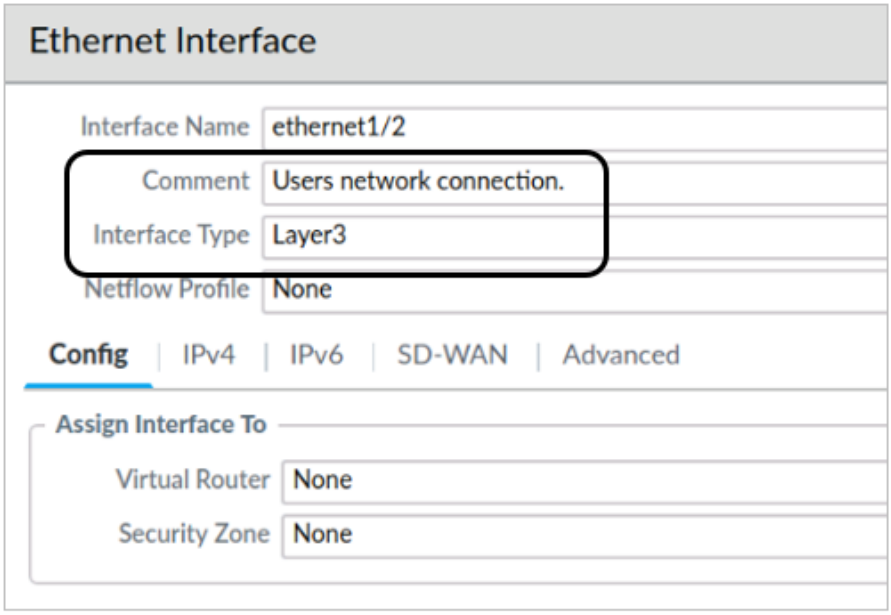
Create a Layer 3 Interface on ethernet1/2

This interface will provide network connectivity to the Users network.

21. Select **Network > Interfaces > Ethernet**.
22. Click the link for **ethernet1/2**.

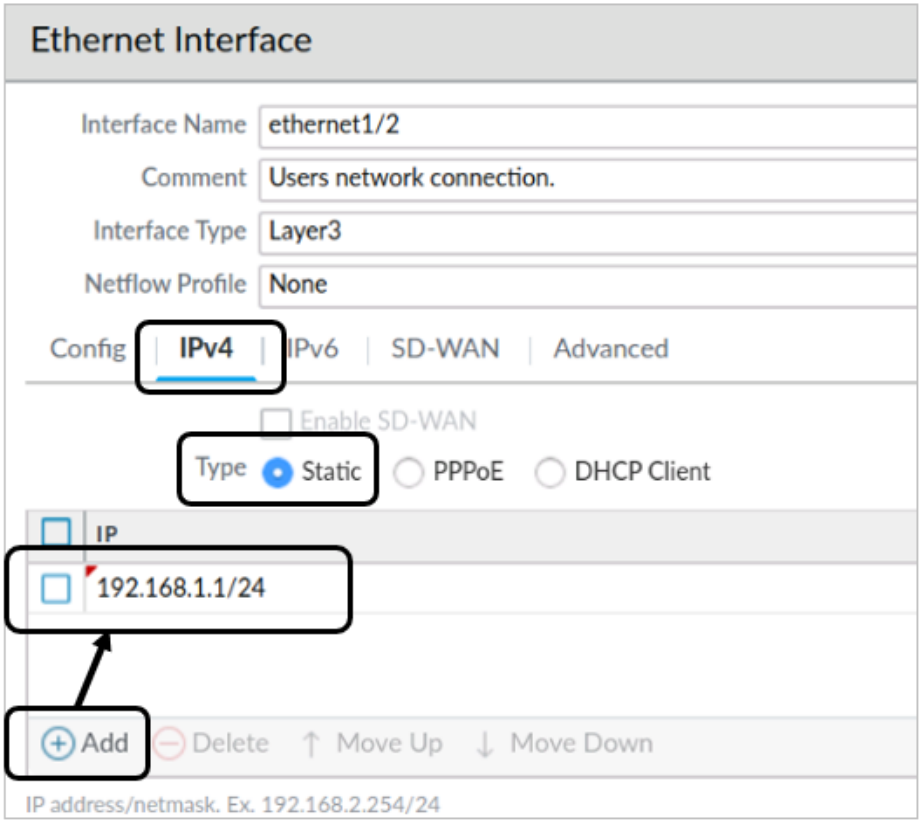


23. For **Comment**, enter **`Users network connection`**.
24. For **Interface Type**, select **Layer3**.
25. Leave the other settings unchanged but do not close this window.



26. Select the tab for **IPv4**.
27. Leave the **Type** set to **Static**.
28. Under the **IP** heading, click **Add**.
29. Enter **`192.168.1.1/24`**

30. Leave the remaining settings unchanged.



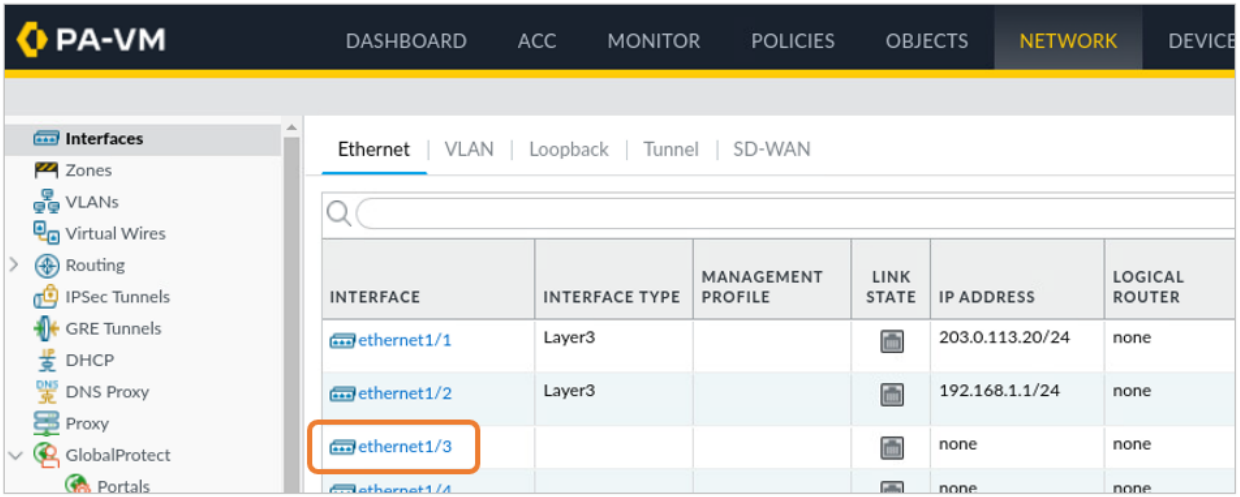
Be sure to include /24 in the address!

31. Click **OK**.

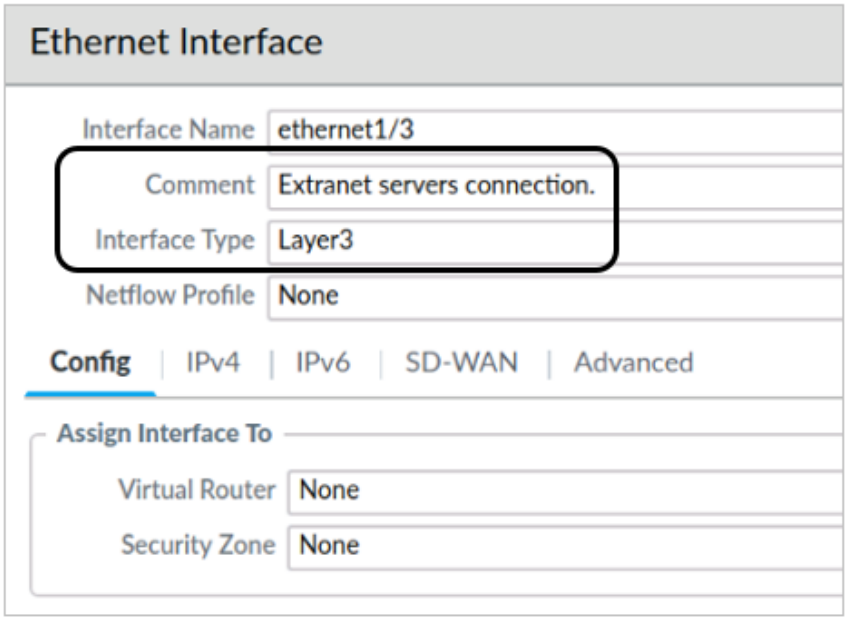
Create a Layer 3 Interface on ethernet1/3

This interface will provide network connectivity to the Extranet network.

32. Select **Network** > **Interfaces** > **Ethernet**.
33. Click the link for **ethernet1/3**.

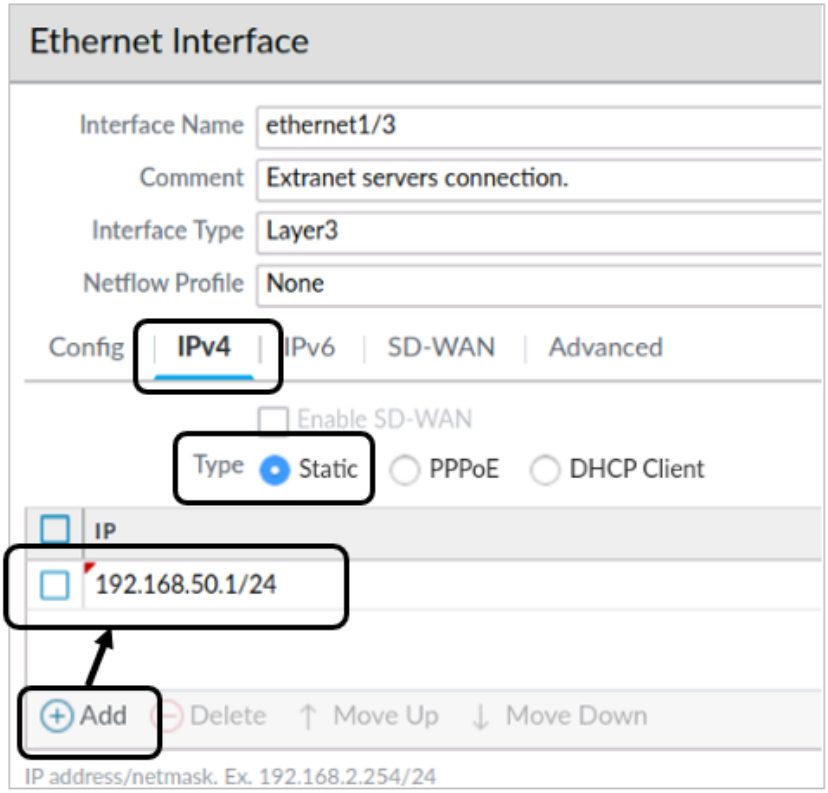


34. For **Comment**, enter **`Extranet servers connection`**.
35. For **Interface Type**, select **Layer3**.
36. Leave the other settings unchanged but do not close this window.



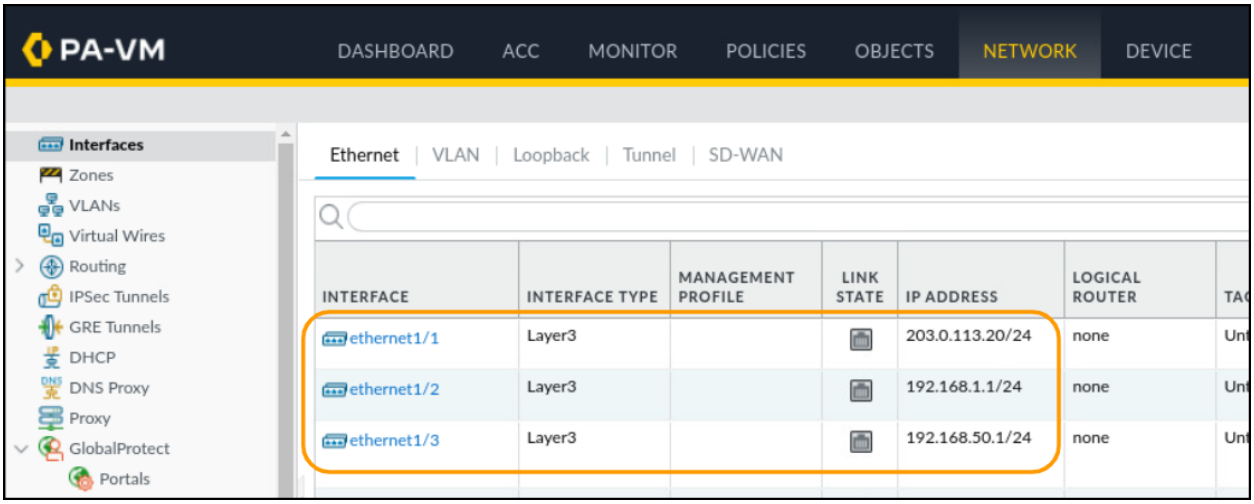
37. Select the tab for **IPv4**.
38. Leave the **Type** set to **Static**.
39. Under the **IP** heading, click **Add**.
40. Enter **`192.168.50.1/24`**

41. Leave the remaining settings unchanged.



Be sure to include /24 in the address!

42. Click **OK**.
43. When complete, your Ethernet table will have three entries:

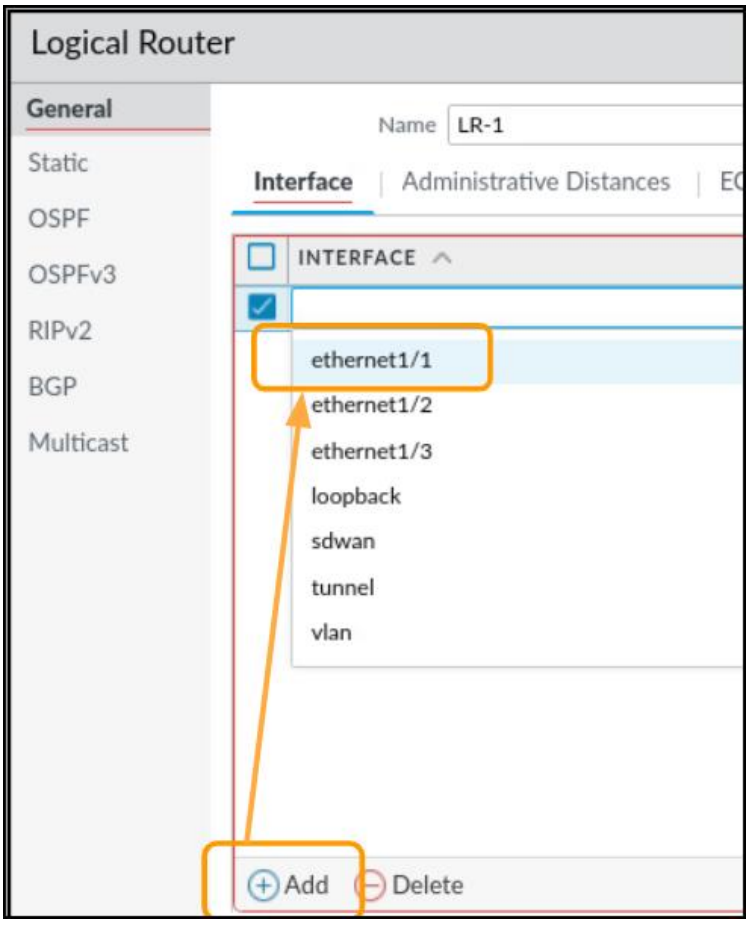


Note that the Link State indicator icons will remain gray until you commit the configuration.

Create a Logical Router

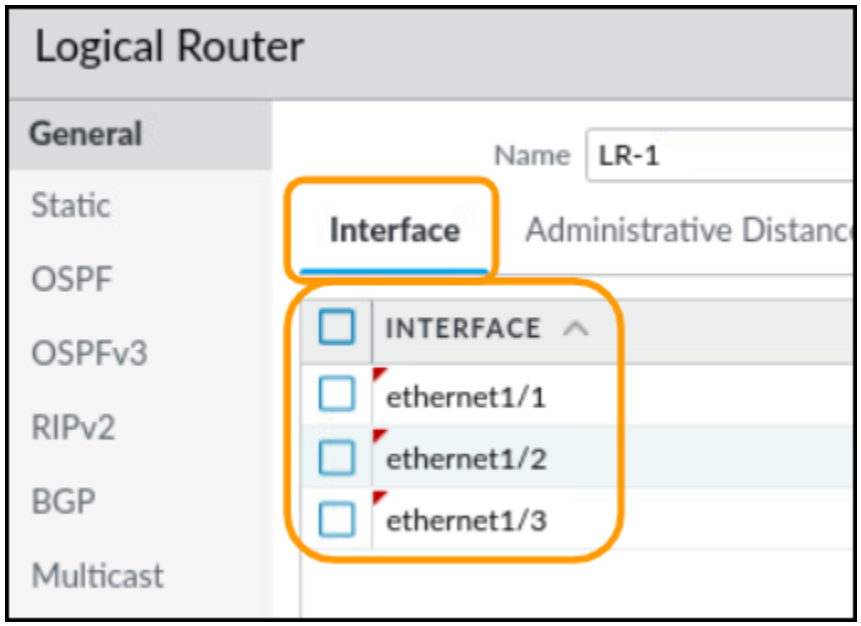
In this section, you will create a logical router and connect your Layer 3 interfaces to it. You also will define a default gateway for the logical router itself.

44. Select **Network** > **Routing** > **Logical Routers**.
45. Click **Add**.
46. For **Name**, enter **`LR-1`**.
47. Under the **Interface** section, click the **Add** button at the bottom.
48. Select **ethernet1/1**.



49. Click **Add** again.

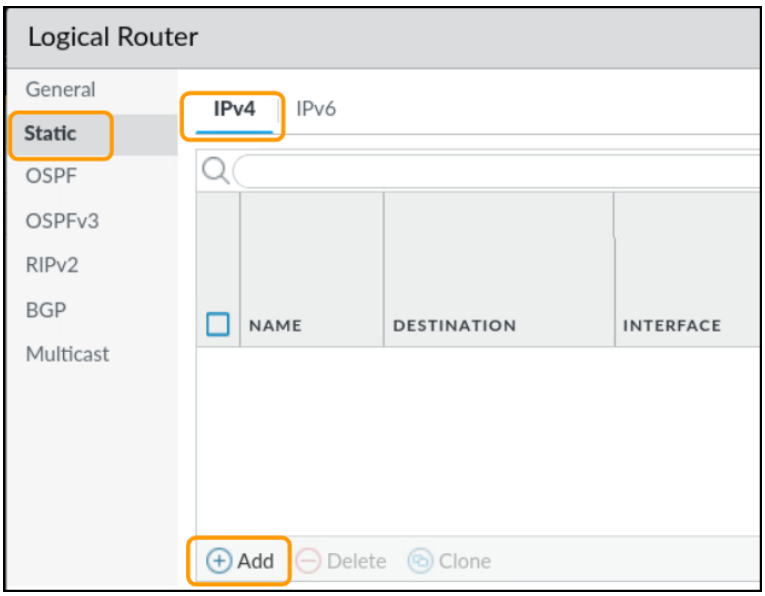
50. Select **ethernet1/2.**
51. Click **Add** again.
52. Select **ethernet1/3**.
53. Leave this window open.
54. When complete all three interfaces should be listed under the **Interface** tab:



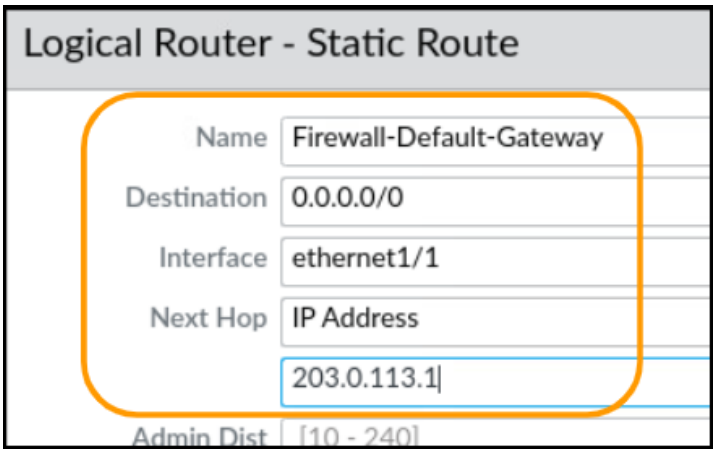
The order in which you add these interfaces to the list is not important. You could start by adding ethernet1/3 and the result will be the same. You are simply adding the appropriate interfaces to this logical router.

55. In the **Logical Router** window, click the link on the side for **Static**.

56. Under the tab for **IPv4**, click **Add** at the bottom of the window.



57. For **Name**, enter **`Firewall-Default-Gateway`**.
58. For **Destination**, enter **`0.0.0.0/0`.**
59. For **Interface**, select **ethernet1/1.**
60. Set the **Next Hop** field to **IP Address**.
61. Below the **Next Hop** field, enter **`203.0.113.1`.**
62. Leave the remaining settings unchanged.



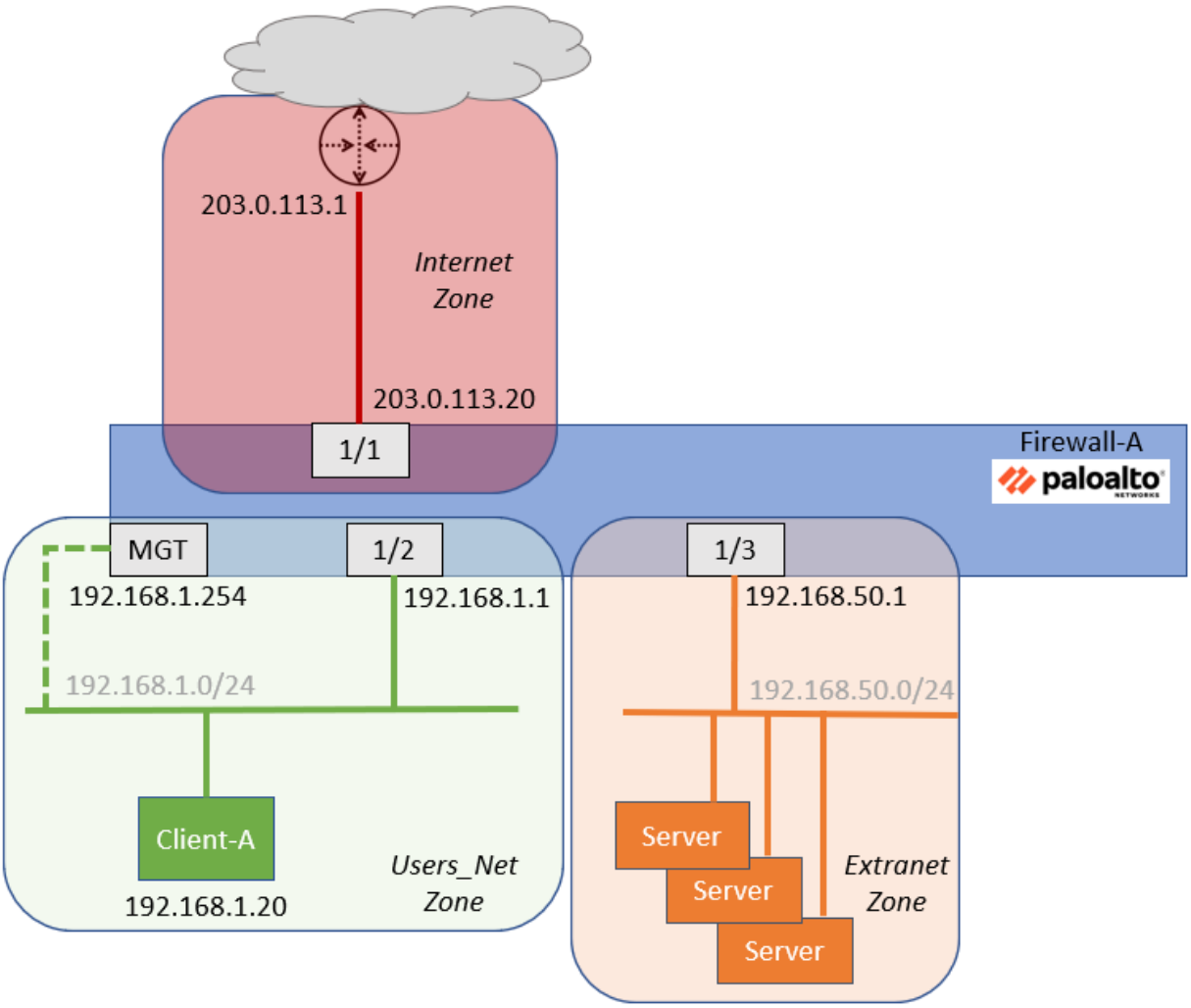
This entry is the default route for the firewall. Like all other network hosts, the firewall needs a default gateway in order to send traffic to unknown networks. The firewall has local connections to 192.168.1.0, 192.168.50.0 and 203.0.113.0 networks, so it can forward packets to hosts on those networks directly. However, for any other destination IP addresses (such as 8.8.8.8 for DNS), this route

statement instructs the firewall to forward packets to 203.0.113.1, which is the internet router.

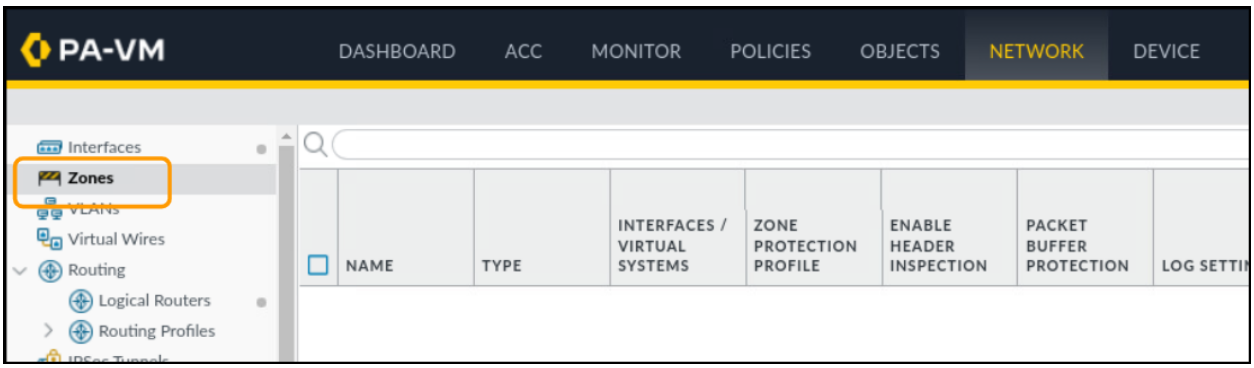
63. Click **OK** on the **Logical Router – Static Route** window.
64. Click **OK** on the **Logical Router** window.

Segment Your Production Network Using Security Zones

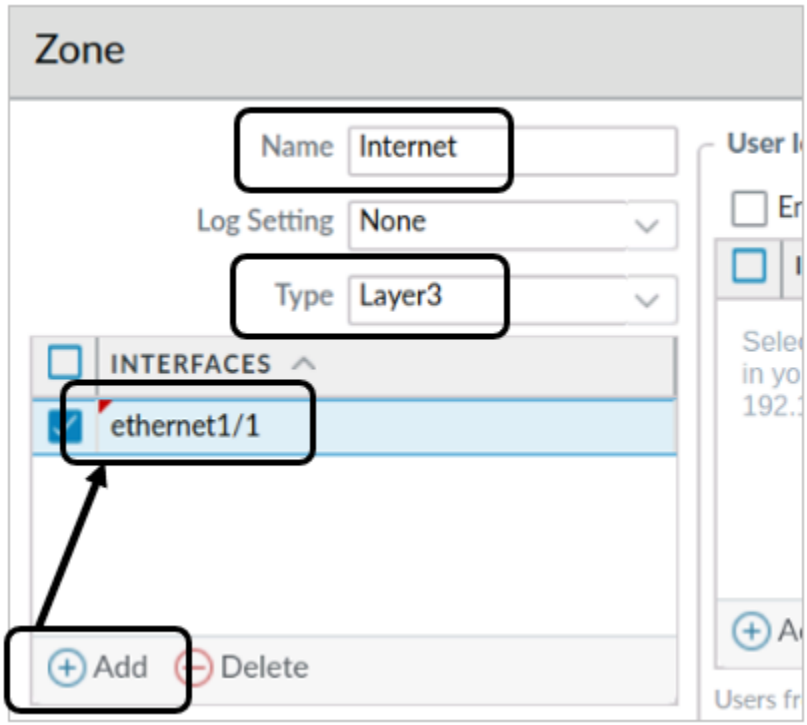
With your network interfaces and logical router in place, you can now create security zones. You will create three security zones:



65. Create the **Internet Zone** by selecting **Network > Zones**.



66. At the bottom of the window, click the **Add** button.
67. For **Name**, enter **`Internet`**.
68. For **Type**, select **Layer3**.
69. Under the **Interfaces** section, click **Add**.
70. Select **ethernet1/1**.
71. Leave the remaining settings unchanged.

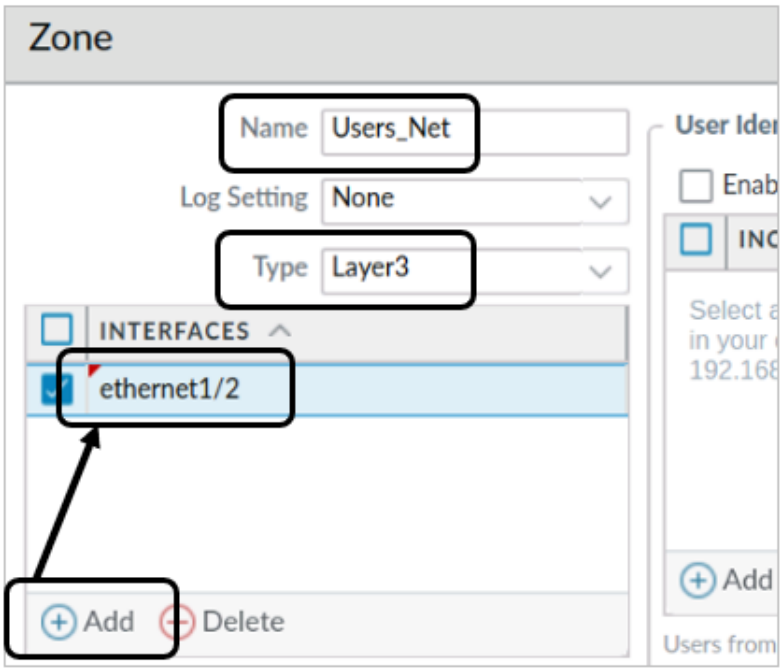


Zone names are case-sensitive! Make sure you are consistent throughout your configuration process.

72. Click **OK**.
73. In the **Zones** window, create the Users_Net Zone by clicking **Add**.
74. At the bottom of the window, click the **Add** button.
75. For **Name**, enter **`Users_Net`**.
76. For **Type**, select **Layer3**.
77. Under the **Interfaces** section, click **Add**.
78. Select **ethernet1/2**.

Notice that ethernet1/1 is no longer listed in the available interfaces. You have assigned ethernet1/1 to another zone so the firewall will not allow you to assign the same interface to any other zone.

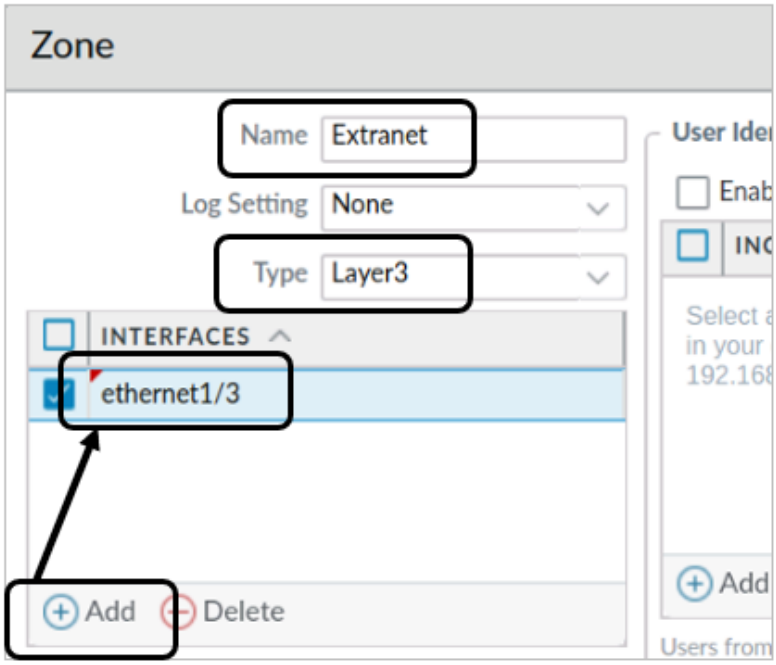
79. Leave the remaining settings unchanged.



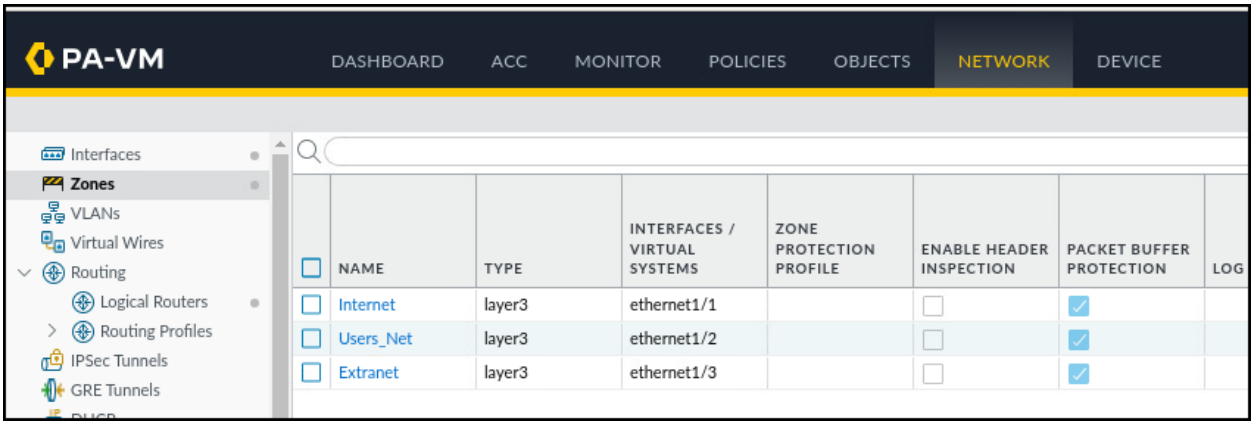
80. Click **OK**.
81. In the **Zones** window, create the Extranet Zone by clicking **Add**.
82. At the bottom of the window, click the **Add** button.
83. For **Name**, enter **`Extranet`**.
84. For **Type**, select **Layer3**.
85. Under the **Interfaces** section, click **Add**.
86. Select **ethernet1/3**.

All other Layer 3 interfaces have been assigned to zones so you can choose only ethernet1/3.

87. Leave the remaining settings unchanged.



88. Click **OK**.
89. You should now have three security zones:



Commit the configuration

90. Click the **Commit** button at the upper right of the web interface.
91. Leave the settings unchanged and click **Commit**.
92. Wait until the **Commit** process is complete.

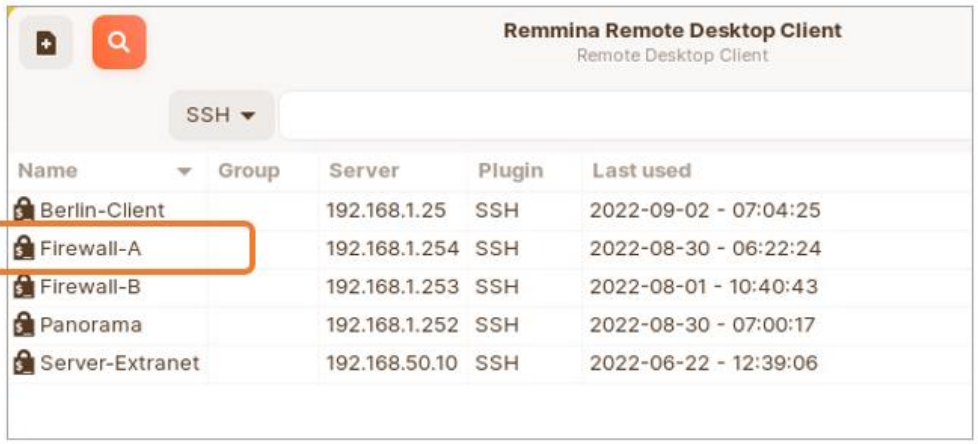
93. Click **Close** to continue.

Test Connectivity to Each Zone

To verify network connectivity from the firewall to hosts in each zone, you will use an SSH connection and ping hosts on each network.

94. On the client **desktop**, open the **Remmina** application:

95. Double-click the entry for **Firewall-A**:



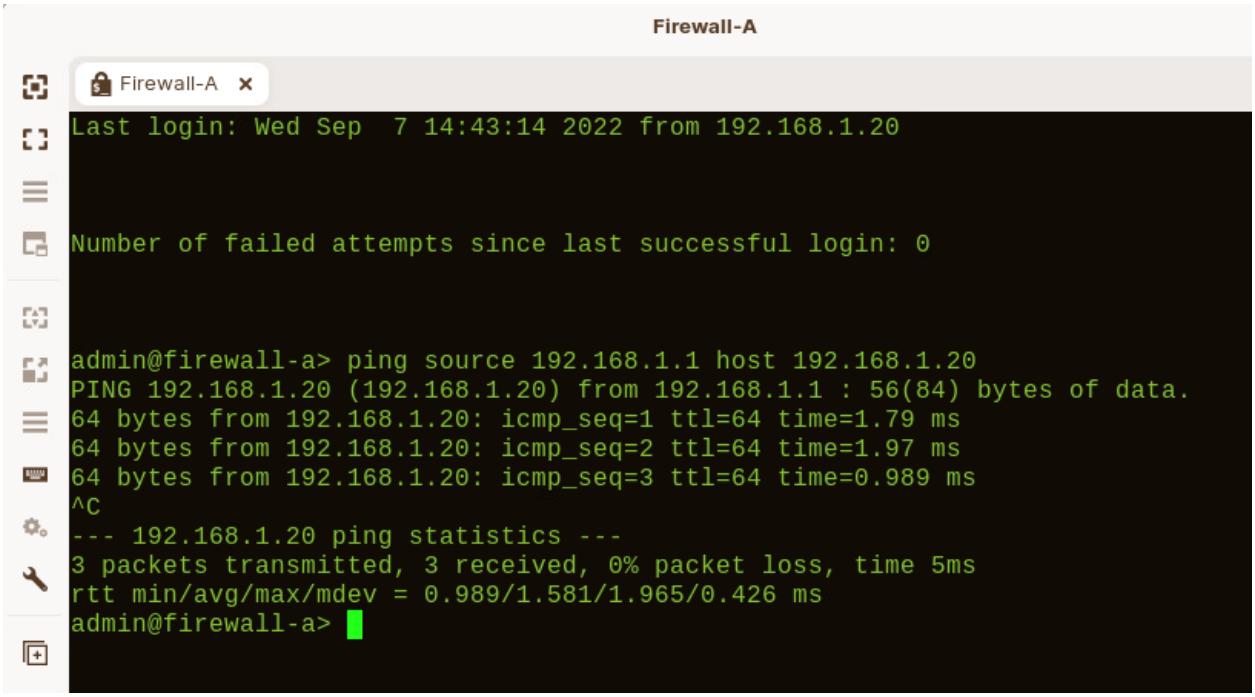
The Firewall-A connection in Remmina has been pre-configured to provide login credentials to the firewall so that you do not have to log in each time. This is for convenience in the lab only.

96. In the CLI connection to the firewall, use the **`ping`** command to check network connectivity to a host in the Users_Net Security Zone by using the following command at the **`admin@firewall-a>`** prompt:

```
admin@firewall-a> ping source 192.168.1.1 host 192.168.1.20
```

Note the syntax for this command. 192.168.1.1 is the IP address of ethernet1/2 on the firewall. The command instructs the firewall to use that IP address on ethernet1/2 to ping the host 192.168.1.20. If you do not use the source option, the firewall uses its management interface address as the source IP.

97. Allow the ping to continue for three or four seconds and then use **Ctrl+C** to interrupt the command:



98. Use the ping command to check connectivity to a host in the Extranet zone by using the following command at the **admin@firewall-a>** prompt :

```
admin@firewall-a> ping source 192.168.50.1 host 192.168.50.150
```

192.168.50.1 is the IP address on ethernet1/3 that is assigned to the Extranet security zone. 192.168.50.150 is a server in the Extranet zone.

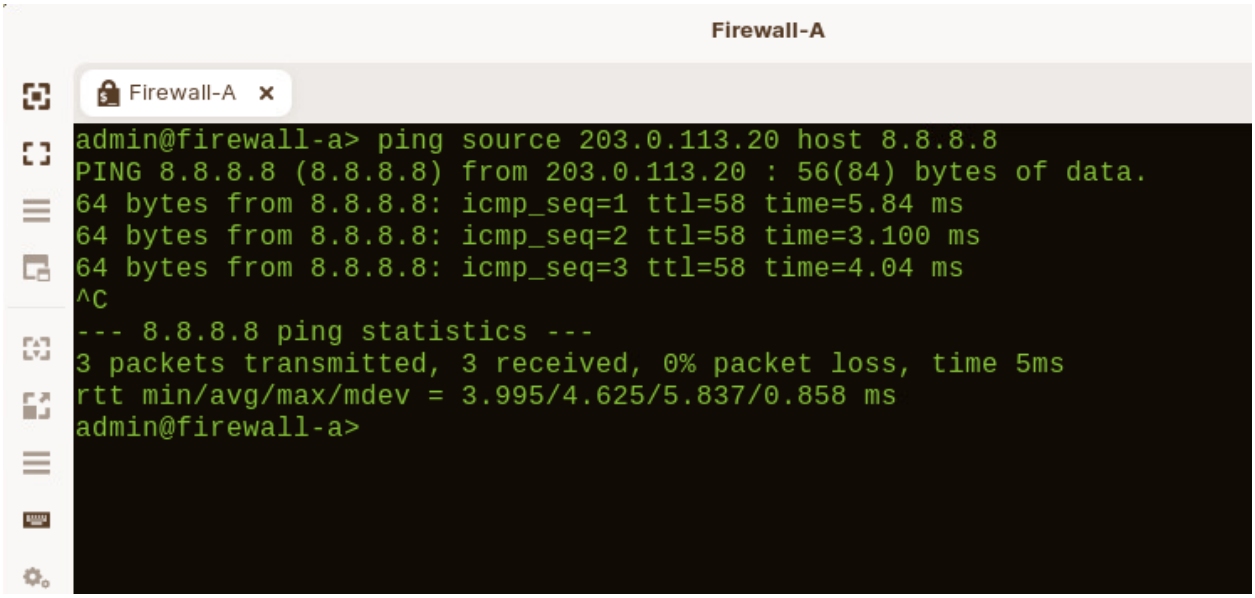
99. Allow the ping to continue for three or four seconds and then use **Ctrl+C** to interrupt the command:

100. Use the ping command to check connectivity to a host on the Internet by using the following command at the admin@firewall-a> prompt:

```
admin@firewall-a> ping source 203.0.113.20 host 8.8.8.8
```

203.0.113.20 is the IP address on ethernet1/1 that is assigned to the Internet security zone. 8.8.8.8 is a DNS server on the Internet zone.

101. Allow the ping to continue for three or four seconds and then use **Ctrl+C** to interrupt the command:



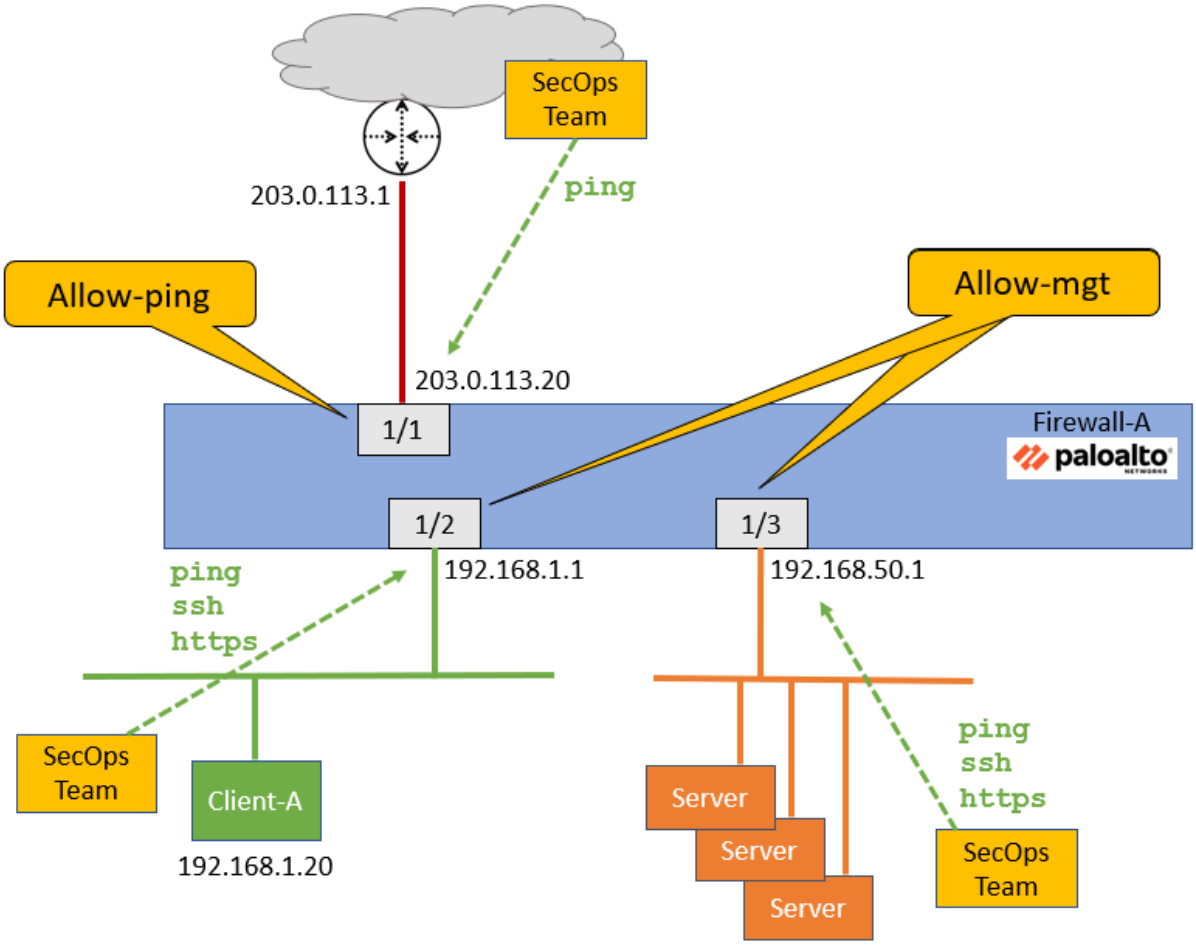
102. After you have successfully tested network access from the firewall to each network segment, close the Remmina SSH connection to the firewall by typing **`exit`** **<Enter>**.
103. Close the Remmina Remote Desktop Client application window.

Create Interface Management Profiles

Management Interface Profiles allow you to enable specific network services on individual firewall interfaces.

Often, your team members need to manage the firewall but do not always have network connectivity to the management network. In this exercise, you will define two Management Interface Profiles. One Profile, named “allow-ping,” will be applied to the Internet interface so that your SecOps team members can ping the external firewall interface for troubleshooting from outside your organization’s network.

You will create a second Interface Management Profile called “Allow-mgt” that allows both ping and secure management traffic including SSH and HTTPS. You will apply this Profile to the Users_Net interface and to the Extranet interface. This Profile will allow your SecOps team to manage the firewall from those networks if they need to.

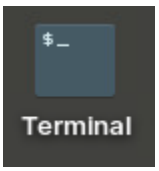


Test Interface Access before Management Profiles

To illustrate the default behavior of firewall interfaces, you will ping 192.168.1.1 from the client workstation. You will also attempt to access the firewall CLI by SSH through 192.168.1.1.

Without any Interface Management Profiles in place, both ping and SSH will fail.

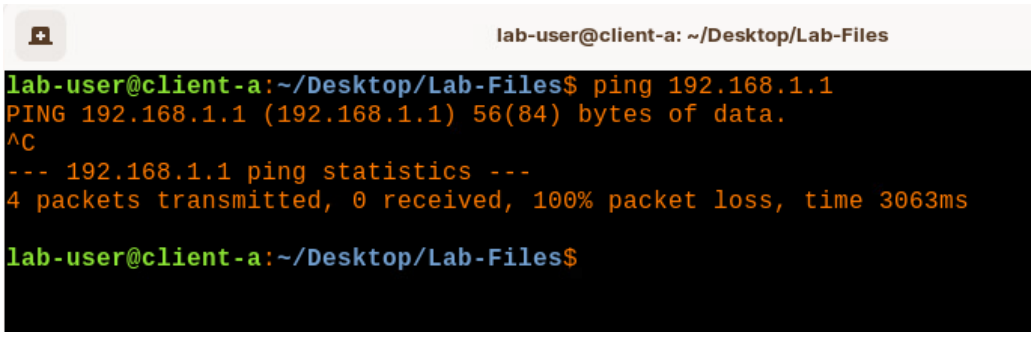
104. Open the Terminal application on the client **desktop**.



105. Issue the following command:

```
lab-user@client-a:~/Desktop/Lab-Files$ ping 192.168.1.1 <Enter>
```

106. You will not get a response.
107. Wait a few seconds and use **Ctrl+C** to stop the command.



108. Attempt to open an SSH connection to the firewall through 192.168.1.1 by issuing the following command:

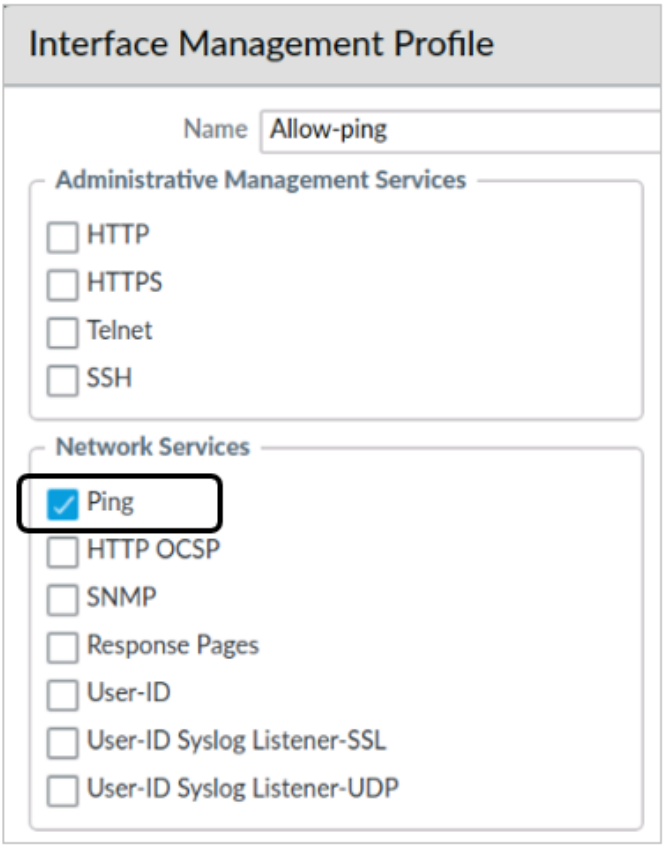
```
lab-user@client-a:~/Desktop/Lab-Files$ ssh admin@192.168.1.1 <Enter>
```

109. After a few seconds, use **Ctrl+C** to stop the connection because it will not succeed.

110. Leave the Terminal window open on the client because you will perform these same tests after applying an Interface Management Profile to ethernet1/2.

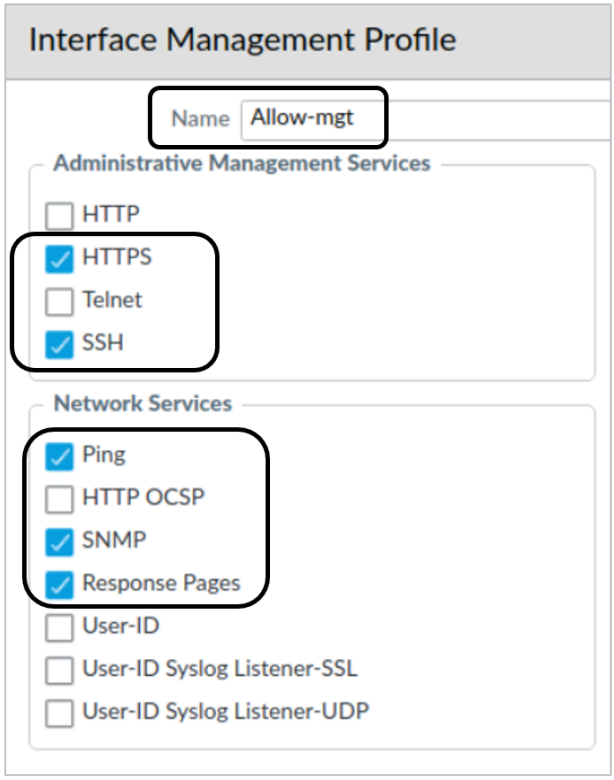
Define Interface Management Profiles

111. In the firewall web interface, select **Network > Network Profiles > Interface Mgmt**.
112. Click **Add** at the bottom of the window.
113. For **Name**, enter **`Allow-ping`**.
114. Under the **Network Services** section, **check** the box for **Ping**.
115. Leave the remaining settings unchanged.



116. Click **OK**.
117. In the Interface Management section, click **Add** again to create another entry.
118. For **Name**, enter **`Allow-mgt`**.
119. Under the **Administrative Management Services** section, check the boxes for **HTTPS** and **SSH**.
120. Under the section for **Network Services**, check **Ping**, **SNMP** and **Response Pages**.

121. Leave the remaining settings unchanged.

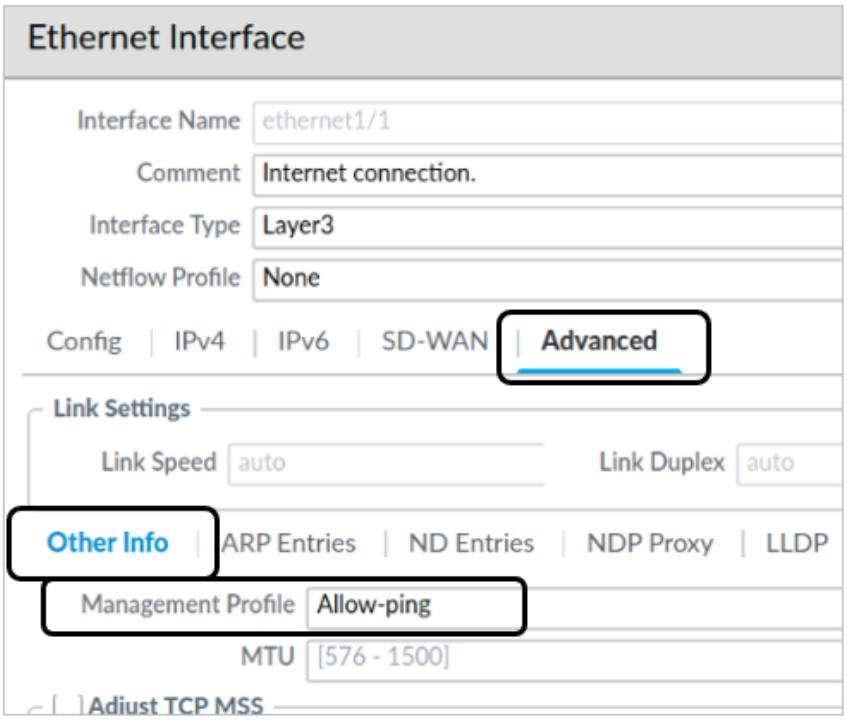


122. Click **OK**.

Apply Allow-ping to ethernet1/1

123. Select **Network** > **Interfaces** > **Ethernet**.
124. Edit the entry for ethernet1/1.
125. Select the tab for **Advanced**.
126. Under the **Other Info** section, use the drop-down list for **Management Profile** to select **Allow-ping**.

127. Leave the other settings unchanged.



This action applies the **Allow-ping** interface management Profile to ethernet1/1. As a result, ethernet1/1 will answer **ping** requests.

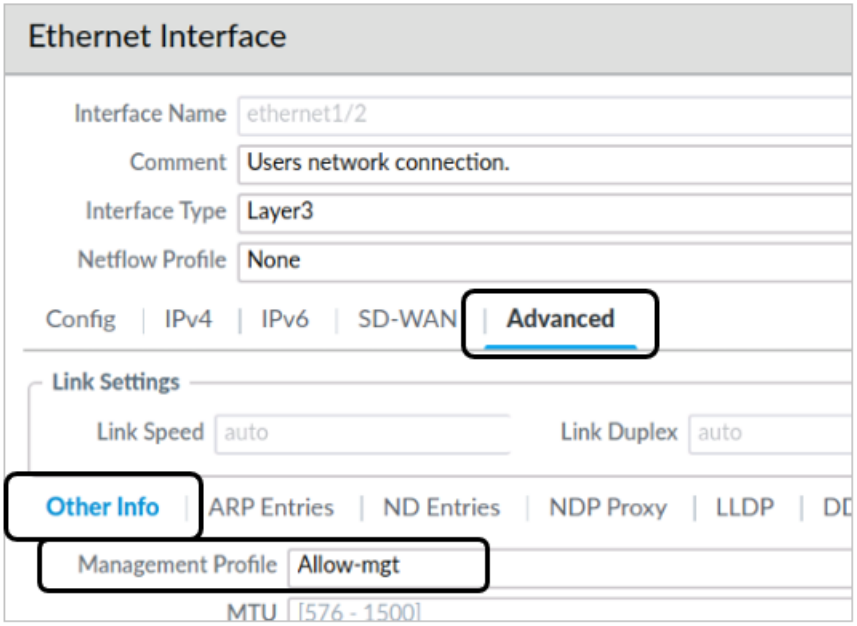
Note that in a production environment, you may not want an Internet-facing interface to reply to any type of traffic. Applying this Profile in the lab allows you to see how different Profiles can be applied to different interfaces.

128. Click **OK**.

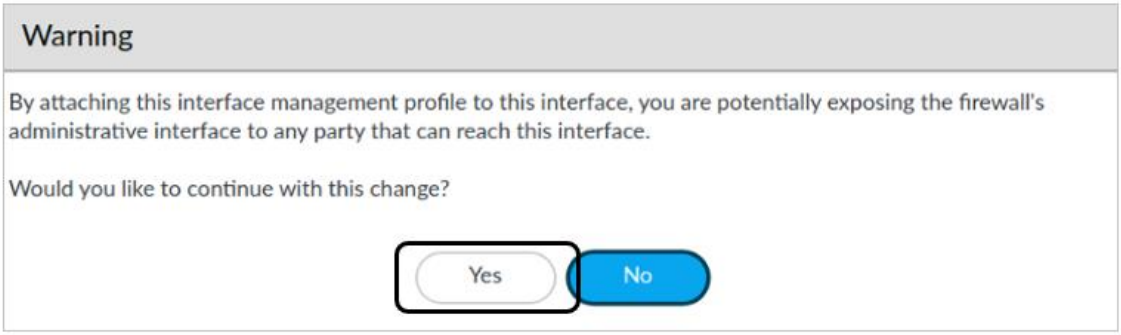
Apply Allow-mgt to ethernet1/2

129. Select **Network > Interfaces > Ethernet**.
130. Edit the entry for ethernet1/2.
131. Select the tab for **Advanced**.
132. Under the **Other Info** section, use the drop-down list for **Management Profile** to select **Allow-mgt**.

133. Leave the other settings unchanged.



134. Click **OK**.
135. Read the Warning message and click **Yes**.

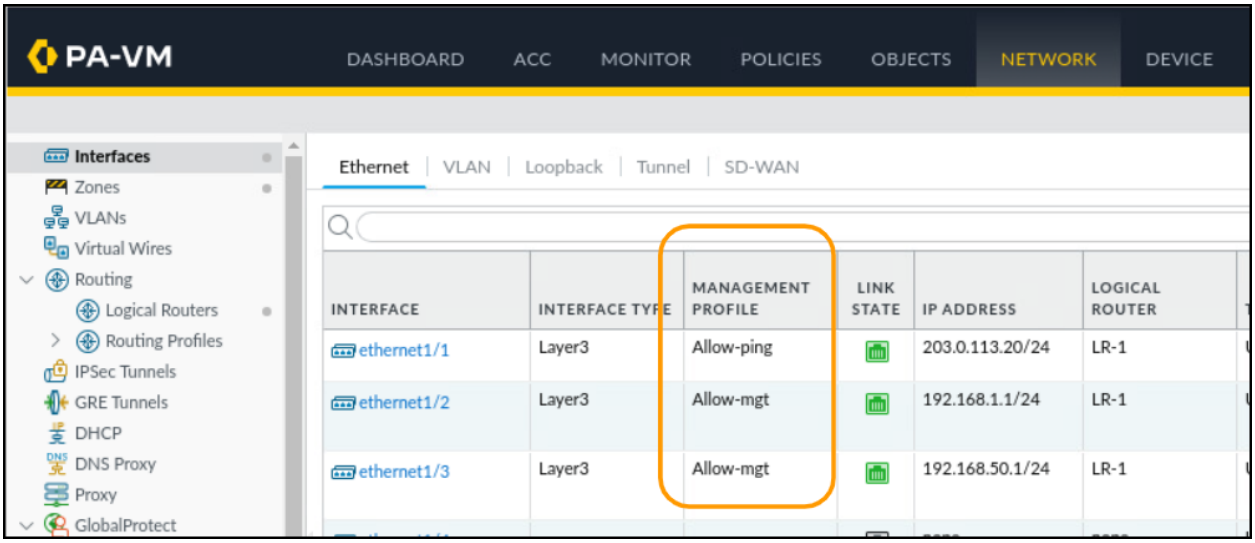


Managing the firewall by applying a management profile on a network interface has risks and therefore should only be used if there is no other option due to the network topology. In a production environment you should avoid this practice when possible.

Apply Allow-mgt to ethernet1/3

136. Select **Network** > **Interfaces** > **Ethernet**.
137. Edit the entry for ethernet1/3.
138. Select the tab for **Advanced**.
139. Under the **Other Info** section, use the drop-down list for **Management Profile** to select **Allow-mgt**.

140. Leave the other settings unchanged.
141. Click **OK**.
142. Click **Yes** on the Warning message.
143. When you complete these steps, your interface table should have an entry under the Management Profile column for each interface.



Commit the configuration

144. Click the **Commit** button at the upper right of the web interface.
145. Leave the settings unchanged and click **Commit**.
146. Wait until the **Commit** process is complete.
147. Click **Close** to continue.

Test Interface Access after Management Profiles

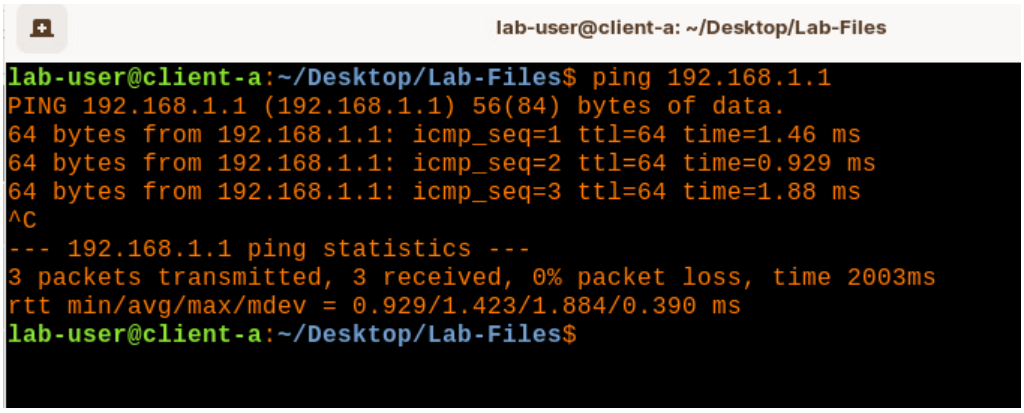
With the **Allow-mgt** Interface Management Profile in place on ethernet1/2, both ping and SSH will succeed.

148. From the Terminal Emulator on the client desktop, issue the following command:

```
lab-user@client-a:~/Desktop/Lab-Files$ ping 192.168.1.1 <Enter>
```

149. The interface will now respond.

150. Wait a few seconds and use **Ctrl+C** to stop the command.

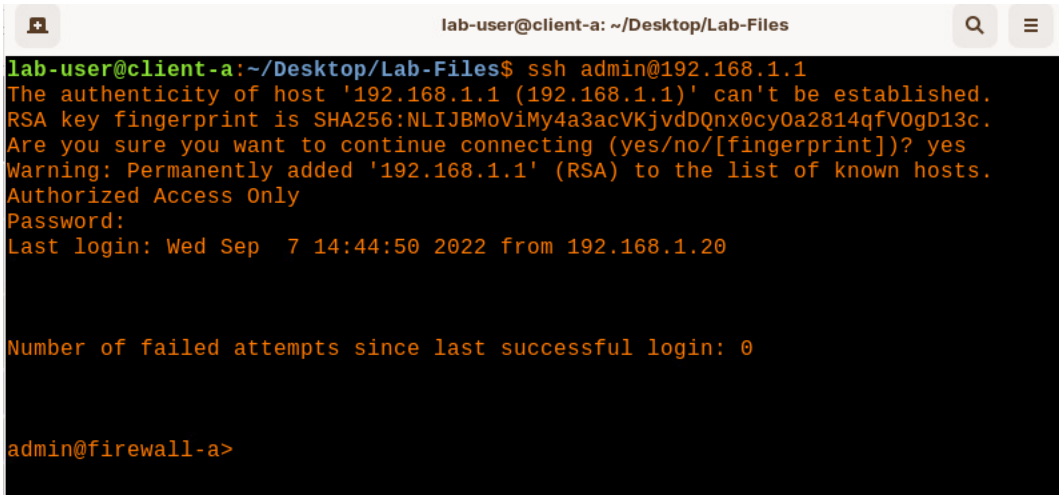


151. Attempt to open an SSH connection to the firewall through 192.168.1.1 by issuing the following command:

```
lab-user@client-a:~/Desktop/Lab-Files$ ssh admin@192.168.1.1 <Enter>
```

If you are prompted to accept an RSA key fingerprint, type **yes** <ENTER>.

152. For password, enter **Pal0Alt0! <Enter>.**
153. The firewall will present the CLI interface.



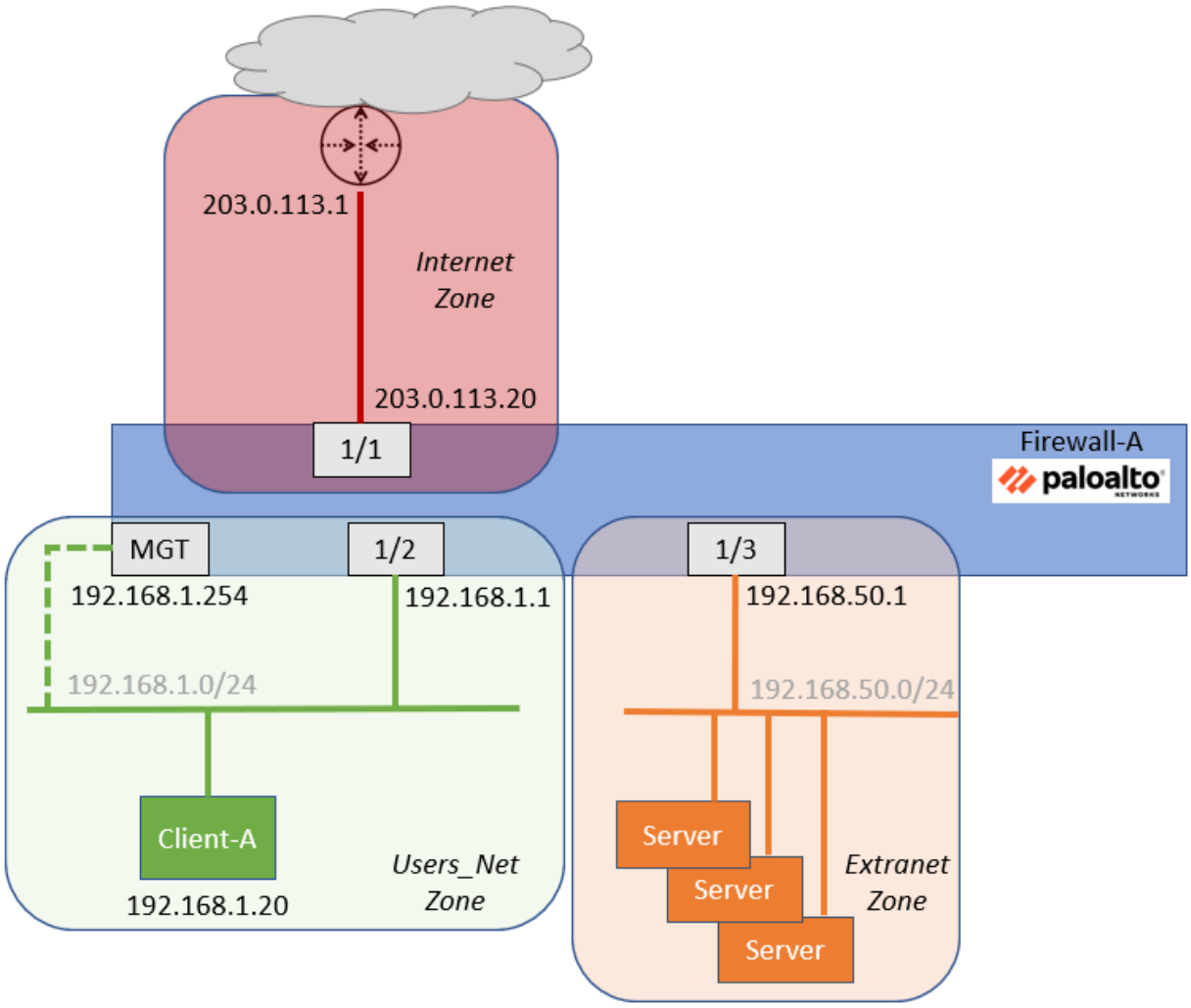
154. Close the SSH connection to the firewall by typing **exit <Enter>**.
155. Close the Terminal window by typing **exit <Enter>**.

Stop. This is the end of the lab.

Lab 6: Creating and Managing Security Policy Rules

You have the firewall deployed and connected to all the appropriate networks. The next step is to begin creating Security Policy rules. You will start by creating rules that allow hosts in the Users_Net zone to communicate with hosts in the Extranet zone. You will then create Security Policy rules to allow hosts in the Users_Net zone to connect to hosts in the Internet zone.

You also need to allow hosts in the Extranet zone to communicate with hosts in the Internet zone.



Lab Objectives

- Configure a Security Policy rule to allow access from Users_Net to Extranet
- Test access from client to Extranet servers
- View the Traffic log
- Examine Policy Rule Hit Count
- Reset rule hit counts
- Customize Policy tables
- Enable intrazone and interzone logging
- Create Security Policy rules to Internet Zone

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

If you need more detailed guidance for the objectives, use the Detailed-Lab Steps section.

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-06.xml`** to the Firewall

Create Security Policy Rule

- Use the information below to create a Security Policy rule that will allow traffic from the **Users_Net** zone to the **Extranet** zone.

Rule Name	`Users_to_Extranet`
Description	`Allows hosts in Users_Net zone to access servers in Extranet zone`
Source Zone	`Users_Net`
Destination Zone	`Extranet`
Application	`Any`
Service	`application-default`
URL Category	`Any`
Action	`Allow`

Commit the configuration

- Commit the changes before proceeding.

Modify Security Policy Table Columns

- Hide the following columns in the **Security Policy** table to create more area to view helpful information
    - **Type**
    - **Source Device**
    - **Destination Device**
    - **Options**
- Drag and drop the **Action** column from its current location so that it appears between the **Name** column and the **Tag** column

Test New Security Policy Rule

- From the Client-A host, ping 192.168.50.80, which is the IP address of a web server in the Extranet zone.
- Use the web browser on the Client-A client to connect to the Extranet web page at 192.168.50.80.

Examine Rule Hit Count

- In the **Security Policy** rule table, locate the column for **Hit Count**, and note the number of **Hits** on this **Users_to_Extranet** rule.
- From the Client-A host, ping the Extranet web server - 192.168.50.80.
- Refresh the **Hit Count** and note any increase in the value for the **Users_to_Extranet** Security Policy rule.

Reset the Rule Hit Counter

- Reset the **Hit Count** for the **Users_to_Extranet** rule

Examine the Traffic Log

- Hide the following columns in the Traffic Log.
    - Type
    - Source Dynamic Address Group
    - Destination Dynamic Address Group
    - Dynamic User Group
- From the terminal window on the Client-A host, ping 8.8.8.8

You will **not** get a reply

- Examine the traffic log again and use a simple filter to see if there are any entries for the ping session that failed
- Answer the following question:

Why there are no entries in the Traffic log for your ping session to 8.8.8.8?

- Write down your answer in the field shown or on notepaper in class.

Enable Logging for Default Interzone Rule

- Edit the **Interzone** Security Policy rule and **`enable` Log at Session End**

Commit the configuration

- Commit the changes before proceeding

Ping a Host on the Internet

- From the terminal window on the Client-A host, ping 8.8.8.8

You will **not** get a reply

- Examine the Traffic Log again and use a simple filter to see if there are any entries for this session that failed
- The entries in the Traffic Log should show you that the ping sessions are hitting the interzone-default rule

Create Block Rules for Known-Bad IP Addresses

- Use the information below to create a rule at top of the Security Policy to block traffic *to* known bad IP addresses provided by Palo Alto Networks.

Rule Name	**`Block-to-Known-Bad-Addresses`**
Description	**`Blocks traffic from Users and Extranet to known bad IP addresses`**
Source Zone	**`Users_Net`** **`Extranet`**
Destination Zone	**`Internet`**
Destination Address	• **`Palo Alto Networks – Bulletproof IP addresses`** • **`Palo Alto Networks – High risk IP addresses`** • **`Palo Alto Networks – Known malicious IP addresses`**
Application	**`Any`**

Service	**any**
URL Category	**Any**
Action	**Deny**

- Use the information below to create another Security Policy rule to block traffic *from* known bad IP addresses provided by Palo Alto Networks. Place this rule at the top of the Security Policy, just below the Block-to-Known-Bad-Addresses rule.

Rule Name	**Block-from-Known-Bad-Addresses**
Description	**Blocks traffic from known bad IP addresses to Users and Extranet**
Source Zone	**Internet**
Source Address	• **Palo Alto Networks – Bulletproof IP addresses** • **Palo Alto Networks – High risk IP addresses** • **Palo Alto Networks – Known malicious IP addresses**
Destination Zone	**Users_Net** **Extranet**
Application	**Any**
Service	**application-default**
URL Category	**Any**
Action	**Deny**

Create Security Rules for Internet Access

- Use the information in the tables below to create Security Policy rules.

Create Users to Internet Security Policy Rule

- Use the information below to create a Security Policy rule that will allow traffic from the **Users_Net** zone to the **Internet** zone.

Rule Name	**Users_to_Internet**
Description	**Allows hosts in Users_Net zone to access Internet zone**
Source Zone	**Users_Net**
Destination Zone	**Internet**
Application	**Any**

Service	`application-default`
URL Category	`Any`
Action	`Allow`

Create Extranet to Internet Security Policy Rule

Use the information below to create a Security Policy rule that will allow traffic from the **Extranet** zone to the **Internet** zone.

Rule Name	`Extranet_to_Internet`
Description	`Allows hosts in Extranet zone to access Internet zone`
Source Zone	`Extranet`
Destination Zone	`Internet`
Application	`Any`
Service	`application-default`
URL Category	`Any`
Action	`Allow`

Commit the configuration

- Commit the changes before proceeding

Ping Internet Host from Client A

- From the terminal window on the Client-A host, ping 8.8.8.8

You will not get a reply

- Examine the Traffic Log again and use a simple filter to see if there are any entries for this session that failed
- The entries in the Traffic Log should show you that the ping sessions are hitting the **Users_to_Internet** rule.
- Answer the following question:

Can you explain why your ping session from the client to the Internet host did not get a reply even though the firewall is allowing the traffic?

- Write down your answer in the field shown or on notepaper in class.

Detailed Lab Steps

Use this section if you prefer detailed guidance to complete the objectives for this lab. We strongly recommend that you use this section if you do not have extensive experience working with Palo Alto Networks firewalls.

Apply a Baseline configuration to the Firewall

To start this lab exercise, you will load a preconfigured firewall configuration file.

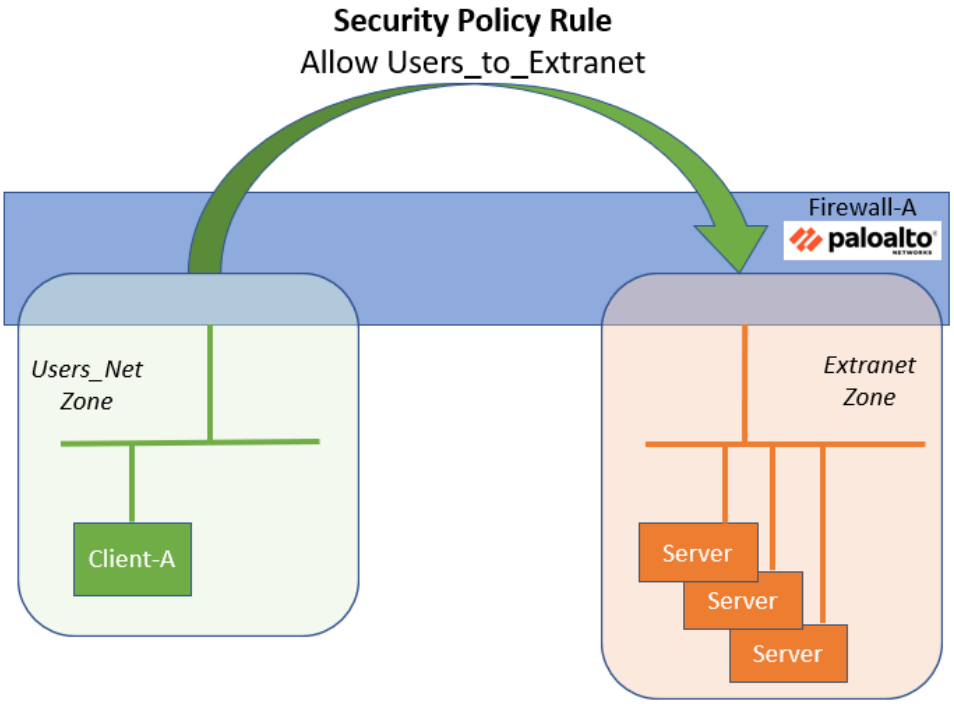
1. In the firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down arrow next to the **Name** field and select **edu-210-11.1a-06.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

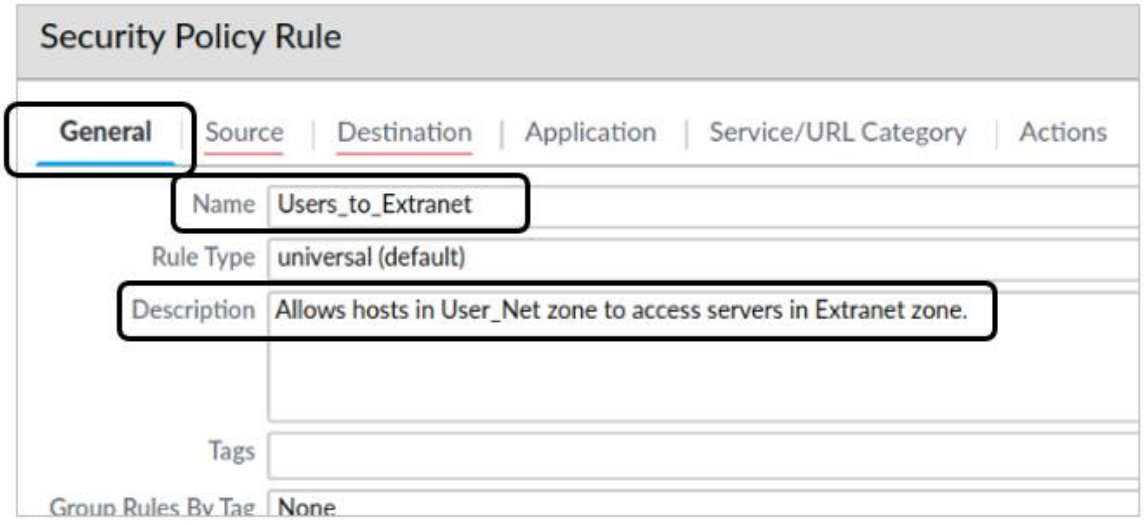
4. Click **OK** to close the **Load Named configuration** window.
5. Click **Close** to close the **Loading configuration** window.
6. Click the **Commit** button at the upper right of the web interface.
7. Leave the remaining settings unchanged and click **Commit**.
8. Wait until the **Commit** process is complete.
9. Click **Close** to continue.

Create a Security Policy Rule

You need to allow network traffic from the Users_Net security zone to the Extranet security zone so that employees can access various business applications. In this section, you will create a Security Policy rule to allow access between these two zones.

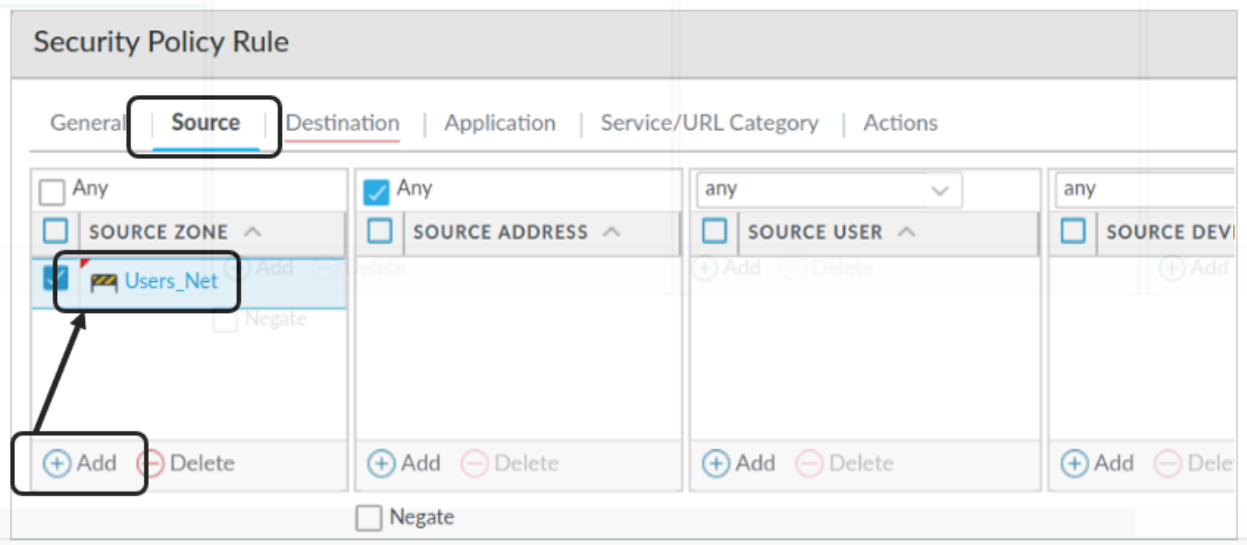


10. Select **Policies** > **Security**.
11. Click **Add** at the bottom of the window.
12. Under the tab for **General**, in the **Name** field, enter **`Users_to_Extranet`**.
13. For **Description**, enter **`Allows hosts in Users_Net zone to access servers in Extranet zone`**.
14. Leave the other settings unchanged:

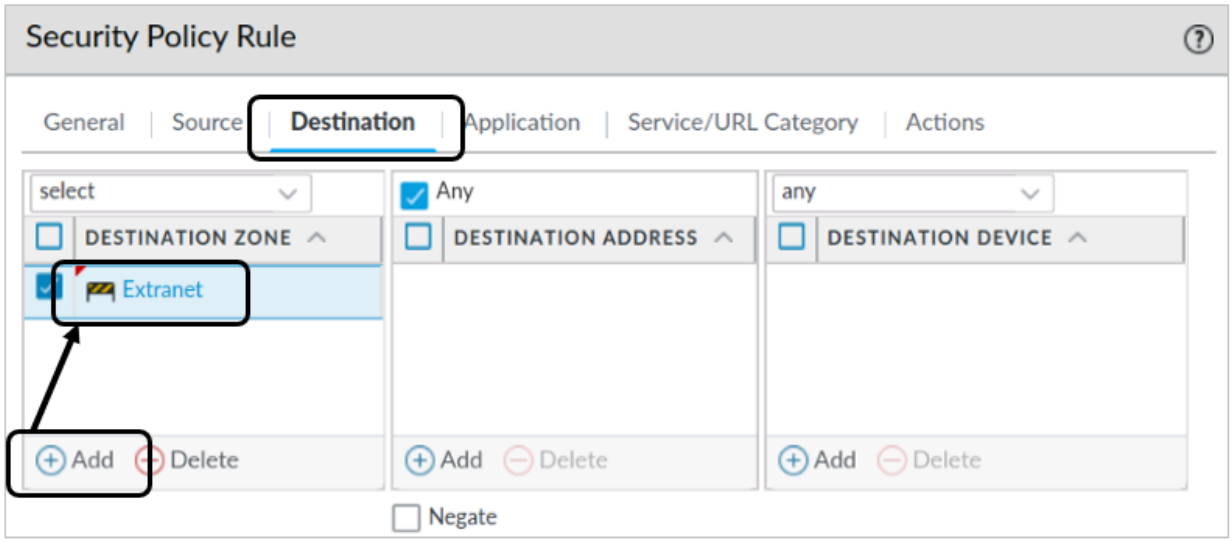


Descriptions are optional but highly recommended. It may take you a few extra moments to enter an accurate Description during these labs, but if you adhere to the practice in the labs, you will be more likely to carry out this best practice when you return to work.

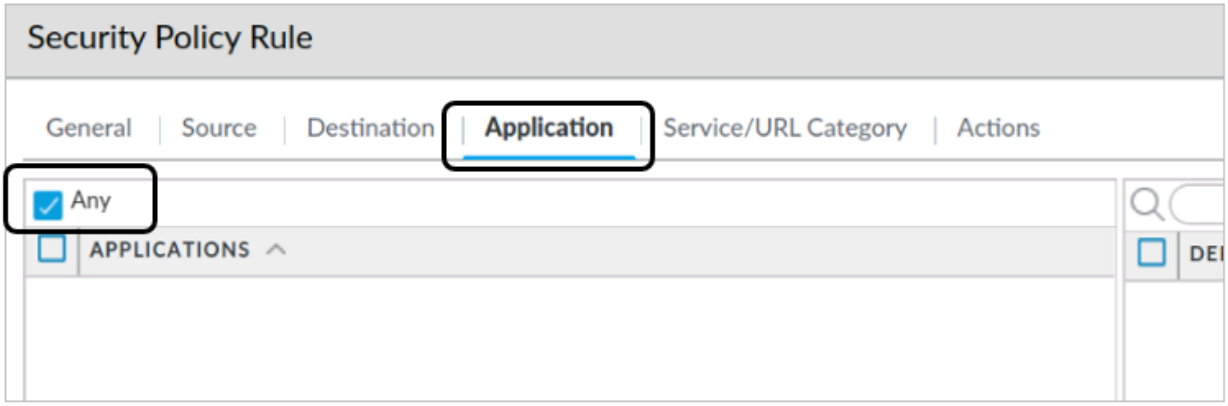
15. Select the tab for **Source**.
16. Under the **Source Zone** section, click **Add**.
17. Select **Users_Net**.
18. Leave the remaining settings unchanged.



19. Select the tab for **Destination**.
20. Under the section for **Destination Zone**, click **Add**.
21. Select **Extranet**.
22. Leave the other settings unchanged.

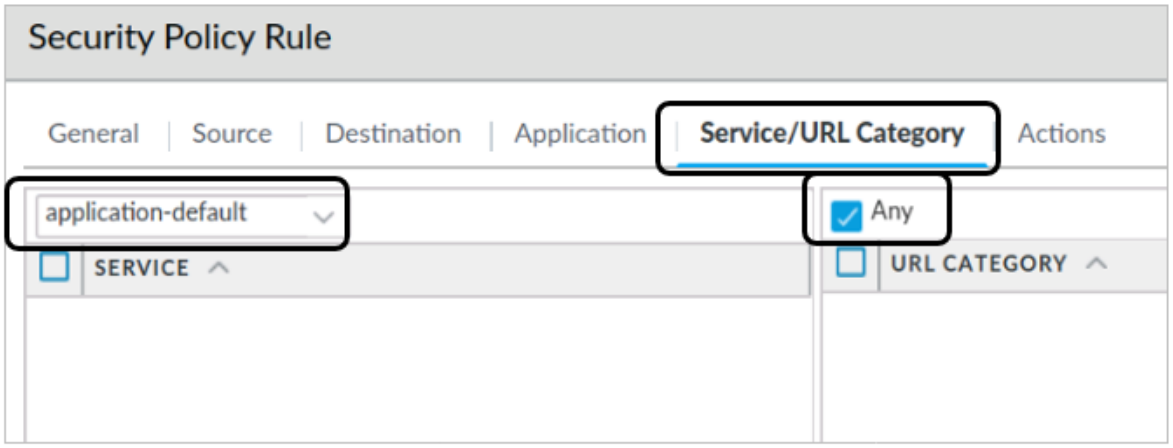


23. Select the tab for **Application**.
24. Do not make any changes to these settings but note that the **Any** box is checked.



Later in this course, we will cover Applications and how to use them in Security Policy rules.

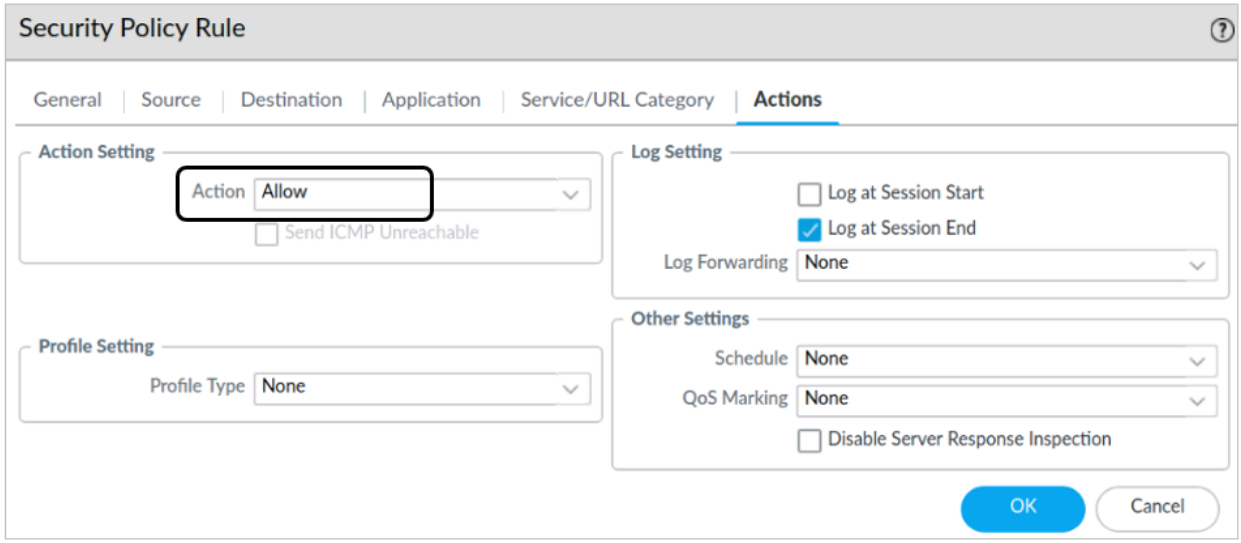
25. Select the tab for **Service/URL Category**.
26. Do not make any changes to the settings in this tab but note that the **Service** is set to **application-default**.



The application-default setting instructs the firewall to allow an application such as web-browsing as long as that application is using the predefined service (or destination port). For an application like web-browsing, the application default service is TCP 80; for an application such as SSL, the application default service is TCP 443. We will spend a great deal of time later in the course discussing Applications and the application-default setting.

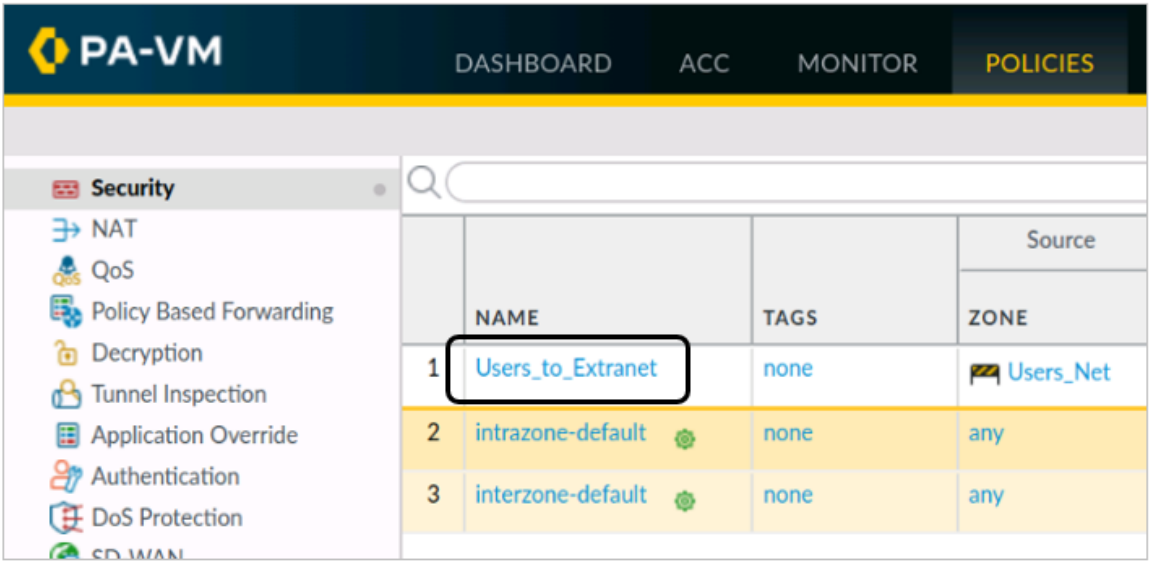
27. Select the tab for **Actions**.

28. You do not need to make any changes in this section but note that the **Action** is set to **Allow** by default.



When you create a new Security Policy rule, the **Action** is automatically set to **Allow**. If you are creating a rule to block traffic, make sure you select the **Actions** tab and change the **Action** before you commit the rule.

29. Click **OK** on the Security Policy Rule window.
30. The new Security Policy rule appears in the table:



The rule appears above the two preconfigured entries intrazone-default and interzone-default. These two rules always appear at the bottom of the ruleset.

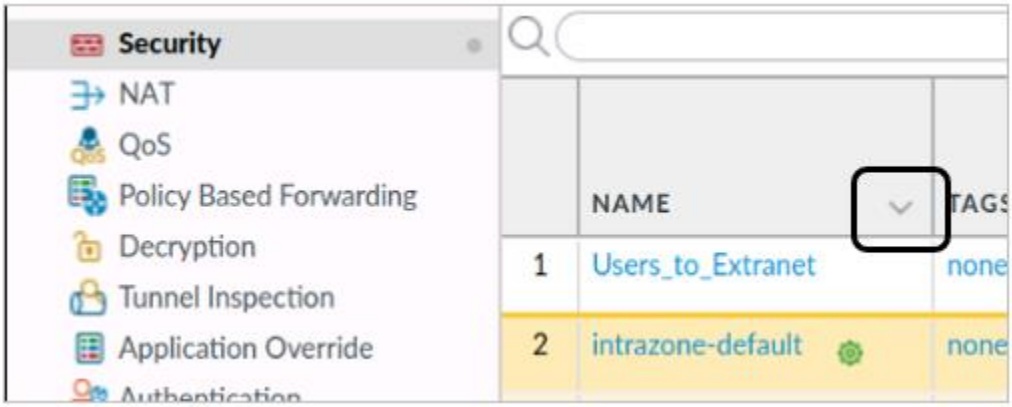
Commit the configuration

31. Click the **Commit** button at the upper right of the web interface.
32. Leave the settings unchanged and click **Commit**.
33. Wait until the **Commit** process is complete.
34. Click **Close** to continue.

Modify Security Policy Table Columns

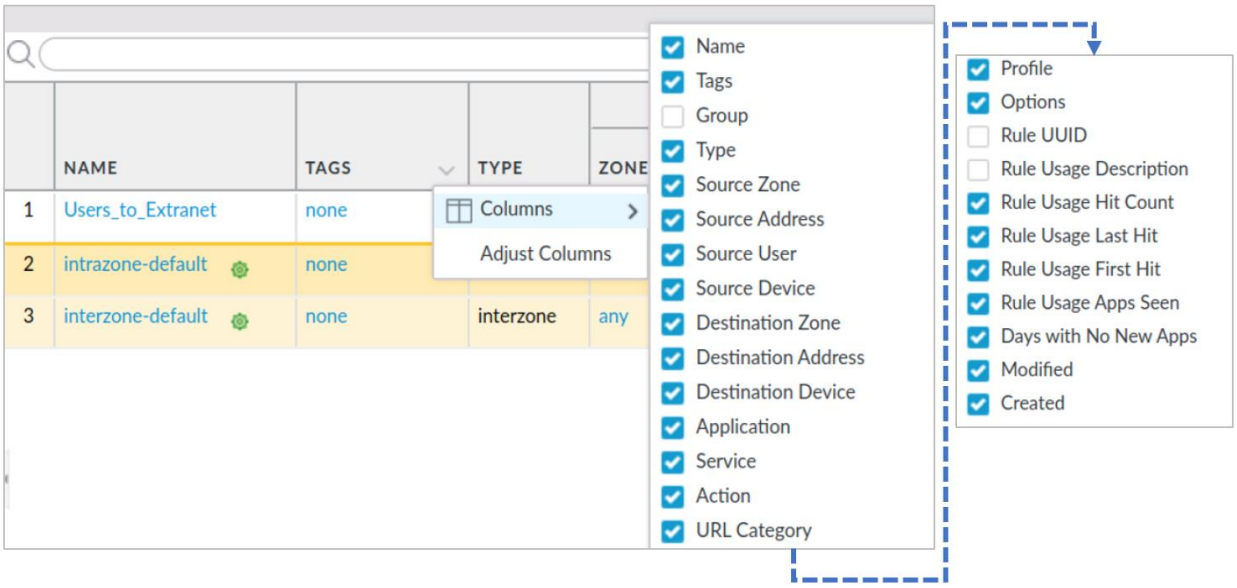
You can customize the information presented in the Security Policy table to fit your needs. In this section, you will hide some of the columns and display others that may be of more interest. You will also move columns around and use the **Adjust Column** feature.

35. Click the small drop-down icon next to the **Name** column in the Security Policy table.



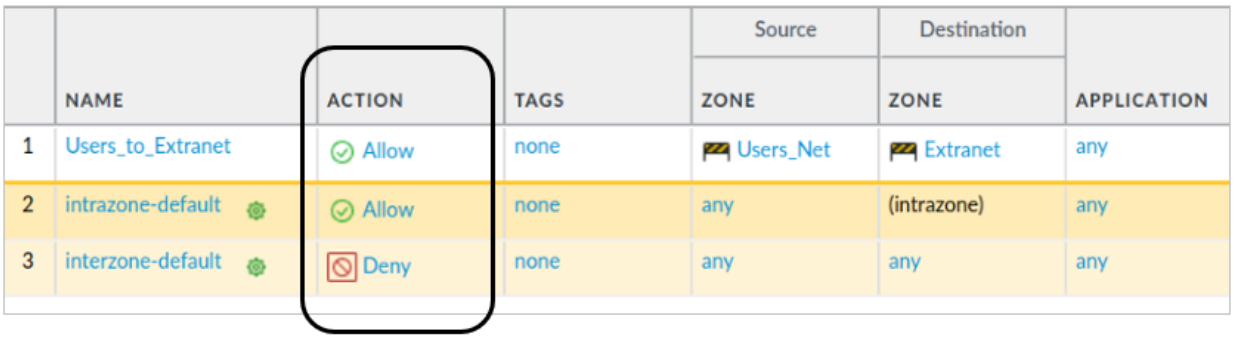
This icon is available next to all column headers.

36. Choose **Columns** and note the available columns that you can hide or display in this table.



Note that the column list in this image has been cropped and wrapped to make it clearer in the lab guide.

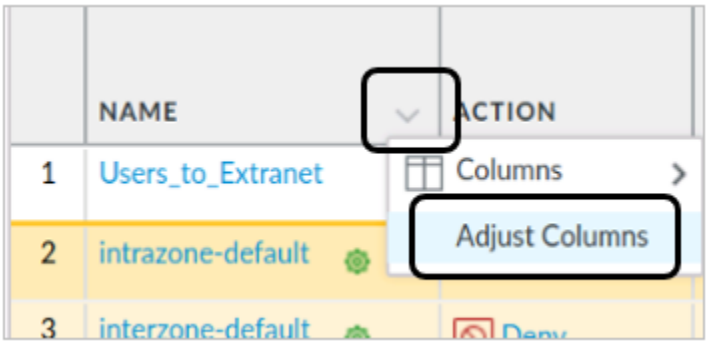
37. **Uncheck** the following item:
    - **Type**
    - **Source Device**
    - **Destination Device**
    - **Options**
38. Drag and drop the **Action** column from its current location so that it appears between the **Name** column and the **Tag** column.



Note: These changes are optional. You do not have to show or hide columns or rearrange items in any of the firewall tables. However, you may find that there are certain columns in certain tables that you never use, and you can hide them to provide more room in the table. You may also find that there are certain columns that you scan frequently, and you can move those to locations that are easier to

see. You can use these same steps to show, hide or move columns in all firewall tables.

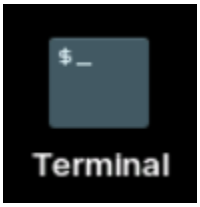
39. At the top of the **Name** column, click the drop-down icon again and choose **Adjust Columns**.



40. This action will resize the displayed columns to best fit in the browser window.

Test New Security Policy Rule

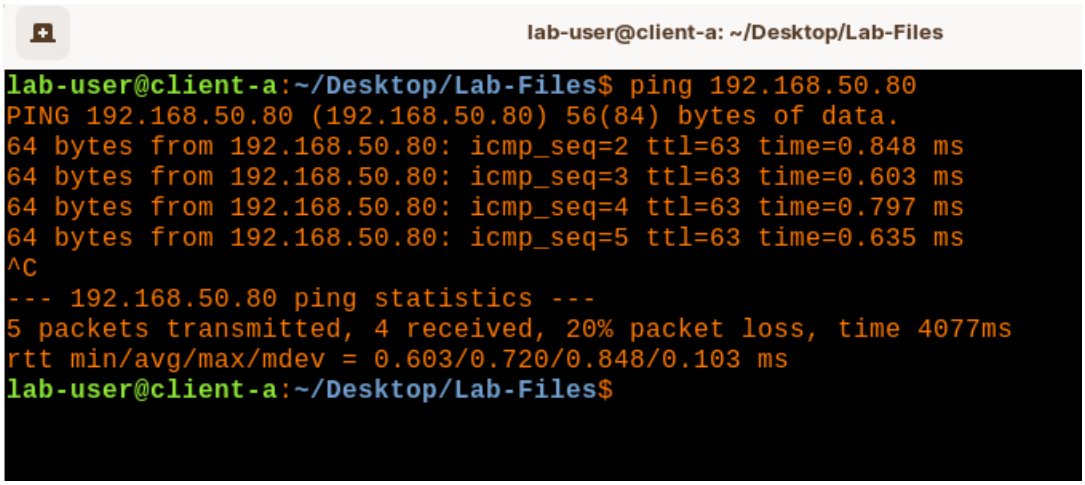
41. To make certain that your Security Policy rule functions, open a terminal window on the client host.



42. Use the following command to ping 192.168.50.80, which is the IP address of a web server in the Extranet zone.

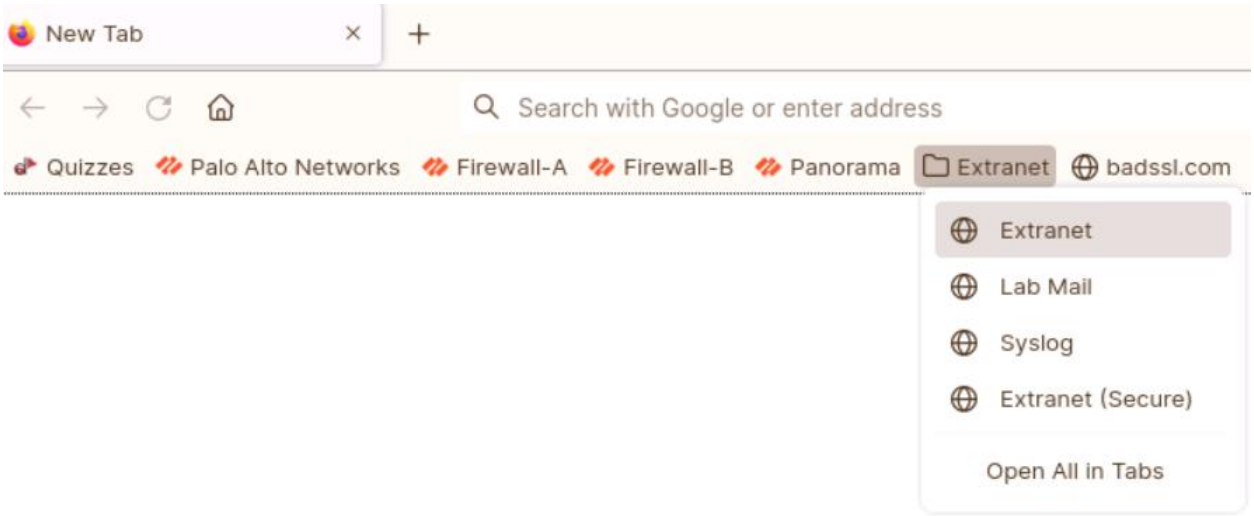
```
lab-user@client-a:~/Desktop/Lab-Files$ ping 192.168.50.80 <Enter>
```

43. After several replies, use **Ctrl+C** to stop the ping.

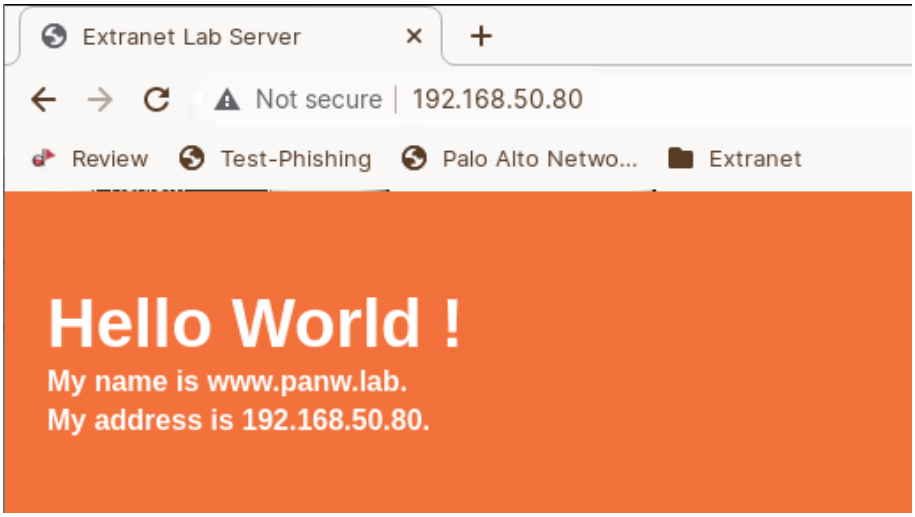


If you see a reply from 192.168.50.80, then your Security Policy rule is configured correctly! If not, review the previous steps and try this test again.

44. On the client workstation, open the Firefox testing browser.
45. Use the bookmark bar to choose **Extranet** > **Extranet**:



46. You should see a webpage displayed by the server.

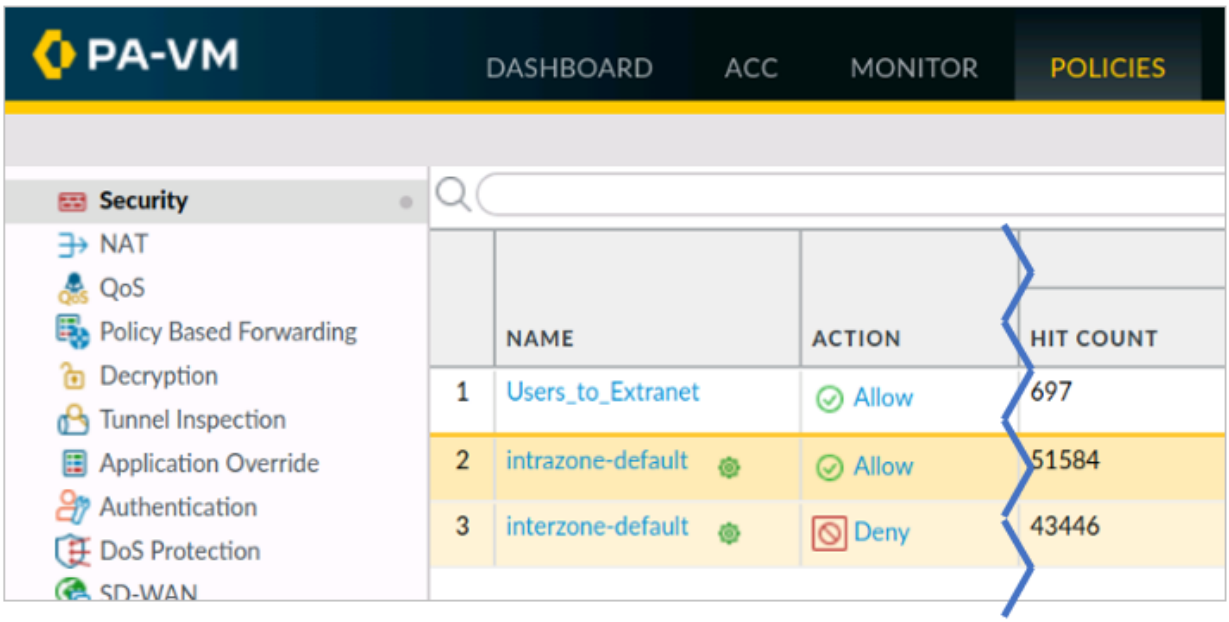


47. Close the testing browser.

Examine Rule Hit Count

With your rule successfully in place, you can now examine hit counters in the Security Policy rule table. These counters can be useful for troubleshooting. If a rule is not being hit, you may need to modify it.

48. In the firewall web interface, select **Policies > Security**.
49. Scroll to the right and locate the column for **Hit Count**.



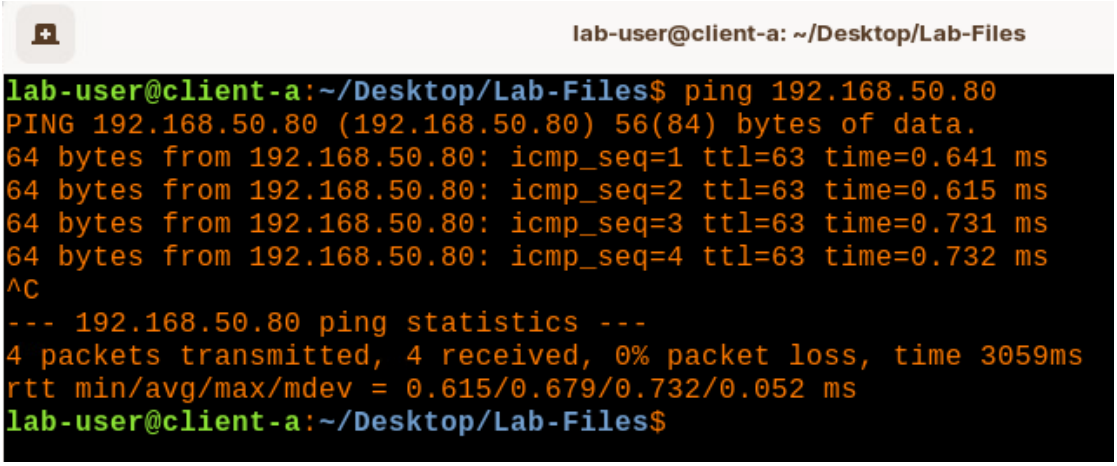
Note: This image has been cropped to fit better on the page.

The Hit Count column in your firewall Security Policy rule list will be further to the right than is displayed here and the numbers displayed will differ from those shown.

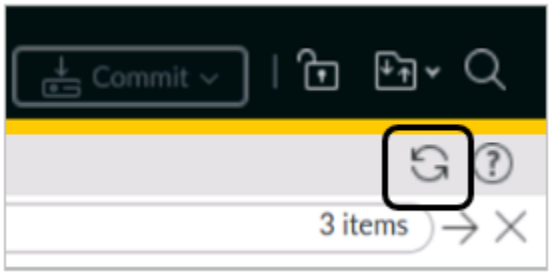
50. Note the number of **Hits** on this rule.
51. Return to the terminal window on the desktop of your client.
52. Ping the server again by issuing the following command:

```
lab-user@client-a:~/Desktop/Lab-Files$ ping 192.168.50.80 <Enter>
```

53. After several replies, use **Ctrl+C** to stop the ping.



54. Return to the firewall web interface and update the Security Policy rules table by clicking the **Refresh** button in the upper right corner of the window.



55. Note the increase in the **Hit Count** for your Security Policy rule.

Reset the Rule Hit Counter

Rule hit counts are very useful to track whether or not a rule is configured correctly. You can reset the counters for all Security Policy rules or for a single rule. In this section, you will reset the counters for the **Users_to_Extranet** rule.

56. Select **Policies** > **Security**.

57. Highlight the entry for **Users_to_Extranet** but do not open it.
58. At the bottom of the window, select **Reset Rule Hit Counter > Selected rules**.

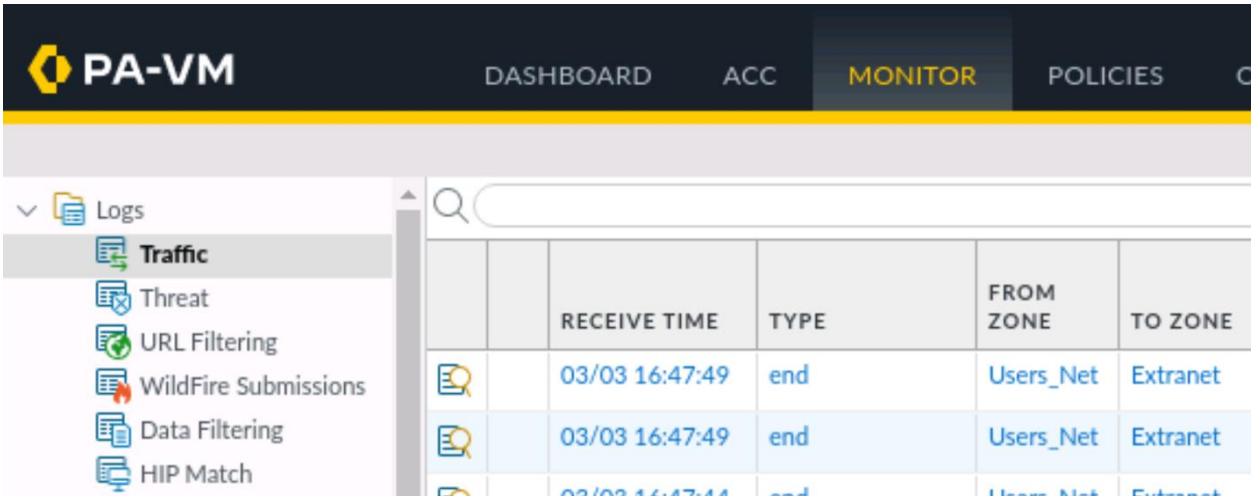
This action does not require a commit.

59. The **Rule Usage Hit Count** is set to **0**.

Examine the Traffic Log

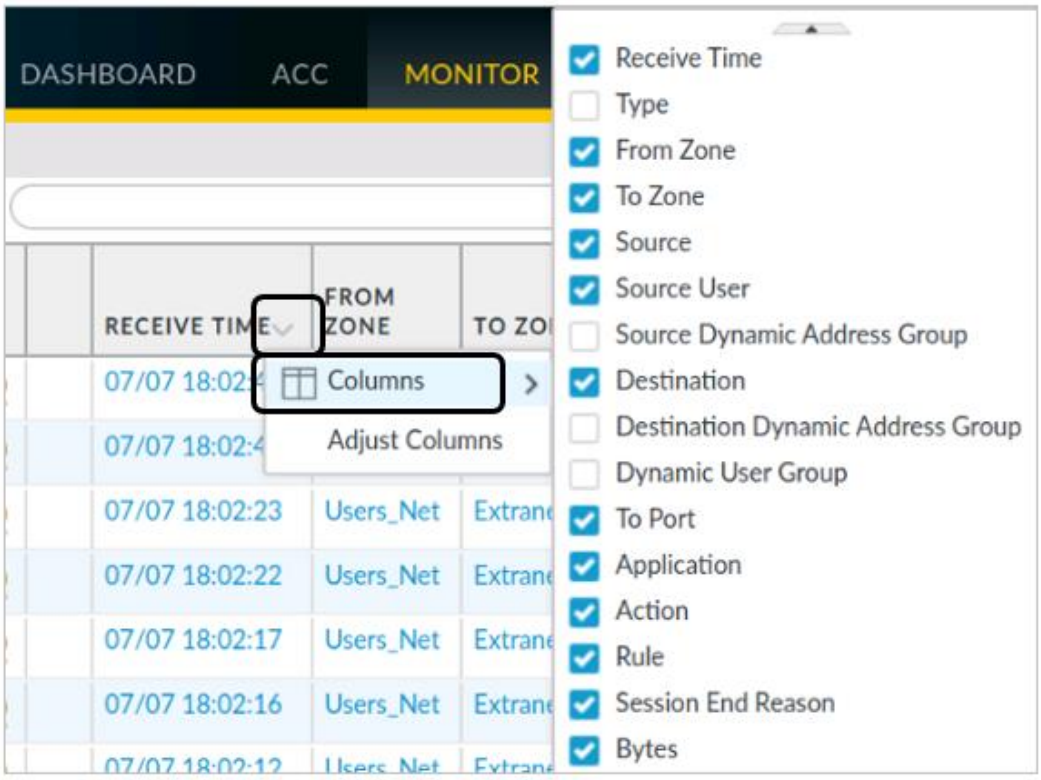
The Traffic Log contains information about sessions that the firewall allows or blocks. In this section, you will examine the Traffic Log to locate entries for sessions between the Users_Net zone and the Extranet zone.

60. Select **Monitor > Logs > Traffic**.



61. Click the drop-down icon next to **Receive** time and choose **Columns**.
62. Uncheck the following items to hide their columns:
    - **Type**
    - **Source Dynamic Address Group**
    - **Destination Dynamic Address Group**

- **Dynamic User Group**

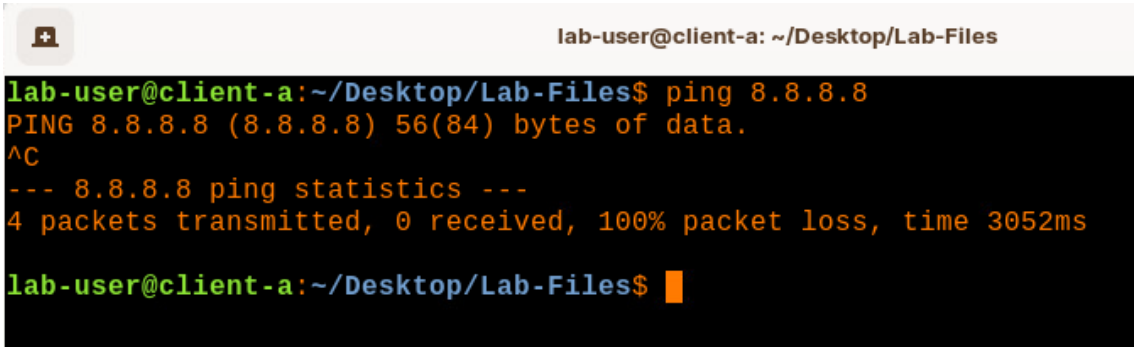


This is not a requirement, but we will not be using information from these columns in any lab for this course.

63. From the terminal window on the desktop, ping an address on the internet by issuing the following command:

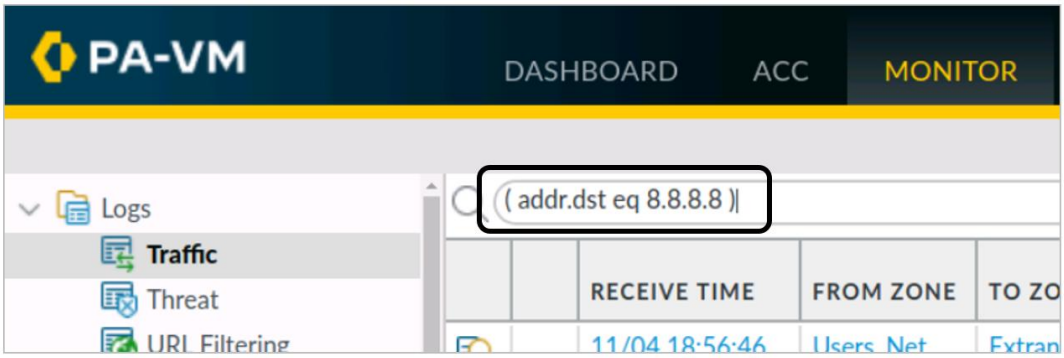
```
lab-user@client-a:~/Desktop/Lab-Files$ ping 8.8.8.8<Enter>
```

64. You will not get a reply, so after several seconds, use **Ctrl+C** to stop the ping.



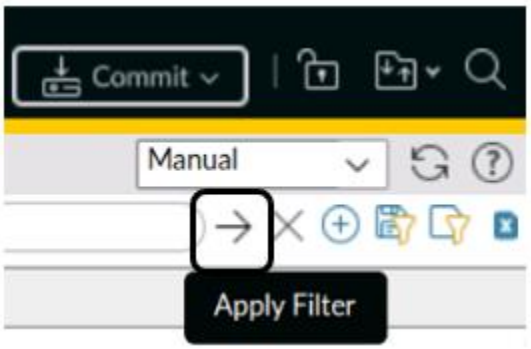
65. Examine the traffic log again and use a simple filter to see if there are any entries for this session that failed.
66. Select **Monitor > Logs > Traffic**.
67. In the filter field, enter the following text exactly as it appears here:

```
( addr.dst eq 8.8.8.8 )
```

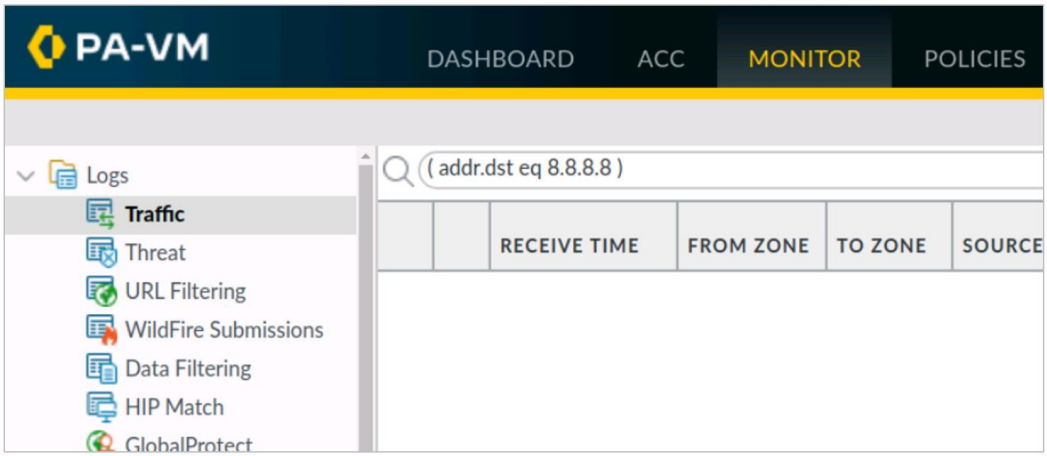


Filters are case sensitive so be precise! Also, note that there is a space after the first parentheses mark and right before the last parentheses mark.

68. Click the **Apply filter** button in the upper right corner of the window (or you can press the **Enter** key).



69. The Traffic log will update the display but there are no matching entries.



70. Answer the following question:

- Why are there no entries in the Traffic log for your ping session to 8.8.8.8?

Write down your answer in the field shown or on notepaper in class.

Enable Logging for Default Interzone Rule

If you were unable to explain why the firewall did not log your ping session to an external address, you are not alone. Most of the students in class probably did not figure it out either.

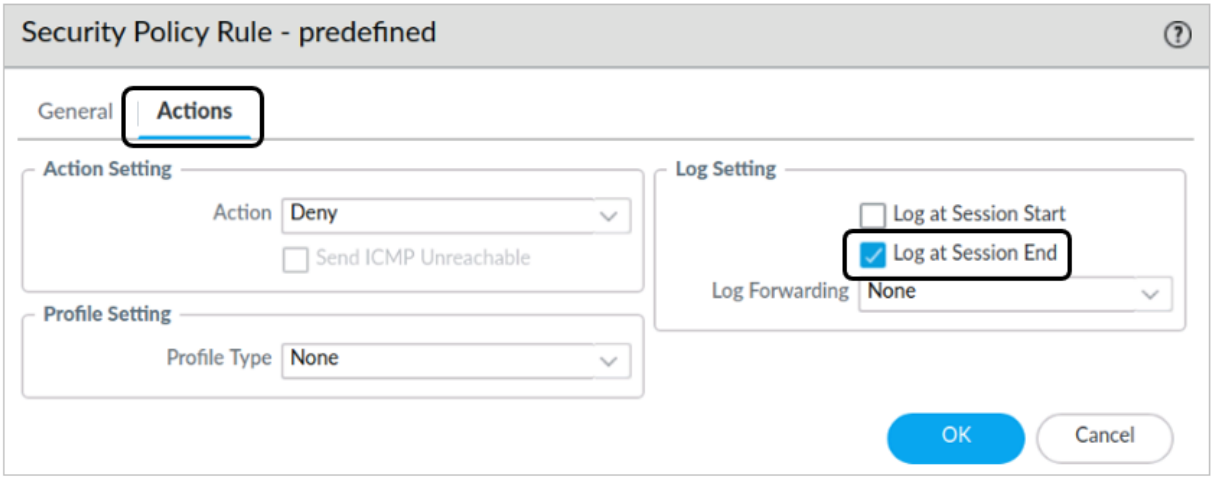
There are two reasons:

- First, you do not have a Security Policy rule in place to allow traffic from the Users_Net zone to the Internet zone. As the firewall examines the ping session, the only rule that matches is the interzone-default, which denies any traffic from one zone to another. The ping session matches this rule; however, there are no entries in the Traffic log indicating the match.
- Second, remember that traffic that hits the interzone-default rule is not automatically logged. You must manually change a setting on this rule to see entries in the Traffic log. You will enable this setting now and perform the test again.

71. Select **Policies > Security**.
72. Highlight the **interzone-default** entry in the Policy list but do not open it.
73. Click the **Override** button at the bottom of the window.

74. Select the **Actions** tab.
75. Place a check in the box for **Log at session end**.

76. Leave the remaining s ettings unchanged.



77. Click **OK.**

Commit the configuration

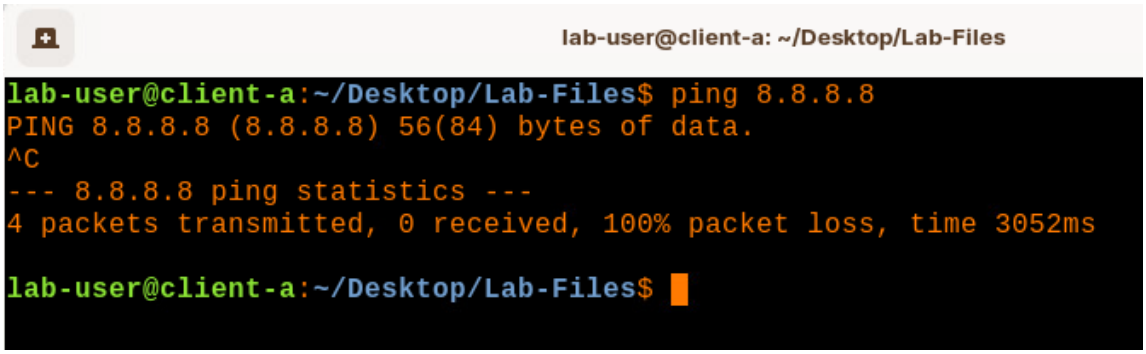
78. Click the **Commit** button at the upper right of the web interface.
79. Leave the settings unchanged and click **Commit**.
80. Wait until the **Commit** process is complete.
81. Click **Close** to continue.

Ping a Host on the Internet

82. Now that you have enabled Log at session end for the default Security Policy rules, ping a host on the internet and examine the Traffic log to see the results.
83. From the Terminal window on the client desktop, ping an address on the Internet by issuing the following command:

```
lab-user@client-a:~/Desktop/Lab-Files$ ping 8.8.8.8 <Enter>
```

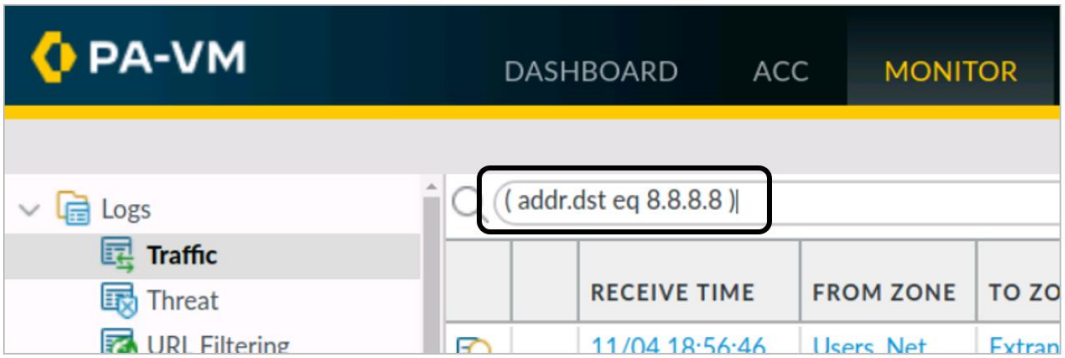
84. You will not get a reply, so after several seconds, use **Ctrl+C** to stop the ping.



85. Examine the traffic log again and use a simple filter to see if there are any entries for this session that failed.

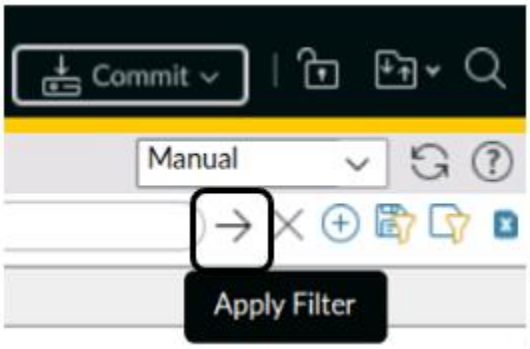
86. Select **Monitor > Logs > Traffic**.
87. In the filter field, enter the following text exactly as it appears here:

```
( addr.dst eq 8.8.8.8 )
```

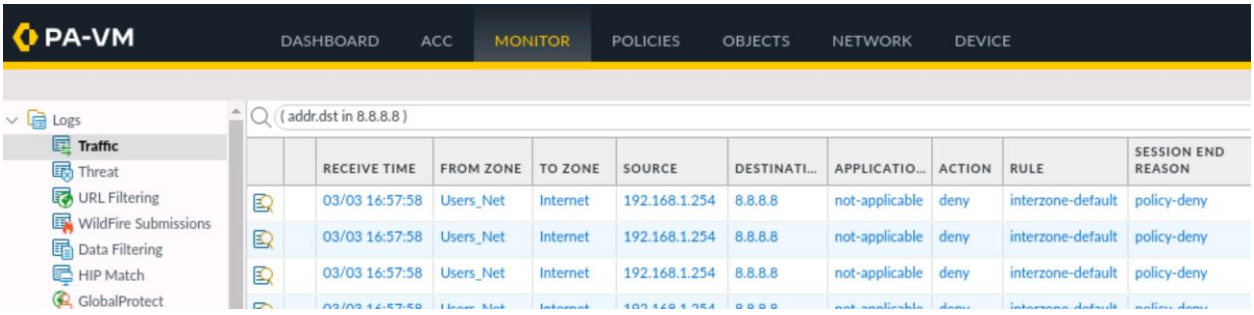


Your filter may already be in place from early.

88. Click the **Apply Filter** button in the upper right corner of the window (or you can press the **Enter** key).



89. The Traffic log will update the display and you should see entries matching the filter.
90. You can see that the sessions are hitting the interzone-default rule.



With Log at session end enabled, the firewall records hits on the internet-default rule so that you can see information about sessions that miss all previous rules.

91. Click the **X** icon to clear the filter from the log filter text box.

Create Block Rules for Known-Bad IP Addresses

Palo Alto Networks provides several lists of IP addresses that are known to be malicious. As a good practice, you should create Security Policy rules to block traffic to and from these known addresses.

92. Under **Policies** > **Security**, click **Add** at the bottom of the window.
93. For **Name**, enter **Block-to-Known-Bad-Addresses**.
94. For **Description**, enter **Blocks traffic from users and Extranet to known bad IP addresses**.
95. Select the **Source** tab.
96. Under the **Source Zone** section, click **Add**.
97. Select the **Users_Net** zone.
98. Under the **Source Zone** section, click **Add** again.
99. Select the **Extranet** zone.

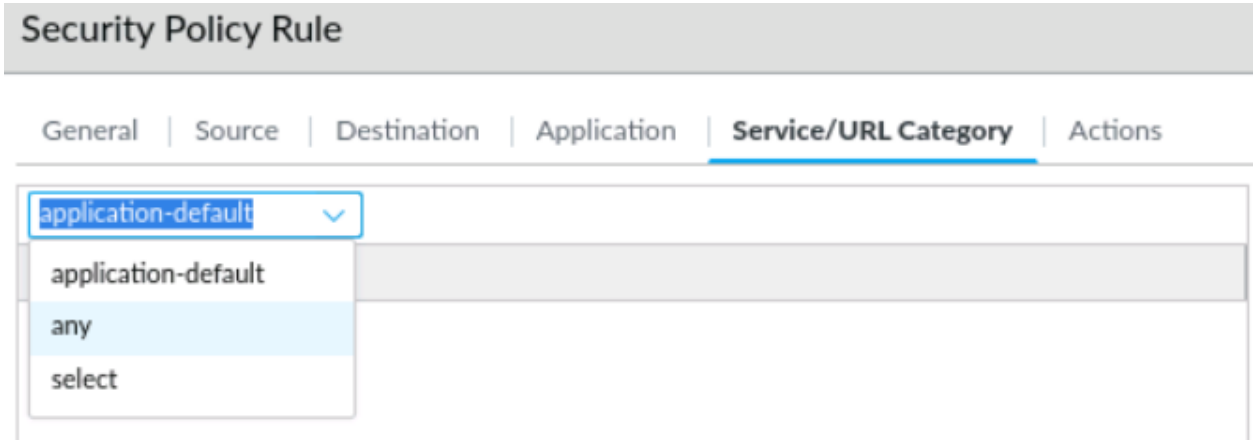
Note that you are adding both internal zones to the Source Zone section of the rule.

100. Select the **Destination** tab.
101. Under the **Destination Zone**, click **Add**.
102. Select the **Internet** zone.
103. Under the **Destination Address** section of the **Destination** tab, click **Add**.
104. Select **Palo Alto Networks – Bulletproof IP addresses**.
105. Click **Add** again under the **Destination Address** section.
106. Select **Palo Alto Networks – High risk IP addresses**.
107. Click **Add** again under the **Destination Address** section.
108. Select **Palo Alto Networks – Known malicious IP addresses**.

    When complete, you should have three Palo Alto Networks IP address lists in the Destination Address section of the rule.

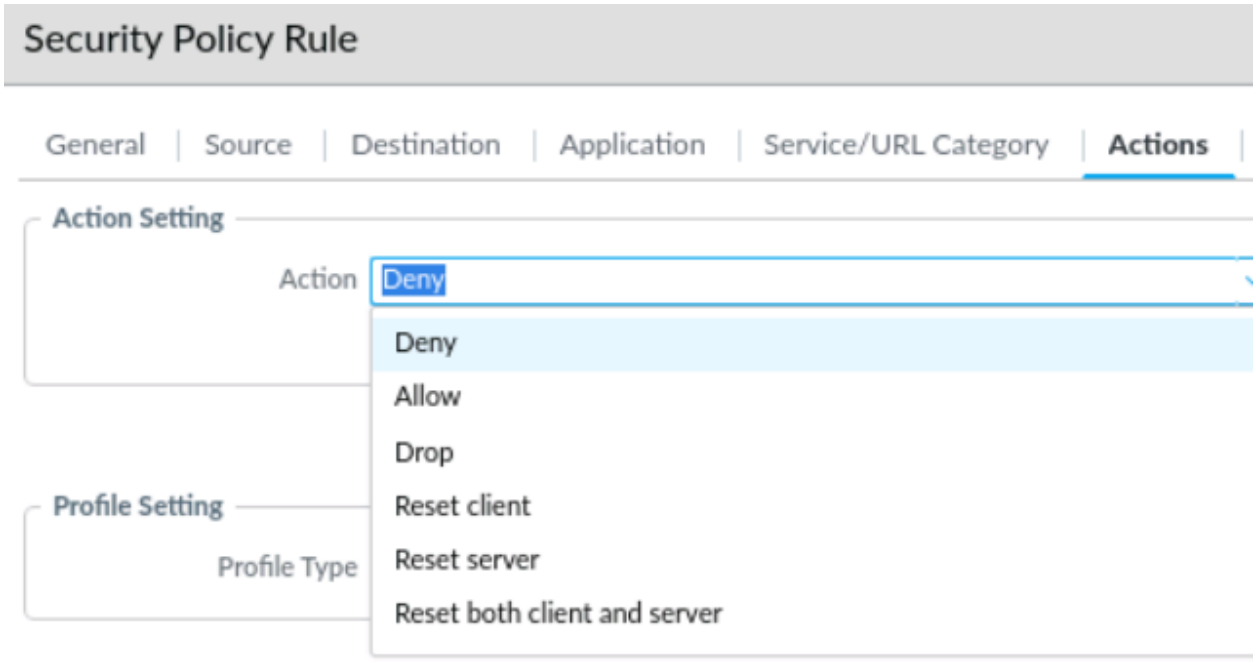
109. Select the **Application** tab.
110. Leave the **Application** set to **any**.

111. Under the **Service/URL Category** tab, change the **Service** from **application-default** to **any**.



When creating deny rules, Palo Alto Networks recommends setting the **Service** to **any** instead of using **application-default**.

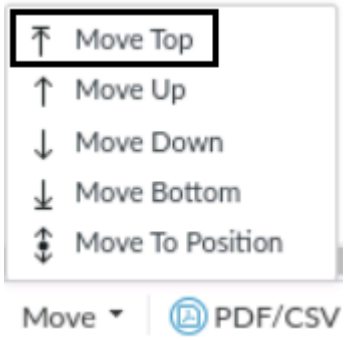
112. Select the **Actions** tab.
113. Change the **Action** to **Deny**.



114. Click **OK**.

The new rule appears in the Security Policy table.

115. Move this new rule to the top of the Security Policy, by highlighting the entry for **Block-to-Known-Bad-Addresses** (do not open it).
116. At the bottom of the window, choose **`Move`** and select **`Move Top`**.



	NAME	ACTION	Source ZONE	Source ADDRESS	Destination ZONE	Destination ADDRESS	APPLICATION
1	Block-to-Known-Bad-Addresses	Deny	Extranet Users_Net	any	Internet	Palo Alto Networks - Bulletproof IP... Palo Alto Networks - High risk IP a... Palo Alto Networks - Known malici...	any
2	Users_to_Extranet	Allow	Users_Net	any	Extranet	any	any
3	intrazone-default	Allow	any	any	(intrazone)	any	any
4	interzone-default	Deny	any	any	any	any	any

117. Create another rule to block traffic *from* known bad IP addresses.
118. In the Security Policy window, click **`Add`**.
119. For **Name**, enter **`Block-from-Known-Bad-Addresses`**.
120. For **Description**, enter **`Blocks traffic from known bad IP addresses to Users and Extranet`**.
121. Select the **Source** tab.
122. Under the **Source Zone** section, click **`Add`**.
123. Select the **`Internet`** zone.
124. Under the **Source Address** section, click **`Add`**
125. Select **`Palo Alto Networks – Bulletproof IP addresses`**.
126. Click **`Add`** again under the **Source Address** section.
127. Select **`Palo Alto Networks – High risk IP addresses`**.

128. Click **Add** again under the **Source Address** section.
129. Select **Palo Alto Networks – Known malicious IP addresses**.

    When complete, you should have three Palo Alto Networks IP address lists in the **Source Address** section of the rule.

130. Select the **Destination** tab.
131. Under the **Destination Zone**, click **Add**.
132. Select the **Users_Net** zone.
133. Click **Add** again under **Destination Zone**.
134. Select **Extranet**.

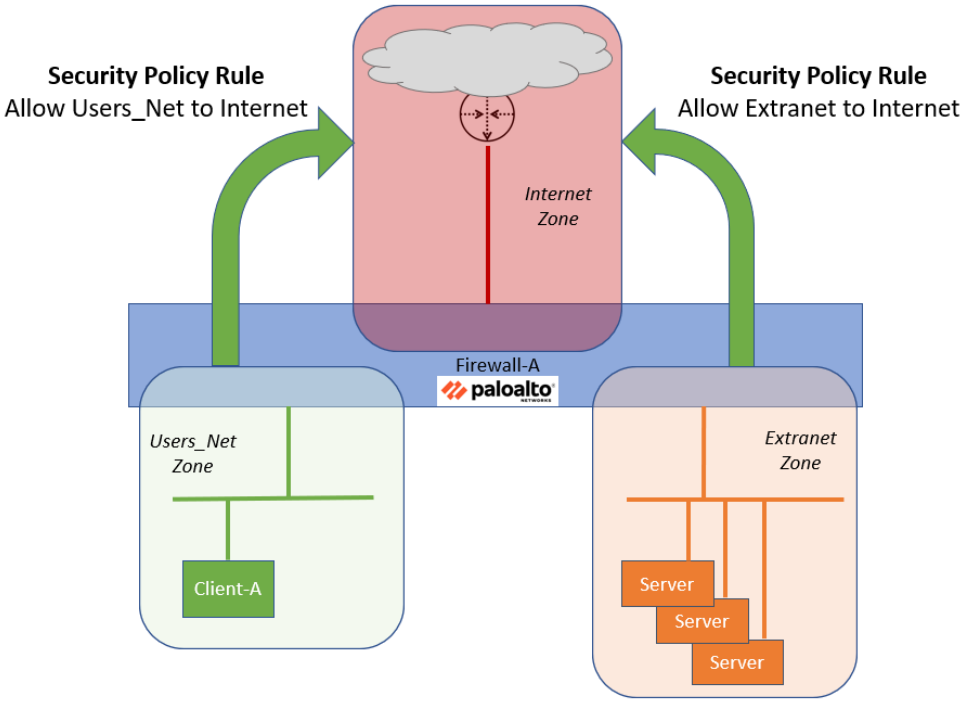
Note that you are adding both internal zones to the Destination Zone section of the rule.

135. Select the **Application** tab.
136. Leave the **Application** set to **any**.
137. Under the **Service/URL Category** tab, set the **Service** to **any**.
138. Select the **Actions** tab.
139. Change the **Action** to **Deny**.
140. Click **OK**.
141. The new rule appears in the Security Policy table.
142. Move the **Block-to-Known-Bad-Addresses** rule to the top of the Security Policy.
143. Highlight the entry for **Block-from-Known-Bad-Addresses** but do not open it.
144. At the bottom of the window, choose **Move** and select **Move Top**.
145. Both of the rules to block traffic to or from known bad IP addresses should be at the top of the Security Policy.

			Source		Destination		
	NAME	ACTION	ZONE	ADDRESS	ZONE	ADDRESS	APPLICATION
1	Block-from-Known-Bad-Addresses	Deny	Internet	Palo Alto Networks - Bulletproo... Palo Alto Networks - High risk I... Palo Alto Networks - Known ma...	Extranet Users_Net	any	any
2	Block-to-Known-Bad-Addresses	Deny	Extranet Users_Net	any	Internet	Palo Alto Networks - Bulletproo... Palo Alto Networks - High risk I... Palo Alto Networks - Known ma...	any
3	Users_to_Extranet	Allow	Users_Net	any	Extranet	any	any
4	intrazone-default	Allow	any	any	(intrazone)	any	any
5	interzone-default	Deny	any	any	any	any	any

Create Security Policy Rules for Internet Access

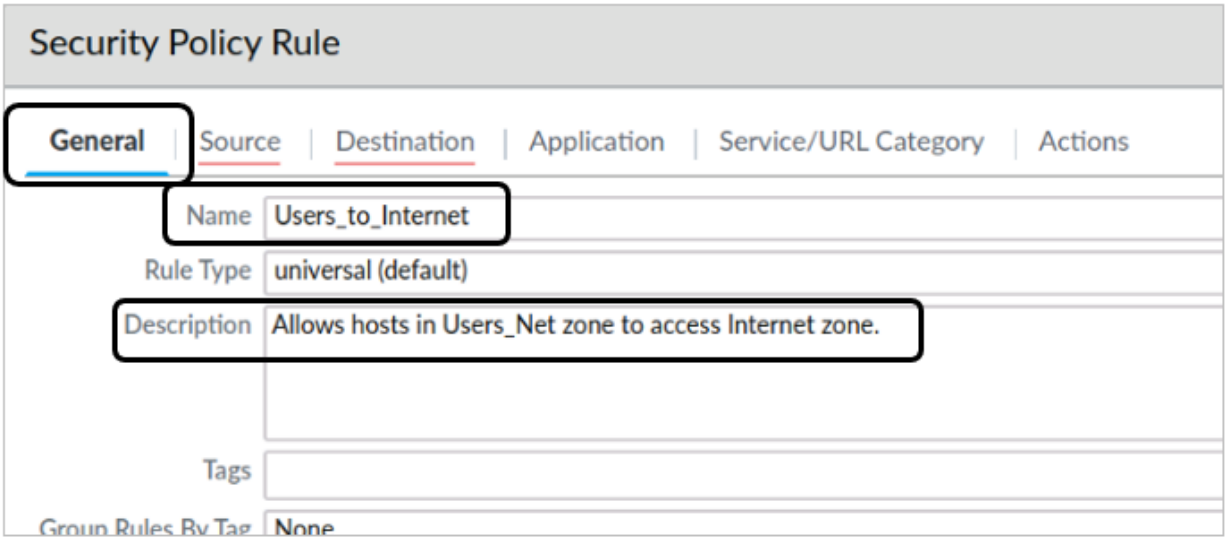
In this section, you will create Security Policy rules to allow hosts in your network to access the Internet. You need to create a rule for hosts in the Users_Net security zone to access hosts in the Internet security zone. You also need to create a rule to allow hosts in the Extranet security zone to access hosts in the Internet security zone.



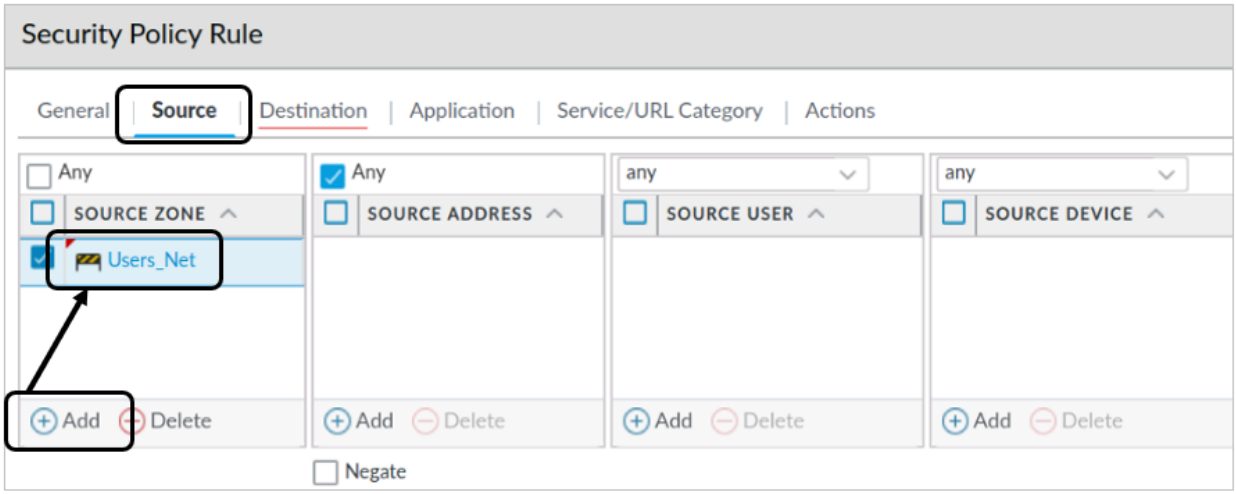
Create Users to Internet Security Policy Rule

146. Select **Policies** > **Security**.
147. Click **Add** at the bottom of the window.
148. Under the tab for **General**, in the **Name** field, enter **`Users_to_Internet`**.
149. For **Description**, enter **`Allows hosts in Users_Net zone to access Internet zone`**.

150. Leave the other settings unchanged:

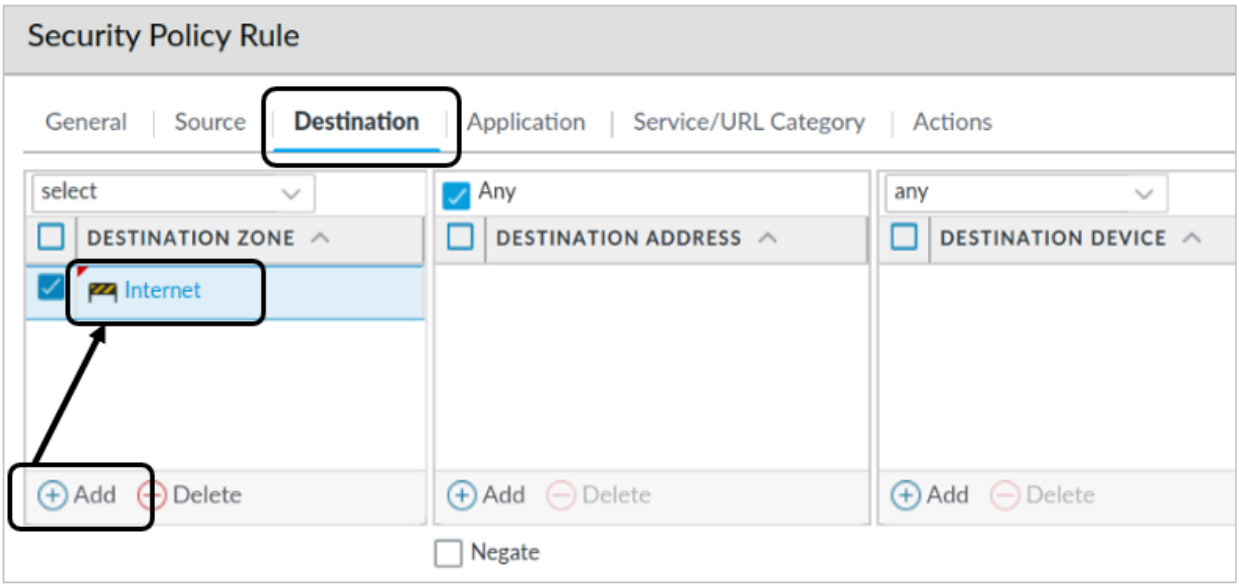


151. Select the tab for **Source**.
152. Under the **Source Zone** section, click **Add**.
153. Select **Users_Net**.
154. Leave the remaining settings unchanged.

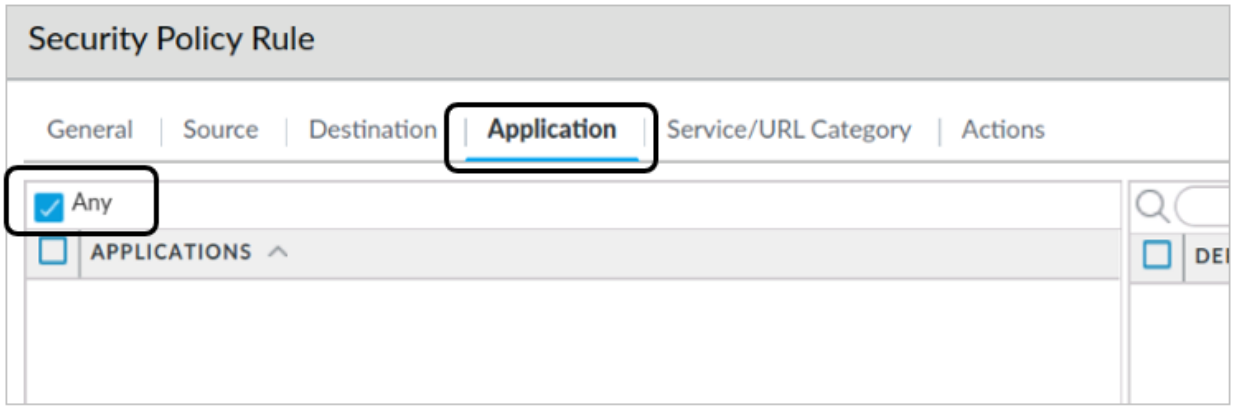


155. Select the tab for **Destination**.
156. Under the section for **Destination Zone**, click **Add**.
157. Select **Internet**.

158. Leave the other settings unchanged.

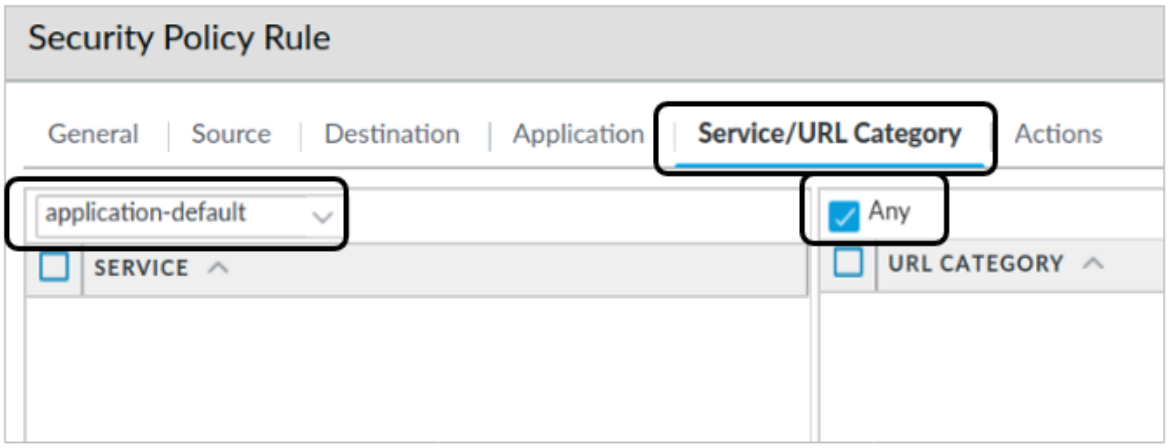


159. Select the tab for **Application**.
160. Do not make any changes to these settings but note that the **Any** box is checked.

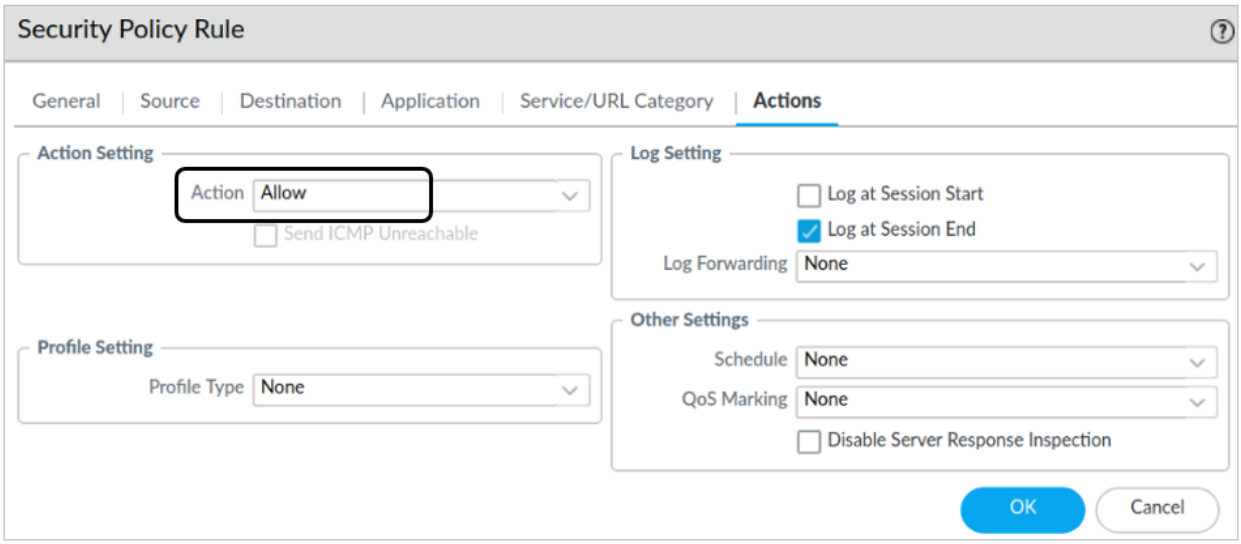


161. Select the tab for **Service/URL Category**.

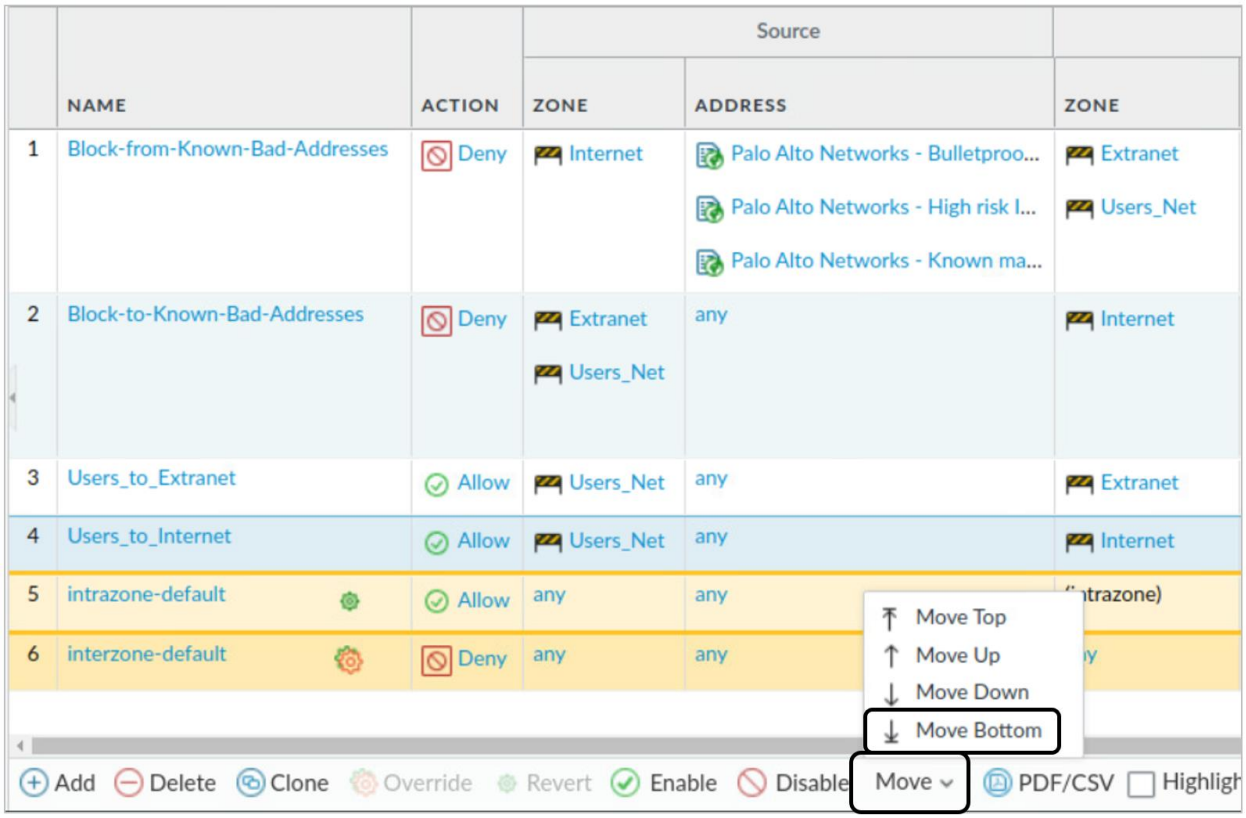
162. Do not make any changes to the settings in this tab but note that the **Service** is set to **application-default**.



163. Select the tab for **Actions**.
164. Make certain that the **Action** is set to **Allow**.



165. Click **OK** on the Security Policy Rule window.
166. The new Security Policy rule appears in the table.
167. Highlight the new rule and use the **Move > Move Bottom** option to place this rule at the end of the Security Policy.

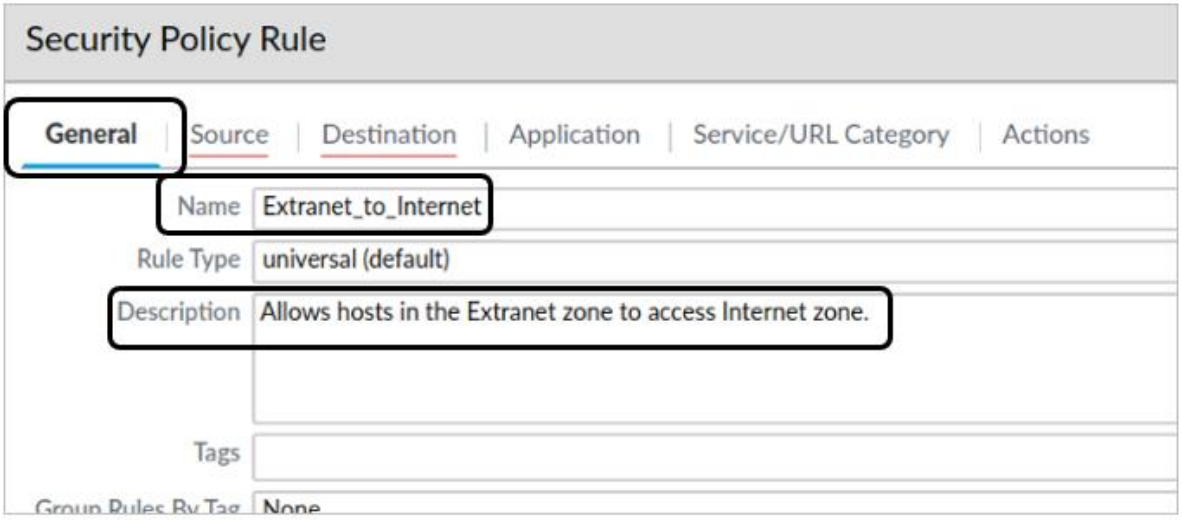


Create Extranet to Internet Security Policy Rule

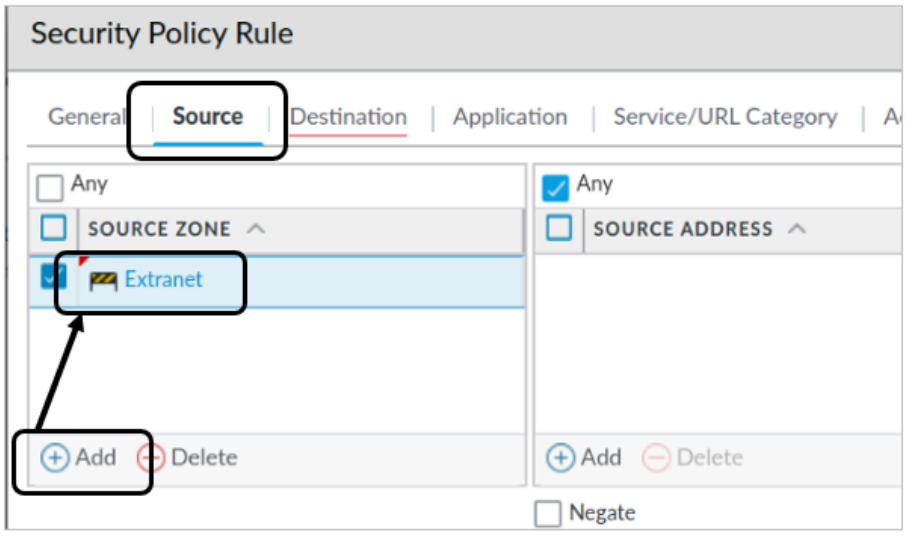
You also need to create a Security Policy rule to allow servers in the Extranet security zone to access hosts in the Internet security zone.

168. Select **Policies** > **Security**.
169. Click **Add** at the bottom of the window.
170. Under the tab for **General**, in the **Name** field, enter **`Extranet_to_Internet`**.
171. For **Description**, enter **`Allows hosts in Extranet zone to access Internet zone`**.

172. Leave the other settings unchanged:

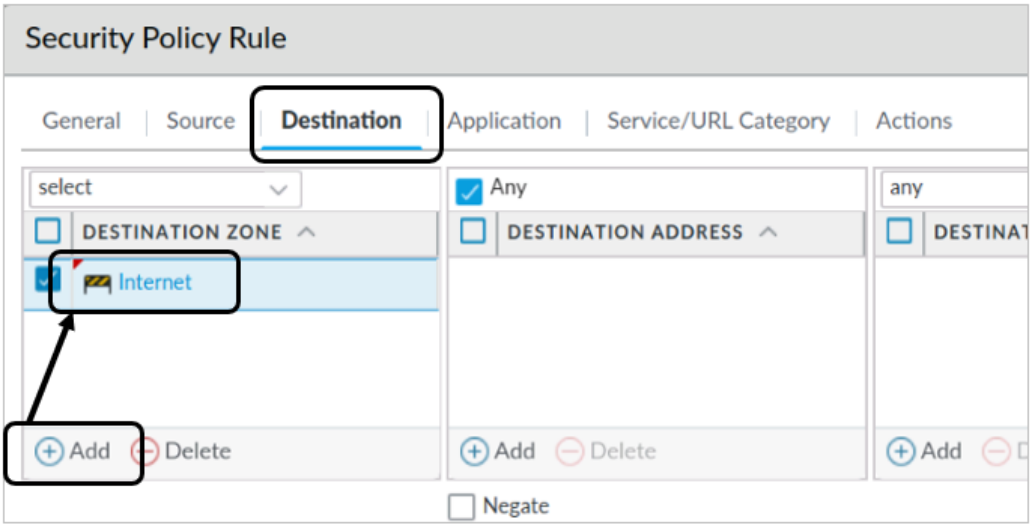


173. Select the tab for **Source**.
174. Under the **Source Zone** section, click **Add**.
175. Select **Extranet**.
176. Leave the remaining settings unchanged.

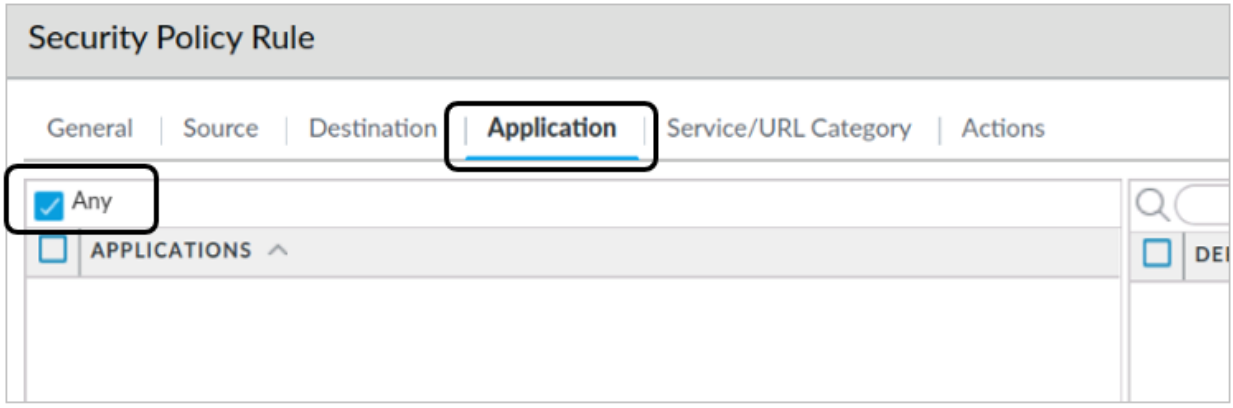


177. Select the tab for **Destination**.
178. Under the section for **Destination Zone**, click **Add**.
179. Select **Internet**.

180. Leave the other settings unchanged.

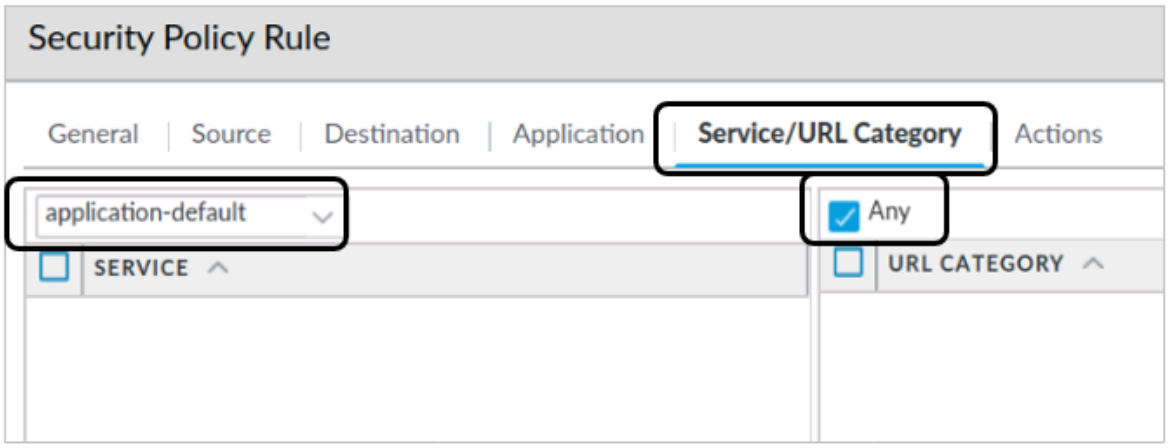


181. Select the tab for **Application**.
182. Do not make any changes to these settings but note that the **Any** box is checked.

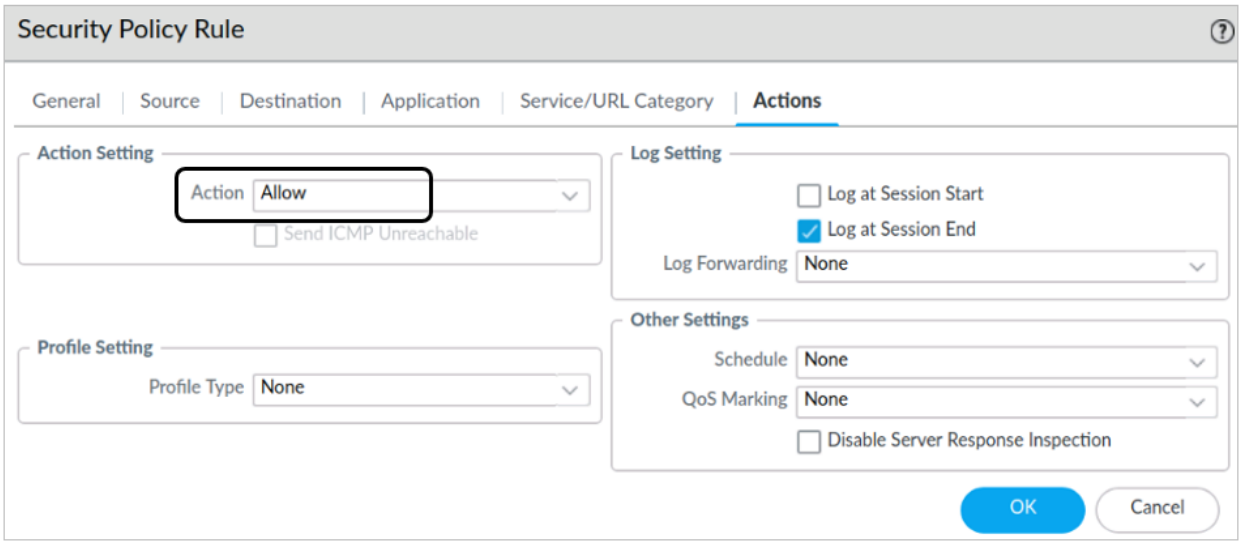


183. Select the tab for **Service/URL Category**.

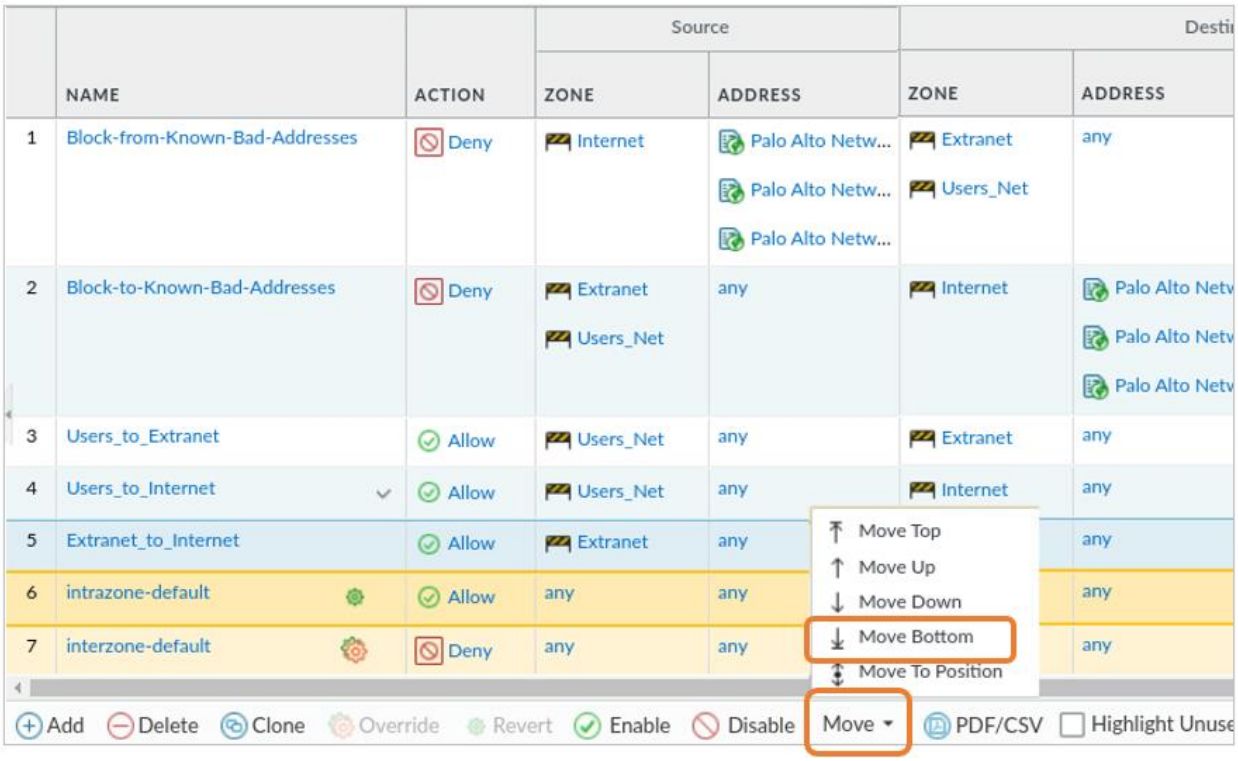
184. Do not make any changes to the settings in this tab but note that the **Service** is set to **application-default**.



185. Select the tab for **Actions**.
186. Make certain that the **Action** is set to **Allow**.



187. Click **OK** on the Security Policy Rule window.
188. The new Security Policy rule appears in the table.
189. Place the rule at the bottom of the Security Policy rule by using **Move > Move Bottom**.



Commit the configuration

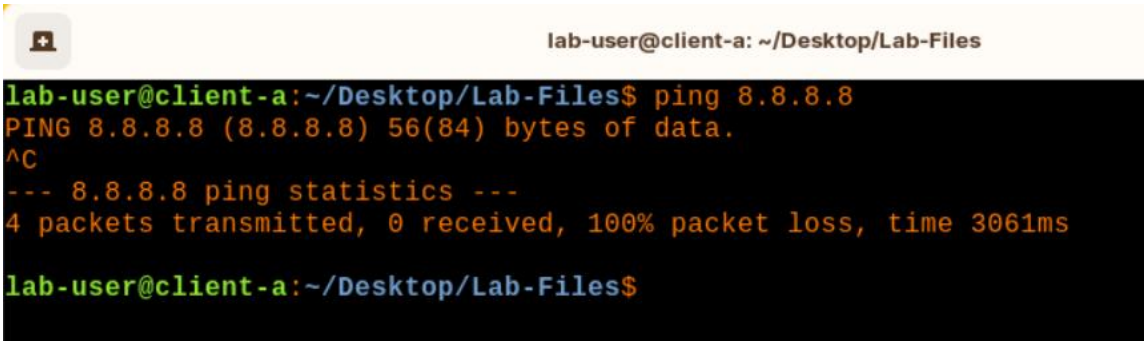
190. Click the **Commit** button at the upper right of the web interface.
191. Leave the settings unchanged and click **Commit**.
192. Wait until the **Commit** process is complete.
193. Click **Close** to continue.

Ping Internet Host from Client A

194. To verify that your Security Policy rule is allowing traffic, you will ping an Internet host from the client workstation and examine the Traffic log to see the results.
195. From the Terminal window on the client desktop, ping an address on the internet by issuing the following command:

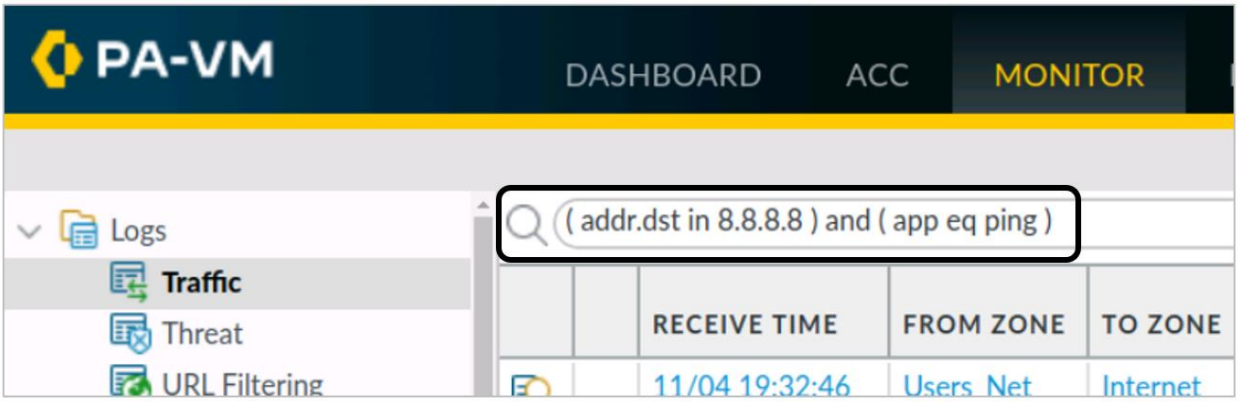
```
lab-user@client-a:~/Desktop/Lab-Files$ ping 8.8.8.8 <Enter>
```

196. You will not get a reply, so after several seconds, use **Ctrl+C** to stop the ping.

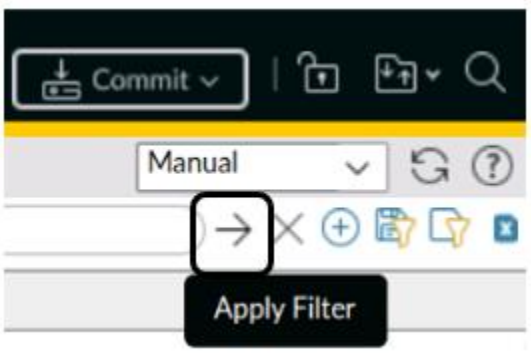


197. Examine the traffic log again and use a filter to see if there are any entries for this session that failed.
198. Select **Monitor** > **Logs** > **Traffic**.
199. In the filter field, update the syntax to include the application ping:

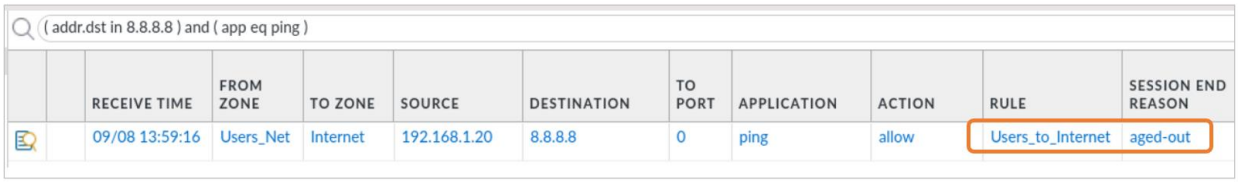
```
( addr.dst in 8.8.8.8 ) and ( app eq ping )
```



200. Click the **Apply filter** button in the upper right corner of the window (or you can press the **Enter** key).



201. The Traffic log will update the display and you should see entries matching the filter.
202. You can see that the sessions are hitting the **Users_to_Internet** rule.



203. Answer the following question:

- Can you explain why your ping session from the client to the Internet host did not get a reply even though the firewall is allowing the traffic?

For a hint, look at the title of the next module.

204. Write down your answer in the field shown or on notepaper in class.

Stop. This is the end of the lab.

Lab 7: Creating and Managing NAT Policy Rules

You need to create Network Address Translation rules to allow hosts in the private network spaces (192.168.1.0/24 and 192.168.50.0/24) to reach hosts on the internet. You will use an interface IP address on the firewall as the source for outbound NAT.

You will also create a static NAT address on the firewall that represents one of the application servers in the Extranet. When traffic reaches the static NAT address the firewall will translate and forward packets to the web server in the Extranet zone.

After you have all these components in place, you will generate test traffic and examine firewall logs.

Lab Objectives

- Configure source NAT
- Configure destination NAT

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

If you need more detailed guidance for the objectives, use the Detailed-Lab Steps section.

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-07.xml`** to the Firewall

Create a Source NAT Policy Rule

- Use the Information in the tables below to create a new Destination NAT Rule.

General tab

Parameter	Value
Name	`Inside_Nets_to_Internet`
NAT Type	**ipv4**
Description	`Translates traffic from Users_Net and Extranet to 203.0.113.20 outbound to Internet`

Original Packet tab

Parameter	Value
Source Zone	**Users_Net** **Extranet**
Destination Zone	**Internet**
Destination Interface	**ethernet1/1**
Service	**any**
Source Address	**Any**
Destination Address	**Any**

Translated Packet tab (**Source Address Translation** section)

Parameter	Value
Translation Type	**Dynamic IP And Port**
Address Type	**Interface Address**
Interface	**ethernet1/1**
IP Address	**203.0.113.20/24**

Commit the configuration

- Commit the changes before proceeding

Verify Internet Connectivity

- From the Terminal window on the client desktop, ping 8.8.8.8

You should now receive a reply

- Use the testing browser to connect to **`www.paloaltonetworks.com`**
- Browse to several other websites to verify that you can establish connectivity to the Internet security zone
- Examine the firewall **Traffic Log** to verify that there is allowed traffic that matches the Security Policy rule **Users_to_Internet**

Create a Destination NAT Policy

Use the information in the tables below to create a Destination NAT address on the firewall using an IP address on the Users_Net network. The firewall will translate traffic that hits this address to the destination IP address of the web server in the Extranet Zone.

General tab

Parameter	Value
Name	**`Dest_NAT_To_Webserver`**
NAT Type	**ipv4**

Original Packet tab

Parameter	Value
Source Zone	**Users_Net**
Destination Zone	**Users_Net**
Destination Interface	**ethernet1/2**
Service	**any**
Destination Address	**`192.168.1.80`**

Translated Packet tab (Destination Address Translation section)

Parameter	Value
Destination Address Translation Translation Type	**Static IP**
Translated Address	**`192.168.50.80`**

Commit the configuration

- Commit the changes before proceeding

Test the Destination NAT Rule

- Use the testing browser and connect to **`http://192.168.1.80 to`** verify access to the web page for the Extranet server
- Search the **Traffic Log** to locate entries with a **Destination IP** of **`192.168.1.80`**
- In the **Security Policy** window, use the **Log Viewer** option for the **Users_to_Extranet** to jump to entries in the Traffic Log that match the rule

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, you will load a preconfigured firewall configuration file.

1. In the firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down arrow next to the **Name** field and select **edu-210-11.1a-07.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

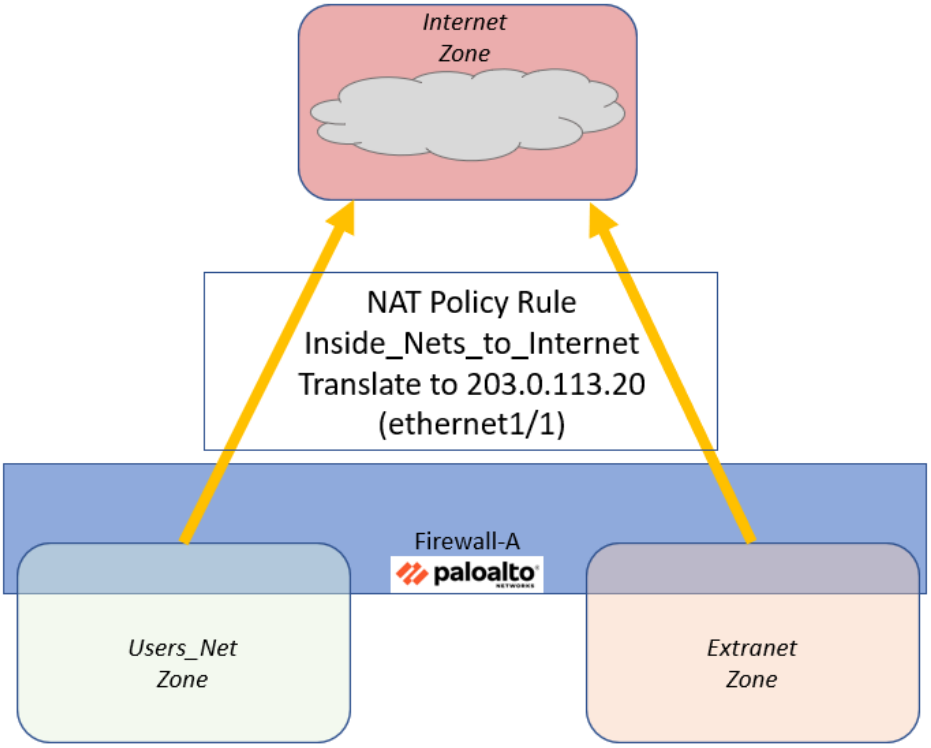
4. Click **OK** to close the **Load Named configuration** window.
5. Click **Close** to close the **Loading configuration** window.
6. Click the **Commit** button at the upper right of the web interface.
7. Leave the remaining settings unchanged and click **Commit**.
8. Wait until the **Commit** process is complete.
9. Click **Close** to continue.

Create a Source NAT Policy Rule

You must create entries in the firewall's NAT Policy table in order to translate traffic from internal hosts (often on private networks) to a public, routable address (often an interface on the firewall itself). NAT rules provide address translation and are different from Security Policy rules, which allow and deny packets. You can configure a NAT Policy rule to match a packet's source and destination zone, destination interface, source and destination address, and service.

In your previous ping test to an Internet host, the ping traffic from your client is allowed by the Security Policy rule, but the packets leave the firewall with a non-routable source IP address from the private network of 192.168.1.0/24.

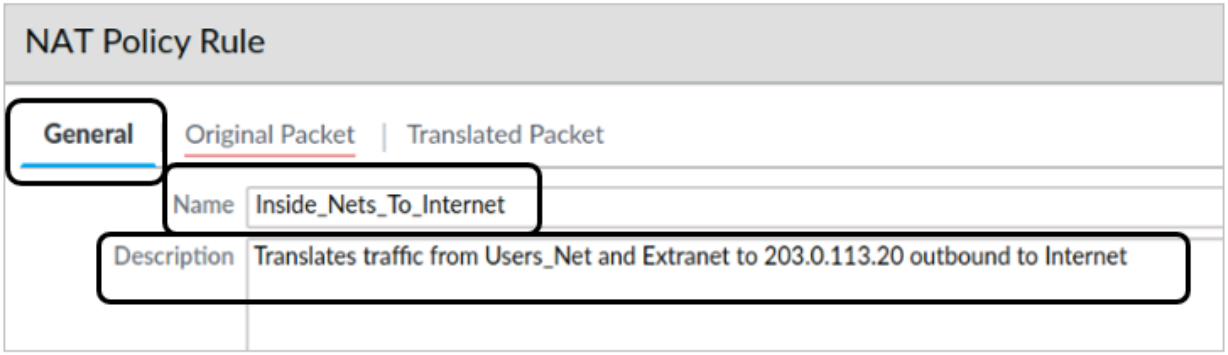
In this section, you will create a NAT Policy rule to translate traffic from the private networks in the Users_Net and Extranet security zones to a routable address. You will use the same interface IP address on the firewall (203.0.113.20) as the source IP for outbound traffic from both Users_Net and Extranet hosts.



10. In the web interface, select **Policies** > **NAT**.
11. Click **Add** to define a new source NAT Policy.

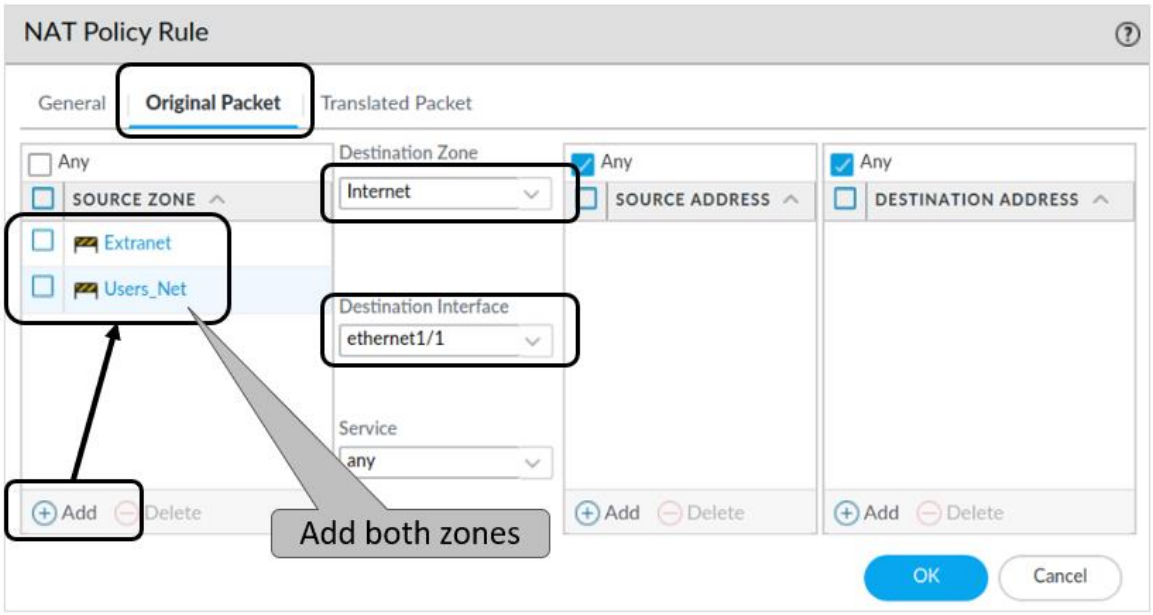
    The **NAT Policy Rule** configuration window should open.
12. Configure the following:

Parameter	Value
Name	`Inside_Nets_to_Internet`
NAT Type	Verify that **ipv4** is selected
Description	`Translates traffic from Users_Net and Extranet to 203.0.113.20 outbound to Internet`



13. Click the **Original Packet** tab and configure the following:

Parameter	Value
Source Zone	Click **Add** and select the **Users_Net** zone Click **Add** and select the **Extranet** zone
Destination Zone	Select **Internet** from the drop-down list
Destination Interface	Select **ethernet1/1** from the drop-down list
Service	Verify that the **any** is selected
Source Address	Verify that the **Any** check box is selected
Destination Address	Verify that the **Any** check box is selected

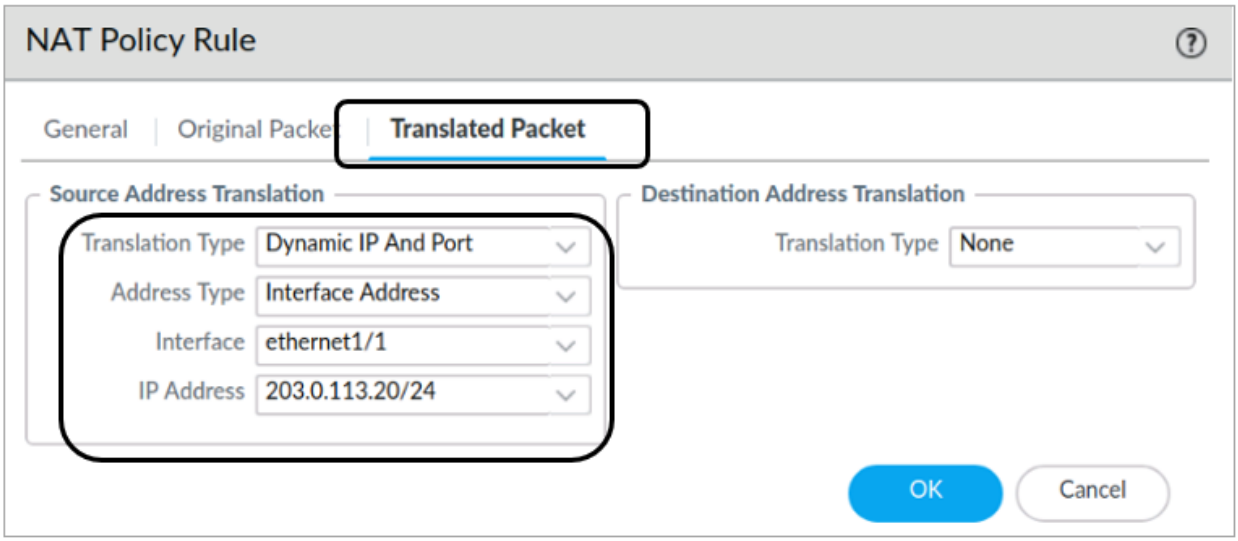


This section defines what the packet will look like when it reaches the firewall. Note that we are using a single NAT rule to translate both source zones to the same interface on the firewall. You could accomplish this same task by creating two separate rules – one for each source zone – and using the same external firewall interface.

14. Click the **Translated Packet** tab and configure the following under the section for **Source Address Translation**:

Parameter	Value
Translation Type	Select **Dynamic IP And Port** from the drop-down list

Parameter	Value
Address Type	Select **Interface Address** from the drop-down list
Interface	Select **ethernet1/1** from the drop-down list
IP Address	Select **203.0.113.20/24** from the drop-down list. (Make sure that you **select** the interface IP address from the drop-down list and ***do not type it***.)



This section defines how the firewall will translate the packet.

Note: You are configuring *only* the **Source Address Translation** part of this window. Leave the destination address translation **Translation Type** set to **None**.

15. Click **OK** to close the **NAT Policy Rule** configuration window.
16. Verify that your configuration matches the following:

	Original Packet				Translated Packet	
NAME	SOURCE ZONE	DESTINATION ZONE	SOURCE ADDRESS	DESTINATION ADDRESS	SOURCE TRANSLATION	DESTINATION TRANSLATION
Inside_Nets_To_Internet	Extranet Users_Net	Internet	any	any	dynamic-ip-and-port ethernet1/1 203.0.113.20/24	none

Note that some columns have been hidden in the image.

Commit the configuration

17. Click the **Commit** button at the upper right of the web interface.
18. Leave the settings unchanged and click **Commit**.

19. Wait until the **Commit** process is complete.
20. Click **Close** to continue.

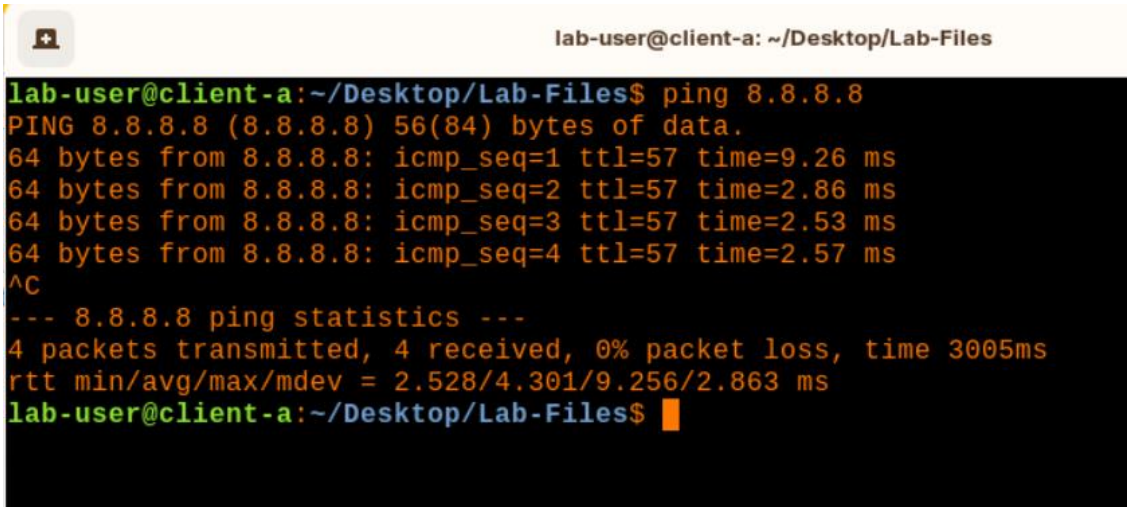
Verify Internet Connectivity

In this section, you will test the configuration of your NAT and Security policies.

21. From the Terminal window on the client desktop, ping an address on the internet by issuing the following command:

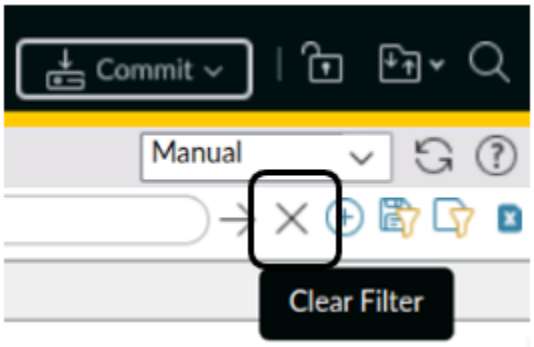
```
lab-user@client-a:~/Desktop/Lab-Files$ ping 8.8.8.8 <Enter>
```

You should now receive a reply:



22. After several seconds, use **Ctrl+C** to stop the ping.
23. Open the testing browser and connect to **`www.paloaltonetworks.com`**.
24. Browse to several other websites to verify that you can establish connectivity to the Internet security zone.
25. Close the testing browser.
26. In the configuration browser, examine the firewall Traffic log by selecting **Monitor > Logs > Traffic**.

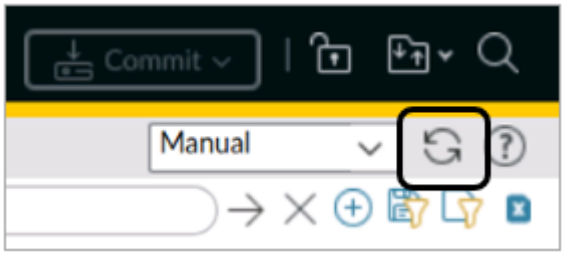
27. Clear any filters you have in place by clicking the **Clear Filter** button in the upper right corner of the window.



28. Verify that there is allowed traffic that matches the Security Policy rule **Users_to_Internet**:

RECEIVE TIME	FROM ZONE	TO ZONE	SOURCE	DESTINATION	TO PORT	APPLICATION	ACTION	RULE
03/03 18:36:29	Users_Net	Internet	192.168.1.254	8.8.8.8	53	dns	allow	Users_to_Internet
03/03 18:36:19	Users_Net	Extranet	192.168.1.25	192.168.50.53	53	dns	allow	Users_to_Extranet
03/03 18:36:19	Users_Net	Extranet	192.168.1.25	192.168.50.53	53	dns	allow	Users_to_Extranet
03/03 18:36:19	Users_Net	Internet	192.168.1.254	8.8.8.8	53	dns	allow	Users_to_Internet

Traffic log entries should be present based on the internet test. A minute or two may elapse for the log files to be updated. If the entries are not present, click the **refresh** icon:

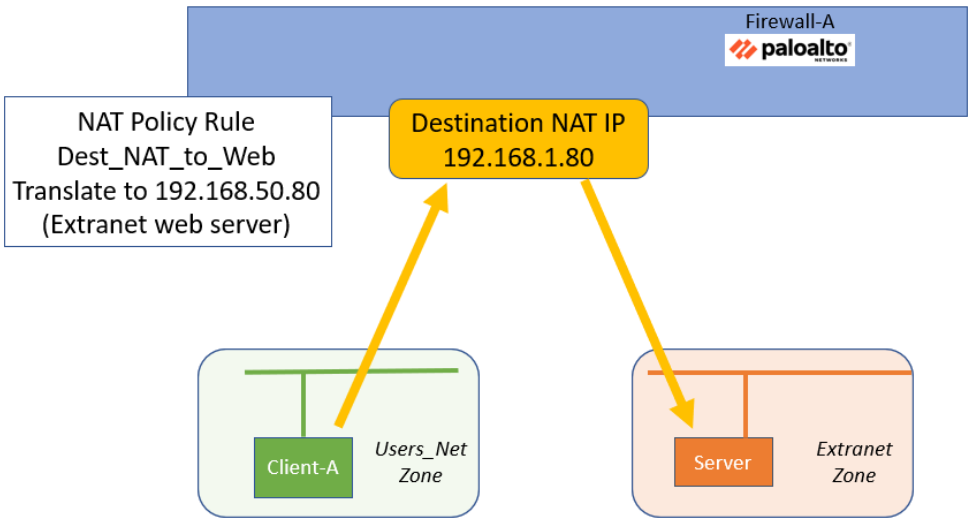


Create a Destination NAT Policy

In this section, you will create a NAT address on the firewall using an IP address on the Users_Net network. The firewall will translate traffic that hits this address to the destination IP address of the web server in the Extranet Zone.

You will connect from the client host (192.168.1.20) to the NAT IP address on the firewall (192.168.1.80). The firewall will translate this connection to the DMZ server at 192.168.50.10.

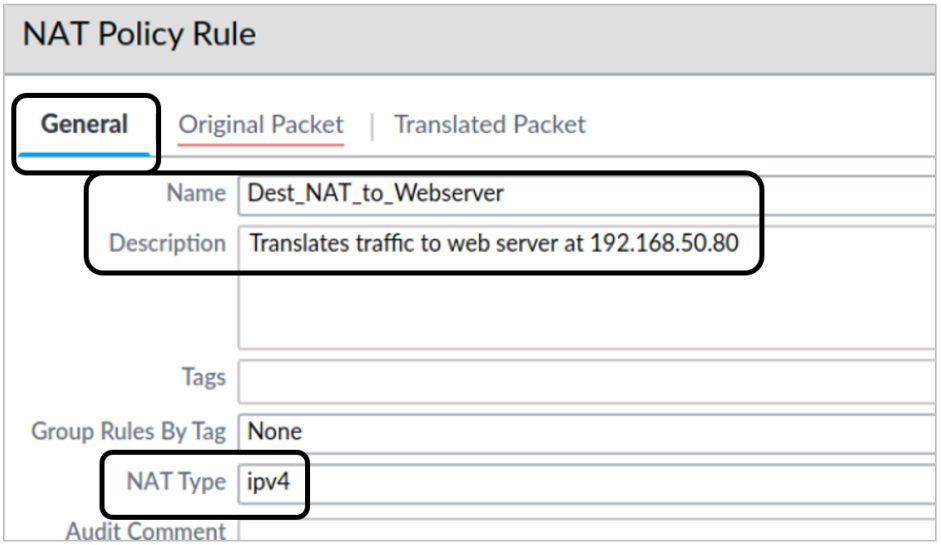
This exercise will help you see how to configure Destination NAT rules.



29. In the web interface, select **Policies > NAT**.
30. Click **Add** to define a new destination NAT Policy rule.

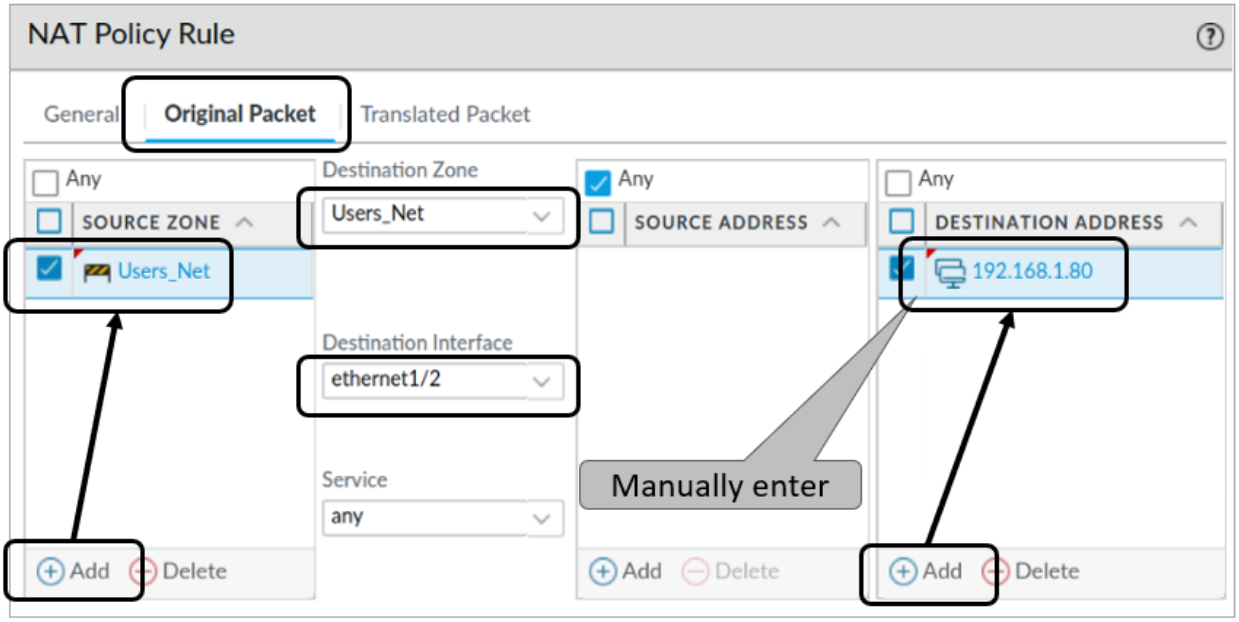
    The **NAT Policy Rule** configuration window should open.
31. Configure the following:

Parameter	Value
Name	`Dest_NAT_To_Webserver`
Description	`Translates traffic to web server at 192.168.50.80`
NAT Type	Verify that **ipv4** is selected



32. Click the **Original Packet** tab and configure the following:

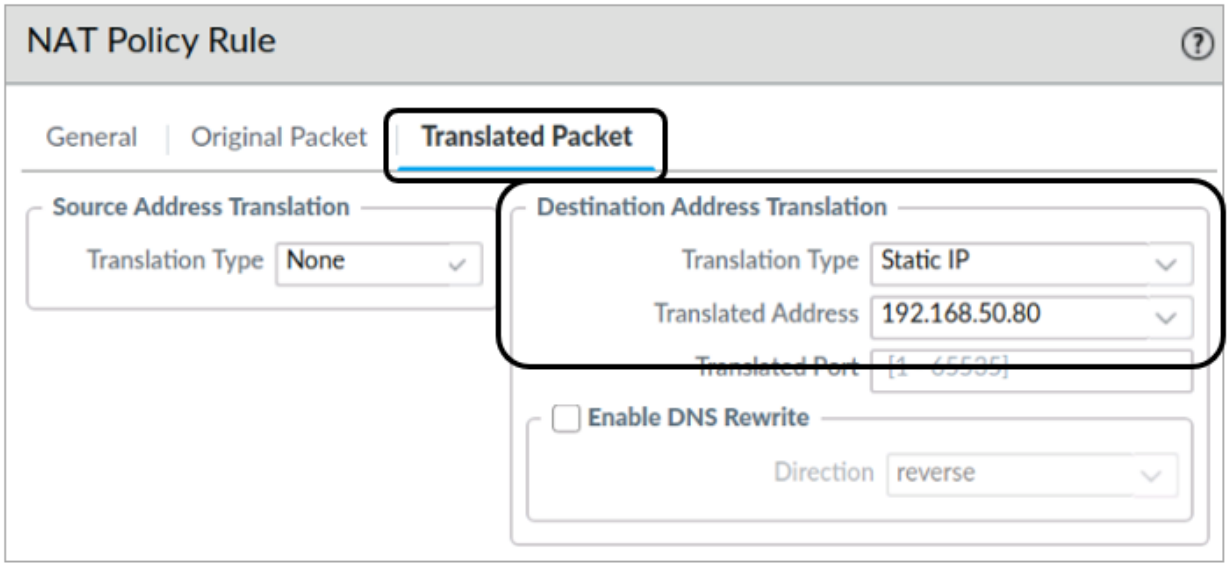
Parameter	Value
Source Zone	Click **Add** and select **Users_Net**
Destination Zone	Select **Users_Net** from the drop-down list
Destination Interface	Select **ethernet1/2** from the drop-down list
Service	Select **any** from the drop-down list
Destination Address	Click **Add** and manually enter **`192.168.1.80`**



The **Original Packet** tab defines how the packet will look when it reaches the firewall. When selecting the Destination Zone, remember that the IP address we are using (192.168.1.80) is one that resides on the firewall in the Users_Net security zone.

33. Click the **Translated Packet** tab and configure the following:

Parameter	Value
Destination Address Translation Translation Type	Select **Static IP** from the drop-down list
Translated Address	**`Type 192.168.50.80`** (address of the Extranet web server)



The **Translated Packet** tab defines how the firewall will translate a matching packet. Leave the **Source Address Translation** section set to **None** because we are performing only destination translation in this exercise.

34. Click **OK** to close the **NAT Policy Rule** configuration window.
    A new NAT Policy rule should display in the web interface.
35. Verify that your configuration matches the following:

		Original Packet				Translated Packet	
	NAME	SOURCE ZONE	DESTINATION ZONE	SOURCE ADDRESS	DESTINATION ADDRESS	SOURCE TRANSLATION	DESTINATION TRANSLATION
1	Inside_Nets_to_Internet	Extranet Users_Net	Internet	any	any	dynamic-ip-and-port ethernet1/1 203.0.113.20/24	none
2	Dest_NAT_To_Webserver	Users_Net	Users_Net	any	192.168.1.80	none	destination-translation address: 192.168.50.80

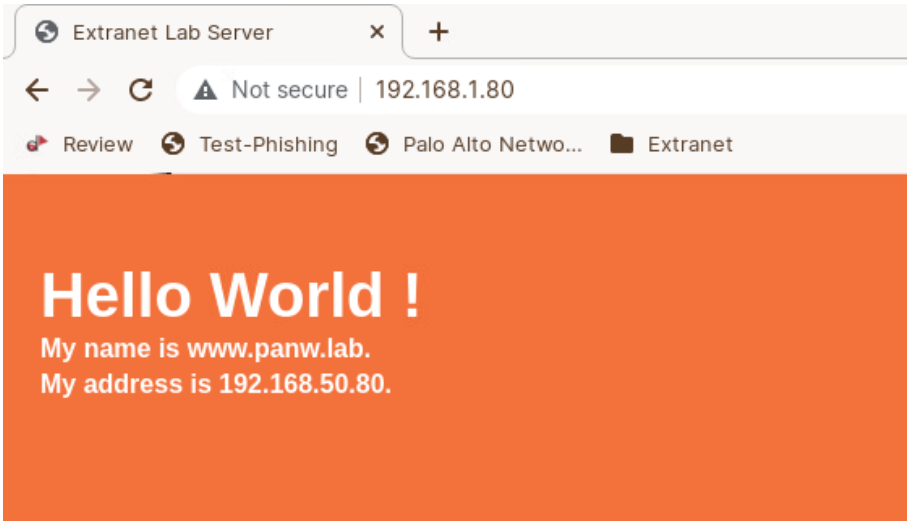
Commit the configuration

36. Click the **Commit** button at the upper right of the web interface.
37. Leave the settings unchanged and click **Commit**.
38. Wait until the **Commit** process is complete.
39. Click **Close** to continue.

Test the Destination NAT Rule

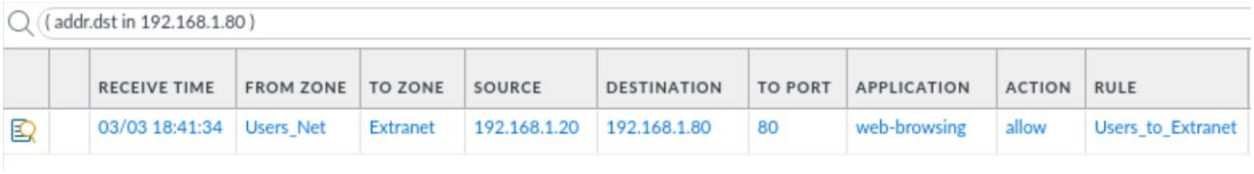
In this section you will test the destination NAT Policy rule by opening a browser connection to the NAT IP address 192.168.1.80.

40. Open the testing browser and connect to **http://192.168.1.80.**
41. Verify that you can view the web page for the Extranet server:



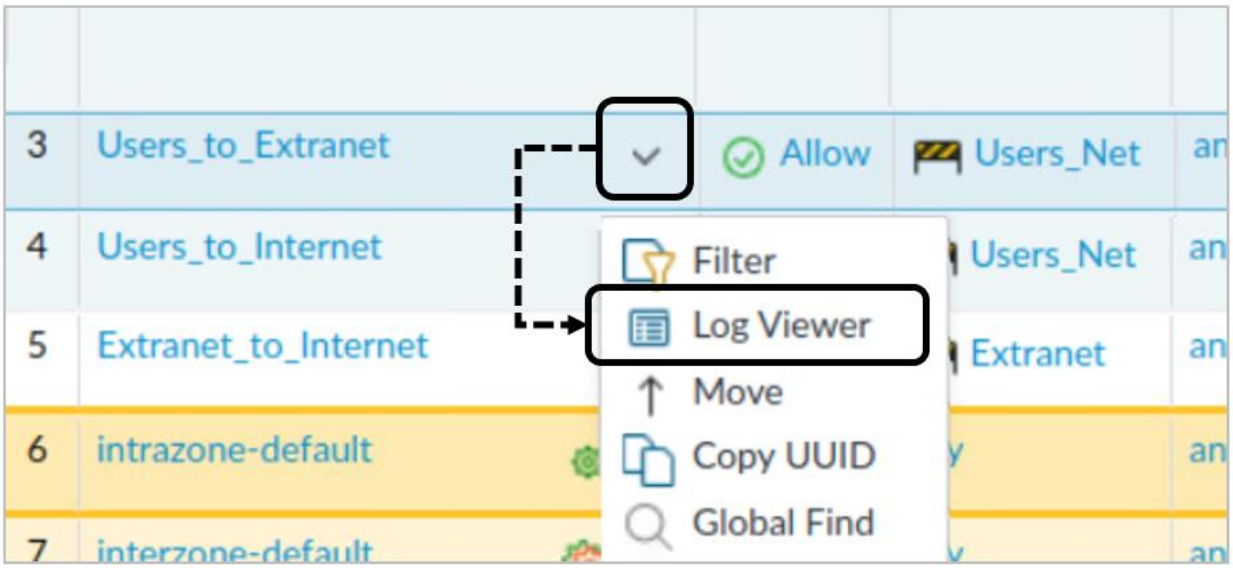
42. Close the testing browser window.
43. In the web interface, select **Monitor > Logs > Traffic**.
44. Use a filter to locate the entry for Destination IP 192.168.1.80:

```
( addr.dst in 192.168.1.80 )
```

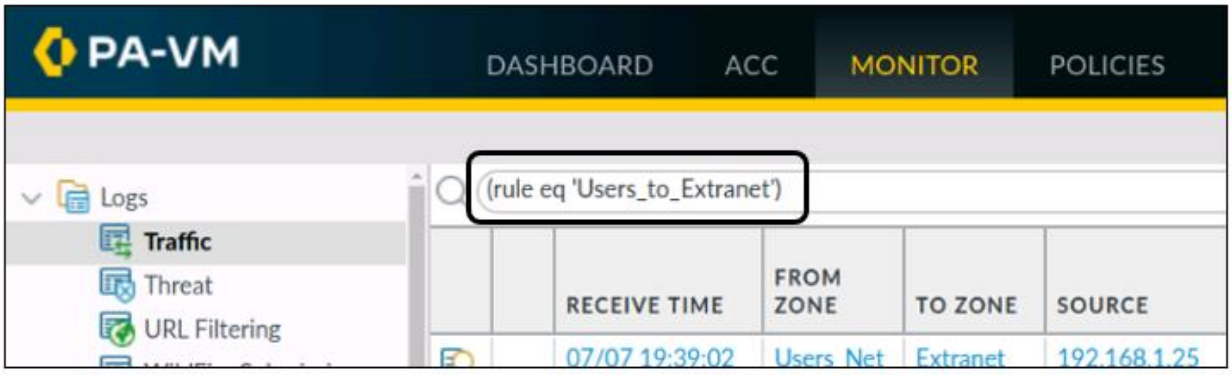


45. Note the Security Policy rule that was matched: **Users_to_Extranet**.
46. As an alternate method to access the Traffic log in the web interface, select **Policies > Security**.

47. Select the drop-down icon next to the rule entry for **Users_to_Extranet** and choose **Log Viewer**:



This process opens the Traffic log and applies a filter automatically to display only those entries that match the Security Policy rule "Users_to_Extranet."



48. Click the **X** icon to clear the filter from the log filter text box.

Stop. This is the end of the lab.

Lab 8: Controlling Application Usage with App-ID

The old firewalls in your network only allowed you to block or allow traffic using Layer 3 and Layer 4 characteristics. With the deployment of the new Palo Alto Networks firewall, your control over traffic now includes which applications are allowed or blocked into and out of your network.

The list of applications that Palo Alto Networks maintains is long, but you already know some of the applications that you must allow from and to your security zones. You will create an Application Group and include individual applications that the Palo Alto Networks devices use. You will then use this Application Group as part of a Security Policy rule. This process will give you practice in creating Security Policy rules that take advantage of applications instead of simply Layer 3 and Layer 4 traffic characteristics.

Lab Objectives

- Load a baseline configuration
- Generate application traffic
- Configure an application group
- Configure a Security Policy to allow update traffic
- Test the Allow-PANW-Apps Security Policy rule
- Identify shadowed rules
- Modify the Security Policy to function properly
- Test the modified Security Policy rule

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-08.xml`** to the Firewall.

Configure an Application Group

- Use the information below to create an Application Group

Parameter	Value
Name	`paloalto-apps`
Applications	`paloalto-dns-security`

Parameter	Value

	`paloalto-updates`
	`paloalto-wildfire-cloud`
	`pan-db-cloud`

Configure a Security Policy Rule to Allow Update Traffic

- Use the information below to create a Security Policy rule to allow Palo Alto Networks update traffic.

Parameter	Value
Name	`Allow-PANW-Apps`
Description	`Allows PANW apps for firewall`
Source Zone	`Users_Net`
Source Address	`192.168.1.254`
Destination Zone	`Internet`
Destination Address	`Any`
Applications	`paloalto-apps`
Service	`application-default`
URL Category	`Any`
Action	`Allow`
Log At Session End	`Enabled`

Commit the configuration

- Commit the changes before proceeding

Test the Allow-PANW-Apps Security Policy Rule

- On the firewall, use the **Check Now** option for Dynamic Updates to test the Security Policy rule – **Allow-PANW-Apps**.
- Create and apply a filter to search for log entries that contain the application **`paloalto-updates`**
- Note which rule allowed the application traffic to pass through the firewall
- Determine why the firewall traffic did not hit the **Allow-PANW-Apps** rule

Identify Shadowed Rules

- Use the **Tasks Manager – All Tasks** window to locate the most recent entry for **`Commit`** under **Type**
- Use the information in the **Rule Shadow** tab to determine why firewall traffic did not hit the **Allow-PANW-Apps** rule

Modify the Security Policy to Function Properly

- Use the information below to update the **Users_to_Internet** Security Policy rule to allow only specific applications (instead of any).

Parameter	Value
Applications	**dns** **ping** **ssl** **web-browsing**

Commit the configuration

- Commit the changes before proceeding and verify that you do not get any commit warnings about **Rule Shadowing**

Test the Modified Security Policy Rule

- On the firewall, use the **Check Now** option for Dynamic Updates to test the Security Policy rule – **Allow-PANW-Apps**.
- Create and apply a filter to search for log entries that contain the application **`paloalto-updates`**
- Note which rule allowed the application traffic to pass through the firewall

Generate Application Traffic

- Generate application traffic by double-clicking on the icon for **App Generator** on the Client-A desktop
- Allow the script to complete
- Examine the **Traffic Log** and note the entries under the **Application** column for the Client-A host
- Use the information in the columns for **Application**, **Action** and **Rule** to answer the following questions.
    - Are there any applications that you should not allow from the Users_Net zone to the Extranet zone?

- Are there any applications being denied from the Users_Net zone that you should allow?

Research Applications

- Use the Application database on the firewall to research one of the three applications below:
  - dailymotion
  - yammer-base
  - scribd-base
- Answer the following questions about the application you have chosen to research:
  - What category does the application fall into?
  - What risk level has Palo Alto Networks assigned to the application?
  - What are some of the characteristics of this application that might make you want to block its use on your network?
  - Should you allow this application on your company's production network?

Update Security Policy Rules

- Edit the **Users_to_Extranet** Security Policy rule and allow only the following applications:
  - **`web-browsing`**
  - **`ssl`**
  - **`ssh`**
  - **`ping`**
  - **`dns`**
  - **`ldap`**
  - **`radius`**
- Edit the **Users_to_Internet** Security Policy rule and allow only the following applications and their dependencies.
  - **`dns`**
  - **`ping`**
  - **`ssl`**
  - **`web-browsing`**
  - **`yelp`**
  - **`dropbox`**

- `ms-office365`

Commit the configuration

- Commit the changes before proceeding

Test the Updated Security Policy Rules

- Run the Traffic Generator script again on the Client-A desktop (**App Generator**)
- Create and apply a filter in the **Traffic** log to display sessions that the firewall has blocked
- Note the applications that are now being blocked.

Enable the Application Block Page

- To see the kind of behavior a user will experience without the **Application Block Page** enabled, open the testing browser and attempt to connect to **http://www.shutterfly.com**.
- Note how the browser responds.
- Enable the **Application Block Page** under **Device > Response Pages**.

Commit the configuration

- Commit the changes before proceeding

Test the Application Block Page

- To see the kind of behavior a user will experience with the **Application Block Page** enabled, open the testing browser and attempt to connect to **http://www.shutterfly.com**.
- Note how the browser responds.

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, load a preconfigured firewall configuration file.

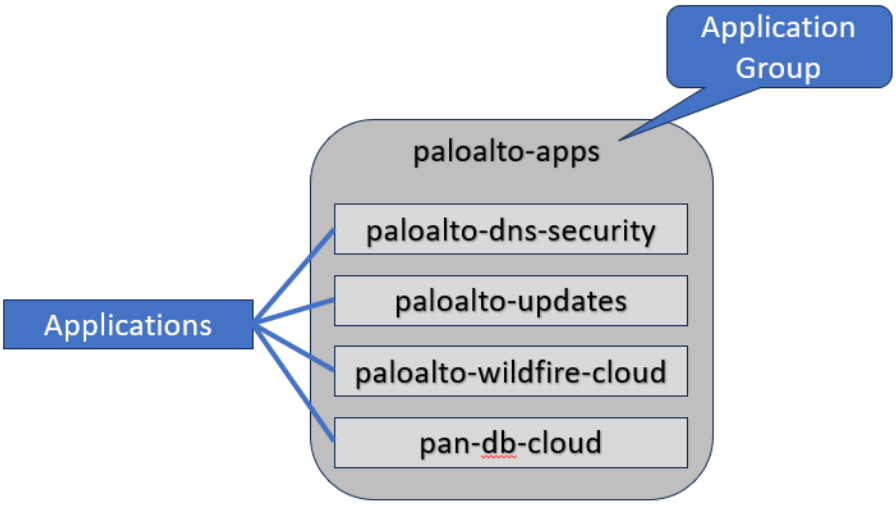
1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down list next to the **Name** text box and select **edu-210-11.1a-08.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK**.
5. A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.
9. Click **Close** to continue.

Configure an Application Group

In this section, you will configure an application group called **`paloalto-apps`** that includes some Palo Alto Networks applications. The firewall uses these applications to label and control access to the content update network and other Palo Alto Networks products and features. You will add the application group to a Security Policy rule later in this lab exercise.

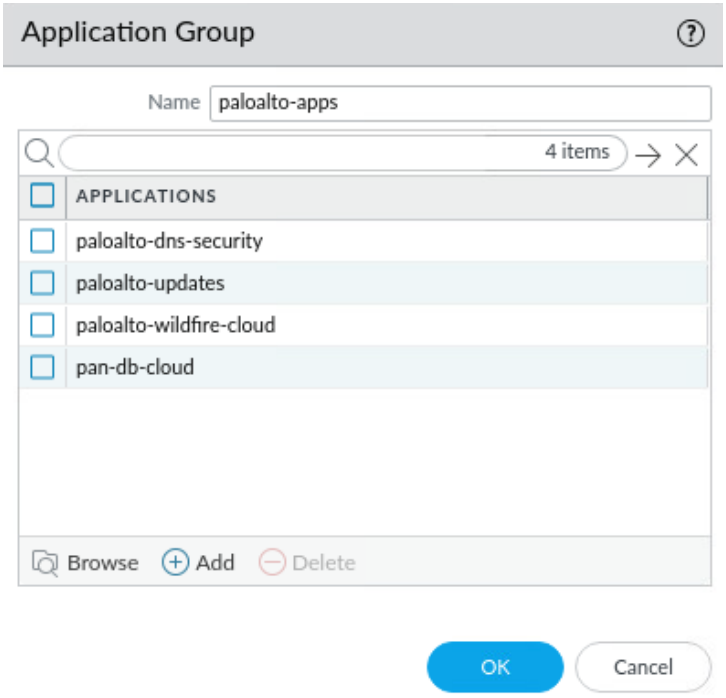


10. In the web interface, select **Objects > Application Groups**.

11. Click **Add** and configure the following:

Parameter	Value
Name	`paloalto-apps`

Applications	`paloalto-dns-security`
	`paloalto-updates`
	`paloalto-wildfire-cloud`
	`pan-db-cloud`



Note that we are only adding a few of the Palo Alto Networks entries to this group as an example of how to create an Application Group. The list you are building here is not necessarily inclusive of all Palo Alto Networks applications that you might need to allow in a production environment.

You can also use the **Browse** button in the Application Group window to add these entries.

12. Click **OK** to close the **Application Group** window.

Configure a Security Policy Rule to Allow Firewall Update Traffic

In this section, you will create a specific Security Policy rule to allow the firewall to use Palo Alto Networks applications, including content updates.

13. Select **Policies** > **Security**.
14. Click **Add** to create a new Security Policy rule.
15. On the **General** tab, type **`Allow-PANW-Apps`** as the **Name**.
16. For **Description**, enter **`Allows PANW apps for firewall`**.
17. Click the **Source** tab and configure the following:

	Parameter	Value
	Source Zone	**`Users_Net`**
	Source Address	**`192.168.1.254`**

Note that 192.168.1.254 is the IP address of the management interface on the firewall.

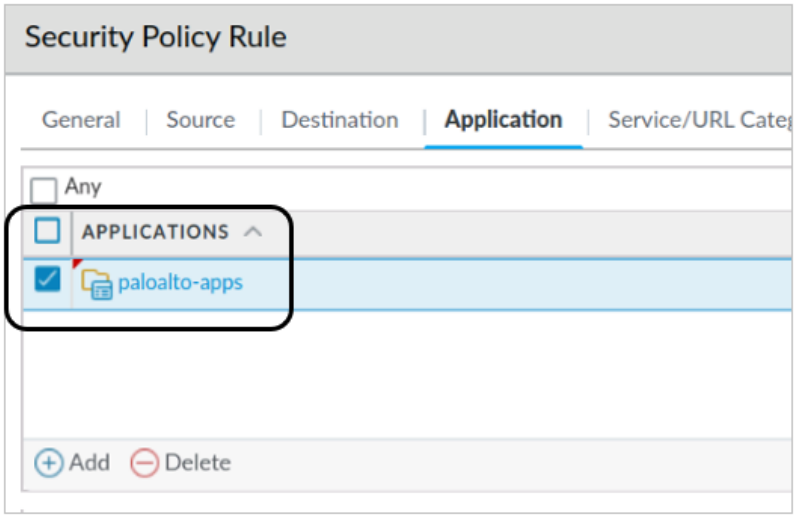
18. Click the **Destination** tab and configure the following:

Parameter	Value
Destination Zone	**`Internet`**
Destination Address	**`Any`**

19. Click the **Application** tab and configure the following:

Parameter	Value
Applications	**`paloalto-apps`**

To locate your **`paloalto-apps`** Application Group, start typing in the first few letters of the group name, and the interface will display only those entries that match. Application Groups appear at the very end of the Application list.



20. Click the **Service/URL Category** tab and verify that **application-default** and **Any** are selected.
21. Click the **Actions** tab and verify the following:

Parameter	Value
Action	`Allow`
Log Setting	`Log at Session End`

22. Click **OK** to close the **Security Policy Rule** window.

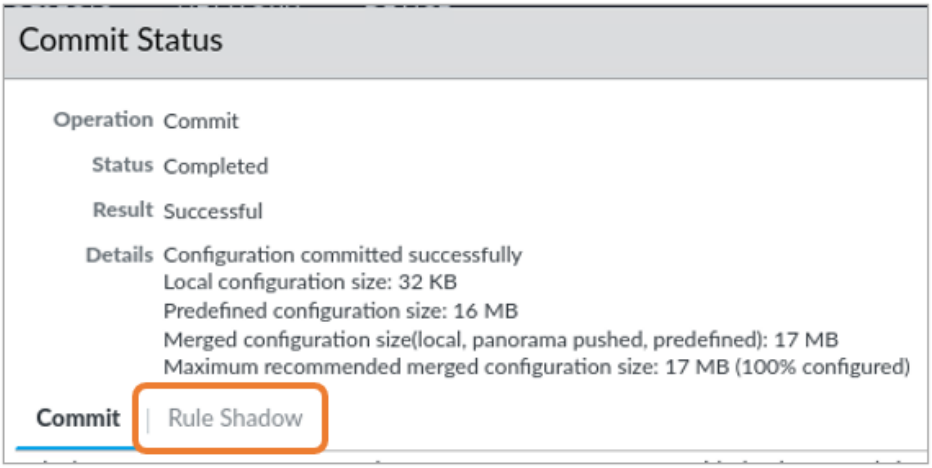
The "Allow-PANW-Apps" rule should be listed just above the "intrazone-default" rule in the Security Policy rule list.

	NAME	ACTION	Source ZONE	Destination ZONE	APPLICATION	URL CATEGORY	PROFILE
1	Block-Known-Bad-IPs	Deny	Extranet Users_Net	Internet	any	any	none
2	migrated-ftp-rule-port-based	Allow	Users_Net	Extranet	any	any	none
3	Users_to_Extranet	Allow	Users_Net	Extranet	any	any	none
4	Users_to_Internet	Allow	Users_Net	Internet	any	any	
5	Extranet_to_Internet	Allow	Extranet	Internet	any	any	none
6	Allow-PANW-Apps	Allow	Users_Net	Internet	paloalto-apps	any	none
7	intrazone-default	Allow	any	(intrazone)	any	any	none
8	interzone-default	Deny	any	any	any	any	none

Some of the columns in the Security Policy table shown here have been hidden or rearranged.

Commit the configuration

23. Click the **Commit** button at the upper right of the web interface.
24. Leave the settings unchanged and click **Commit**.
25. Wait until the **Commit** process is complete.
26. When the commit process completes, notice that there is an additional tab available for **Rule Shadow**.



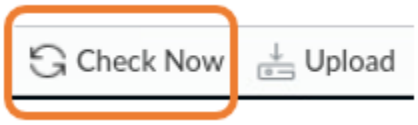
This tab only appears when you have a rule that shadows other rules. You will fix the rule shadow issue in a later section of the lab.

27. Close the **Commit** window.

Test the Allow-PANW-Apps Security Policy Rule

In this section, you will test the new Security Policy rule for **Allow-PANW-Apps** to see how it is working.

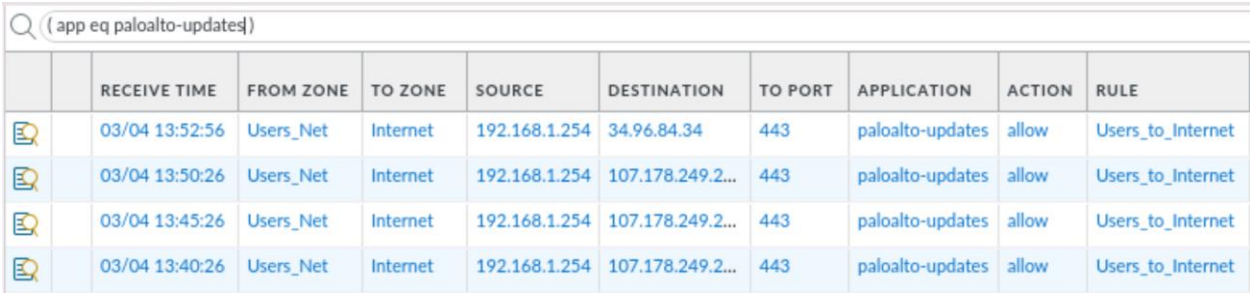
28. In the web interface, select **Device > Software**.
29. Click **Check Now**:



This action instructs the firewall to check for new versions of the PAN-OS software. The application used for this task by the firewall is called paloalto-updates and is one that you included in the Application Group called paloalto-apps.

30. Select **Monitor > Logs > Traffic**.
31. Clear any filters you have in place.
32. Create and apply a filter to search for log entries that contain the application paloalto-updates:

```
( app eq paloalto-updates )
```



Leave this filter in place for later testing in this lab.

33. Which rule allowed the application traffic to pass through the firewall?

    It should be the **Users_to_Internet** rule.

34. Why did the firewall traffic not use the Allow-PANW-Apps rule?

    Because the **Users_to_Internet** rule 'shadows' the **Allow-PANW-Apps** rule. Traffic matched the **Users_to_Internet** rule and the firewall carried out the allow action. There is no reason for the

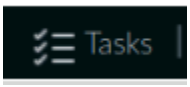
firewall to continue comparing packet characteristics to any following rules after it has found a match. Remember: Rule order is important!

Identify Shadowed Rules

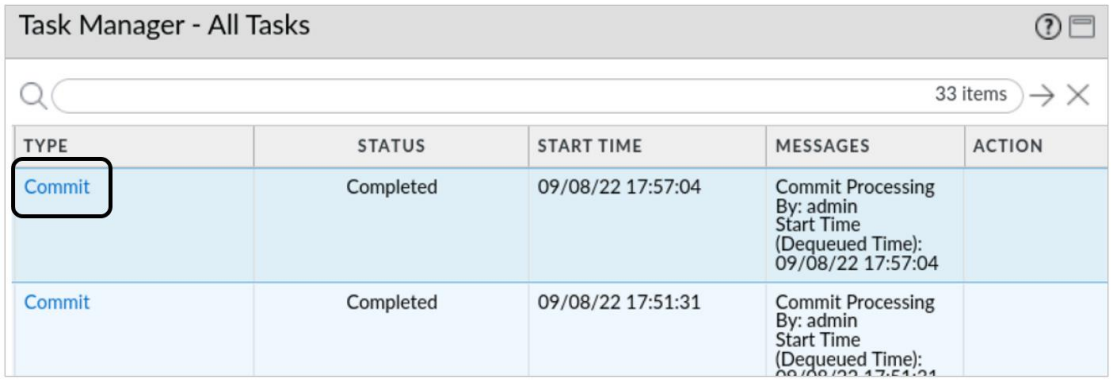
The firewall provides notification when you have a rule shadowing one or more other rules. The **Rule Shadow** tab appears at the end of the Commit process.

However, you might not always notice the **Rule Shadow** tab, so in this section, you will use the **Task** list to examine your earlier Commit messages.

35. In the bottom right corner of the web browser, click the **Tasks** button.



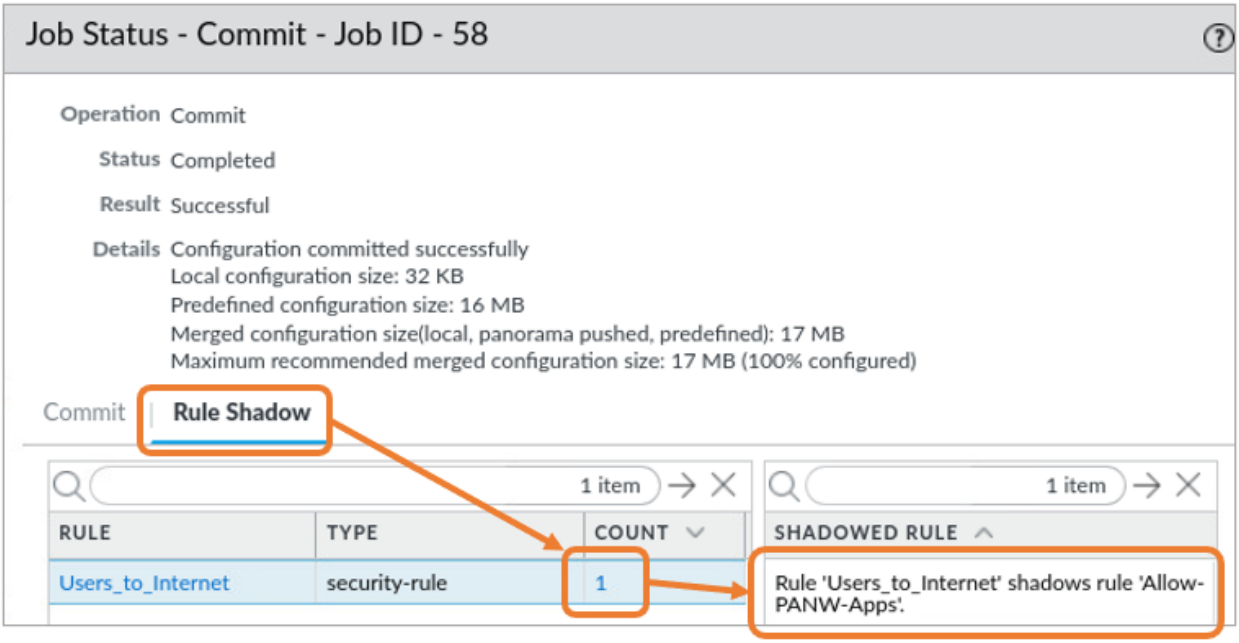
36. In the **Tasks Manager – All Tasks** window, scroll down to locate the most recent entry for **`Commit`** under **Type**.
37. Click the link for **Commit**.



38. Select the **Rule Shadow** tab.

    The interface shows you which rule is shadowing other rules.

39. Click the number under **Count** (in this example, the value is 1).



The value under the **Count** column indicates the number of rules that are shadowed. The **Shadowed Rule** column shows you details about which rule is shadowed.

You can use this detailed information to modify your Security Policy rule order to make certain traffic hits rules in the correct manner.

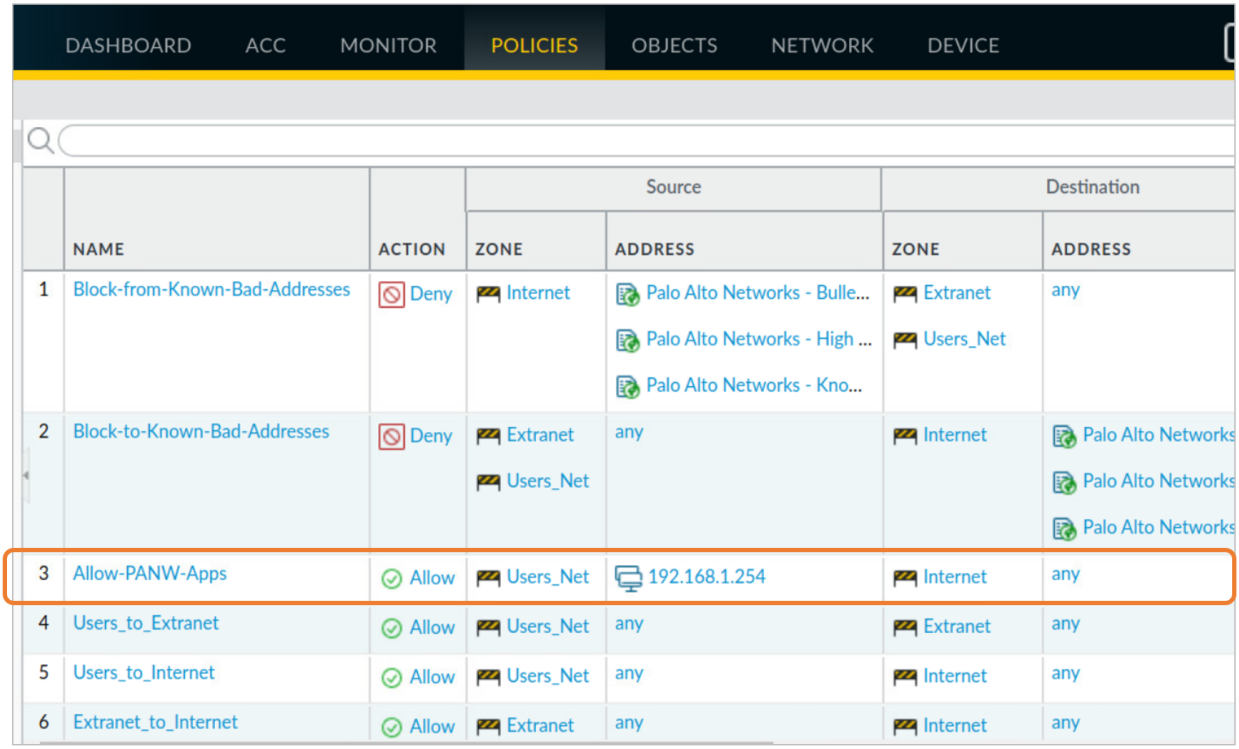
40. Close the **Job Status Commit** window.
41. Close the **Task Manager – All Tasks** window.

Modify the Security Policy to Function Properly

In this section, you will modify your Security Policy to ensure that firewall update traffic hits the **Allow-PANW-Apps** rule.

42. In the web interface, select **Policies** > **Security**.
43. Highlight the entry for **Allow-PANW-Apps** but do not open it.
44. Move the entry to the third row of the Policy – just below the two Block rules for known bad IP addresses.

You may drag and drop the **Allow-PANW-Apps** entry to the correct location, or you can use the **Move** button at the bottom to place the rule in the right spot.



	NAME	ACTION	Source ZONE	Source ADDRESS	Destination ZONE	Destination ADDRESS
1	Block-from-Known-Bad-Addresses	Deny	Internet	Palo Alto Networks - Bulle... Palo Alto Networks - High ... Palo Alto Networks - Kno...	Extranet Users_Net	any
2	Block-to-Known-Bad-Addresses	Deny	Extranet Users_Net	any	Internet	Palo Alto Networks Palo Alto Networks Palo Alto Networks
3	Allow-PANW-Apps	Allow	Users_Net	192.168.1.254	Internet	any
4	Users_to_Extranet	Allow	Users_Net	any	Extranet	any
5	Users_to_Internet	Allow	Users_Net	any	Internet	any
6	Extranet_to_Internet	Allow	Extranet	any	Internet	any

Note that several columns have been hidden or rearranged in the example shown here.

Commit the configuration

45. Click the **Commit** button at the upper right of the web interface.
46. Leave the settings unchanged and click **Commit**.
47. Wait until the **Commit** process is complete.
48. Did you get any commit warnings on a **Rule Shadow** tab about one rule shadowing another rule?

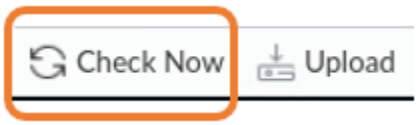
    You should not receive any commit warnings.

49. Click **Close**.

Test the Modified Security Policy

In this section, you will test the modified Security Policy to verify that it is working as expected. You want to verify that Dynamic Update traffic from the firewall uses the **Allow-PANW-Apps** rule and not the **Users_to_Internet** rule.

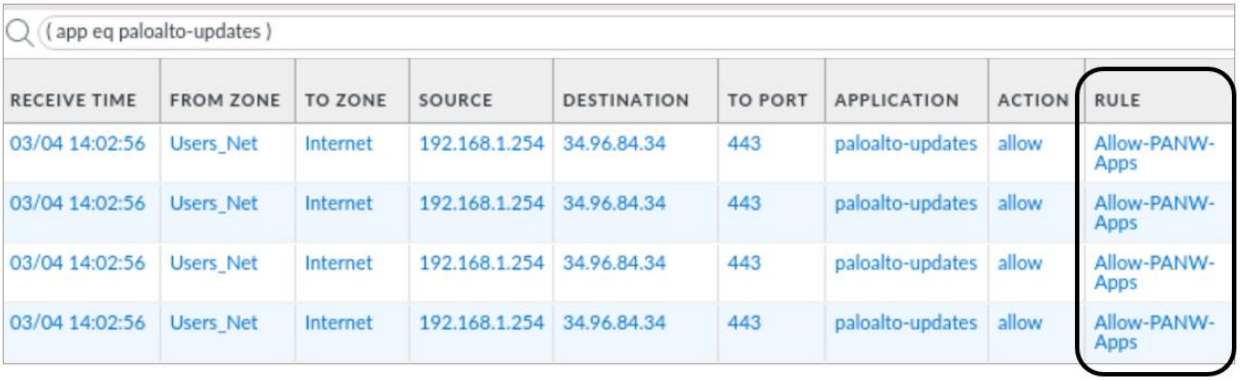
50. In the web interface, select **Device > Software**.
51. Click **Check Now**:



52. Select **Monitor > Logs > Traffic**.
53. If your filter is still in place, click the **Apply Filter** button, or create a filter to search for update traffic:

    `( app eq paloalto-updates )`
54. Look for the log entries for the application paloalto-updates. Which rule allowed the application traffic to pass through the firewall?

    It should be the “Allow-PANW-Apps” rule.



RECEIVE TIME	FROM ZONE	TO ZONE	SOURCE	DESTINATION	TO PORT	APPLICATION	ACTION	RULE
03/04 14:02:56	Users_Net	Internet	192.168.1.254	34.96.84.34	443	paloalto-updates	allow	Allow-PANW-Apps
03/04 14:02:56	Users_Net	Internet	192.168.1.254	34.96.84.34	443	paloalto-updates	allow	Allow-PANW-Apps
03/04 14:02:56	Users_Net	Internet	192.168.1.254	34.96.84.34	443	paloalto-updates	allow	Allow-PANW-Apps
03/04 14:02:56	Users_Net	Internet	192.168.1.254	34.96.84.34	443	paloalto-updates	allow	Allow-PANW-Apps

Generate Application Traffic

In this section, you will run a short script that generates application traffic from your client workstation to hosts in the Internet and Extranet security zones.

55. On the client desktop, generate application traffic by double-clicking the icon for **App Generator**:

56. Press **`ENTER`** in the opened window to start the script.
57. Allow the script to complete and then press **`ENTER`** to close the window.
58. Examine the Traffic log by selecting **Monitor > Logs > Traffic**.
59. Clear any filters you may have in place.
60. Create and apply a filter to display sessions from your client workstation (192.168.1.20) that do not include the application dns:

`( addr.src in 192.168.1.20 ) and ( app neq dns )`

Excluding the dns application from the display will make it easier for you to see other applications in use on the network.

61. Note the information under the **Application**, **Action** and **Rule** columns.

You should see entries for a variety of applications. Some of the entries will be recognizable and others will be for applications you may never have heard of.

62. Use the information in the columns for **Application**, **Action** and **Rule** to answer the following questions. You can also use filters to help you find the answers from the Traffic log.

(addr.src in 192.168.1.20) and (app neq dns)

RECEIVE TIME	FROM ZONE	TO ZONE	SOURCE	DESTINATION	TO PORT	APPLICATION	ACTION	RULE
03/08 17:24:20	Users_Net	Internet	192.168.1.20	151.101.0.116	443	yelp-base	allow	Users_to_Internet
03/08 17:24:12	Users_Net	Internet	192.168.1.20	23.221.22.170	443	gotomeeting	allow	Users_to_Internet
03/08 17:24:07	Users_Net	Extranet	192.168.1.20	192.168.50.80	80	web-browsing	allow	Users_to_Extranet
03/08 17:24:04	Users_Net	Internet	192.168.1.20	13.107.6.159	443	yammer-base	allow	Users_to_Internet
03/08 17:24:04	Users_Net	Internet	192.168.1.20	23.216.68.169	443	webex-base	allow	Users_to_Internet
03/08 17:24:04	Users_Net	Internet	192.168.1.20	203.205.251.1...	443	wechat-base	allow	Users_to_Internet
03/08 17:24:03	Users_Net	Extranet	192.168.1.20	192.168.50.150	0	ping	allow	Users_to_Extranet
03/08 17:24:03	Users_Net	Internet	192.168.1.20	184.84.66.128	443	viber-base	allow	Users_to_Internet
03/08 17:24:03	Users_Net	Internet	192.168.1.20	216.239.36.21	443	ssl	allow	Users_to_Internet
03/08 17:24:02	Users_Net	Internet	192.168.1.20	104.244.42.193	443	twitter-base	allow	Users_to_Internet
03/08 17:24:02	Users_Net	Internet	192.168.1.20	18.195.149.18	443	teamdrive-base	allow	Users_to_Internet

- Are there any applications that you should not allow from the Users_Net zone to the Extranet zone?

  There is no right or wrong answer to this question.

  Whether the list of allowed applications is 'correct' or not depends on your environment and the applications and services running on the destination servers.

  FTP is an insecure application, and you might be tempted to deny it. However, your organization may have an old process in place that relies on FTP to transfer files. Denying FTP would break that process, so be careful.

  You can use the output of the Traffic log to identify the kinds of applications in use in your network. You can then research the applications in question to make an informed decision about them. You can also use the source and destination information to find out more about why an application is in use.

- Are there any applications being denied from the Users_Net zone that you should allow?

Another trick question!

The answer depends on your organization and the applications that are necessary for employees to do their jobs. Although you may not think it appropriate to use social media applications during work, organizations like sales and marketing often use those types of applications to drive awareness and branding. Your company may rely on Dropbox as the sanctioned cloud storage application, so should you be concerned that someone is using boxnet? Or sharefile? What is dailymotion and who uses it?

You cannot answer these kinds of questions intelligently without additional information. Fortunately, Palo Alto Networks provides that kind of information within the firewall itself.

Research Applications

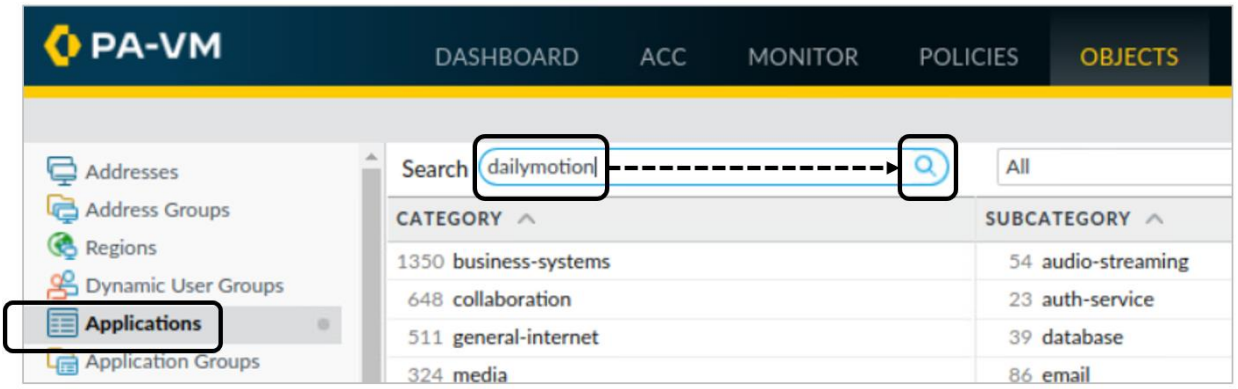
Now that you have access to detailed information about the applications in use in the network, you can use tools available from Palo Alto Networks to help answer the questions at the end of the last section. In this section, you will locate one application and find out more information about it so you can make an informed decision about whether to allow it onto your network or not.

63. In the **Traffic** log, locate the entry for one of the three applications listed below:

- **`dailymotion`**
- **`yammer-base`**
- **`scribd-base`**

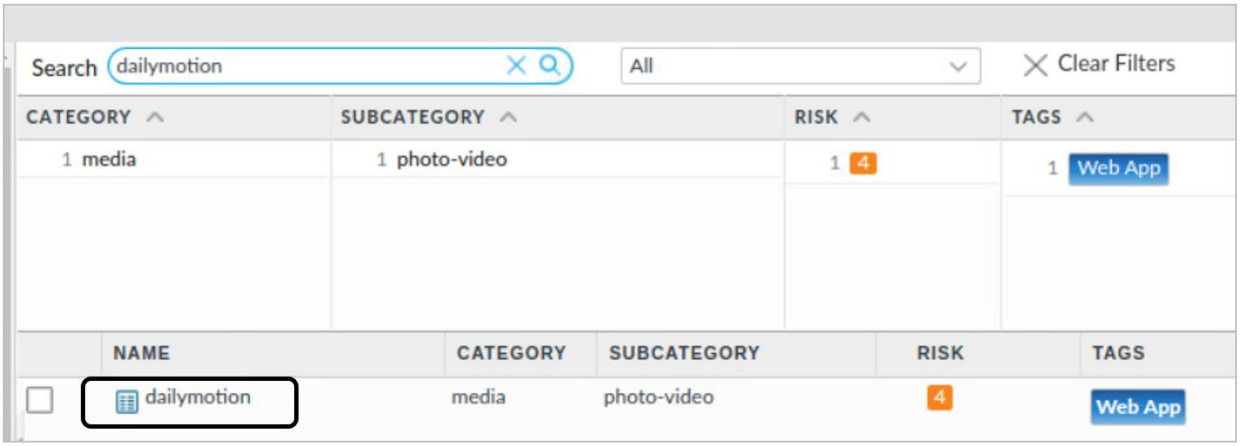
Note that you can use the navigation buttons at the bottom of the window, or you can create and apply a filter to locate the application entries.

64. Use the **Applications** database to find details about the application you have chosen to research.
65. Select **Objects** > **Applications**.
66. In the **Search** field, enter the name of the application as it appears in the Traffic log.
67. Click the magnifying glass icon to search.



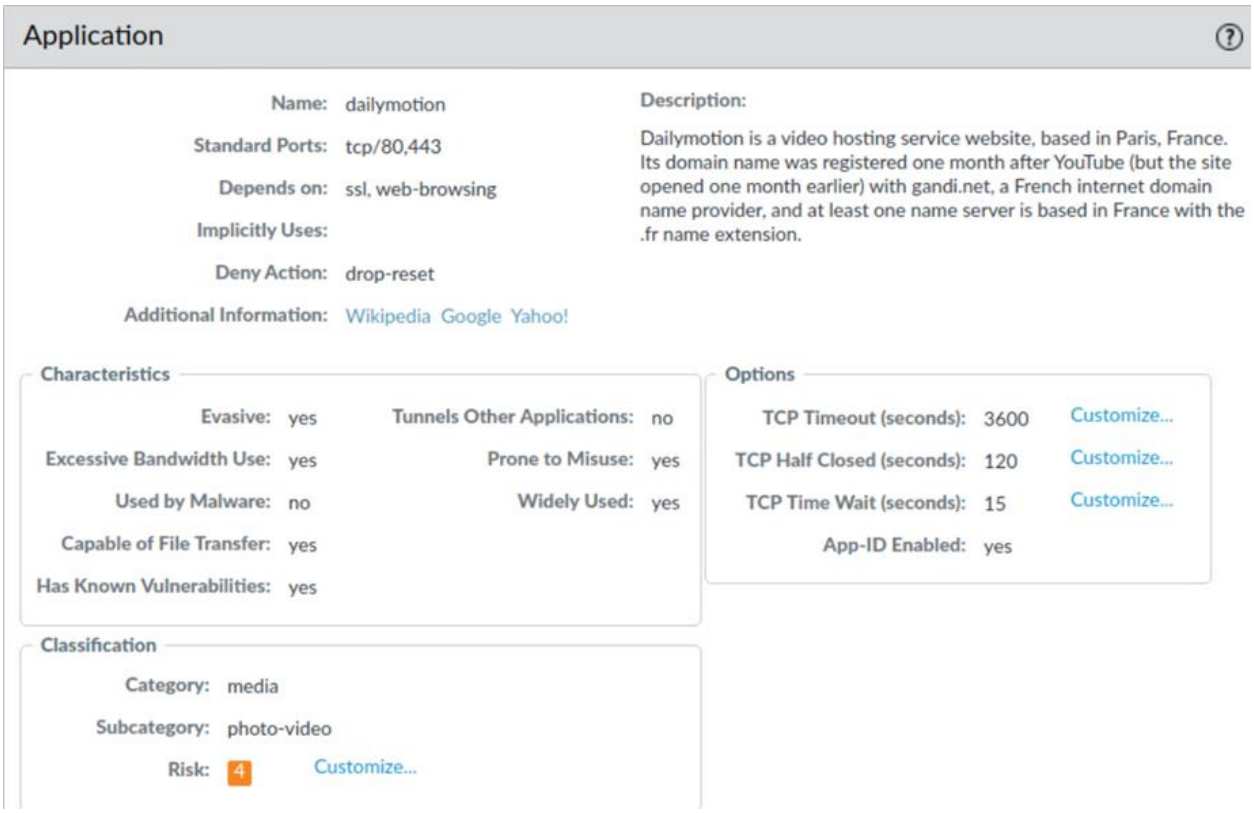
The previous example shows searching for the **dailymotion** application.

68. The **Applications** database will display all entries that match the Search.
69. Click directly on the entry for application below the **Name** column.



The previous example shows selecting the **dailymotion** entry.

70. The **Applications** database entry will display detailed information about the application:



71. Answer the following questions about the application you have chosen to research.

- What category does the application fall into?

  In the bottom left corner of the window under the Classification section, you can see the entry for Category.

- What risk level has Palo Alto Networks assigned to the application?

  The Risk level will be listed under the Classification section on a scale of 1 (Safe) to 5 (Very Risky).

- What are some of the characteristics of this application that might make you want to block its use on your network?

  Under the Characteristics section of the window you can see a list of traits for the application. A Yes answer for a characteristic increases the risk rating of that application.

- Should you allow this application on your company's production network?

  Note that this last question does not have a right or wrong answer. Whether you allow an application on your network depends on numerous factors. Even if the application presents some risk, your organization may need to use it ("I can't do my job without it!"), or there may be lots of employees that prefer the application over safer alternatives ("We've always used this application!"). Part of your job as a security professional is to identify network risks and to

mitigate them when possible. You can use the detailed information about applications on your network to advocate for safer alternatives when possible.

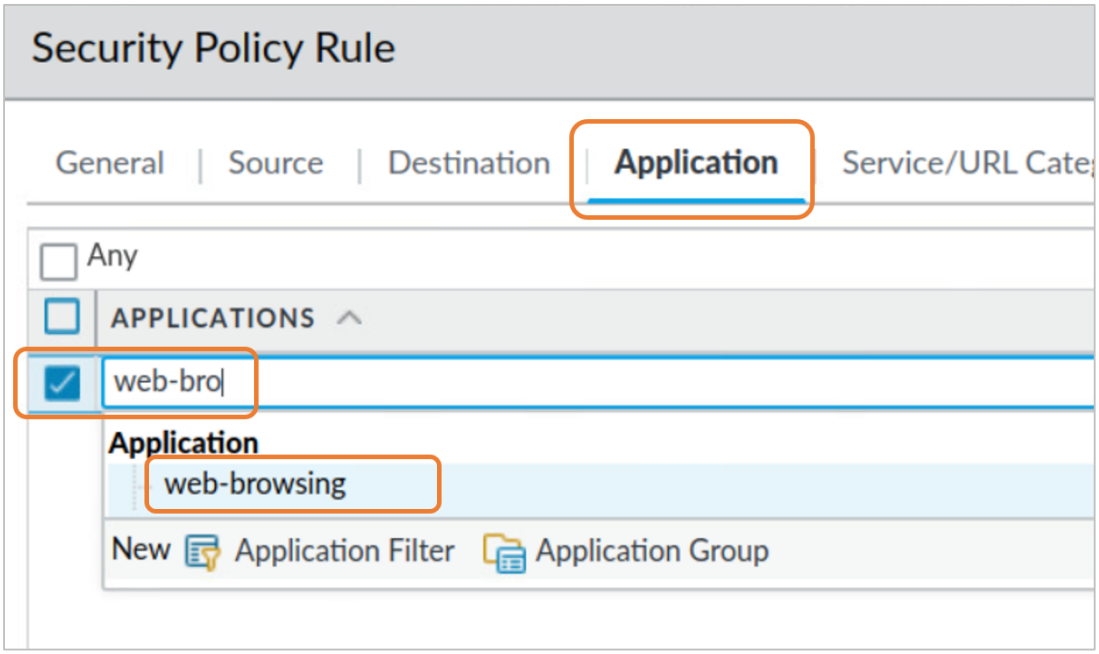
72. Click **Close** in the Application window.

Update Security Policy Rules

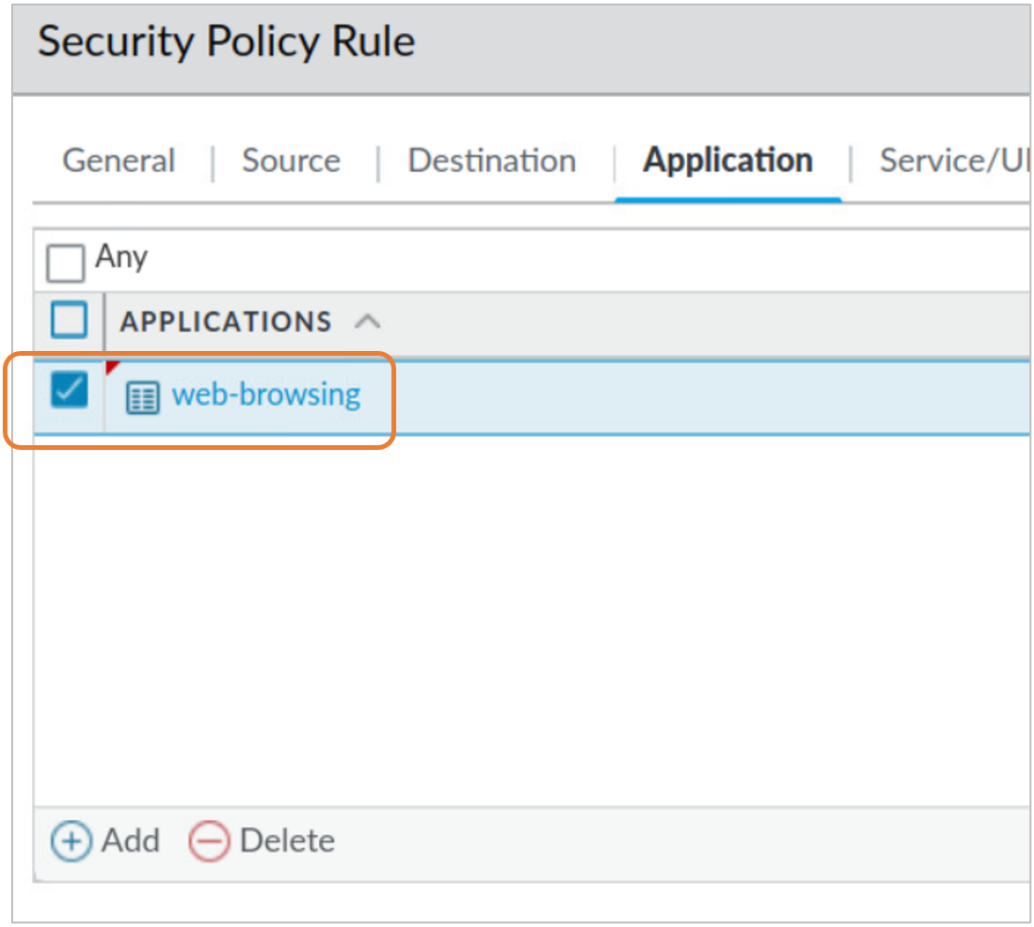
When you created the **Users_to_Extranet** and the **Users_to_Internet** Security Policy rules in an earlier lab, you set the **Application** to **Any**.

After your research, you can now update both rules to allow only applications that are necessary for your organization.

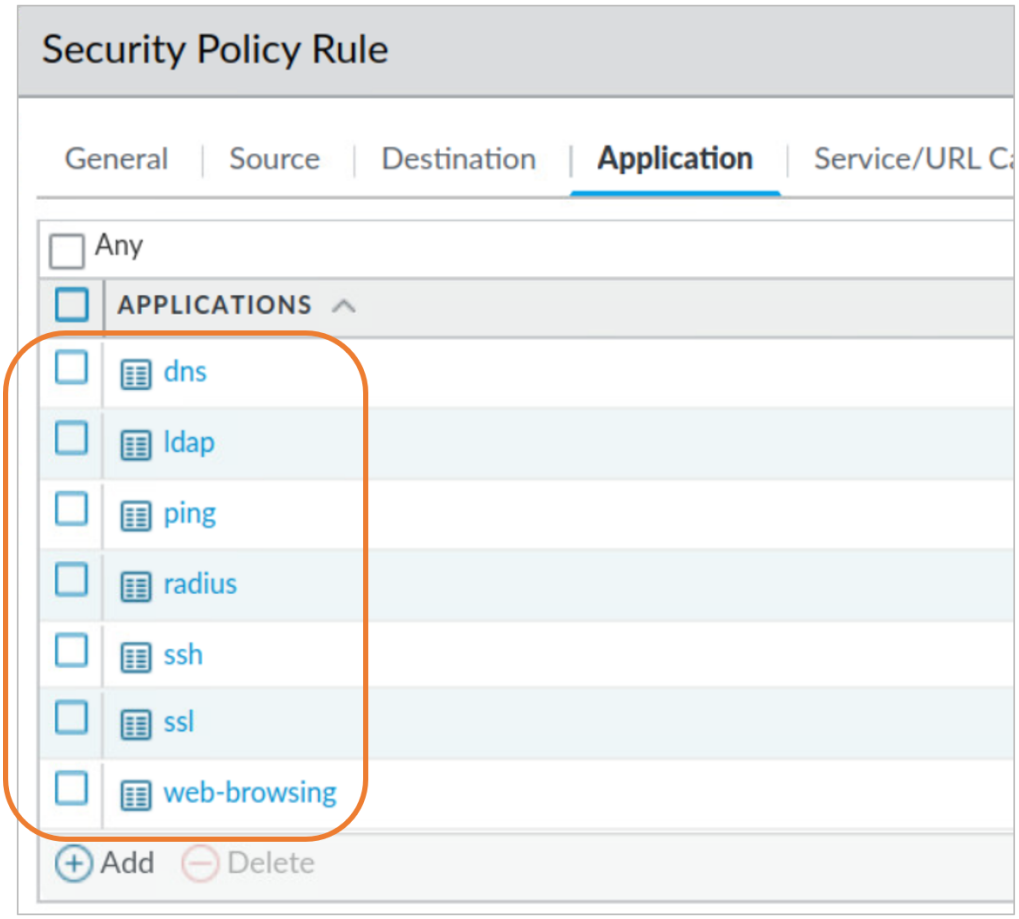
73. Navigate to **Policies** > **Security**.
74. Edit the entry for **`Users_to_Extranet`**.
75. Select the tab for **Application**.
76. **`Uncheck`** the option for **Any**.
77. Click **Add** under the **Applications** section.
78. Type in the first few letters of **`web-browsing`** and allow the list to update with the available selection.



79. Select the entry for **`web-browsing`** to add it to the list.



80. Click **Add** again.
81. Enter **`ssl`** and choose it from the list.
82. Repeat this process and add the following applications to this Security Policy rule:
    - **`ssh`**
    - **`ping`**
    - **`dns`**
    - **`ldap`**
    - **`radius`**
83. When complete, your list of applications should look like the following:



84. Click **OK** to close the Security Policy rule.
85. In the Security Policy table, click the entry for **`Users_to_Internet`** to edit it.
86. Select the tab for **Application**.
87. Uncheck the box for **Any**.
88. Add the following applications to this Security Policy rule:

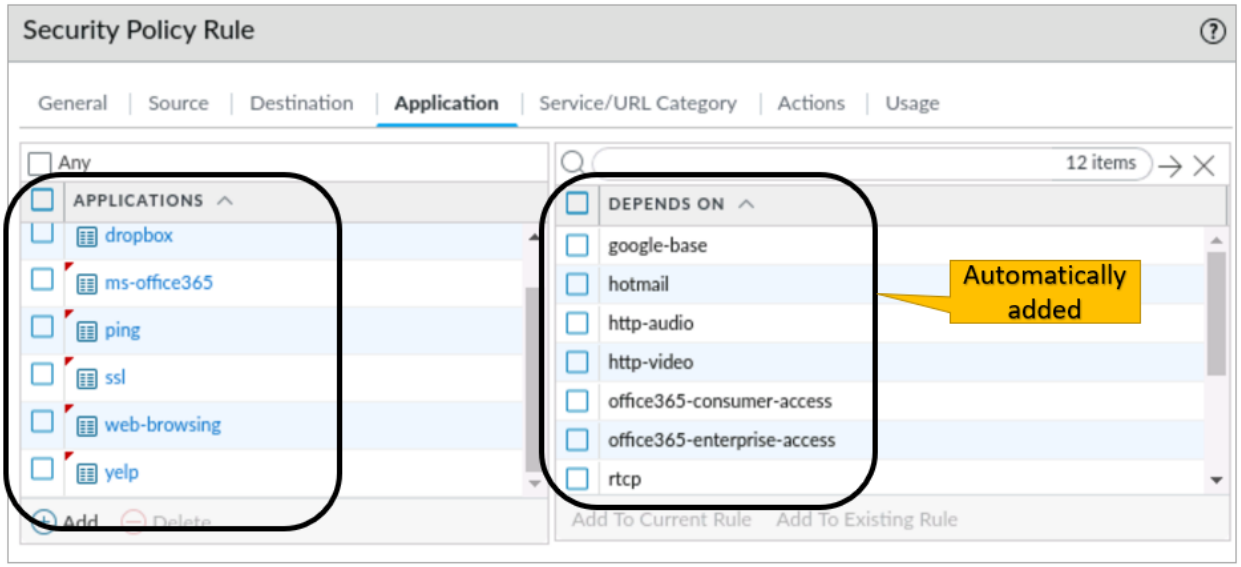
- **`dns`**
- **`ping`**
- **`ssl`**
- **`web-browsing`**
- **`yelp`**
- **`dropbox`**

Note – when you add the **dropbox** application, the web interface adds an entry to the **Depends On column** for the **google-base** application.

- **`ms-office365`**

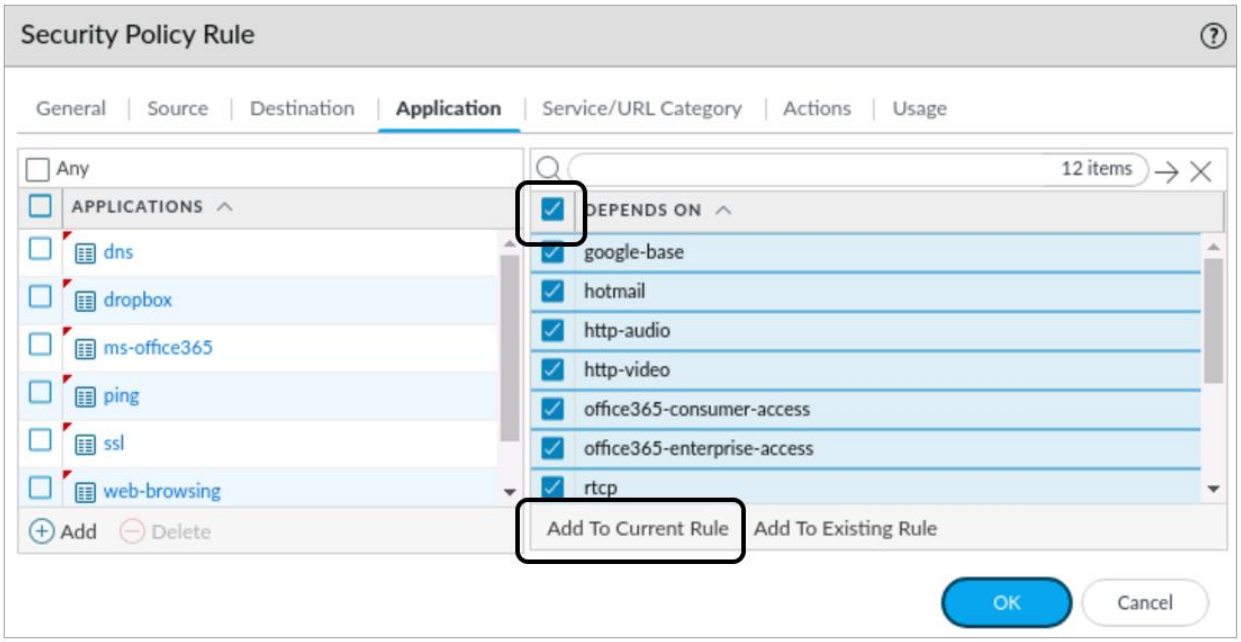
Note – when you add **ms-office365**, the web interface adds additional applications to the Depends On list.

89. When complete, the **Applications** list should have seven entries and the **Depends On** list should have multiple entries.



Note that the list of applications in the **Depends On** column may differ from the example shown here. Palo Alto Networks updates application definitions frequently, and in many cases an existing application will require additional applications to work correctly.

90. Place the check box next to **Depends On** to select all items in that column.
91. Click **Add to Current Rule**.



92. Scan through the list of **Applications** on the left side of the window and note that the dependent applications have been added.
93. Click **OK.**

Commit the configuration

94. Click the **Commit** button at the upper right of the web interface.
95. Leave the settings unchanged and click **Commit**.
96. Wait until the **Commit** process is complete.
97. Click **Close** to continue.

Test the Updated Security Policy Rules

Run the application script again and examine the results.

98. On the client desktop, generate application traffic by double-clicking the icon for **App Generator**:

99. Press **ENTER** in the opened window to start the script.
100. Allow the script to complete and then press **ENTER** to close the window.

Ignore any errors that the script generates – these occur because the firewall is blocking various application traffic types. The script may also pause at different points while applications time out because they are being blocked by the firewall.

101. When the script is complete, press **ENTER** to close the window.
102. Examine the Traffic log by selecting **Monitor** > **Logs** > **Traffic**.
103. Clear any filters you may have in place.
104. Create and apply a filter to display sessions that the firewall has blocked:

```
( action neq allow )
```

This filter will allow you to see the applications that have been blocked.

105. Note the entries under the **Application** column:

(action neq allow)

RECEIVE TIME	FROM ZONE	TO ZONE	SOURCE	DESTINATION	TO PORT	APPLICATION	ACTION	RULE	SESSION END REASON
09/08 18:34:31	Users_Net	Internet	192.168.1.20	13.107.6.159	443	yammer-base	reset-both	interzone-default	policy-deny
09/08 18:34:31	Users_Net	Internet	192.168.1.20	23.64.139.64	443	webex-base	deny	interzone-default	policy-deny
09/08 18:34:31	Users_Net	Internet	192.168.1.20	23.211.76.194	443	viber-base	deny	interzone-default	policy-deny
09/08 18:34:31	Users_Net	Internet	192.168.1.20	104.244.42.129	443	twitter-base	reset-both	interzone-default	policy-deny
09/08 18:34:31	Users_Net	Internet	192.168.1.20	18.195.149.18	443	teamdrive-base	reset-both	interzone-default	policy-deny
09/08 18:34:31	Users_Net	Internet	192.168.1.20	192.0.77.40	443	tumblr-base	reset-both	interzone-default	policy-deny

Many of the applications are now being blocked by the interzone-default rule. Remember that any application that is not explicitly allowed in a Security Policy rule will be blocked by the interzone-default rule.

The entries you see will differ from the example shown here.

106. Clear the filter in the Traffic log.

Enable the Application Block Page

When the firewall denies traffic to a web-based application, many users may assume that the Internet is down or slow or that there is something wrong with their browser settings.

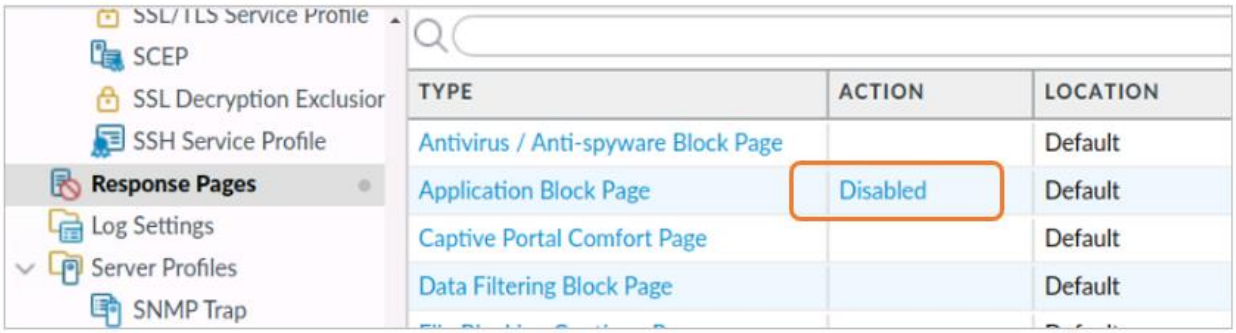
To reduce the number of potential calls to the help desk, you can enable the **Application Block Page** on the firewall. This setting presents a web page that informs users when the firewall has blocked a web-based application.

By default, the **Application Block Page** is not enabled.

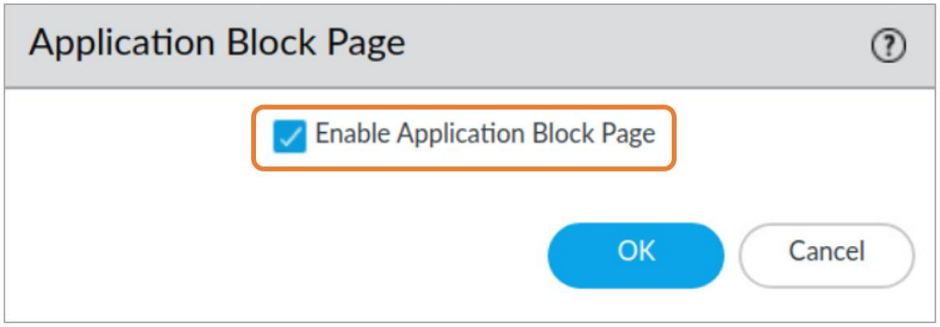
107. To see the kind of behavior a user will experience without the Application Block page enabled, open the testing browser.
108. Attempt to connect to **`http://www.shutterfly.com`**.

Note: Be sure to type in the URL as shown above – include **http** as the protocol for the request.

109. The browser will not be able to connect and will eventually time out (note that you do not have to wait until you receive the time out message before continuing to the next step).
110. Close the testing browser.
111. In the firewall web interface, select **Device > Response Pages**.
112. Under the **Action** column in the row for **Application Block Page**, click the link for **Disabled**.



113. Place a check in the box for **Enable Application Block Page**.



114. Click **OK**.

Commit the configuration

115. Click the **Commit** button at the upper right of the web interface.
116. Leave the settings unchanged and click **Commit**.
117. Wait until the **Commit** process is complete.

118. Click **Close** to continue.

Test the Application Block Page

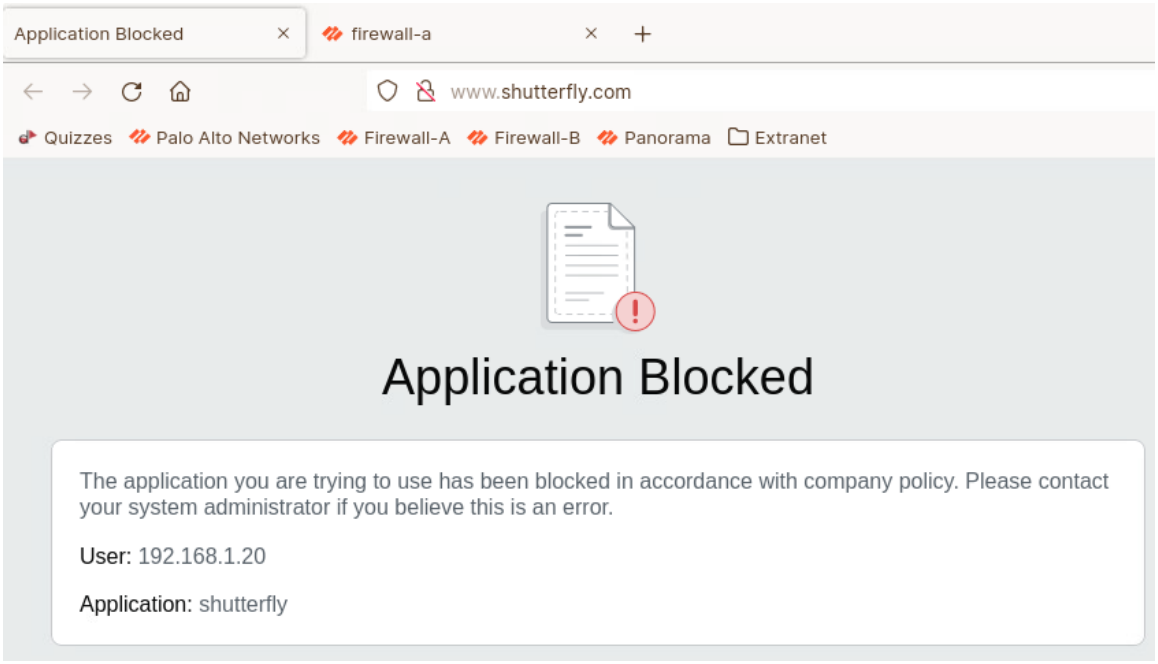
119. To see the kind of behavior a user will experience with the Application Block page enabled, open the testing browser.
120. Attempt to connect to **`http://www.shutterfly.com`**.

Be sure to use http in the request and be sure to use the configuration browser for this test.

The number of websites which still support HTTP is dwindling. And, some browsers automatically send requests using HTTPS even if you specify HTTP.

This test is only to show you how to enable the block page. In order for the firewall to determine an application inside encrypted web traffic (HTTPS), you need to enable decryption which is covered in a later section of this course.

121. The firewall will present a web page indicating that the application has been blocked.



You can customize this page to include additional information if necessary. This is the default page that the firewall presents.

Note: Response Pages must also be enabled on the Interface Management Profile assigned to the firewalls interface that is required to respond. This was completed in an earlier lab.

122. Close the testing browser.

Note that there are limitations to the Application Block Page. The firewall cannot present the page to a user when the browser session is encrypted using HTTPS. Doing so would interrupt the secure communication between the client and the destination server and violate the rules of encryption.

However, you can configure and enable decryption on the firewall (which we cover in a later module). With decryption enabled, the firewall can present the Application Block Page to a web browser when a user attempts to access a blocked application.

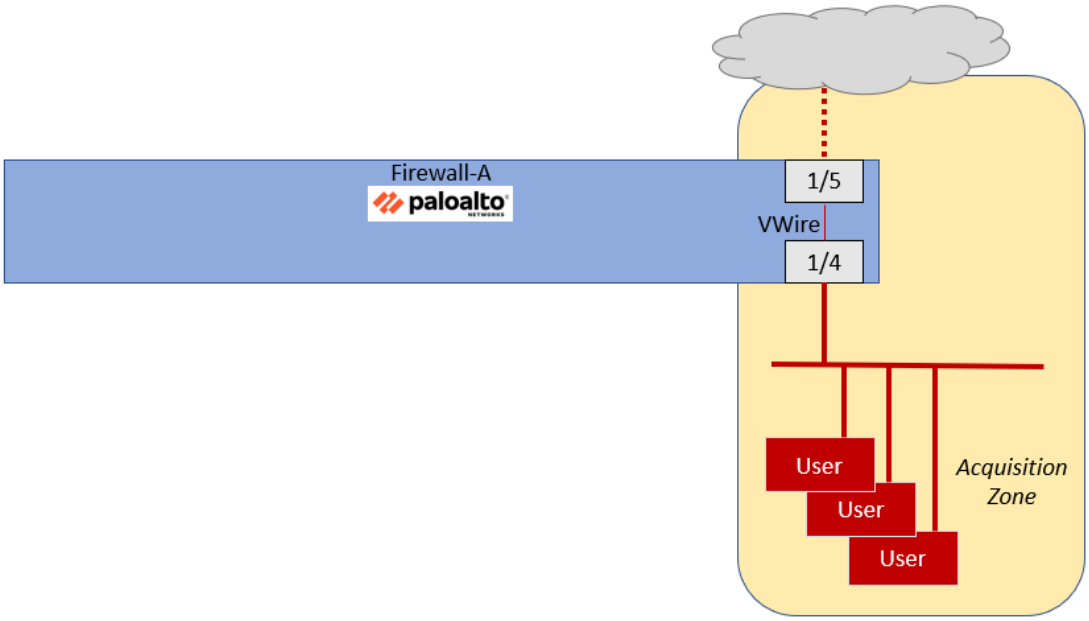
Stop. This is the end of the lab.

Lab 9: Blocking Known Threats Using Security Profiles

Your organization recently acquired another company. Over the weekend one of your coworkers configured the firewall with a new security zone called Acquisition that contains all the users from this new company.

The coworker also configured the firewall with a Virtual Wire that allows traffic to the Internet from the users in the Acquisition security zone.

Traffic is now being forwarded from users in the acquisition company through the firewall.



The firewall has a Security Policy rule that allows users in the Acquisition zone to access any application on the Internet.

In this lab, you will build and apply a set of Security Profiles that will watch for and block known threats from the users in this Acquisition zone.

Lab Objectives

- Load a baseline configuration
- Generate traffic without Security Profiles and examine logs
- Create Security Profiles
- Create a Security Profile Group
- Apply the Security Profile Group to existing Security Policy rules

- Generate traffic with Security Profiles and examine logs

High-Level Lab Steps

Use the information in the sections below to complete the objectives for this lab. We suggest that you use this section only if you have extensive experience working with Palo Alto Networks firewalls.

If you need more detailed guidance for the objectives, use the Detailed-Lab Steps section.

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-09.xml`** - to the Firewall

Generate Traffic Without Security Profiles

- Use Remmina to connect to the **`Server-Extranet`** host
- Change to the working directory

  `cd pcaps92019/attack.pcaps/ <Enter>`

- Run the simulated attacks script

  `./malwareattacks.sh <Enter>`

  This script takes about 6 minutes to complete

- Allow the script to run uninterrupted
- Use testing browser on the Client-A workstation to connect to the following URI:

  `http://192.168.50.80/badtarfile.tar`

- Save the file to the **Downloads** folder when prompted
- From a new tab in testing browser, browse to the following URI:

  `http://192.168.50.80/companyssns.txt`

  Note that the browser will displays a file with employees and their Social Security Numbers.

- From a **Terminal** window on the Client-A host, use the following command to generate a DNS query using **`dig`** to resolve a URL to an IP address:

  `dig @8.8.8.8 www.quora.com`

  The command should return a public IP address, indicating that the URL is accessible.

- Leave the Terminal Emulator window open because you will use it again later in this lab
- In the firewall web interface, examine the **Threat Log**
- You should have ***no*** significant entries in the Threat Log

Create a Corporate Antivirus Profile

- Clone the **default** Antivirus Profile

- Rename the clone to **`Corp-AV`**
- For the Corp-AV **Description**, enter **`Standard antivirus profile for all security policy rules`**

Create A Corporate Vulnerability Security Profile

- Clone the **strict** Vulnerability Profile
- Rename the clone to **`Corp-Vuln`**
- For the Corp-Vuln **Description**, enter **`Standard vulnerability profile for all security policy rules`**

Create a Corporate File Blocking Profile

- Clone the **strict file blocking** Profile
- Rename the clone to **`Corp-FileBlock`**.
- For the Corp-FileBlock **Description**, enter **`Standard file blocking profile for all security policy rules`**.

Create a Corporate Data Filtering Profile

- Use the information below to create a Data Filtering Pattern that will identify US Social Security numbers with and without dash separators

Parameter	Value
Name	`US-SSNs`
Description	`US Social Security Numbers`
Pattern Type	`Predefined Pattern`
First Pattern	`Social Security Numbers`
Second Pattern	`Social Security Numbers (without dash separator)`

- Use the information below to create a **Data Filtering** Profile

Parameter	Value
Name	`Corp-DataFilter`
Description	`Standard data filtering profile for all security rules`
Data Pattern	`US-SSNs`
Alert Threshold	`1`

Parameter	Value
Block Threshold	`3`
Log Severity	`critical`

Create a Corporate Anti-Spyware Security Profile

- Clone the **strict** Anti-Spyware Profile
- Rename the clone **`Corp-AS`**
- For the Corp-AS **Description**, enter **`Standard anti-spyware profile for all security policy rules`**

Create an External Dynamic List for Malicious Domains

- Use the information below to create an External Dynamic List

Parameter	Value
Name	`malicious-domains-edl`
Type	`Domain List`
Description	`Custom list of bad domains maintained on Extranet server`
Source	`http://192.168.50.80/malicious-domains.txt` (The EDL contains the domains quora.com and producthunt.com.)
Automatically expand to include subdomains	`Checked`
Check for updates	`Every Five Minutes`

Update the Anti-Spyware Profile with EDL

- Edit the **Corp-AS** Security profile and apply the DNS **`sinkhole`** action to the entry for **`malicious-domains-edl`**

Commit the configuration

- Commit the changes before proceeding

Create a Security Profile Group

- Use the information below to create a Security Profile Group

Parameter	Value
Name	`Corp-Profiles Group`
Antivirus Profile	`Corp-AV`
Anti-Spyware Profile	`Corp-AS`
Vulnerability Protection Profile	`Corp-Vuln`
URL Filtering Profile	`none`
File Blocking Profile	`Corp-FileBlock`
Data Filtering Profile	`Corp-DataFilter`
Wildfire Analysis Profile	`none`

Leave the URL Filtering Profile and the WildFire Analysis Profile set to **none** for this lab. We will examine both of those Security Profiles in more detail later in the course.

Apply the Corp-Profiles-Group to Security Policy Rules

- Individually edit each Security Policy rule that allows traffic and change the **Profile Setting** under the **Action** tab to use the **`Corp-Profiles Group`**
    - **Allow-PANW-Apps**
    - **Users_to_Extranet**
    - **Users_to_Internet**
    - **Extranet_to_Internet**
    - **Extranet_to_Users_Net**
    - **Acquisition-Allow-All**

Commit the configuration

- Commit the changes before proceeding

Generate Attack Traffic to Test Security Profiles

- Use Remmina to connect to the **`Server-Extranet`** host
- Change to the working directory

  `cd pcaps92019/attack.pcaps/` **<Enter>**

- Run the simulated attacks script

  `./malwareattacks.sh` <Enter>

  This script takes about 6 minutes to complete

- Allow the script to run uninterrupted
- Use testing browser on the Client-A workstation to connect to the following URI:

  http://192.168.50.80/badtarfile.tar

- You should receive a File Transfer Blocked page from the firewall.
- From a new tab in testing browser, browse to the following URI:

  `http://192.168.50.80/companyssns.txt`

- You should receive a **Data Transfer Blocked** page from the firewall
- From a **Terminal** window on the Client-A host, use the following command to generate a DNS query using **`dig`** to resolve a URL to an IP address:

  `dig @8.8.8.8 www.quora.com`

This time, the command returns **sinkhole.paloaltonetworks.com** instead of an IP address for the domain.

- In the firewall web interface, examine the **Threat Log** and note the numerous entries for spyware and vulnerabilities

Lab Clean-Up

- Close the SSH connection to the firewall
- Close the Remmina desktop application window
- Close the Terminal Emulator window on the workstation desktop

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down list next to the **Name** text box and select **edu-210-11.1a-9.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK**.
5. A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.
9. Click **Close** to continue.

Note that you may receive messages in the **Commit** window about **App Dependencies**. In a production environment, you should examine the messages and use the information provided to add the missing applications to the appropriate rules. These dependencies result from changes in Application definitions that are released each month.

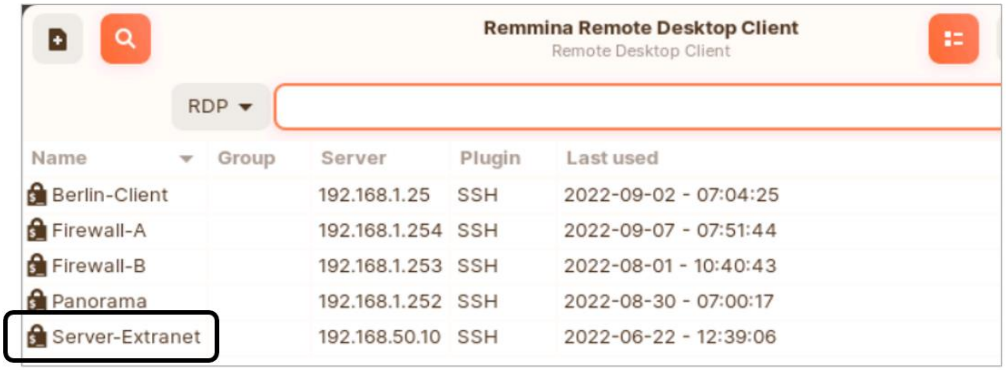
Generate Traffic Without Security Profiles

In this section, you will generate traffic that contains threats and malicious content. You will do so from the client workstation and from the Extranet server. Because you have not yet configured Security Profiles for your Security Policy, the firewall will allow this harmful traffic.

After the testing, you will examine the Threat Log to verify that this traffic was passed.

10. On the client desktop, open the Remmina application by double-clicking the icon:

11. In the Remmina Remote Desktop Client window, double-click the entry for **Server-Extranet**:



This action will open an SSH connection to the server and automatically log you in with appropriate credentials.

12. Enter the following command to change the working directory:

`cd pcaps92019/attack.pcaps/` **<Enter>**

13. Run the simulated attacks:

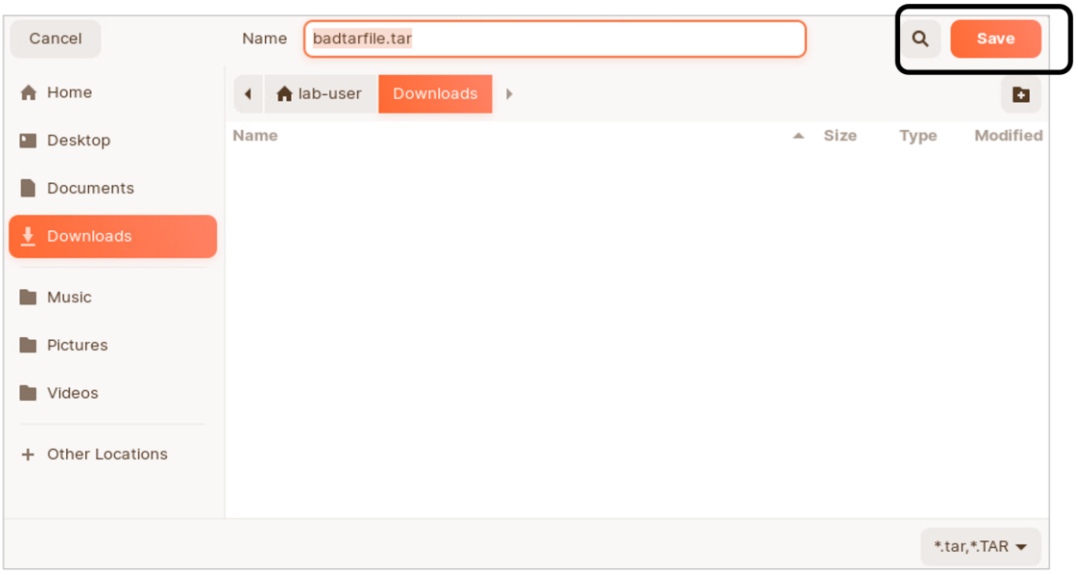
`./malwareattacks.sh` **<Enter>**

This script takes about 6 minutes to complete.

14. Allow the script to run uninterrupted.
15. Minimize the Remmina connection window and move to the next step.
16. On the client workstation, open the testing browser.
17. Connect to the following URI:
18. **http://192.168.50.80/badtarfile.tar**

The download should succeed. This filetype is one that you will block when you configure the firewall with a File Blocking Profile.

19. When prompted, select **Save** and click **OK**.

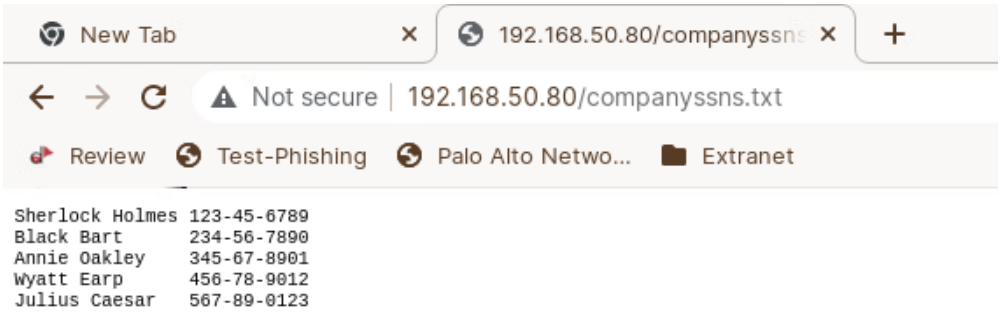


This action saves the malicious tar file to the client Downloads folder.

20. In the testing browser, open a new tab.
21. Browse to the following URI:

`http://192.168.50.80/companyssns.txt`

22. The browser will display the file:



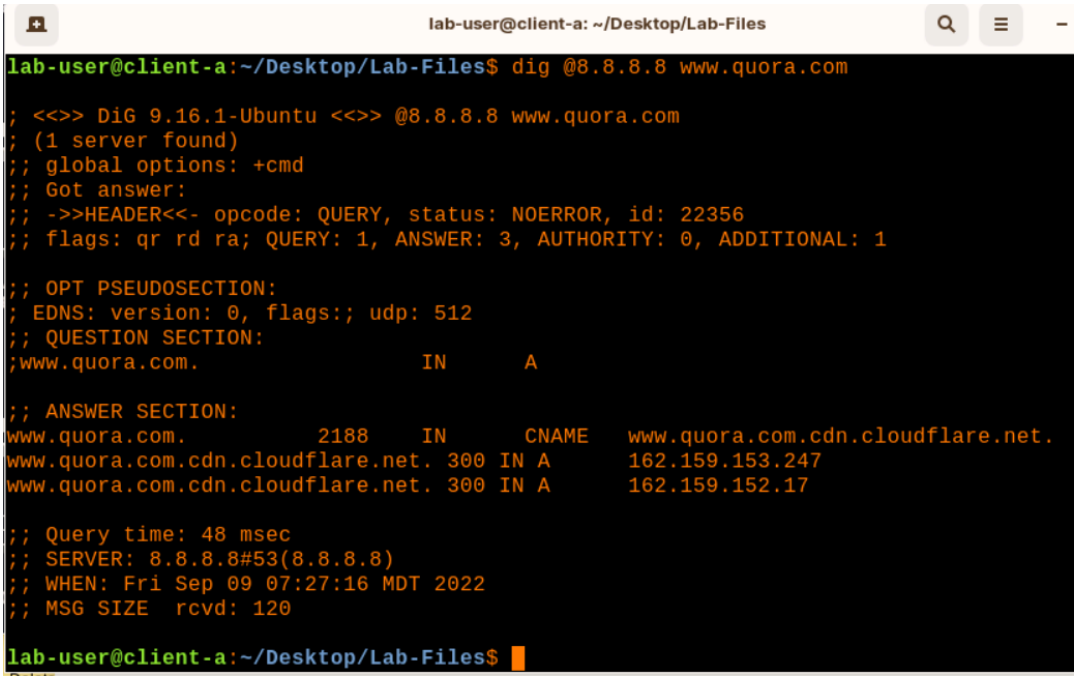
23. Close the testing browser.
24. On the client workstation, open a **Terminal Emulator** window.
25. Enter the following command to generate a DNS query using **`dig`** to resolve a URL to an IP address:

`dig @8.8.8.8 www.quora.com` **<Enter>**

Quora.com is one of the entries included in an external dynamic list of malicious domains. You will configure this type of list later in the lab.

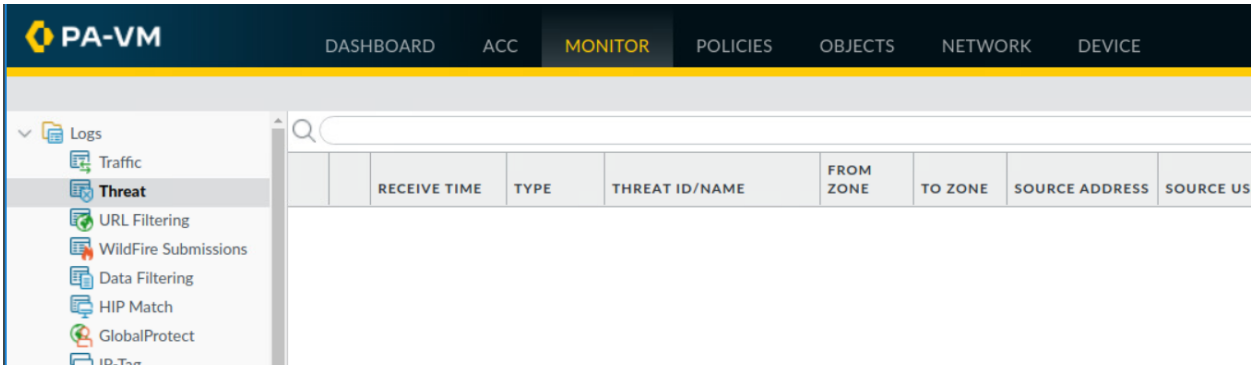
The **`dig`** tool is similar to **`nslookup`** but provides more detailed information.

26. The command returns a public IP address, indicating that the URL is accessible.



Note that the IP address you see may differ from this example.

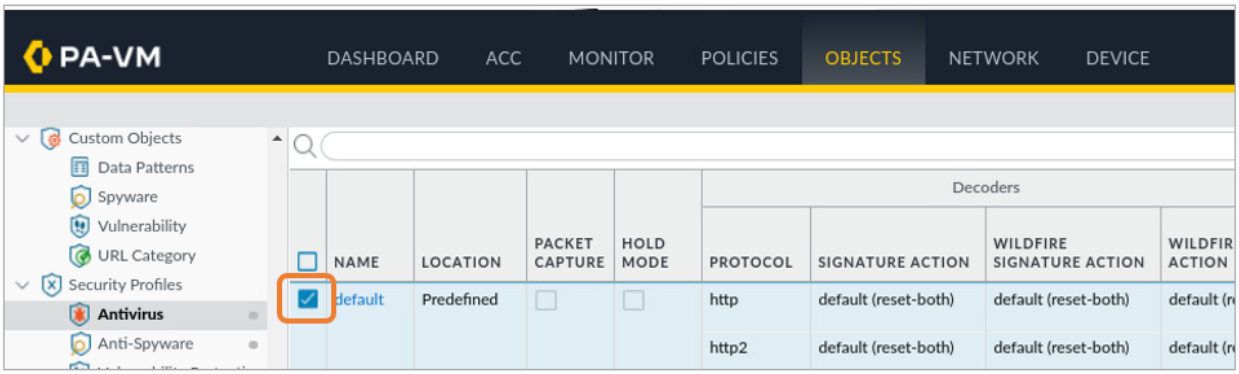
27. Leave the Terminal Emulator window open because you will use it again later in this lab.
28. In the firewall web interface, select **Monitor > Logs > Threat**.
29. You should have ***no*** significant entries in the Threat Log.



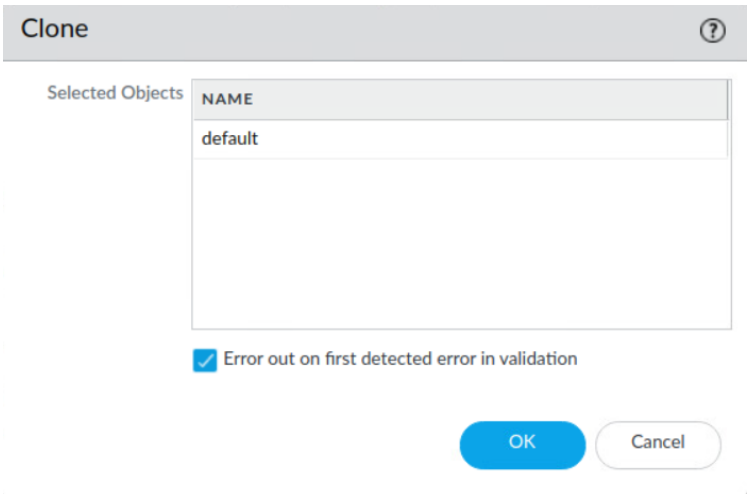
Create a Corporate Antivirus Profile

In this section, you will create the first of several Security Profiles. The Antivirus Profile you create will use signatures provided by Palo Alto Networks to watch for and block known threats from viruses.

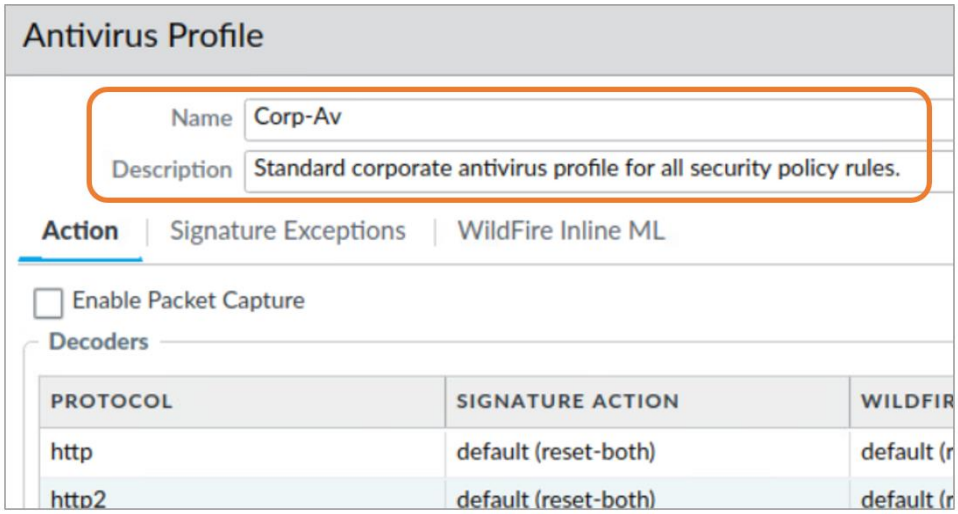
30. In the web interface, select **Objects > Security Profiles > Antivirus**.
31. Place a check in the box next to the **default** entry.



32. At the bottom of the window, click the **Clone** button.
33. In the **Clone** window that appears, leave the settings unchanged.



34. Click **OK**.
35. A new entry called **default-1** will appear in the Antivirus list.
36. Click the entry for **default-1** to edit it.
37. Change the **Name** to **`Corp-AV`**.
38. For **Description**, enter **`Standard corporate antivirus profile for all security policy rules`**.
39. Leave the remaining settings unchanged.



40. Click **OK**.

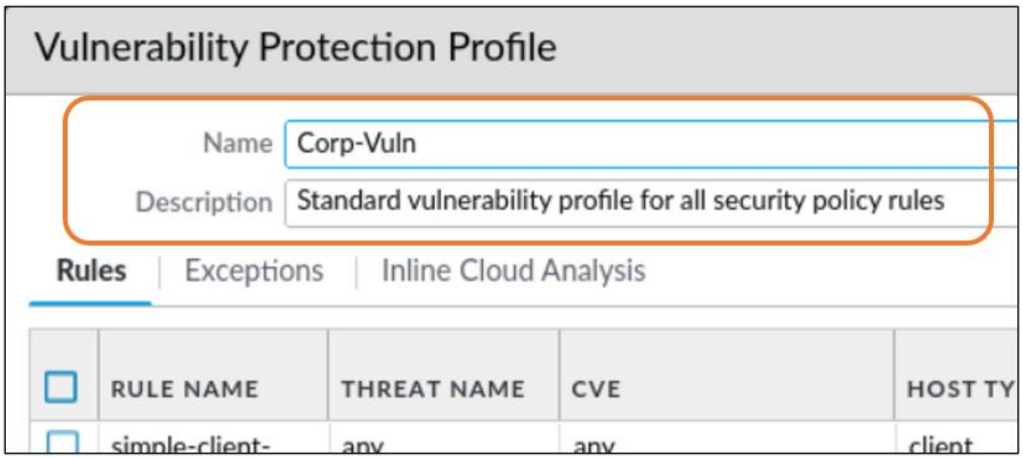
Create A Corporate Vulnerability Security Profile

In this section, you will create a vulnerability Security Profile. Palo Alto Networks provides two Vulnerability Profiles that you can use as the basis for your own – strict and default.

You will clone the strict Profile and modify it to function as your Corp-Vuln Profile.

41. Select **Objects > Security Profiles > Vulnerability Protection**.
42. Place a check in the box beside **strict**.
43. At the bottom of the window, click **Clone**.
44. In the **Clone** window that appears, leave the settings unchanged and click **OK**.
45. A new **Vulnerability Protection** Profile appears called **strict-1**.
46. Click the entry for **strict-1** to open it.
47. Change the **Name** to **`Corp-Vuln`**.

48. For **Description**, enter **`Standard vulnerability profile for all security policy rules`**.



49. Leave the remaining settings unchanged and click **OK**.

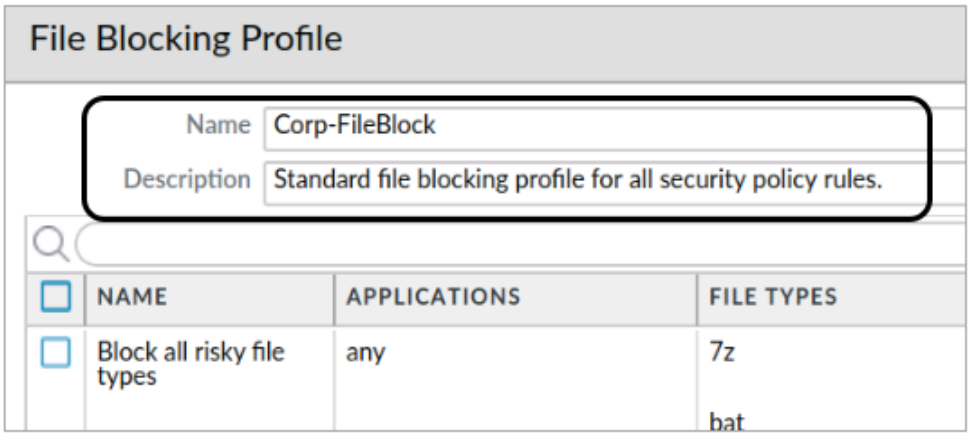
Create a Corporate File Blocking Profile

In this section, you will configure a File Blocking Security Profile that the firewall will use to help detect, report, and block attempts to download potentially harmful filetypes. Palo Alto Networks provides two File Blocking Profiles that you can use as the basis for your own – basic file blocking and strict file blocking.

You will clone the strict file blocking Profile and modify it to function as your Corp-FileBlock Profile.

50. Select **Objects > Security Profiles > File Blocking**.
51. Place a check beside the entry for **strict file blocking**.
52. At the bottom of the window, click the **Clone** button.
53. In the **Clone** window that appears, leave the settings unchanged and click **OK**.
54. A new File Blocking Profile appears called **strict file blocking-1**.
55. Click the entry for **strict file blocking-1** to open it.
56. Change the **Name** to **`Corp-FileBlock`**.

57. For **Description**, enter **`Standard file blocking profile for all security policy rules`**.



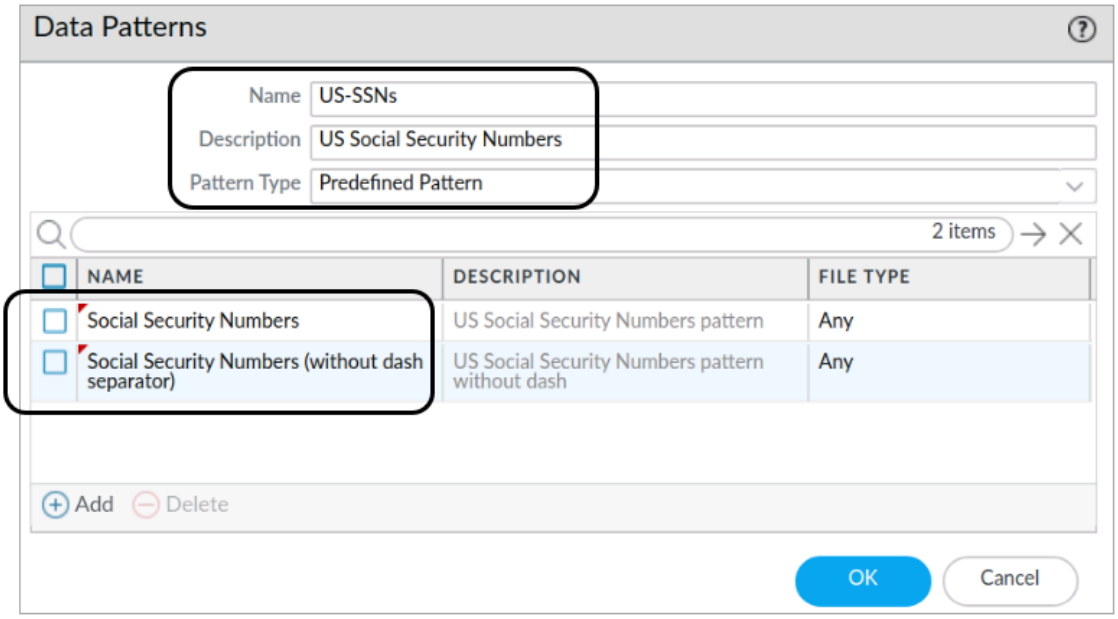
58. Leave the remaining settings unchanged and click **OK**.

Create a Corporate Data Filtering Profile

Create a Data Filtering Profile to detect and block the transfer of files that contain more than three US social security numbers. Data Filtering Profiles are based on one or more Data Patterns, so you will need to first configure a Data Pattern that matches variations of US social security numbers.

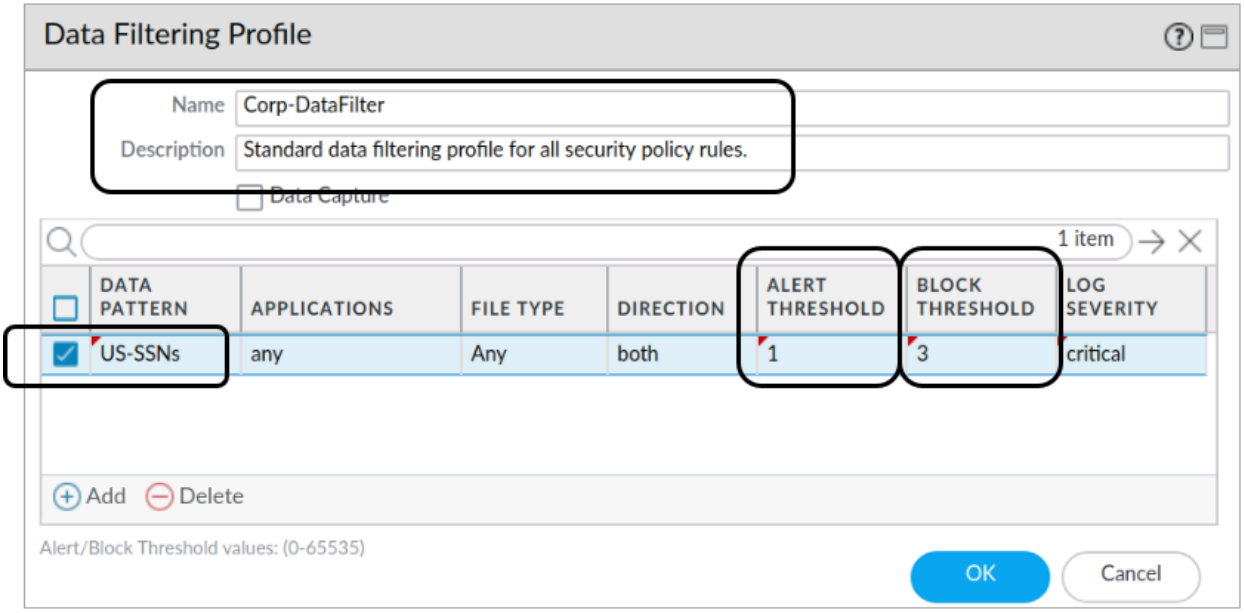
59. Select **Objects** > **Custom Objects** > **Data Patterns**.
60. Click **Add**.
61. For **Name**, enter **`US-SSNs`**.
62. For **Description**, enter **`US Social Security Numbers`**.
63. Change the **Pattern Type** to **Predefined Pattern**.
64. Click **Add**.
65. Scroll down the available list and select **Social Security Numbers**.
66. Click **Add** again.

67. Scroll down the list and select **Social Security Numbers (without dash separator)**.



68. Leave the remaining settings unchanged and click **OK**.
69. Select **Objects** > **Security Profiles** > **Data Filtering**.
70. Click **Add**.
71. For **Name**, enter **`Corp-DataFilter`**.
72. For **Description**, enter **`Standard data filtering profile for all security policy rules`**.
73. Click **Add** and select the **US-SSNs** data pattern that you defined.
74. Click in the **Alert Threshold** field and change the value to **1**.
75. Click in the **Block Threshold** field and change the value to **3**.
76. Change the **Log Severity** to **critical**.

77. Leave the remaining settings unchanged.

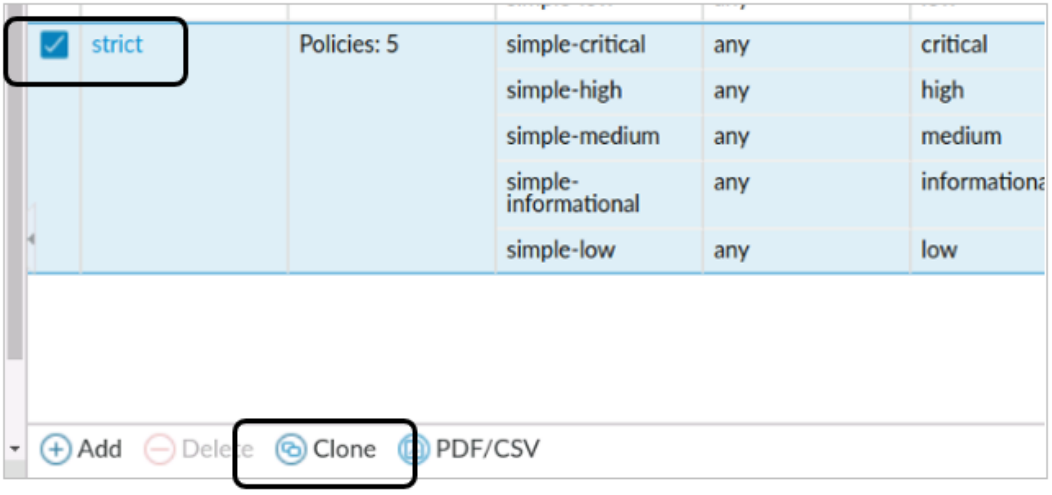


78. Click **OK**.

Create a Corporate Anti Spyware Profile

In this section, you will create a Security Profile that will watch for and block known spyware.

79. In the web interface, select **Objects > Security Profiles > Anti-Spyware**.
80. Select the check box next to the **strict** Anti-Spyware Profile.
    The Profile should be highlighted after it has been selected.
81. Click **Clone** to clone the Profile.



82. A **Clone** window should open.
83. Click **OK** to close the **Clone** window.

A new **strict-1** Anti-Spyware Profile should have been created.

84. Click **strict-1** to edit the Profile.

    The **Anti-Spyware Profile** window should open.

85. Rename the Profile **`Corp-AS`**.
86. For **Description**, enter **`Standard anti-spyware profile for all security policy rules`**.
87. Click **OK** to close the **Anti-Spyware Profile** window.

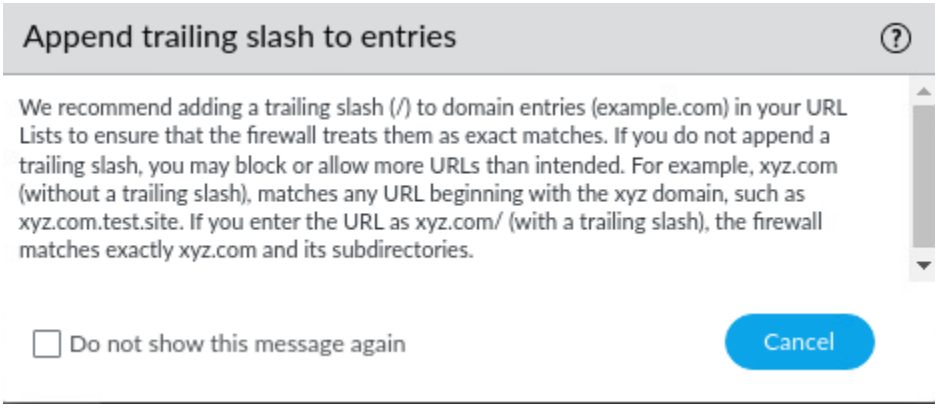
Create an External Dynamic List for Malicious Domains

You need to configure the firewall to ingest an external dynamic list that contains entries for several malicious domains that users should not access due to company restrictions. You have a list available on a local server that you can import to the firewall.

In this section, you will configure the firewall to import an External Dynamic List (EDL) from a server in the DMZ.

With the list configured on the firewall, you will update the Corporate-AS Anti-Spyware Profile to sinkhole entries in the EDL.

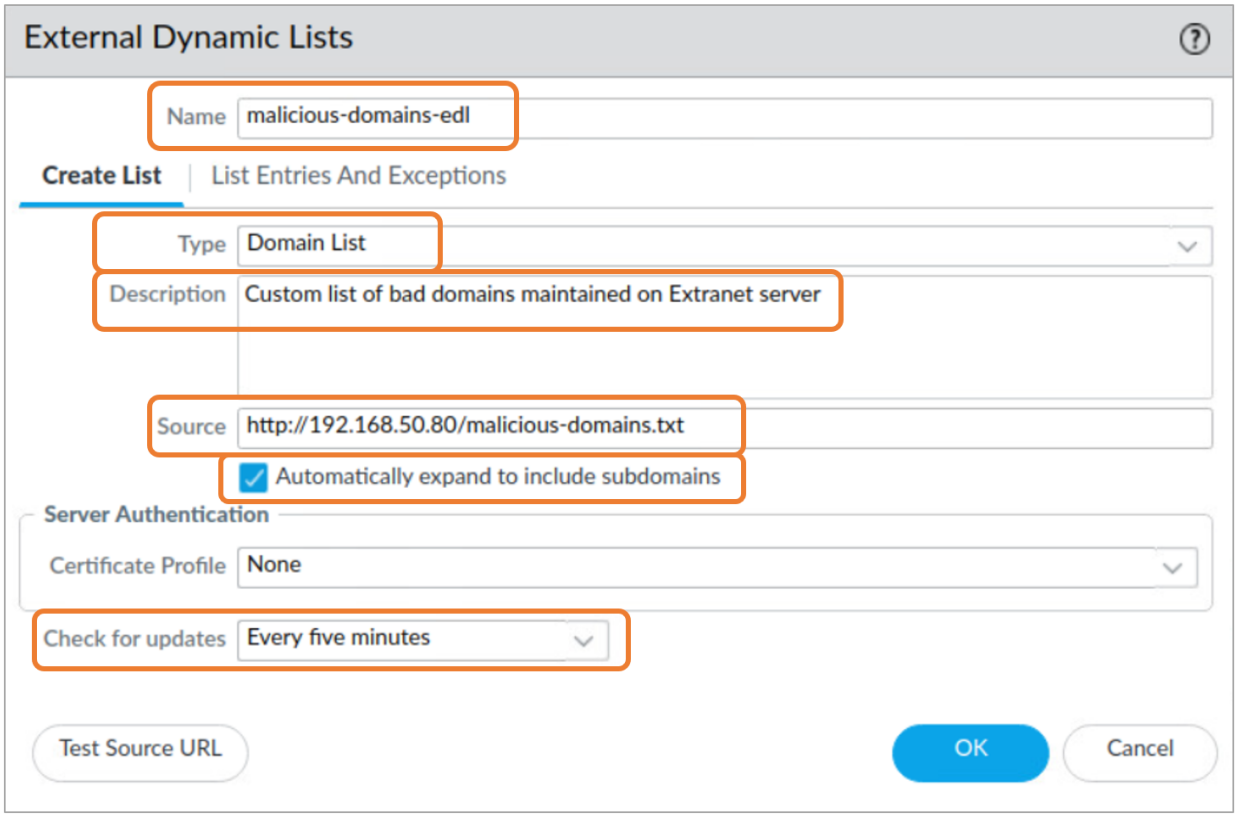
88. In the web interface, select **Objects > External Dynamic Lists**.
89. Click **Add**.
90. The firewall presents a notice about using trailing slashes for entries:



91. Read the notice and then click **Cancel**.
92. In the External Dynamic Lists window, configure the following:

Parameter	Value
Name	**`malicious-domains-edl`**
Type	**`Domain List`**

Parameter	Value
Description	`Custom list of bad domains maintained on Extranet server`
Source	`http://192.168.50.80/malicious-domains.txt` (The EDL contains the domains quora.com and producthunt.com.)
Automatically expand to include subdomains	`Checked`
Check for updates	`Every five minutes`

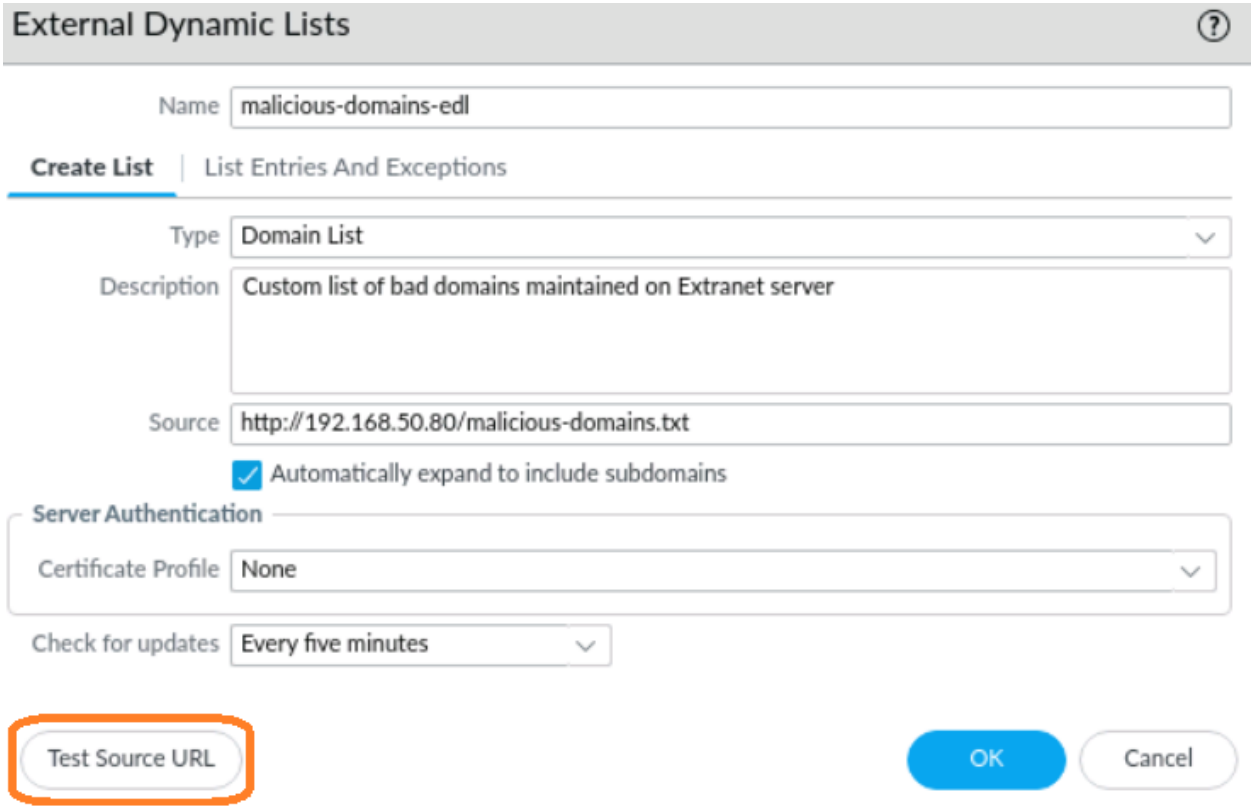


93. Click **OK** to close the **External Dynamic Lists** window.
94. Click **malicious-domains-edl**.

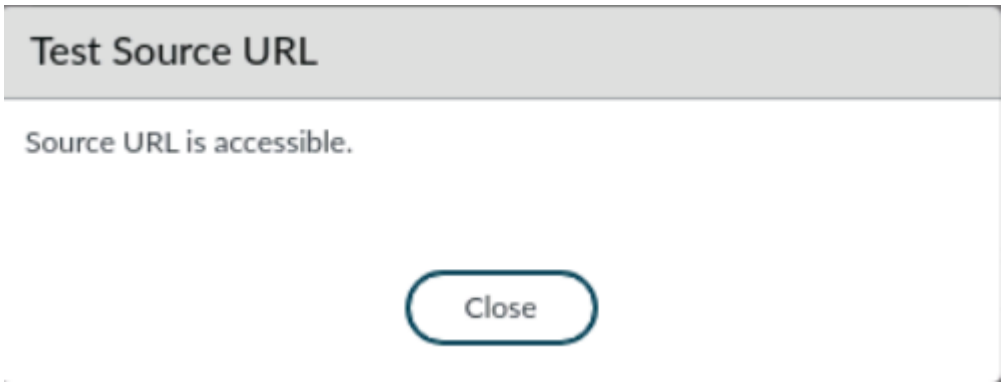
    The External Dynamic Lists window should open again.

95. Click **Cancel** on the **Append trailing slash to entries** window.
96. Click **Test Source URL** to verify that the firewall can access the EDL URL.

A message window should open and state that the source URL is accessible.



97. Click **Close** to close the **Test Source URL** window.



98. Click **OK** to close the **External Dynamic Lists** window.

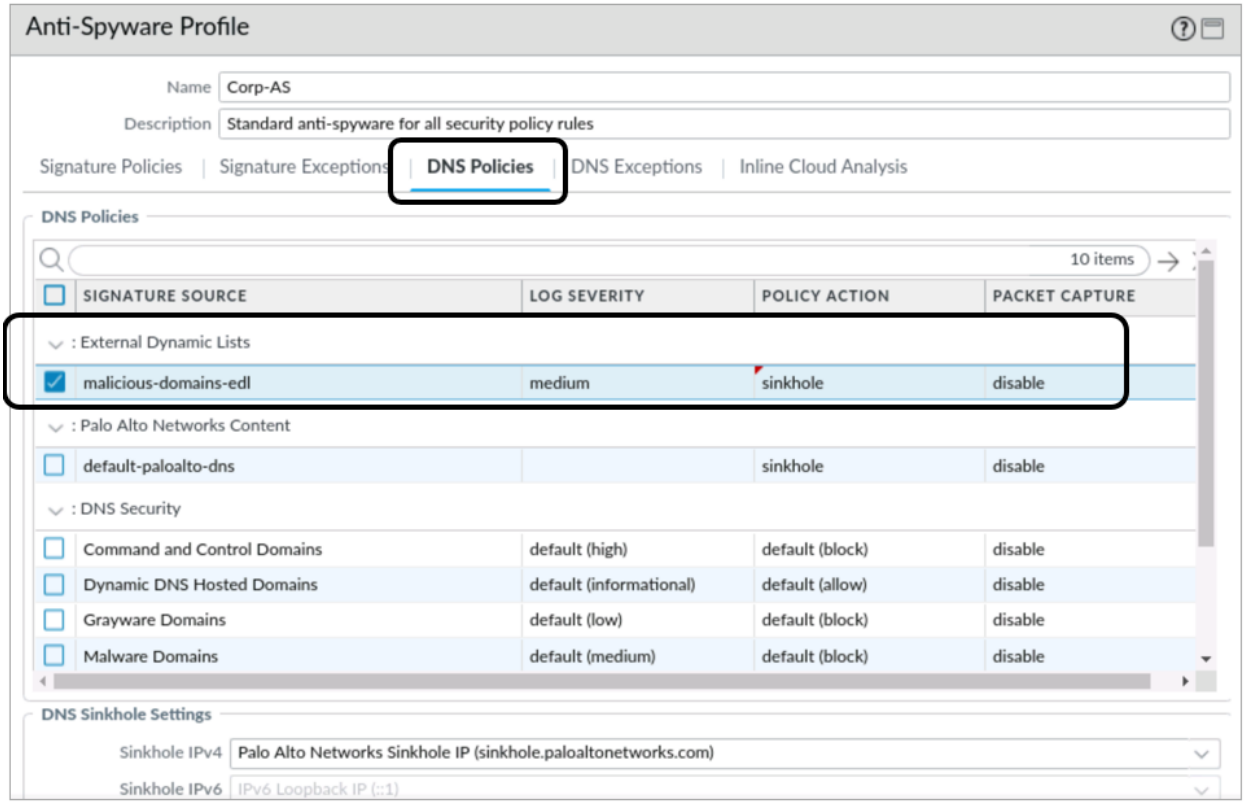
Update the Anti-Spyware Profile with EDL

Now that you have configured the firewall with the External Dynamic List for custom malicious domains, you can update the Anti-Spyware Profile to use the list for sinkholing.

99. In the web interface, select **Objects > Security Profiles > Anti-Spyware**.
100. Click **Corp-AS** to edit the Profile.

    The **Anti-Spyware Profile** window should open.

101. Click the **DNS Policies** tab.
102. Under the **External Dynamic Lists** section, change the **Policy Action** drop-down list to **`sinkhole`** for the **malicious-domains-edl** entry.



103. Leave the remaining settings unchanged.
104. Click **OK** to close the **Anti-Spyware Profile** window.

Commit the configuration

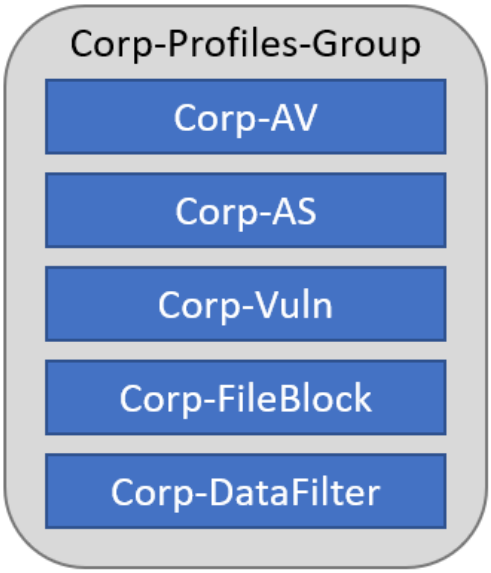
105. Click the **Commit** button at the upper right of the web interface.
106. Leave the settings unchanged and click **Commit**.
107. Wait until the **Commit** process is complete.
108. Click **Close**.

Create a Security Profile Group

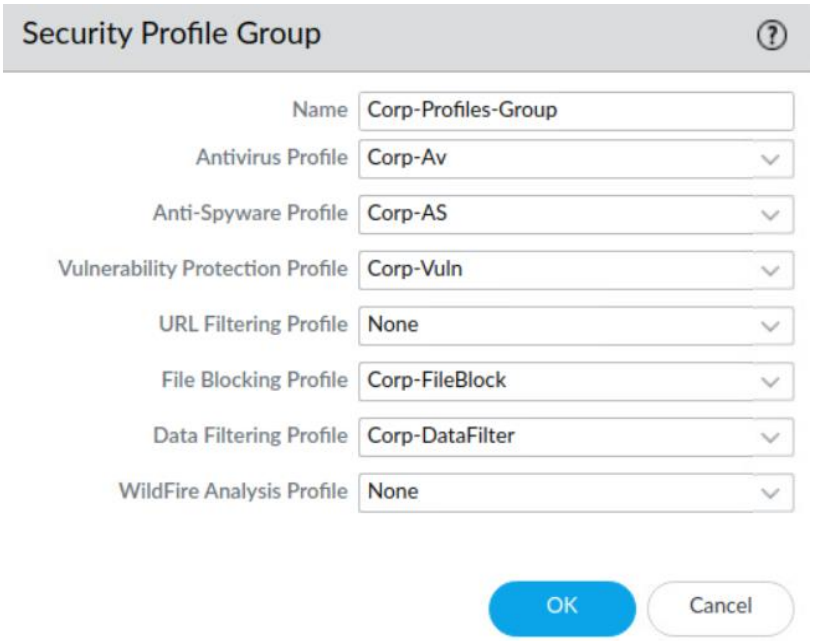
In order to simplify the process of applying Security Profiles to Security Policy rules, you can create a Security Profile Group that contains individual Security Profiles.

You can then apply the Security Profile Group to a Security Policy rule, rather than individually selecting each Profile for each rule.

In this section, you will create a Security Profile Group called Corp-Profiles-Group. You will add each of your Corp-* Security Profiles to the group.



109. Select **Objects** > **Security Profile Groups**.
110. Click **Add**.
111. For **Name**, enter **`Corp-Profiles-Group`**.
112. For each of the available **Profiles**, use the drop-down list to select the **Corp-*** entry you have created.



Leave the URL Filtering Profile and the WildFire Analysis Profile set to None for this lab. We will examine both of those Security Profiles in more detail later in the course.

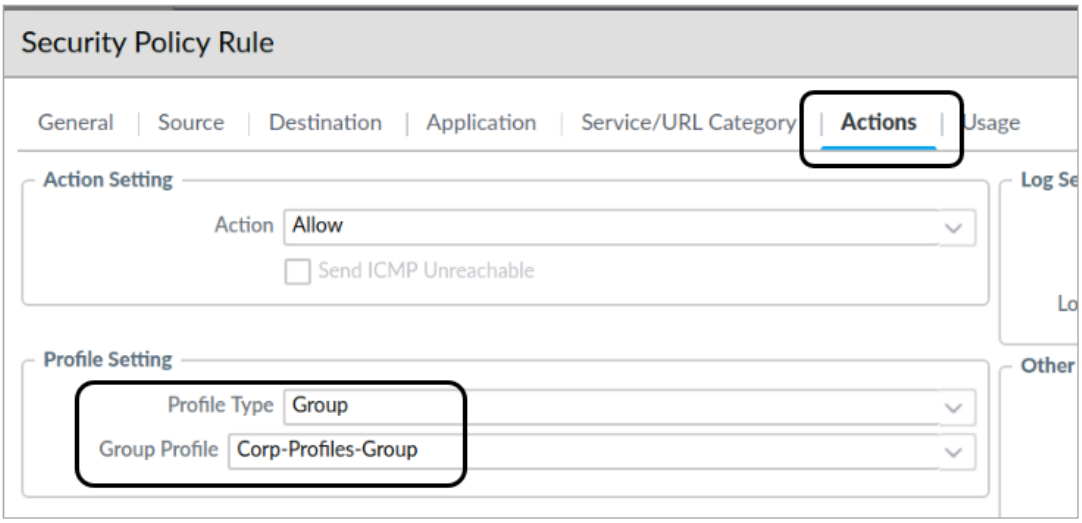
113. Click **OK**.

Apply the Corp-Profiles-Group to Security Policy Rules

With the Security Profiles in place, you can modify your Security Policy rules to use these protections.

114. Select **Policies** > **Security**.

115. Individually edit each Security Policy rule that ***allows*** traffic and change the **Profile Setting** under the **Action** tab to use the **Corp-Profiles Group**:



116. Be sure to edit and modify each of these rules:
    - **Allow-PANW-Apps**
    - **Users_to_Extranet**
    - **Users_to_Internet**
    - **Extranet_to_Internet**
    - **Extranet_to_Users_Net**
    - **Acquisition-Allow-All**

Commit the configuration

117. Click the **Commit** button at the upper right of the web interface.
118. Leave the settings unchanged and click **Commit**.
119. Wait until the **Commit** process is complete.
120. Click **Close**.

Generate Attack Traffic to Test Security Profiles

121. On the client desktop, locate the Remmina SSH connection to **Server-Extranet**.
122. Enter the following command to change the working directory:

    `cd /home/paloalto42/pcaps92019/attack.pcaps/` **<Enter>**
123. Run the simulated attacks script again:

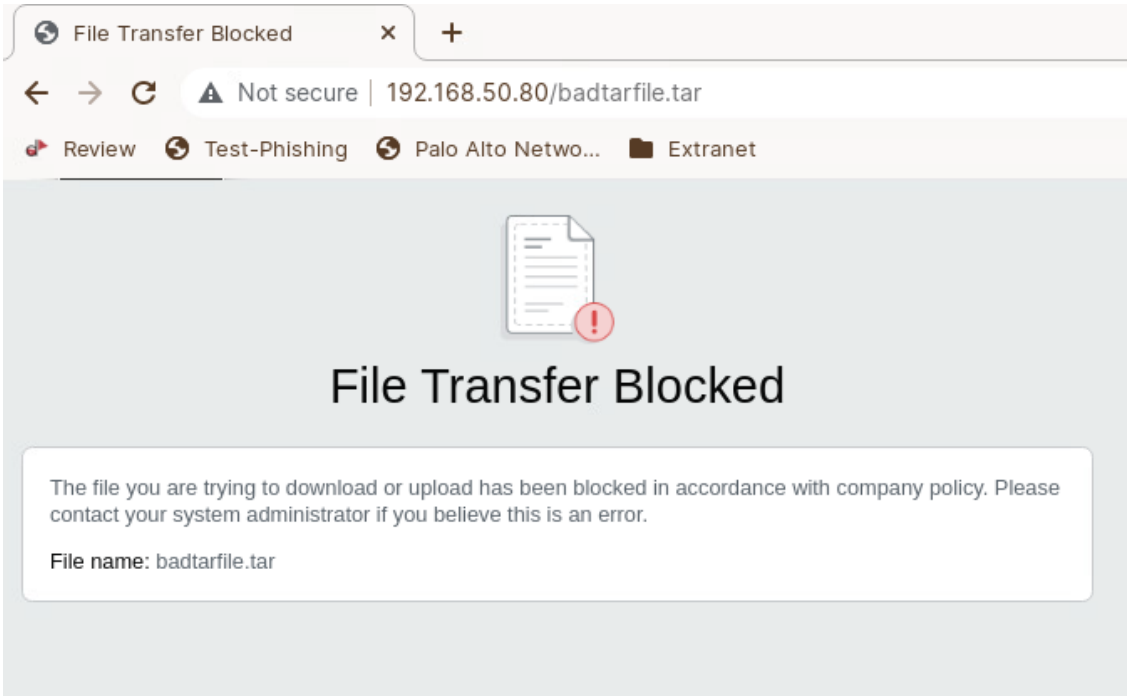
    `./malwareattacks.sh` **<Enter>**

    This script takes about 6 minutes to complete.
124. Allow the script to run uninterrupted.
125. Minimize the Remmina connection window and move to the next step.
126. On the client workstation, open the testing browser.

127. Connect to the following URI:

http://192.168.50.80/badtarfile.tar

128. You should receive a File Transfer Blocked page from the firewall.



This page indicates that the firewall has blocked the file using the File Blocking Profile you defined.

If testing browser prompts you to save the file, clear the browser cache (Settings > Privacy and Security > Clear browsing data and click Clear Data). Close testing browser and try the test again.

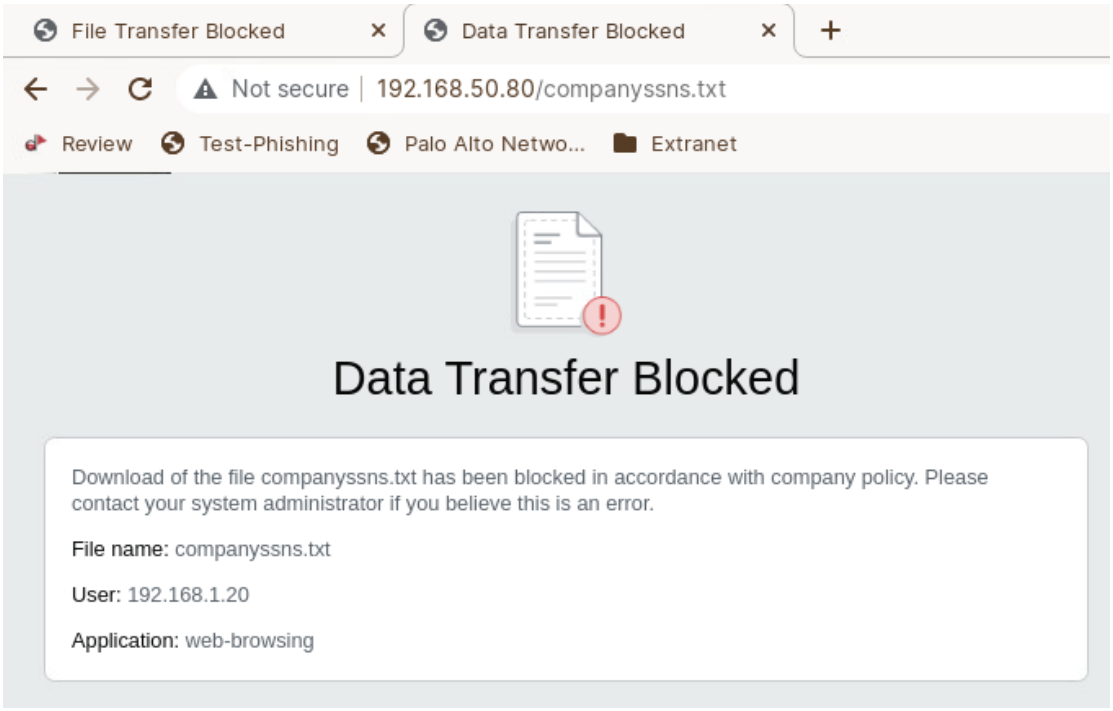
You can also use CTRL + Shift + Delete as a shortcut to invoke the **Clear Recent History** window in Firefox. The same key sequence invokes the **Clear browsing data** window in Chromium.

129. In testing browser, open a new tab.

130. Browse to the following URI:

http://192.168.50.80/companyssns.txt

131. You should receive a **Data Transfer Blocked** page from the firewall.



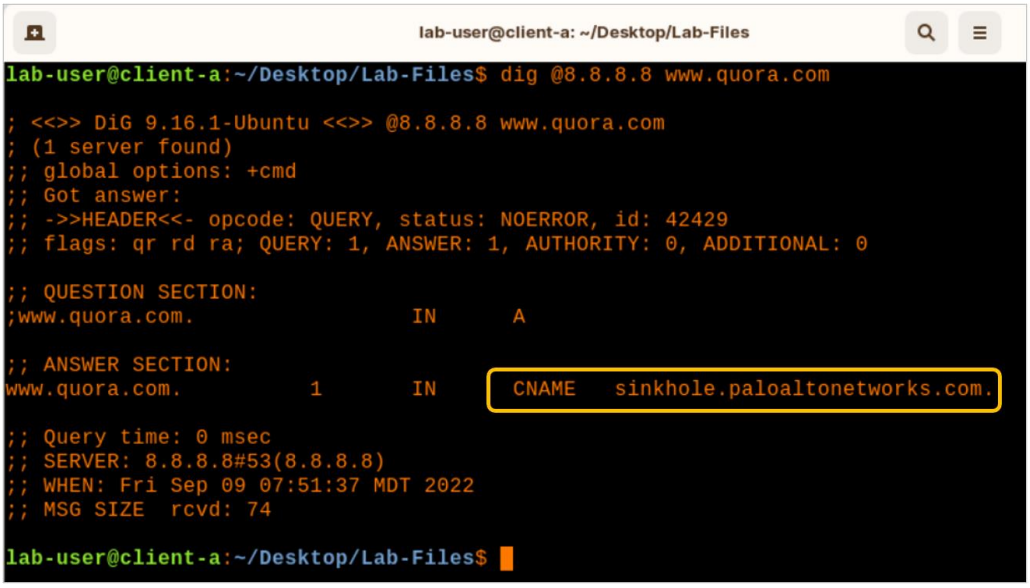
If you see the companyssns.txt file, **clear the browser cache and try again**. Often browsers will display content from earlier sessions so you want to make certain your request is actually sent to the server so that the firewall can intercept and block the reply which contains Social Security Numbers.

This page indicates that the firewall has blocked the transfer using the Data Filtering Profile and Data Pattern you defined for Social Security Numbers.

132. Close the testing browser.
133. On the client workstation, locate the open Terminal Emulator window you used earlier in this lab.
134. Run the **`dig`** command again to resolve a URL to an IP address:

`dig @8.8.8.8 www.quora.com` **<Enter>**

135. This time, the command returns **sinkhole.paloaltonetworks.com** instead of an IP address for the domain.



This indicates that the firewall has intercepted and sinkholed the DNS query using the DNS Sinkholing function in your Anti-Spyware Profile.

136. In the firewall web interface, select **Monitor > Logs > Threat**.
137. The Threat Log should contain numerous entries for spyware and vulnerabilities:

	RECEIVE TIME	SEVERITY	TYPE	THREAT ID/NAME	TO ZONE	DESTINATION ADDRESS	ACTION
	07/09 17:50:14	high	spyware	DGA:wodjfdhhe...	Acquisition	192.168.56.17	drop-packet
	07/09 17:50:14	medium	spyware	malicious-domains-edl	Internet	4.2.2.2	sinkhole
	07/09 17:50:13	high	spyware	generic:paleorant...	Acquisition	192.168.56.17	drop-packet
	07/09 17:50:12	high	spyware	Trojan.yakes:afro...	Acquisition	5.135.183.146	reset-both
	07/09 17:50:10	high	spyware	Trojan.yakes:afro...	Acquisition	31.3.135.232	reset-both
	07/09 17:50:10	high	spyware	Trojan.yakes:afro...	Acquisition	58.251.121.110	reset-both
	07/09 17:50:10	high	spyware	Trojan.yakes:afro...	Acquisition	188.165.200.156	reset-both
	07/09 17:50:06	high	spyware	Trojan.yakes:afro...	Acquisition	5.135.183.146	reset-both

These entries indicate that the firewall has blocked malicious traffic using the Vulnerability and Anti-Spyware Profiles that you defined. Note that the entries you see in the Threat Log may

differ from the example shown here. Also, several Threat Log columns have been hidden in this example.

The table may not contain very many entries until the malwareattacks script is finished. Use the refresh button periodically to update the table.

Lab Clean-Up

138. On the workstation desktop, locate the Remmina SSH connection to the Extranet server.
139. Type **`exit`** **<Enter>** to close the session.
140. Close the Remmina desktop application window.
141. Locate the open Terminal Emulator window on the workstation desktop.
142. Type **`exit`** **<Enter>** to close the window.

Stop. This is the end of the lab.

Lab 10: Blocking Inappropriate Web Traffic with Advanced URL Filtering

You can block access to malicious or inappropriate websites in two ways.

- Create Security Policy rules with a Deny Action and use URL categories as part of the rule criteria
- Create a URL Filtering Profile that includes blocked categories and apply the Profile to a Security Policy rule that allows the web-browsing and ssl applications.

In this lab, you will use both methods so that you can see the differences in how they are configured and in the kind of detail available through the logs when you use one method compared to the other.

Lab Objectives

- Test access to inappropriate web content without URL blocking in place
- Create a Security Policy rule to block inappropriate web content using the URL Category
- Test the Security Policy rule and examine the results
- Disable the Security Policy rule
- Create and apply a URL Filtering Profile to block access to a malicious URL
- Test the Security Profile and examine the results

High-Level Lab Steps

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-10.xml`** - to the Firewall

Test Access to Inappropriate Web Content

- Run the **Clear Logs Firewall-A** script from the **`/home/lab-user/Desktop/`**
- Use testing browser to browse to **hacker9.com** and **hidester.com** and verify that both sites are available

Create a Security Policy Rule to Block Categories

- Use the information in the tables below to create a Security Policy rule to block traffic to certain URL Categories:

Rule Name	`Block-Bad-URLs`
Description	`Blocks bad URLs based on categories`

Source Zone	`Users_Net`
Destination Zone	`Internet`
Application	`Any`
Service	`application-default`

URL Category	Add the following:
	`adult`
	`command-and-control`
	`extremism`
	`hacking`
	`high-risk`
	`malware`
	`nudity`
	`parked`
	`peer-to-peer`
	`phishing`
	`proxy-avoidance-and-anonymizers`
	`questionable`

Action	`Deny`

- Move the **Block-Bad-URLs** rule to the top of the Security Policy.

Commit the configuration

- Commit the changes before proceeding.

Test Access to URLs Blocked by the Security Policy

- Use testing browser and attempt to connect to `hacker9.com` and `hidester.com`
- Note the message displayed by browser
- Examine the **Traffic** log and use a filter to locate entries that have been blocked by the **Block-Bad-URLs**
- Examine the **URL Filtering** log and use a filter to locate entries that have been blocked by the firewall

Block Access to Inappropriate Web Content Using Security Profile

- Create a URL Filtering Profile using the information in the table below:

Name	`Corp-URL-Profile`
Description	`Standard corporate URL profile for all security policy rules`
Site Access All Categories (except those below)	`Alert`

Site Access Block	`adult`
	`command-and-control`
	`copyright-infringement`
	`extremism`
	`hacking`
	`high-risk`
	`malware`
	`nudity`
	`parked`
	`peer-to-peer`
	`phishing`
	`proxy-avoidance-and-anonymizers`
	`questionable`
	`unknown`

Add the URL Profile to the Corp-Profiles-Group

- Edit the **Corp-Security-Group** and add the URL Filtering Profile **`Corp-URL-Profile`**.

Disable Block-Bad-URLs Rule

- Disable the **Block-Bad-URLs** in the Security Policy so that it does not interfere with your URL Filtering Profile testing.

Commit the configuration

- Commit the changes before proceeding.

Test Access to URLs Blocked by a URL Filtering Profile

- Use testing browser and browse to **`hidester.com`** and **`hacker9.com`**
- Note the difference between this error page and the one you received when using a Security Policy rule to block categories

- Examine the **Traffic** log and use a filter to display entries that fall in the URL Category of **`hacking`**
- Examine the **URL Filtering** Log and use a filter to display entries that fall in the URL Category of **`hacking`**

Create a Custom URL Category

- Use the information in the table below to create a **Custom URL Category**:

Parameter	Value
Name	`Block-Per-Company-Policy`
Description	`URLs that are blocked by company policy.`

Sites	Add the following:
	`*.nbcnews.com`
	`*.theguardian.com`

Use Custom Category to Block URL Access in Security Policy Rule

- Enable the Security Policy Rule **Block-Bad-URLs**
- Add the **Block-Per-Company-Policy** custom URL category to the rule

Commit the configuration

- Commit the changes before proceeding.

Test Access to Custom URLs Blocked by the Security Policy

- Use the testing browser and connect to **`www.nbcnews.com`** and **`www.theguardian.com`**
- Note the **Application Blocked** page message presented by the firewall
- Examine the **URL Filtering** log and use it to locate entries with an **Action** of **block-url**

Add Custom URL Category to URL Filtering Profile

- Edit the **Corp-URL-Profile** and set the **Site Access** for **Block-Per-Company-Policy** to **`block`**.
- Disable the Security Policy rule **Block-Bad-URLs** so that it does not interfere with the URL Filtering Profile.

Commit the configuration

- Commit the changes before proceeding.

Test Access to Custom URLs Blocked by the URL Filtering Profile

- Use testing browser and browse to **`www.nbcnews.com`** and **`www.theguardian.com`**
- Note the Block page presented by the firewall

Create an EDL to Block Malicious URL Access

Use the information in the table below to create an **External Dynamic Lists**:

Parameter	Value
Name	`malicious-urls-edl`
Type	`URL List`
Description	`List of malicious URLs maintained on Extranet server`
Source	`http://192.168.50.80/malicious-urls.txt` (The EDL contains only the URL duckduckgo.com)
Check for updates	`Every Five Minutes`

Block Access to the the URL List with a Security Policy Rule

- Add the **malicious-urls-edl** to the URL Category of the **Block-Bad-URLs** Security Policy rule.
- Enable the **Block-Bad-URLs** Security Policy rule

Commit the configuration

- Commit the changes before proceeding.

Test Access to URLs Blocked by the EDL in the Security Policy

- Use testing browser and browse to **`http://duckduckgo.com`**.
- Note the Application Blocked that the firewall displays
- Examine the **URL Filtering** log
- Use a filter that will display entries that have an action of block-url
- Disable the Security Policy rule **Block-Bad-URLs**

Commit the configuration

- Commit the changes before proceeding.

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down list next to the **Name** text box and select **edu-210-11.1a-10.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK**.
5. A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.
9. Click **Close** to continue.

Test Access to Inappropriate Web Content

You can block access to inappropriate or malicious URLs by creating rules in the Security Policy. In this section, you will create a rule that blocks access to several URL categories.

Before you create the rule, you will clear the log file entries on the firewall (to make it easier to see new entries generated during this lab). You will also test access to two websites to verify that they are not being blocked.

Throughout this lab, use the Chromium browser to test access to various websites.

Different browsers react in different ways, and Chromium provides consistent and predictable responses to the firewall's blocking messages. Other browsers may display messages about reset connections or page not available. These responses do indicate that the firewall is blocking inappropriate web requests, but Chromium will usually display the response pages correctly.

If you do not see the appropriate block page in Chromium, clear the browser cache (**Settings > Privacy & Security > Clear browsing data > Clear data**). Close and reopen Chromium and try the test again.

You can also use CTRL + Shift + Delete to invoke the Clear browsing data window.

10. Clear the firewall log files by double-clicking on the Desktop icon for **Clear Logs Firewall-A**:

11. On the client desktop, open Chromium and browse to **`http://www.hacker9.com`**, which belongs to the URL category *hacking*.
12. In Chromium, browse to **`http://kproxy.com`**, which belongs to the URL category *proxy-avoidance-and-anonymizers*.

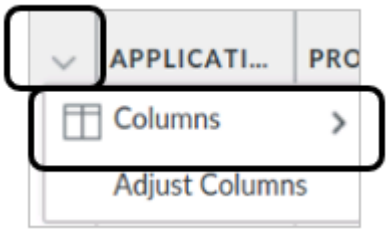
    The browser should display a valid webpage.

13. Close the Chromium browser.

Create a Security Policy Rule to Block Categories

14. In the web interface, select **Policies** > **Security**.
15. If the **URL Category** column is not displayed, click the **down-arrow** menu that appears next to any column header (hover your pointer over a header to see the **Down arrow**) and select **Columns** > **URL Category**.

    The **URL Category** column should appear in the web interface.



16. Click **Add** to create a new Security Policy rule.
17. On the **General** tab, type **`Block-Bad-URLs`** as the **Name**.
18. For **Description**, enter **`Blocks bad URLs based on categories`**.
19. Click the **Source** tab and configure the following:

Parameter	Value
Source Zone	**Users_Net**
Source Address	**Any**

20. Click the **Destination** tab and configure the following:

Parameter	Value
Destination Zone	**Internet**
Destination Address	**Any**

21. Click the **Application** tab and verify that **Any** is selected.
22. Click the **Service/URL Category** tab and configure the following:

	Parameter	Value
	Service	**application-default**
	URL Category	Add the following: **adult** **command-and-control** **extremism** **hacking** **high-risk** **malware** **nudity** **parked** **peer-to-peer** **phishing** **proxy-avoidance-and-anonymizers** **questionable**

Note: you can type in the first few letters of a category to locate each one more quickly.

The categories you add to the Security Policy rule in this exercise are only some of the ones that you may need to add in a production environment. For more information on recommended categories to block, search the Live Community for "URL Filtering Category Recommendations."

23. Click the **Actions** tab and configure the following:

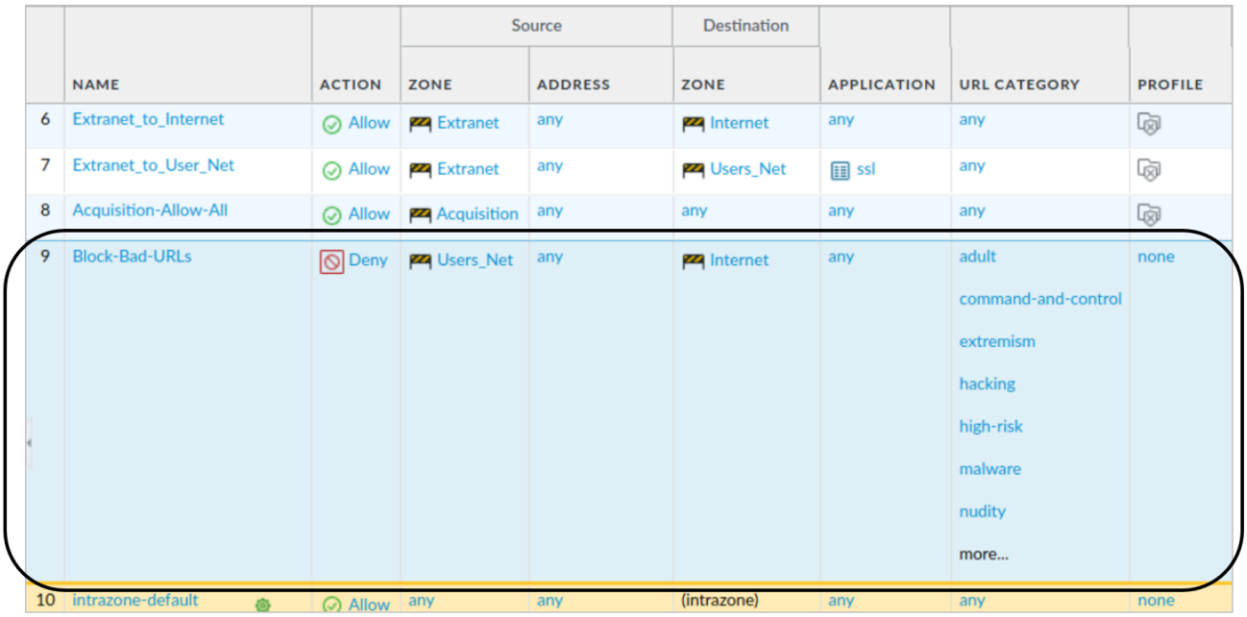
Parameter	Value
Action	**Deny**
Log Setting	**Log at Session End**

24. Click **OK** to close the Security Policy Rule window.

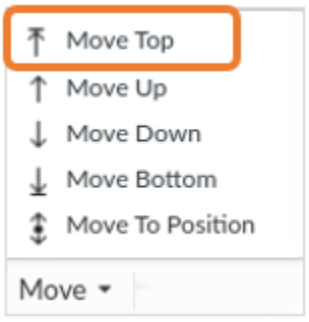
    The new **Block-Bad-URLs** rule should be added to the Security Policy.

25. Select, but do not open, the **Block-Bad-URLs** rule in the Security Policy.

    The rule should be highlighted after it has been selected.



26. Select **Move > Move Top** to move the **Block-Bad-URLs** rule to the top of the Security Policy:



Commit the configuration

27. Click the **Commit** button at the upper right of the web interface.
28. Leave the settings unchanged and click **Commit**.
29. Wait until the **Commit** process is complete.

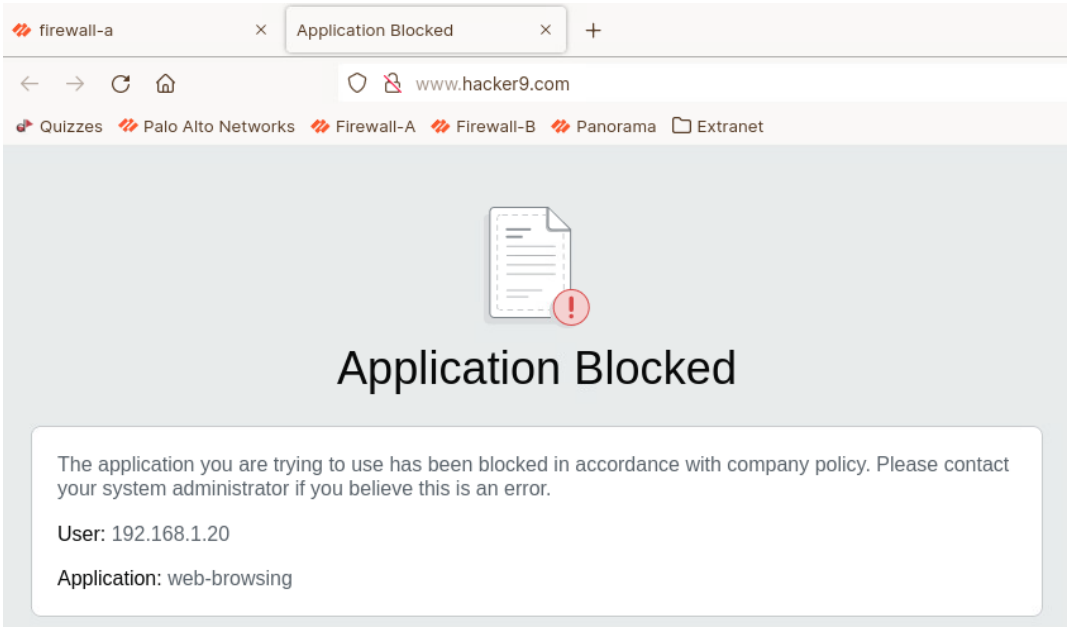
30. Click **Close**.

Test Access to URLs Blocked by the Security Policy

In this section, you will test access to URLs that belong to URL categories prohibited by the Security Policy.

31. On the client desktop, open Chromium (or open a new tab if you are using Chromium as the configuration browser).
32. Connect to **`http://www.hacker9.com`**, which belongs to the URL category *hacking*.

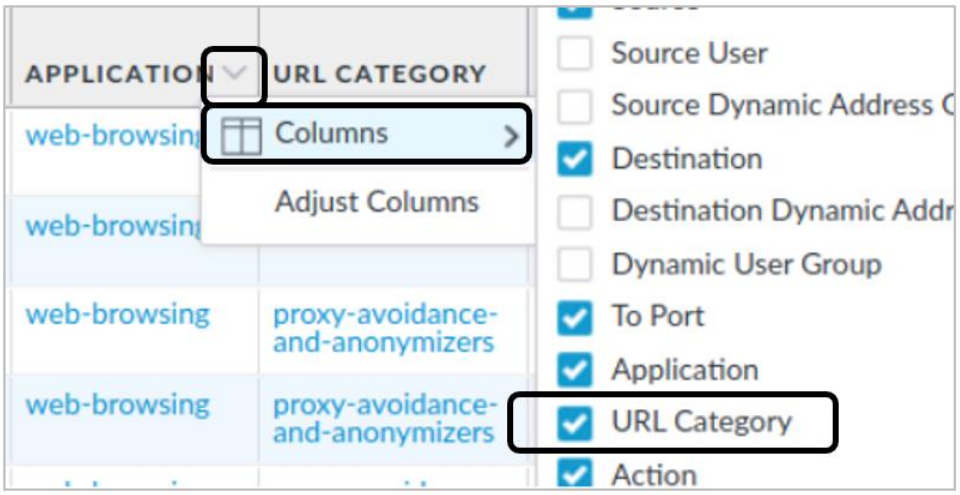
    The browser should display an error message similar to the following example because the URL category *hacking* is blocked in the Security Policy.



Although this page says the Application web-browsing has been blocked, the firewall is actually blocking the site based on its category – hacking. The firewall uses this page to inform users that the firewall has blocked a web page deliberately. You will see a different message when the firewall blocks a page using a URL Filtering Profile.

33. In Chromium, open a new tab and connect to **`http://www.kproxy.com`**, which belongs to the URL category *proxy-avoidance-and-anonymizers*.

    The browser should display the same kind of block page.
34. Close the Chromium browser.
35. In the firewall web interface, navigate to **Monitor > Logs > Traffic**.
36. Add the **URL Category** column to the display by clicking the small arrow next to the **Application** column heading and choosing **URL Category**:



37. Create and apply a filter to locate entries that have been blocked by the **Block-Bad-URLs** rule:
    `( rule eq 'Block-Bad-URLs' )`
38. Note the entries you see in the Traffic Log that have been blocked by the Block-Bad-URLs Security Policy rule.
39. Clear the filter entry from the Traffic Log.
40. Navigate to **Monitor > Logs > URL Filtering**.
41. Create and apply a filter to locate entries that have been blocked by the firewall:
    `( action eq block-url )`
42. You should see multiple entries for web-browsing sessions that have been blocked.
43. Note that the URL Filtering table contains the actual URL that was blocked as well as the category of the site.

RECEIVE TIME	CATEGORY	URL CATEGORY LIST	URL	SOURCE	APPLICATION	ACTION
10/24 13:49:16	hacking	hacking,low-risk	www.hacker9.com/favicon.ico	192.168.1.20	web-browsing	block-url
10/24 13:49:16	hacking	hacking,low-risk	www.hacker9.com/login/css/la...	192.168.1.20	web-browsing	block-url
10/24 13:49:16	hacking	hacking,low-risk	www.hacker9.com/	192.168.1.20	web-browsing	block-url
10/24 13:46:51	proxy-avoidance-and-anonymizers	proxy-avoidance-and-anonymizers,low-risk	www.kproxy.com/favicon.ico	192.168.1.20	web-browsing	block-url
10/24 13:46:51	proxy-avoidance-and-anonymizers	proxy-avoidance-and-anonymizers,low-risk	www.kproxy.com/login/css/lat...	192.168.1.20	web-browsing	block-url

The Traffic log does not list the specific URL that a user attempted to visit; however, the URL filtering log does. Note that the default columns for the URL Filtering log table have been rearranged in this example.

44. Clear the filter from the URL Filtering Log.

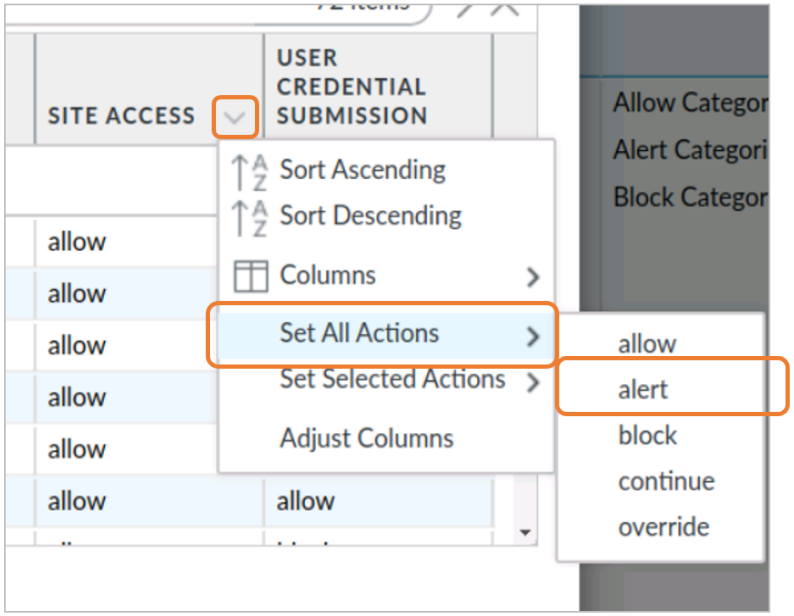
Block Access to Inappropriate Web Content Using A Security Profile

You can use a Security Policy rule to control access to web site categories or you can use a URL Filtering Profile to accomplish the same task. One significant difference between the two is that you can configure a URL Filtering Profile to log access to all websites and categories; not just to websites that have been blocked by a Security Policy rule.

In this section, you will create a URL Filtering Profile that blocks certain categories of web content.

45. In the firewall web interface, select **Objects** > **Security Profiles** > **URL Filtering**.
46. Click **Add** to create a new Profile.

    A **URL Filtering Profile** window should open.
47. Type **`Corp-URL-Profile`** as the **Name** of the Profile.
48. For **Description**, enter **`Standard corporate URL profile for all security policy rules`**.
49. In the **Site Access** column, click the small triangle.
50. Choose **Set All Actions** > **alert**.



This shortcut allows you to change the setting for all categories in the list rather than changing each one entry at a time. Setting the action to alert instructs the firewall to allow access to the category and to write an entry to the URL Filtering log. When the action is set to allow, the firewall allows access but does not write an entry to the URL Filtering log.

51. Under the **Categories** tab, configure the following:

Parameter	Value
Site Access	Configure the **block** action for the following URL categories: **adult** **command-and-control** **copyright-infringement** **extremism** **hacking** **high-risk** **malware** **nudity** **parked** **peer-to-peer** **phishing** **proxy-avoidance-and-anonymizers** **questionable** **ransomware** **unknown**

The categories you are blocking here are only some of the ones that you should consider blocking in production environments. The choices you make about the types of categories to block in production may often be influenced by company policies and other factors. Also, Palo Alto Networks continuously updates the categories used in URL filtering, so you should re-evaluate the list of allowed and blocked URLs frequently to make certain the firewall carries out the appropriate actions for your environment.

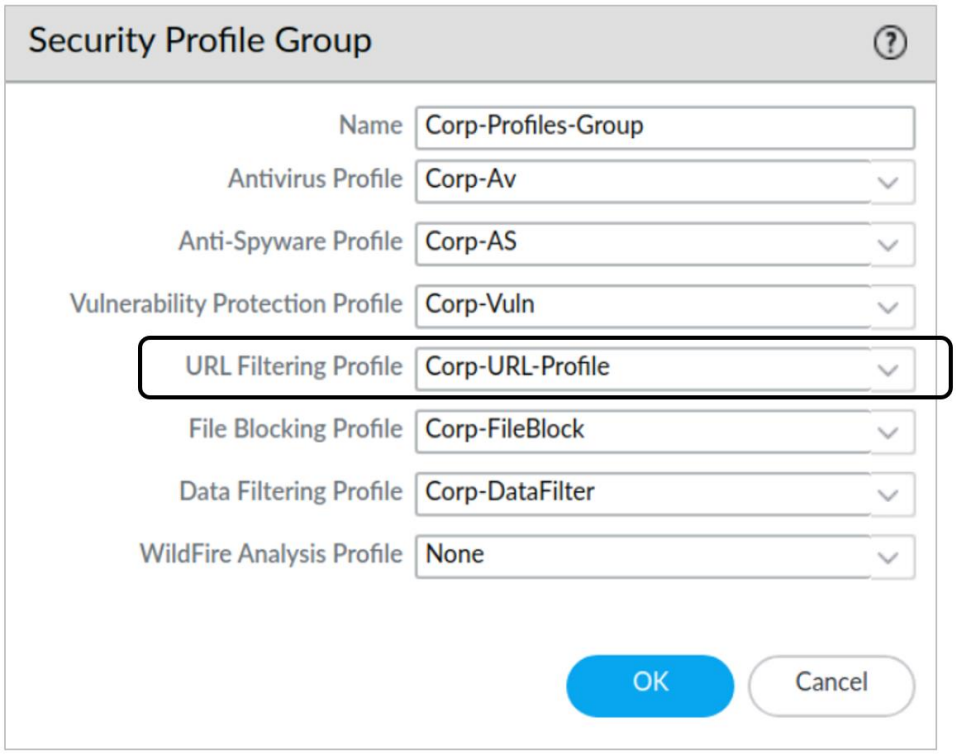
For more information on recommended categories to block, search the Live Community for "URL Filtering Category Recommendations."

52. Click **OK** to close the **URL Filtering Profile** window.

Add the URL Profile to the Corp-Profiles-Group

In this section, you will add the URL Filtering Profile **`Corp-URL-Filtering`** to the existing Security Profile Group you created in an earlier lab.

53. In the firewall web interface, select **Objects > Security Profile Groups**.
54. Click the entry for **Corp-Profiles-Group** to edit it.
55. Use the drop-down list for **URL Filtering Profile** to select **`Corp-URL-Profile`**.



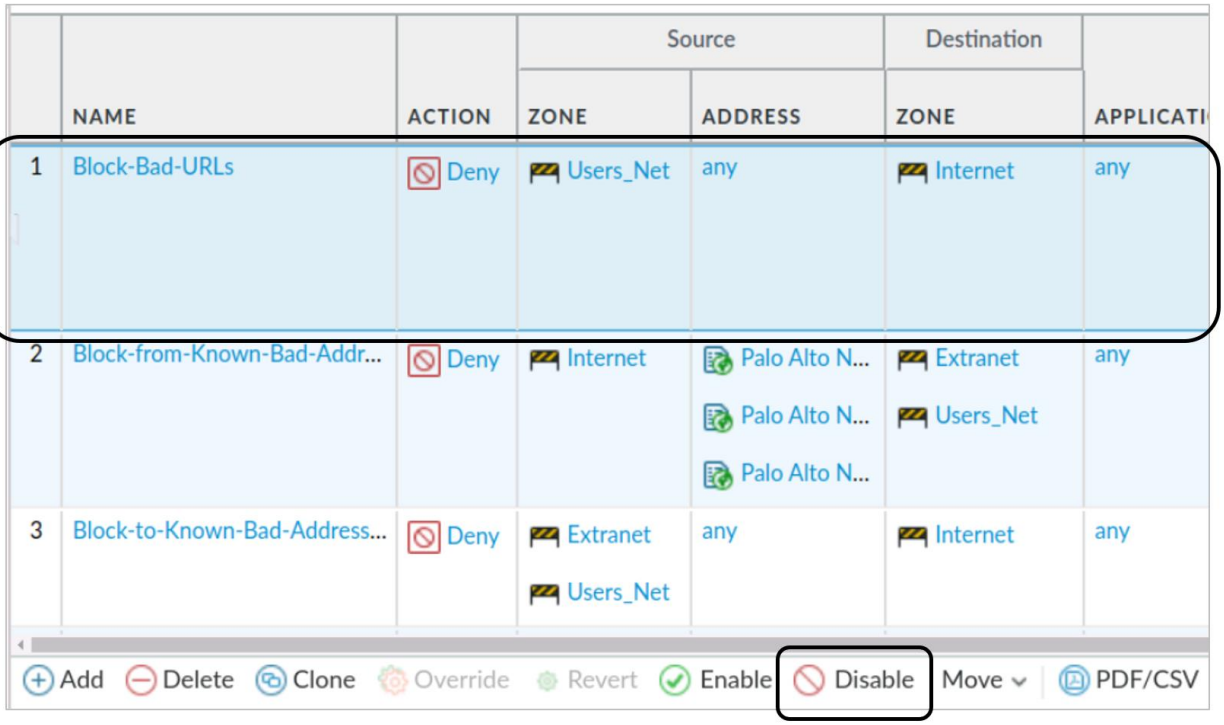
Because you have already applied this Security Profile group to the rules in your Security Policy, you will not need to modify any of the rules themselves. Each rule will now also include this Corp-URL-Profile as part of the inspection process.

56. Leave the remaining settings unchanged and click **OK**.

Disable Block-Bad-URLs Rule

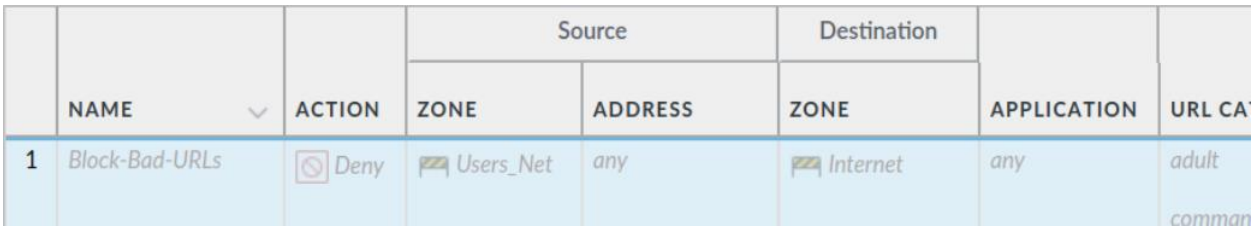
In this section, you will disable the rule that blocks URLs based on categories so that it does not interfere with the URL Filtering Profile.

57. In the firewall web interface, navigate to **Policies > Security**.
58. Highlight the entry for **Block-Bad-URLs** but do not open it.
59. At the bottom of the window, click the **Disable** button.



Note that several columns have been hidden or rearranged in the example shown here.

60. The entry will change to *italics* to indicate that the rule is now **Disabled**.



Note that several columns have been hidden or rearranged in the example shown here.

Commit the configuration

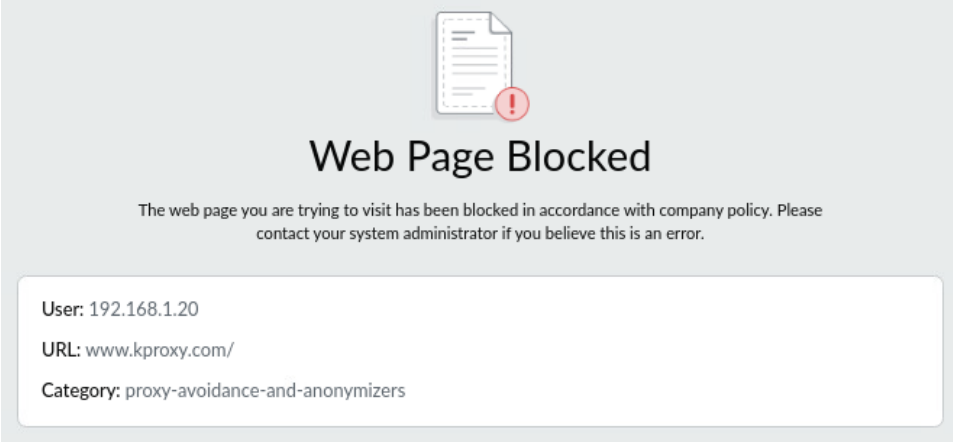
61. Click the **Commit** button at the upper right of the web interface.
62. Leave the settings unchanged and click **Commit**.
63. Wait until the **Commit** process is complete.
64. Click **Close**.

Test Access to URLs Blocked by a URL Filtering Profile

In this section, you will perform tests to ensure that access to malicious URLs is blocked by the firewall using the URL Filtering Profile.

65. Open Chromium and browse to **`http://www.kproxy.com`**.

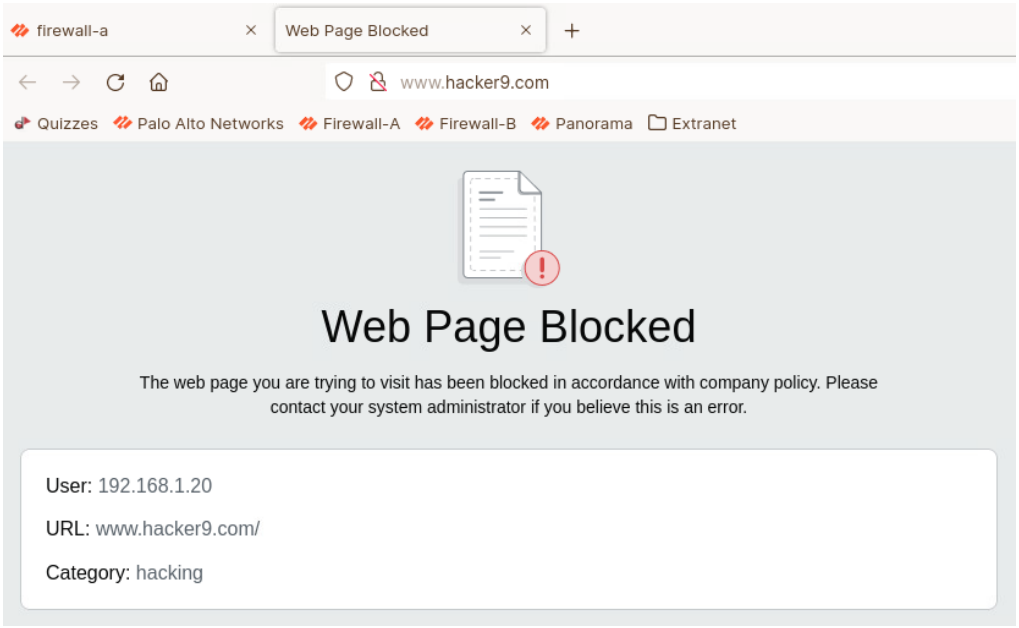
66. You should get a block page because you do not have access to this website. It belongs to the URL category *proxy-avoidance-and-anonymizers*, which is blocked by the URL Filtering Profile.



Notice that the information provided in this page provides more details than what the firewall displayed when it blocked the same website using the Block-Bad-URLs Security Policy rule.

This block page includes the actual URL and the Category that the site belongs to.

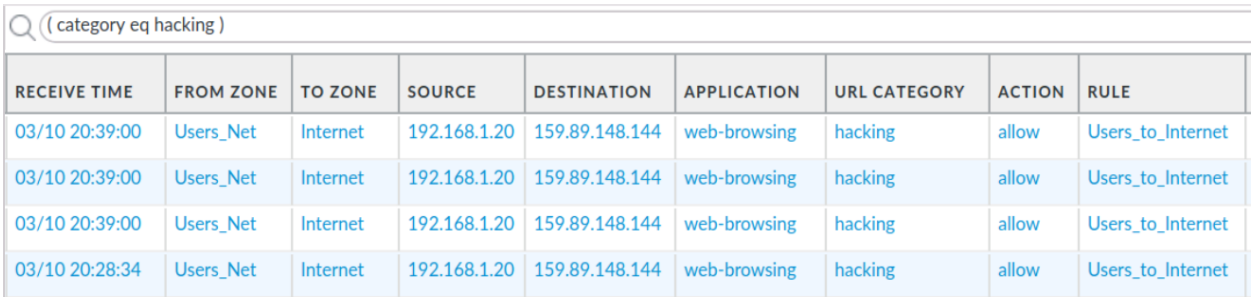
67. In the same tab, browse to **`http://www.hacker9.com`**.



68. Close the Chromium browser.
69. Select **Monitor > Logs > Traffic**.
70. Clear any filters you have in place.

71. Create and apply a filter that will display entries that fall in the URL Category of hacking:

```
( category eq hacking )
```



(category eq hacking)

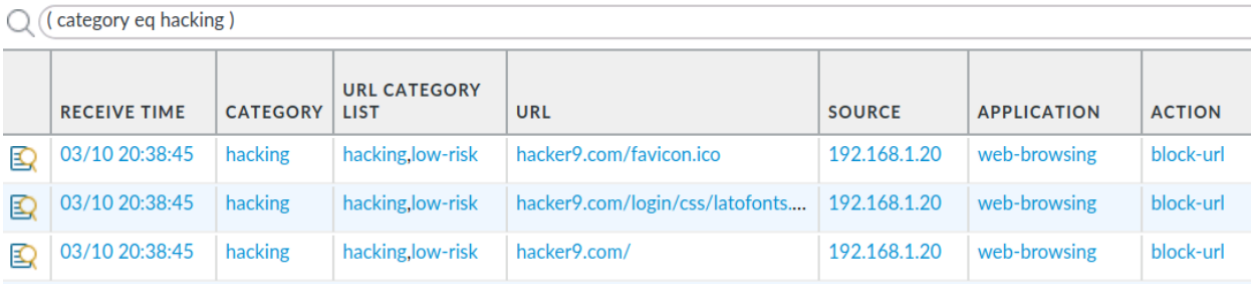
RECEIVE TIME	FROM ZONE	TO ZONE	SOURCE	DESTINATION	APPLICATION	URL CATEGORY	ACTION	RULE
03/10 20:39:00	Users_Net	Internet	192.168.1.20	159.89.148.144	web-browsing	hacking	allow	Users_to_Internet
03/10 20:39:00	Users_Net	Internet	192.168.1.20	159.89.148.144	web-browsing	hacking	allow	Users_to_Internet
03/10 20:39:00	Users_Net	Internet	192.168.1.20	159.89.148.144	web-browsing	hacking	allow	Users_to_Internet
03/10 20:28:34	Users_Net	Internet	192.168.1.20	159.89.148.144	web-browsing	hacking	allow	Users_to_Internet

Notice that the Security Policy rule listed is **Users_to_Internet** and that the **Action** for each entry is **allow**.

The Security Policy rule is not blocking the URL category of hacking. The blocking process happens as part of the URL Filtering Profile inspection.

72. Clear the filter from the Traffic Log.
73. Examine the URL Filtering Log under **Monitor > Logs > URL Filtering**.
74. Clear any filters you have in place.
75. Create and apply a filter to show entries in which the **URL Category** is **hacking:**

```
( category eq hacking )
```



(category eq hacking)

	RECEIVE TIME	CATEGORY	URL CATEGORY LIST	URL	SOURCE	APPLICATION	ACTION
	03/10 20:38:45	hacking	hacking,low-risk	hacker9.com/favicon.ico	192.168.1.20	web-browsing	block-url
	03/10 20:38:45	hacking	hacking,low-risk	hacker9.com/login/css/latofonts....	192.168.1.20	web-browsing	block-url
	03/10 20:38:45	hacking	hacking,low-risk	hacker9.com/	192.168.1.20	web-browsing	block-url

Note that several columns have been hidden or rearranged in the example shown here.

76. Note that the action for these sessions is **block-url**, which is carried out by the URL Filtering Profile.
77. Clear the filter in the URL Filtering log.

Create a Custom URL Category

In some situations, you may want to block only a few websites in a particular category, but you do not want to block the entire category itself. You can accomplish this by creating a Custom URL Category. Adding individual URLs to the Custom URL Category allows you to then block the Custom URL Category within a Security Policy rule or within a URL Filtering Profile.

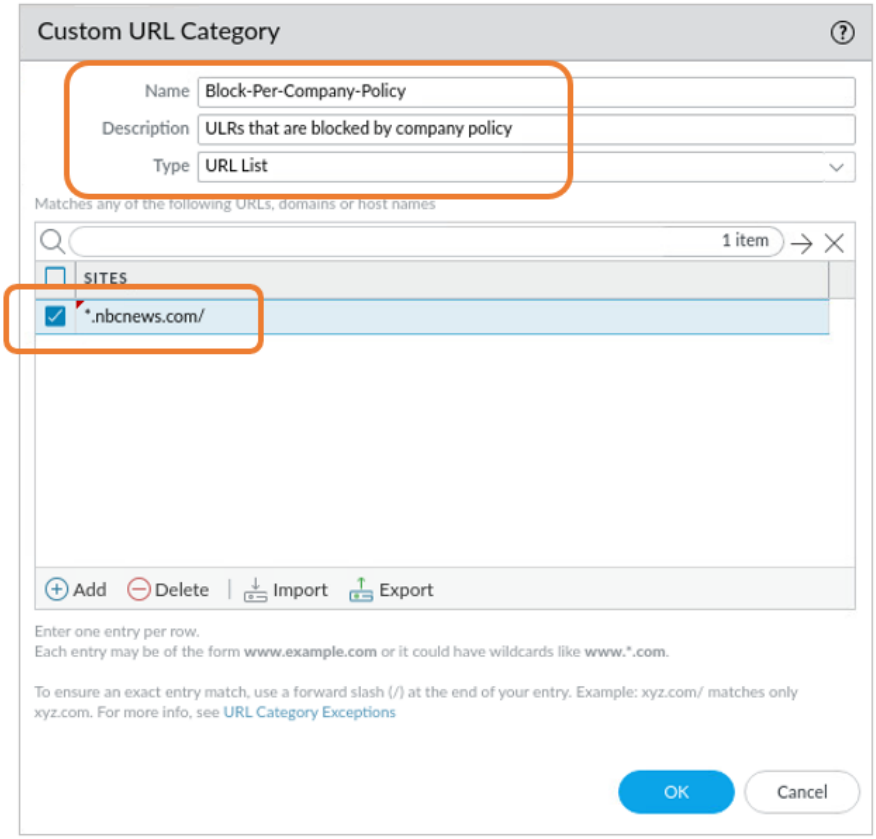
In this section, you will test access to a URL and then create a Custom URL Category that includes that URL along with a few others.

78. Open Chromium (or a new tab) and connect to **`www.nbcnews.com`**.

    The browser should display a valid webpage.

79. Close the Chromium tab for nbcnew.com.
80. In the firewall web interface, select **Objects > Custom Objects > URL Category**.
81. Click **Add.**
82. Click **Cancel** on the message about **Append trailing slash to entries**.
83. Configure the following for the Custom URL Category:

Parameter	Value
Name	**`Block-Per-Company-Policy`**
Description	**`URLs that are blocked by company policy.`**
Type	**`URL List`**
Sites	Add the following: **`*.nbcnews.com/`**

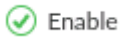


84. Click **OK** to close the **Custom URL Category** window.

Use Custom Category to Block URL Access in Security Policy Rule

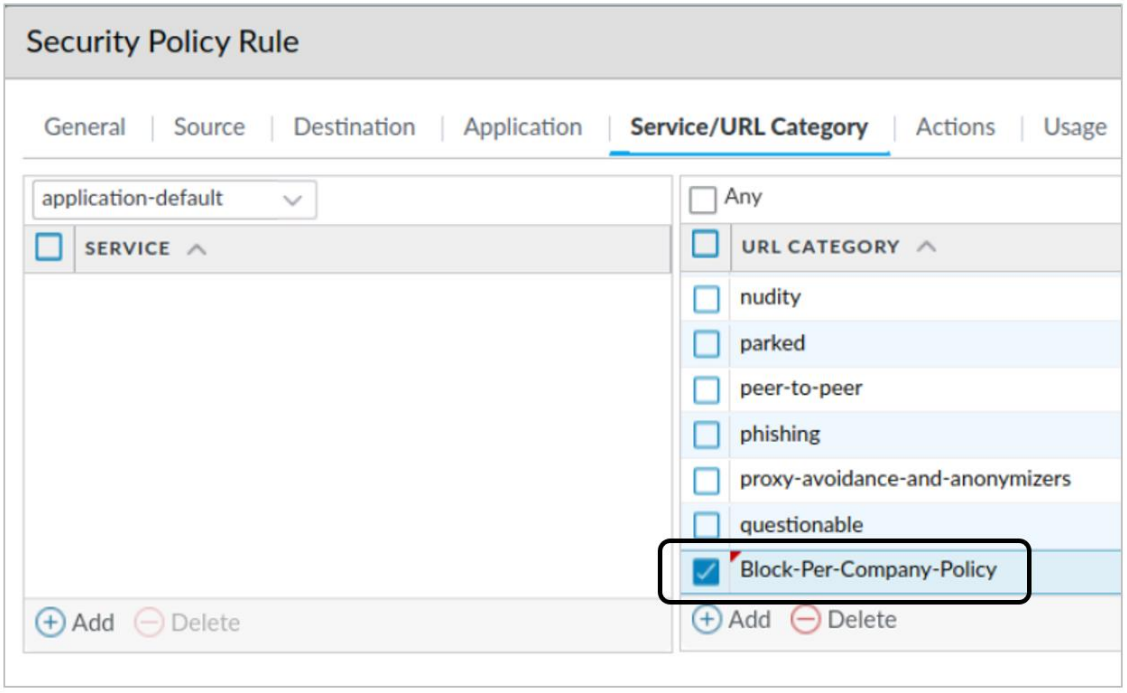
In this section, you will add your Custom URL Category to a Security Policy rule that has a "deny" action.

85. In the web interface, select **Policies** > **Security**.
86. Highlight the rule for **Block-Bad-URLs** but do not open it.
87. Click the **`Enable`** button at the bottom of the window.



88. Click **Block-Bad-URLs** to edit the rule.
89. Click the **Service/URL Category** tab.
90. Under the URL Category, configure the following:

Parameter	Value
URL Category	Add the following to the list: **Block-Per-Company-Policy**



91. Click **OK** to close the **Security Policy Rule** window.

Commit the configuration

92. Click the **Commit** button at the upper right of the web interface.
93. Leave the settings unchanged and click **Commit**.

94. Wait until the **Commit** process is complete.
95. Click **Close**.

Test Access to Custom URLs Blocked by the Security Policy

Now you will test access to URLs that belong to the Custom URL Category that you added to a Security Policy deny rule.

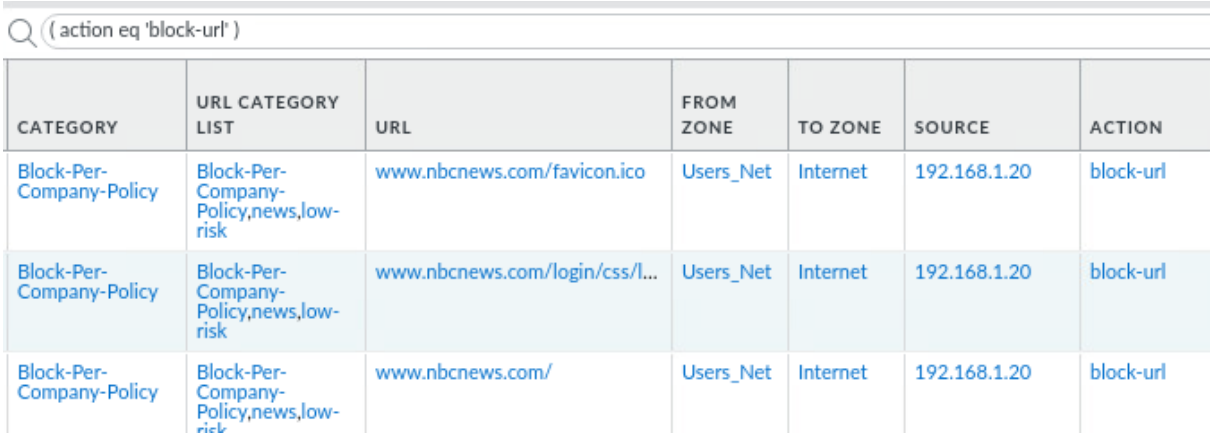
96. On the client desktop, open Chromium and browse to **`http://www.nbcnews.com`**.

    The browser should display an Application Blocked page message because the Custom URL Category in the Security Policy blocks access to the webpage.

97. In the firewall web interface, navigate to **Monitor > Logs > URL Filtering**.
98. Create and the apply a filter to display blocked URLs:

    `( action eq block-url )`

99. You should see multiple entries for sessions to www.nbcnews.com that the firewall has blocked:



CATEGORY	URL CATEGORY LIST	URL	FROM ZONE	TO ZONE	SOURCE	ACTION
Block-Per-Company-Policy	Block-Per-Company-Policy,news,low-risk	www.nbcnews.com/favicon.ico	Users_Net	Internet	192.168.1.20	block-url
Block-Per-Company-Policy	Block-Per-Company-Policy,news,low-risk	www.nbcnews.com/login/css/l...	Users_Net	Internet	192.168.1.20	block-url
Block-Per-Company-Policy	Block-Per-Company-Policy,news,low-risk	www.nbcnews.com/	Users_Net	Internet	192.168.1.20	block-url

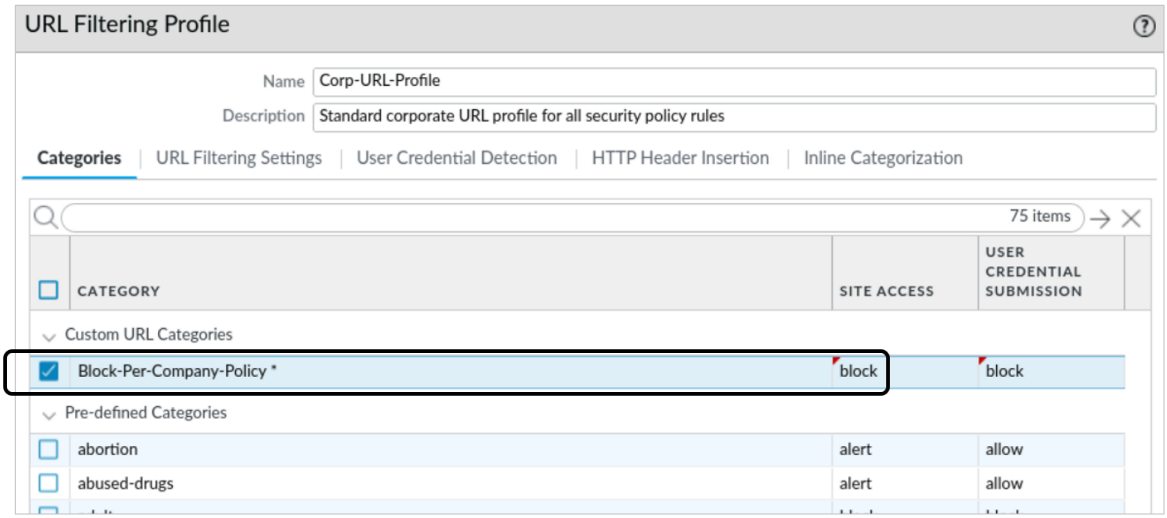
    Note that several default columns have been hidden in the example URL Filtering log file shown here.

100. Notice that the **Category** listed for each of the entries is the **Block-Per-Company-Policy**.

Add Custom URL Category to URL Filtering Profile

In this section, you will set the **Block-Per-Company-Policy** category to **`block`** in the **`Corp-URL-Profile`** URL Filtering Profile.

101. In the firewall web interface, navigate to **Objects > Security Profiles > URL Filtering**.
102. Edit the **Corp-URL-Profile** entry.
103. Under the **Custom URL Categories** section, set the **Site Access** for **Block-Per-Company-Policy** to **`block`**.



104. Leave the remaining settings unchanged.
105. Click **OK**.
106. In the web interface, select **Policies** > **Security**.
107. Highlight the entry for **Block-Bad-URLs** but do not open it.
108. Click **Disable** at the bottom of the window.

Note that you are disabling this rule so that it does not interfere with the Users_to_Internet rule which allows traffic but applies the URL Filtering Profile.

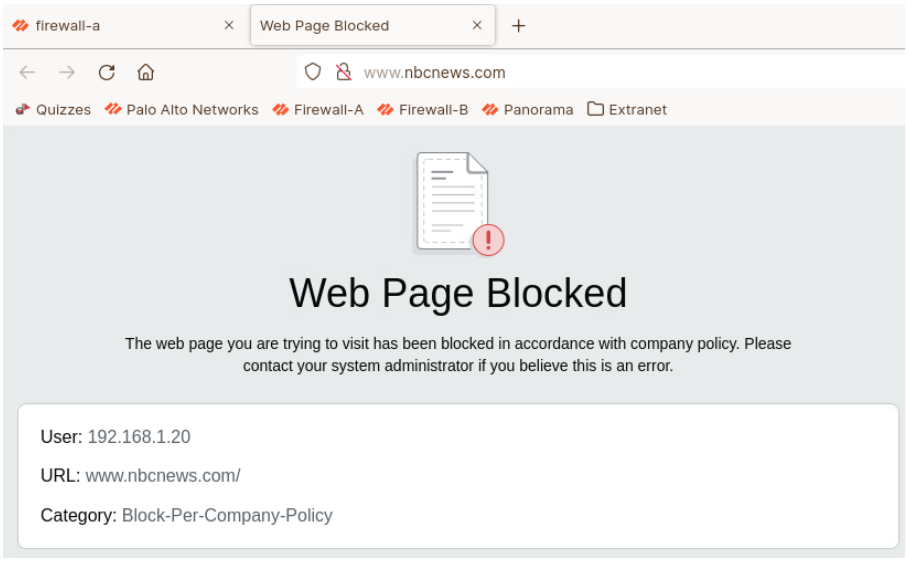
Commit the configuration

109. Click the **Commit** button at the upper right of the web interface.
110. Leave the settings unchanged and click **Commit**.
111. Wait until the **Commit** process is complete.
112. Click **Close**.

Test Access to Custom URLs Blocked by the URL Filtering Profile

Now you will test access to URLs that belong to the Custom URL Category that you added to the URL Filtering Profile.

113. On the client desktop, open Chromium and browse to **`www.nbcnews.com`**.
114. The browser should display a **Web Page Blocked** message.



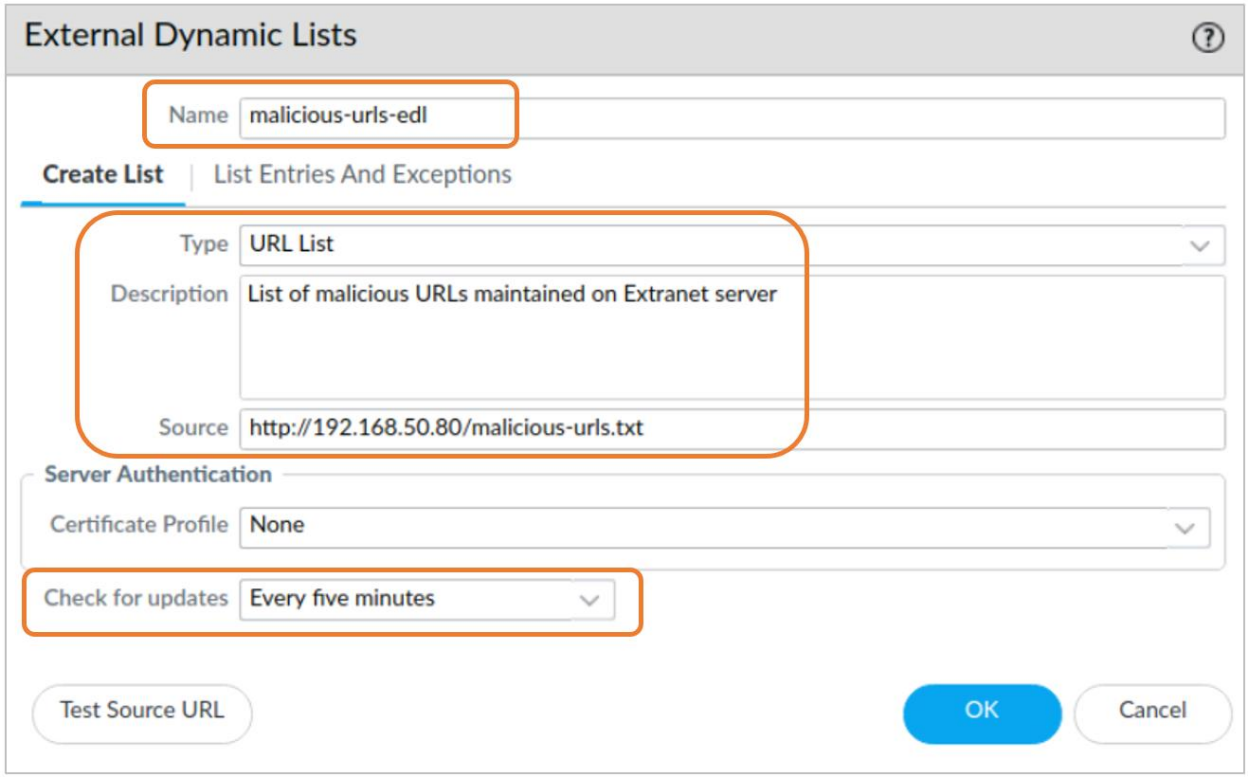
115. Close the Chromium browser.

Create an EDL to Block Malicious URL Access

You can add a list of malicious URLs to a file on an external web server, and then configure the firewall to access the list as an External Dynamic List (EDL). The advantage of this approach is that you can regularly update the malicious URL list without the need to recommit the firewall configuration each time, as you would have to do if you updated a Security Policy rule with a new URL.

116. In the firewall web interface, select **Objects > External Dynamic Lists**.
117. Click **Add**.
118. Click **Cancel** on the message about **Append trailing slash to entries**.
119. Configure the following:

Parameter	Value
Name	`malicious-urls-edl`
Type	`URL List`
Description	`List of malicious URLs maintained on Extranet server`
Source	`http://192.168.50.80/malicious-urls.txt` (The EDL contains several URL for testing purposes - duckduckgo.com is one of them)
Check for updates	`Every Five Minutes`

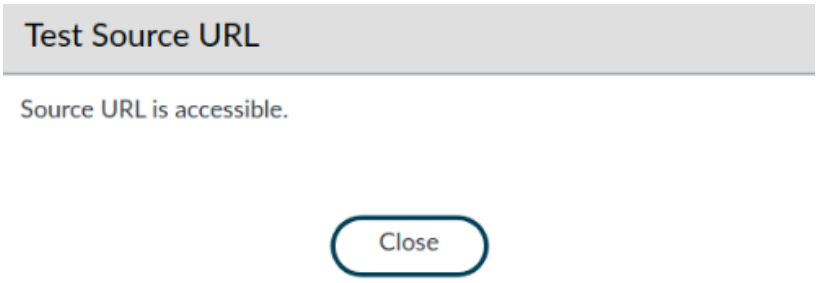


The malicious-urls.txt file contains entries for duckduckgo.com.

120. Click **OK** to close the **External Dynamic Lists** window.
121. Click **malicious-urls-edl**.

The External Dynamic Lists window should open again.

122. Click **Cancel** on the message about **Append trailing slash to entries**.
123. Click **Test Source URL** to verify that the firewall can access the EDL URL.
124. A message window should open and state that the source URL is accessible.



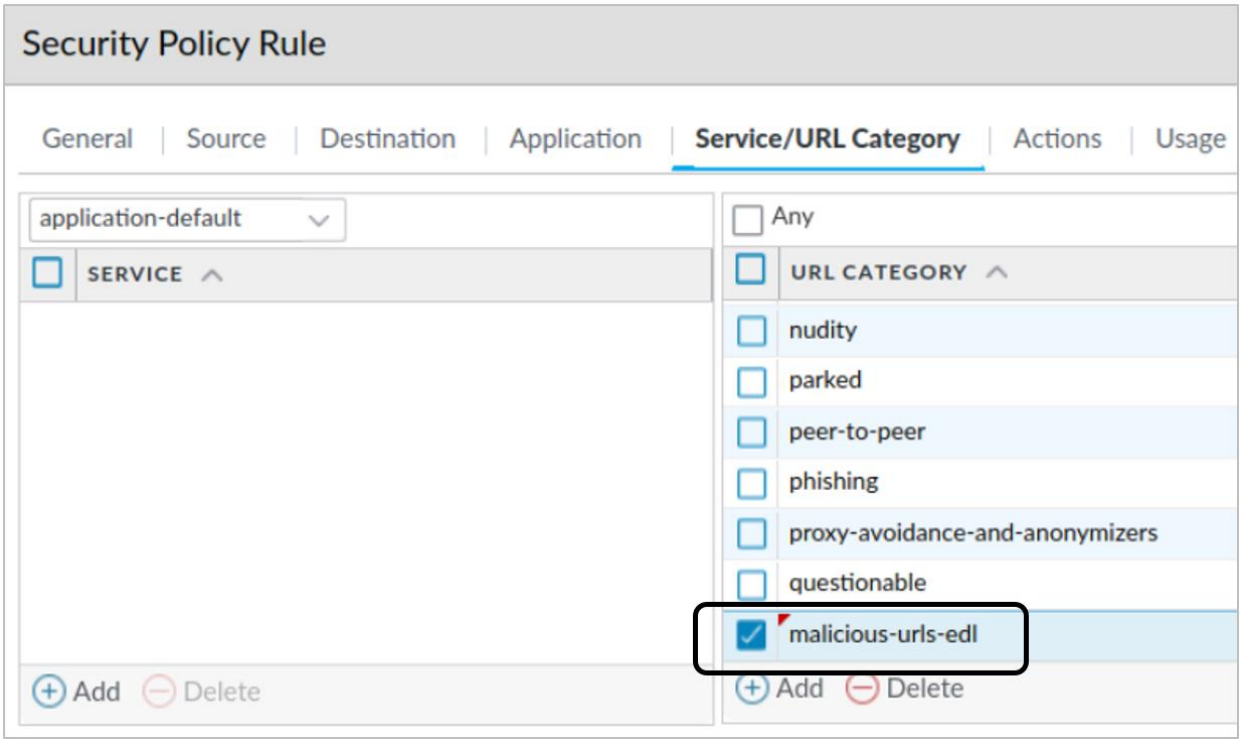
125. Click **Close** to close the message window.
126. Click **OK** to close the **External Dynamic Lists** window.

Block Access to the URL List with a Security Policy Rule

Now you will add the EDL containing the malicious URL list to a Security Policy rule with a "deny" action.

127. In the web interface, select **Policies > Security**.
128. Click **Block-Bad-URLs** to edit the rule.
129. Click the **Service/URL Category** tab and configure the following:

Parameter	Value
URL Category	Add **malicious-urls-edl** to the list. This EDL will block access to duckduckgo.com.



130. Click **OK** to close the **Security Policy Rule** window.
131. With the **Block-Bad-URLs** Security Policy rule highlighted, click **`Enable`** at the bottom of the window.

Commit the configuration

132. Click the **Commit** button at the upper right of the web interface.
133. Leave the settings unchanged and click **Commit**.
134. Wait until the **Commit** process is complete.
135. Click **Close**.

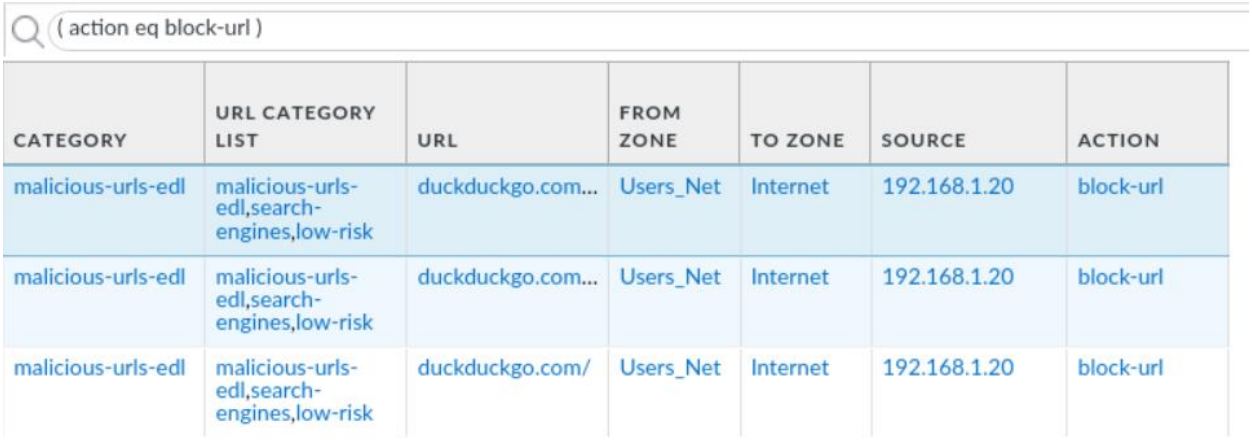
Test Access to URLs Blocked by the EDL in the Security Policy

In this section, you will test access to a URL that is contained in the EDL that you added to a Security Policy rule with a "deny" action.

136. Open Chromium and browse to **`http://duckduckgo.com`**.

    The browser will display an Application Blocked page because the EDL in the Security Policy blocks access to the duckduckgo.com webpage. If you do not see the response page from the FireWall, then please ensure you are using http and not https. If the browser switches to https automatically then please access the link using incognito mode. To open Chromium in incognito mode, please right click the Chromium icon and select **Open a New Window in incognito mode**

137. Close Chromium.
138. In the firewall web interface, navigate to **Monitor > Logs > URL Filtering**.
139. Clear any filters you have in place.
140. Create and apply a filter that will display entries that have an action of block-url:
    `( action eq block-url )`
141. You should see multiple entries for sessions to duckduckgo.com that the firewall has blocked:



CATEGORY	URL CATEGORY LIST	URL	FROM ZONE	TO ZONE	SOURCE	ACTION
malicious-urls-edl	malicious-urls-edl,search-engines,low-risk	duckduckgo.com...	Users_Net	Internet	192.168.1.20	block-url
malicious-urls-edl	malicious-urls-edl,search-engines,low-risk	duckduckgo.com...	Users_Net	Internet	192.168.1.20	block-url
malicious-urls-edl	malicious-urls-edl,search-engines,low-risk	duckduckgo.com/	Users_Net	Internet	192.168.1.20	block-url

Note that several default columns have been hidden in the example URL Filtering log file shown here.

142. In the web interface, select **Policies > Security**.
143. Highlight the entry for **Block-Bad-URLs** but do not open it.
144. Click **Disable** at the bottom of the window.

Commit the configuration

145. Click the **Commit** button at the upper right of the web interface.
146. Leave the settings unchanged and click **Commit**.
147. Wait until the **Commit** process is complete.
148. Click **Close**.

Stop. This is the end of the lab.

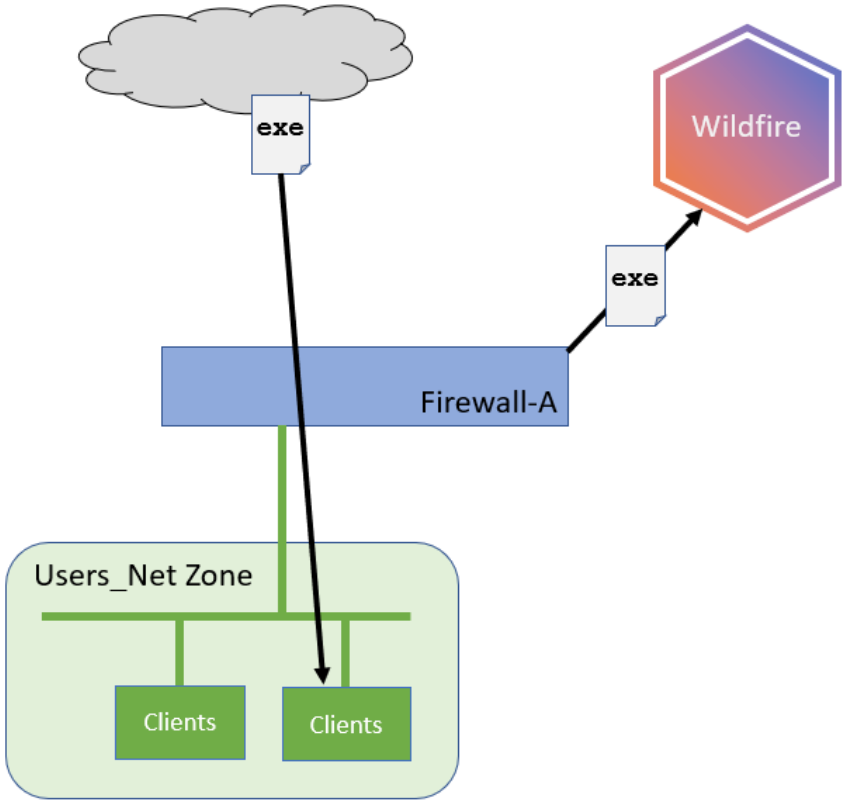
Lab 11: Blocking Unknown Threats with WildFire

Your company has recently seen an increase in malicious files that users are downloading. You have sent out informational emails explaining how much damage these types of files can do, and you have told people not to download files from questionable sources.

Fortunately, you have deployed the Palo Alto Networks firewall, and you can set up a Security Profile that will send any unknown files to the WildFire cloud for analysis.

To test the Security Profile after you have configured it, you will download a test file provided by Palo Alto Networks. This test file is not actually malicious, but WildFire will identify it as such.

You will then examine a detailed report from WildFire with information about the file that was analyzed.



Lab Objectives

- Create a WildFire Analysis Profile
- Apply WildFire Profile to security rules
- Test the WildFire Analysis Profile
- Examine WildFire analysis details

High-Level Lab Steps

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-11.xml`** - to the Firewall

Create a WildFire Analysis Profile

- Use the information in the tables below to create a WildFire Analysis Security Profile that you can attach to Security Policy rules to test files and URLs for malware.

Parameter	Value
Name	**`Corp-WF`**
Description	**`WildFire profile for Corp security rules.`**

- Click **Add** in the bottom left corner and configure the following:

Profile Details	Value
Name	**`All_Files`**
Applications	**any**
File Types	**any**
Direction	**Both**
Analysis	**public-cloud**

Modify Security Profile Group

- Add the **Corp-WF** Profile to the **Corp-Profiles-Group**.
- **`Disable`** all but the **Corp-WF** Security Profile.

  Doing this ensures that the firewall will only use WildFire and no other Security Profiles such as Anti-Virus or Machine Learning for this lab.

Update WildFire Settings

- Enable the options for **Report Benign Files** and **Report Grayware Files** under the **General Settings** for Wildfire.

Set Monitor Log Interval

- Change the **Interval** setting from the default **20** minutes to **1** minute by issuing the following command:

  ```
  debug wildfire monitor-log interval 1
  ```

Commit the configuration

- Commit the changes before proceeding.

Test the WildFire Analysis Profile

- Use the testing browser and connect to:

```
http://192.168.50.80/wildfire-test-pe-file.exe
```

- Save the file when prompted
- Use the **Remmina** application and connect to **Firewall-A**
- Use the command **debug wildfire upload-log show** to verify that the test file was uploaded

Examine WildFire Analysis Details

- Examine the **WildFire Submissions** log file and periodically use the **Refresh** until you see a new entry for the wildfire-test-pe-file.exe.
- Examine the **Detailed Log View** for the entry.
- Note the **Verdict** of the file.
- Click the link for **Download PDF** and examine the report to view detailed information about the Wildfire analysis of the file.

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down list next to the **Name** text box and select **edu-210-11.1a-11.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK**.
5. A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.
9. Click **Close** to continue.

Create a WildFire Analysis Profile

In this section you will create a WildFire Analysis Security Profile that you can attach to Security Policy rules to test files and URLs for malware.

10. In the web interface, select **Objects > Security Profiles > WildFire Analysis**.
11. Click **Add** to create a new Profile.

    A **WildFire Analysis Profile** window should open.

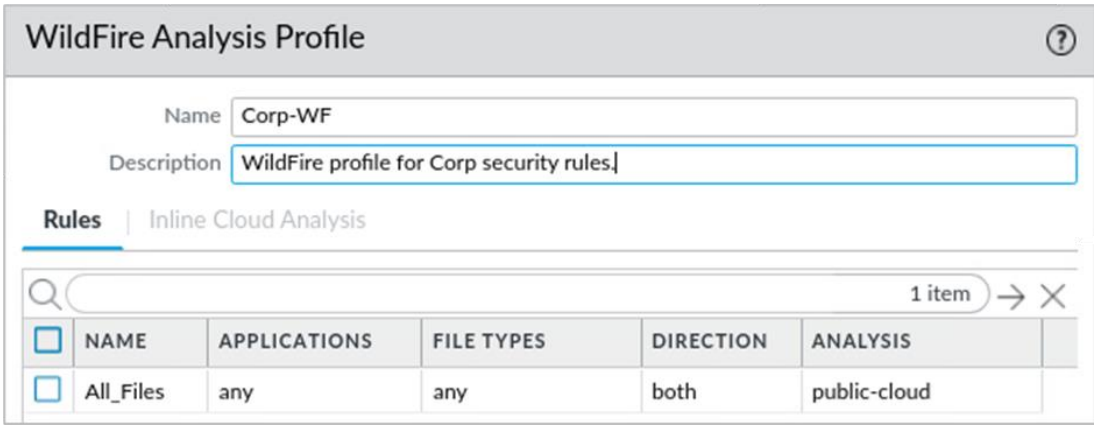
12. Configure the following:

Parameter	Value
Name	`Corp-WF`
Description	`WildFire profile for Corp security rules.`

13. Click **Add** in the bottom left corner and configure the following:

Parameter	Value
Name	`All_Files`
Applications	Verify that **any** is selected
File Types	Verify that **any** is selected
Direction	Verify that **both** is selected

Parameter	Value
Analysis	Verify that **public-cloud** is selected

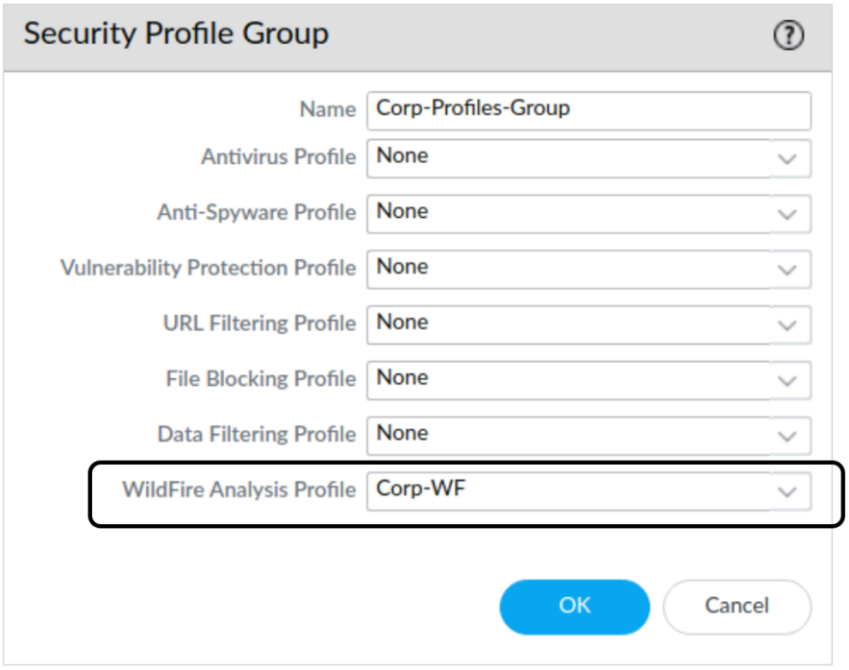


14. Click **OK** to close the window.

    The new WildFire Analysis Profile now should be listed.

Modify Security Profile Group

15. Select **Objects > Security Profile Groups**.
16. Edit the entry for **Corp-Profiles-Group**.
17. Use the drop-down list for **Wildfire Analysis Profile** to select **Corp-WF**.
18. Set the other **Profiles** to **None**:



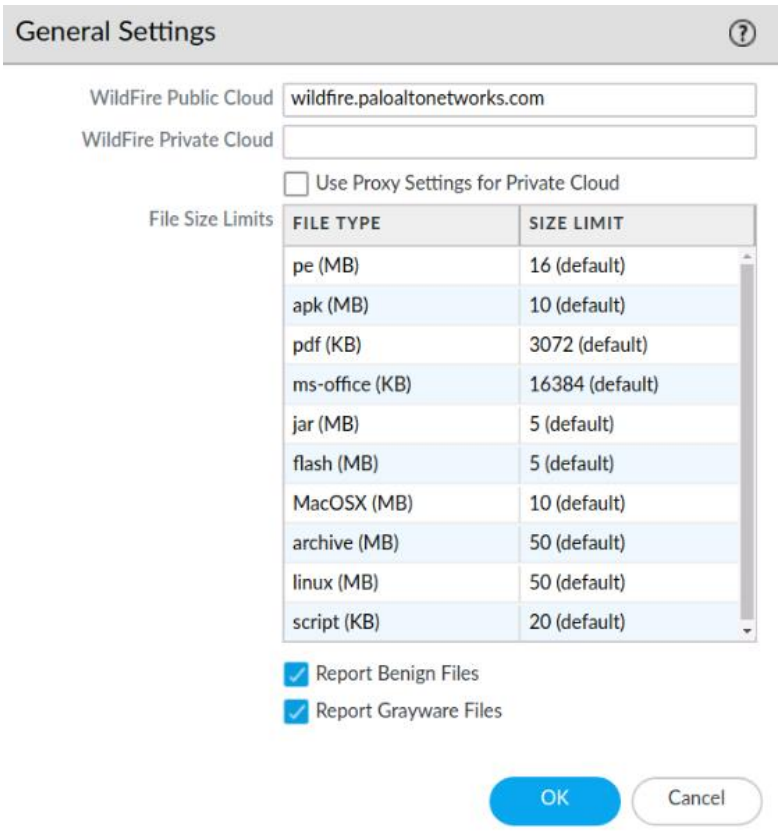
Doing this ensures that the firewall will only use Wildfire and no other Security Profiles such as Anti-Virus or Inline Machine Learning.

In a production environment, you definitely want to apply all the Security Profiles for your Group. In this lab, we only want to test WildFire to see how it operates alone.

19. Click **OK**.

Update WildFire Settings

20. Select **Device > Setup > WildFire**.
21. Click the gear icon to edit the **General Settings**.
22. Check the boxes for **Report Benign Files** and **Report Grayware Files**.
23. Leave the remaining settings unchanged.



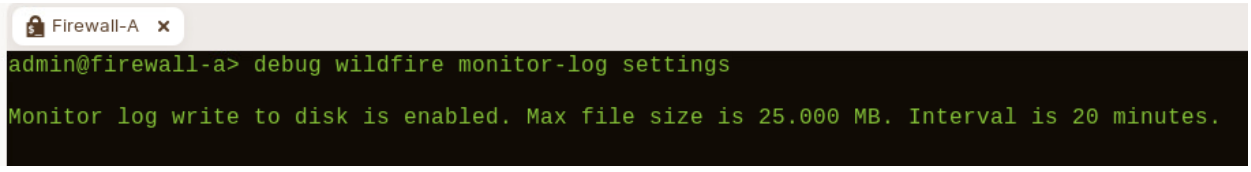
24. Click **OK**.

Set Monitor Log Interval

In this section, you will connect to the firewall through the CLI and modify a setting that determines how long the firewall waits before writing information to the WildFire upload log. The default value is 20 minutes. You will set this value to 1 minute only for this test (so you don't have to wait as long to see information in the log). When testing is complete, you will set the value back to the default 20 minutes.

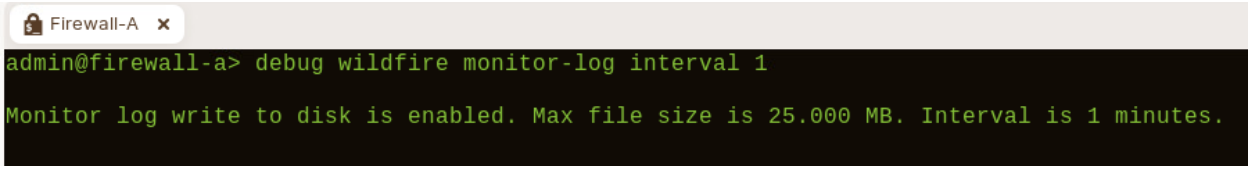
25. Open the Remmina Remote Desktop Client.
26. Double-click the entry for **Firewall-A** to connect.
27. Issue the following command to see the current monitor log settings:

```
debug wildfire monitor-log settings <ENTER>
```



28. Change the **Interval** setting from the default **20** minutes to **1** minute by issuing the following command:

debug wildfire monitor-log interval 1 <ENTER>



The monitor log interval determines how long the firewall waits to

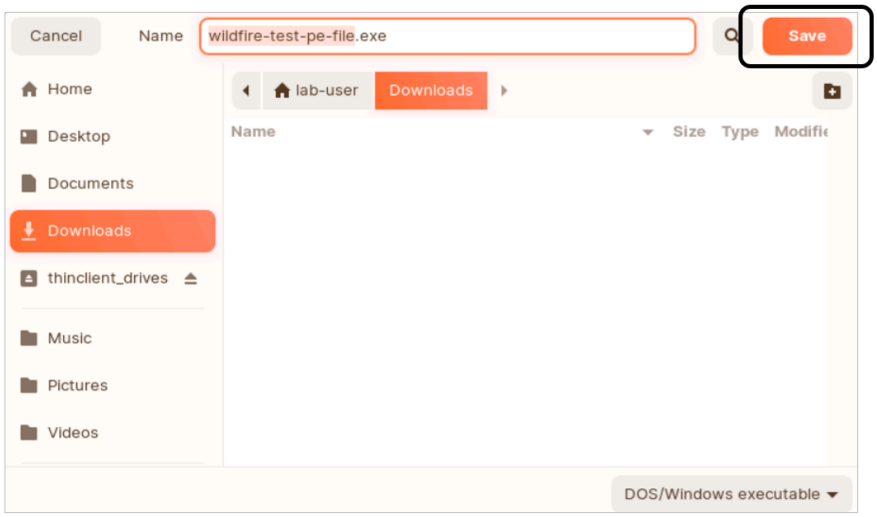
29. Leave the Remmina connection to Firewall-A open because you will use it a bit later in this lab.

Commit the configuration

30. In the web interface, click the **Commit** button at the upper right of the web interface.
31. Leave the settings unchanged and click **Commit**.
32. Wait until the **Commit** process is complete.
33. Click **Close**.

Test the WildFire Analysis Profile

34. Open the testing browser and connect to:
http://192.168.50.80/wildfire-test-pe-file.exe
35. When the testing browser prompts you, select **Save**.

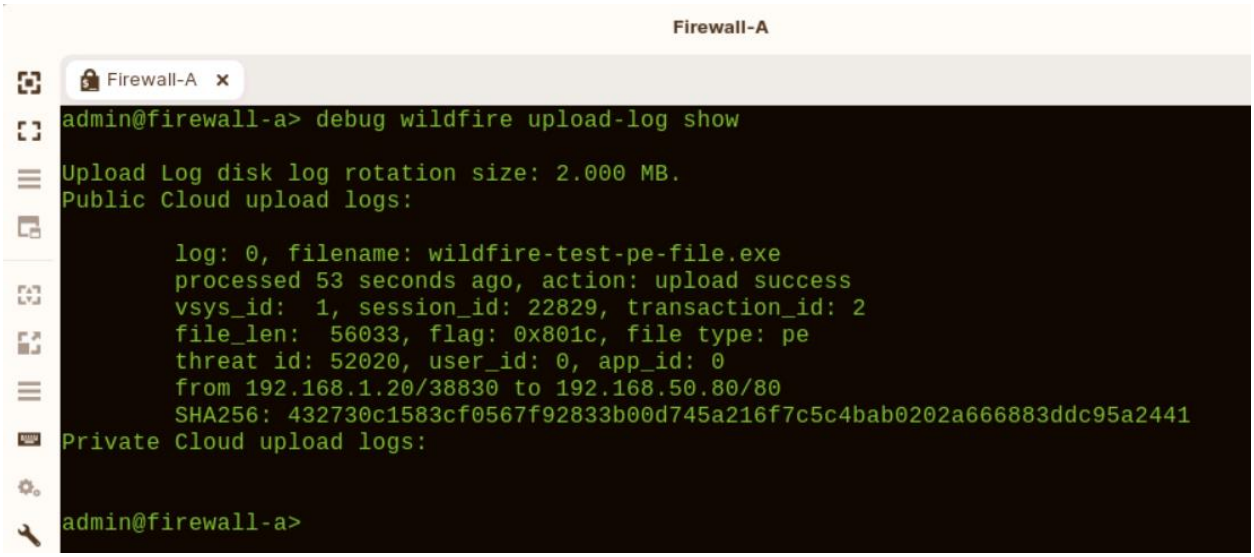


This site generates an attack file with a unique signature that simulates a zero-day attack.

36. Close the testing browser.
37. On the client desktop, select the **Remmina** connection to Firewall-A.

38. From the CLI, enter the command **`debug wildfire upload-log show.`**

    The command should display the output **`log: 0, filename: wildfire-test-pe-file.exe processed….`** This output verifies that the file was uploaded to the WildFire public cloud. The message might take a minute or two to display.



    Note that the details of the entry you see will differ from the example shown here.

    If you do not see any entries in the wildfire upload log, clear the cache in the testing browser and repeat the file download steps.

39. Change the Monitor Log Interval back to the default setting by issuing the following command:

`debug wildfire monitor-log interval 20 <ENTER>`

40. Type **`exit`** **<Enter>** to close the SSH session to the firewall.
41. Close the Remmina application window.

Examine WildFire Analysis Details

42. In the firewall web interface, select **Monitor > Logs > WildFire Submissions**:

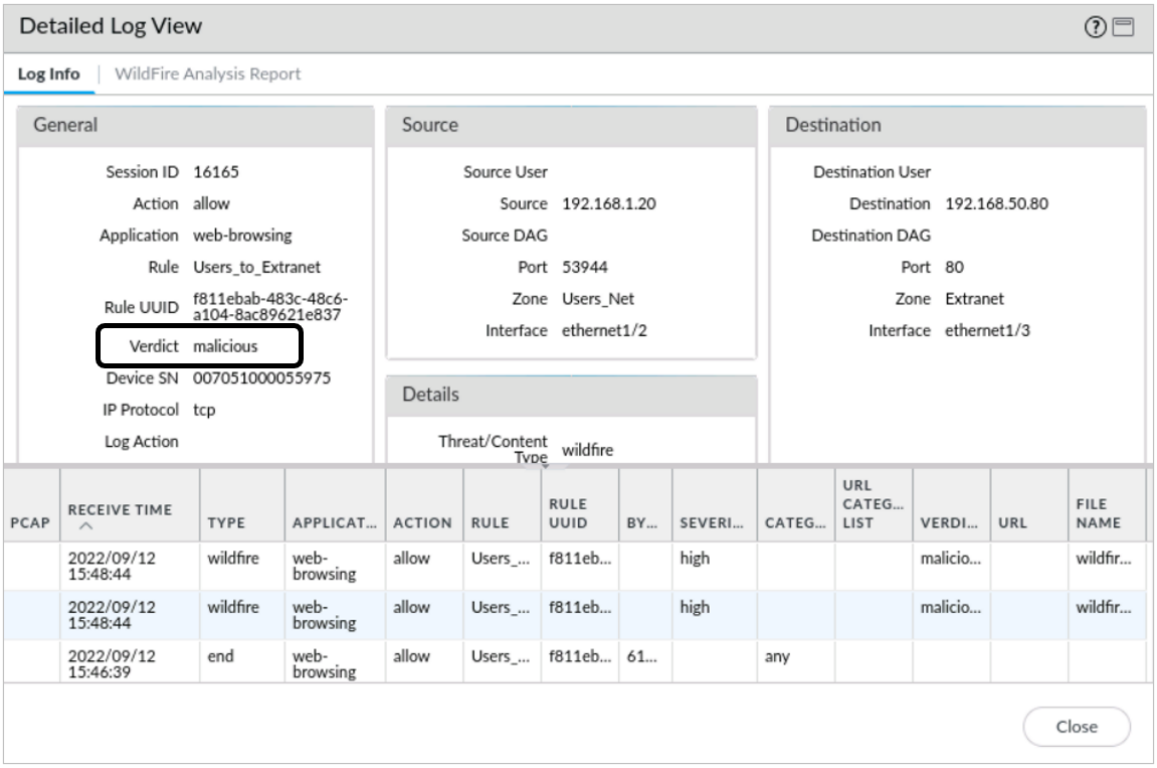
    Analysis takes 5 to 15 minutes, and the table will remain empty until WildFire has reached a verdict about the file.

43. Periodically use the **Refresh** button  in the upper right corner of the window until you see a new entry for the wildfire-test-pe-file.exe.

	RECEIVE TIME	FILE NAME	SOURCE ZONE	DESTINA... ZONE	SOURCE ADDRESS	APPLICATION	RULE	VERDICT	SEVERITY
	09/12 15:48:44	wildfire-test-pe-file.exe	Users_Net	Extranet	192.168.1.20	web-browsing	Users_to_Extranet	malicious	high

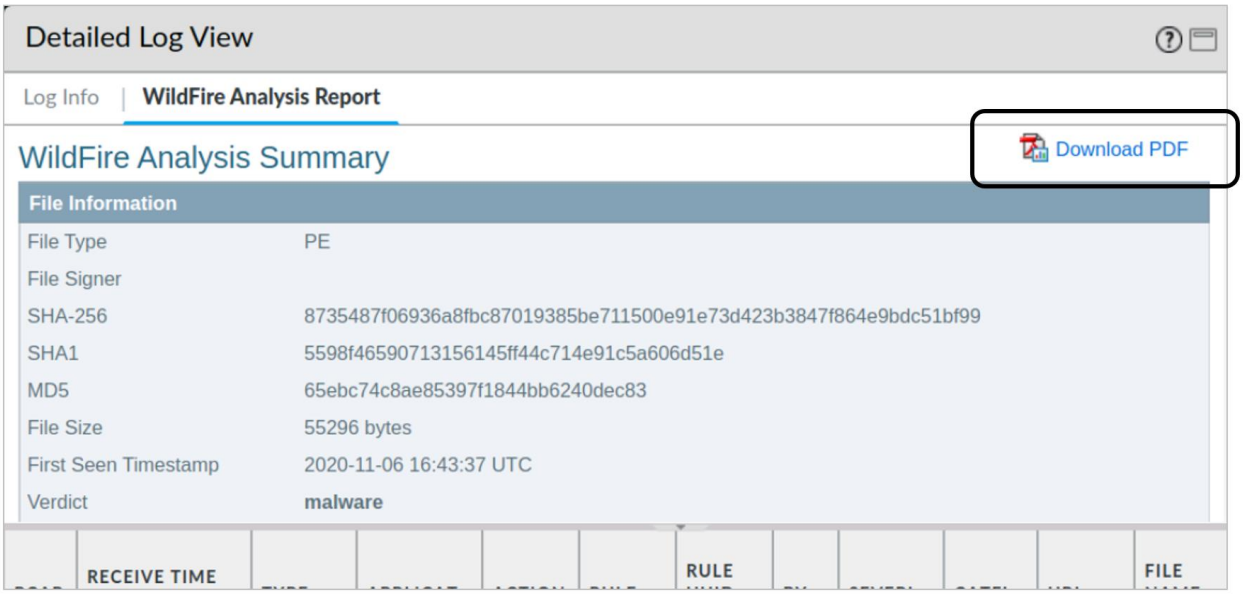
    Note that in this example several default columns have been hidden, and the details of the entry you see will differ.

44. Click the **magnifying glass** icon next to the entry to open the **Detailed Log View** of the entry.
45. Under the General section, note the **Verdict**:

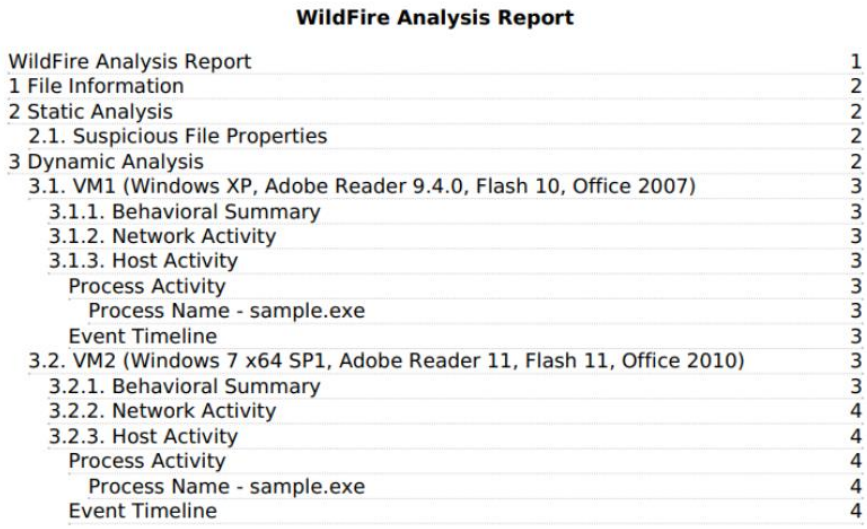


Note that the details of the entry you see will differ from this example.

46. Click the tab labeled **Wildfire Analysis Report** at the top of the Detailed Log View.
47. Click the link for **Download PDF**.



48. This action will open a PDF version of the Wildfire Analysis Report in another tab of the configuration browser.



WildFire Analysis Report

WildFire Analysis Report 1
1 File Information 2
2 Static Analysis 2
2.1. Suspicious File Properties 2
3 Dynamic Analysis 2
3.1. VM1 (Windows XP, Adobe Reader 9.4.0, Flash 10, Office 2007) 3
3.1.1. Behavioral Summary 3
3.1.2. Network Activity 3
3.1.3. Host Activity 3
Process Activity 3
Process Name - sample.exe 3
Event Timeline 3
3.2. VM2 (Windows 7 x64 SP1, Adobe Reader 11, Flash 11, Office 2010) 3
3.2.1. Behavioral Summary 3
3.2.2. Network Activity 4
3.2.3. Host Activity 4
Process Activity 4
Process Name - sample.exe 4
Event Timeline 4

Note that the information you see in your report may vary from the example shown here.

49. Scroll through the report to view detailed information about the Wildfire analysis of the file.

3.1. VM1 (Windows XP, Adobe Reader 9.4.0, Flash 10, Office 2007)

3.1.1. Behavioral Summary

This sample was found to be **malware** on this virtual machine.

Behavior	Severity
Sample removed system files. Sample removed system files.	
This is a WildFire test sample WildFire test samples exercise the capabilities of the WildFire analysis engine for purposes of testing.	
Created or modified a file in the Windows system folder The Windows system folder contains configuration files and executables that control the underlying functions of the system. Malware often modifies the contents of this folder to manipulate the system, establish persistence, and avoid detection.	
Created or modified a file Legitimate software creates or modifies files to preserve data across system restarts. Malware may create or modify files to deliver malicious payloads or maintain persistence on a system.	
Modified the Windows Registry The Windows Registry houses system configuration settings and options, including information about installed applications, services, and drivers. Malware often modifies registry data to establish persistence on the system and avoid detection.	

For example, section 3.1 provides details about the kind of environment that WildFire used to test the file along with specific actions that the malware file carried out. Note that the information you see in your report may vary from the example shown here.

50. Close the configuration browser tab that contains the PDF version of the WildFire Analysis Report.
51. Click **Close** to close the **Detailed Log View** window.

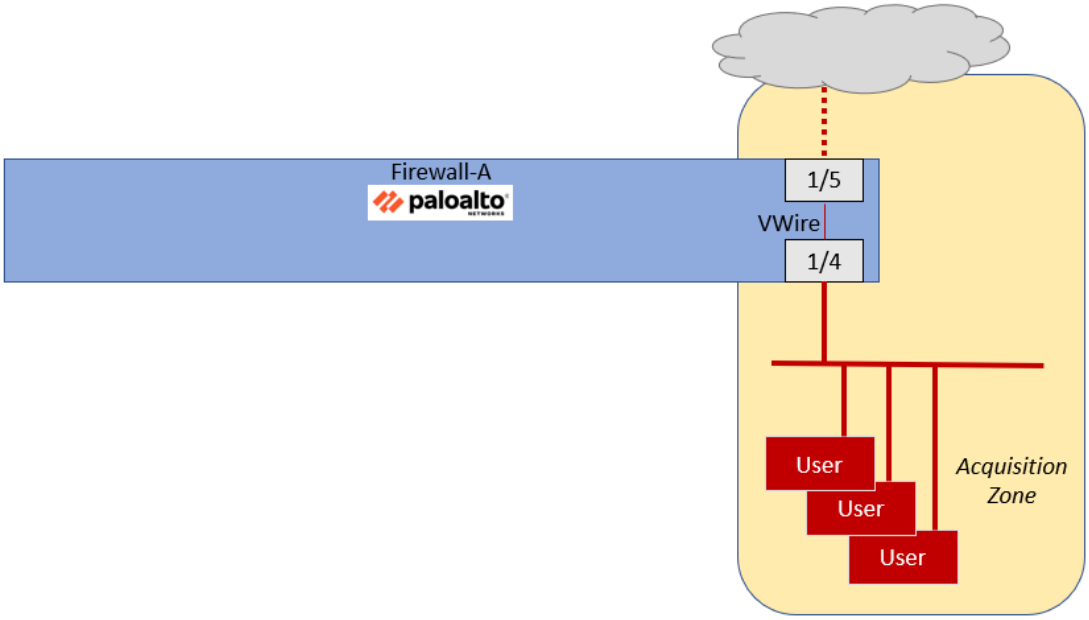
Stop. This is the end of the lab.

Lab 12: Controlling Access to Network Resources with User-ID

Your organization recently acquired another company, and you have been tasked to create appropriate security Policy rules for traffic generated by these new users.

Your firewall has been configured with a virtual wire that allows traffic to the Internet from the users in the newly acquired company. The firewall also has a new security zone in place called Acquisition that contains all new users.

The firewall has an existing Security Policy rule that allows all users in the Acquisition zone to access any application on the internet. Your task is to restrict users in this new organization to approved corporate applications only.

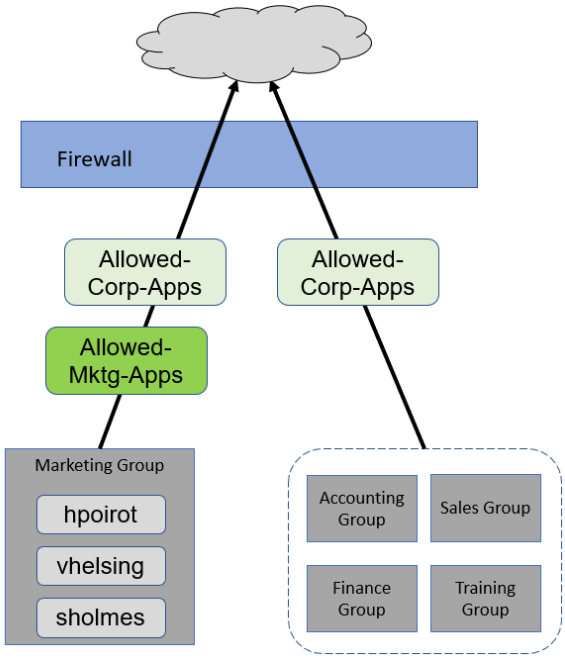


The approved corporate applications include DNS, web-browsing, and SSL.

You also need to ensure that only users in the marketing group are allowed to use social media applications such as Facebook, Instagram, and others.

Another firewall administrator has created the appropriate Application Groups for you.

The firewall receives User-ID and Group membership information about users in this new company from an XML upload sent by network authentication devices. (Note that this is simulated in this lab and outside the scope of this course).



You also need to create a Security Policy rule that explicitly denies any other traffic generated by users in the Acquisition zone. Although the interzone-default rule will deny any traffic not expressly allowed, creating an explicit deny rule will allow you to examine the kinds of applications users in the Acquisition zone are attempting to access.

Lab Objecti

- Examine current configuration
- Enable User-ID technology on the Acquisition zone.
- Generate traffic
- Modify Security Policy to meet requirements

High-Level Lab Steps

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-12.xml`** - to the Firewall

Examine Firewall configuration

- Review the settings that another administrator has configured for Application Groups and Security Policy rules, and verify the following settings on the **Acquisition-Allow-All** Security Policy rule

Parameter	Value
Source Zone	`Acquisition`
Source Address	`Any`
Destination Zone	`any`
Destination IP	`Any`
Application	`Any`
Action	`Allow`

- Clear the counters for all Security Policy rules
- Use the information below to verify that the configuration contains two new **Application Groups**

Name	Applications

Allowed-Corp-Apps	`dns`
	`web-browsing`
	`ssl`

Allowed-Mktg-Apps	`facebook-base`
	`instagram-base`
	`twitter-base`
	`myspace-base`
	`linkedin-base`

Generate Traffic from the Acquisition Zone

- Use **Remmina** to connect to the **Server-Extranet** host
- Change to the appropriate directory

cd /home/paloalto42/pcaps92019/app.pcaps `<Enter>`

- Run the following command to start generating traffic in the Acquisition Zone:

./Appgenerator-2.sh `<Enter>`

- While the script is running, examine the firewall Traffic log under **Monitor** > **Logs** > **Traffic**.
- Note that almost all traffic is hitting the **Acquisition-Allow-All Rule**.
- Add the **Source User** column to the Traffic Log

Enable User-ID on the Acquisition Zone

- Edit the **Acquisition** Security zone and check the box for **Enable User Identification**

Modify the Acquisition-Allow-All Security Policy Rule

- Change the name of the Security Policy rule **Acquisition-Allow-All** to **`Allow-Corp-Apps`**
- Change the Description field to **`Allows only approved apps for Acquisition users`**.
- Set the Applications to use only the **`Allowed-Corp-Apps`** Application Group

Create Marketing Apps Rule

- Use the information below to create a Security Policy rule to allow only Marketing users to access the Allowed-Mktg-Applications

Parameter	Value
Name	`Allow-Mktg-Apps`
Description	`Allows only users of marketing group to access Mktg apps`
Source Zone	`Acquisition`
Source User	`marketing`
Destination Zone	`any`
Application	`Allowed-Mktg-Apps`
Dependent Applications	`Add to Current Rule`
Action	`Allow`

Create Deny Rule

- Use the information below to create a new Security Policy rule that will deny any other application traffic for users in the Acquisition zone.

Parameter	Value
Name	`Deny-All-Others`
Description	`Denies non-approved applications for users in Acquisition zone`
Source Zone	`Acquisition`
Source User	`Any`
Destination Zone	`any`

Parameter	Value
Application	`Any`
Action	`Deny`

- Place the **Deny-All-Others** rule at the bottom of the Security Policy.

Commit the configuration

- Commit the changes before proceeding

Generate Traffic from the Acquisition Zone

- Use the Extranet-Server connection in the Remmina application to run the **Appgenerator-2.sh** script again
- While the script is running, move to the next section in which you will examine the firewall logs

Examine User-ID Logs

- Use the firewall CLI and the web interface to examine information about User-ID
- The firewall should have numerous entries with username-to-ip-address mappings in the User-ID log
- Use the Remmina application to connect to the CLI of **Firewall-A**
- Use the following command to display entries for User-ID:

show user ip-user-mapping all `<Enter>`

- Close the firewall SSH connection.

Examine Firewall Traffic Log

Examine Firewall Traffic Log

1. Create and apply filters in the Traffic log to answer the questions in this section.

Which rule does the firewall use when it encounters youtube-base traffic?

Which rule does the firewall use when it encounters dns traffic?

Which rule does the firewall use when it encounters facebook-base?

Which users are allowed access to facebook-base?

Is the user sholmes allowed to access instagram-base?

Is the user bbart allowed to access instagram-base?

Clean Up the Desktop

- In the Traffic log window on the firewall, clear any filters you have in place
- In the Remmina application window, close the SSH connections to the firewall and the Server-Extranet
- Close the main Remmina application window

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down list next to the **Name** text box and select **edu-210-11.1a-12.xml**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

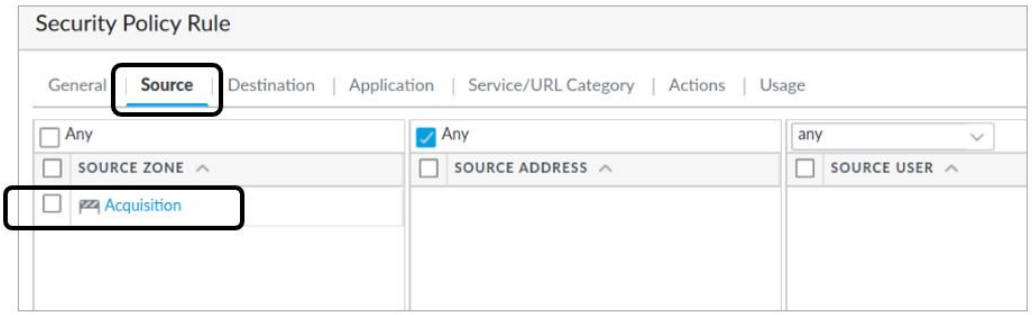
4. Click **OK**.
5. A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.

9. Click **Close** to continue.

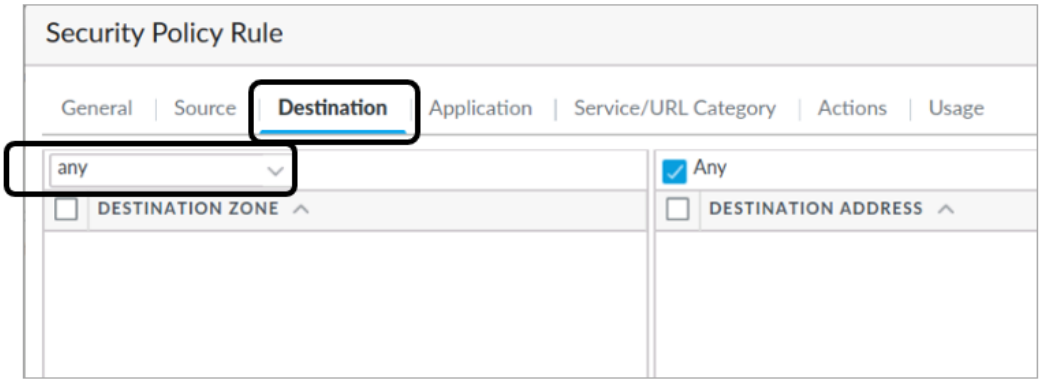
Examine Firewall Configuration

In this section, you will review the settings that another administrator has configured for Application Groups and Security Policy rules.

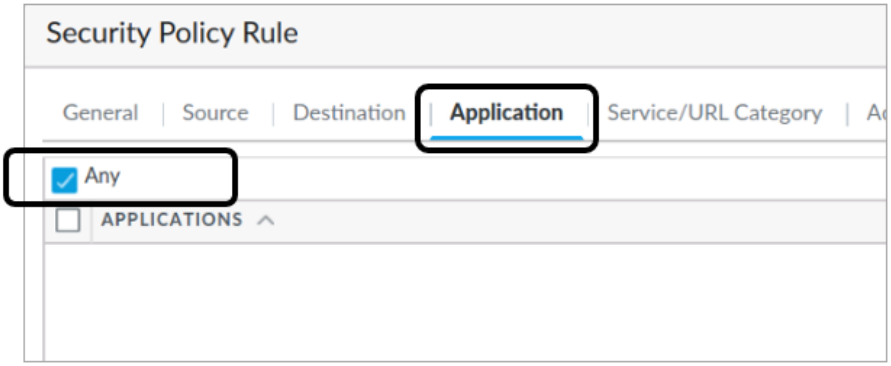
10. Select **Policies** > **Security**.
11. Edit the entry for **Acquisition-Allow-All**.
12. Select the **Source** tab.



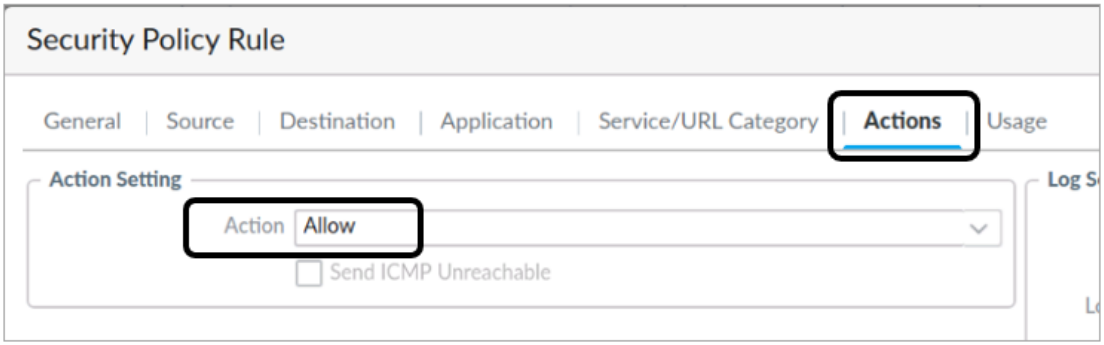
13. Note that the **Source Zone** is set to **Acquisition**.
14. Select the **Destination** tab.
15. Note that the **Destination Zone** is set to **any**.



16. Select the **Application** tab.



17. Note that the **Application** is set to **Any**.
18. Select the **Actions** tab.



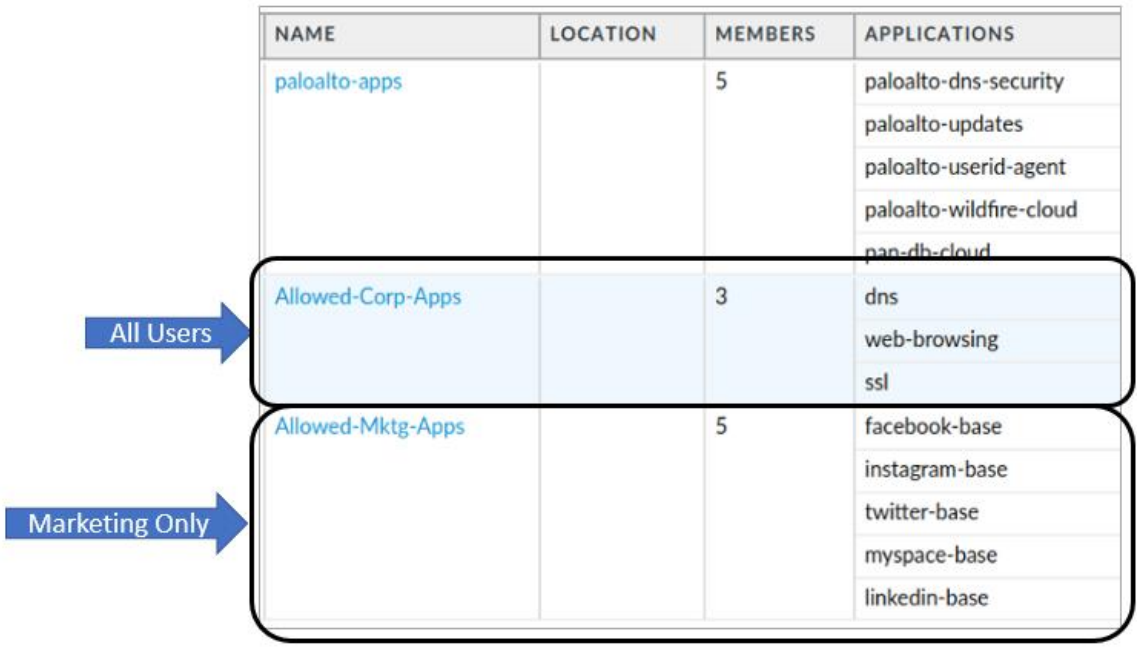
19. Note that the **Action** is set to **Allow**.
20. Click **OK** to close the **Security Policy Rule** window.

This Security Policy rule allows any host in the Acquisition security zone to access any application anywhere.

21. Clear the counters for all Security Policy rules by clicking **Reset Rule Hit Counter** > **All rules** at the bottom of the window.

This action will allow you to see how many times the rules are accessed from this point forward.

22. Click **Yes** in the **Reset** window.
23. Select **Objects > Application Groups**.
24. Note the two new **Application Groups**:



NAME	LOCATION	MEMBERS	APPLICATIONS
paloalto-apps		5	paloalto-dns-security
			paloalto-updates
			paloalto-userid-agent
			paloalto-wildfire-cloud
			pan-db-cloud
Allowed-Corp-Apps		3	dns
			web-browsing
			ssl
Allowed-Mktg-Apps		5	facebook-base
			instagram-base
			twitter-base
			myspace-base
			linkedin-base

You will configure the firewall to allow all users in the Acquisition zone to use the Allowed-Corp-Apps. However, only users in the Marketing group will be able to use applications in the Allowed-Mktg-Apps group.

Generate Traffic from the Acquisition Zone

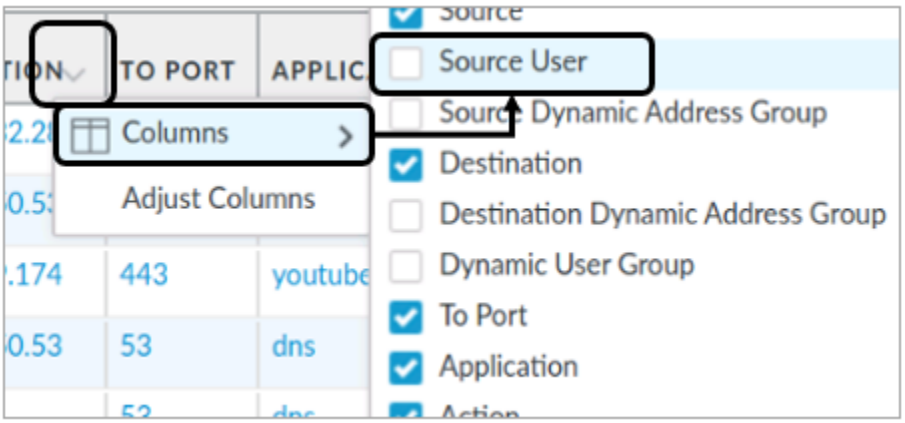
25. On the client workstation, open **Remmina**.
26. Open the connection to the **Server-Extranet**.
27. Enter the following command to change directories:

```
cd /home/paloalto42/pcaps92019/app.pcaps <Enter>
```

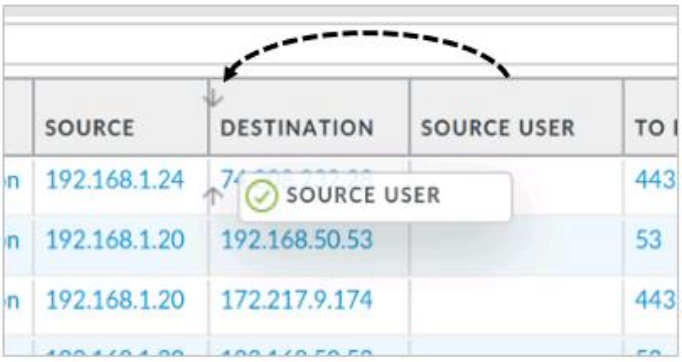
28. Run the following command to start generating traffic in the Acquisition Zone:

```
./Appgenerator-2.sh <Enter>
```

29. While the script is running, examine the firewall Traffic log under **Monitor > Logs > Traffic**.
30. Clear any filters you may have in place.
31. Note that almost all traffic is hitting the **Acquisition-Allow-All Rule**.
32. If the **Source User** column is not already displayed, add it to the table by clicking the small triangle in any header and choosing **Columns > Source User**.



33. Drag and drop the **Source User** column between the **Source** and **Destination** columns



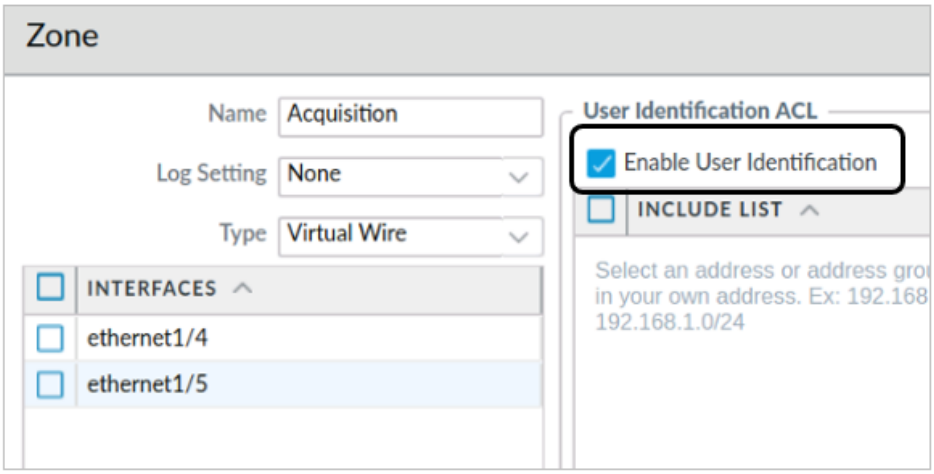
This action will make it easier for you to locate Source User information later in this lab. Note that the Source User column will be empty because you have not yet enabled User-ID.

Enable User-ID on the Acquisition Zone

In this section you will enable User-ID on the Acquisition Security zone as part of the process of enabling User-ID on a firewall.

34. In the web interface, select **Network > Zones**.
35. Click **Acquisition** to open the zone.

    The **Zone** configuration window should open.
36. Select the **Enable User Identification** check box:

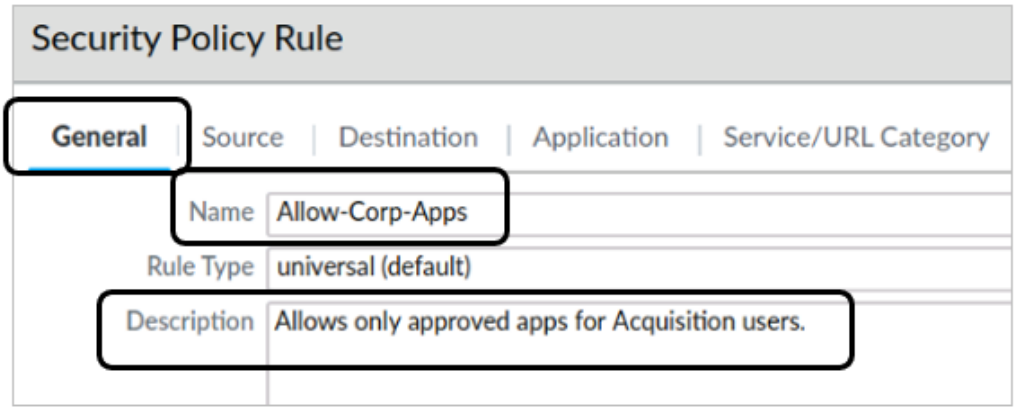


37. Click **OK** to close the **Zone** configuration window.

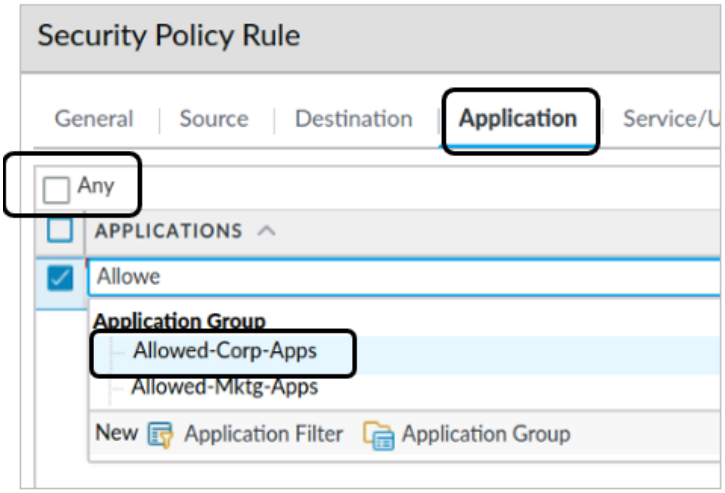
Modify the Acquisition-Allow-All Security Policy Rule

You will now change the set of applications that Acquisition users are allowed to access by modifying the existing **Acquisition-Allow-All** rule.

38. Select **Policies** > **Security**.
39. Edit the entry for **Acquisition-Allow-All**.
40. Under the **General** tab, change the **Name** of this rule to **`Allow-Corp-Apps`**.
41. For **Description**, change the entry to **`Allows only approved apps for Acquisition users`**.



42. Select the **Application** tab.
43. **`Uncheck`** the option for **Any**.
44. Click **Add** and enter the first few letters of the **`Allowed-Corp-Apps`** to display the Application Groups available:
45. Select **Allowed-Corp-Apps**.

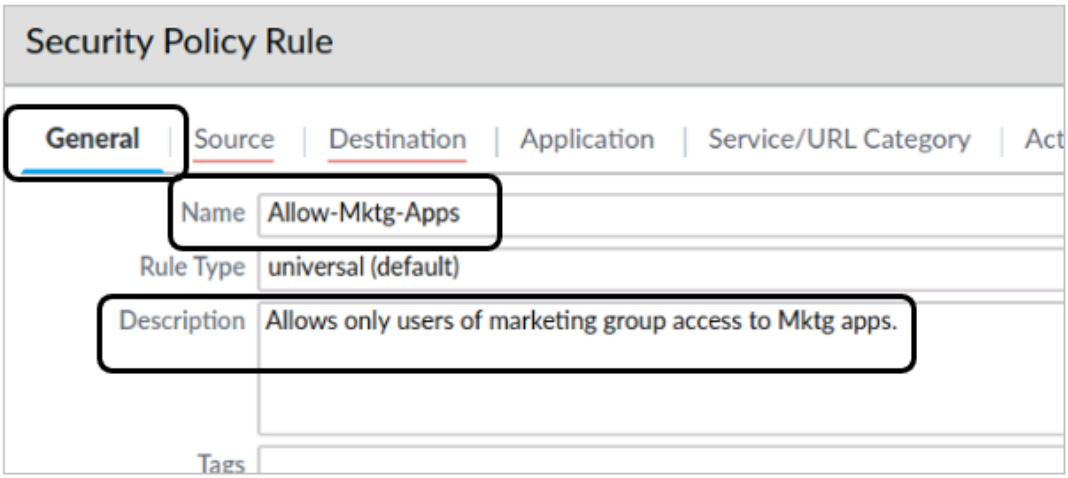


46. Click **OK** to close this Security Policy Rule window.

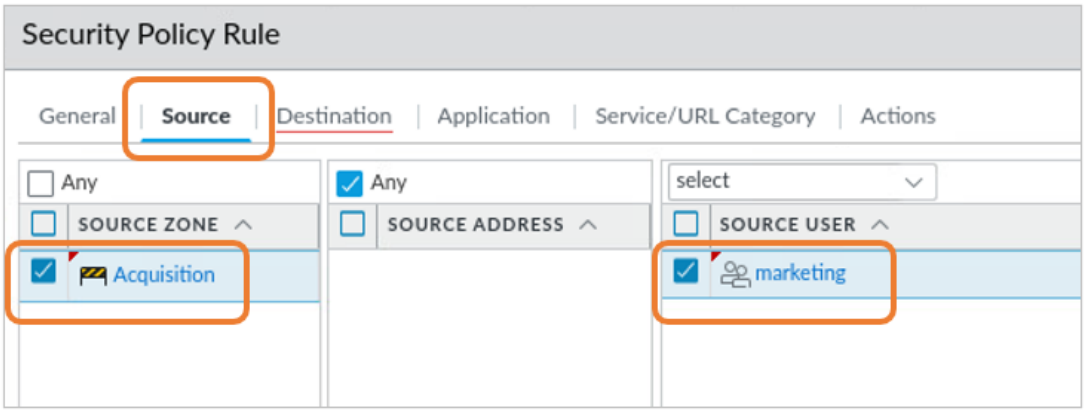
Create Marketing Apps Rule

Create a new Security Policy rule to allow only Marketing users to access the Allowed-Mktg-Applications.

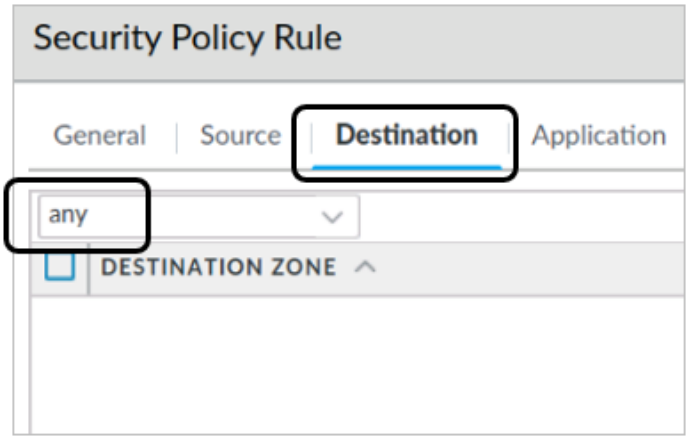
47. In **Policies** > **Security**, click **Add**.
48. Under the **General** tab, enter **`Allow-Mktg-Apps`** for the **Name**.
49. For **Description**, enter **`Allows only users of marketing group to access Mktg apps`**.



50. Select the **Source** tab.
51. Under **Source Zone**, click **Add**.
52. Select **Acquisition**.
53. Under the **Source User** column, click **Add** and enter **`marketing`**.

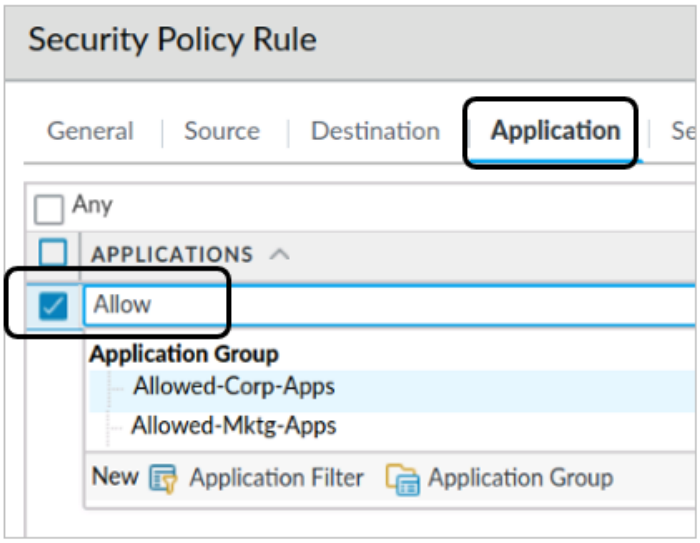


54. Select the **Destination** tab.
55. Use the drop-down list at the top to select **any**.

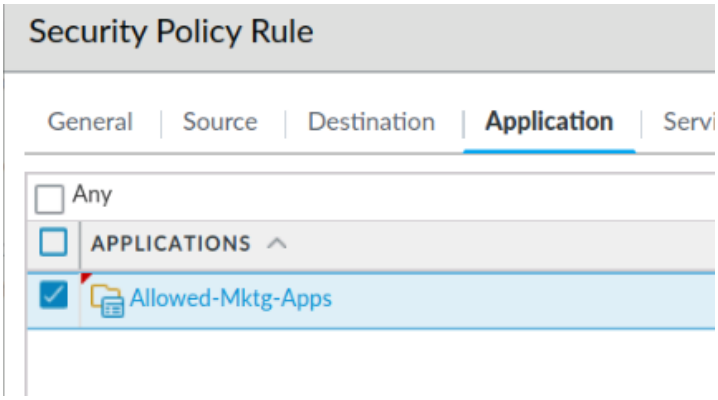


56. Select the **Application** tab.
57. **Uncheck** the option for **Any**.

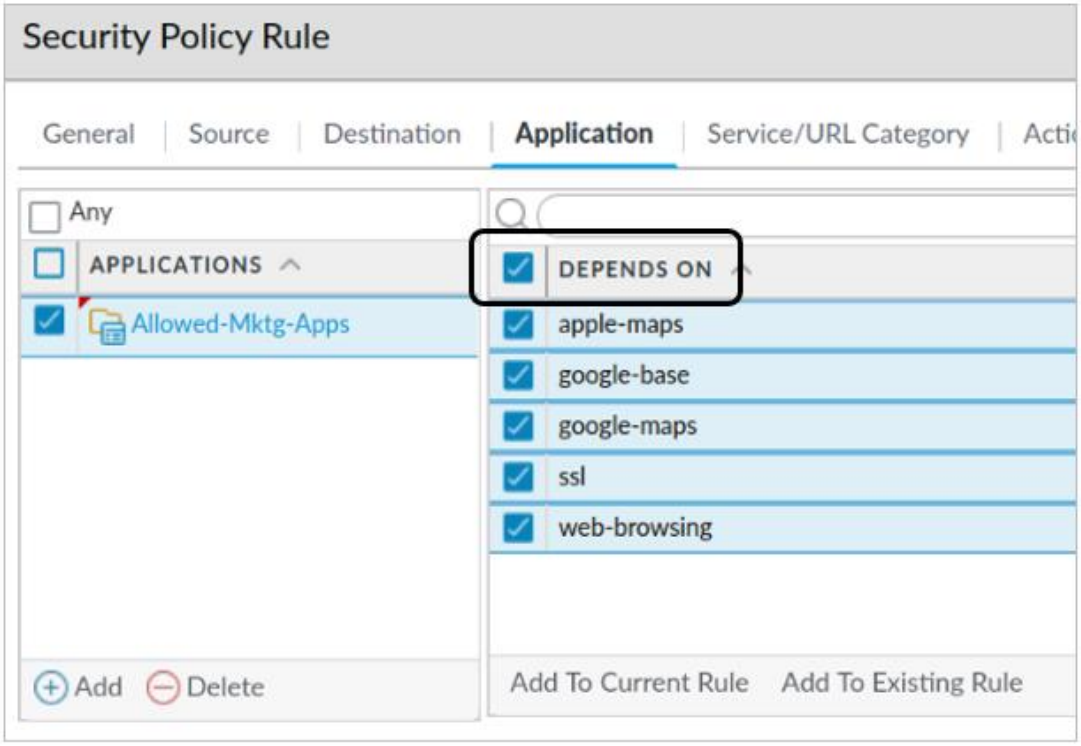
58. Click **Add** and enter the first few letters of the **`Allowed-Mktg-App`**s to display the Application Groups available:



59. Select **Allowed-Mktg-Apps**.

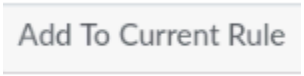


60. In the right side of the **Application** window, place a check box beside **DEPENDS ON**:



This action will select all the individual applications under the DEPENDS ON column. Note that the list of applications in the Depends On column may differ from the example here.

61. Click **Add to Current Rule** to add these applications to this Security Policy rule.



62. Select the **Action** tab.
63. Verify that the **Action** is set to **Allow**.

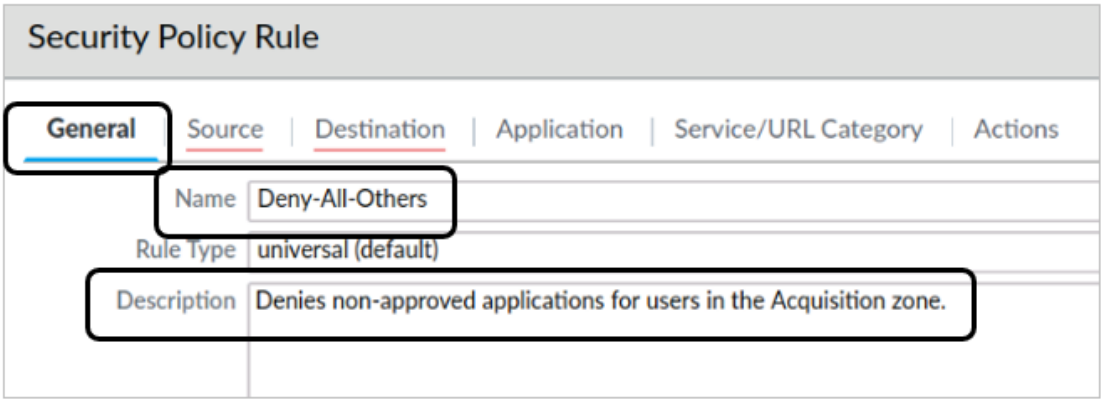
When you create a new Security Policy rule, the default setting for Action is Allow. However, it is always a good practice to verify this setting before closing the window.

64. Click **OK** to close this Security Policy Rule window.

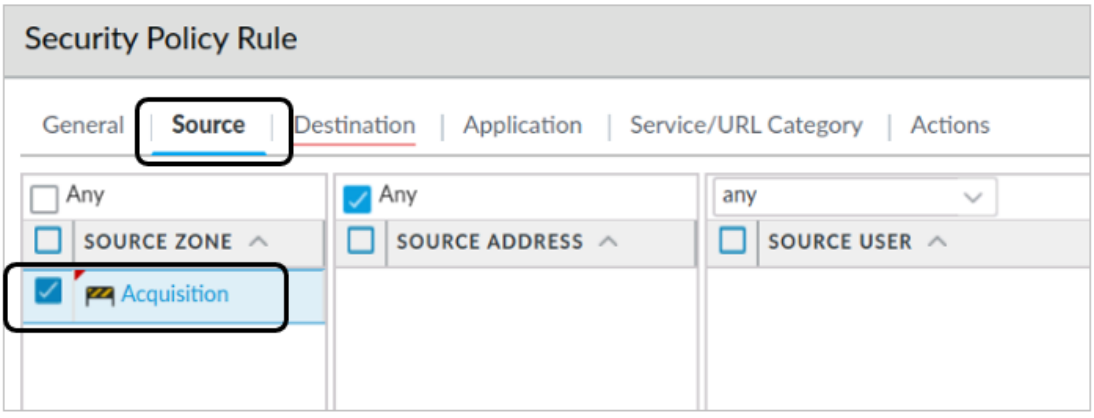
Create Deny Rule

Create a new Security Policy rule that will deny any other application traffic for users in the Acquisition zone.

65. In the Security Policy table, click **Add**.
66. Select the tab for **General**.
67. For **Name**, enter **`Deny-All-Others`**.
68. For **Description**, enter **`Denies non-approved applications for users in Acquisition zone`**.

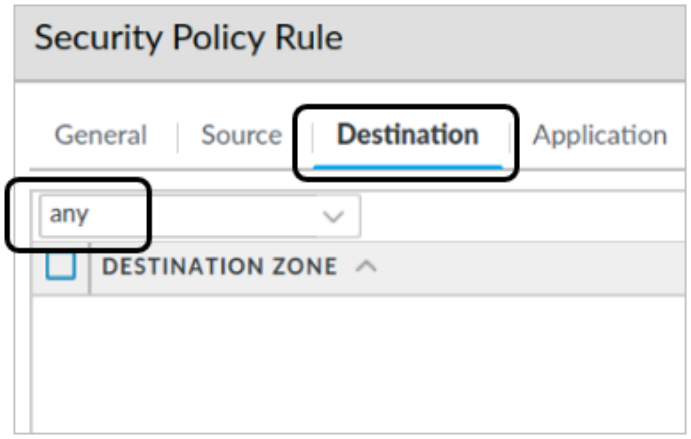


69. Select the tab for **Source**.
70. Under the **Source Zone** column, click **Add** and select **Acquisition**.

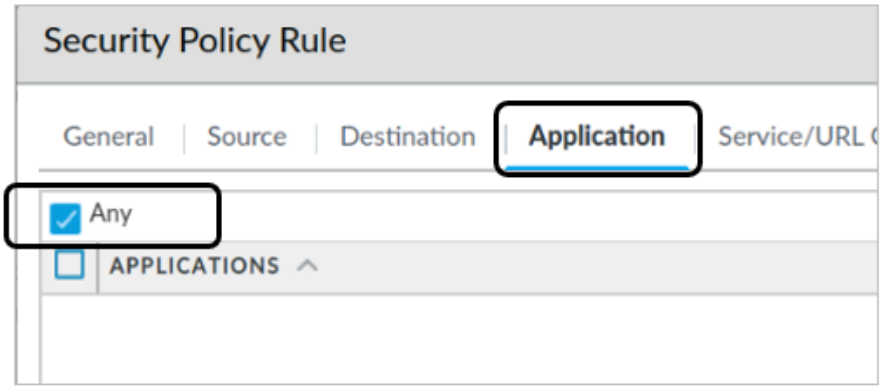


Note that you do not need to specify any users or user groups under the Source User column. Because the drop-down list is set to **any**, this rule will deny traffic to any user, regardless of group membership.

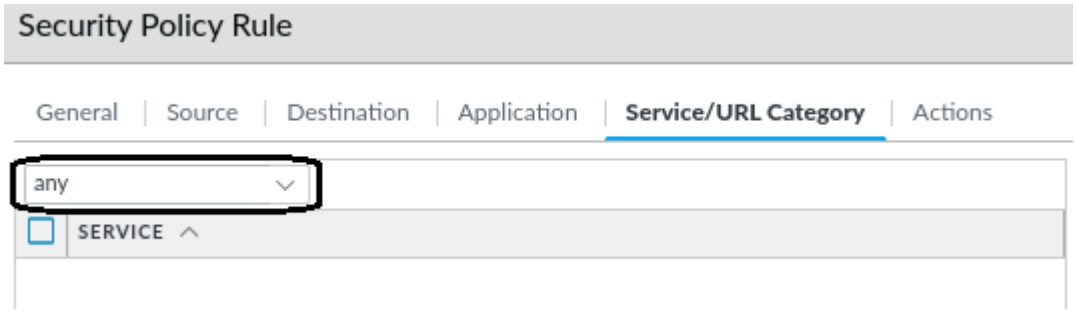
71. Select the tab for **Destination**.
72. Use the drop-down list at the top to select **any**.



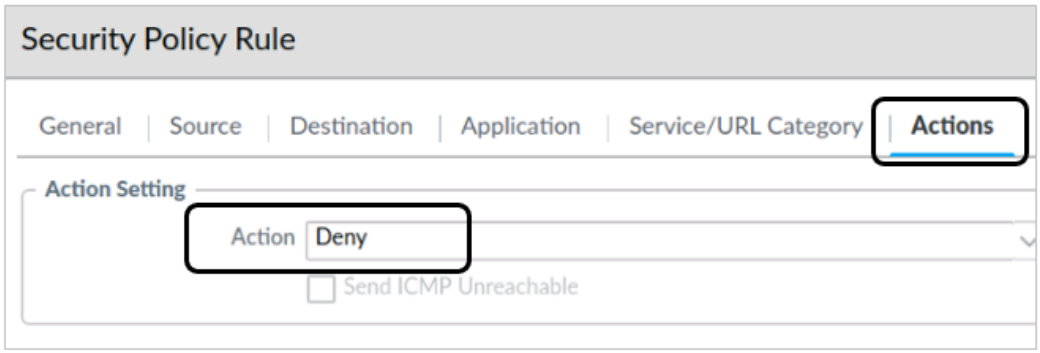
73. Select the tab for **Application** and verify that **Any** is checked.



74. Select **Service/URL Category**
75. Use the drop-down list at the top to select **any**



76. Select the tab for **Actions**.
77. Change the **Action** to **Deny**.



78. Click **OK** to close this Security Policy Rule window.
79. Verify that the **Deny-All-Others** rule appears at the bottom of the Security Policy.
80. If the "Deny-All-Others" rule does not appear at the bottom of the ruleset, use the **Move Down** button to place the rule just above the "intrazone-default" rule.

Commit the configuration

81. Click the **Commit** button at the upper right of the web interface.
82. Leave the settings unchanged and click **Commit**.
83. Wait until the **Commit** process is complete.
84. Click **Close**.

Generate Traffic from the Acquisition Zone

85. On the client workstation, select the window for the Remmina application.
86. Select the tab for **Extranet-Server** connection.
87. Use the up arrow key to retrieve the previous command:

```
./Appgenerator-2.sh
```

88. Press **Enter** to launch the script again.
89. While the script is running, move to the next section in which you will examine the firewall logs.

Examine User-ID Logs

You can see information about User-ID through the firewall CLI or in the web interface. In this section, you will use both tools to examine User-ID entries.

90. In the firewall web interface, select **Monitor > Logs > User-ID**.
91. The firewall should have numerous entries with username-to-ip-address mappings:

	RECEIVE TIME	IP	USER	TIMEOUT	GROUP FOUND	DATA SOU
	07/08 19:56:55	192.168.1.50	chicago\dcrocket	2700	yes	xml-api
	07/08 19:56:55	172.20.200.20	chicago\dboone	2700	yes	xml-api
	07/08 19:56:55	10.10.17.102	chicago\wearp	2700	yes	xml-api
	07/08 19:56:55	192.168.1.47	chicago\wbhickock	2700	yes	xml-api
	07/08 19:56:55	192.168.1.46	chicago\skid	2700	yes	xml-api
	07/08 19:56:55	192.168.1.45	chicago\sbull	2700	yes	xml-api
	07/08 19:56:55	192.168.1.44	chicago\pgarrett	2700	yes	xml-api
	07/08 19:56:55	192.168.1.43	chicago\jringo	2700	yes	xml-api

Note that the entries you see will differ from this example.

92. On the client desktop, locate the main window for the Remmina application.
93. Double-click the **Firewall-A** connection.
94. This action will open a connection to the firewall CLI.
95. In the firewall CLI, enter the following command to display entries for User-ID:

```
show user ip-user-mapping all <Enter>
```

96. The firewall will display User-ID information:

```
IP                   Vsys     From    User                 IdleTimeout(s) MaxTimeout(s)
-------------------- -------- ------- -------------------- -------------- -------------
10.10.24.102         vsys1    XMLAPI  chicago\jcaesar      2558           2558
192.168.1.9          vsys1    XMLAPI  chicago\nnickleby    2558           2558
10.4.5.101           vsys1    XMLAPI  chicago\tsawyer      2558           2558
192.168.1.104        vsys1    XMLAPI  chicago\mrhyde       2558           2558
192.168.1.22         vsys1    XMLAPI  chicago\hpoirot      2558           2558
192.168.1.43         vsys1    XMLAPI  chicago\jringo       2558           2558
192.168.1.36         vsys1    XMLAPI  chicago\bbill        2558           2558
192.168.1.41         vsys1    XMLAPI  chicago\gronimo      2558           2558
192.168.1.2          vsys1    XMLAPI  chicago\drjekyll     2558           2558
192.168.1.13         vsys1    XMLAPI  chicago\jhawkins     2558           2558
192.168.1.102        vsys1    XMLAPI  chicago\hfinn        2558           2558
```

97. When you have finished examining the User-ID information, type **`exit`** **<Enter>** to close the firewall SSH connection.

Examine Firewall Traffic Log

Create and apply filters in the **Traffic** log to answer the questions in this section.

98. In the firewall web interface, select **Monitor > Logs > Traffic**.
99. Write down your answers to the following questions in the space provided or on notepaper:

Question: Which rule does the firewall use when it encounters youtube-base traffic?

Hint: Use the filter **`( app eq youtube-base )`**

Answer: Deny-All-Others

Question: Which rule does the firewall use when it encounters dns traffic?

Hint: Use the filter **`( app eq dns )`**

Answer: Allow-Corp-Apps (in some cases, you may also see Users_to_Extranet)

Question: Which rule does the firewall use when it encounters facebook-base?

Hint: Use the filter **`( app eq facebook-base )`**

Answer: Allow-Mktg-Apps and Deny-All-Others (depending on the Source User)

Question: Which users are allowed access to facebook-base?

Hint: Use the filter **`( app eq facebook-base ) and ( action eq allow )`**

Answer: chicago\hpoirot; chicago\sholmes; chicago\vhelsing

Question: Is the user sholmes allowed to access instagram-base?

Hint: Use the filter **`( app eq instagram-base ) and ( user.src eq 'chicago\sholmes' )`**

Answer: Yes

Question: Is the user bbart allowed to access instagram-base?

Hint: Use the filter **`( app eq instagram-base ) and ( user.src eq 'chicago\bbart )`**

Answer: No

Clean Up the Desktop

100. In the Traffic log window on the firewall, clear any filters you have in place.
101. In the Remmina window on the client workstation, select the tab for the **Server-Extranet**.
102. Close the SSH connection by typing **`exit`** **<Enter>**.
103. Close the main Remmina application window.

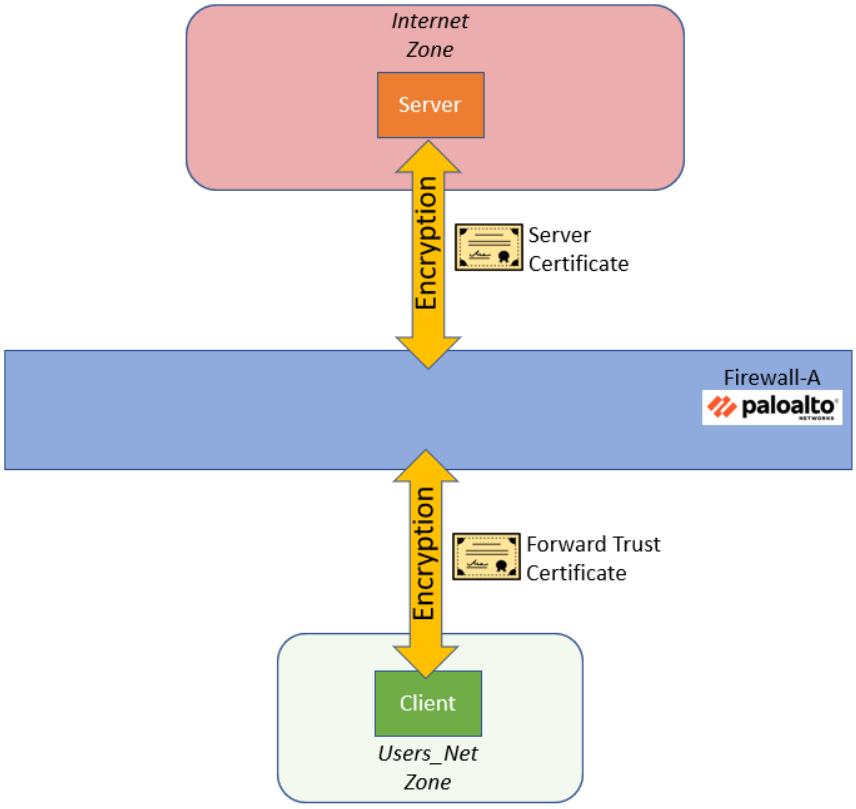
Stop. This is the end of the lab.

Lab 13: Using Decryption to Block Threats in Encrypted Traffic

As an astute network security professional, you have noticed the dramatic increase of HTTPS secure traffic over the past few years. Correspondingly, you have noticed that very few websites even use unencrypted HTTP traffic anymore. Virtually all network traffic is now encrypted.

You know that HTTPS protects privacy and sensitive data in transit between hosts, but you have begun to realize that HTTPS also hides potentially damaging data as well. Encrypted traffic into and out of your network might contain viruses, spyware, vulnerability exploits and other damaging types of data.

You need to make certain that the Palo Alto Networks firewall can inspect even encrypted traffic, so you have decided to implement decryption. This process will allow the firewall to decrypt HTTPS traffic, inspect it and then block any sessions that contain malicious content.



Right now, you do not have budget funds available to build a corporate PKI infrastructure to generate a decryption certificate from a CA (certificate authority). However, you can generate a self-signed CA certificate on the Palo Alto Networks firewall and deploy that for decryption

HR has also told you that there are certain types of traffic from employees that should not be decrypted because those transactions might contain personally identifiable information (PII). You need to exclude certain categories of websites (such as finance and healthcare) from decryption. You will create a No-Decrypt rule to prevent the firewall from decrypting traffic to and from these kinds of websites.

Lab Objectives

- Load a lab configuration
- Test the firewall without decryption
- Create a self-signed certificate for trusted connections
- Create a self-signed certificate for untrusted connections
- Create and test a Decryption Policy rule for outbound traffic
- Test outbound Decryption Policy rule
- Export the firewall certificate and import it to the Firefox browser
- Test outbound Decryption Policy again
- Review firewall logs
- Exclude URL categories from decryption using a No-Decrypt rule
- Test the No-Decrypt rule

The lab instructions show you how to import a certificate to the Firefox browser, so for this lab, use Firefox for testing and Chromium to configure the firewall. Although the concept of using a firewall-issued certificate for decryption in any client browser is the same, the actual steps to carry out the import process are different.

High-Level Lab Steps

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-13.xml`** - to the Firewall

Test the Firewall Behavior Without Decryption

- On the client-A host, use the Firefox browser and browse to the following URI: **`http://192.168.50.80/eicar.com`**
- Note the block page that the firewall presents

Your Antivirus Security Profile is in place and has blocked this file

- Use Firefox to browse to **`www.eicar.org`**.

- In the Eicar website, navigate to **`Download Anti Malware Testfile`** > **Download area using the secure, SSL enabled protocol HTTPS**
- Download the **`eicar.com`** file
- When prompted to save the file, click **`Cancel`**.
- Close the configuration browser.

Create a Self-Signed Certificate for Trusted Connections

Use the information in the table below to create a self-signed certificate to use as a Forward Trust Certificate.

Parameter	Value
Certificate Name	`Type trusted-cert`
Common Name	`Type 192.168.1.1`
Certificate Authority	Select the **Certificate Authority** check box
Forward Trust Certificate	`Checked`

Create a Decryption Policy Rule for Outbound Traffic

Use the information below to create a Decryption Policy rule that will decrypt HTTPS traffic from the Users_Net security zone to the Internet security zone.

Parameter	Value
Name	`Decrypt_Users_Traffic`
Description	`Decrypts web traffic from Users_Net.`
Source Zone	`Users_Net`
Source Address	`Any`
Source User	`Any`
Destination Zone	`Internet` `Extranet`
Destination Address	`Any`
Service	`any`
URL Category	`Any`
Action	`Decrypt`

Parameter	Value
Type	`SSL Forward Proxy`
Decryption Profile	`None`

Commit the configuration

- Commit the changes before proceeding.

Test Outbound Decryption Policy

- Use Firefox to browse to **`https://www.bing.com`**.
- Use the **Advanced > View Certificate** buttons to note that the **Issuer Name** section contains **192.168.1.1**
- Close Firefox.

Export the Firewall Certificate

- From the firewall web interface, export the trusted-cert as a Base64 Encoded Certificate (PEM)
- Save the file to the Downloads folder of the Client-A host

Import the Firewall Certificate to configuration browser

- Use the Certificate Manager in Firefox to Import the **`cert_trusted-cert.crt`** to the **Authorities** section.
- Set Firefox to **Trust this CA to identify websites** and **Trust this CA to identify email users**

Test Outbound Decryption Policy Again

- In Firefox, browse to **`https://www.eicar.org`**
- Navigate to **`Download Anti Malware Testfile`** > **Download**
- Attempt to download the **`eicar.com`** file
- You will receive a warning page from the firewall indicating that it has detected and blocked the malicious file download
- Close Firefox.

Review Firewall Logs

- Add the Decrypted column to the **Traffic Log**
- Drag and drop the **Session End Reason** column from the right side of the table to the beginning of the table.

- Create and apply a filter to display entries that have been decrypted from the client workstation and that have been terminated because of a detected threat in the traffic
- Examine the Detailed Log View of a matching entry to see details about the session
- Use the **Threat** Log to locate entries about the eicar.com test file that the firewall detected and blocked

Exclude URL Categories from Decryption

- Use the information below to create an entry in the Decryption Policy that will exclude certain URL categories from decryption

Parameter	Value
Name	`No-Decryption`
Description	`Do not decrypt URLs in gov, shopping and finance`
Source Zone	`Users_Net`
Destination Zone	`Internet`
Service	`any`

URL Category	`government`
	`financial-services`
	`shopping`

Action	`No Decrypt`
Type	`SSL Forward Proxy`

Note that in a production environment, the URL Categories which you exclude from decryption will depend on many factors. Company policy, national privacy laws, HR concerns, destination country – all of these can dictate what types of traffic you should or should not decrypt. The examples we use here simple ones to illustrate how to exclude URL categories from decryption.

- Place this rule at the top of the **Decryption** Policy

Commit the configuration

- Commit the changes before proceeding

Test the No-Decryption Rule

- Use Firefox to browse to a website that falls into one of the excluded categories.
- Connect to https://texas.gov
- Examine the certificate issued to the texas.gov website
- Note that the Issuer Name is *not* 192.168.1.1 (the firewall)

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**.
3. Click the drop-down list next to the **Name** text box and select **edu-210-11.1a-13.xml**.

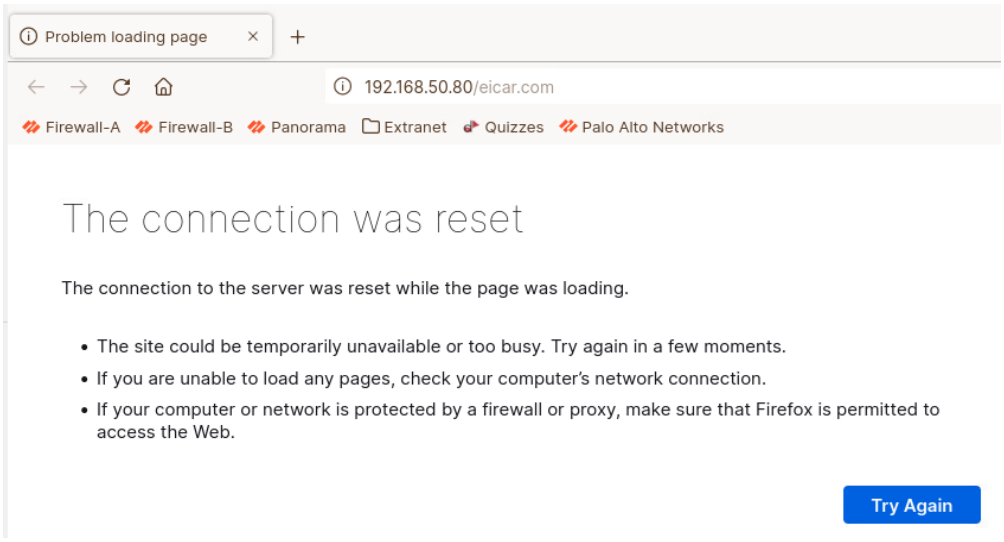
Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK**.
5. A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.
9. Click **Close** to continue.

Test the Firewall Behavior Without Decryption

For this lab, use Firefox to test and Chromium to configure. The instructions for this lab will walk you through the process of installing a Trusted certificate from the firewall in Firefox. You can install a Trusted certificate in the other browsers as well; however, the lab will only show you how to do so in Firefox to illustrate the process and in order to make sure you have time to complete the tasks.

10. On the client desktop, open Firefox and browse to **`http://192.168.50.80/eicar.com`**
11. You should get a page indicating that the connection was reset:

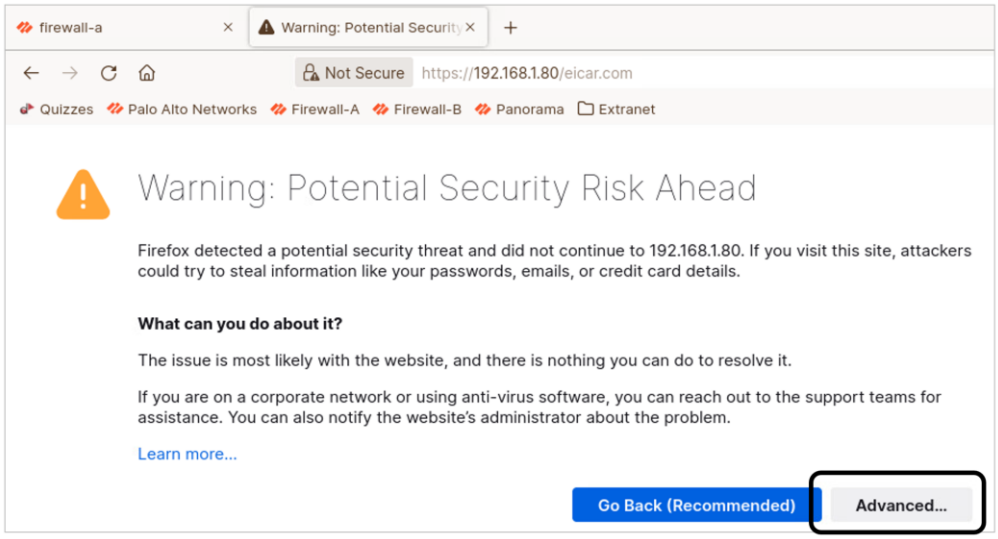


12. In the firewall web interface, navigate to **Monitor > Logs > Threat**.
13. You should see one or more entries for vulnerability indicating that the firewall blocked the Eicar file download:

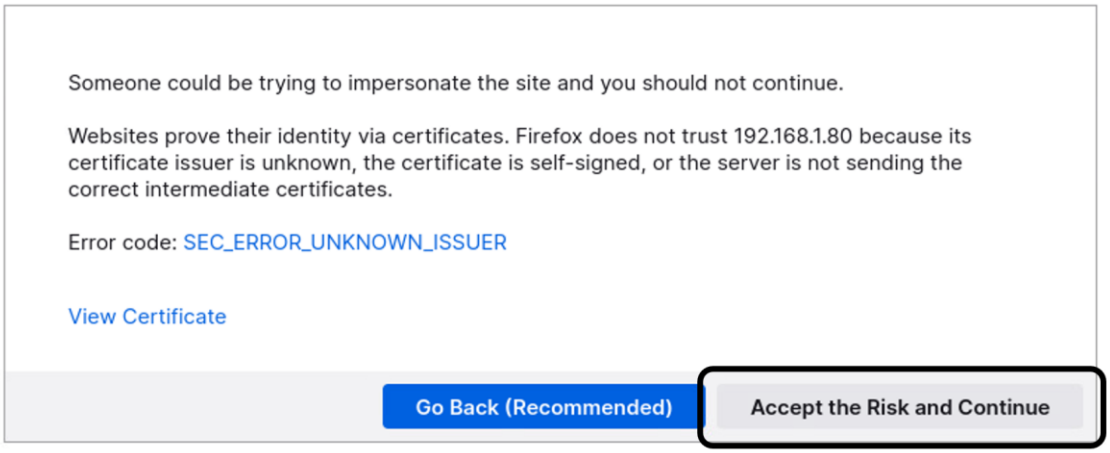
		RECEIVE TIME	TYPE	THREAT ID/NAME	FROM ZONE	TO ZONE	SOURCE ADDRESS	SOURCE USER	DESTINATION ADDRESS
		03/07 17:36:13	vulnerability	Eicar File Detected	Users_Net	Extranet	192.168.1.20		192.168.50.80

Because the connection between the client and the server is not encrypted, the firewall is able to examine the traffic and block malicious content.

14. In Firefox, open a new tab and browse to **`https://192.168.50.80/eicar.com`**.
15. If the browser presents a **Warning** window, click the **Advanced** button.

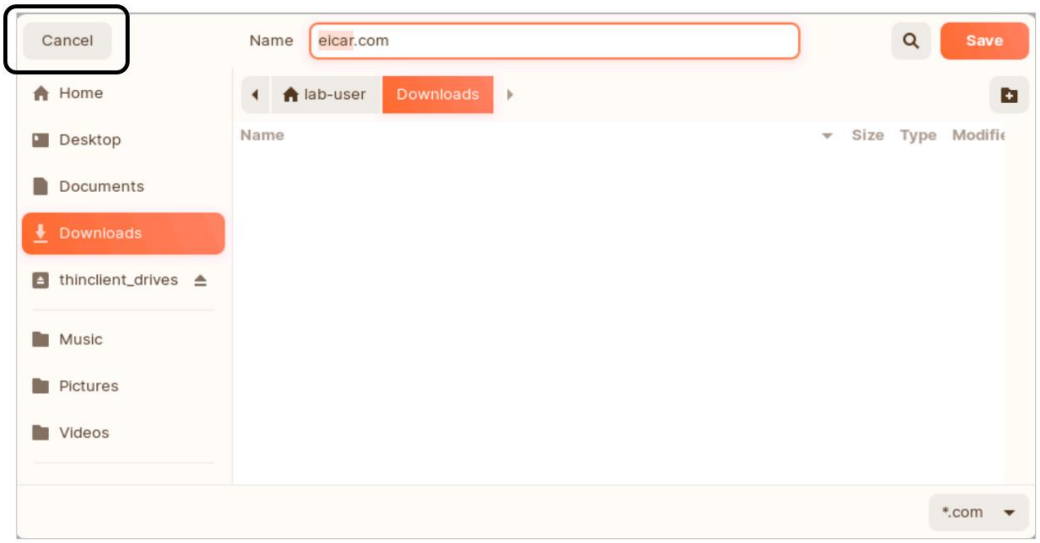


16. Click **Accept the Risk and Continue**.



The web server is using a self-signed SSL certificate, which is why Firefox presents this warning.

17. When you are prompted to save the file, click **Cancel**.



Notice that the download is *not* blocked because the connection is encrypted, and the virus is hidden. This exercise proves that without Decryption, the firewall is unable to examine the contents of a secure connection and cannot scan for malicious content.

18. Close Firefox.

Create Certificate for Trusted Connections

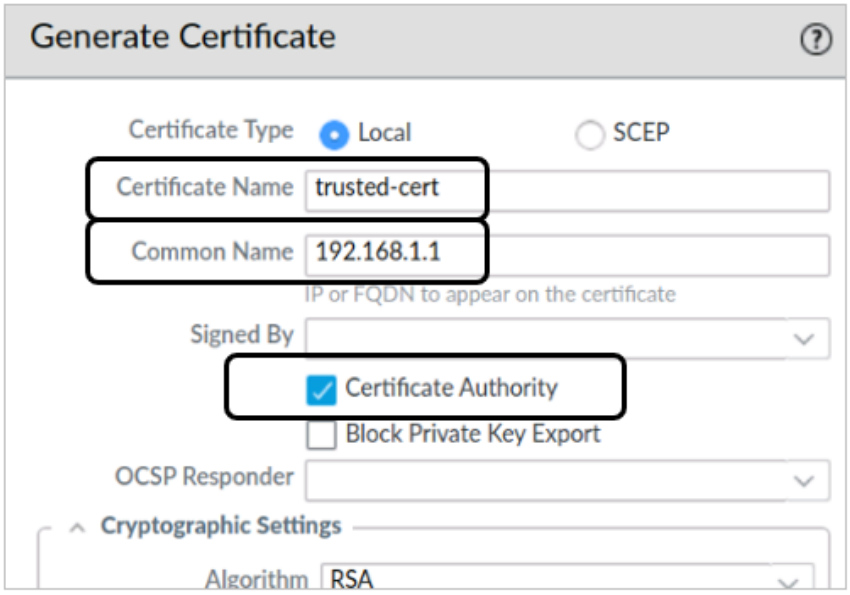
In this section, you will generate a certificate on the firewall that will be used when clients connect to HTTPS websites that have certificates issued by trusted certificate authorities.

The firewall will use this certificate as part of the decryption process between clients and trusted HTTPS websites.

19. In the web interface, select **Device > Certificate Management > Certificates**.
20. Click **Generate** at the bottom of the page to create a new CA certificate:

21. Configure the following:

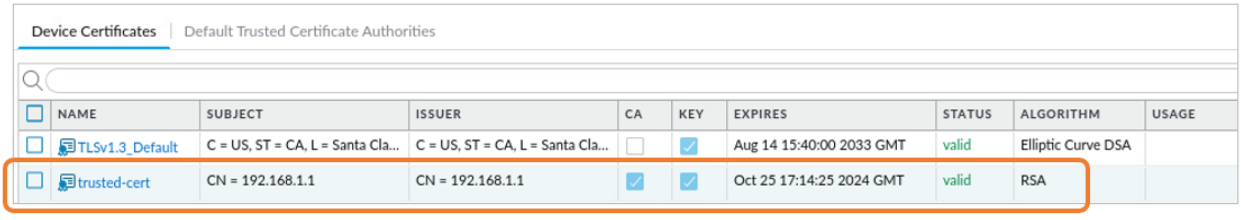
Parameter	Value
Certificate Name	`trusted-cert`
Common Name	`192.168.1.1`
Certificate Authority	Select the **Certificate Authority** check box



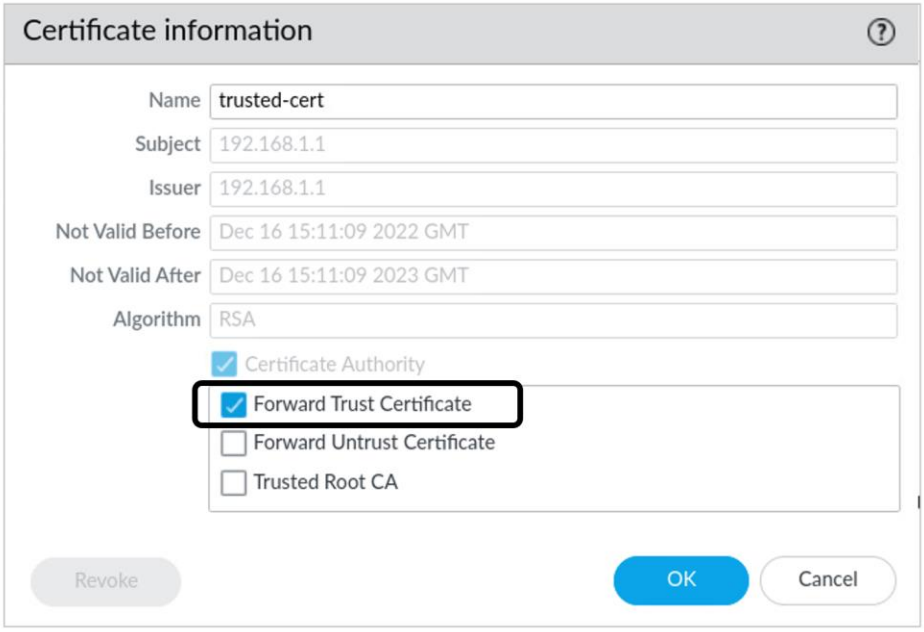
22. Leave the remaining settings unchanged and click **Generate** to create the certificate.

    A **Generate Certificate** status window should open that confirms that the certificate and key pair were generated successfully.

23. Click **OK** to close the **Generate Certificate** success window.
24. You should have a new entry in the **Device Certificates** table:



25. Edit the entry for **trusted-cert** by clicking it.
26. Place a **check** in the box for **Forward Trust Certificate**.
27. Leave the remaining settings unchanged.



This action instructs the firewall to use this certificate to decrypt traffic between clients and sites which have a trusted HTTPS certificate.

Note that the dates for Not Valid Before and Not Valid After will be different for your certificate.

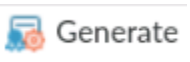
28. Click **OK**.

Create a Certificate for Untrusted Connections

In this section, you will generate a certificate on the firewall that will be used when clients connect to HTTPS websites that *do not* have certificates issued by trusted certificate authorities.

The firewall will use this certificate as part of the decryption process between clients and untrusted HTTPS websites.

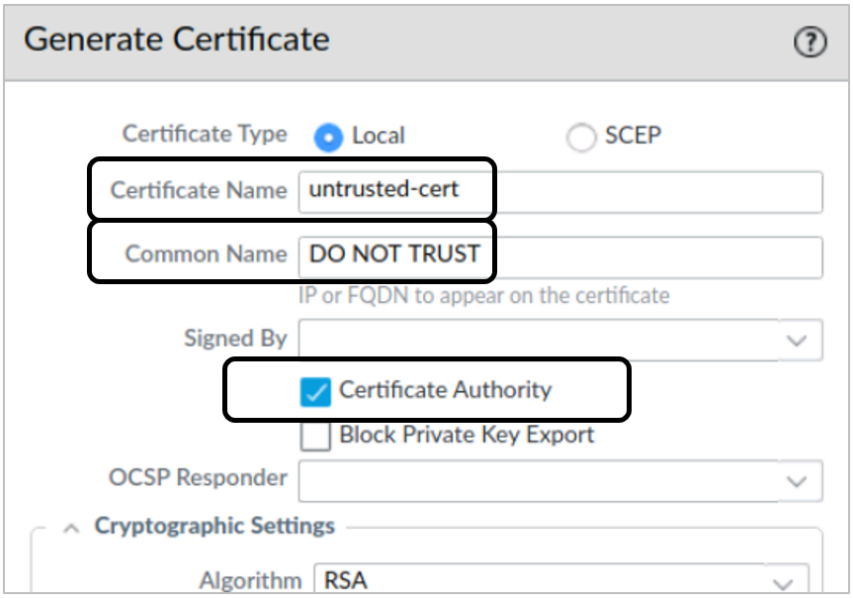
29. In the web interface, select **Device > Certificate Management > Certificates**.
30. Click **Generate** at the bottom of the page to create a new CA certificate:



31. Configure the following:

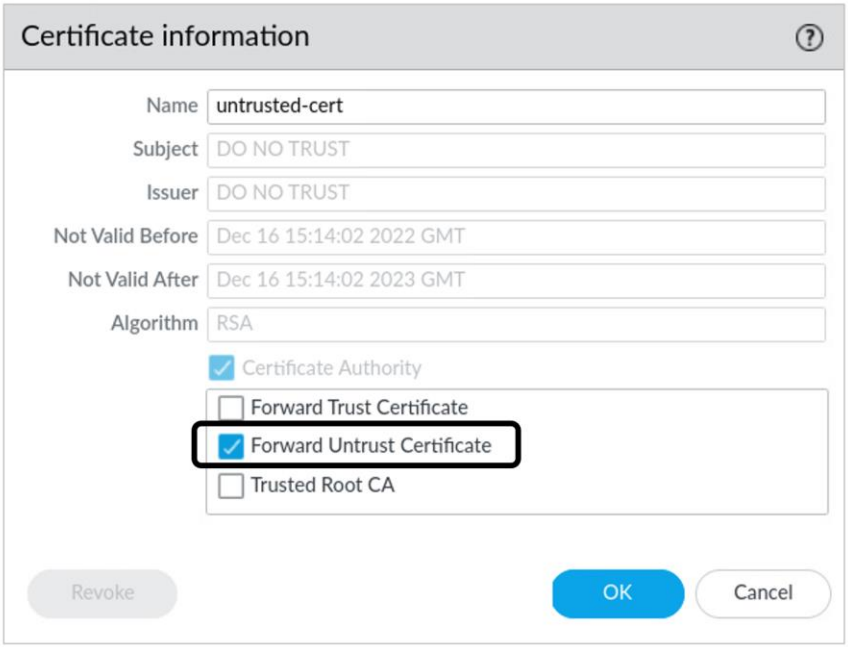
Parameter	Value
Certificate Name	**untrusted-cert**

Parameter	Value
Common Name	**DO NOT TRUST**
Certificate Authority	Select the **Certificate Authority** check box



32. Leave the remaining settings unchanged and click **Generate** to create the certificate.
    A **Generate Certificate** status window should open that confirms that the certificate and key pair were generated successfully.
33. Click **OK** to close the **Generate Certificate** success window.
34. You should have a new entry in the **Device Certificates** table.
35. Edit the entry for **untrusted-cert** by clicking it.
36. Place a **check** in the box for **Forward Untrust Certificate**.

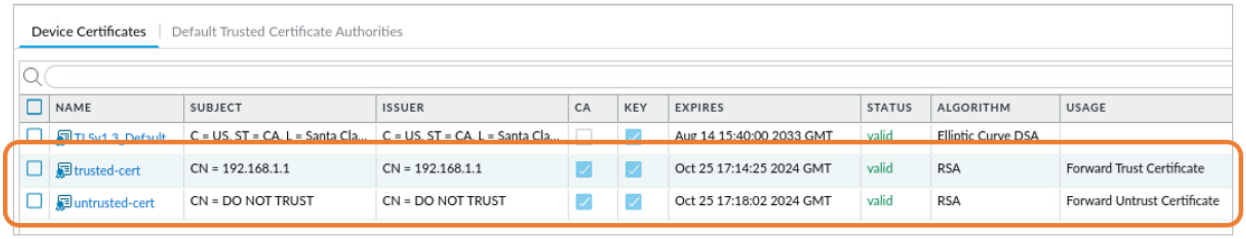
37. Leave the remaining settings unchanged.



This action instructs the firewall to use this certificate when it encounters a site that is not trusted – one that has a self-signed certificate, for example.

Note that the dates for Not Valid Before and Not Valid After will be different for your certificate.

38. Click **OK**.
39. You should now have two new entries in the **Device Certificates** table:



Note that the dates for Expires will be different for your certificates.

Create a Decryption Policy Rule for Outbound Traffic

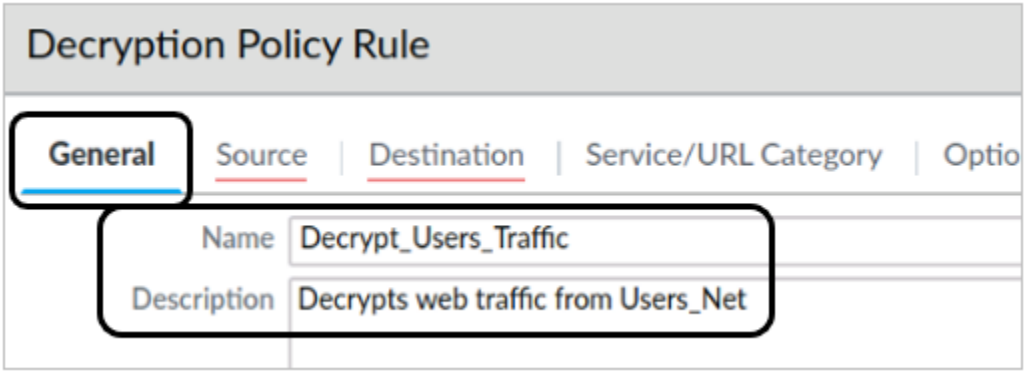
In this section, you will create a Decryption Policy to decrypt HTTPS traffic from the **Users_Net** security zone to the **Internet** and **Extranet** security zones.

40. In the firewall web interface, select **Policies > Decryption**.
41. Click **Add** to create a decryption Policy rule.

    A **Decryption Policy Rule** window should open.

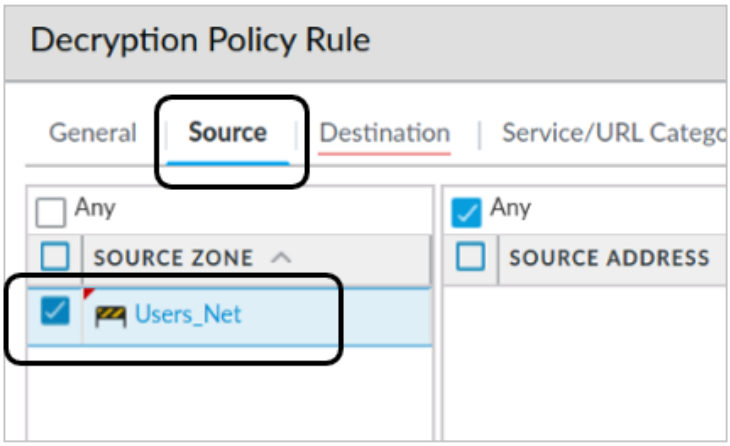
42. Configure the following:

Parameter	Value
Name	`Decrypt_Users_Traffic`
Description	`Decrypts web traffic from Users_Net`



43. Click the **Source** tab and configure the following:

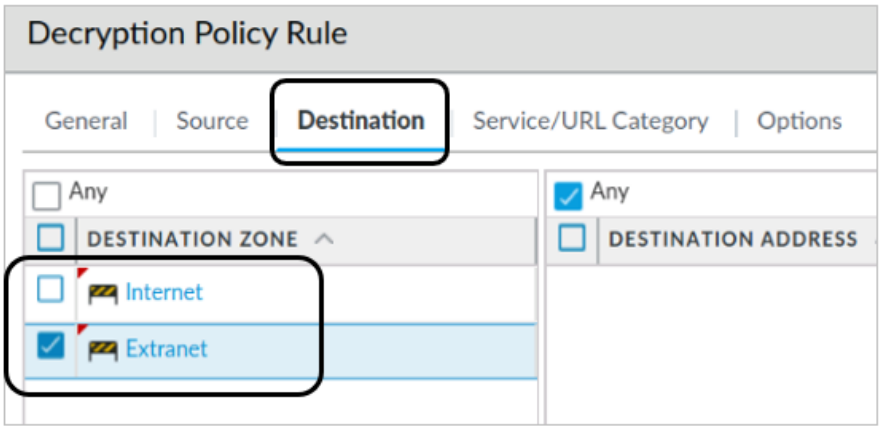
Parameter	Value
Source Zone	**Users_Net**
Source Address	Verify that the **Any** check box is selected
Source User	Verify that **any** is selected
Source Device	Verify that **any** is selected



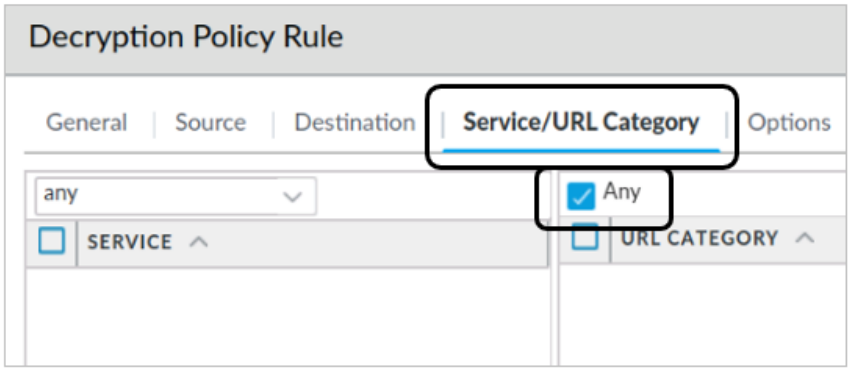
44. Click the **Destination** tab and configure the following:

Parameter	Value
Destination Zone	**Internet** **Extranet**

Parameter	Value
Destination Address	Verify that the **Any** check box is selected
Destination Device	Verify that the **Any** check box is selected



45. Click the **Service/URL Category** tab and verify that the **Service** is set to **Any** and that the box for **Any** above **URL Category** is **checked**:



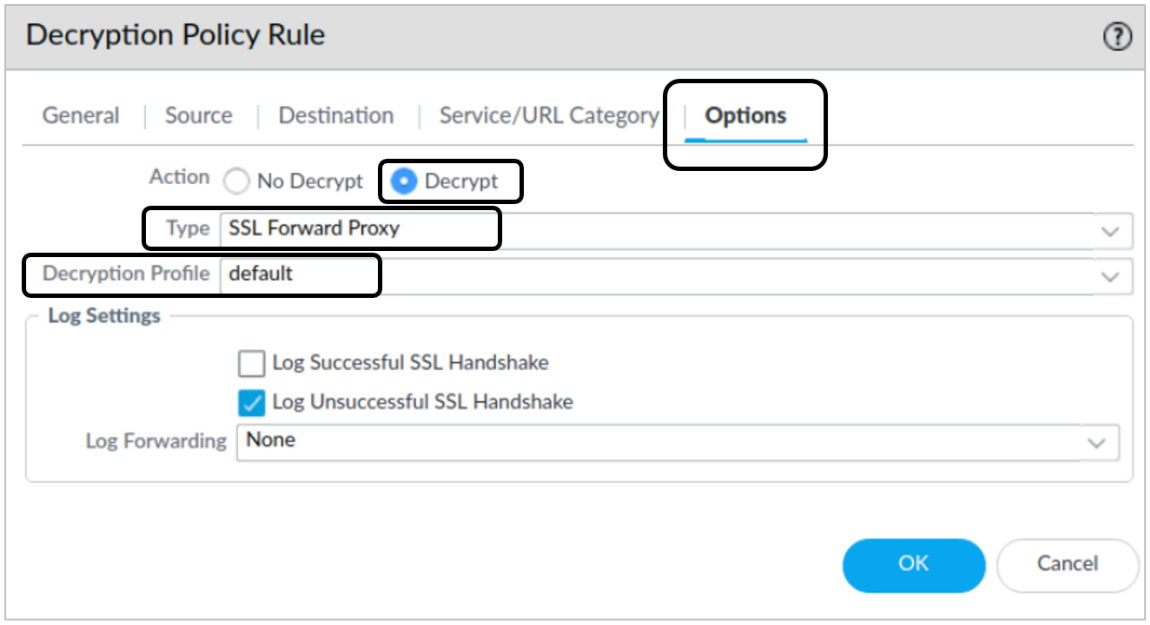
Note that the **Any** setting for URL category instructs the firewall to decrypt all HTTPS traffic, regardless of the type of website users are accessing. Decrypting traffic from users to website categories such as Health and Medicine, Shopping or Government can expose Personally Identifiable Information (PII). In a production environment, you will need to make sure you only decrypt traffic that is appropriate.

Later in this lab, you will exclude several categories of websites as an illustration.

46. Click the **Options** tab and configure the following:

Parameter	Value
Action	**Decrypt**
Type	Verify that **SSL Forward Proxy** is selected

Parameter	Value
Decryption Profile	Select **default**



47. Leave the remaining settings unchanged.
48. Click **OK** to close the **Decryption Policy Rule** configuration window.
49. Verify that your configuration matches the following:

	NAME	Source ZONE	Destination ZONE	URL CATEGORY	SERVICE	ACTION	TYPE
1	Decrypt_Users_Traffic	Users_Net	Extranet Internet	any	any	decrypt	ssl-forward-proxy

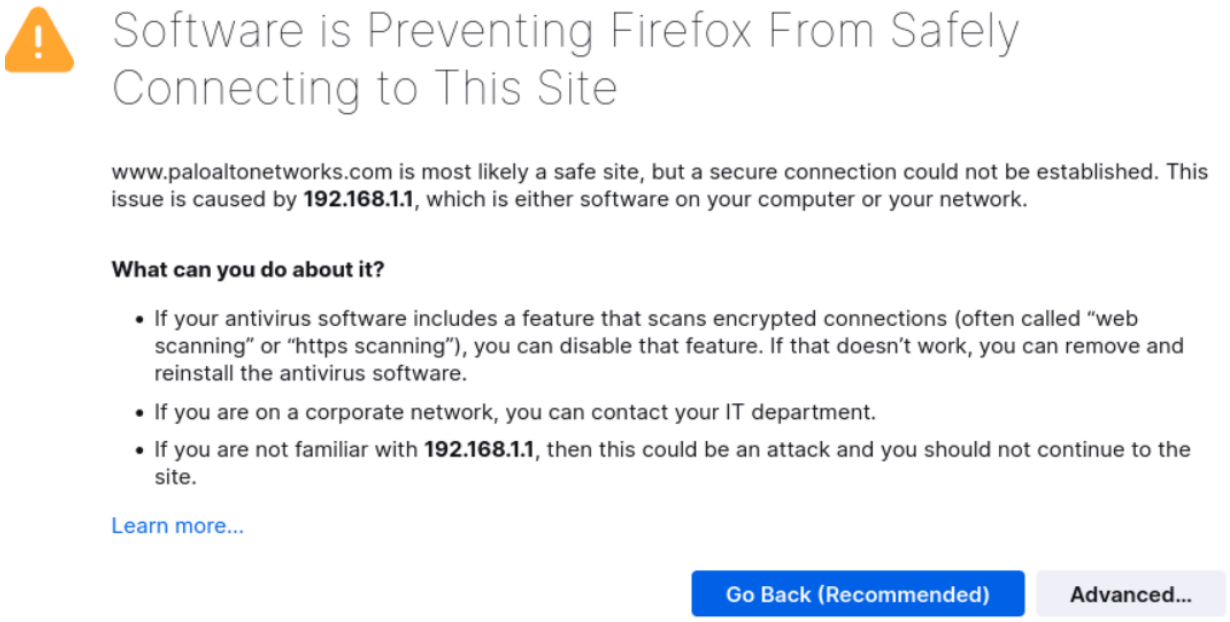
Note that several columns have been hidden or rearranged in the example shown here.

Commit the configuration

50. Click the **Commit** button at the upper right of the web interface.
51. Leave the settings unchanged and click **Commit**.
52. Wait until the **Commit** process is complete.
53. Click **Close**.

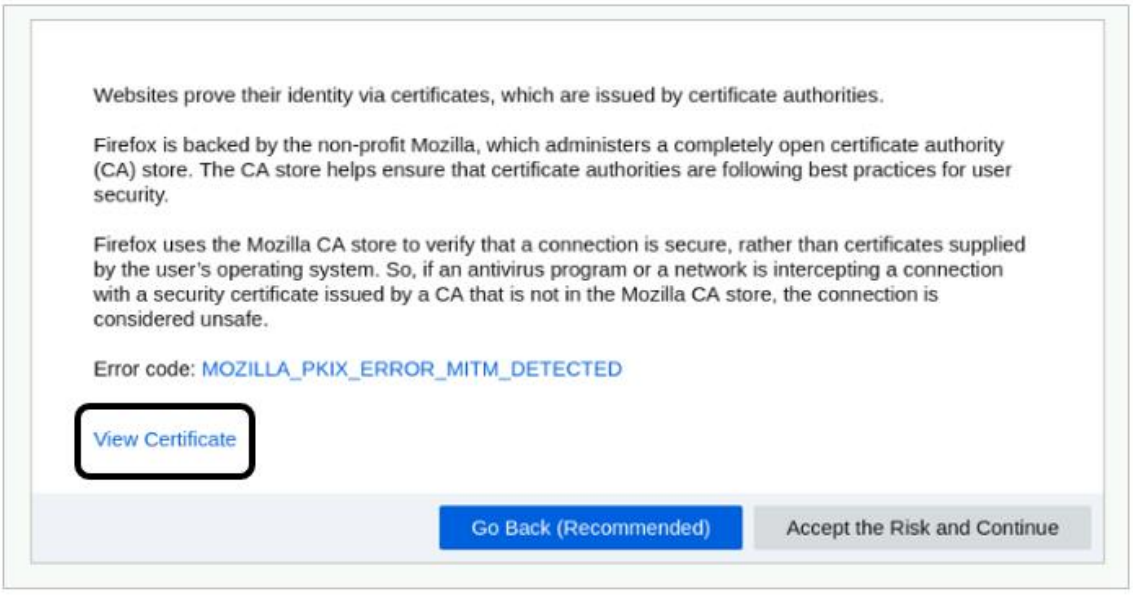
Test Outbound Decryption Policy

54. Open Firefox and browse to **`https://www.paloaltonetworks.com`**.
55. The browser presents a Caution message.

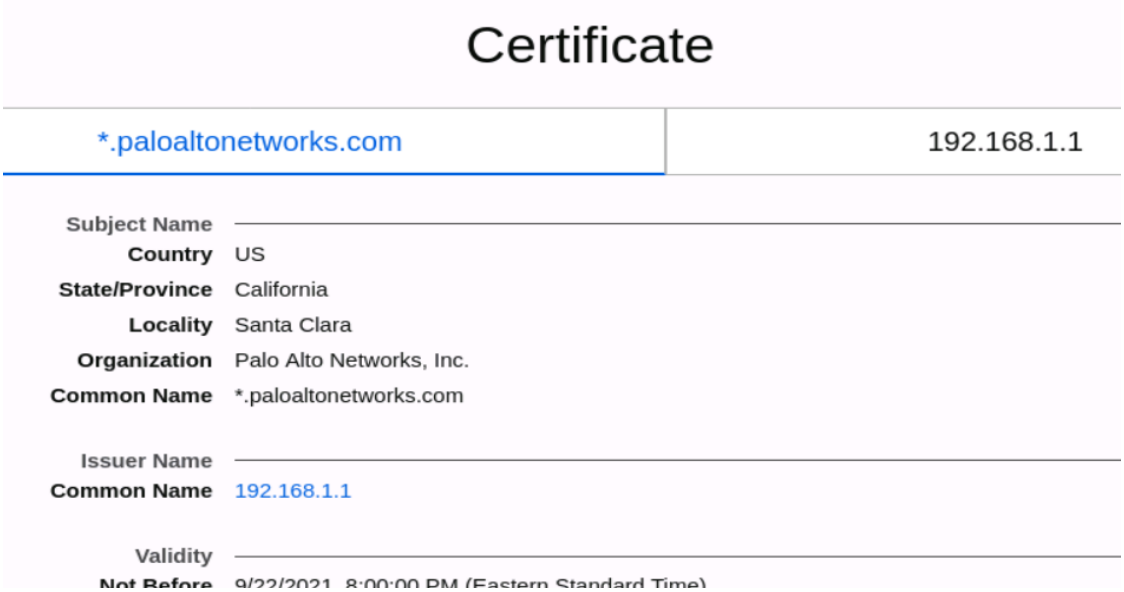


Note: The configuration browser on the client workstation does not trust the certificate generated by the firewall (192.168.1.1).

56. Click the button for **Advanced**.
57. Click the link for **View Certificate**.



58. Under the section for ***paloaltonetworks.com**, note the **Issuer Name** section contains **192.168.1.1**:

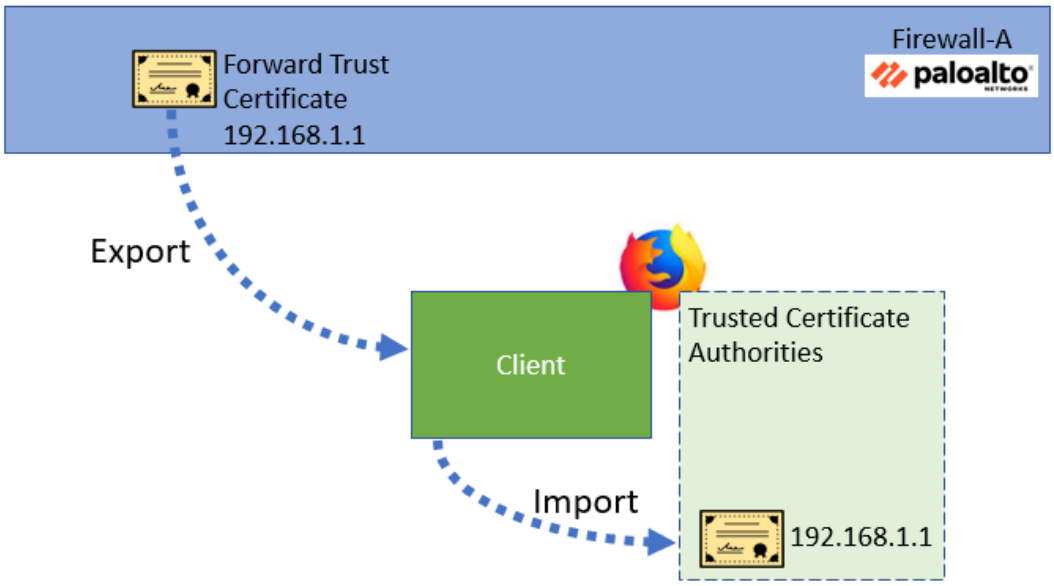


This certificate has been issued on behalf of *.paloaltonetworks.com by the firewall (192.168.1.1) using the Trusted Certificate you created earlier. Firefox does not trust this certificate because it is “self-signed” by the firewall. In the next section, you will fix this issue so that Firefox trusts certificates issued by the firewall.

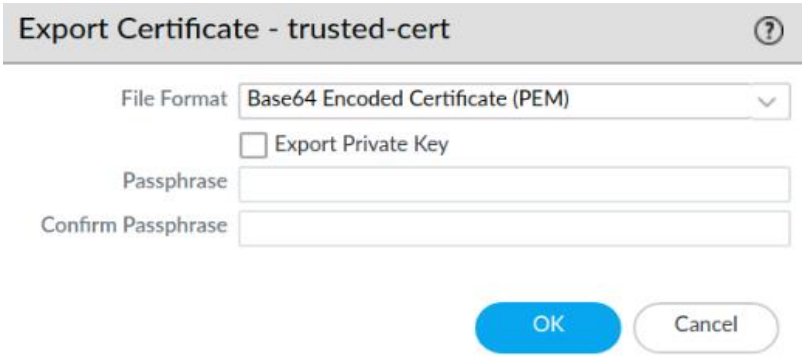
59. Close the Firefox browser.

Export the Firewall Certificate

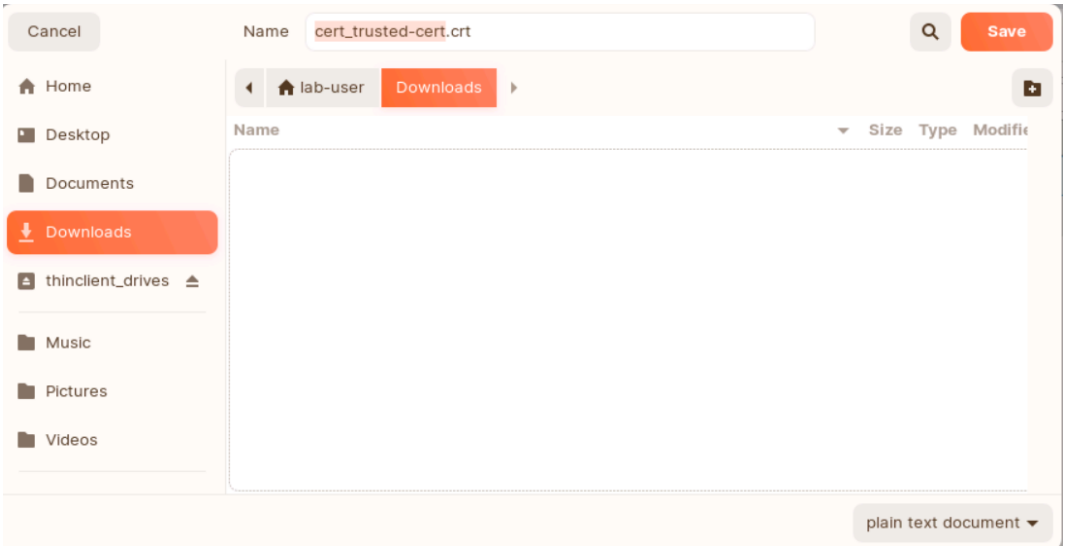
To make users’ web browsing experience seamless while implementing decryption, you will export the trusted certificate from the firewall and import the certificate into Firefox on the Client host.



60. In the firewall web interface, select **Device > Certificate Management > Certificates**.
61. Highlight but do not open **trusted-cert**.
62. At the bottom of the window, click **Export Certificate** to open the **Export Certificate** configuration window.
63. Use the drop-down list for File Format to verify that **Base64 Encoded Certificate (PEM) is selected**.
64. Leave the box for **Export Private Key** unchecked.
65. Leave all settings unchanged and click **OK** to export the trusted-cert CA certificate.

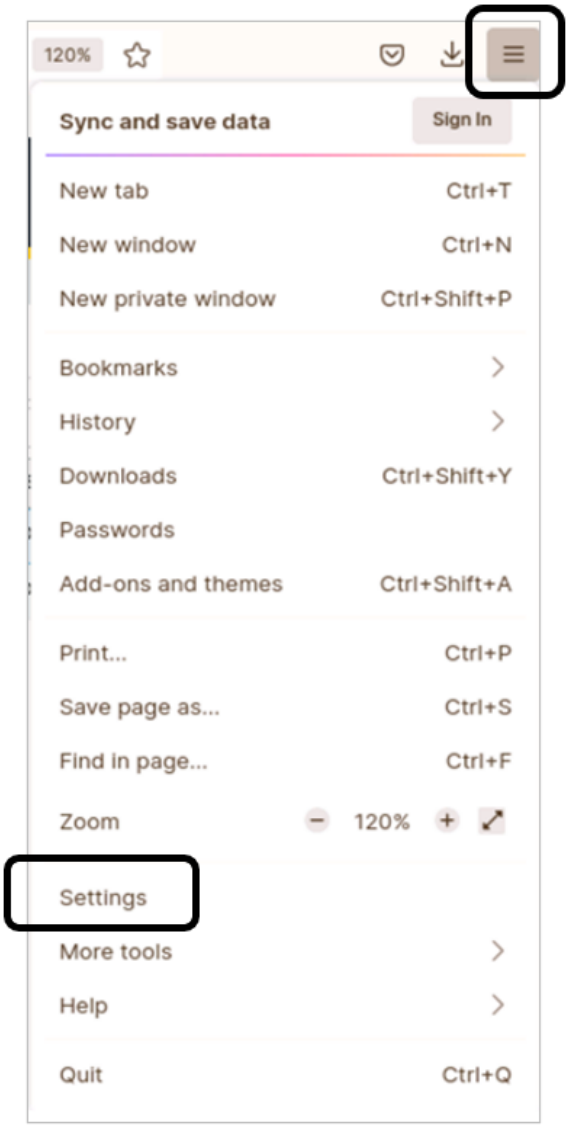


66. Save the file to the workstation's **Downloads** folder:

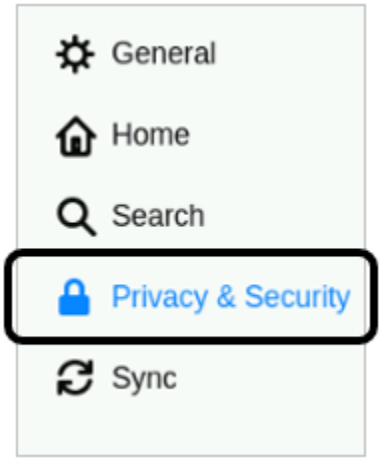


Import the Firewall Certificate

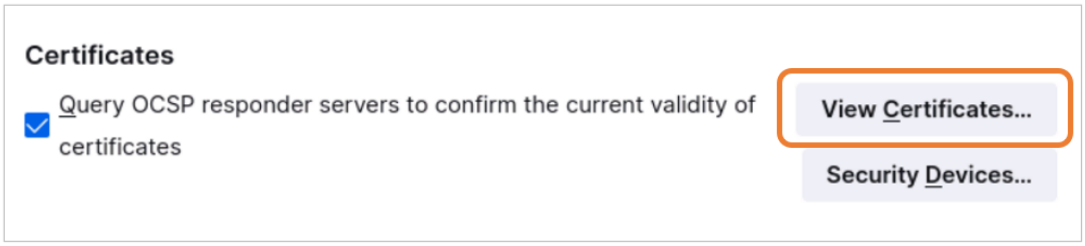
67. Open the Firefox browser.
68. In the upper right corner of the browser window, click the “hamburger” button and choose **Settings**:



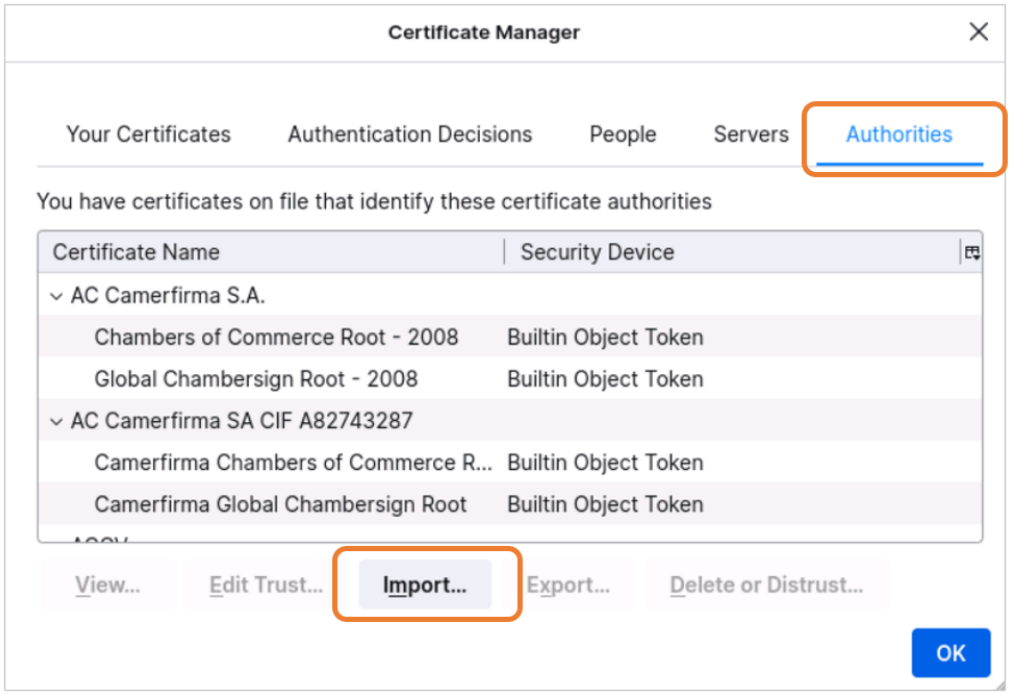
69. On the left side of the screen, select **Privacy & Security**:



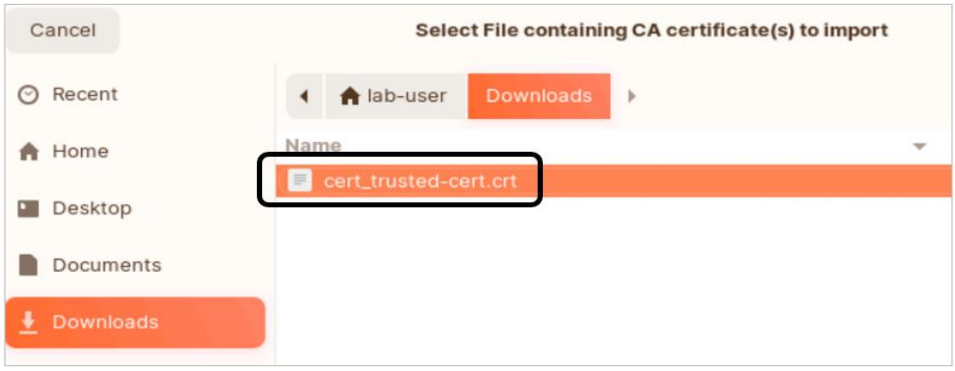
70. Scroll to the bottom of the screen and locate the **Certificates** section.
71. Click the button for **View Certificates**.



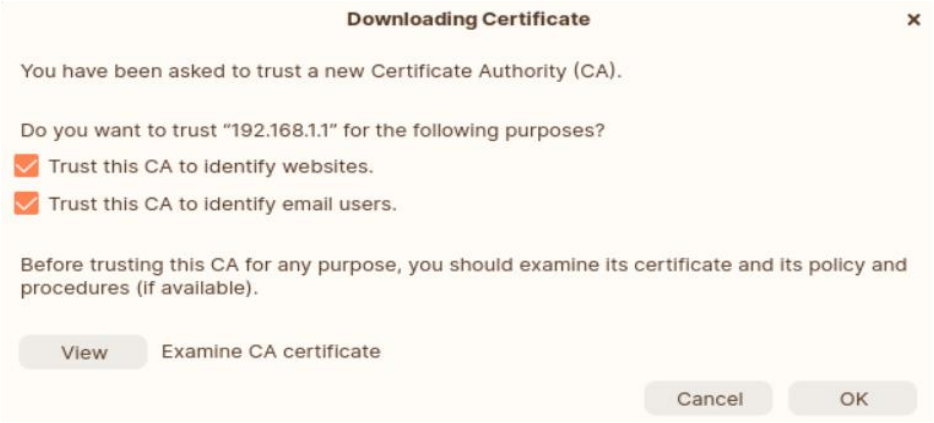
72. Under the **Authorities** tab, click **Import**.



73. Select the **Downloads** folder.
74. Highlight the entry for **cert_trusted-cert.crt**.
75. Click **Open**.

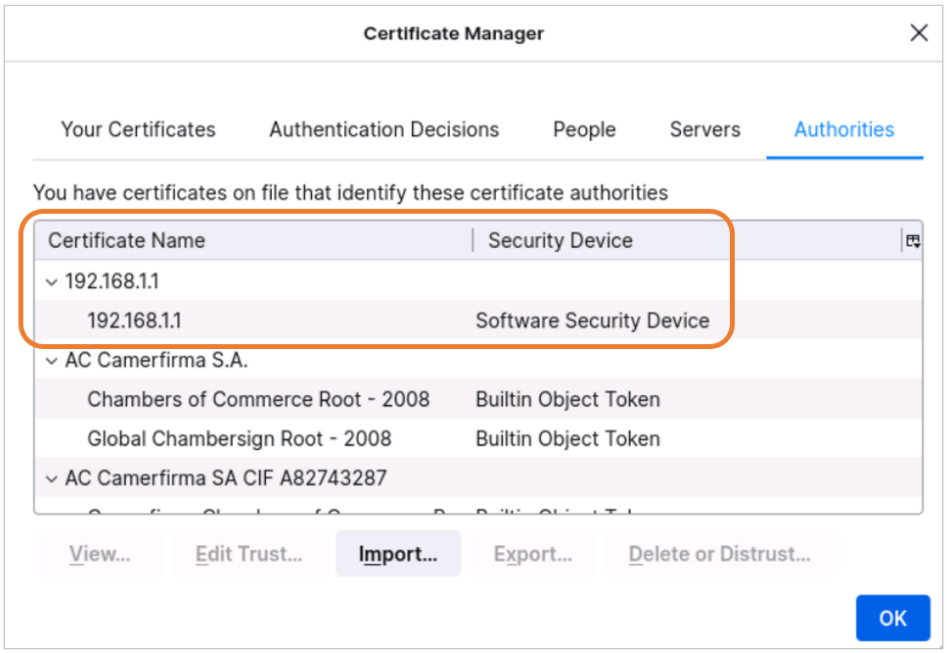


76. In **the Downloading Certificate** window, place **checks** in both boxes for **Trust this CA to …**



77. Click **OK**.

78. The firewall **trusted-cert** entry appears in the list of certificate authorities:



Note – if you do not see the entry for 192.168.1.1 at the top of the list, click **OK** and then click **View Certificates** again.

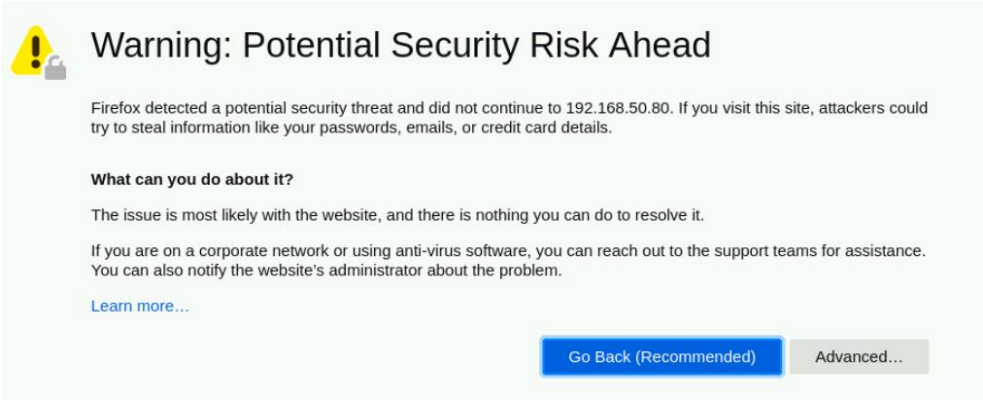
The Firefox browser will trust any certificate issued by the entities in this Authorities list. By adding the firewall certificate to this list, Firefox will trust any certificates issued by the firewall. Note that the process of importing certificates to client workstations varies based on the browser type and the operating system. This lab shows you how to add a certificate to Firefox, but the process is similar for other browsers.

79. Click **OK** to close the **Certificate Manager** window.
80. Close Firefox.
81. Open Firefox and browse to **`https://www.paloaltonetworks.com`**.
82. Notice that you do not get any warning messages about certificates.

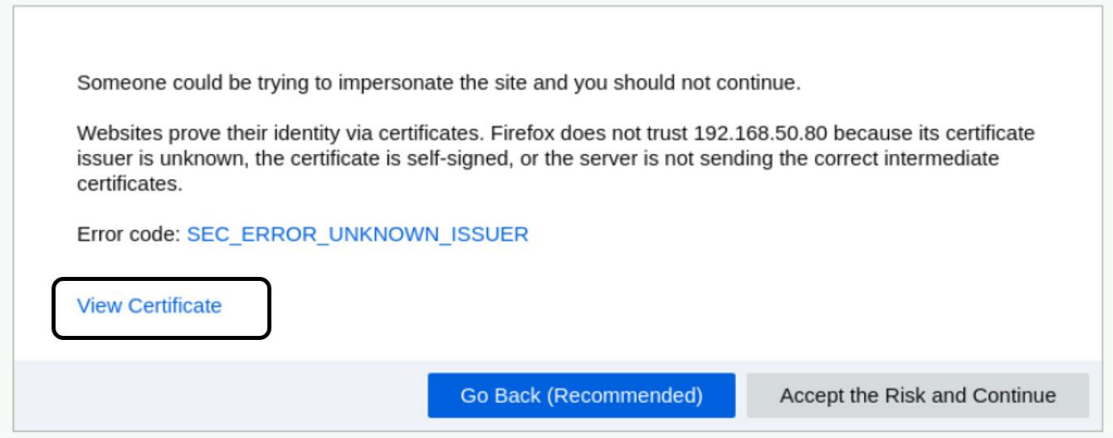
Test Forward Untrust Certificate

When a web browser connects to a site that has a self-signed or untrusted certificate, the firewall will present the Forward Untrust Certificate. The web server in the Extranet zone has a self-signed certificate; in this section, you will see how the firewall presents the DO NOT TRUST certificate you created.

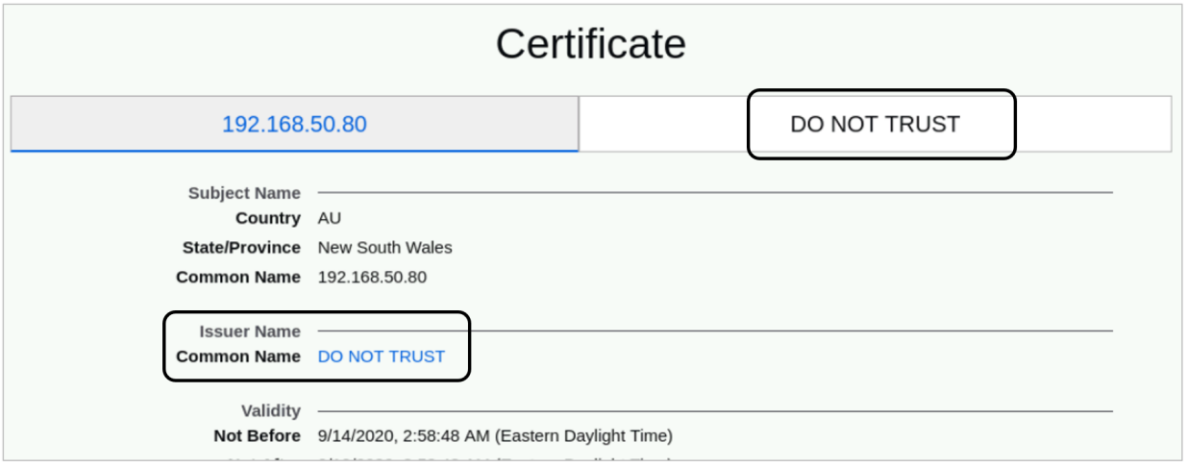
83. In Firefox, connect to **https://192.168.50.80**.
84. Note the **Warning** message that configuration browser presents:



85. Click **Advanced**.
86. Click **View Certificate**.



87. Note the information in the certificate:

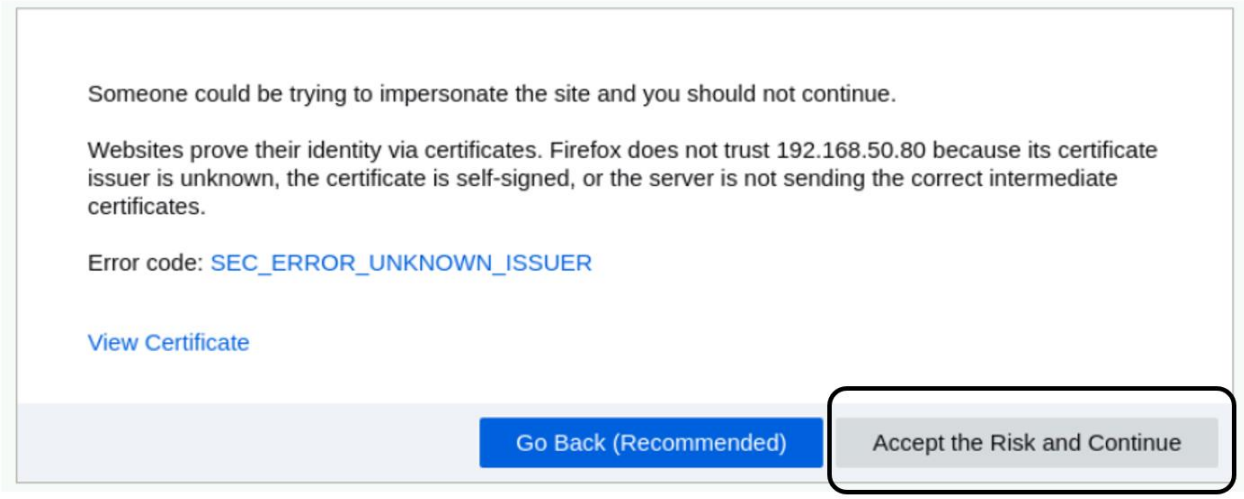


You can tell that the firewall has intervened in this connection and presented the Forward Untrust certificate you created.

88. Close the tab for **Certificate for 192.168.50.80**.

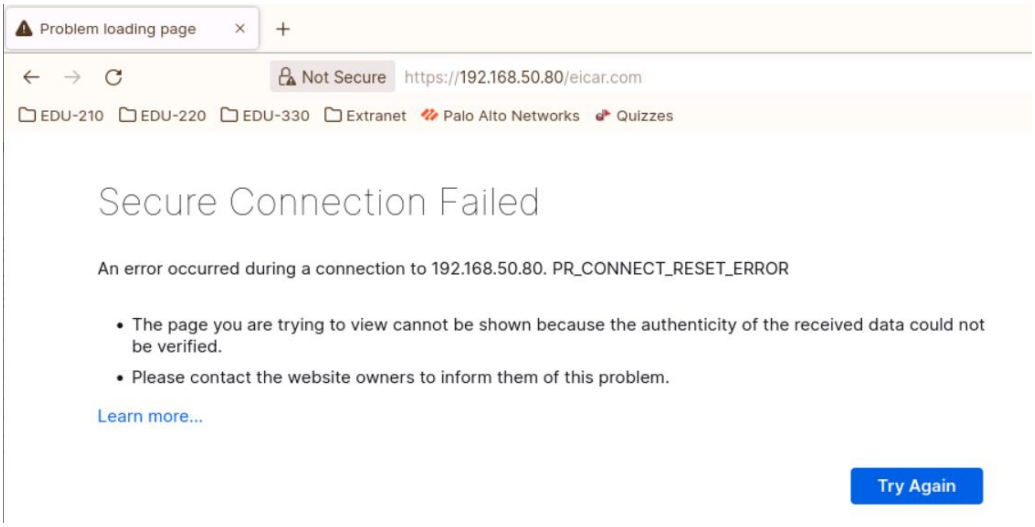
Test Outbound Decryption Policy Again

89. In the Firefox browser warning window, click **Accept the Risk and Continue**:



90. You will see the default page for the web server in the Extranet:

91. Attempt to download the virus file by appending **`eicar.com`** to the end of the link **`https://192.168.50.80/eicar.com <ENTER>`**
92. The connection will not succeed, and you will receive a message from the browser:



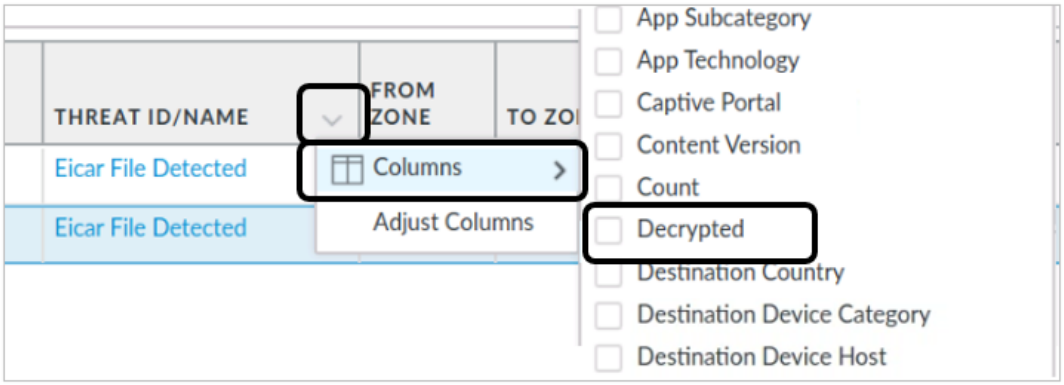
Note that the kind of message a client receives will vary depending on the browser.

93. Close Firefox.

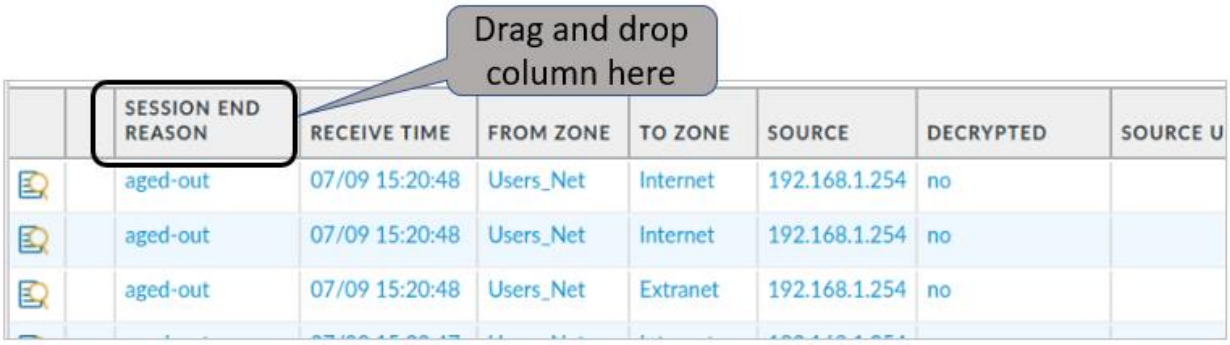
Review Firewall Logs

In this section, you will examine information in the firewall Logs to see more details about the decryption process.

94. In the firewall web interface, select **Monitor > Logs > Traffic**.
95. Click the small triangle to the right of the Threat ID/Name column header.
96. Add the **Decrypted** column to the table by selecting **Columns > Decrypted**.

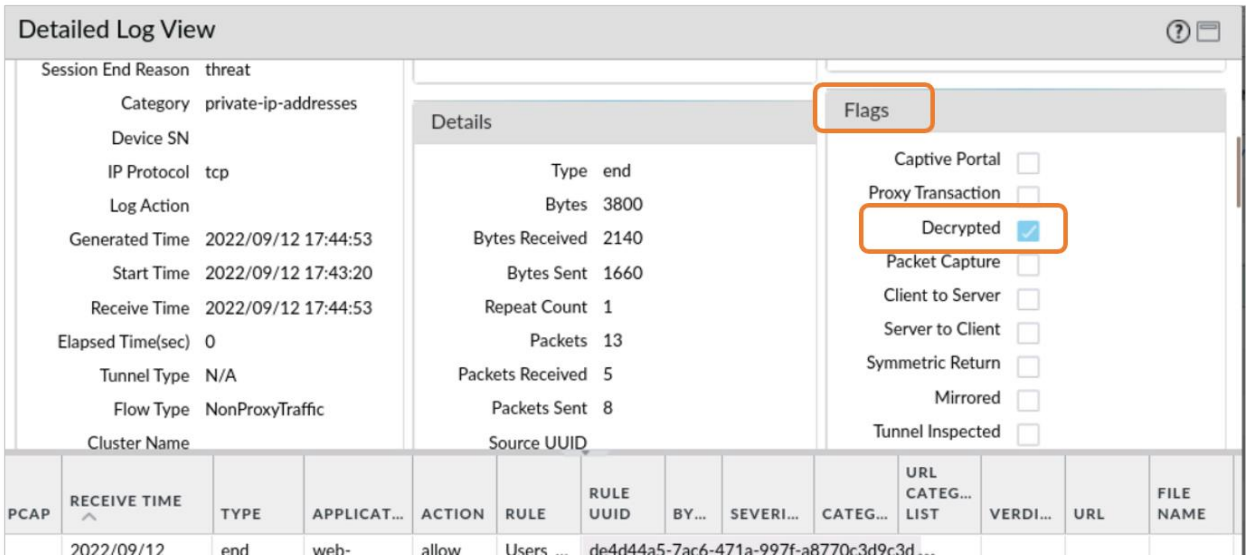


97. Drag and drop the **Session End Reason** column from the right side of the table to the beginning of the table:



This is not a requirement, but placing this column at the beginning of the table will make it easier for you to locate entries that have ended because of unusual actions taken by the firewall (such as detecting a threat).

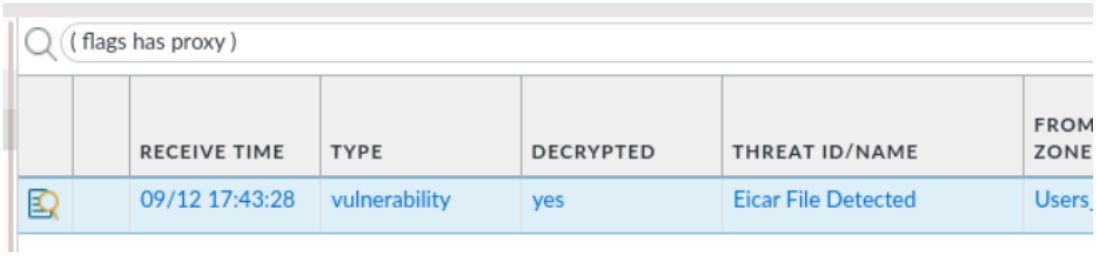
98. Create and apply a filter to display entries that have been decrypted from the client workstation and that have been terminated because of a detected threat in the traffic:
    `( flags has proxy )`
    The filter syntax "flags has proxy" displays entries that have been decrypted (the value will show as **yes** in the **Decrypted** column). Entries that match the filter indicate that the firewall carried out a proxy connection for decryption.
99. Click the **magnifying glass** next to the most recent entry listed to see details about the session.
100. Scroll down in the upper section of the window until you see the Flags section in the right column.
101. Note the **Decrypted** box is checked, indicating that the firewall decrypted this session.



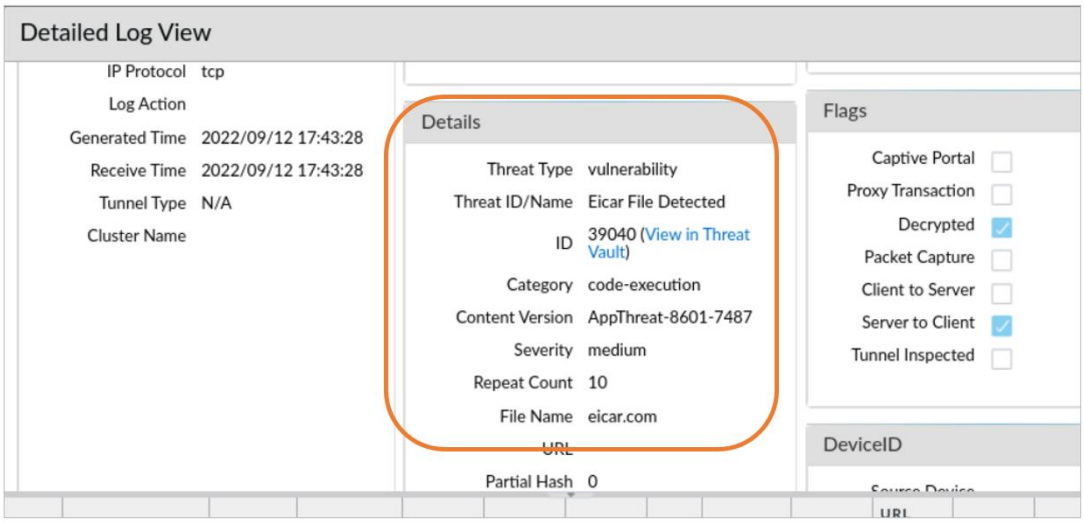
The details you see will differ from the example shown, but you should see similar information.

102. Click **Close** in the Detailed Log View window.

103. Select **Monitor > Logs > Threat**.
104. Add the **Decrypted** column to the table.
105. Create and apply a filter in the Threat Log to show decrypted session:
     (flags has proxy)

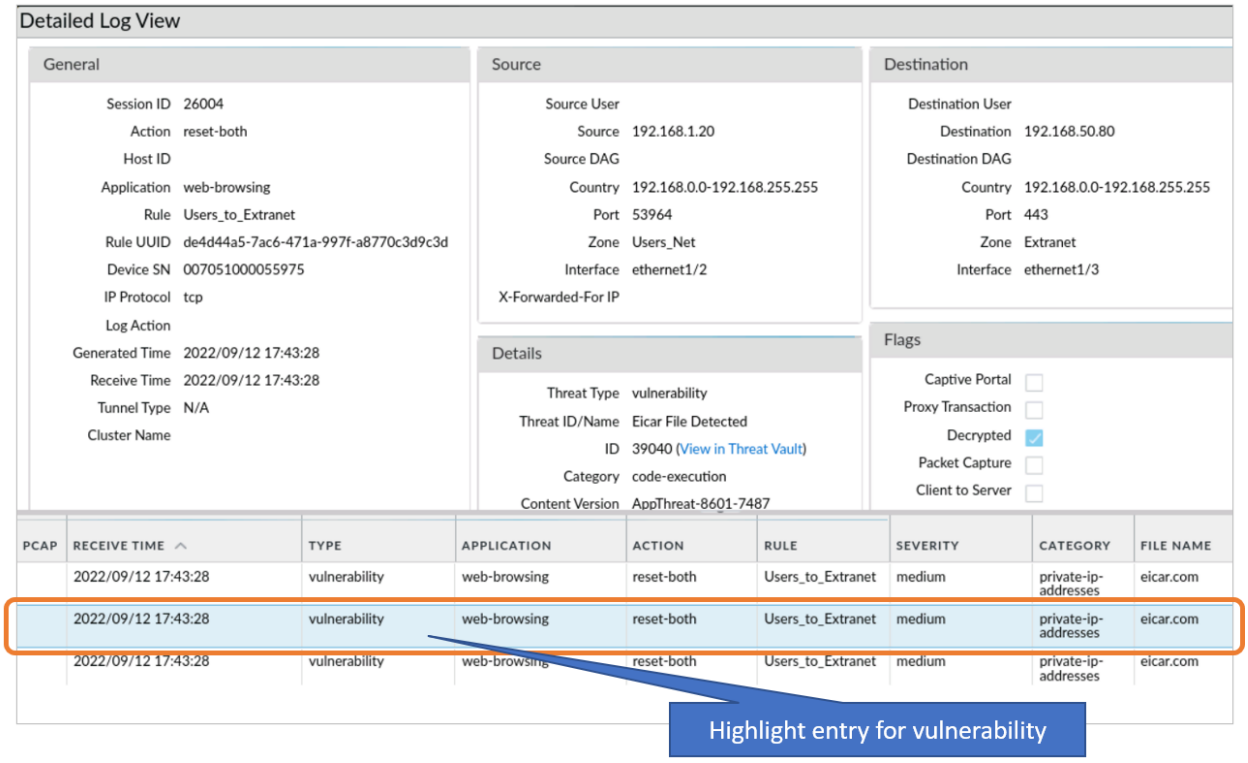


106. Click the magnifying glass icon next to the entry for **vulnerability**.
107. In the top portion of the window, scroll down until you can see the **Details** section in the middle column.
108. You can see information about the file that the firewall detected and blocked:



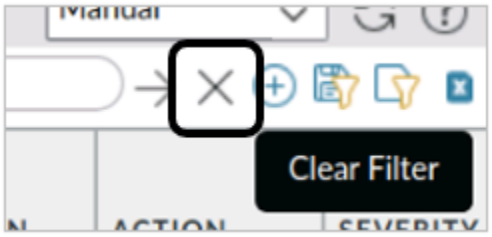
Note the ID number 39040 and the link **View in Threat Vault**. The ID number is a unique value assigned to each threat by Palo Alto Networks. Threat Vault is an online database maintained by Palo Alto Networks with extensive information about each threat. Access to Threat Vault requires a support account.

109. In the bottom of the window, highlight an entry with **Type vulnerability** to see more information about why the firewall terminated this connection.



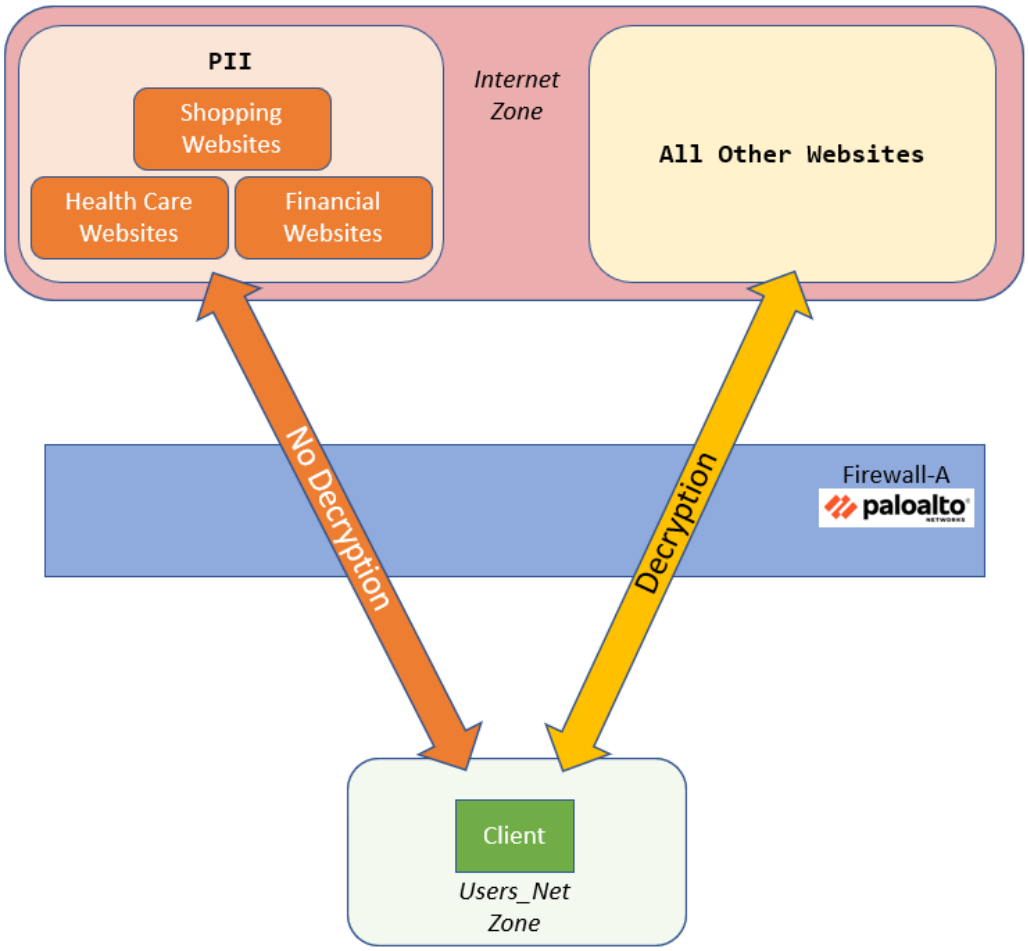
Note that when you select the row, the information in the top half of the window changes.

110. Click **Close** in the **Detailed Log View**.
111. Clear the filter you have in place in the Threat log by clicking the **X** in the upper right corner of the window.



Exclude URL Categories from Decryption

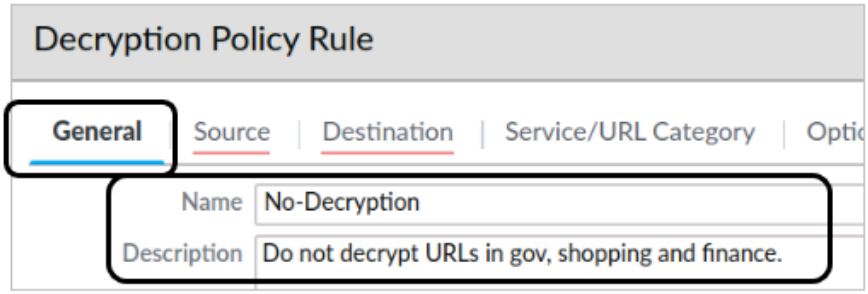
The existing Decryption Policy rule you created instructs the firewall to decrypt all traffic, regardless of the URL category. In this section, you will configure a No-Decrypt rule that instructs the firewall to exclude sensitive categories of web traffic from decryption in order to avoid exposing PII (Personally Identifiable Information).



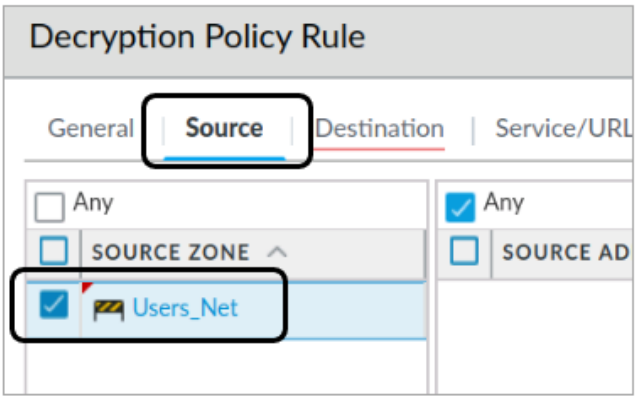
Note that in a production environment, the URL Categories which you exclude from decryption will depend on many factors. Company policy, national privacy laws, HR concerns, destination country – all of these can dictate what types of traffic you should or should not decrypt. The examples we use here are simple ones to illustrate how to exclude URL categories from decryption.

112. In the firewall web browser, select **Policies** > **Decryption**.
113. Click **Add**.
114. Under the **General** tab, enter **`No-Decryption`** for **Name**.

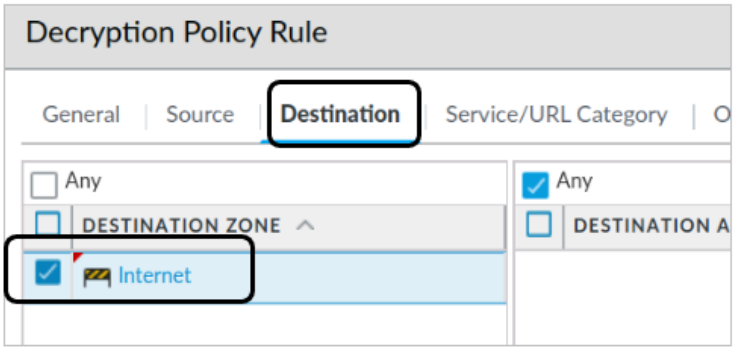
115. For **Description**, enter **`Do not decrypt URLs in gov, shopping and finance`**.



116. Select the tab for **Source**.
117. Under the **Source Zone** section, click **Add** and select **Users_Net**.

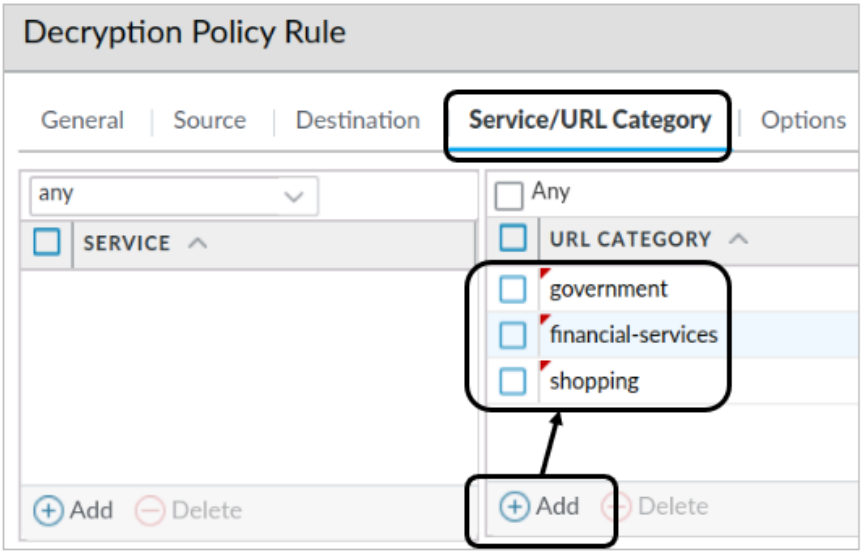


118. Select the **Destination** tab.
119. Under the **Destination Zone** section, click **Add** and select **Internet**.



120. Select the tab for **Service/URL Category**.
121. Leave the **Service** set to **any**.

122. Under the **URL Category**, use the **Add** button to add **government, financial-services,** and **shopping**.



123. Select the tab for **Options**.
124. Verify that the **Action** is set to **No Decrypt**.
125. Set the Decryption Profile to default.

126. Leave the remaining settings unchanged.
127. Click **OK** to create this entry.
128. You should have two entries in the **Decryption** Policy.

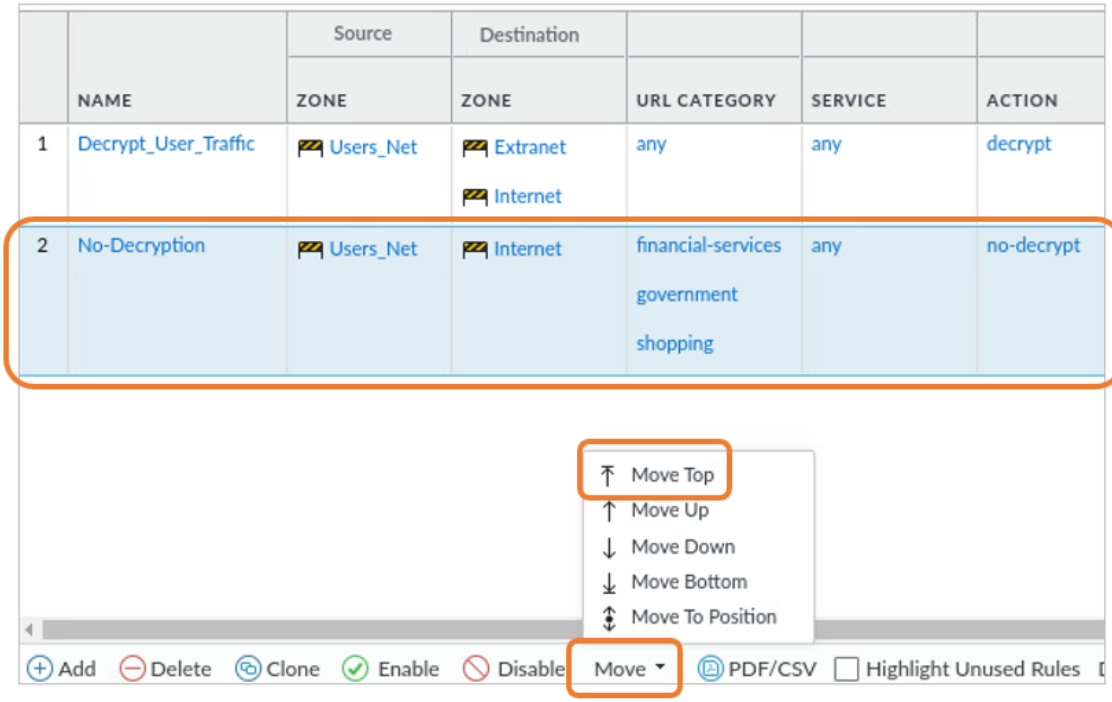
	NAME	Source ZONE	Destination ZONE	URL CATEGORY	SERVICE	ACTION
1	Decrypt_Users_Traffic	Users_Net	Extranet Internet	any	any	decrypt
2	No-Decryption	Users_Net	Internet	financial-services government shopping	any	no-decrypt

129. Before you proceed, answer the following question:

Is there anything wrong with these Decryption Policy rules?

The answer is yes. They are in the wrong order. All traffic will match the first rule Decrypt_Users_Traffic because the URL category is set to **any**. The firewall will therefore never proceed beyond the first rule to implement the second rule, which instructs the firewall to exclude financial-services, government and shopping websites from decryption.

130. Highlight the **No-Decryption** rule entry (but do not open it).
131. At the bottom of the window, click **Move > Move Top**.



132. The rules now should be in the correct order:

	NAME	Source ZONE	Destination ZONE	URL CATEGORY	SERVICE	ACTION
1	No-Decryption	Users_Net	Internet	financial-services government shopping	any	no-decrypt
2	Decrypt_Users_Traffic	Users_Net	Extranet Internet	any	any	decrypt

Always place no-decrypt rules at the beginning of the Decryption Policy table.

Commit the configuration

133. Click the **Commit** button at the upper right of the web interface.
134. Leave the settings unchanged and click **Commit**.
135. Wait until the **Commit** process is complete.
136. Click **Close**.

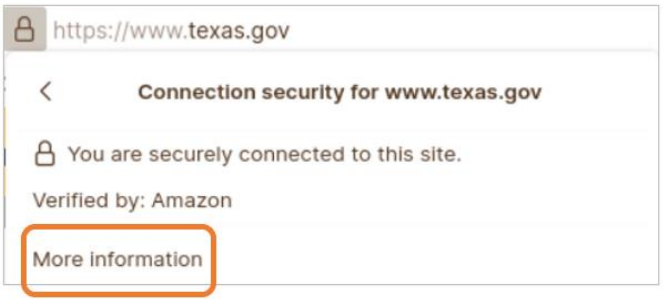
Test the No-Decryption Rule

With your No-Decryption rule in place, browse to a website that falls into one of the excluded categories.

137. Open Firefox.
138. Connect to **https://texas.gov.**
139. Click the **padlock** icon just in front of the URL:

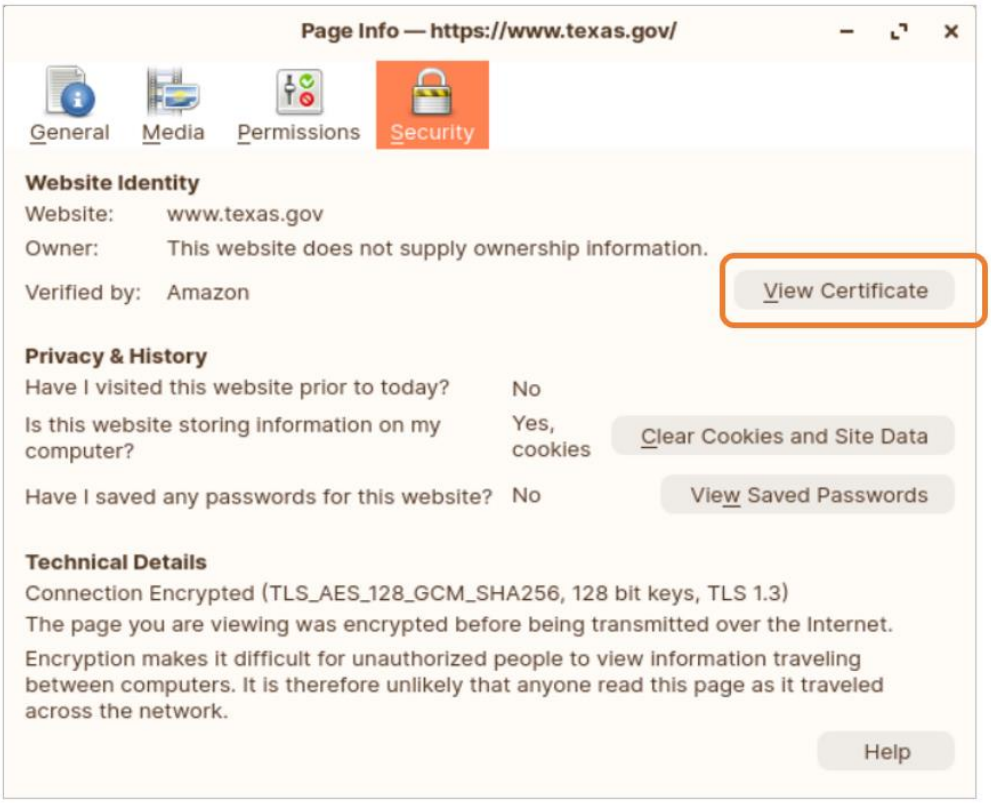
140. Click the **arrow** next to **Connection secure**:

141. Click **More information**.

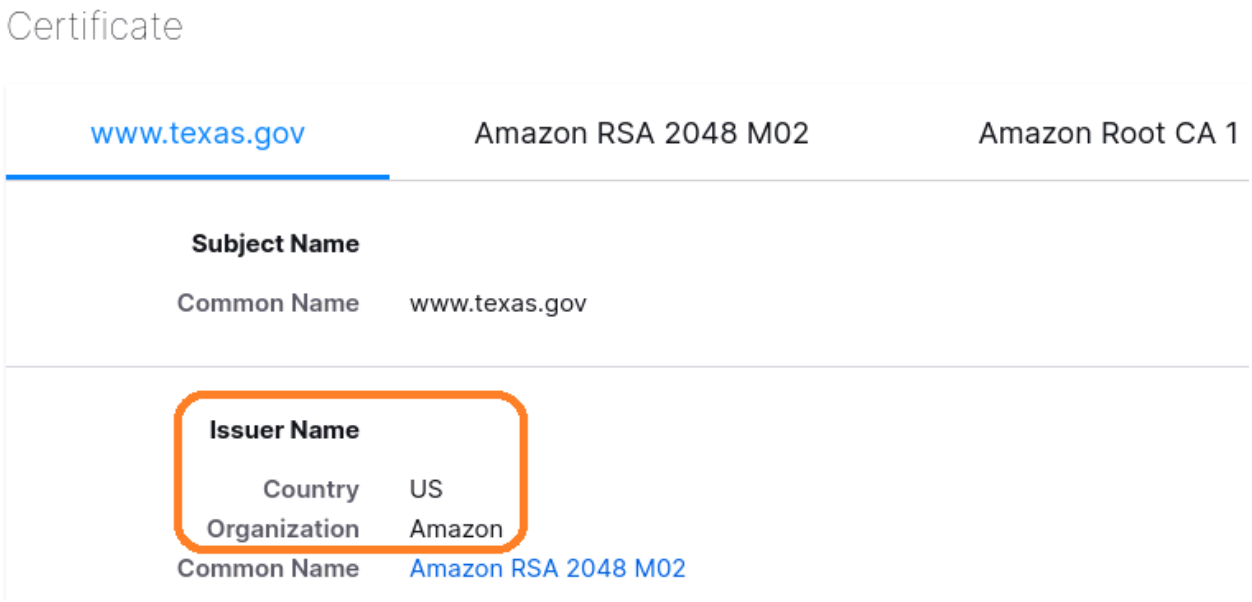


The Certificate details you see may vary from this example because we are testing with live websites that may change.

142. Click **View Certificate**:



143. Note that the Issuer Name is *not* 192.168.1.1.



If the firewall had decrypted this website, the Issuer Name would be displayed as 192.168.1.1. Because you excluded government websites from Decryption, the firewall has not decrypted this site.

The issuer name you see may be different from the example shown here.

144. Close Firefox and any certificate windows.

Stop. This is the end of the lab.

Lab 14: Locating Valuable Information Using Logs and Reports

Having worked with the new Palo Alto Networks firewall for almost a week, you have discovered how much information the device provides about traffic that it processes. You have already worked with the Traffic, Threat, URL and System log files and learned how to create filters to locate specific information. But before you roll the firewall into production, you want to spend some time looking at some of the other resources, graphs, reports and tools that are available.

You will also need to show your colleagues where to find different kinds of information in the firewall web interface so that they can assist you in keeping your network as secure as possible.

Lab Objectives

- View threat information using the Dashboard
- View application information using the Dashboard
- View threat information using the ACC
- View application information using the ACC
- View threat information using the Threat log
- View application information using the Traffic log
- View threat information using App Scope reports
- View threat information using predefined reports
- View application information using predefined reports
- View threat and application information using custom reports

High-Level Lab Steps

Apply a Baseline configuration to the Firewall

- Load and commit the configuration file - **`edu-210-11.1a-lab-14.xml`** - to the Firewall

Generate Traffic

- Use the Remmina application to connect to the **`Server-Extranet`** host
- Run the traffic generating script by entering the following commands:

```
cd ~ <ENTER>
./UsingLogs-V1.sh <Enter>
```

- Allow the script to run uninterrupted

Display Recent Threat Information in the Dashboard

- Add the Threat Logs widget to the Dashboard
- Use the Threat Log widget to determine what threats the firewall has detected within the last hour
- Add the URL Filtering Logs widget to the Dashboard
- Use the URL Filtering Logs widget to examine URL Filtering entries written by the firewall within the last hour
- Add the Data Filtering Logs widget to the Dashboard
- Use the Data Filtering Logs widget to examine Data Filtering entries written by the firewall within the last hour

Display Recent Application Information in the Dashboard

- Add the Top Applications widget to the Dashboard
- Note which applications the firewall has detected within the last hour
- Add the Top High Risk Applications to the Dashboard
- Note which applications the firewall has detected that are considered high-risk

  Applications with a risk level of 4 are shown in orange. Applications with a risk level of 5 are shown in red. These rankings come from Palo Alto Networks.

View Threat Information in the ACC

- In the ACC, use the Threat Activity tab to view information for the Last 7 Days
- In the Threat Activity widget's table below the graph, click the small arrow icon next to one of the critical severity level entries to add critical severity level as a Global filter for the ACC

  Note that the widget's table changes to display only threats that have a critical severity level

- In the Global Filters area, click Clear all to remove the global filter
- On the Threat Activity tab, determine what widgets you would use to see which hosts have either visited or resolved a malicious DNS domain

View Application Information in the ACC

- In the Network Activity tab of the ACC, hide the sidebar to make more room for the widgets
- In the top section of the Application Usage widget, hover your mouse pointer over the web-browsing section in the graph

  Note the summary window that appears with information about web-browsing

- In the table below the graph, hover your pointer over the web-browsing application until the global filter Left arrow appears. Then click the Left arrow to promote the web-browsing application to a global filter
- Unhide the sidebar
- In the Network Activity tab, locate the Rule Usage widget and change the display to Bytes

  Use the information displayed to determine which Security Policy rules have allowed web-browsing traffic

- In the Rule Usage widget, use the Jump to Logs button to open the Traffic Log

  Note the log filters that have been applied automatically to the Traffic log

- Clear the filter in the Traffic log
- In the Global Filters section of the ACC tab, clear all filters

View Threat Information in the Threat Log

- In the Threat Log, clear any filters you may have in place
- Use the Add Log Filter button to build a filter with the following characteristics:

Parameter	Value
Connector	**and**
Attribute	**Severity**
Operator	**greater than or equal**
Value	**high**

This configuration filters the log to display only critical-severity and high-severity threats

- Apply the filter to the Threat Log
- Use the information from the Action column to determine how these threats have been handled by the firewall.
- Clear the existing filter
- Use the Add Log Filter button to build a filter with the following characteristics:

Parameter	Value
Connector	**and**
Attribute	**Source User**
Operator	**equal**
Value	**`chicago\escrooge`**

This configuration filters the log to display threats coming from only this user.

- Apply the filter to the Threat log
- Note what Threats this user has generated

  You may need to add the Source User column to the Threat Log display if it is not already present

- Clear the existing filter

  Note: URL Filtering, WildFire Submissions, and Data Filtering logs are available to display traffic and threats detected by the firewall but are not shown in this section. You also can use filters to view these logs.

View Application Information in the Traffic Log

- In the **Traffic** Log, remove any existing log filters
- Use the Add Log Filter button to build a filter with the following characteristics:

Parameter	Value
Connector	**and**
Attribute	**Source Zone**
Operator	**equal**
Value	**`Acquisition`**

This configuration filters the log to display only application traffic that is sourced from the Acquisition zone.

- **Apply** the filter to the Traffic Log

  Note that the Traffic log been filtered to display only traffic sourced from the Acquisition zone

- Use the **Add Log Filter** to modify the existing source zone filter to filter on the Users_Net zone instead of the Acquisition zone.
- Use the Add Log Filter to update the filter to include the following information:

Parameter	Value
Connector	**and**
Attribute	**Application**
Operator	**equal**
Value	**web-browsing**

- **Apply** the filter to the Traffic Log

  Note that the Traffic log been filtered to display only web-browsing traffic sourced from the Users_Net zone

View Threats Using App Scope Reports

- Select App Scope > Threat Monitor
- Set the time frame to Last 7 days
- Set the list of entries to Top 25
- Filter the list by Source User
- Set the display to Show all threat types
- Hover your pointer over the top section of any bar on the bar chart and note the popup window that shows the threat name and number of detections

View Threat Information Using Predefined Reports

- Under Monitor > Reports, expand the list of Traffic Reports
- Select the entry for Sources
- Note the Sources report that is displayed in the web interface
- In the calendar below the report column, click various dates from the past week to see information about traffic logged by the firewall on other days

  Note that days that are grayed out do not have any data available

View Application Information Using Predefined Reports

- Under Monitor > Reports, expand the list of Application Reports
- Select the entry for Applications

  Note the Applications report that is displayed in the web interface

- Expand the list of URL Filtering Reports and select the entry for Web Sites

  Note that you may need to click different dates until you see a report with data

View Threat and Application Information Using Custom Reports

- Select **Monitor > Manage Custom Reports**, and use the following information to create a **Custom Report**:

Parameter	Value
Name	**`Apps Used by Internal Zones`**
Database	**Traffic Summary**
Scheduled check box	Select it
Time Frame	**Last 7 Days**
Sort By	Select **Sessions** and **Top 100**

Parameter	Value
Group By	Select **Source Zone** and **5 Groups**
Selected Columns	In top-down order, select **Source Zone**, **Application**, **Bytes**, and **Action**

The report will list each internal zone along with the applications seen coming from each zone. Because only four zones are available in the lab environment, grouping of the data into a maximum of five groups is enough to display all zones. Sorting the applications list in each zone by the top 100 sessions should display all applications associated with a source zone.

- Use the Filter Builder button to create a filter with the following characteristics:

Parameter	Value
Connector	**and**
Attribute	**Source Zone**
Operator	**not equal**
Value	`Internet`

- **Apply** the filter
- Click **OK** to close the **Custom Report** window and to see a new entry in the list of custom reports
- Open the custom report and use **Run Now** to see report information

  Note that the report provides details for applications used by the Extranet and the Acquisition zones

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

To start this lab exercise, load a preconfigured firewall configuration file.

1. Open configuration browser and connect to firewall-a.
2. In the Palo Alto Networks firewall web interface, select **Device** > **Setup** > **Operations**.
3. Click **Load named configuration snapshot**.
4. Click the drop-down list next to the **Name** text box and select **`edu-210-11.1a-14.xml`**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

5. Click **OK**.

   A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.
9. Click **Close** to continue.

Generate Traffic

In this section, you will generate simulated attacks, web browsing and application traffic to populate firewall logs.

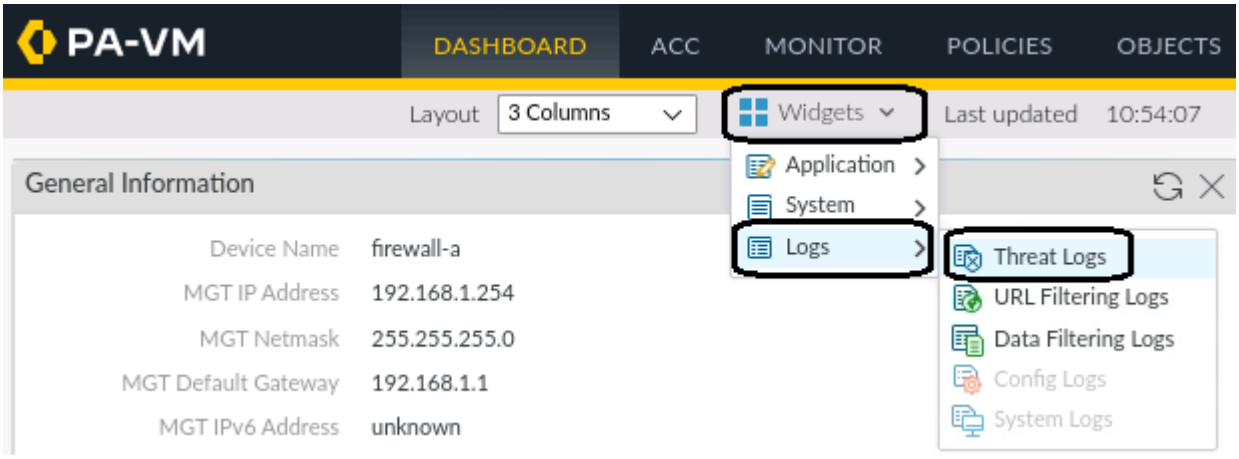
10. On the client workstation, open the Remmina application.
11. Double-click the entry for **Server-Extranet**.
12. At the prompt, enter the following command:

    `./UsingLogs-V1.sh` **<Enter>**
13. Press **Enter** again to begin the process.
14. Allow the script to run uninterrupted.
15. Minimize the Remmina application window.

Display Recent Threat Information in the Dashboard

You will use the **Dashboard** to view threats detected by the firewall in the last hour. Because you can configure the **Dashboard** to periodically refresh, the displayed threats will change, depending on the most recent information available. The **Dashboard** information is sourced from the Threat, URL Filtering, and Data Filtering logs.

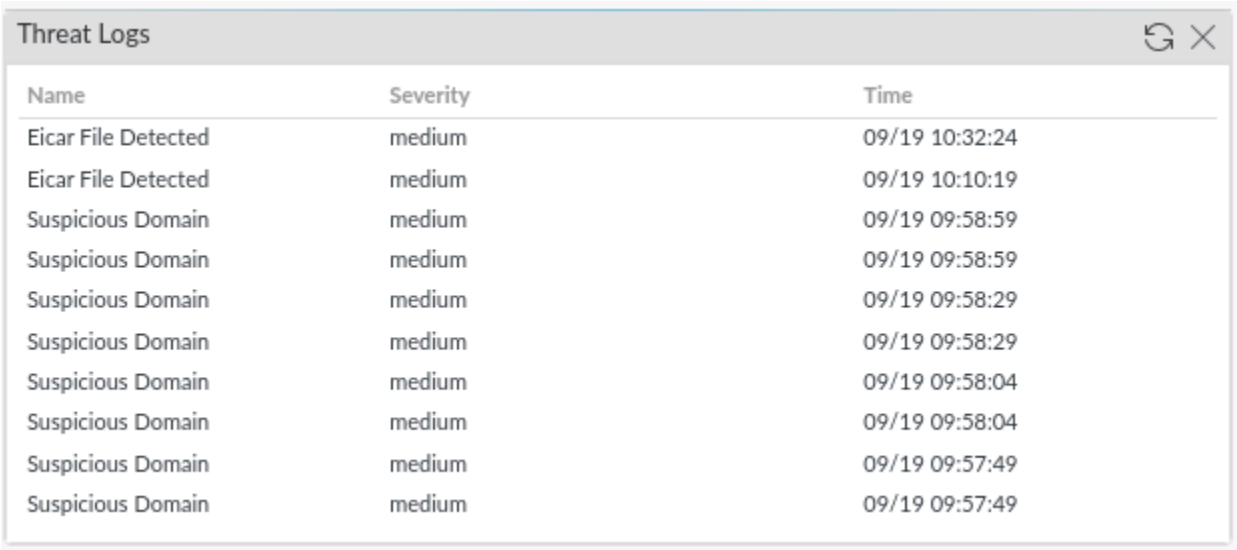
16. In the web interface, click the **Dashboard** tab.
17. Click **Widgets** and select **Logs** > **Threat Logs**:



Note that if Threat Logs is grayed out, it means that the widget is already displayed on the Dashboard.

18. Are any threats displayed in the **Threats Logs** widget? It can display the 10 most recent threats detected by the firewall in the last hour.

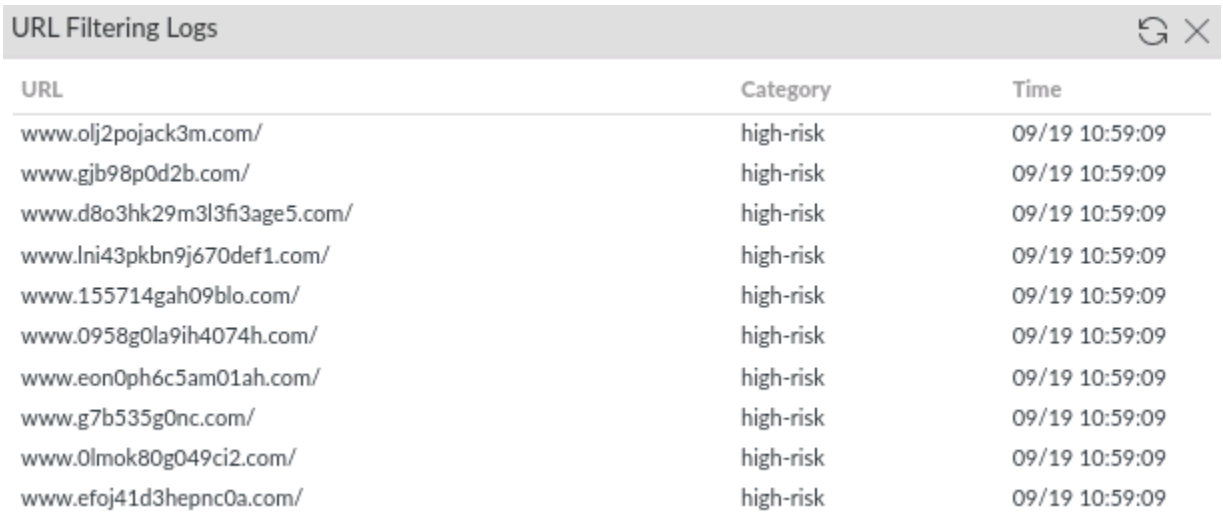
Depending on activity in your lab environment in the last hour, you might not see threat entries. This widget is useful for viewing only the most recent threats detected by the firewall. Here is an example:



You can use the refresh button in the upper right corner of any widget to update the displayed items. The entries you see will differ from the examples shown here.

19. Click **Widgets** and select **Logs > URL Filtering Logs**.

    A **URL Filtering Logs** widget should appear on the **Dashboard**. Note that if URL Filtering Logs is grayed out, it means that the widget is already displayed on the Dashboard.



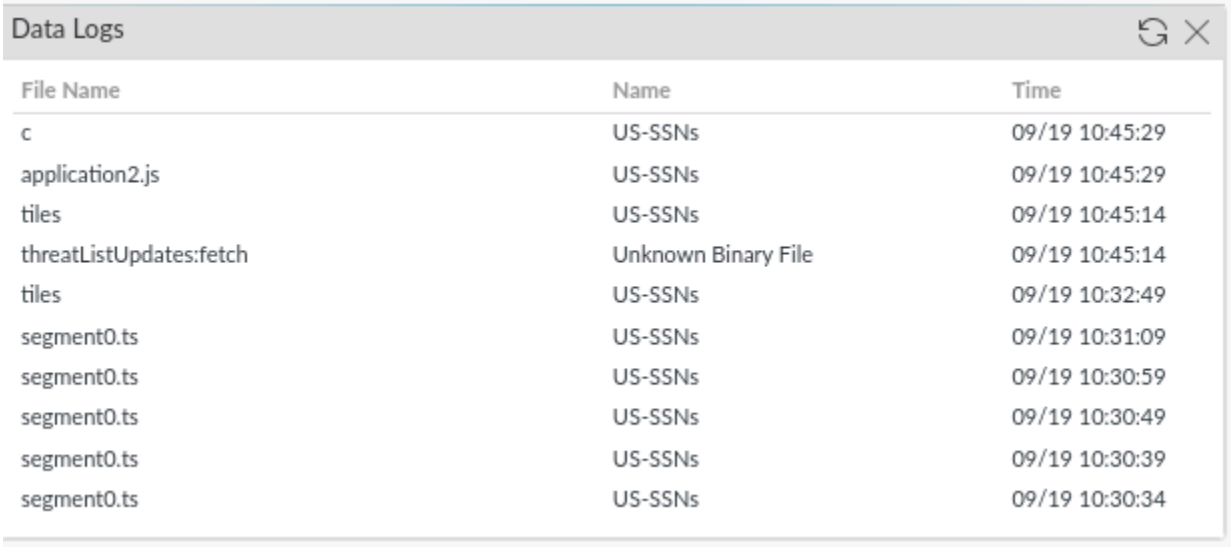
    You can use the refresh button in the upper right corner of any widget to update the displayed items. The threats you see will differ from the examples shown here.

20. Are any URLs displayed in the **URL Filtering Logs** widget? It can display the 10 most recent URLs seen by the firewall in the last hour.

    Depending on activity in your lab environment in the last hour, you might see URL entries. This widget is useful for viewing only the most recent URLs seen by the firewall.

21. Click **Widgets** and select **Logs > Data Filtering Logs**.

    A **Data Logs** widget should appear on the **Dashboard**. Note that if Data Filtering Logs is grayed out, it means that the widget is already displayed on the Dashboard.



File Name	Name	Time
c	US-SSNs	09/19 10:45:29
application2.js	US-SSNs	09/19 10:45:29
tiles	US-SSNs	09/19 10:45:14
threatListUpdates:fetch	Unknown Binary File	09/19 10:45:14
tiles	US-SSNs	09/19 10:32:49
segment0.ts	US-SSNs	09/19 10:31:09
segment0.ts	US-SSNs	09/19 10:30:59
segment0.ts	US-SSNs	09/19 10:30:49
segment0.ts	US-SSNs	09/19 10:30:39
segment0.ts	US-SSNs	09/19 10:30:34

    The entries you see will differ from the examples shown here.

22. Are any files displayed in the **Data Logs** widget? It can display the 10 most recent files detected by the firewall in the last hour.

    Depending on activity in your lab environment in the last hour, you might not see file entries. This widget is useful for viewing only the most recent file transfers seen by the firewall.

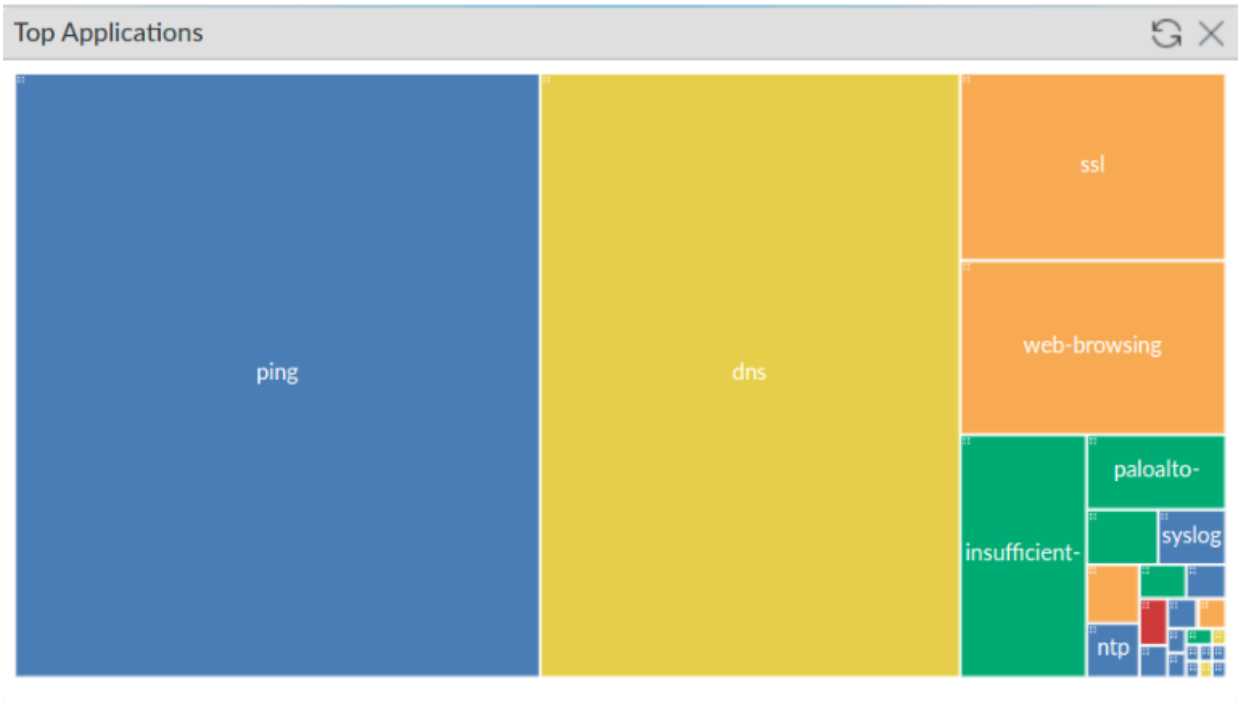
Display Recent Application Information in the Dashboard

In this section, you will display the **Dashboard** and view applications identified by the firewall in the last hour. Because you can configure the **Dashboard** to periodically refresh, the displayed applications will change depending on the most recent information available. You also will use the **Dashboard** to display those applications identified by the firewall in the last hour that have the most risk associated with them.

23. In the web interface, click the **Dashboard** tab.
24. Click **Widgets** and select **Application > Top Applications**.

    A **Top Applications** widget should appear on the **Dashboard**.
25. Look at the applications displayed in the **Top Applications** widget. It displays the applications seen by the firewall in the last hour.

    Some applications should be listed because some "housekeeping" traffic nearly always traverses the network, even in the lab environment. This widget is useful for viewing only the recent application traffic seen in the last hour by the firewall. Here is an example:

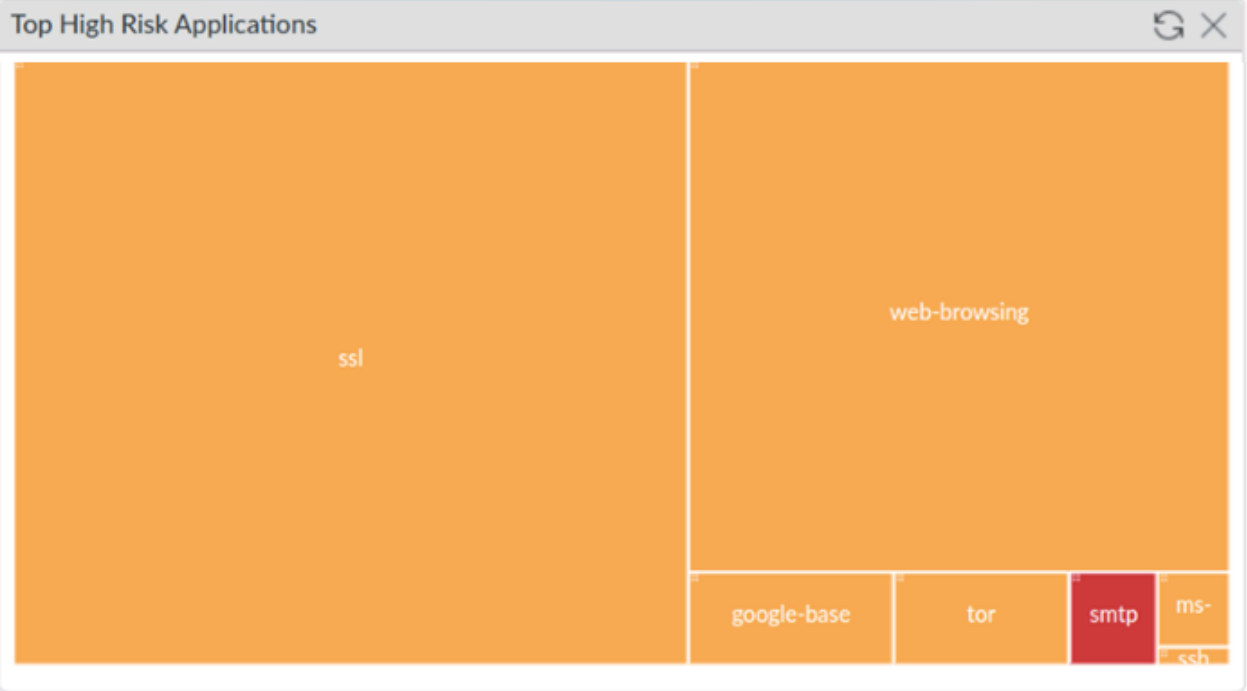


    The information you see will differ from the examples shown here.
26. Click **Widgets** and select **Application** > **Top High Risk Applications**.

    A **Top High Risk Applications** widget should appear on the Dashboard.

27. Notice the applications displayed in the **Top High Risk Applications** widget. It displays the high-risk applications seen by the firewall in the last hour.

    Some applications should be listed because some “housekeeping” traffic nearly always traverses the network. This widget is useful for quickly viewing only the recent application traffic seen by the firewall in the last hour. Here is an example:



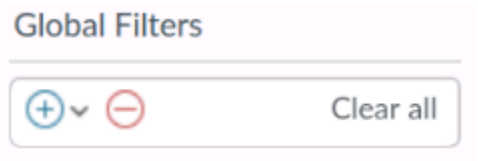
    Applications with a risk level of 4 are shown in orange. Applications with a risk level of 5 are shown in red. These rankings come from Palo Alto Networks. The information you see will differ from the examples shown here.

View Threat Information in the ACC

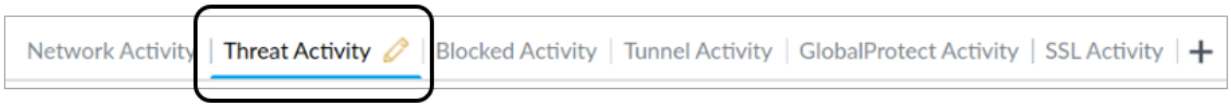
In this section, you will view a few ACC widgets on the **Threat Activity** tab to become familiar with widgets that display threats against your environment. Spend time examining each widget so that you can determine which information is presented that might be most useful to you back in your environment.

28. In the web interface, click the **ACC** tab.

29. On the left side of the **ACC** page, look at **Global Filters** for any configured global filters. If there are filters, click **Clear all**:



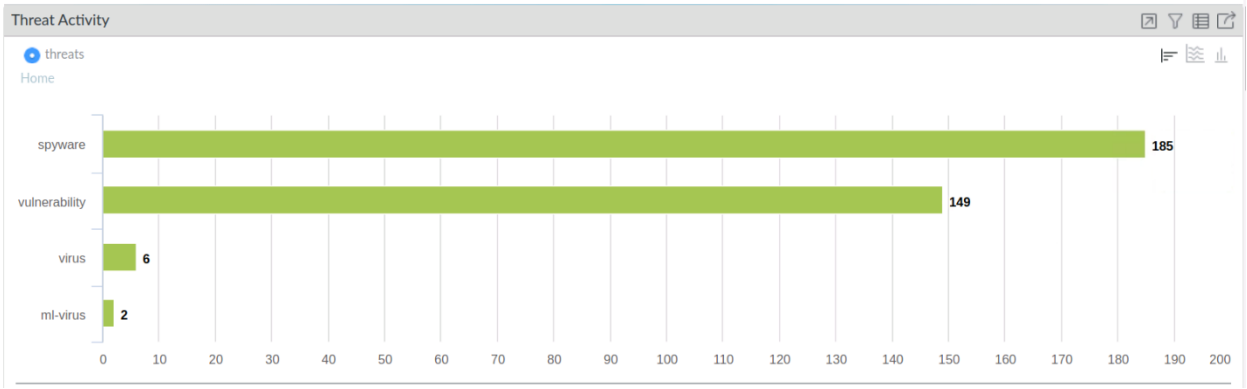
30. Click the **Threat Activity** tab:



31. On the left side of the **ACC** window, click the **Time** drop-down menu and select **Last 7 Days**. This value configures all the widgets to display threat information for the last seven days:

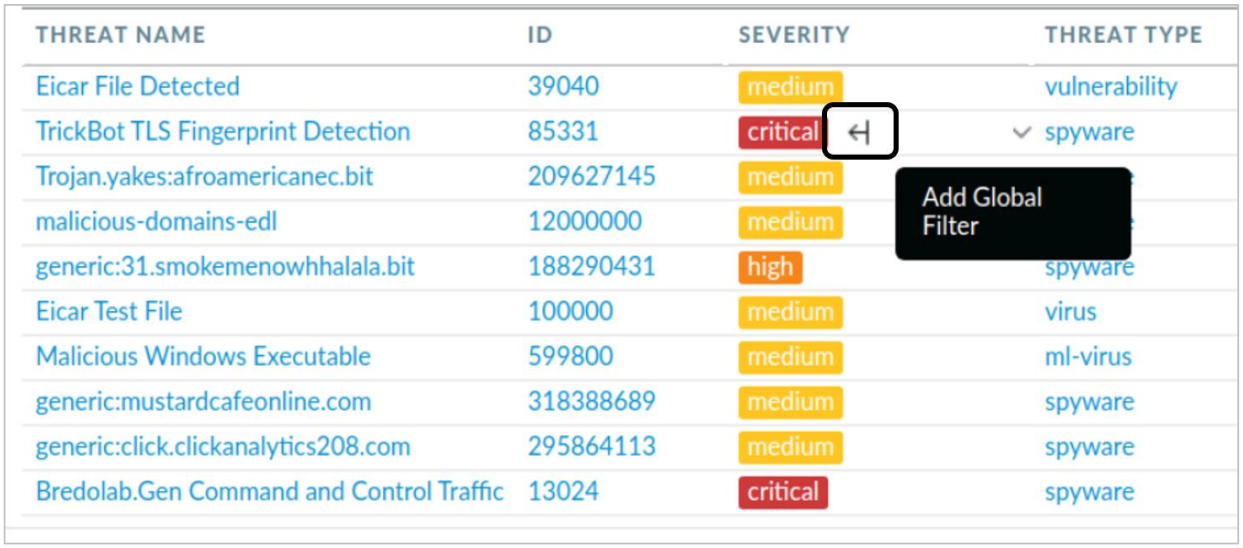
32. Do you see any threats listed in the **Threat Activity** widget?

    You should see some combination of flood, scan, spyware, packet, vulnerability, and virus threats displayed in a graph. Next to each entry should be the number of occurrences of these threat types that the firewall has seen in the last seven days. More detail about the threats should be displayed in a table below the graph:



    The entries you see will differ from the examples shown here.

33. In the **Threat Activity** widget's table below the graph, click the small arrow icon next to one of the **critical** severity level entries.

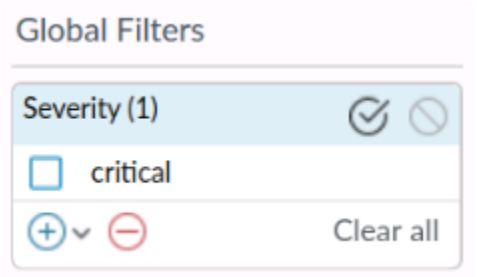


This action adds the critical severity level as a Global filter for the ACC. Global filters are applied to every widget on the ACC. Global filters are useful for quickly pivoting your search on a specific piece of information, thus causing all widgets to display only information that is relevant to a specific object or threat.

34. Did the widget's table change to display only threats that have a **critical** severity level?

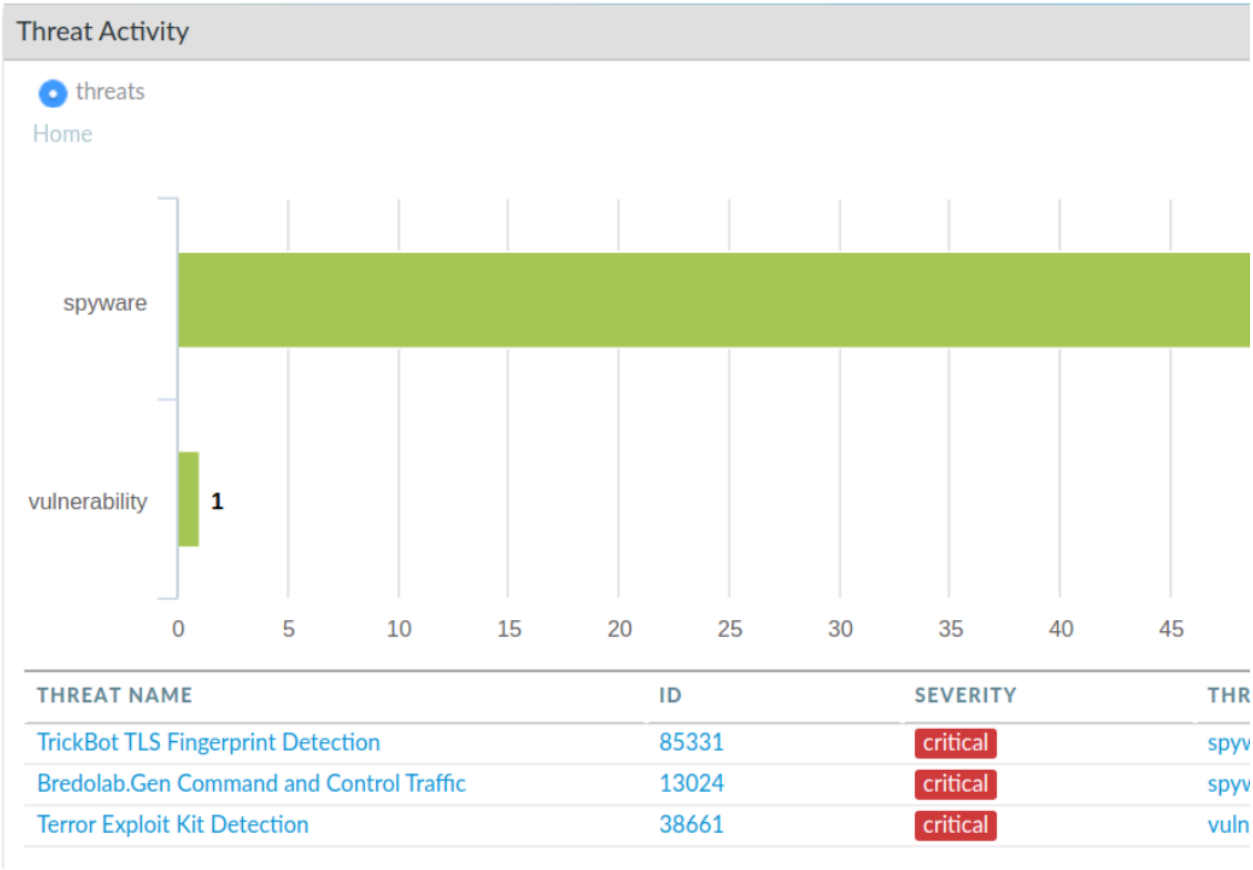
The widget should have changed to display only critical severity level threats. The graph will also change to display only threats that match the filter.

35. Find the global filter on the left side of the **ACC** window.
36. Was **critical** added as a global filter condition?



You should see a global filter for critical.

37. Note that the Threat Activity graph and the table of Threat Names are updated to reflect only items with a Severity level of Critical.



The entries you see will differ from the examples shown here.

38. In the **Global Filters** area, click **Clear all** to remove the global filter.

The global filter should be removed, and all widgets should be refreshed to include all threats detected in the last seven days.

39. On the **Threat Activity** tab, which widgets would you use to see which hosts have either visited or resolved a malicious DNS domain? Make a guess based on the widget names.

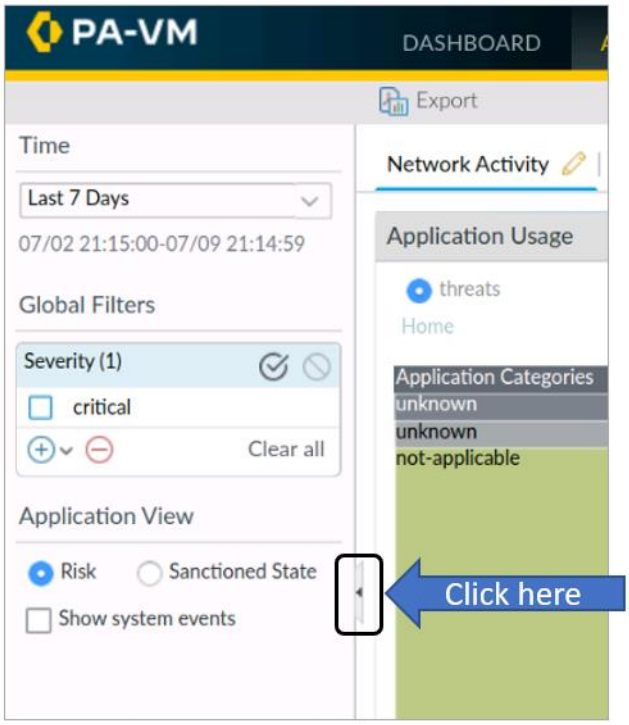
The answer is: **Hosts Visiting Malicious URLs** and **Hosts Resolving Malicious Domains**.

View Application Information in the ACC

In this section, you will view two widgets on the **Network Activity** tab. The goal is for you to gain familiarity with some of the widgets available for viewing application and traffic information.

40. In the web interface, click the **ACC** tab and then the **Network Activity** tab.

41. Hide the sidebar to make more room for the widgets by clicking the very small arrow shown:



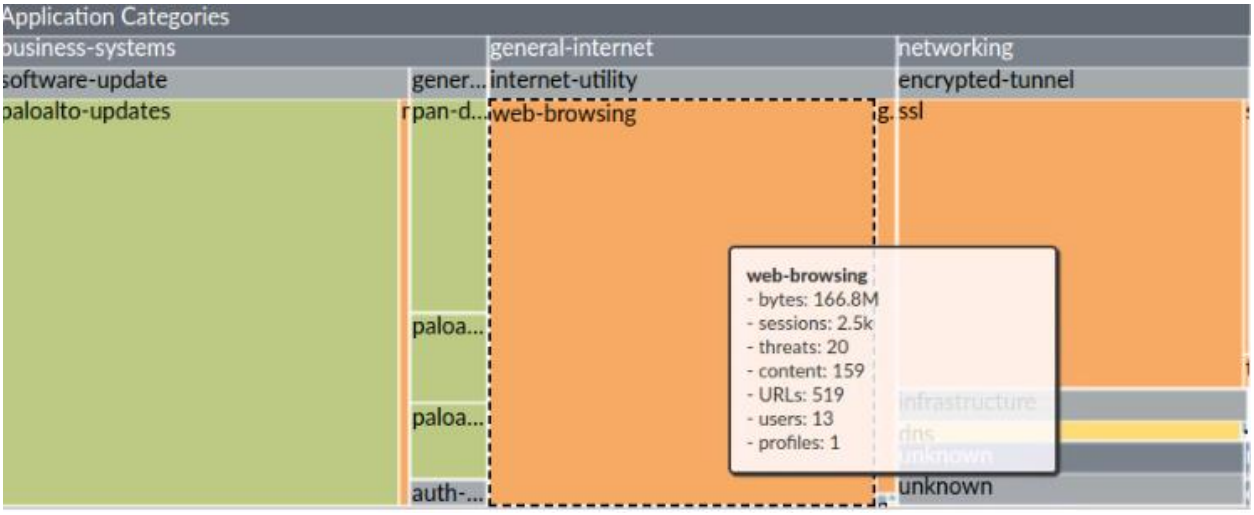
42. Resize the **Application** column to display the entries:

APPLICATION	RISK	BYTES	SESS
not-applicable	1	0	
dns	3	37.0M	35.7
ssl	4	179.0M	1.2
web-browsing	4	50.0M	1.5
smtp	5	23.0k	

43. The top section of the **Application Usage** widget is a graph that illustrates how much of the traffic a specific application represents:

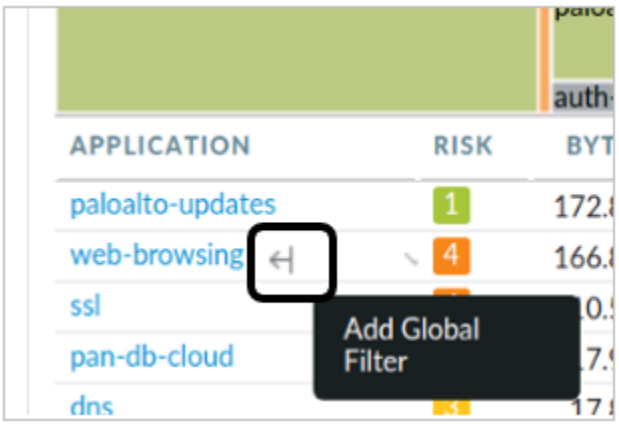
Think of this as a sort of square pie-chart. The entries you see will differ from the examples shown here.

44. Hover your pointer over the section for **web-browsing**.

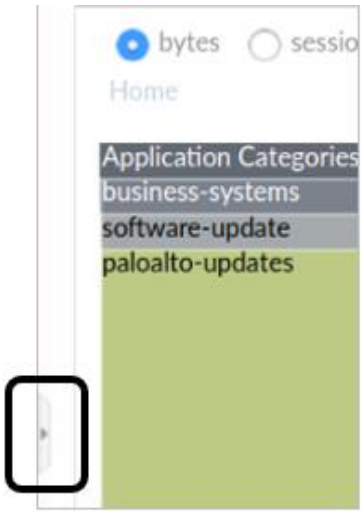


This action displays a summary window with information about that application. The information you see will differ from the examples shown here.

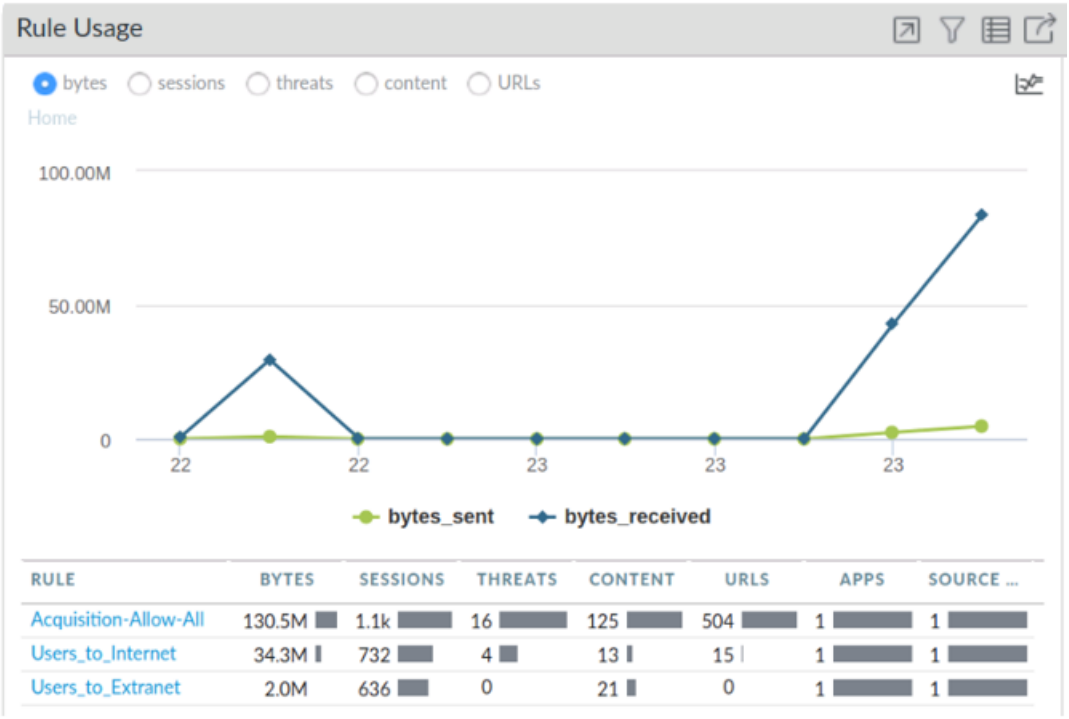
45. In the table below the graph, hover your pointer over the **web-browsing** application until the global filter **Left arrow** appears. Then click the **Left arrow** to promote the **web-browsing** application to a global filter:



46. Unhide the sidebar by clicking the tiny arrow again:



47. Scroll down in the **Network Activity** tab until you reach the **Rule Usage** widget.
48. Select the radio button at the top for **Bytes**.

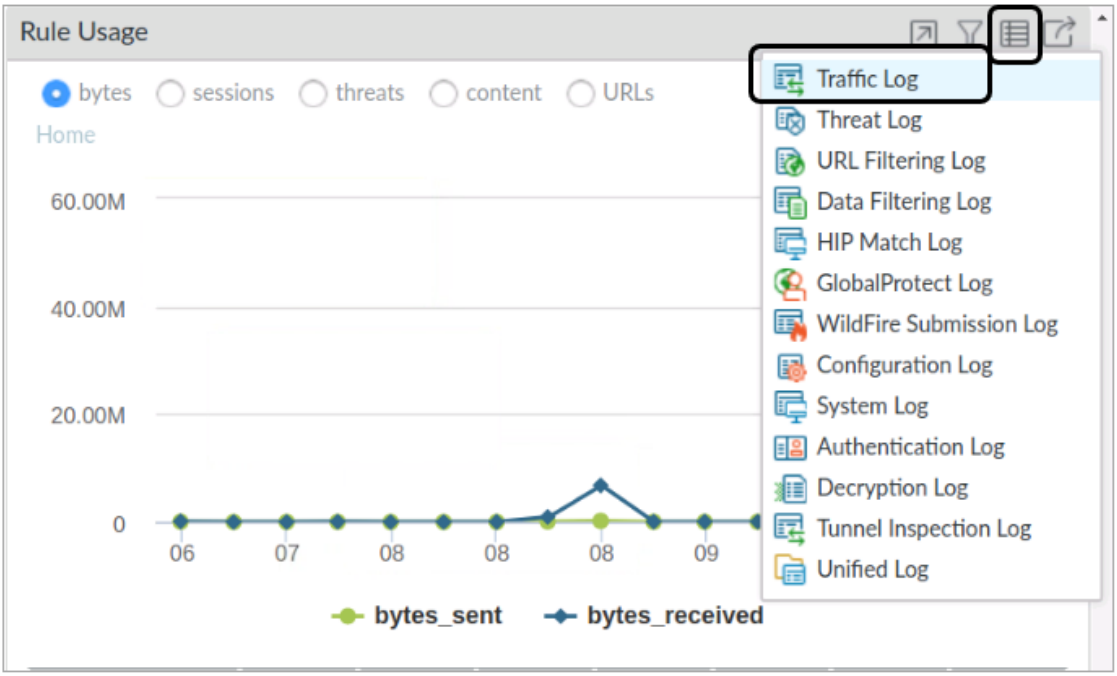


The entries you see will differ from the examples shown here.

49. Which Security Policy rules have allowed web-browsing traffic?

The widget should display only those rules that have allowed web-browsing traffic in the last seven days because the widget is filtered by the web-browsing application in the global filter and the ACC time range setting.

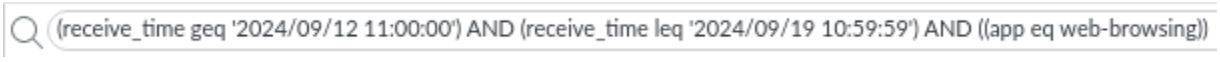
50. In the upper right corner of the **Rule Usage** widget, click the **Jump to Logs** button and select **Traffic Log** icon to open the logs menu.



51. Which log is displayed in the web interface?

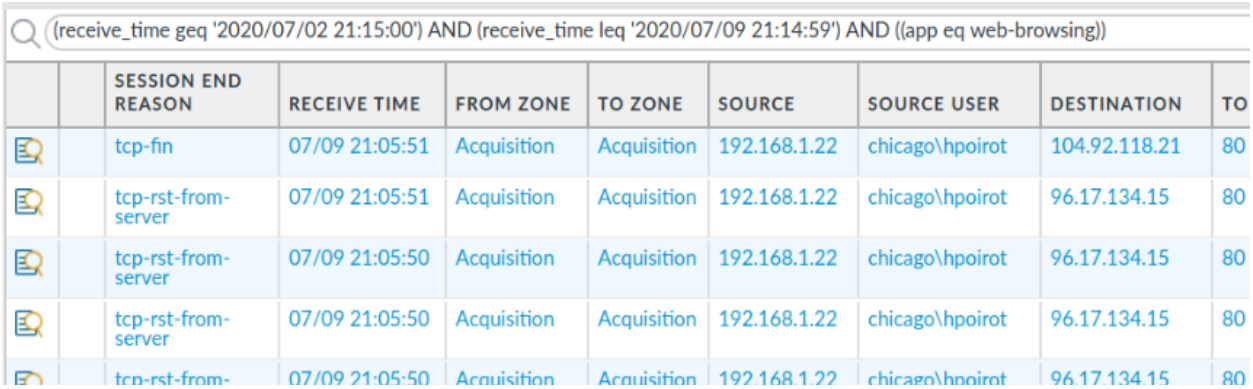
It should be the Traffic log.

52. Which log filters have been applied automatically to the Traffic log?



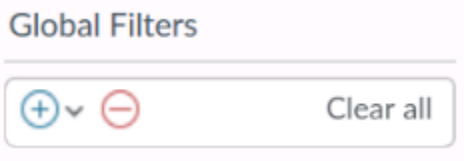
There should be a time range filter and an application filter for web-browsing. The time range filter is derived from the time specified in the ACC. The entry you see will differ from the example shown here.

53. Note that the entries displayed in the Traffic log match the filter:



Note that several columns have been hidden or rearranged in the example shown here.

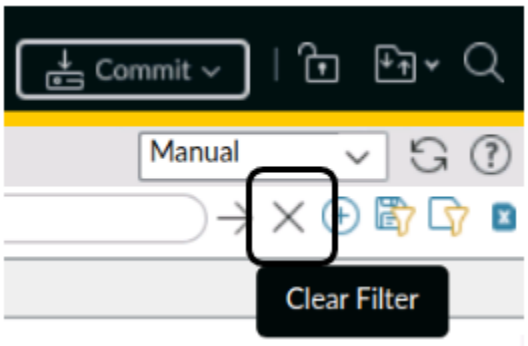
54. Clear the filter in the Traffic log.
55. Click the **ACC** tab.
56. In the **Global Filters** area, click **Clear all** to remove the global filter:



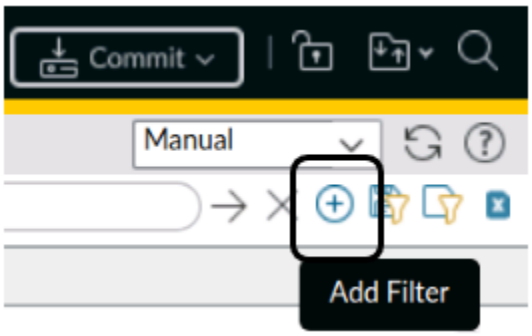
View Threat Information in the Threat Log

In this section, you will apply different filters to the Threat log. You will use the filters to determine whether all critical-severity and high-severity threats detected by the firewall have been blocked. You also will use a log filter to determine which detected threats come from a specific security zone.

57. In the web interface, select **Monitor > Logs > Threat**.
58. In the upper right corner of the window, click the **X** icon in the filter area to remove any existing log filter:



59. Click the + icon in the filter area to open the **Add Log Filter** window:

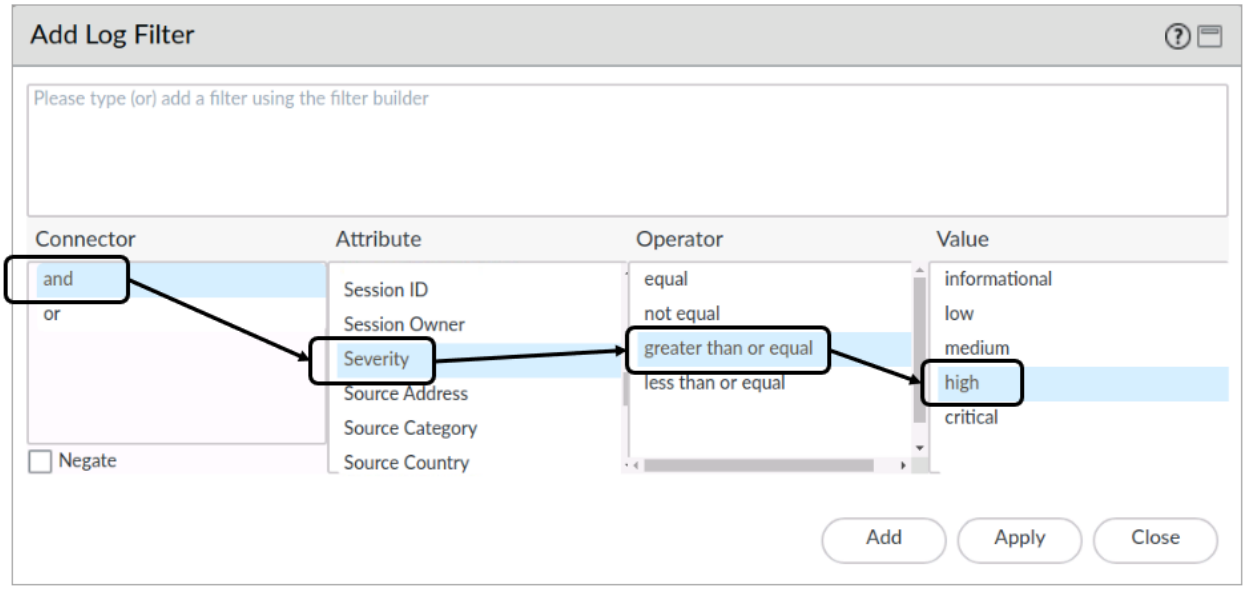


The **Add Log Filter** window should open.

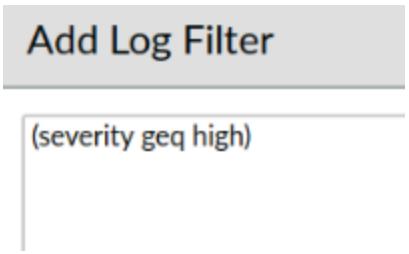
60. In the **Add Log Filter** window, select the following:

Parameter	Value
Connector	**and**
Attribute	**Severity**
Operator	**greater than or equal**
Value	**high**

This configuration filters the log to display only critical- and high-severity threats.



61. Click **Add** to add the in-progress filter to the top pane of the **Add Log Filter**'s window:

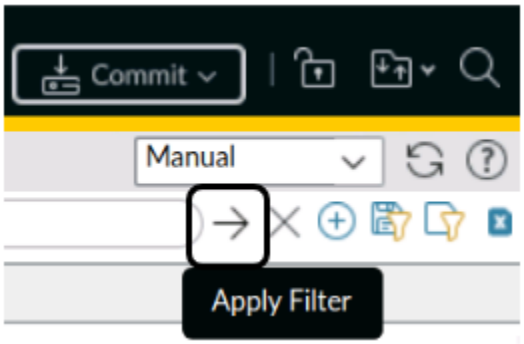


62. Click **Apply** to add the filter to the Threat log filter text box.

    The **Add Log Filter** window should close.

    As you become more familiar with filter syntax, you can simply type the filter directly into the filter field and forego using the filter builder.

63. With the filter string in the log filter text box, click the **right arrow** icon to apply the filter to the Threat log:



64. Has the Threat log been filtered to display only threats of high severity or greater?

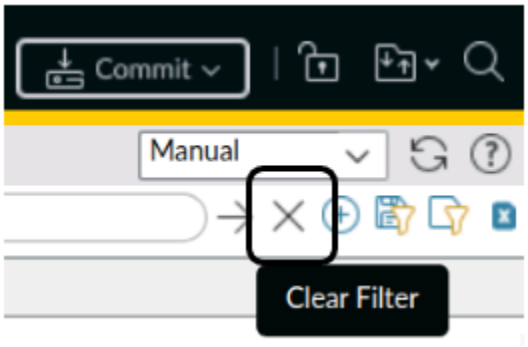
    It should be filtered. You can scan the **Action** column to determine how the threats have been handled by the firewall. You could, for example, use this information to help you determine the Security Profile configuration required to control threats found in legitimate traffic.

(severity geq high)

RECEIVE TIME	SEVERITY	TYPE	THREAT ID/NAME	TO ZONE	DESTINATION ADDRESS	ACTION
07/09 21:05:38	critical	spyware	Ursnif.Trojan Command and Control Traffic	Acquisition	144.168.95.105	reset-both
07/09 21:05:37	high	spyware	generic:aplatmes...	Acquisition	172.21.169.77	drop-packet
07/09 21:05:35	high	spyware	generic:teomeng...	Acquisition	172.21.169.77	drop-packet
07/09 21:05:35	critical	spyware	DeepPanda.Gen Command And Control Traffic	Acquisition	172.17.124.171	reset-both
07/09 21:05:31	critical	vulnerabil...	Terror Exploit Kit	Acquisition	159.203.185.4	reset-

Note that several columns have been hidden or rearranged in the example shown here. The entries you see will differ from the ones shown here.

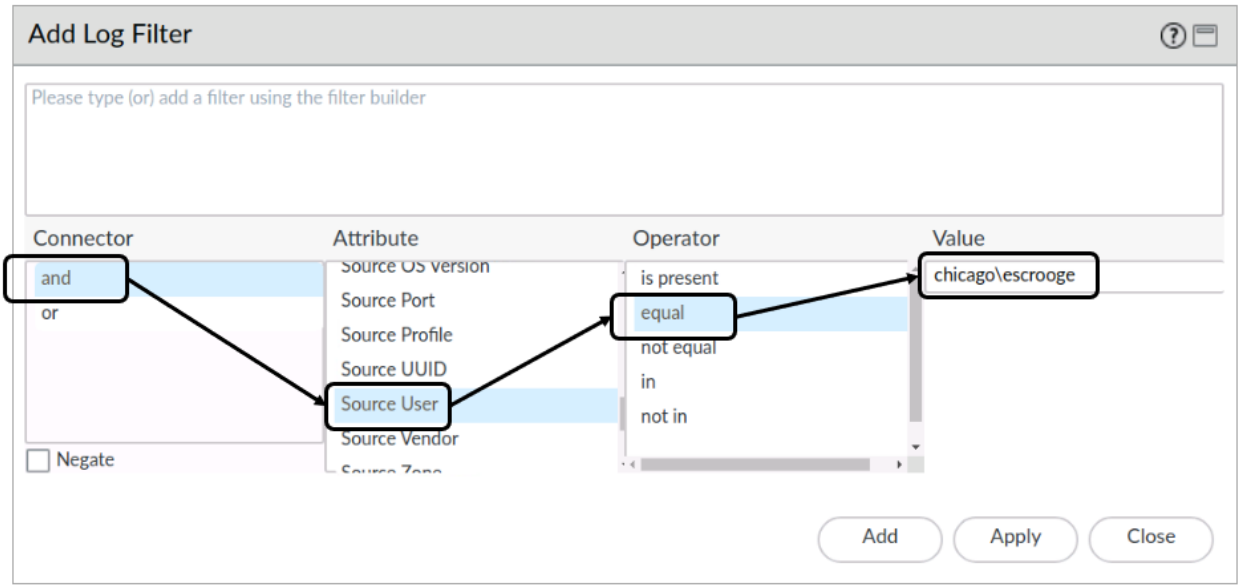
65. Click the **X** icon in the filter area to remove any existing log filter:



66. Click the **+** icon in the filter area to re-open the **Add Log Filter** window.
67. In the **Add Log Filter** window, select the following:

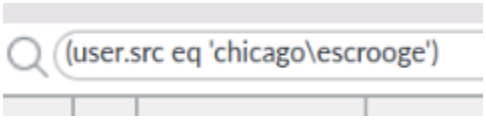
Parameter	Value
Connector	**and**
Attribute	**Source User**
Operator	**equal**
Value	**`chicago\escrooge`**

This configuration filters the log to display threats coming from only this user.



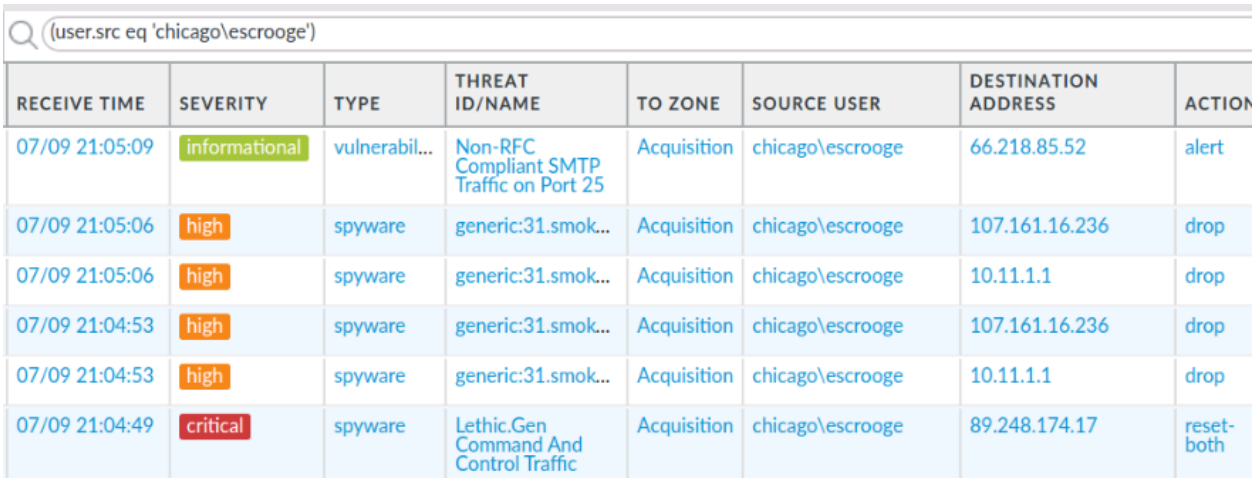
68. Click **Add** and then click **Apply** to add the filter to the Threat log filter text box.

    The **Add Log Filter** window should close, and the filter should have been added to the Threat log's filter text box.



69. With the filter string in the log filter text box, click the **right arrow** icon to apply the filter to the Threat log.
70. Has the Threat log been filtered to display only threats coming from the specified user?

    You may need to add the Source User column to the Threat Log display if it is not already present.



RECEIVE TIME	SEVERITY	TYPE	THREAT ID/NAME	TO ZONE	SOURCE USER	DESTINATION ADDRESS	ACTION
07/09 21:05:09	informational	vulnerabil...	Non-RFC Compliant SMTP Traffic on Port 25	Acquisition	chicago\escrooge	66.218.85.52	alert
07/09 21:05:06	high	spyware	generic:31.smok...	Acquisition	chicago\escrooge	107.161.16.236	drop
07/09 21:05:06	high	spyware	generic:31.smok...	Acquisition	chicago\escrooge	10.11.1.1	drop
07/09 21:04:53	high	spyware	generic:31.smok...	Acquisition	chicago\escrooge	107.161.16.236	drop
07/09 21:04:53	high	spyware	generic:31.smok...	Acquisition	chicago\escrooge	10.11.1.1	drop
07/09 21:04:49	critical	spyware	Lethic.Gen Command And Control Traffic	Acquisition	chicago\escrooge	89.248.174.17	reset-both

Note that several columns have been hidden or rearranged in the example shown here. If you do not see any entries, wait a few moments and click the refresh button to update the Threat Log table.

71. Click the **X** icon to clear the filter from the log filter text box.

    Note: URL Filtering, WildFire Submissions, and Data Filtering logs are available to display traffic and threats detected by the firewall but are not shown in this section. You can also use filters to view these logs.

View Application Information in the Traffic Log

In this section, you will apply different filters to the Traffic log. You will use a filter to determine which applications are being seen in a specific zone.

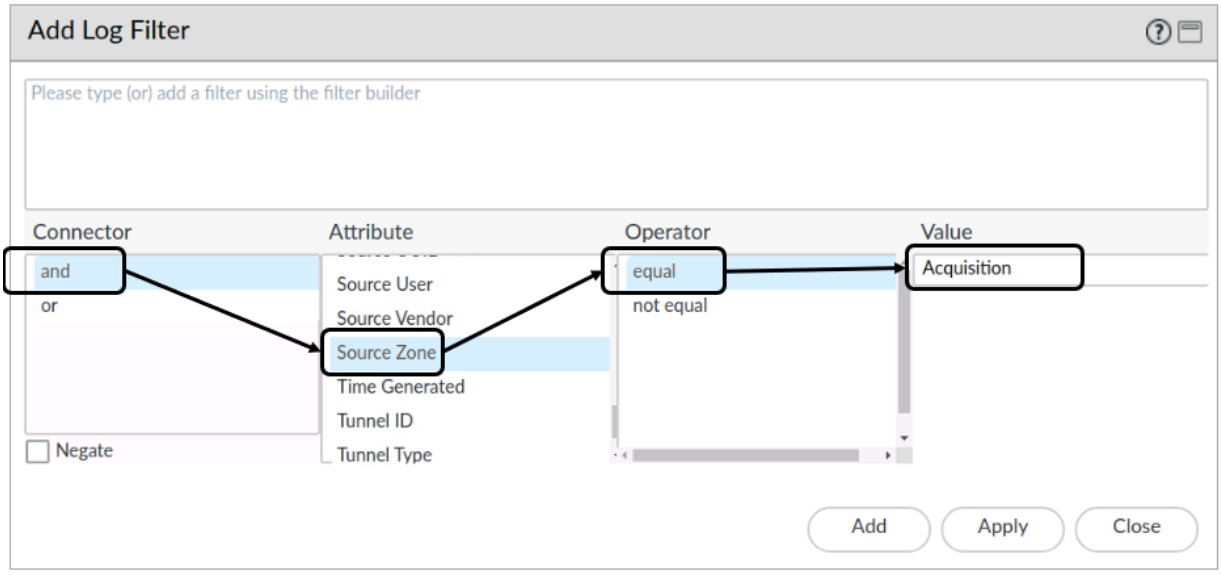
72. In the web interface, select **Monitor > Logs > Traffic**.
73. Click the **X** icon in the filter area to remove any existing log filter
74. Click the **+** icon in the filter area to open the **Add Log Filter** window:

    The **Add Log Filter** window should open.

75. In the **Add Log Filter** window, select the following:

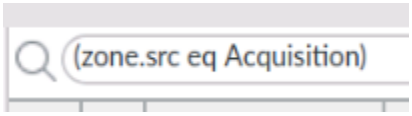
Parameter	Value
Connector	**and**
Attribute	**Source Zone**
Operator	**equal**
Value	**`Acquisition`**

This configuration filters the log to display only application traffic that is sourced from the Acquisition zone. You could use this information, for example, to help you to determine how to configure your Security Policy rules. You easily could modify the filter to display application traffic sourced from any zone and use that information to help you improve your Security Policy configuration.



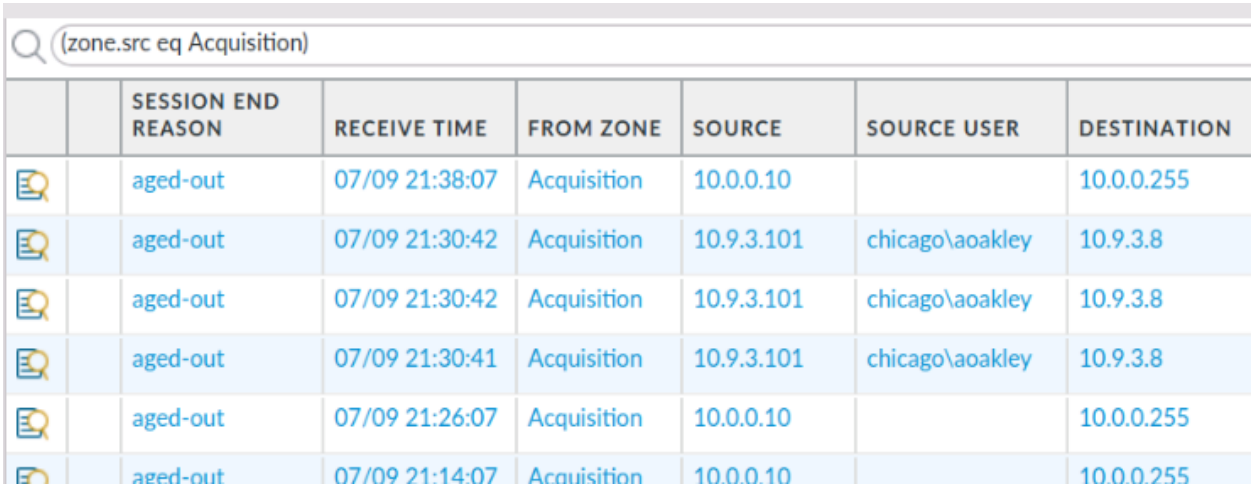
76. Click **Add** and then click **Apply** to add the filter to the Traffic log filter text box.

    The **Add Log Filter** window should close.



77. With the filter string in the log filter text box, click the **right arrow** icon to apply the filter to the Traffic log
78. Has the Traffic log been filtered to display only traffic sourced from the Acquisition zone?

    It should be. You could use this information to help you determine the Security Policy rules required to control legitimate traffic sourced from devices in the Acquisition zone.

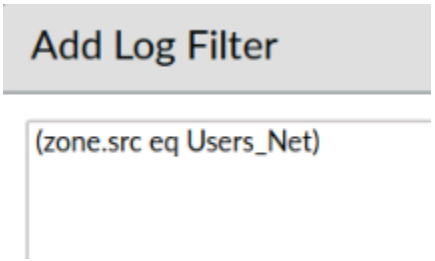


Note that several columns have been hidden or rearranged in the example shown here.

79. Click the + icon in the filter area to again open the **Add Log Filter** window.

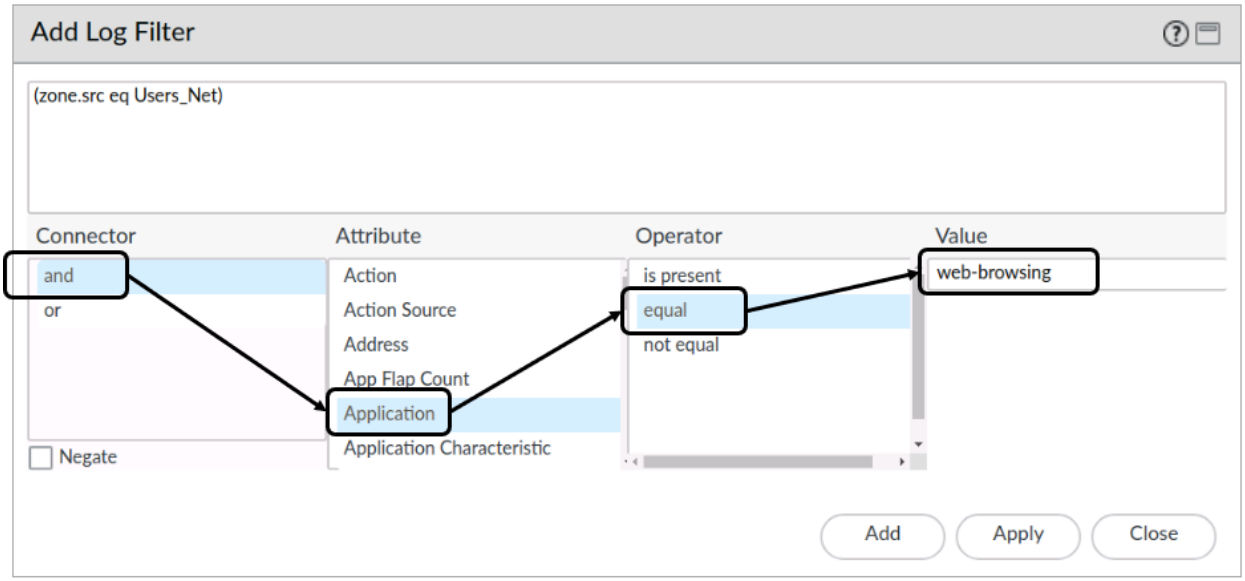
    The Acquisition source zone filter still should appear in the open **Add Log Filter** window.

80. In the **Add Log Filter** window in the top pane, modify the existing source zone filter to filter on the Users_Net zone instead of the Acquisition zone. The completed filter should read **`(zone.src eq Users_Net)`**:



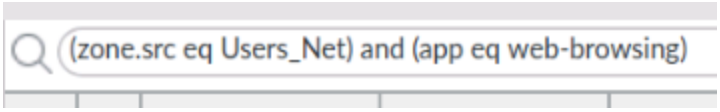
81. In the **Add Log Filter** window, also add the following selections:

Parameter	Value
Connector	**and**
Attribute	**Application**
Operator	**equal**
Value	**web-browsing**



82. Click **Add** and then click **Apply** to add the filter to the Traffic log filter text box.

    The **Add Log Filter** window should close.



83. With the filter string in the log filter text box, click the **right arrow** icon to apply the filter to the Traffic log.
84. Has the Traffic log been filtered to display only web-browsing traffic sourced from the Users_Net zone?

It should be filtered.

(zone.src eq Users_Net) and (app eq web-browsing)

RECEIVE TIME	FROM ZONE	SOURCE	SOURCE USER	DESTINATION	TO PORT	APPLICATIO...	ACTION
07/09 21:47:14	Users_Net	192.168.1.254		192.168.50.80	80	web-browsing	allow
07/09 21:47:14	Users_Net	192.168.1.254		192.168.50.80	80	web-browsing	allow
07/09 21:42:13	Users_Net	192.168.1.254		192.168.50.80	80	web-browsing	allow
07/09 21:42:13	Users_Net	192.168.1.254		192.168.50.80	80	web-browsing	allow
07/09 21:37:12	Users_Net	192.168.1.254		192.168.50.80	80	web-browsing	allow
07/09 21:37:12	Users_Net	192.168.1.254		192.168.50.80	80	web-browsing	allow
07/09 21:35:11	Users_Net	192.168.1.254		199.167.52.141	443	web-browsing	allow

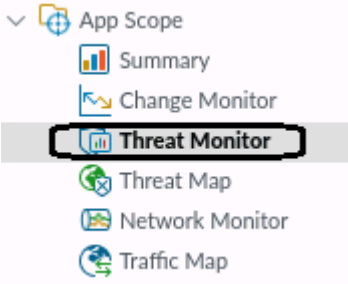
Note that several columns have been hidden or rearranged in the example shown here.

85. Click the **X** icon to clear the filter from the log filter text box.

View Threats Using App Scope Reports

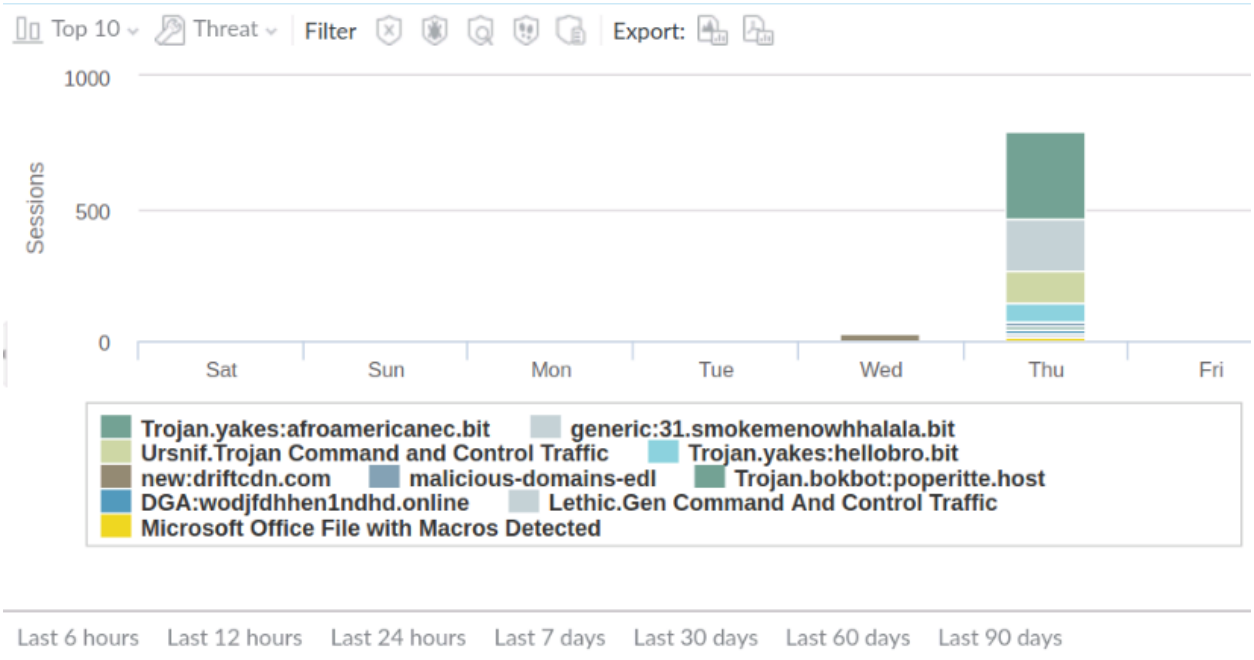
In this section, you will view threat information using App Scope's Threat Monitor and Threat Map reports.

86. In the web interface, select **Monitor > App Scope > Threat Monitor**.



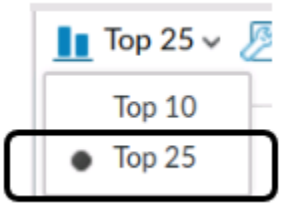
87. At the bottom of the window, click **Last 7 days**:

88. The window should update to display the top 10 threats detected by the firewall in the last seven days.



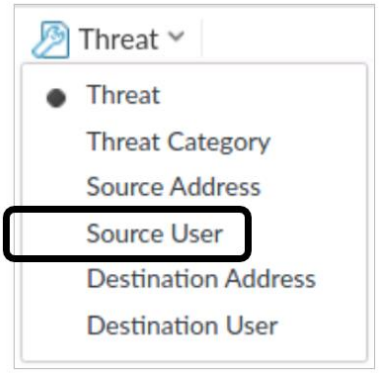
Note that the image you see will differ from the example shown here.

89. At the top of the window, click **Top 10** and select **Top 25** from the menu:



This configuration enables you to see the top 25 threats within the selected time range.

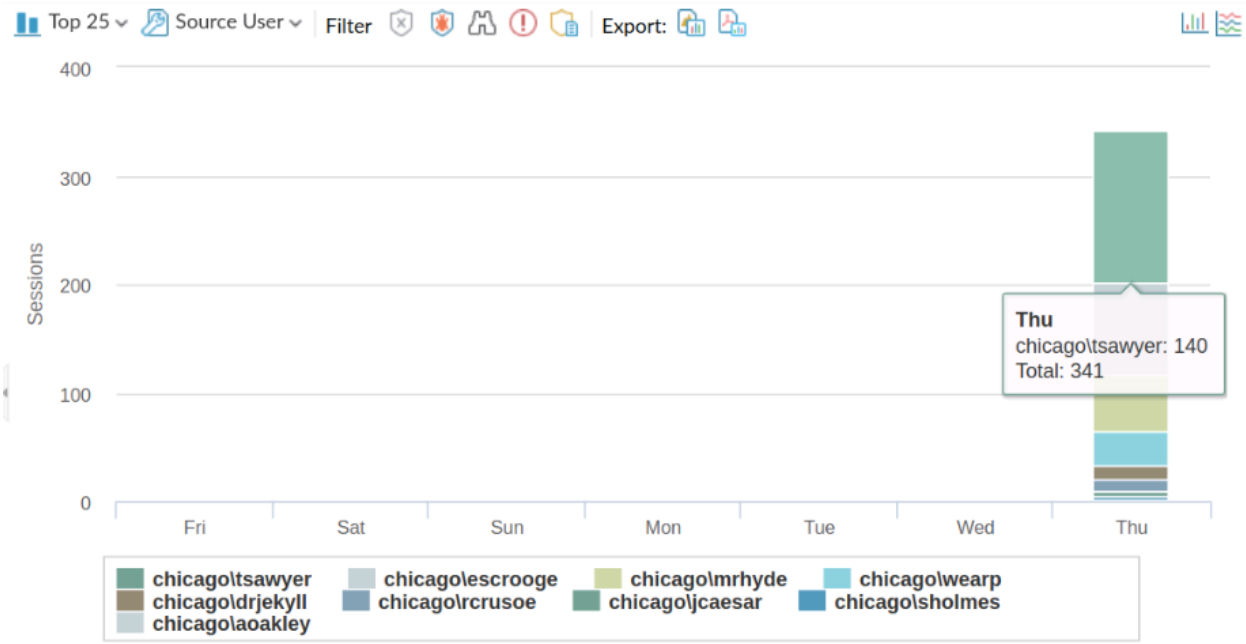
90. At the top of the window, click **Threat** and choose **Source User**:



91. At the top of the window, hover your pointer over each **Filter** icon to see how to display specific types of threats:

92. Select **Show all threat types**.
93. Hover your pointer over the top section of any bar on the bar chart. What appears on the page?

You should see a popup window that shows the threat name and number of detections.



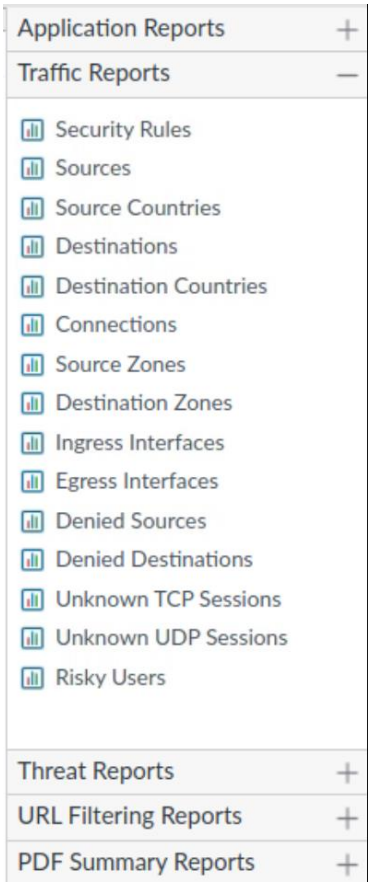
The information you see may differ from the example here.

View Threat Information Using Predefined Reports

In this section, you will open and view three of the more than 40 predefined reports available on the firewall. Your efficient use of the predefined reports depends on your spending time

with each report, discovering and determining which information might be useful to you in your own environment. Your familiarity with the reports will help you to find the reports that are most useful to you.

94. In the web interface, select **Monitor > Reports**.
95. Click **Traffic Reports** to expand the list of available Traffic Reports:



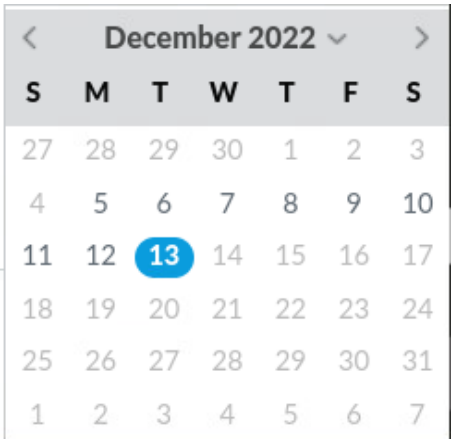
96. Click **Sources** to view a report.

    A Sources report should be displayed in the web interface. The report displays which source IP addresses were detected by your firewall on the previous day. It should have a format like the following example, but your data may be different.

    Note: Reports are generated by the firewall each morning at 2 am. Your lab firewall might not show any reports because it was not running at this time. This also applies to the next step 97.

	SOURCE ADDRESS	SOURCE HOST NAME	SOU... EDL	SO... USER	SOURCE DYNAMIC ADDRESS GROUP	BYTES	SESSIONS
1	192.168.50.1	192.168.50.1				10.8M	48.6k
2	192.168.50.150	192.168.50.150				14.3M	11.4k
3	192.168.1.20	192.168.1.20				12.6M	9.3k
4	192.168.1.25	192.168.1.25				2.5M	5.4k
5	192.168.1.254	192.168.1.254				41.2M	1.4k
6	192.168.50.14	192.168.50.14				59.7k	110
7	192.168.50.53	192.168.50.53				59.7k	110
8	192.168.50.25	192.168.50.25				59.7k	110

97. In the calendar below the report column, click various dates from the past week to see information about traffic logged by the firewall on other days:

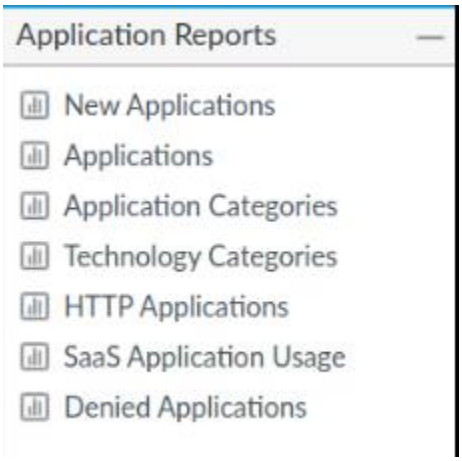


Note that days that are grayed out do not have any data available.

View Application Information Using Predefined Reports

In this section, you will view reports related to Applications.

98. In the web interface, select **Monitor > Reports**.
99. Click **Application Reports** to expand the list of available application reports:

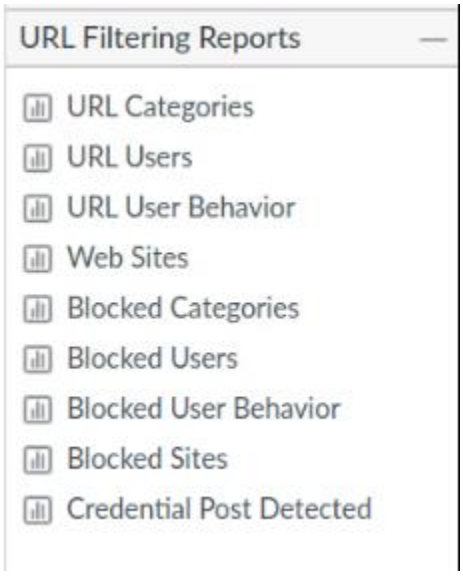


100. Click **Applications** to view the Applications report.

An **Applications** report should be displayed in the web interface. The report displays the applications that were detected by your firewall on the previous day. It should have a format like the following example, but your application data will be different. You can use this information to update your Security Policy rules, as necessary.

Note: Reports are generated by the firewall each morning at 2 am. Your lab firewall might not show any reports because it was not running at this time. This also applies to the next step 97.

101. Click **URL Filtering Reports** to expand the list of available URL Filtering reports:



102. Click **Web Sites** to view the report. Click each date until you see a report with data.

A **Web Sites** report should be displayed in the web interface. The report displays the websites that were seen by your firewall on a given day. It should have a format like the following example, but your data will be different. You can use this information to update your Security Policy rules or a URL Filtering Profile, as necessary.

Note: Reports are generated by the firewall each morning at 2 am. Your lab firewall might not show any reports because it was not running at this time. This also applies to the next step 97.

	URL DOMAIN	CATEGORY	COUNT
1	www.amazon.com	shopping	29
2	www.hackthissite.org	hacking	28
3	www.taobao.com	shopping	20
4	www.tmall.com	shopping	20
5	global.jd.com	shopping	20
6	www.aliexpress.com	shopping	20
7	shodan.io	hacking	11
8	www.shutterfly.com	shopping	10

View Threat and Application Information Using Custom Reports

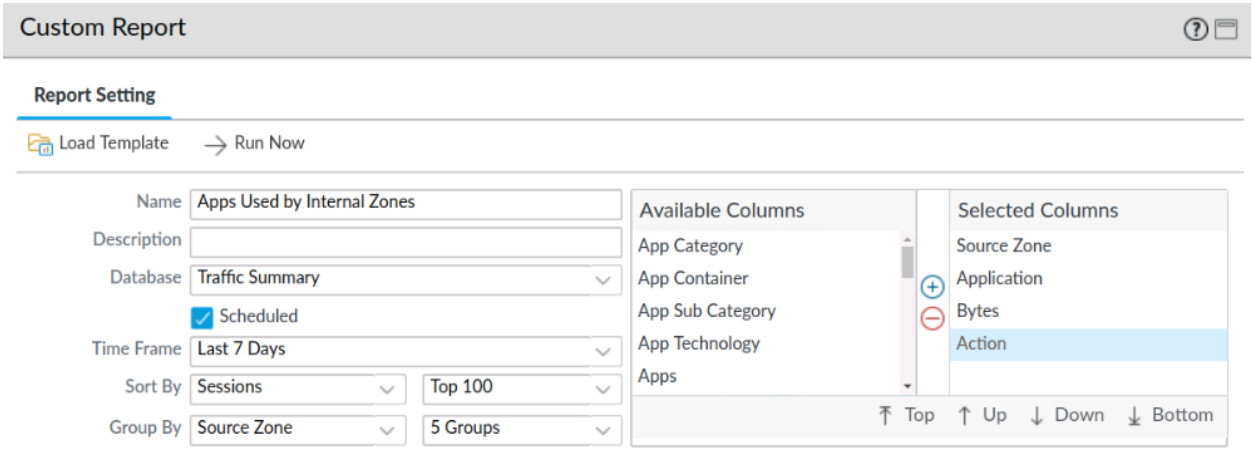
In this section, you will create a custom report. The custom reports feature enables you to build reports that include only the information that you consider useful in your environment. The first custom report will list the applications that the firewall has detected in each of your internal security zones. The second custom report will list the applications that the firewall has detected in the outside zone, which in the lab environment is associated with the internet. Such information can help you to improve the configuration of your Security policies and ultimately improve your security stance.

103. In the web interface, select **Monitor > Manage Custom Reports**.
104. Click **Add** and configure the following in the **Custom Report** window:

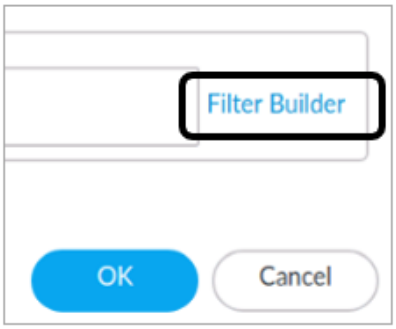
Parameter	Value
Name	`Apps Used by Internal Zones`
Database	**Traffic Summary**
Scheduled box	Checked
Time Frame	**Last 7 Days**
Sort By	Select **Sessions** and **Top 100**
Group By	Select **Source Zone** and **5 Groups**
Selected Columns	In top-down order, select **Source Zone**, **Application**, **Bytes**, and **Action**

The report will list each internal zone along with the applications seen coming from each zone. Because only four zones are available in the lab environment, grouping of the data into a

maximum of five groups is enough to display all zones. Sorting the applications list in each zone by the top 100 sessions should display all applications associated with a source zone.



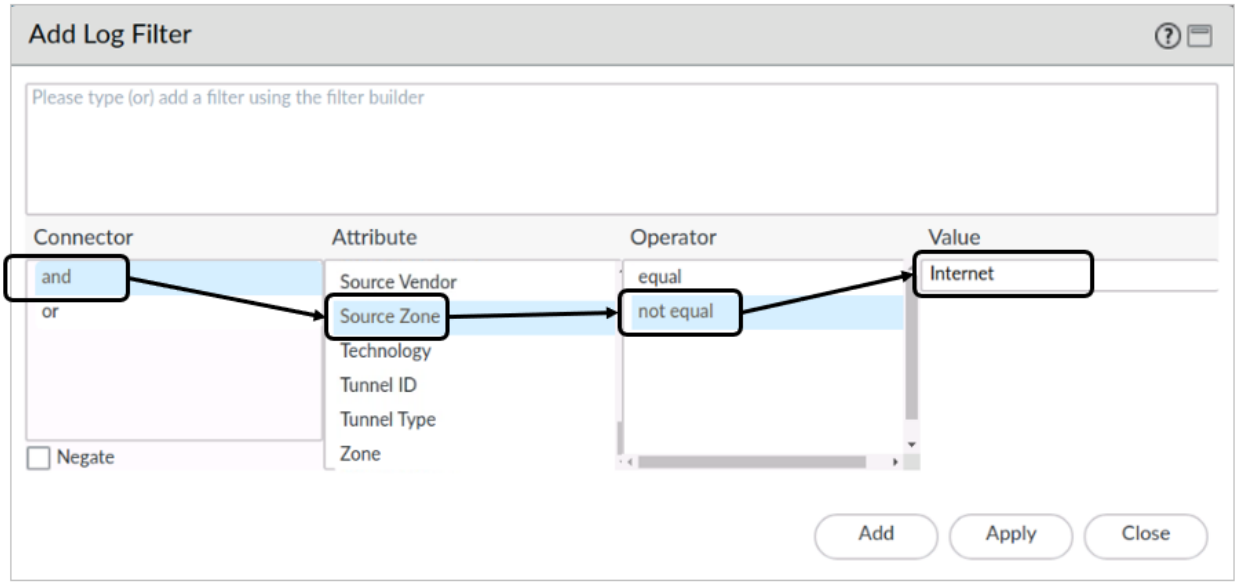
105. In the bottom right corner of the Custom Report window, click the **Filter Builder** link:



The **Add Log Filter** window should open.

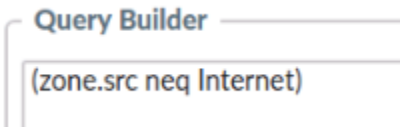
106. Configure the following:

Parameter	Value
Connector	**and**
Attribute	**Source Zone**
Operator	**not equal**
Value	`Internet`



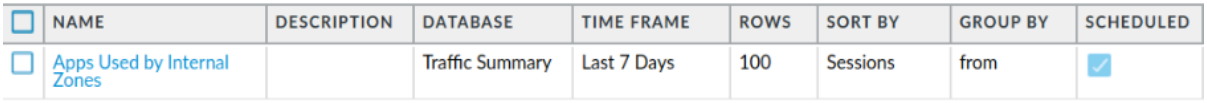
107. In the **Add Log Filter** window, click **Add** and then **Apply**.

A filter should be added to the custom report. The Internet zone is outside of your network, and this filter ensures that the custom report does not include applications that are coming from outside your network.



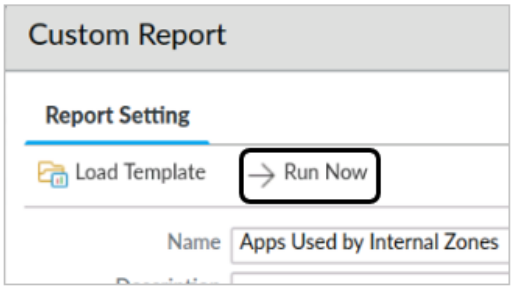
108. Click **OK** to close the **Custom Report** window.

The new custom report should be added to the list of custom reports in the web interface.



NAME	DESCRIPTION	DATABASE	TIME FRAME	ROWS	SORT BY	GROUP BY	SCHEDULED
Apps Used by Internal Zones		Traffic Summary	Last 7 Days	100	Sessions	from	☑

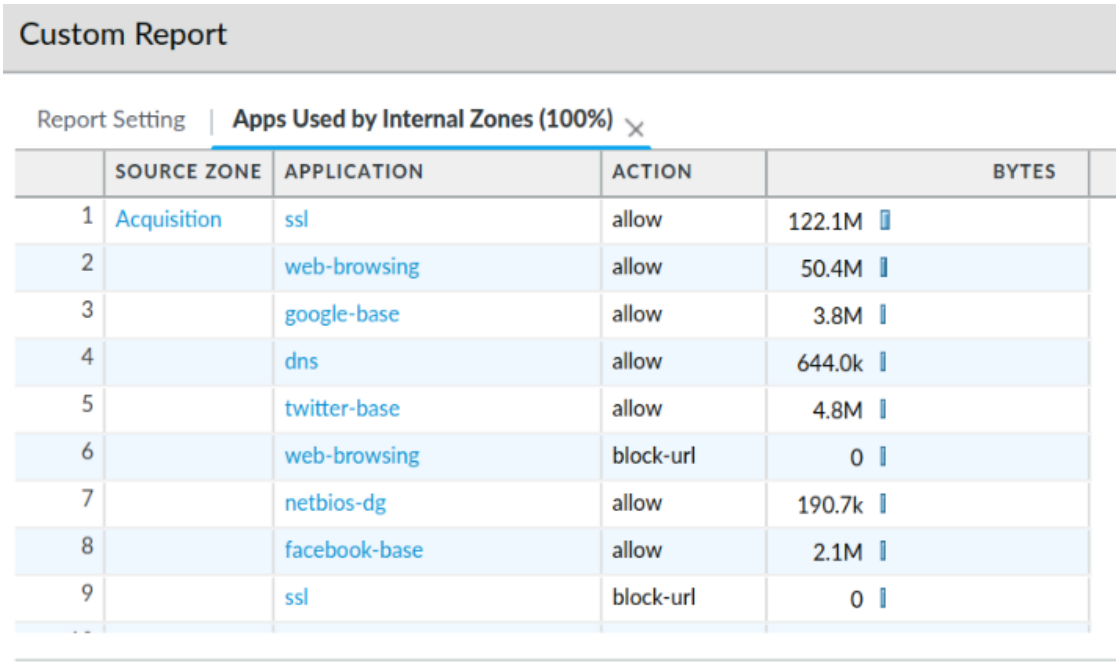
109. Click **Apps Used by Internal Zones** to open the custom report.
110. Click **Run Now** to run the custom report:



The report should run, and the results should be displayed in a tab that is added and opened in the **Custom Report** window.

111. View the results of the custom report.

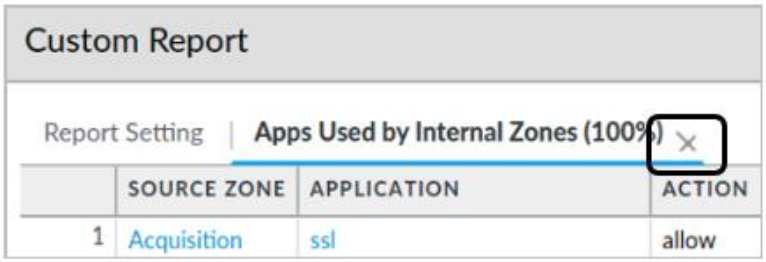
You can scroll down through the report to see information about the Extranet and the Acquisition zones along with details about the applications that the firewall processed in each one. Note that the entries you see in the report may differ from the example shown here.



	SOURCE ZONE	APPLICATION	ACTION	BYTES
1	Acquisition	ssl	allow	122.1M
2		web-browsing	allow	50.4M
3		google-base	allow	3.8M
4		dns	allow	644.0k
5		twitter-base	allow	4.8M
6		web-browsing	block-url	0
7		netbios-dg	allow	190.7k
8		facebook-base	allow	2.1M
9		ssl	block-url	0

Ensure that you explore all pages of the report, as other zones may be listed on subsequent pages.

112. When you are finished viewing the report, close it by clicking the **X** on the **Apps Used by Internal Zones (100%)** tab:



113. Click **Cancel** to close the **Custom Report** window.

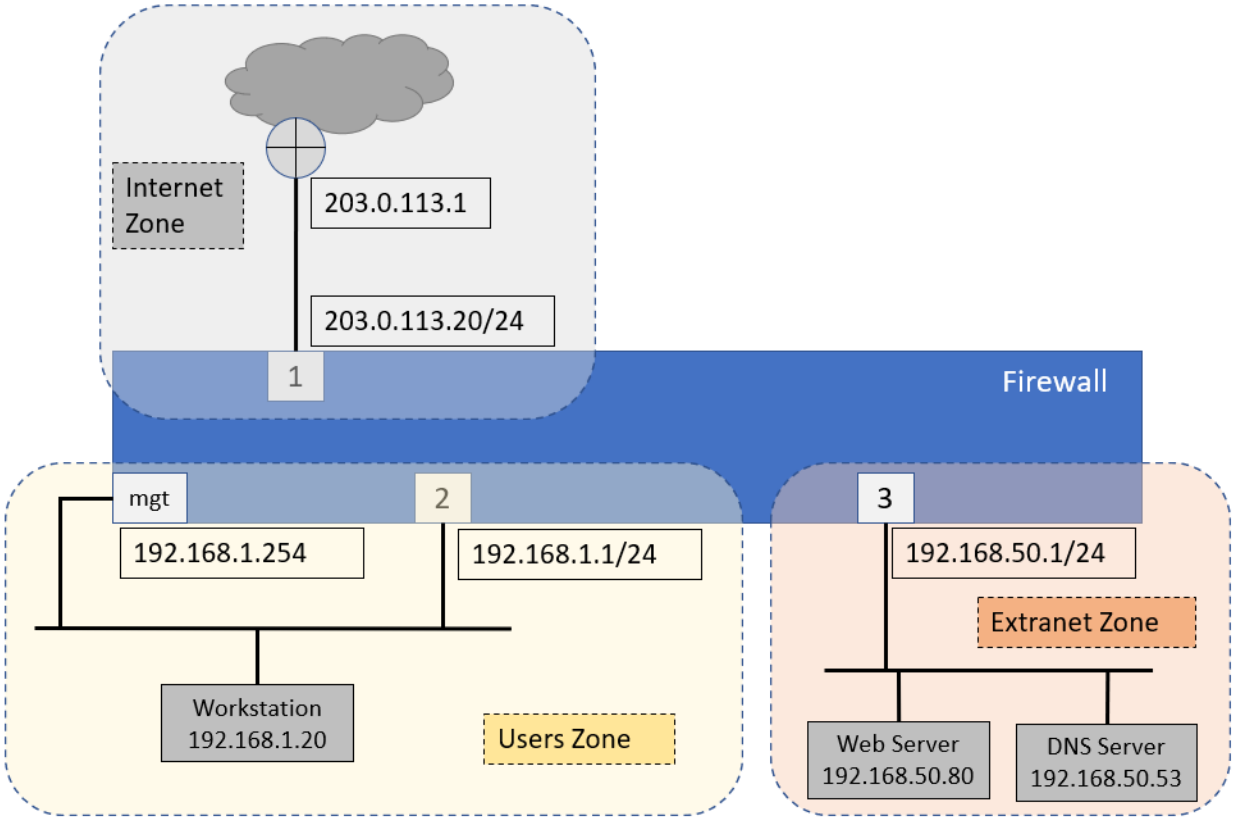
Stop. This is the end of the lab.

Lab 15: Capstone

This comprehensive lab is meant to provide you with additional hands-on firewall experience and to enable you to test your new knowledge and skills. You can refer to your student guide and previous lab exercises.

In this scenario, you are a network administrator and recently received a new Palo Alto Networks VM-Series firewall. The firewall's management IP address is 192.168.1.254. You can log in with the username **`admin`** and **`Pal0Alt0!`** as the password. Take special care to use the exact spelling and capitalization for the items you are asked to configure.

You are being asked to meet multiple configuration objectives. These objectives are listed in the lab exercise sections that follow.



Load a Lab configuration

1. In the web interface, select **Device** > **Setup** > **Operations**.
2. Click **Load named configuration snapshot**:
3. Select **edu-210-11.1a-Capstone-start.xml** and click **OK**.
4. Click **Close**.
5. **Commit** all changes.

Configure Networking

Complete the following objectives:

- Configure three firewall interfaces using the following values:
    - **Ethernet 1/1**: **`203.0.113.20/24 - Layer 3`**
    - **Ethernet 1/2**: **`192.168.1.1/24 - Layer 3`**
    - **Ethernet 1/3**: **`192.168.50.1/24 - Layer 3`**
- Create a logical router called **`LR-1`** for all configured firewall interfaces.
- Create a default route for the firewall called **`Default-Route`**
- Create an **Interface Management Profile** called **`Allow-ping`** that allows **`ping`**
- Assign the **`Allow-ping`** Interface Management Profile to **ethernet1/2**

Configure Security Zones

Complete the following objectives:

- Create a **Security Zone** called **`Internet`** and assign **ethernet1/1** to the zone
- Create a **Security Zone** called **`Users`** and assign **ethernet1/2** to the zone:
    - Configure the **Users** zone for User-ID
- Create a **Security Zone** called **`Extranet`** and assign **ethernet1/3** to the zone

Verify network connectivity from the firewall to other hosts.

- Your internal host can ping **`192.168.1.1`** and receive a response
- From the firewall CLI, the following commands are successful:
    - **`ping source 203.0.113.20 host 203.0.113.1`**
    - **`ping source 203.0.113.20 host 8.8.8.8`**
    - **`ping source 192.168.1.1 host 192.168.1.20`**
    - **`ping source 192.168.50.1 host 192.168.50.150`**

Configure NAT Policy Rules

Create Source NAT rules to meet the following requirements:

- Rule Name = **`Users_to_Internet`**
  - From Source Zone **`Users`** to Destination Zone **`Internet`**
  - Use **`ethernet1/1`** on the firewall as the source translation address
- Rule Name = **`Extranet_to_Internet`**
  - From Source Zone **`Extranet`** to Destination Zone **`Internet`**
  - Use **`ethernet1/1`** on the firewall as the source translation address
- All NAT rules must include a helpful Description

Configure Security Policy Rules

Create Security Policy rules to meet the following requirements:

- For all Security Policy rules, enter a helpful **Description**.
- Modify the **interzone-default** Security Policy rule so that traffic is logged at session end.
- Create a Security Policy rule called **`Block_Bad_URLs`** with the following characteristics:
  - For all outbound traffic, the URL categories **`hacking`**, **`phishing`**, **`malware`**, and **`unknown`** must be **blocked** by a Security Policy rule match criterion.
- From the User zone to the Extranet zone, create a Security Policy rule called **`Users_to_Extranet`** to allow the following applications:
  - **`ping`**
  - **`ssl`**
  - **`ssh`**
  - **`dns`**
  - **`web-browsing`**
- From the User zone to the Internet zone, create a Security Policy rule called **`Users_to_Internet`** to allow the following applications:
  - **`ping`**
  - **`dns`**
  - **`web-browsing`**
  - **`ssl`**
- From the Extranet zone to the Internet zone, create a Security Policy rule called **`Extranet_to_Internet`** to allow the following applications:
  - **`ping`**
  - **`dns`**

- `web-browsing`
- `ssl`

You can consider this objective complete when the following tests are successful:

- The client host can **ping 8.8.8.8** and **google.com**
- The client host can access **www.paloaltonetworks.com**
- The client host can browse to the Extranet web server at **http://192.168.50.80**
- The client host can use **SSH** to access the Extranet host at **192.168.50.150** using the login name **`paloalto42`** and the password **`Pal0Alt0!`**
- The Extranet host can **ping 8.8.8.8** and **google.com**
- The internal host cannot access **`hacker9.com`**
- The firewall blocks attempts to download a test virus file using the URL: **http://192.168.50.80/eicar.com**

Create and Apply Security Profiles

Create Security Profiles and a Security Profile Group to meet the following requirements:

- A Corporate **URL Filtering Security Profile** called **`Corp-URL`** to log access to all web categories

  You can use the existing default Profile as the basis for your own

- A Corporate **File Blocking Security Profile** called **`Corp-FB`** to block dangerous file types

  You can use the existing strict Profile as the basis for your own

- A Corporate **Antivirus Security Profile** called **`Corp-AV`** to block virues

  You can use the existing default Profile as the basis for your own

- A Corporate **Anti-Spyware Security Profile** called **`Corp-AS`** to block spyware

  You can use the existing strict Profile as the basis for your own

- A Corporate **Vulnerability Protection Security Profile** called **`Corp-Vuln`** to block vulnerabilities

  You can use the existing strict Profile as the basis for your own

- A Corporate **WildFire Profile** called **`Corp-WF`** to send all file types to the public cloud for inspection

  You can use the existing default Profile as the basis for your own

- Create a **Security Profile Group** called **`Corp-Profiles`** and assign the appropriate Security Profiles to it

  Note: You can leave the Data Filtering Profile set to **None**.

- Apply the **Corp-Profiles Group** to all applicable Security Policy rules

You can consider this objective complete when the following tests are successful:

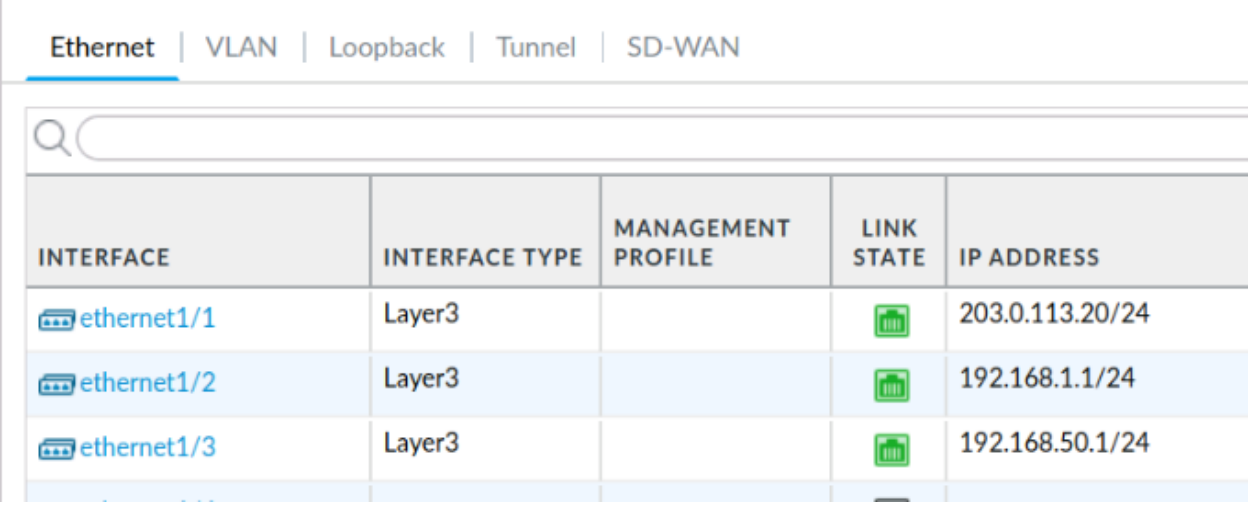
- The internal host cannot download a test virus file from **`http://192.168.50.80/eicar.com`** using **`HTTP`**.
- The internal host cannot download the **`badtarfile.tar`** from **`http://192.168.50.80/badtarfile.tar`**
- A URL log file entry appears when the client host browses to **`https://www.paloaltonetworks.com`**

Solutions

You can use the following screenshots to determine how to accomplish the requirements for this lab. You are encouraged to attempt meeting the requirements BEFORE you use these screenshots.

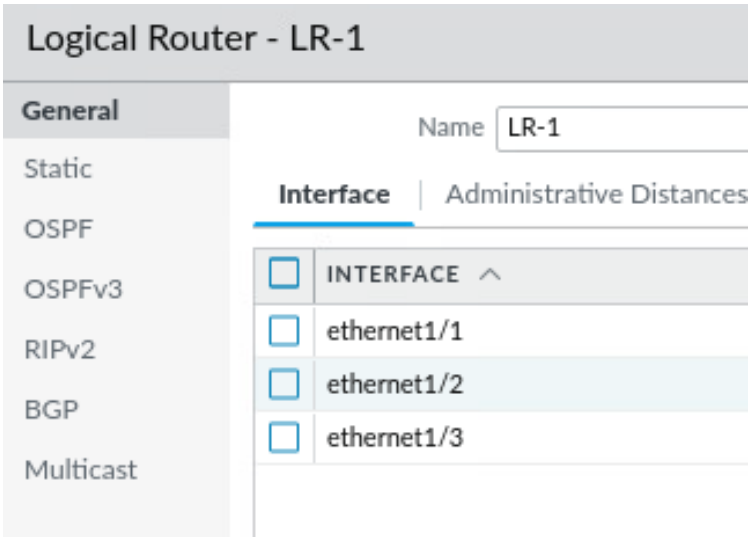
Firewall Interfaces

Network > Interfaces > Ethernet



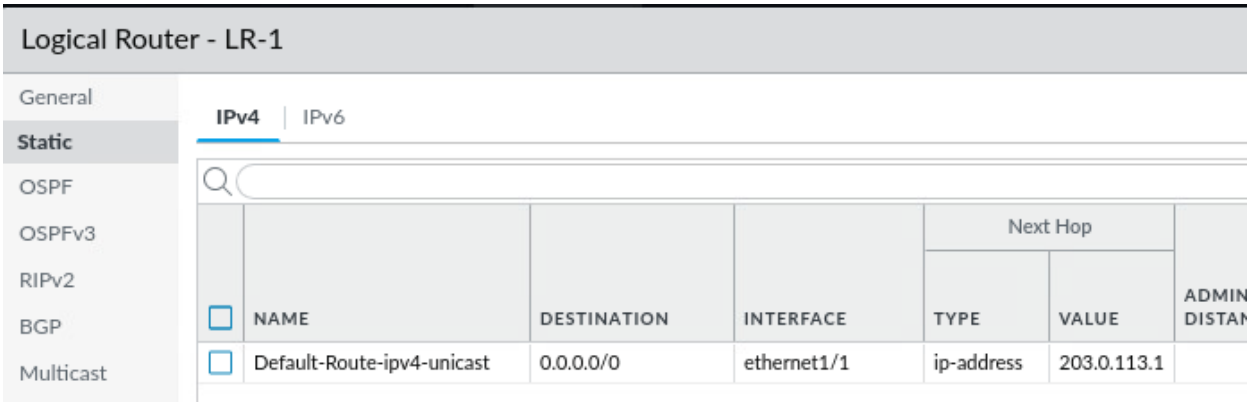
Logical Router

Network > Routing > Logical Routers



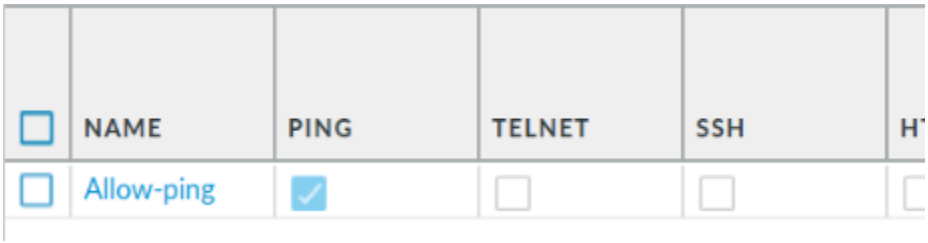
Firewall Default Route

Network > Routing > Logical Routers > LR-1 > Static



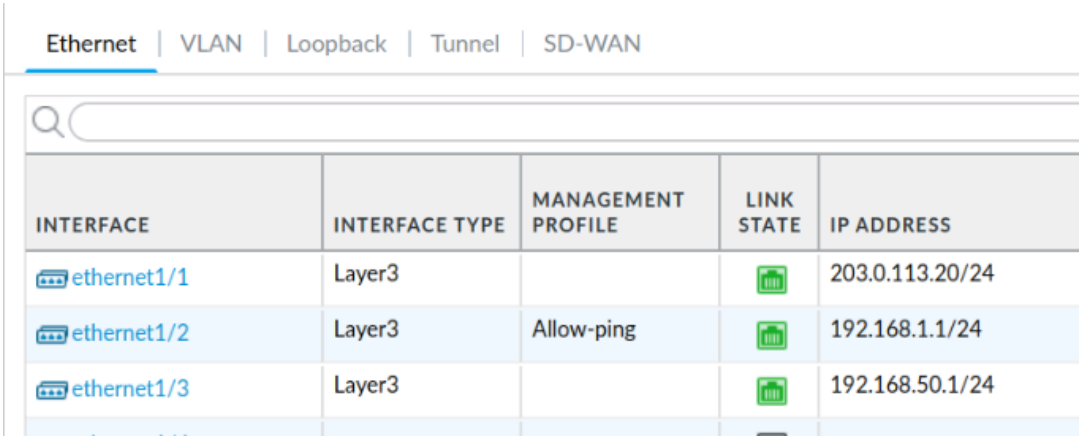
Allow-ping Interface Management Profile

Network > Network Profiles > Interface Mgmt



Allow-ping Interface Management Profile Assigned to ethernet1/2

Network > Interfaces > Ethernet > ethernet1/2 > Advanced



Security Zones

Network > Zones

NAME	TYPE	INTERFACES / VIRTUAL SYSTEMS	ZONE PROTECTION PROFILE	PACKET BUFFER PROTECTION	LOG SETTING	User-ID	
						ENABLED	INCLUDED NETWORKS
Extranet	layer3	ethernet1/3		☑		☐	any
Internet	layer3	ethernet1/1		☑		☐	any
Users	layer3	ethernet1/2		☑		☑	any

NAT Policy Rules

Policies > NAT

	NAME	Original Packet				Translated Packet	
		SOURCE ZONE	DESTINATION ZONE	SOURCE ADDRESS	DESTINATION ADDRESS	SOURCE TRANSLATION	DESTINATION TRANSLATION
1	Users_to_Internet	Users	Internet	any	any	dynamic-ip-and-port ethernet1/1 203.0.113.20/24	none
2	Extranet_to_Internet	Extranet	Internet	any	any	dynamic-ip-and-port ethernet1/1 203.0.113.20/24	none

Security Policy Rules

Policies > Security

	NAME	ACTION	Source ZONE	Destination ZONE	URL CATEGORY	APPLICATION	PROFILE
1	Block_Bad_URLs	Deny	Extranet Users	Internet	hacking malware phishing unknown	any	none
2	Users_to_Extranet	Allow	Users	Extranet	any	dns ping ssh ssl web-browsing	
3	Users_to_Internet	Allow	Users	Internet	any	dns ping ssl web-browsing	
4	Extranet_to_Internet	Allow	Extranet	Internet	any	dns ping ssl web-browsing	
5	intrazone-default	Allow	any	(intrazone)	any	any	none
6	interzone-default	Deny	any	any	any	any	none

	NAME	ACTION	Source ZONE	Destination ZONE	URL CATEGORY	APPLICATION	PROFILE	OPTIONS
5	intrazone-default	Allow	any	(intrazone)	any	any	none	none
6	interzone-default	Deny	any	any	any	any	none	

Traffic log sent at session end

Security Profiles

Objects > Security Profiles

- Corporate URL Filtering Profile

NAME	SITE ACCESS
Corp-URL	Allow Categories (0) Alert Categories (77) Continue Categories (0) Block Categories (0) Override Categories (0)

- Corporate File Blocking Profile

NAME	RULE NAME	APPLICATIONS	FILE TYPES	DIRECTION	ACTION
Corp-FB	Block all risky file types	any	7z, bat, cab, chm, class, cpl, dll, exe, flash, hlp, hta, jar, msi, Multi-Level-Encoding, ocx, PE, pif, rar, scr, tar, torrent, vbe, wsf	both	block
	Block encrypted files	any	encrypted-rar, encrypted-zip	both	block
	Log all other file types	any	any	both	alert

- Corporate Antivirus Profile

NAME	LOCATION	PACKET CAPTURE	Decoders			
			PROTOCOL	SIGNATURE ACTION	WILDFIRE SIGNATURE ACTION	WILDFIRE INLINE ML ACTION
Corp-AV			http	default (reset-both)	default (reset-both)	default (reset-both)
			http2	default (reset-both)	default (reset-both)	default (reset-both)
			smtp	default (alert)	default (alert)	default (alert)
			imap	default (alert)	default (alert)	default (alert)
			pop3	default (alert)	default (alert)	default (alert)
			ftp	default (reset-both)	default (reset-both)	default (reset-both)
			smb	default (reset-both)	default (reset-both)	default (reset-both)

- Corporate Anti-Spyware Profile

NAME	COUNT	POLICY NAME	THREAT NAME	SEVERITY	ACTION	PACKET CAPTURE
Corp-AS	Policies: 5	simple-critical	any	critical	reset-both	disable
		simple-high	any	high	reset-both	disable
		simple-medium	any	medium	reset-both	disable
		simple-informational	any	informational	default	disable
		simple-low	any	low	default	disable

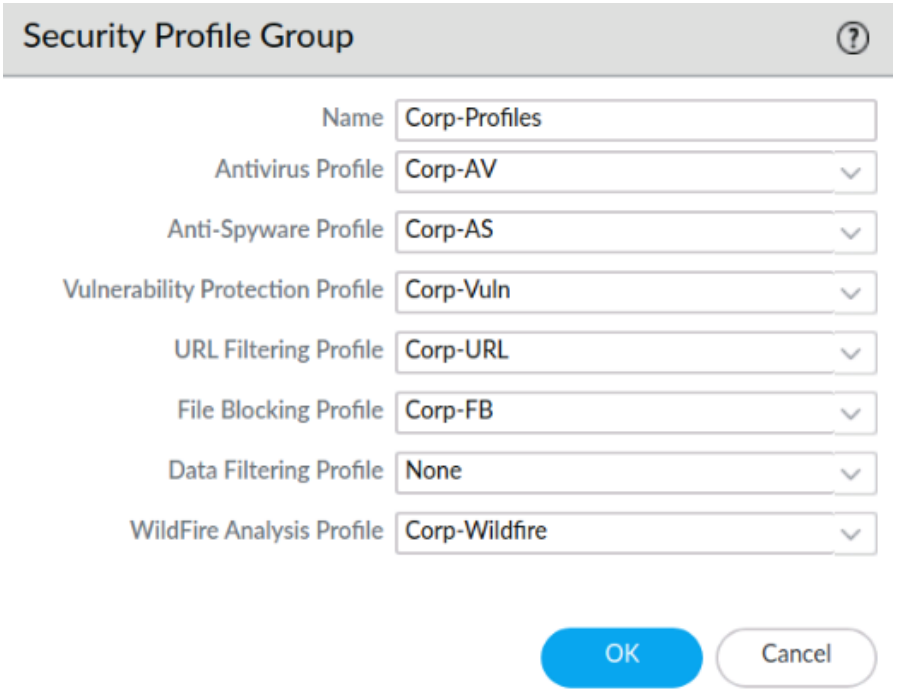
- Corporate Vulnerability Profile

NAME	COUNT	RULE NAME	THREAT NAME	HOST TYPE	SEVERITY	ACTION	PACKET CAPTURE
Corp-Vuln	Rules: 10	simple-client-critical	any	client	critical	reset-both	disable
		simple-client-high	any	client	high	reset-both	disable
		simple-client-medium	any	client	medium	reset-both	disable
		simple-client-informational	any	client	informational	default	disable
		simple-client-low	any	client	low	default	disable
		simple-server-critical	any	server	critical	reset-both	disable
		simple-server-high	any	server	high	reset-both	disable
		more...					

- Corporate WildFire Profile

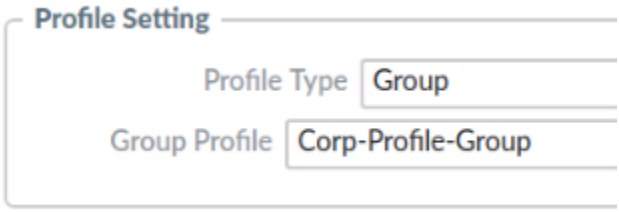
NAME	RULE NAME	APPLICATIONS	FILE TYPES	DIRECTION	ANALYSIS
Corp-Wildfire	default	any	any	both	public-cloud

- Security Profile Group



- Security Policy rules with Profile Group

Policies > Security > [Rule] > Actions



Stop. This is the end of the lab.

Bonus Lab

In this lab, you will create a new API certificate on the firewall. This certificate can then be used to eliminate the API KeyGen warning message you receive when committing a configuration.

Lab Objectives

- Modify the firewall Authentication Settings to use a new API Key Certificate

Detailed Lab Steps

Apply a Baseline configuration to the Firewall

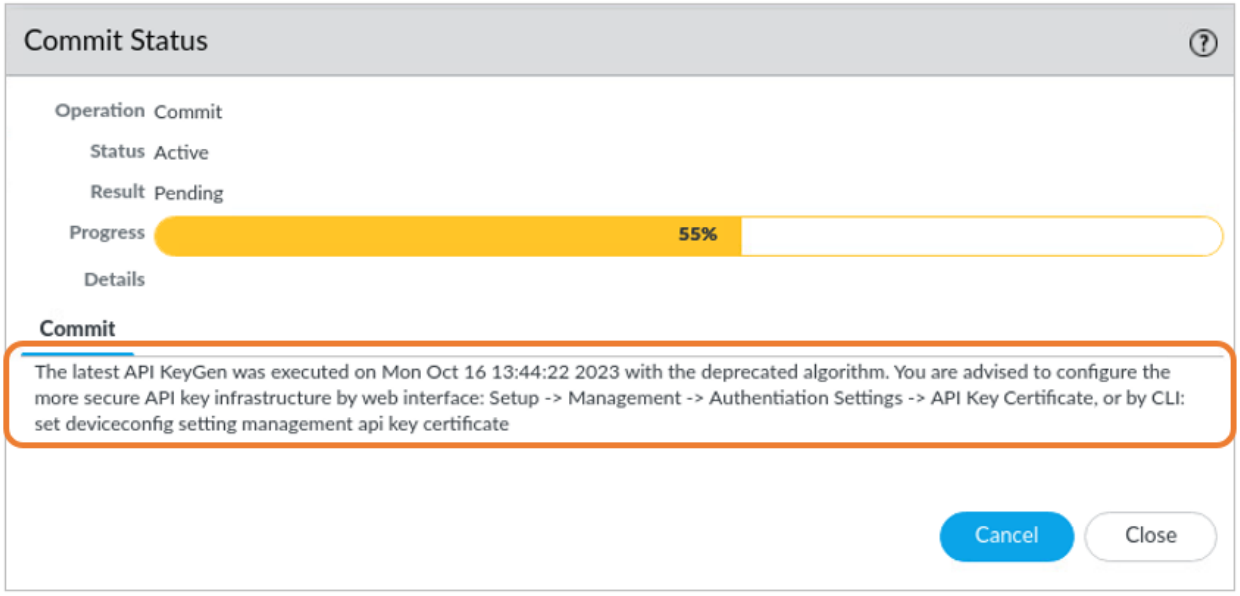
To start this lab exercise, load a preconfigured firewall configuration file.

1. Open configuration browser and connect to firewall-a.
2. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
3. Click **Load named configuration snapshot**.
4. Click the drop-down list next to the **Name** text box and select **`edu-210-11.1a-Capstone-end.xml`**.

Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

5. Click **OK**.

   A window should open that confirms that the configuration is being loaded.
6. Click **Close**.
7. Click the **Commit** link at the upper right of the web interface:
8. Click **Commit** again and wait until the commit process is complete.
9. Note the error message you receive regarding the API KeyGen algorithm:

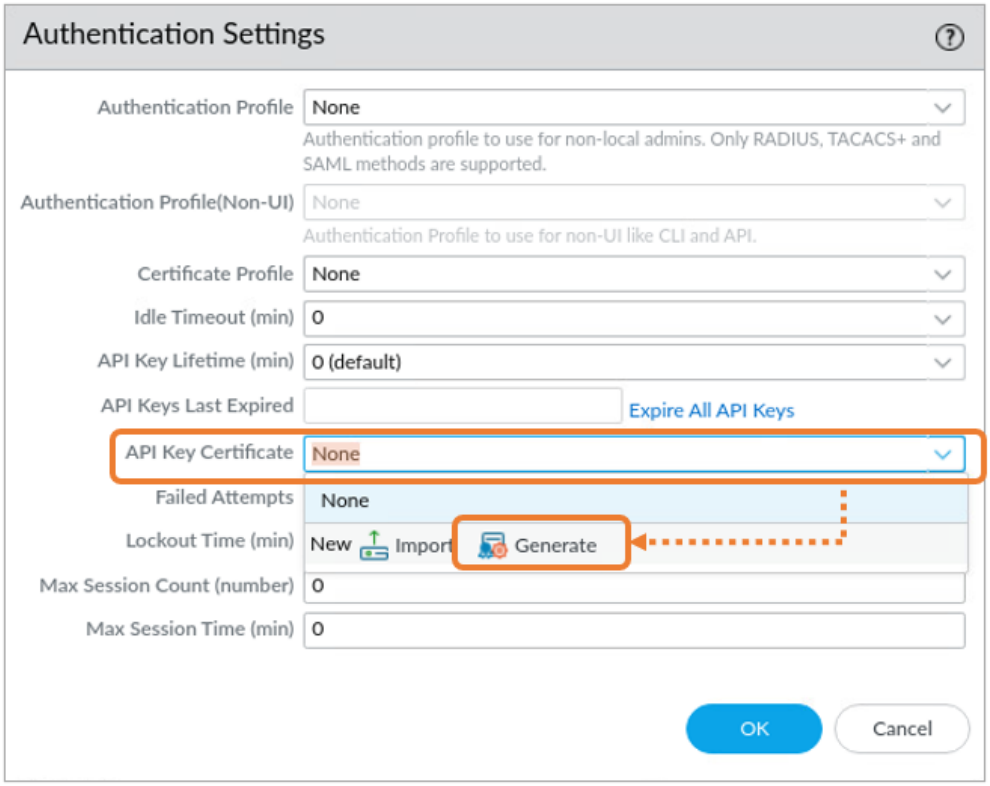


10. Click **Close** to continue.

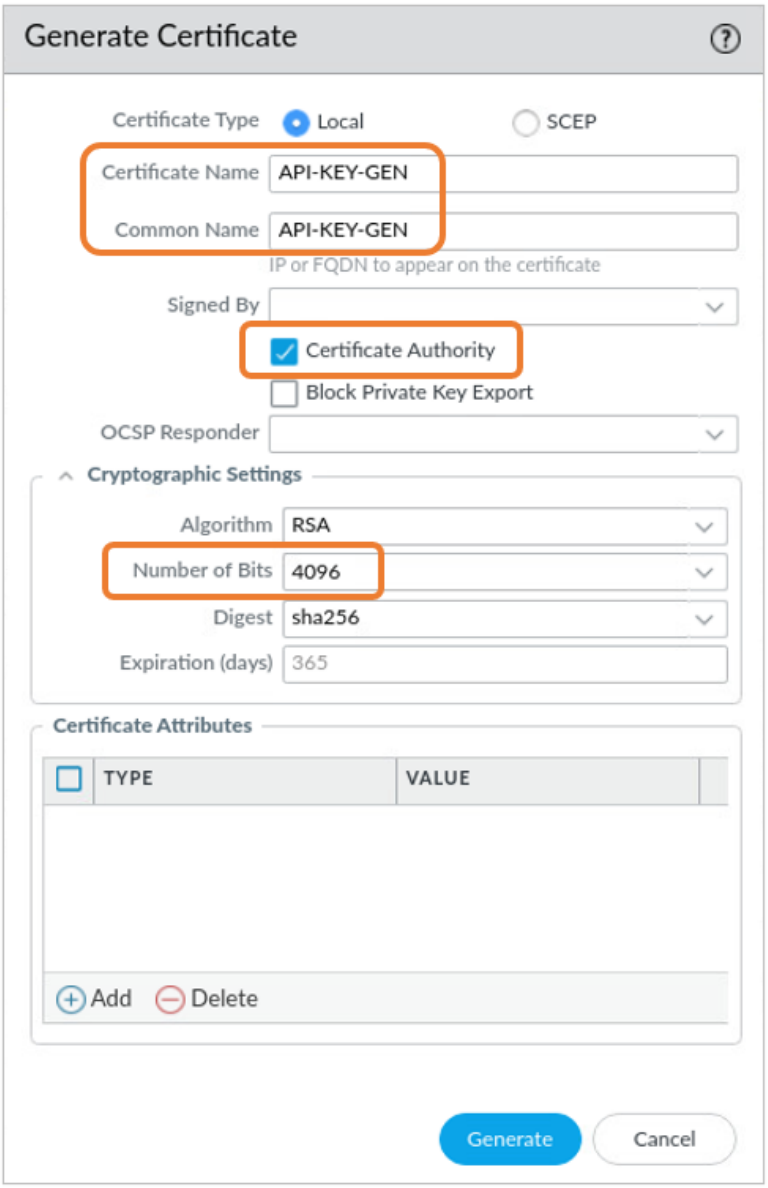
Modify Authentication Settings

In this section, you will create a certificate that the firewall will use to generate API Keys. Doing so will remove the error message you see when you commit a configuration. With this certificate in place, you will not see the error message when committing any configuration files you save from this point forward. If you load an older configuration file (one you created before applying the API Key certificate), you will receive the error message.

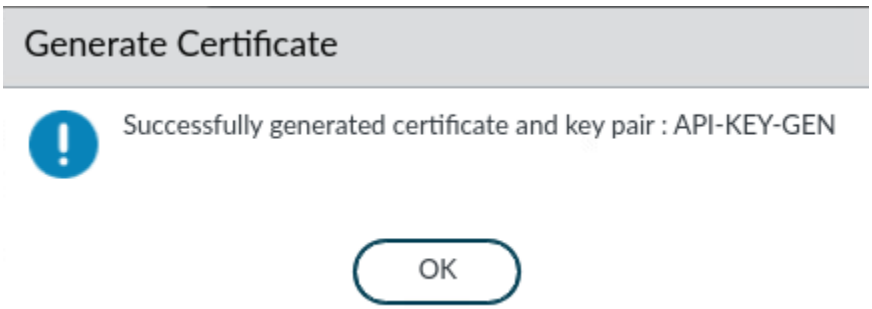
11. Go to **Device > Setup > Management**.
12. Scroll down and locate the section for **Authentication Settings**.
13. Click the gear icon to edit this section.
14. In the field labeled **API Key Certificate**, use the dropdown box to select **Generate**.



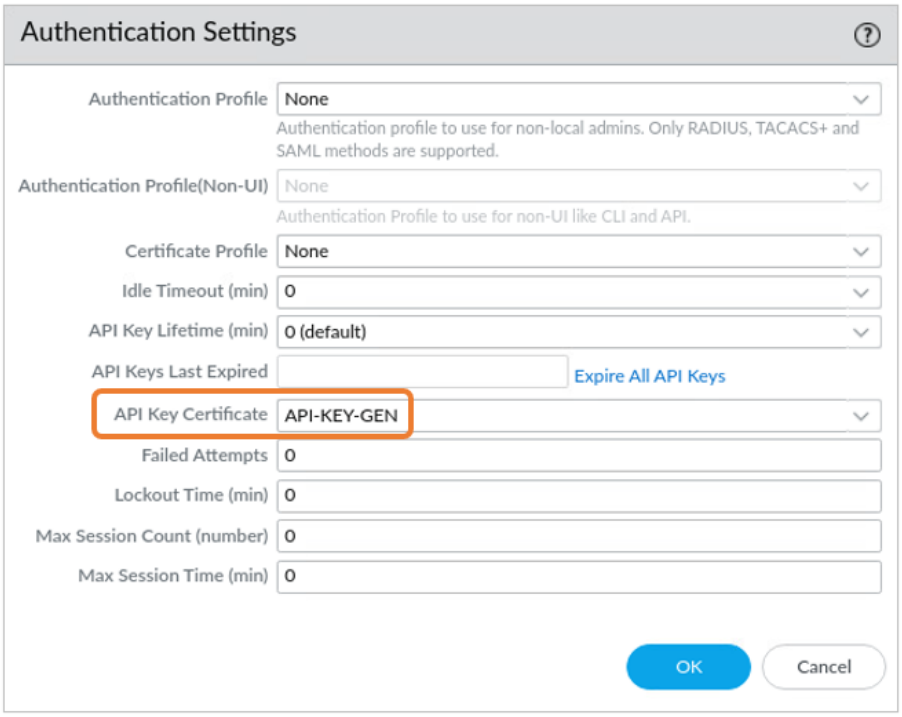
15. In the **Generate Certificate** window, enter **`API-KEY-GEN`** for **Certificate Name**.
16. For **Common name**, also enter **`API-KEY-GEN`**.
17. Check the box for **Certificate Authority**.
18. Under **Cryptographic Settings**, change the **Number of Bits** to **`4096`**.
19. Leave the remaining settings unchanged.



20. Click **Generate**.
21. Click **OK** on the **Generate Certificate** message box.



22. Your Authentication Settings window should now display the API-KEY-GEN certificate in the API Key Certificate field.

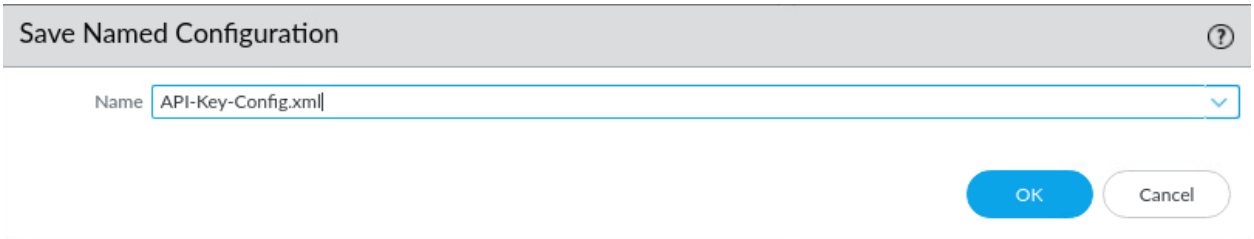


23. Leave the remaining settings unchanged.
24. Click **OK** to close the **Authentication Settings** window.
25. Select **YES** on the warning message:

26. Click the **Commit** link at the upper right of the web interface:
27. Click **Commit** again and wait until the commit process is complete.
28. Click **Close** to continue.

Save the Configuration

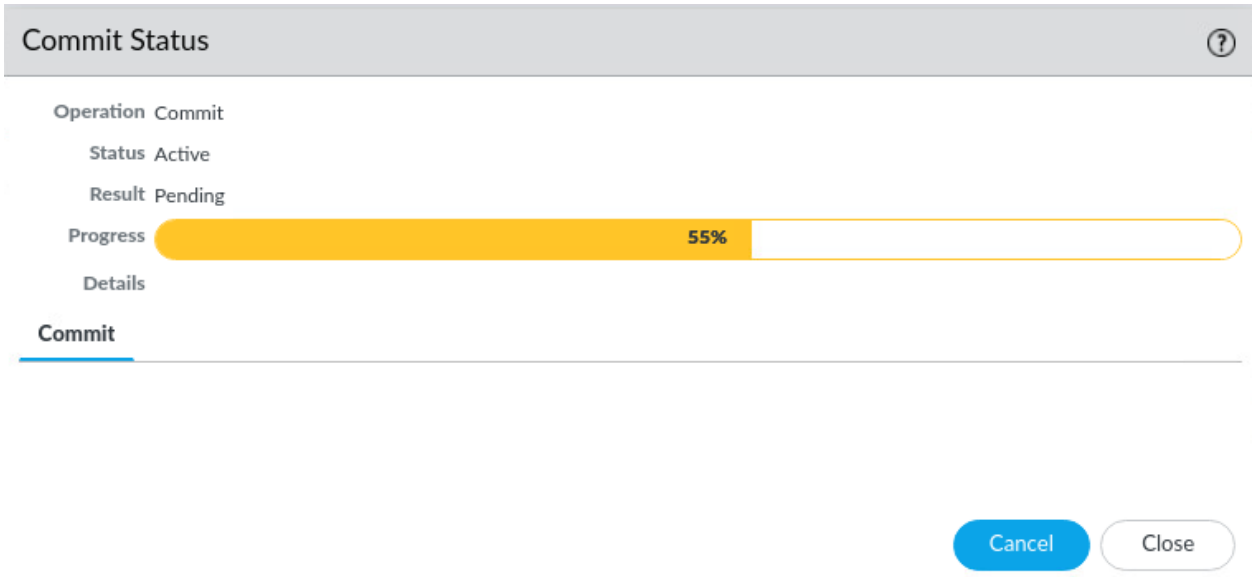
29. Under **Device > Setup > Operations > Configuration Management**, click **Save named configuration snapshot**.
30. In the **Save Named Configuration** window, enter **`API-Key-Config.xml`** for **Name**.



31. Click **OK**.
32. Click **Close** on the **Save Named Configuration** message window.
33. Under **Device > Setup > Operations**, click **Load named configuration snapshot**.
34. For **Name**, use the drop-down list to select the **`API-Key-Config.xml`** file.
35. Click **OK** to close the **Load Named Configuration** window.
36. Click **OK** to close the **Loading Configuration** message box.

Commit Your Changes and Verify Fix

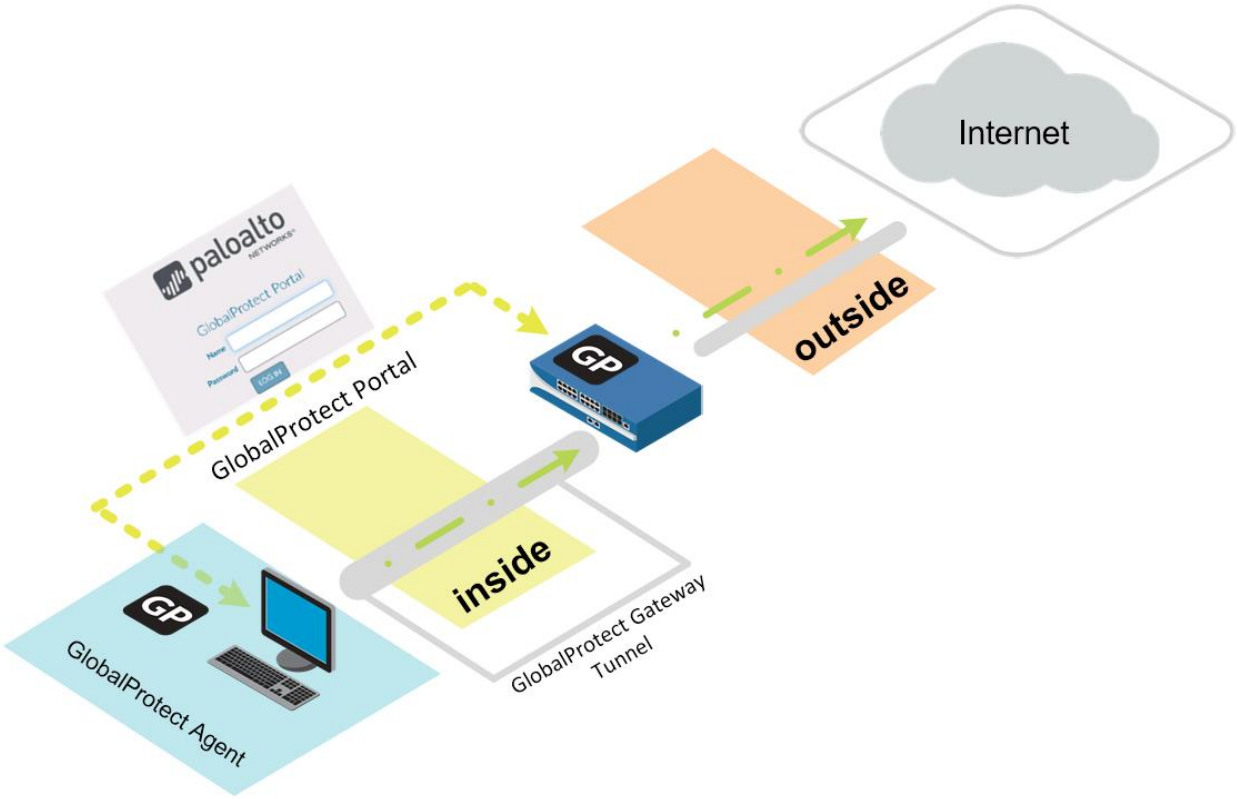
37. Click the **Commit** link at the upper right of the web interface:
38. Click **Commit** again and wait until the commit process is complete.
39. Note that you no longer receive any error messages regarding the API KeyGen algorithm.



40. Click **Close** when the Commit Status is complete.

Any configuration files you save on this firewall will now use the updated API Key Certificate.

Appendix A - GlobalProtect



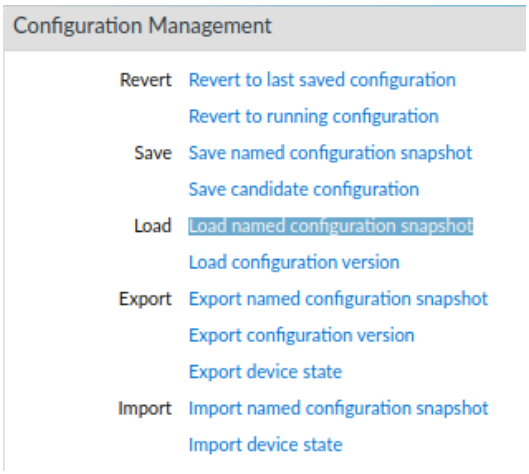
Lab Objectives

- Create and configure a Loopback interface.
- Create certificates for the GlobalProtect Portal, internal gateway, and external gateway.
- Attach certificates to an SSL/TLS Service Profile.
- Configure the Server Profile and Authentication Profile to be used when authenticating users.
- Create and configure the tunnel interface to be used with the external gateway.
- Configure the internal gateway, external gateway, and portal.
- Host the GlobalProtect agent on the portal for download.
- Create a No-NAT policy rule to ensure that portal traffic is not subjected to network address translation.
- Test the external gateway and internal gateway.

11.0 Load the Lab Configuration

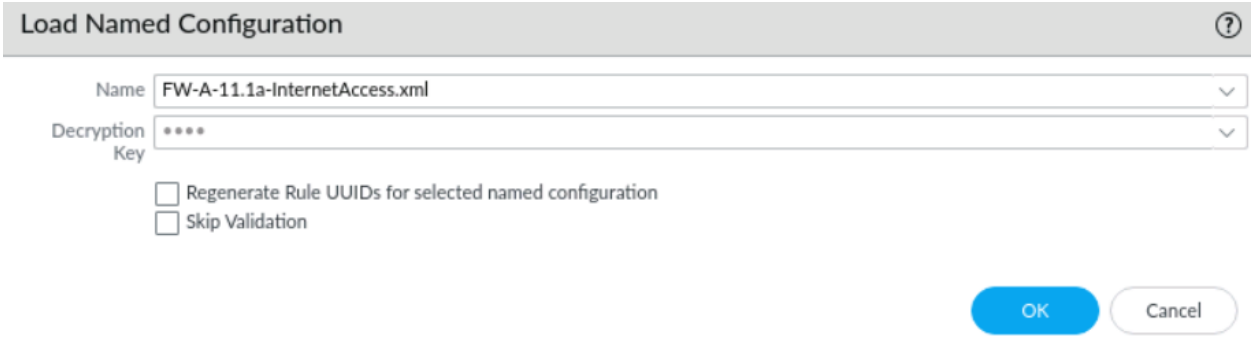
To start this lab exercise, you will load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**:



A **Load Named Configuration** dialog box opens.

3. Click the drop-down arrow next to the **Name** field and select **FW-A-11.1a-InternetAccess.xml**



4. Click **OK** to close the **Load Named Configuration** window.
   A window should open that confirms that the configuration is being loaded.
5. Click **Close** to close the **Loading Configuration** window.
6. Click the **Commit** link at the upper right of the web interface:

A **Commit** window should open.

7. Click **Commit** and wait until the commit process is complete.
   A **Commit Status** window should open that confirms the configuration was committed successfully.
8. Click **Close** to continue.

11.1 Configure a Loopback interface

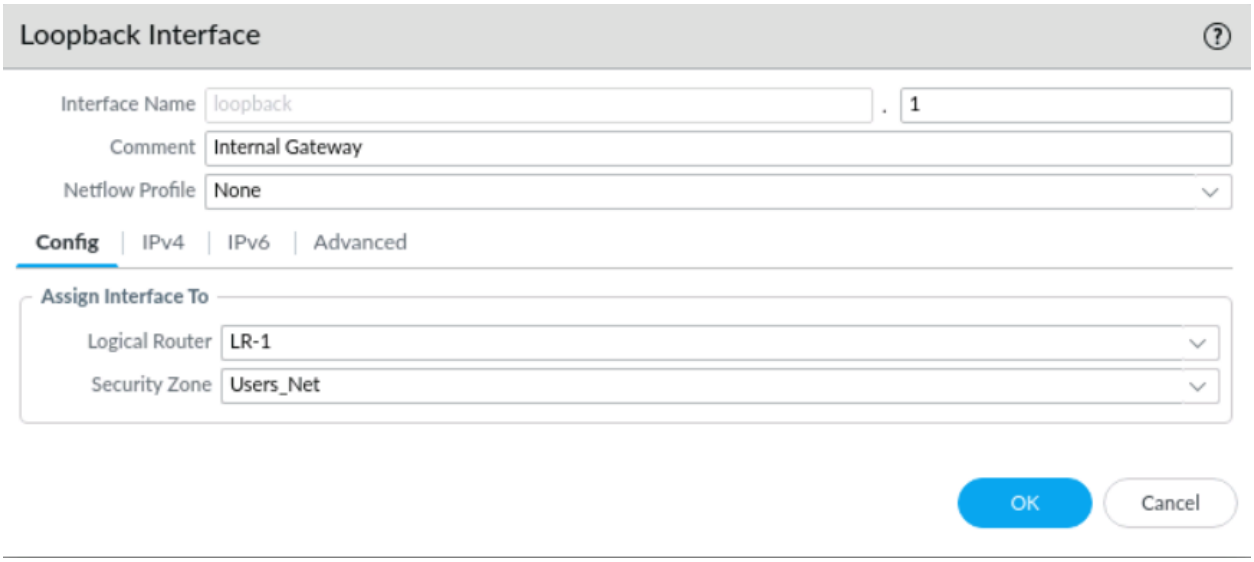
This Loopback interface will be used for the internal GlobalProtect Gateway.

9. In the web interface, select **Network > Interfaces > Loopback**.
10. Click **Add**.

    The **Loopback Interface** configuration window should open.

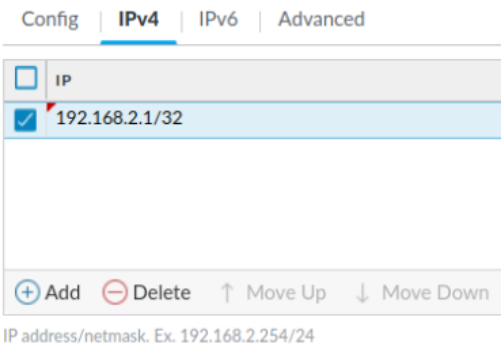
11. Configure the following:

Parameter	Value
Interface Name	
Comment	Type **`Internal gateway`**
Logical Router	Select **LR-1** from the drop-down list
Security Zone	Select **Users_Net** from the drop-down list

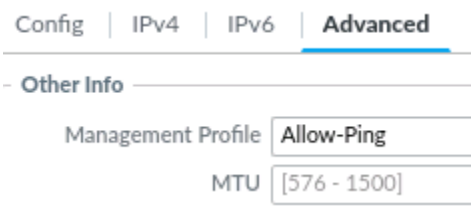


12. Click the **IPv4** tab and configure the following:

Parameter	Value
IP	Click Add and type **`192.168.2.1/32`**



13. Click the **Advanced** tab and select **Allow-Ping** for the **Management Profile**:



Addition of a Management Profile is not a requirement for GlobalProtect but can make troubleshooting easier if you need to verify that the IP address on the loopback interface is available.

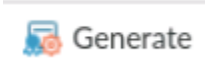
14. Click **OK** to close the **Layer3 Subinterface** configuration window.
    A new loopback interface should display in the web interface.
15. Verify that your configuration looks like the following:

INTERFACE	MANAGEMENT PROFILE	IP ADDRESS	LOGICAL ROUTER	SECURITY ZONE	FEATURES	COMMENT
loopback		none	none	none		
loopback.1	Allow-ping	192.168.2.1/32	LR-1	Users_Net		Internal Gateway

11.2 Generate Self-Signed Certificates

GlobalProtect needs three certificates, one each for the portal, external gateway, and internal gateway. These certificates typically are signed by a common CA certificate. This lab creates a CA certificate and internal gateway certificate but combines the portal and external gateway certificates because these GlobalProtect functions are combined on the same IP address. The common CA certificate will be exported and installed on the lab client to make all certificates trusted. In a production environment it is recommended to use a public SSL certificate for the GlobalProtect Portal.

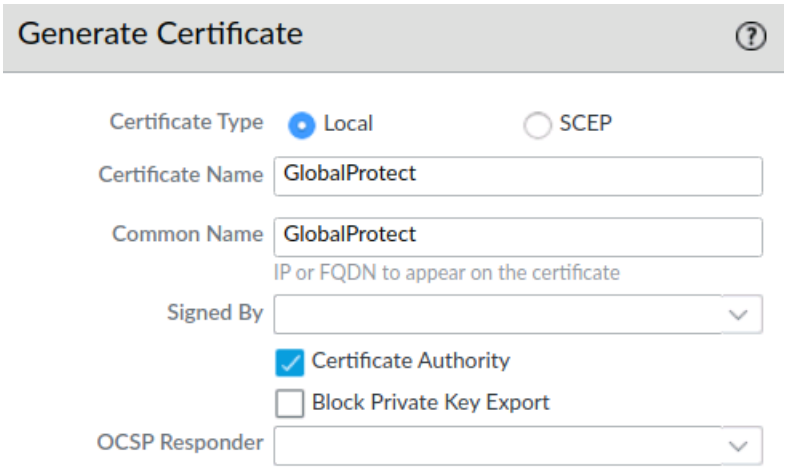
16. In the web interface, select **Device > Certificate Management > Certificates**.
17. Click **Generate** to create a certificate.



The **Generate Certificate** window should open.

18. Configure the following:

Parameter	Value
Certificate Name	**`GlobalProtect`**
Common Name	**`GlobalProtect`**
Signed By	Leave blank
Certificate Authority	Select the check box



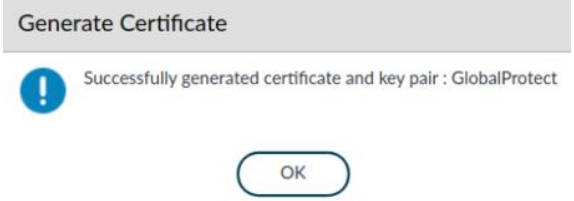
You will use this certificate to sign the external and internal gateway certificates.

19. Click **Generate**.

A status window should open that shows that the **GlobalProtect** certificate and key pair were generated successfully.

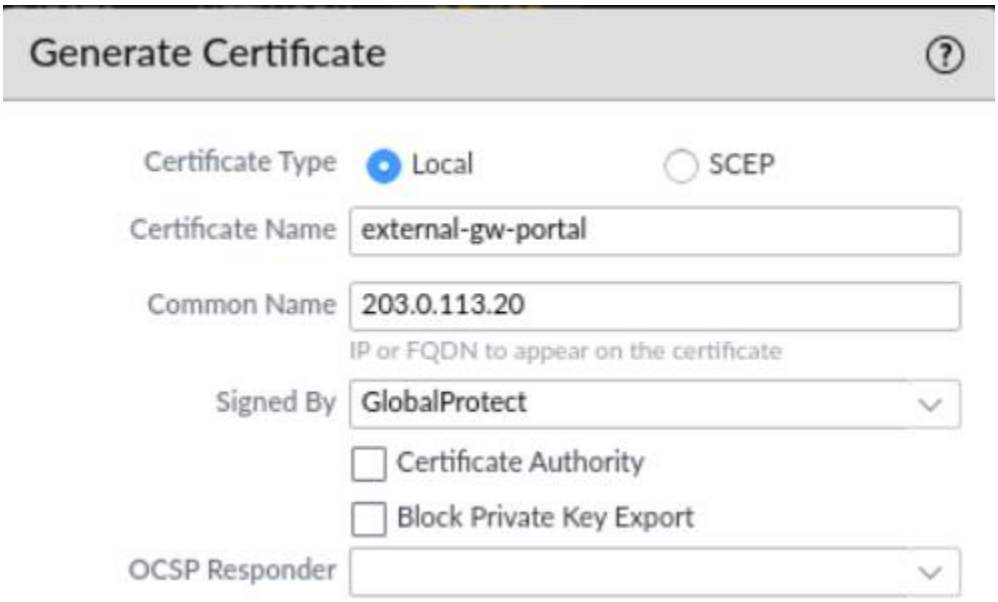
20. Click **OK** to close the status window.

A new certificate should display in the web interface.



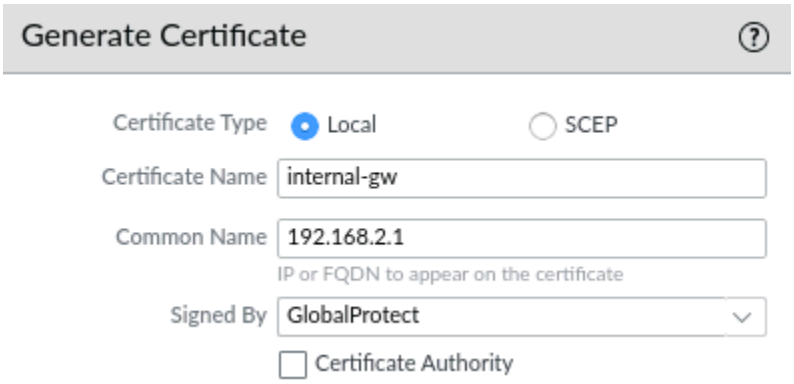
21. Click **Generate** and create a certificate for the GlobalProtect external gateway.
    The **Generate Certificate** window should open.
22. Configure the following:

Parameter	Value
Certificate Name	`external-gw-portal`
Common Name	`203.0.113.20` In a production environment it is recommended to use a public SSL certificate with a public DNS name as the common name
Signed By	Select **GlobalProtect** from the drop-down list



    Note that you are signing this new certificate with the **GlobalProtect** certificate.
23. Click **Generate**.
    A status window should open that shows the **external-gw-portal** certificate and key pair were generated successfully.
24. Click **OK** to close the status window.
    A new certificate should open in the web interface.
25. Click **Generate** and create a certificate for the GlobalProtect internal gateway.
    The **Generate Certificate** window should open.
26. Configure the following:

Parameter	Value
Certificate Name	`internal-gw`
Common Name	`192.168.2.1` (the IP address previously assigned to the Loopback interface)
Signed By	Select **GlobalProtect** from the drop-down list



Again, you are signing this new certificate with the **GlobalProtect** certificate you created earlier.

27. Click **Generate**.
    A status window should open that shows the **internal-gw** certificate and key pair were generated successfully.
28. Click **OK** to close the status window.
    A new certificate should display in the web interface.
29. Verify that your configuration looks like the following:

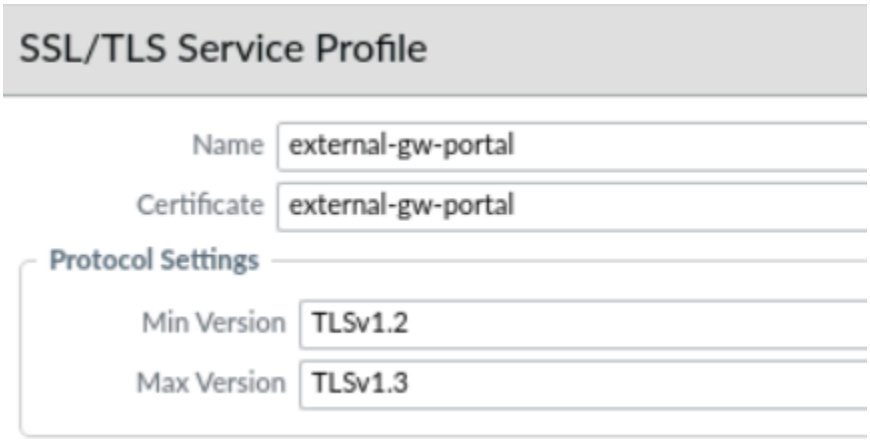
NAME	SUBJECT	ISSUER	CA	KEY	EXPIRES	STATUS	ALGORITH...
TLSv1.3_Default	C = US, ST = CA, L = Santa Clara, O = Palo Alto Networks, CN =...	C = US, ST = CA, L = Santa Clara, O = Palo Alto Networks, CN = ...	☐	☑	Aug 31 11:19:52 2034 GMT	valid	Elliptic Cur...
GlobalProtect	CN = GlobalProtect	CN = GlobalProtect	☑	☑	Sep 21 11:50:53 2025 GMT	valid	RSA
external-gw-portal	CN = 203.0.113.20	CN = GlobalProtect	☐	☑	Sep 21 11:53:34 2025 GMT	valid	RSA
internal-gw	CN = 192.168.2.1	CN = GlobalProtect	☐	☑	Sep 21 11:54:57 2025 GMT	valid	RSA

11.3 Configure the SSL/TLS Service Profile

30. In the web interface, select **Device** > **Certificate Management** > **SSL/TLS Service Profile**.
31. Click **Add** to create a profile.
    The **SSL/TLS Service Profile** configuration window should open.

32. Configure the following:

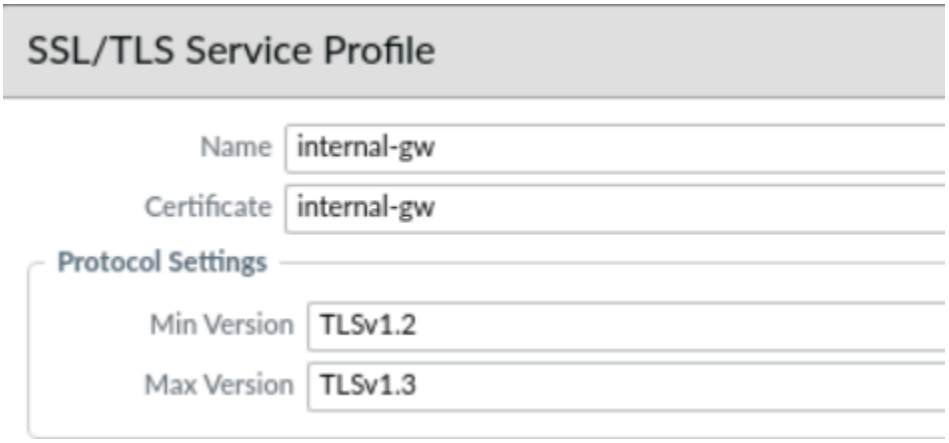
Parameter	Value
Name	Type **`external-gw-portal`**
Certificate	Select **external-gw-portal** from the drop-down list
Min Version	Select **TLSv1.2** from the drop-down list
Max Version	Select **TLSv1.3** or the maximum available **TLS** version



This SSL/TLS Service Profile defines the certificate to present to the GlobalProtect client agent when the agent initially connects to the GlobalProtect Portal. The firewall will present this same certificate when the agent software connects to an external gateway.

33. Click **OK** to close the **SSL/TLS Service Profile** configuration window.
    A new SSL/TLS profile should display in the web interface.
34. Click **Add** to create a second **SSL/TLS Service Profile**.
    The **SSL/TLS Service Profile** configuration window should open.
35. Configure the following:

Parameter	Value
Name	Type **`internal-gw`**
Certificate	Select **internal-gw** from the drop-down list
Min Version	Select **TLSv1.2** from the drop-down list
Max Version	Select **TLSv1.3** or the maximum available **TLS** version



This SSL/TLS Service Profile defines the certificate to present to the GlobalProtect client agent when the agent connects to an internal GlobalProtect Gateway.

36. Click **OK** to close the **SSL/TLS Service Profile** configuration window.
    A new SSL/TLS profile should display in the web interface.
37. Verify that your configuration looks like the following:

external-gw-portal	external-gw-portal	RSA DHE ECDHE	Min Version: TLSv1.2 Max Version: TLSv1.3
internal-gw	internal-gw	RSA DHE ECDHE	Min Version: TLSv1.2 Max Version: TLSv1.3

These entries instruct the firewall to use the appropriate certificate when communicating with the GlobalProtect agent software. You have one certificate to use when the client connects to the portal or to an external gateway; and a second certificate to use when the client connects to an internal gateway.

11.4 LDAP Server Profile Configuration

When the GlobalProtect agent connects to the portal, the firewall must authenticate the user. In this section, you define the service that the firewall will use to authenticate users when they invoke the GlobalProtect agent. Separately, when the GlobalProtect agent connects to a gateway to establish a VPN, the firewall must authenticate the user.

You should have created an LDAP Server Profile for authentication.

In the web interface, select **Device > Server Profiles > LDAP**.

38. Select **Add**.
39. Configure the following parameters:

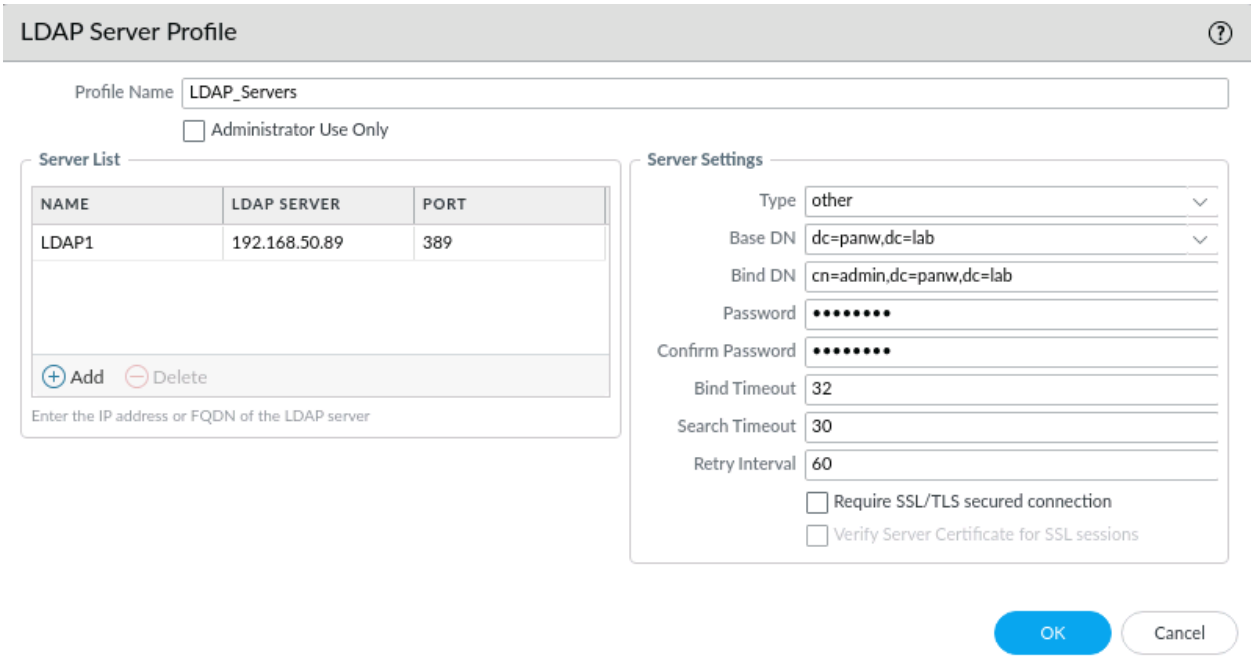
Parameter	Value
Profile Name	`LDAP_Servers`

40. Locate the **Server list** on the left side of the window.
41. Configure the following:

Parameter	Value
Name	`LDAP1`
LDAP Server	`192.168.50.89`
Port	`389`

42. Locate **Server Settings** on the right side of the window and configure the following:

Parameter	Value
Type	**o**ther
Base DN	`dc=panw,dc=lab`
Bind DN	**cn=admin,dc=panw,dc=lab**
Password	`Pal0Alt0!`
Require SSL/TLS secured connection	Deselected check box



43. Click **OK** to close the **LDAP Server Profile** configuration window.

11.5 Authentication Profile Configuration

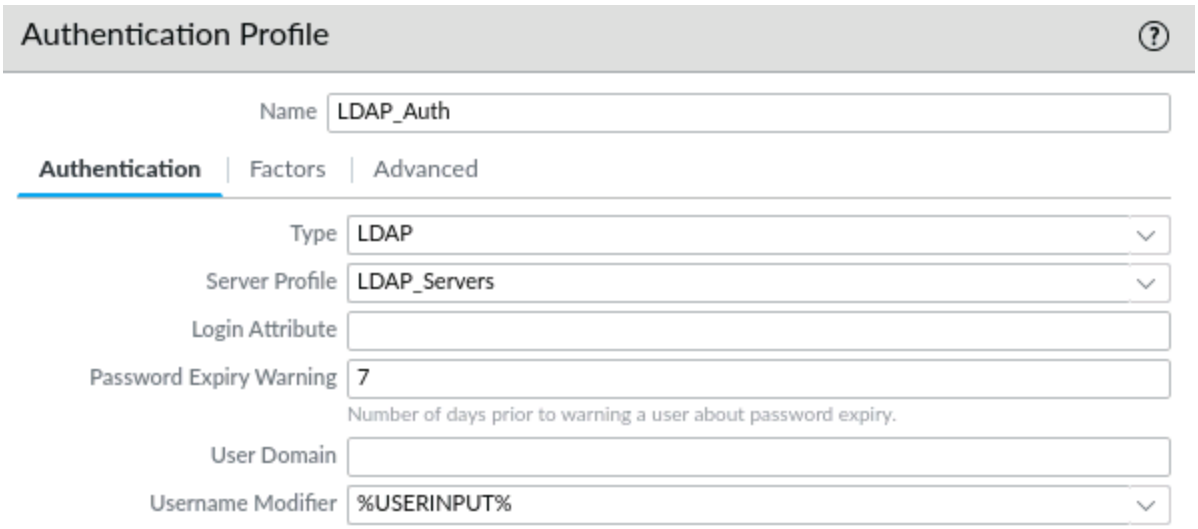
You should have create an Authentication Profile that contains the LDAP Server Profile. You will create this profile and authenticate the users accessing the GlobalProtect Portal or the Gateway via it.

44. In the web interface, select **Device** > **Authentication Profile**.
45. Click **Add**.

    An **Authentication Profile** configuration window should open.

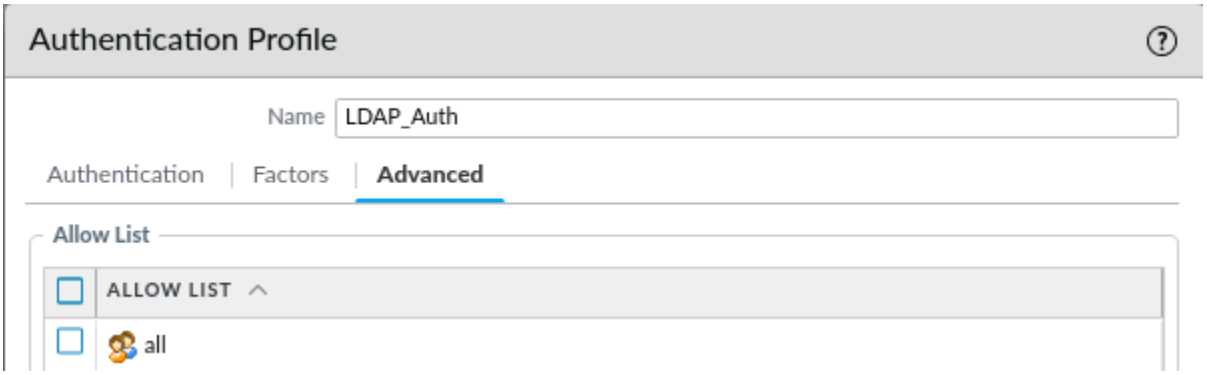
46. Configure the following parameters:

Parameter	Value
Name	**`LDAP_Auth`**
Type	**LDAP**
Server Profile	**LDAP_Servers**



47. Select the **Advanced** tab then **Add** under **Allow List** and configure the following:

Parameter	Value
Allow List	**all**



48. Click **OK** to close the **Authentication Profile** configuration window.

A new Authentication Profile should display in the web interface.

NAME	LOCATION	Lockout		ALLOW LIST	AUTHENTICATION	SERVER PROFILE
		FAILED ATTEMPTS (#)	LOCKOUT TIME (MIN)			
LDAP_Auth			0	all	LDAP	LDAP_Servers

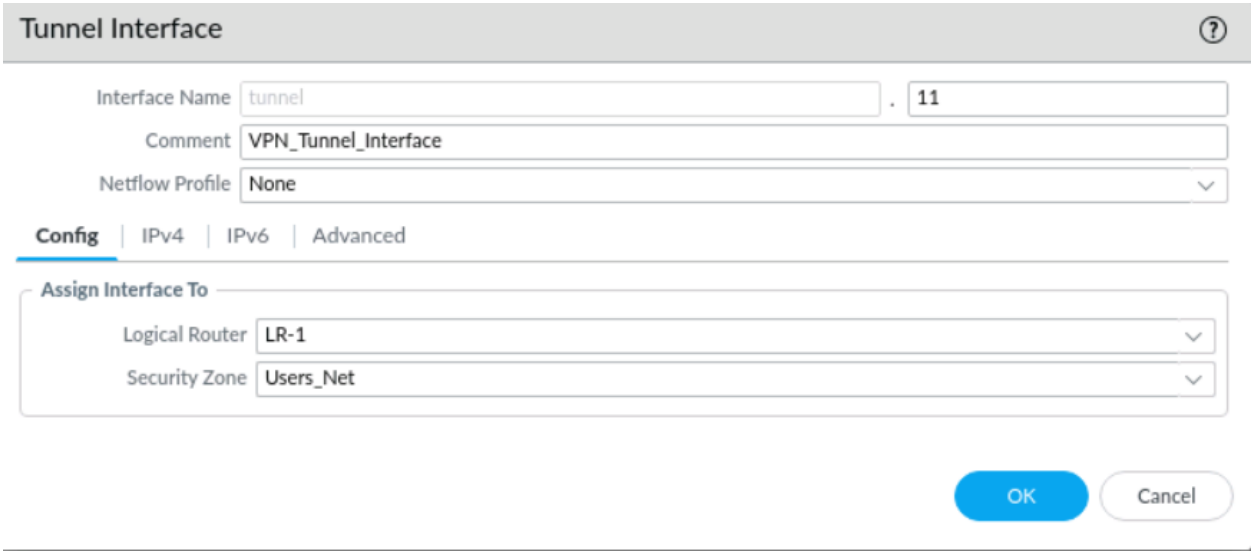
11.6 Configure the Tunnel Interface

The GlobalProtect client agent software uses a VPN tunnel to establish a secure connection to an external gateway. The firewall uses a tunnel interface to encrypt and decrypt traffic with the client.

49. In the web interface, select **Network** > **Interfaces** > **Tunnel**.
50. Click **Add** to create a new tunnel interface.

    A **Tunnel Interface** configuration window should open.
51. Configure the following:

Parameter	Value
Interface Name	
Comment	Type **`VPN Tunnel Interface`**
Logical Router	Select **LR-1** from the drop-down list
Security Zone	Select **Users_Net** from the drop-down list



The logical tunnel interface is connected to a logical router and assigned to a security zone just as are other interfaces.

52. Click **OK** to close the **Tunnel Interface** configuration window.

    A new tunnel interface should display in the web interface.

INTERFACE	MANAGEMENT PROFILE	IP ADDRESS	LOGICAL ROUTER	SECURITY ZONE	FEATURES	COMMENT
tunnel		none	none	none		
tunnel.11		none	LR-1	Users_Net		VPN_Tunnel_Interface

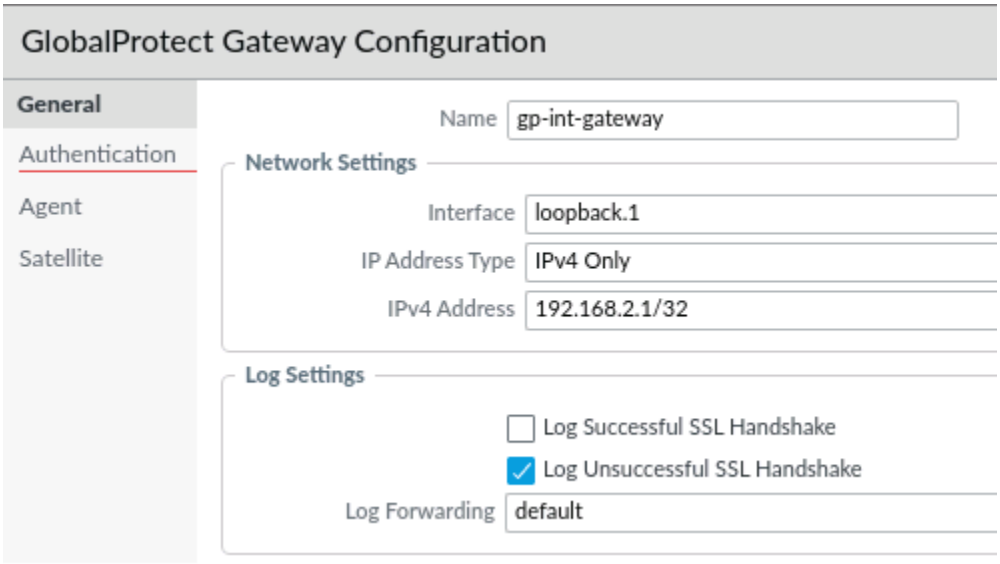
11.7 Configure the Internal Gateway

Internal gateways can be used for User-ID deployment and host information profile (HIP) enforcement. They also can be used to encrypt traffic from the client to sensitive internal resources through a VPN gateway.

53. In the web interface, select **Network** > **GlobalProtect** > **Gateways**.
54. Click **Add** to create a gateway.

    The **GlobalProtect Gateway Configuration** window should open.
55. Configure the following:

Parameter	Value
Name	Type **`gp-int-gateway`**
Interface	Select **loopback.1** from the drop-down list
IPv4 Address	Select **192.168.2.1/32** from the drop-down list

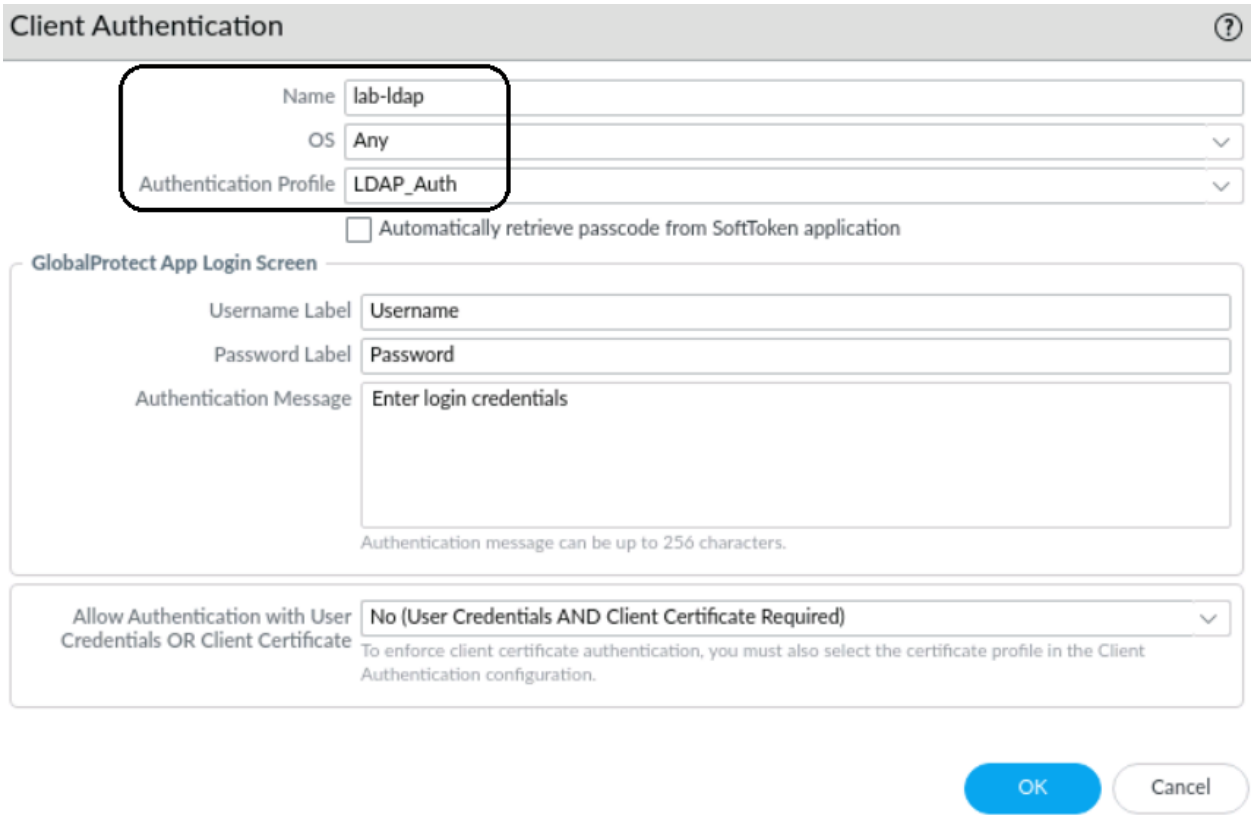


56. Select the **Authentication** tab and configure the following:

Parameter	Value
SSL/TLS Service Profile	Select **internal-gw** from the drop-down list

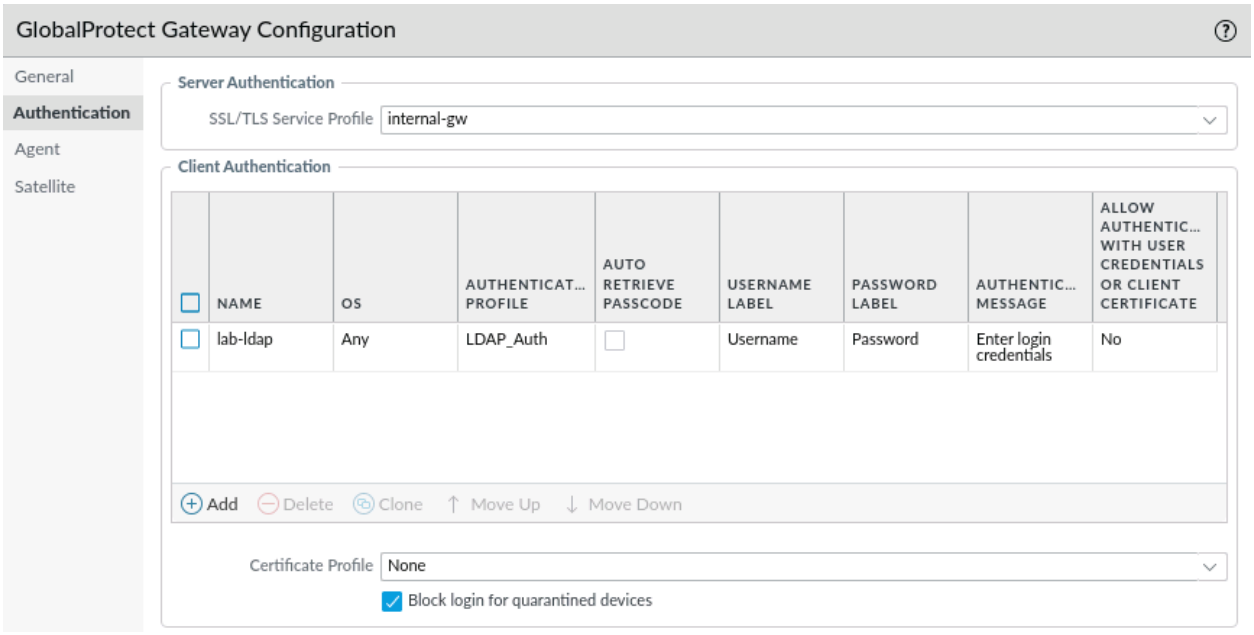
57. Locate the **Client Authentication** list box.
58. Click **Add** to configure client authentication settings.
    The **Client Authentication** configuration window should open.
59. Configure the following:

Parameter	Value
Name	Type **`lab-ldap`**
OS	Verify that **Any** is selected
Authentication Profile	Select **LDAP_Auth** from the drop-down list



This area lets you configure different authentication methods for different sets of users based on the operating system in use for the GlobalProtect client agent software.

60. Click **OK** to close the **Client Authentication** configuration window.



61. Click **OK** to close the **GlobalProtect Gateway Configuration** window.

    A new GlobalProtect Gateway should display in the web interface.

11.8 Configure the External Gateway

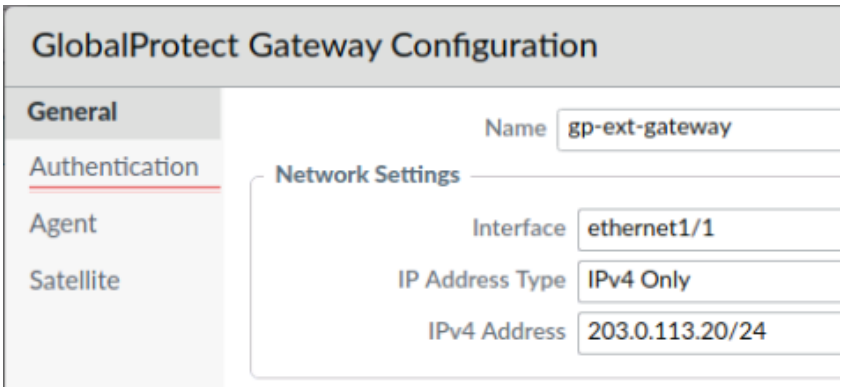
In this section you will create the GlobalProtect external gateway.

62. Click **Add** to create a second gateway.

    The **GlobalProtect Gateway Configuration** window should open. The external gateway is the VPN gateway that GlobalProtect clients connect to when they are outside the local network.

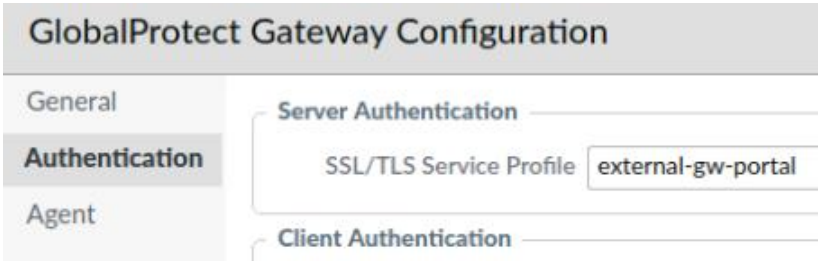
63. Configure the following:

Parameter	Value
Name	Type **`gp-ext-gateway`**
Interface	Select **ethernet1/1** from the drop-down list
IPv4 Address	Select **203.0.113.20/24** from the drop-down list



64. Select the **Authentication** tab and configure the following:

Parameter	Value
SSL/TLS Service Profile	Select **external-gw-portal** from the drop-down list



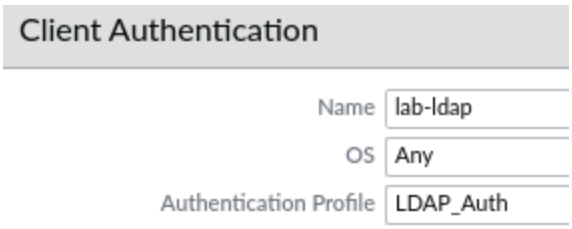
This setting defines the certificates to present to the client when it connects to the gateway. Remember that you created a single SSL/TLS Service Profile for the portal and for the external gateway.

65. Locate the **Client Authentication** list box.
66. Click **Add** to configure client authentication settings.

    The **Client Authentication** configuration window should open.

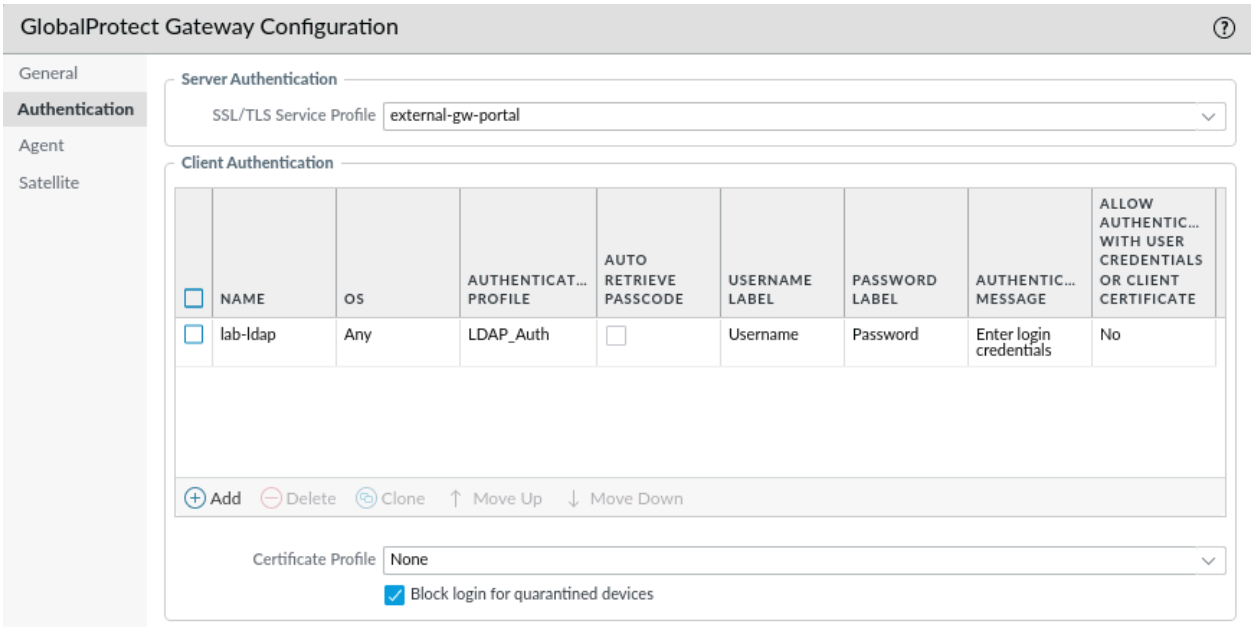
67. Configure the following:

Parameter	Value
Name	Type **`lab-ldap`**
OS	Verify that **Any** is selected
Authentication Profile	Select **LDAP_Auth** from the drop-down list



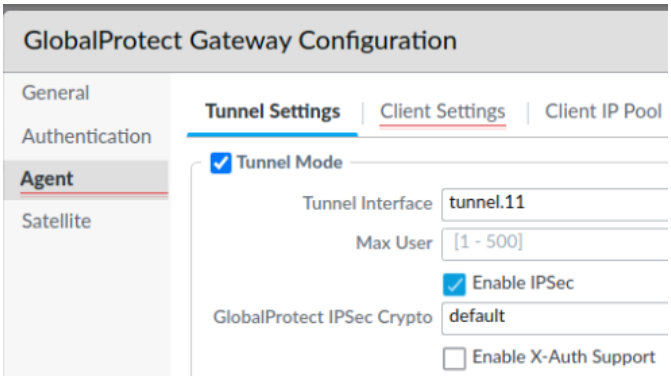
This section allows you to select different authentication methods (Authentication Profiles) based on the operating system of client hosts.

68. Click **OK** to close the **Client Authentication** window:



69. Click the **Agent** tab and configure the following:

Parameter	Value
Tunnel Mode	Select the check box
Tunnel Interface	Select **tunnel.11** from the drop-down list
Enable IPSec	Verify that the **Enable IPSec** check box is selected

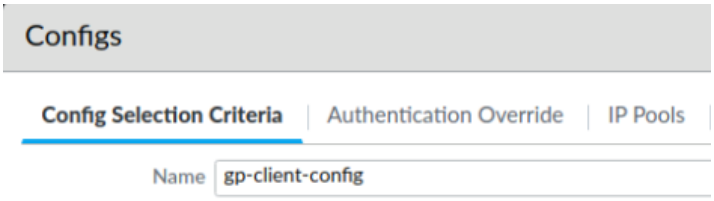


This section tells the firewall how to establish a tunnel with a client and which interface to use.

70. Click the **Client Settings** subtab.
71. Click **Add** to configure client settings.

    The **Configs** configuration window should open.
72. Click the **Config Selection Criteria** tab and configure the following:

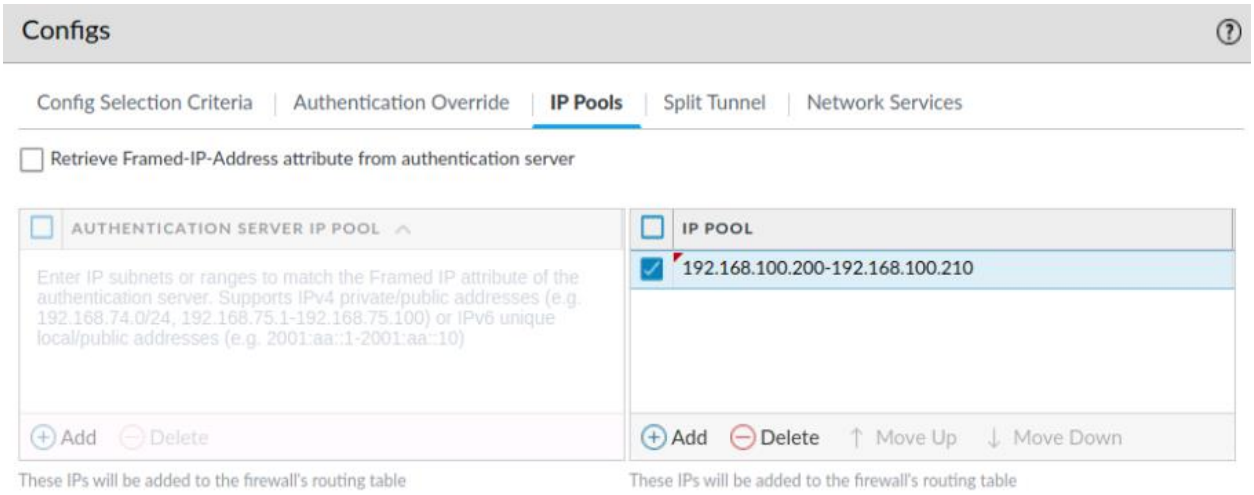
Parameter	Value
Name	Type **`gp-client-config`**



After a client has been authenticated to establish a VPN with the gateway, these settings define which IP address and other network elements the GlobalProtect client adapter will use.

73. Click the **IP Pools** subtab and configure the following:

Parameter	Value
IP Pools	Click **Add** and type **`192.168.100.200-192.168.100.210`**



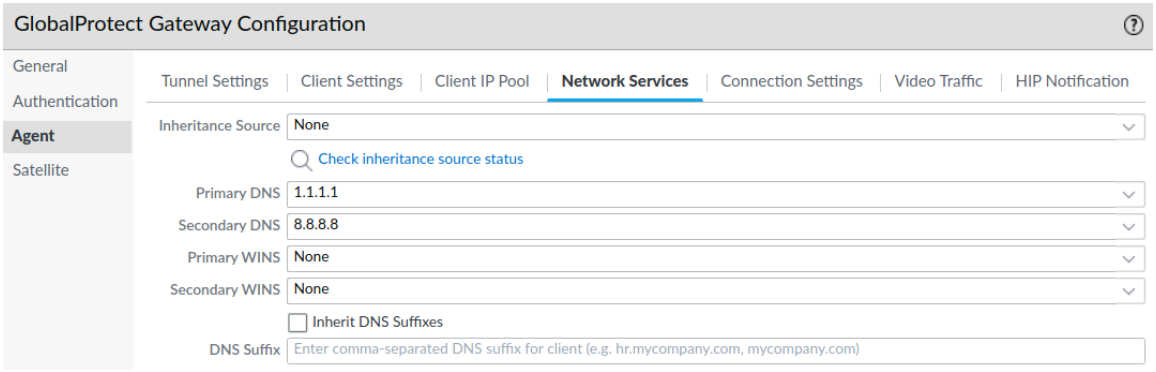
The firewall will assign an IP address to each GlobalProtect client from this range of addresses.

74. Click **OK** to close the **Configs** window.

    The **GlobalProtect Gateway** configuration window still should be open on the **Client Settings** subtab.

75. Click the **Network Services** subtab and configure the following:

Parameter	Value
Primary DNS	**Type `1.1.1.1`**
Secondary DNS	**Type `8.8.8.8`**

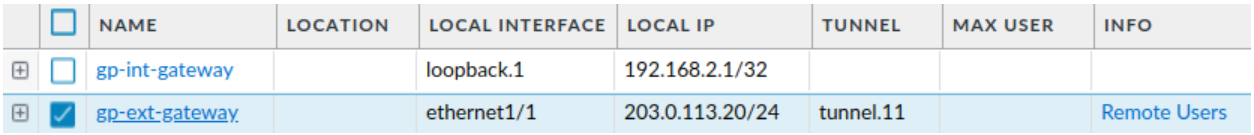


The servers used in the lab are public, but in many cases the DNS servers that are assigned to the GlobalProtect client adapter will be private, internal DNS hosts. This setting will enable the client to resolve internal hostnames while connected to the VPN.

76. Click **OK** to close the **GlobalProtect Gateway Configuration** window.

    A new GlobalProtect Gateway should display in the web interface.

77. Verify that your configuration looks like the following:



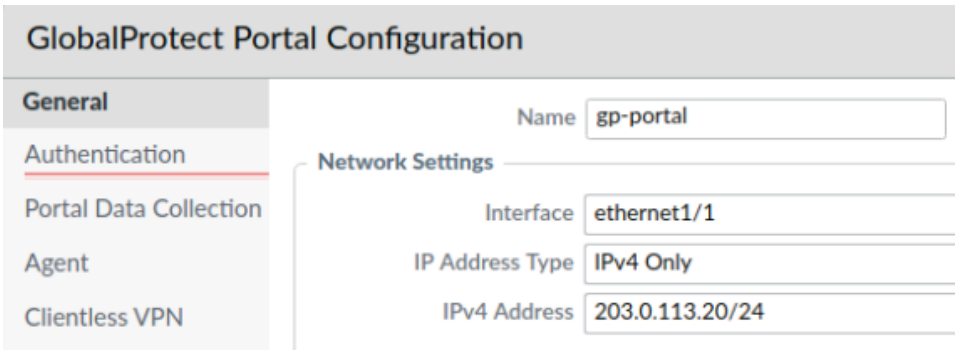
	NAME	LOCATION	LOCAL INTERFACE	LOCAL IP	TUNNEL	MAX USER	INFO
⊞	gp-int-gateway		loopback.1	192.168.2.1/32			
⊞	gp-ext-gateway		ethernet1/1	203.0.113.20/24	tunnel.11		Remote Users

11.9 Configure the Portal

The GlobalProtect Portal provides the management functions for the GlobalProtect infrastructure. Every endpoint that participates in the GlobalProtect network receives its configuration from the portal, including information about the available GlobalProtect Gateways and any optional client certificates that might be necessary for the client to connect to a gateway.

78. In the web interface, select **Network > GlobalProtect > Portals**.
79. Click **Add** to create a new portal.
    The **GlobalProtect Portal Configuration** window opens.
80. Configure the following:

Parameter	Value
Name	`Type gp-portal`
Interface	Select **ethernet1/1** from the drop-down list
IPv4 Address	Select **203.0.113.20/24** from the drop-down list



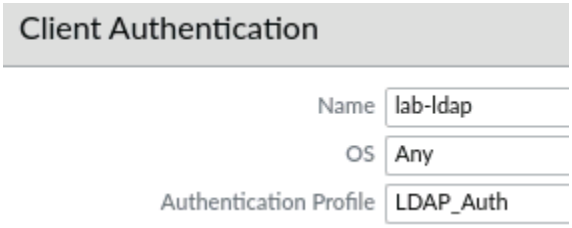
81. Click the **Authentication** tab and configure the following:

Parameter	Value
SSL/TLS Service Profile	Select **external-gw-portal** from the drop-down list

82. Locate the **Client Authentication** list box.

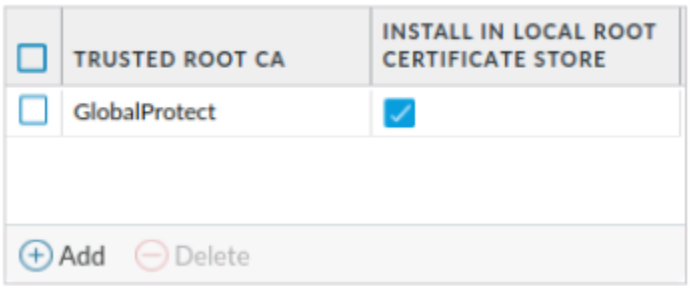
83. Click **Add** to configure client authentication settings.
    The **Client Authentication** configuration window should open.
84. Configure the following:

Parameter	Value
Name	**`Type lab-ldap`**
OS	Verify that **Any** is selected
Authentication Profile	Select **LDAP_Auth** from the drop-down list



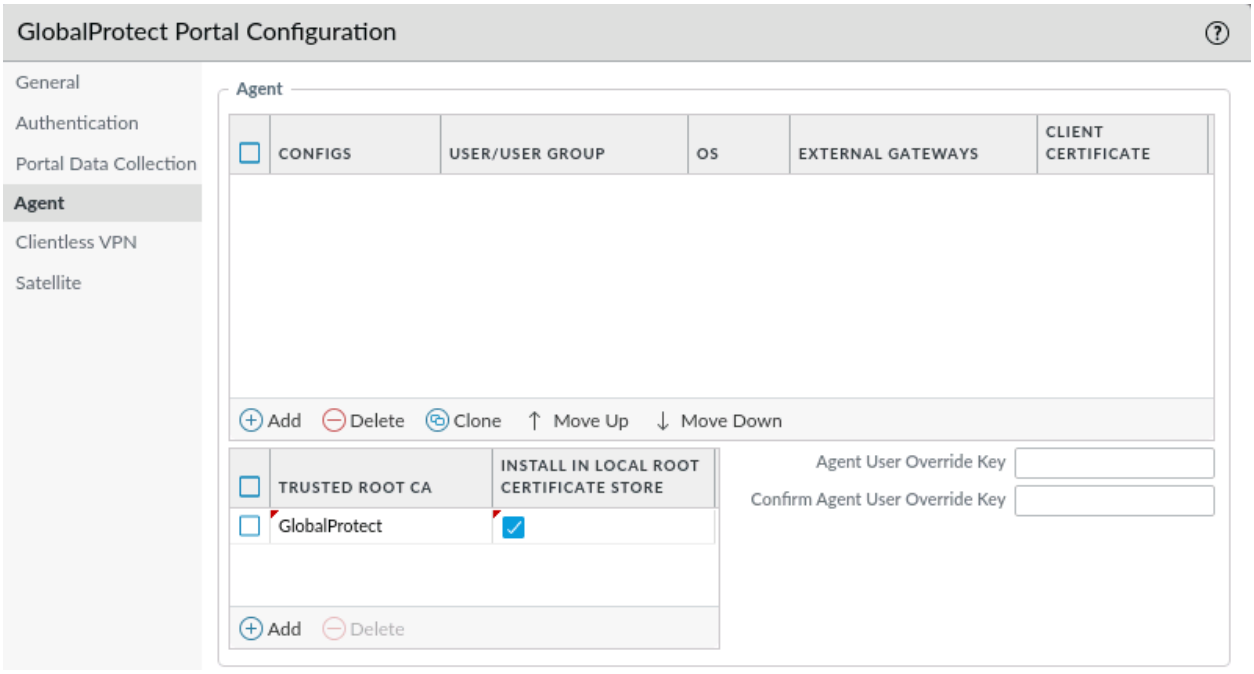
In this section, the portal is being configured to authenticate users against the LDAP_Auth Profile that contains your LDAP server.

85. Click **OK** to close the **Client Authentication** list box.
86. Click the **Agent** tab.
87. Locate **Trusted Root CA** in the lower-left corner.
88. Click **Add** and select the **GlobalProtect** certificate from the drop-down list.
89. Check **Install in Local Root Certificate Store**



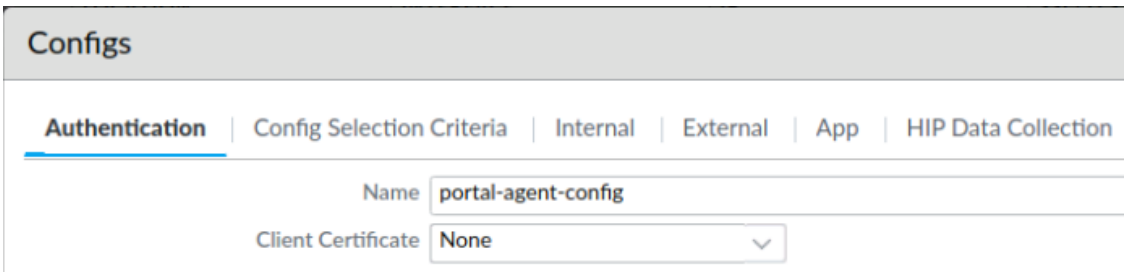
This is the certificate you used to sign the portal certificate and the gateway certificate. By placing it in this section, you can push this signing certificate down to the client's trusted certificate store through the GlobalProtect connection. This CA is at the top of the chain of trust, so the client host will trust any certificate signed by this one, including the portal and gateway certificates.

90. Locate the **Agent** list box:



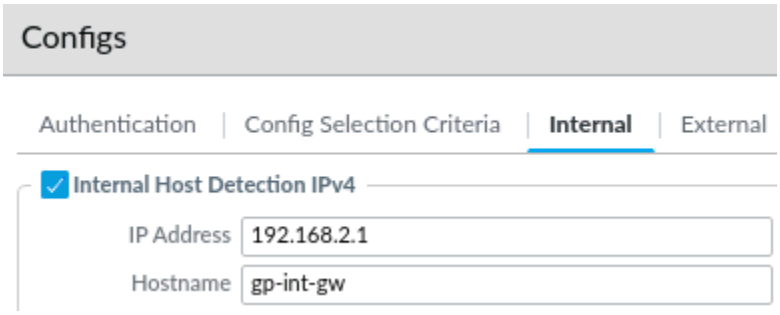
91. Click **Add** to configure **Agent**.
    The **Configs** configuration window should open.
92. Click the **Authentication** tab and configure the following:

Parameter	Value
Name	Type **`portal-agent-config`**



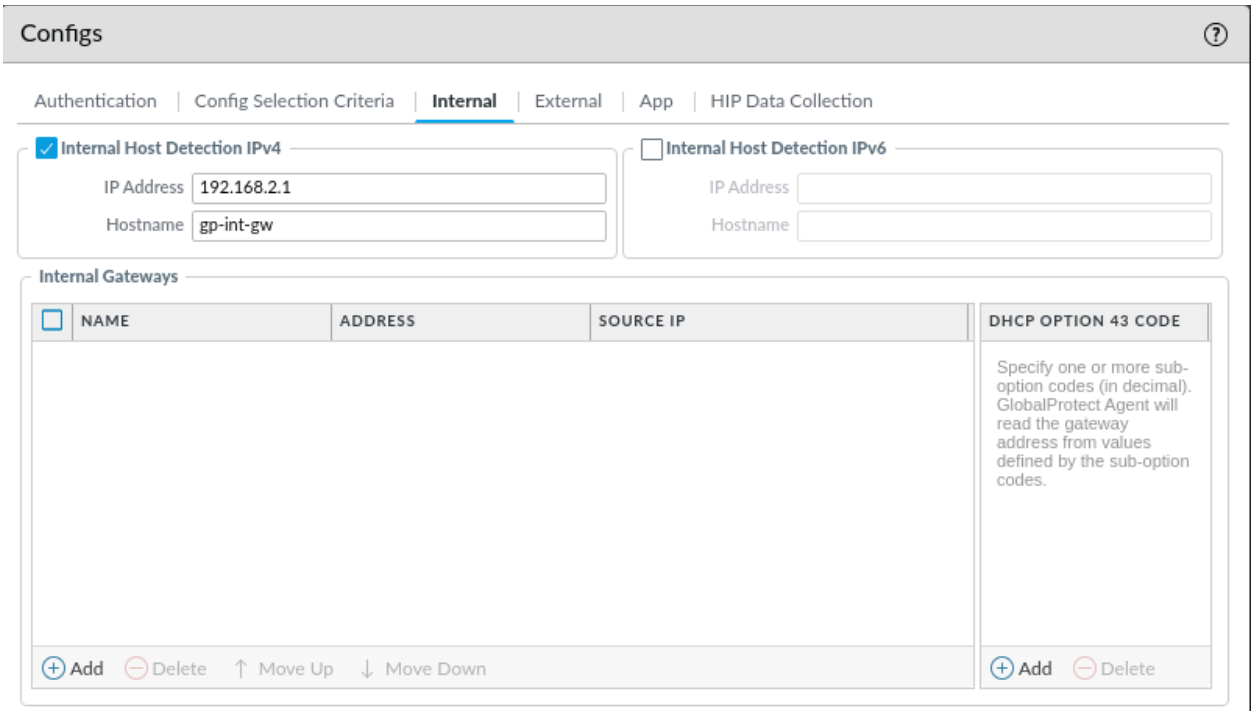
93. Click the **Internal** tab.
94. Select the **Internal Host Detection IPv4** check box.
95. Configure the following:

Parameter	Value
IP Address	Type **`192.168.2.1`**
Hostname	Type **`gp-int-gw`**



When the client is inside the network, a reverse DNS lookup for 192.168.2.1 will resolve to gp-in-gw. If that lookup is successful, the GlobalProtect client will connect to an internal gateway. If that reverse lookup fails (or returns a name other than gp-in-gw), the GlobalProtect client will connect to an external gateway.

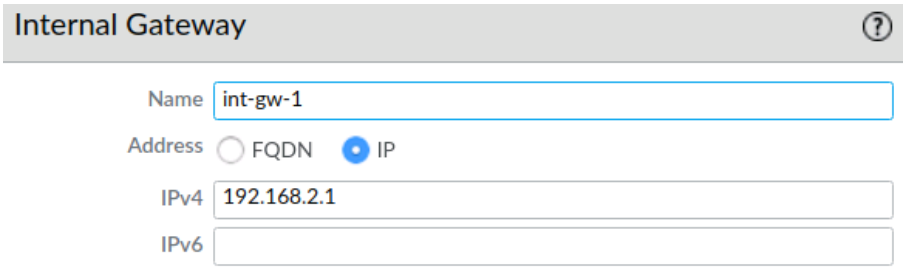
96. Locate the **Internal Gateways** list box and click **Add** to configure:



The **Internal Gateway** configuration window should open.

97. Configure the following:

Parameter	Value
Name	Type **`int-gw-1`**
Address	Select the **IP** radio button
IPv4	Type **`192.168.2.1`**

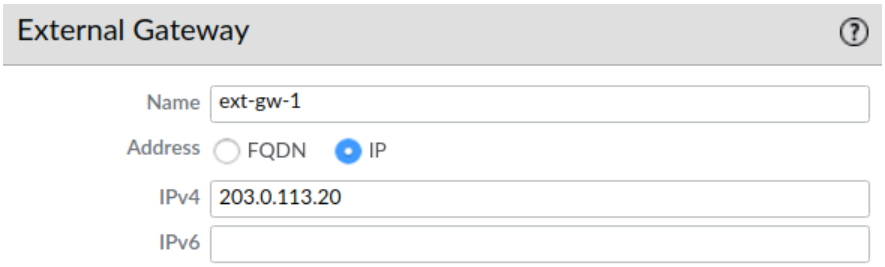


98. Click **OK** to close the **Internal Gateway** configuration window.
99. Click the **External** tab.
100. Locate the **External Gateways** list box and click **Add** to configure.

    The **External Gateway** configuration window should open.

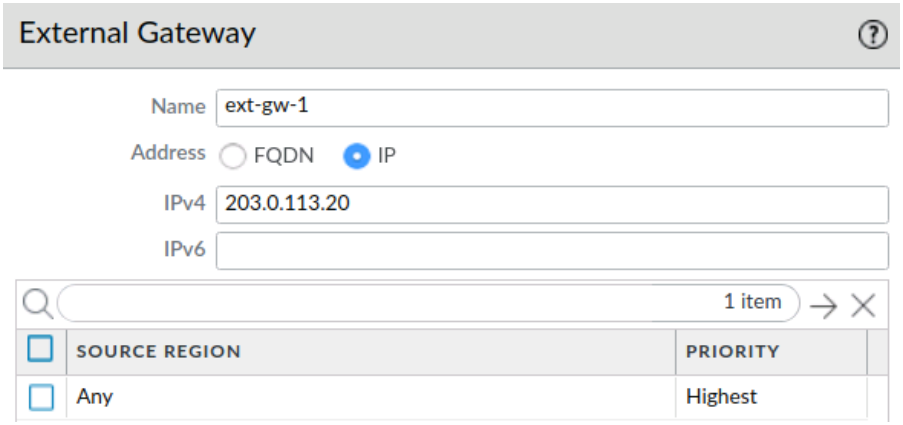
101. Configure the following:

Parameter	Value
Name	Type **`ext-gw-1`**
Address	Select the **IP** radio button
IPv4	Type **`203.0.113.20`**



102. Locate the **Source Region** list box and click **Add** to configure the following:

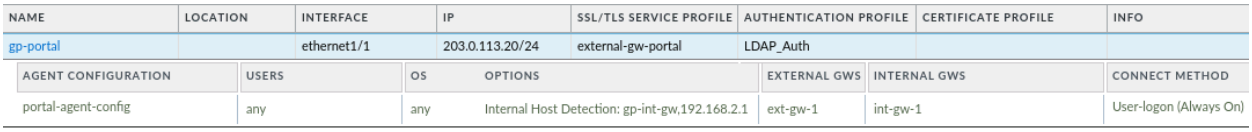
Parameter	Value
Source Region	Select **Any** from the drop-down list
Priority	Verify that **Highest** is selected



The **Source Region** options allow you to prioritize that the external gateway that a client connects to be based on the geographic assignment of a client's IP address. You have only a single external gateway, so you are setting **Source Region** to **Any** so that all clients connect to this gateway, regardless of their IP address.

103. Click **OK** to close the **External Gateway** configuration window.
104. Click **OK** to close the **Configs** configuration window.
105. Click **OK** to close the **GlobalProtect Portal Configuration** window.

    A new GlobalProtect Gateway should display in the web interface. **Click the Plus icon to expand the entry and verify that your configuration looks like the following screenshot:**



NAME	LOCATION	INTERFACE	IP	SSL/TLS SERVICE PROFILE	AUTHENTICATION PROFILE	CERTIFICATE PROFILE	INFO
gp-portal		ethernet1/1	203.0.113.20/24	external-gw-portal	LDAP_Auth		

AGENT CONFIGURATION	USERS	OS	OPTIONS	EXTERNAL GWS	INTERNAL GWS	CONNECT METHOD
portal-agent-config	any	any	Internal Host Detection: gp-int-gw,192.168.2.1	ext-gw-1	int-gw-1	User-logon (Always On)

11.10 Host the GlobalProtect Agent on the Portal

To make the process of obtaining and installing the GlobalProtect agent software easier for users, you will download a specific version and activate it on the portal. Activation of the GlobalProtect Agent software allows users to connect to a webpage on the portal and download the appropriate version of the client software for their host operating system.

106. In the web interface, select **Device > GlobalProtect Client**.
107. Click **Check Now** at the bottom of the page.

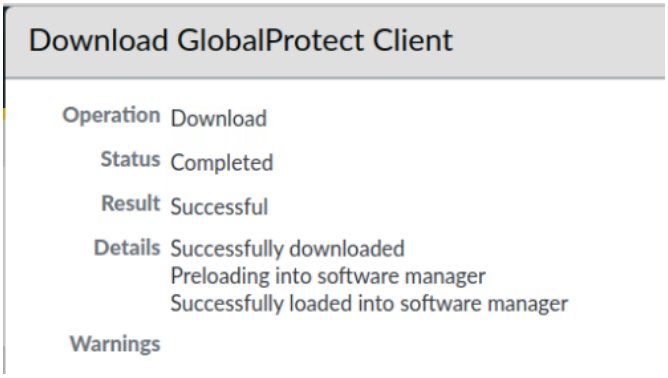
    The Palo Alto Networks firewall checks for the latest version of the GlobalProtect agent.
108. Search for the **`6.1.0`** version of GlobalProtect.

    Even if there is a newer version of the client software, be sure to use the 6.1.0 version.

109. Click **Download** in the **Action** column:

VERSION	SIZE	RELEASE DATE	DOWNLOADED	CURRENTLY ACTIVATED	ACTION	
6.1.0	124 MB	2022/09/01 14:06:19			Validate Download	Release Notes

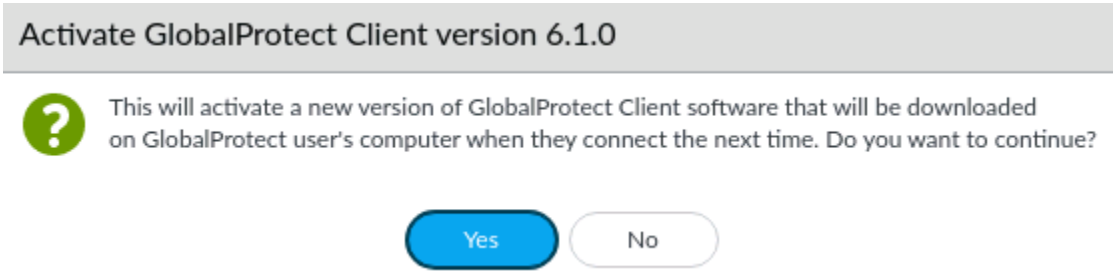
A **Download GlobalProtect Client** status window should open. Do not continue until the download has completed successfully. After a new version of the GlobalProtect client software is released, you can download it through this interface and activate it. Any users currently running an older version of the GlobalProtect software will be upgraded to the new version when they connect to the portal.



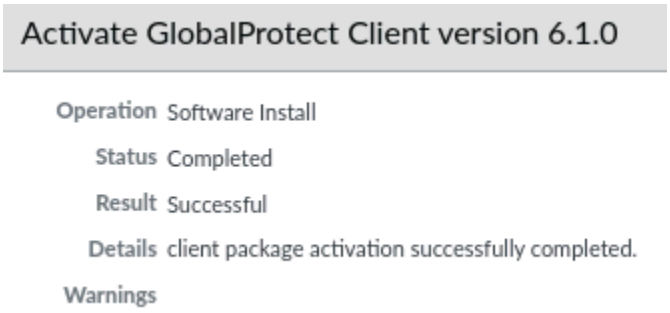
110. Clock **Close** to close the status window.
111. Click **Activate** in the **Action** column.

VERSION	SIZE	RELEASE DATE	DOWNLOADED	CURRENTLY ACTIVATED	ACTION	
6.1.0	124 MB	2022/09/01 14:06:19	✓		Validate Export Activate	Release Notes

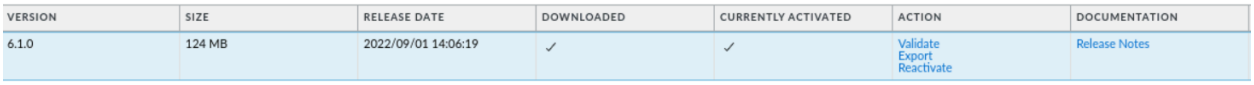
112. Click the **Yes** button to close the **Activate GlobalProtect Client version** message:



An **Activate GlobalProtect Client** message should display that shows that the client package was activated successfully.



113. Click **Close** to close the **Activate GlobalProtect Client** status message:
114. Verify:



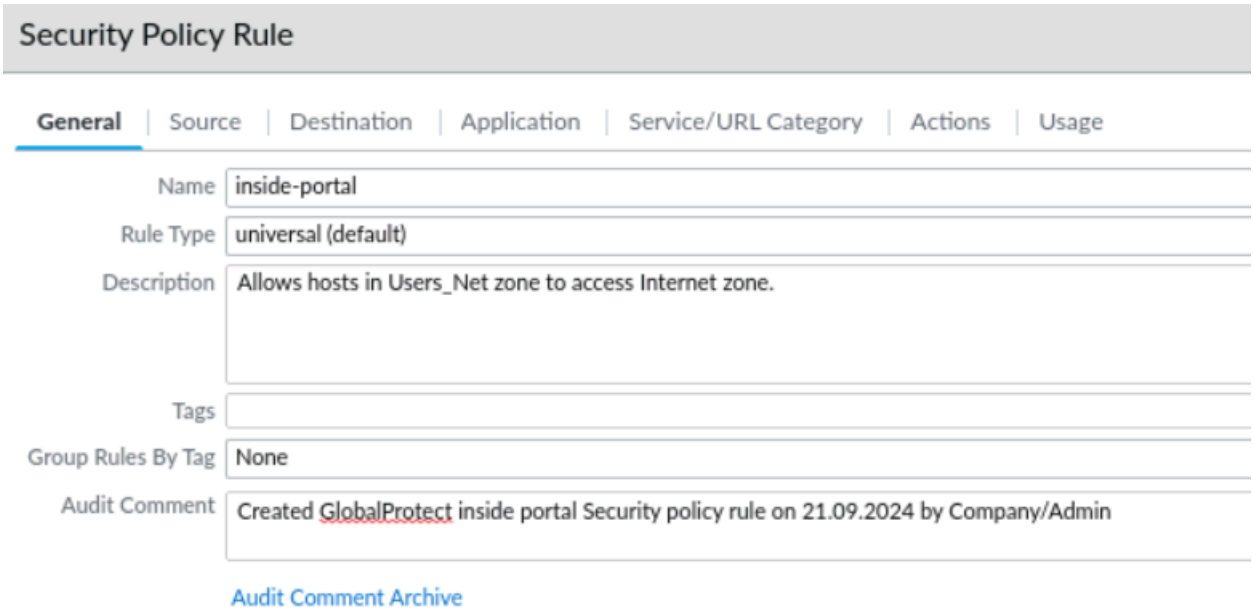
11.11 Create a Security Policy Rule

115. In the web interface, select **Policies > Security**.
116. Select the "**Users_to_Internet"** rule without opening it.
117. Click **Clone**.
118. When the cloned security rule appears click on "**Users_to_Internet-1**" to edit it.

The **Security Policy Rule** configuration window should open.

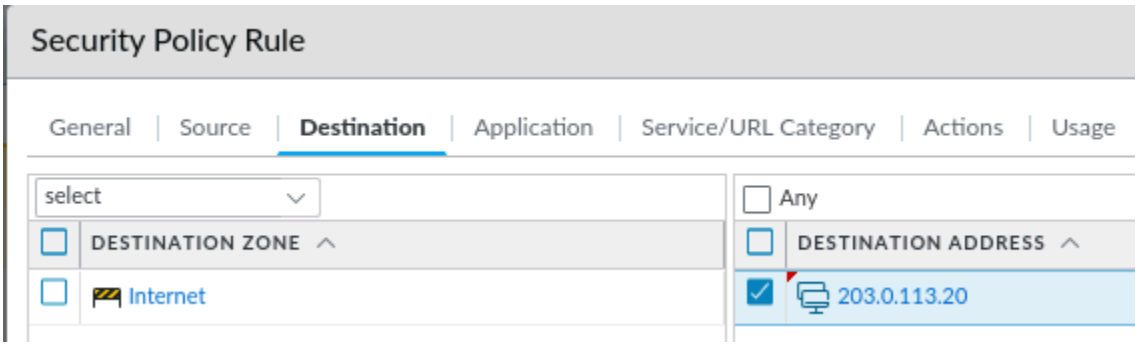
119. Configure the following:

Parameter	Value
Name	Rename the security policy rule to **`inside-portal`**
Audit Comment	Type - **`Created GlobalProtect inside portal Security policy rule on <date> by <Your-Role>`**



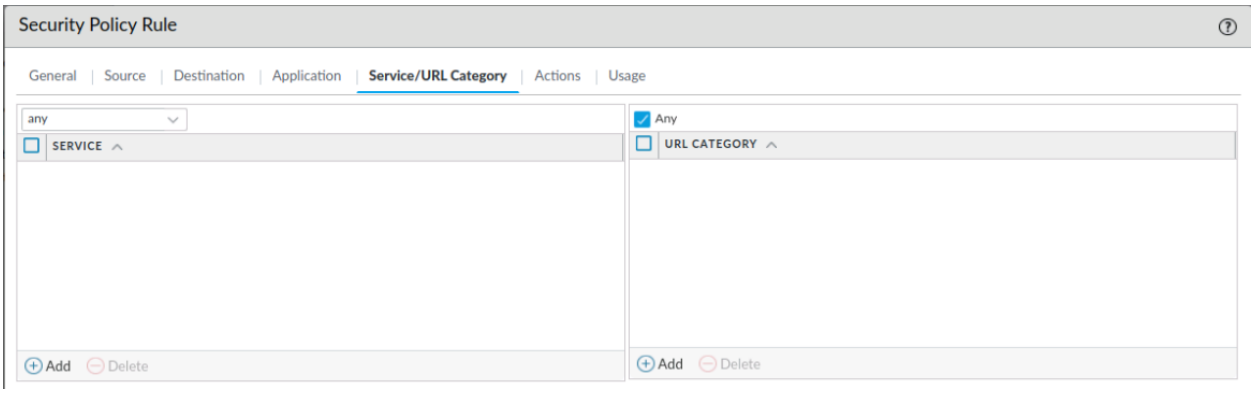
120. Click the **Destination** tab and configure the following:

Parameter	Value
Destination Address	Click **Add** and type **203.0.113.20**



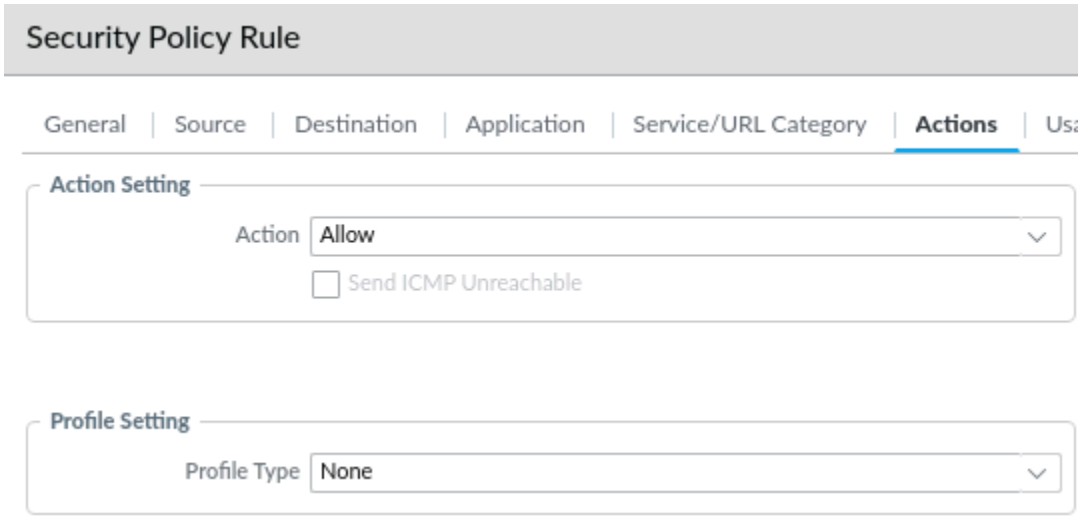
121. Click the **Service/URL Category** tab and configure the following:

Parameter	Value
Service	Select **any** from the drop-down list



122. Click the **Actions** tab and configure the following:

Parameter	Value
Profile Type	**None**



123. Click **OK** to close the **Security Policy Rule** configuration window.

11.12 Create a No-NAT Rule

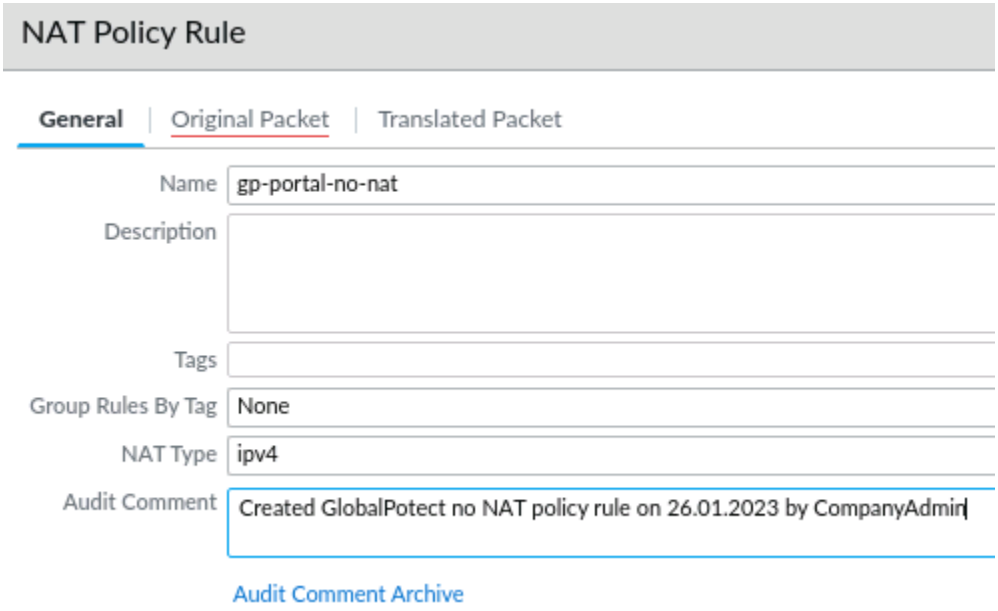
All traffic from the **Users_Net** zone to the **Internet** zone uses source NAT. In this section, you will create a new NAT policy rule so that internal requests for the GlobalProtect Portal (203.0.113.20) will not get their address translated by the "Users_to_Internet" rule. The new NAT policy rule must be matched before the "Users_to_Internet" rule, so you will place it at the top of the NAT policy.

124. In the web interface, select **Policies** > **NAT**.
125. Click **Add** to create a rule.

    The **NAT Policy Rule** configuration window should open.

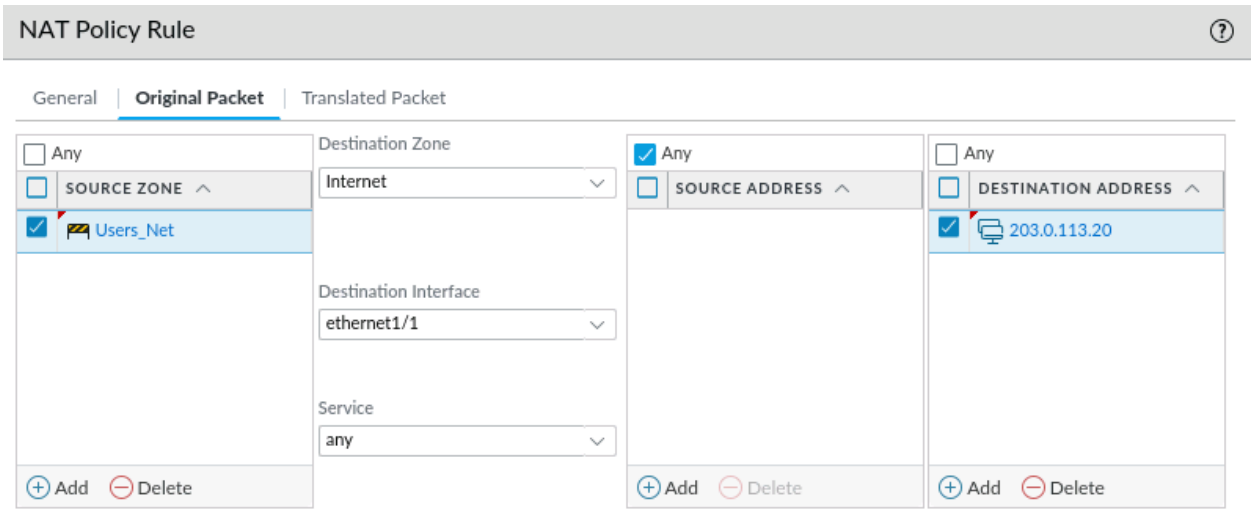
126. Configure the following:

Parameter	Value
Name	Type **`gp-portal-no-nat`**
NAT Type	Verify that **ipv4** is selected
Audit Comment	Type **`Created GlobalProtect no NAT policy rule on <date> by <Your-Role>`**



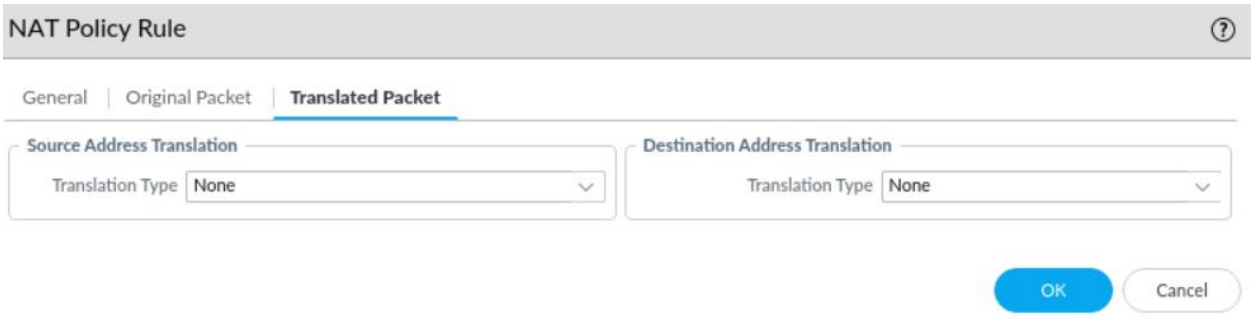
127. Click the **Original Packet** tab and configure the following:

Parameter	Value
Source Zone	Click **Add** and select **Users_Net**from the drop-down list
Destination Zone	Select **Internet** from the drop-down list
Destination Interface	Select **ethernet1/1** from the drop-down list
Destination Address	Click **Add** and type **`203.0.113.20`**



128. Select the **Translated Packet** tab and verify that the **Translation Type** for **Source Address Translation** and **Destination Address Translation** are set to **None**.

This rule instructs the firewall to *not* perform network address translation of any kind for traffic from the Users_Net zone that has a destination address of 203.0.113.20 in the Internet zone, which is the IP address of the GlobalProtect Portal and of the external gateway.



129. Click **OK** to close the **NAT Policy Rule** configuration window.

A new NAT policy rule should display in the web interface.

130. Select but do not open **gp-portal-no-nat**.
131. Click **Move** and select **Move Top**:

	NAME	TAGS	Original Packet						Translated Packet	
			SOURCE ZONE	DESTINATION ZONE	DESTINATION INTERFACE	SOURCE ADDRESS	DESTINATION ADDRESS	SERVICE	SOURCE TRANSLATION	DESTINATION TRANSLATION
1	gp-portal-no-nat	none	Users_Net	Internet	ethernet1/1	any	203.0.113.20	any	none	none
2	Extranet_to_Internet	none	Extranet	Internet	any	any	any	any	dynamic-ip-and-port ethernet1/1 203.0.113.20/24	none
3	Users_to_Internet	none	Users_Net	Internet	any	any	any	any	dynamic-ip-and-port ethernet1/1 203.0.113.20/24	none
4	Extranet-to-UsersNet	none	Extranet	Users_Net	any	any	any	any	dynamic-ip-and-port ethernet1/2 192.168.1.1/24	none

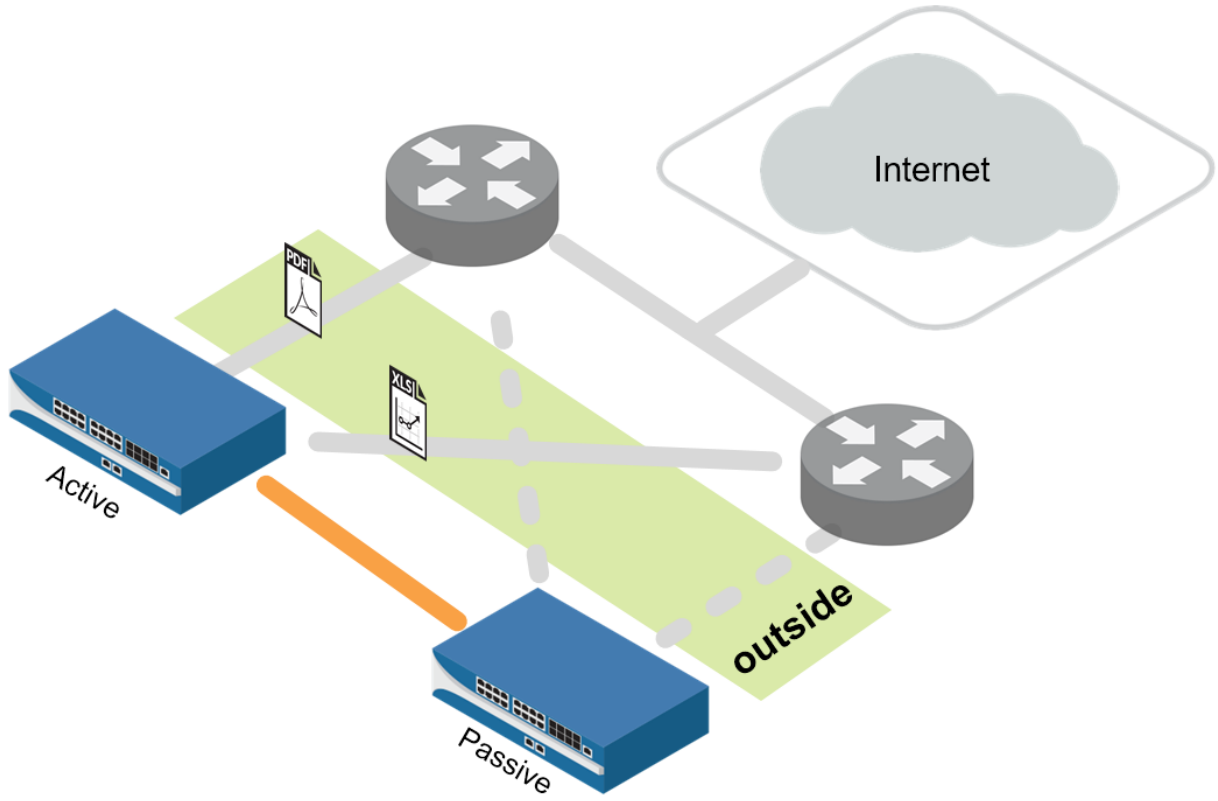
Traffic that is not destined for the portal IP address (203.0.113.20) will be translated by the "Users_to_Internet" rule.

132. **Commit** all changes.

Note: A warning might display about IPv6 not being enabled on the tunnel interface. You can safely ignore it.

Stop. This is the end of the GlobalProtect lab.

Appendix B - Active/Passive High Availability



Lab Objectives

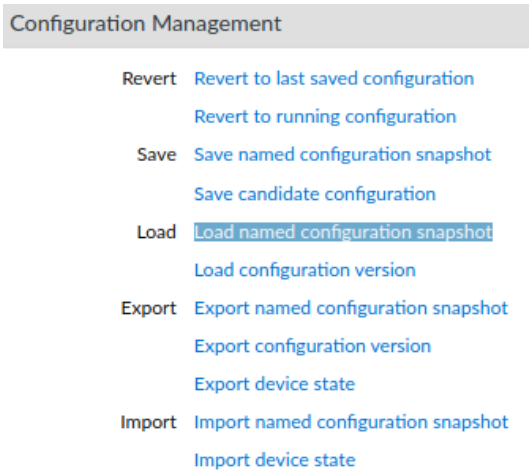
Please note that this is a configuration lab only as the lab has been designed with a single FireWall.

- Display the Dashboard HA widget.
- Configure a dedicated HA interface.
- Configure active/passive HA.
- Configure HA monitoring.
- Observe behavior in the HA widget.

14.0 Load a Lab Configuration

To start this lab exercise, you will load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot:**



A **Load Named Configuration** dialog box opens.

3. Click the drop-down arrow next to the **Name** field and select **FW-A-11.1a-InternetAccess.xml**.

4. Click **OK** to close the **Load Named Configuration** window.

   A window should open that confirms that the configuration is being loaded.

5. Click **Close** to close the **Loading Configuration** window.
6. Click the **Commit** link at the upper right of the web interface:

   A **Commit** window should open.

7. Click **Commit** and wait until the commit process is complete.

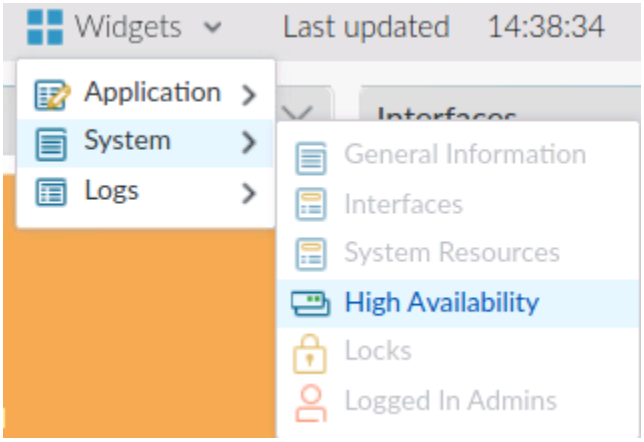
   A **Commit Status** window should open that confirms that the configuration was committed successfully.

8. Click **Close** to continue.

14.1 Display the HA Widget

If high availability (HA) is enabled, the **High Availability** widget on the **Dashboard** indicates the HA status.

9. In the web interface, click the **Dashboard** tab to display current firewall information.
10. If the **High Availability** panel is not displayed, select **Widgets > System > High Availability** to enable the display:



The **High Availability** widget now displays on the **Dashboard**:

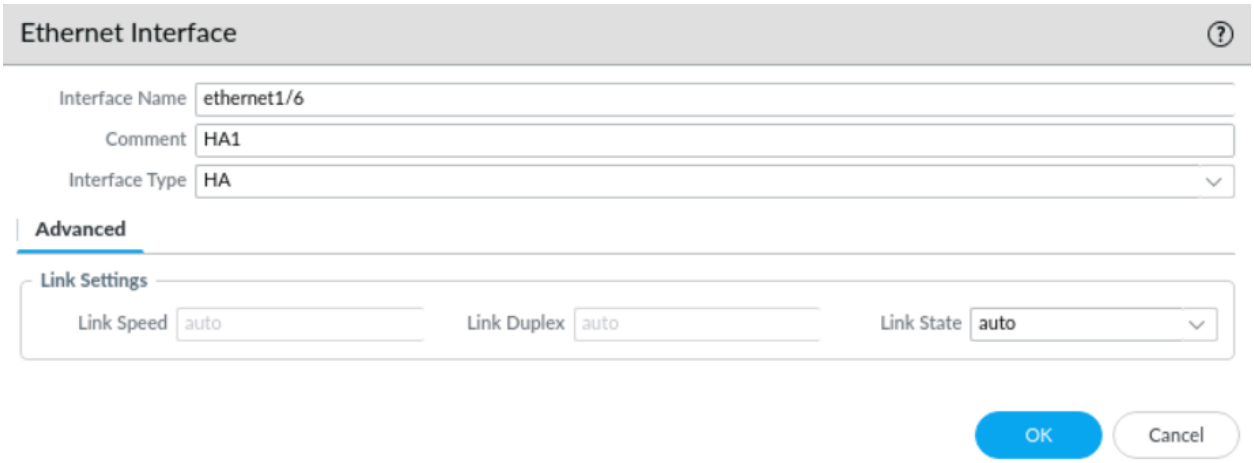
14.2 Configure the HA Interface

Each HA interface has a specific function: One interface is for configuration synchronization and heartbeats, and the other interface is for state synchronization.

11. In the web interface, select **Network > Interfaces > Ethernet**.
12. Click **ethernet1/6** to open the configuration window.

    The **Ethernet Interface** configuration window should open.
13. Configure the following:

Parameter	Value
Interface Type	Select **HA** from the drop-down list
Comment	HA1



14. Click **OK** to close the **Ethernet Interface** configuration window.
15. Click **ethernet1/7** to open the configuration window.
    The **Ethernet Interface** configuration window should open.
16. Configure the following:

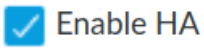
Parameter	Value
Interface Type	Select **HA** from the drop-down list
Comment	HA2

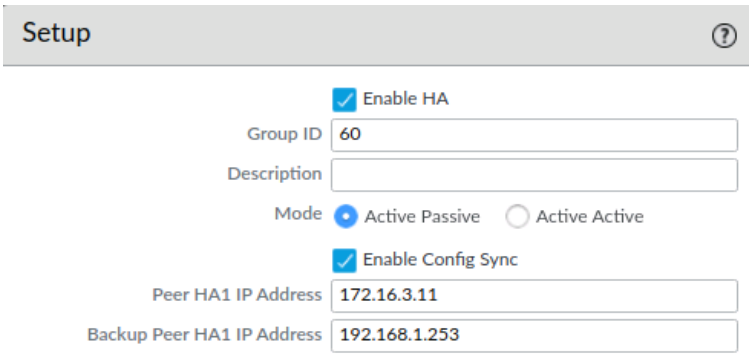
17. Click **OK** to close the **Ethernet Interface** configuration window.

14.3 Configure Active/Passive HA

In this deployment, the active firewall continuously synchronizes its configuration and session information with the passive firewall over two dedicated interfaces. If a hardware or software disruption occurs on the active firewall, the passive firewall becomes active automatically without loss of service. Active/passive HA deployments are supported by the interface modes Virtual Wire, Layer 2, and Layer 3.

18. In the web interface, select **Device > High Availability > General**.
19. Click the  icon of the **Setup** panel.
    The **Setup** configuration window should open.
20. Configure the following:

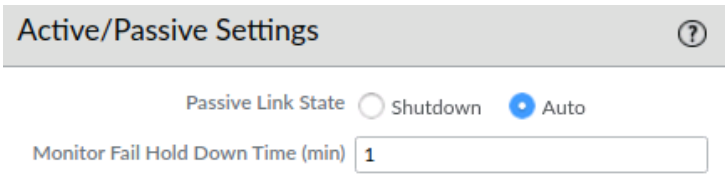
Parameter	Value
Enable HA	
Group ID	Type **`60`** (This field is required, and must be unique, if multiple HA pairs reside on the same broadcast domain.)
Mode	Verify that the **Active Passive** radio button is selected
Enable Config Sync	 (Select this option to enable synchronization of configuration settings between the peers.)
Peer HA1 IP Address	Type **`172.16.3.11`**
Backup Peer HA1 IP Address	Type **`192.168.1.253`**



21. Click **OK** to close the **Setup** configuration window.
22. Click the  icon of the **Active/Passive Settings** panel:
    The **Active/Passive Settings** configuration window should open.

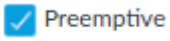
23. Configure the following:

Parameter	Value
Passive Link State	Select the **Auto** radio button

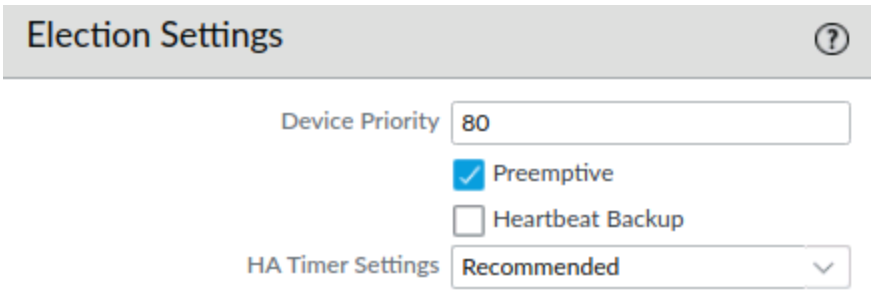


When **Auto** is selected, the links that have physical connectivity remain physically up but in a disabled state. They do not participate in ARP or packet forwarding. This configuration helps reduce convergence times during failover because no time is required to activate the links. To avoid network loops, do not select this option if the firewall has any Layer 2 interfaces configured.

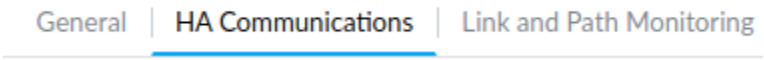
24. Click **OK** to close the **Active/Passive Settings** configuration window.
25. Click the  icon of the **Election Settings** panel to configure failover behavior:

Parameter	Value
Device Priority	**`Type 80`** Enter a priority value (range is 0 to 255) to identify the active firewall. The firewall with the lower value (higher priority) becomes the active firewall when the preemptive capability is enabled on both firewalls in the pair.)
Preemptive	 Enables the higher priority firewall to resume active operation after recovering from a failure. This parameter must be enabled on both firewalls but is not always a recommended practice.
Heartbeat Backup	 Uses the management ports on the HA firewalls to provide a backup path for heartbeat and hello messages

26. Click **OK** to close the **Election Settings** configuration window.

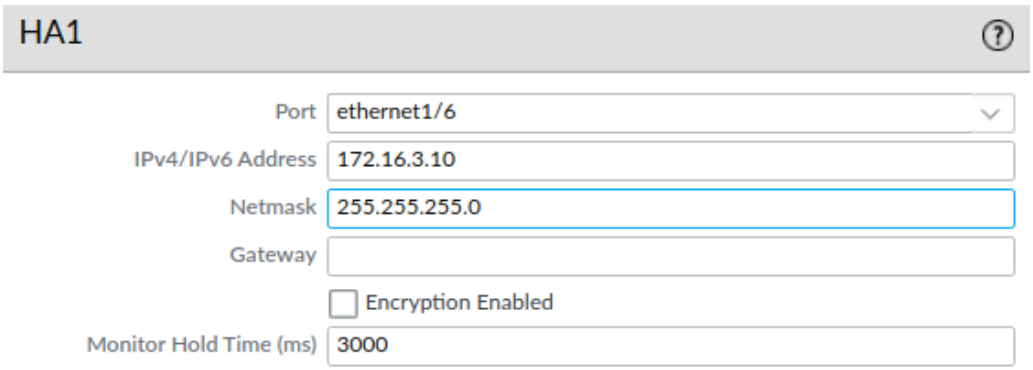


27. Open the **HA Communication** tab.



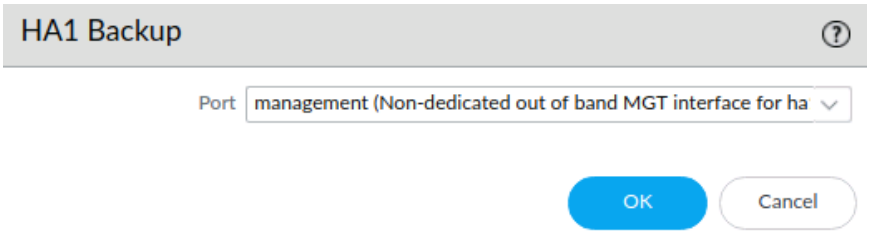
28. Click the  icon of the **Control Link (HA1)** configuration window to configure the HA1 link. The firewalls in an HA pair use HA links to synchronize data and maintain state information:

Parameter	Value
Port	Select **ethernet1/6** from the drop-down list
IPv4/IPv6 address	**`Type 172.16.3.10`**
Netmask	**`Type 255.255.255.0`**



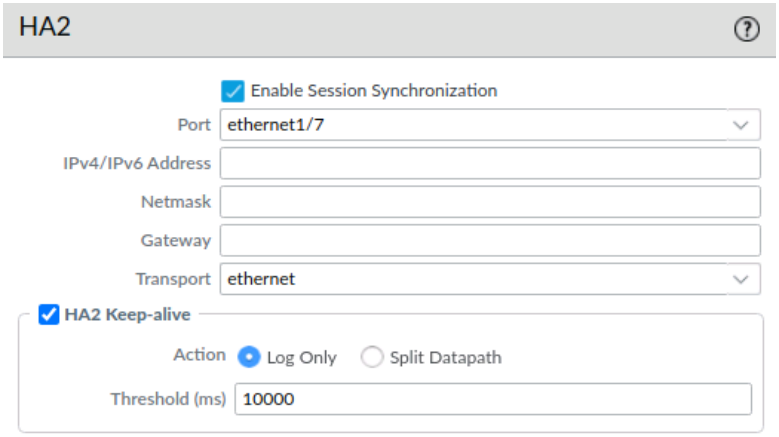
29. Click **OK** to close the **Control Link (HA1)** configuration window.
30. Click the  icon of the **Control Link (HA1 Backup)** configuration window to configure the HA1 Backup link. The HA1 Backup link is important to avoid a split brain condition in case the primary HA1 link goes down:

Parameter	Value
Port	Select **management**



31. Click **OK** to close the **Control Link (HA1 Backup)** configuration window.
32. Click the ⚙ icon of the **Data Link (HA2)** configuration window.
33. to configure the HA2 link. The firewalls in an HA pair use HA2 links to synchronize session state information:

Parameter	Value
Port	Select **ethernet1/7** from the drop-down list
Transport	Select **ethernet** When using ethernet as the transport protocol, it is not necessary to configure any IP addresses on the HA2 link as the state information are transferred between the FireWalls at Layer-2
HA2 Keep-alive	**Check** and select **Log Only**



34. Click **OK** to close the **Data Link (HA2)** configuration window.

14.4 Configure HA Monitoring

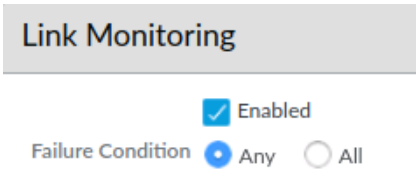
35. In the web interface, select **Device > High Availability > Link and Path Monitoring**.
36. Click the ⚙ icon of the **Link Monitoring** panel to configure link failure detection.

The **Link Monitoring** configuration window should open.

Link monitoring enables failover to be triggered when a physical link or group of physical links fails.

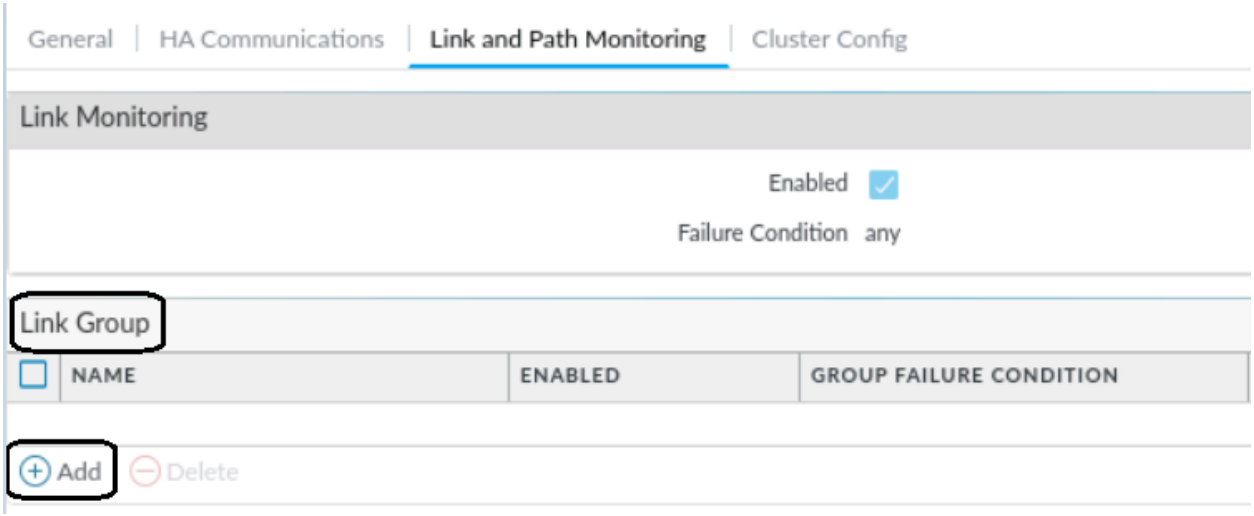
37. Configure the following:

Parameter	Value
Enabled	Enabled
Failure Condition	Verify that the **Any** radio button is selected



38. Click **OK** to close the **Link Monitoring** configuration window.
39. Click **Add** in the **Link Group** panel to configure the traffic links to monitor.

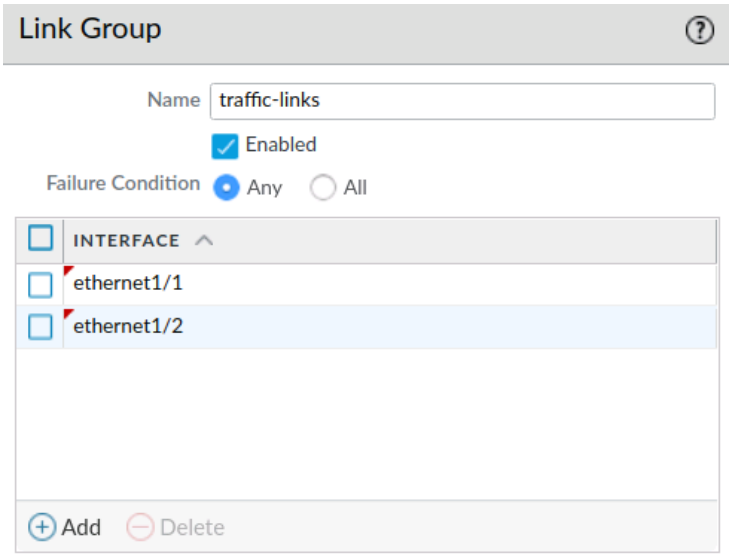
The **Link Group** configuration window should open.



40. Configure the following:

Parameter	Value
Name	Type **`traffic-links`**
Enabled	Enabled (**Note:** not supported on VM-Series firewalls on ESXi)
Failure Condition	Verify that the **Any** radio button is selected

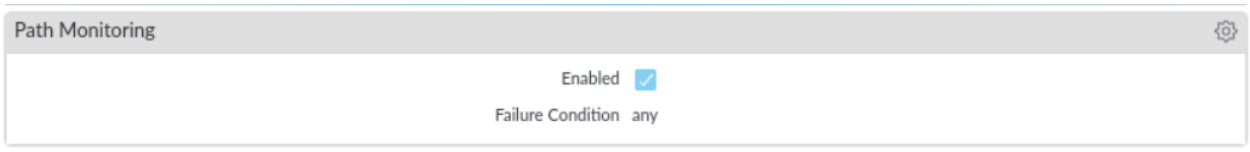
Parameter	Value
Interface	Click **Add** and select the following from the drop-down list: **ethernet1/1** **ethernet2/2**



41. Click **OK** to close the **Link Group** configuration window.
42. Click the icon of the **Path Monitoring** panel to configure path failure detection.
    The **Path Monitoring** configuration window should open. Path monitoring enables the firewall to monitor specified destination IP addresses by sending ICMP ping messages to ensure that they are responsive.
43. Configure the following:

Parameter	Value
Enabled	Enabled
Failure Condition	Verify that the **Any** radio button is selected

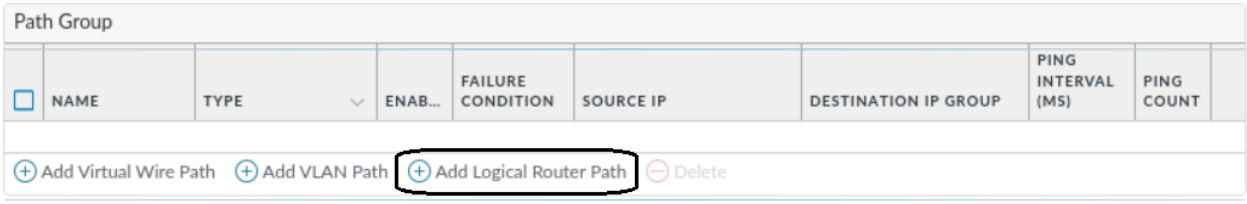
44. Click **OK** to close the **Path Monitoring** configuration window.



45. Find the **Path Group** panel and click **Add Logical Router Path** to configure the path failure condition.

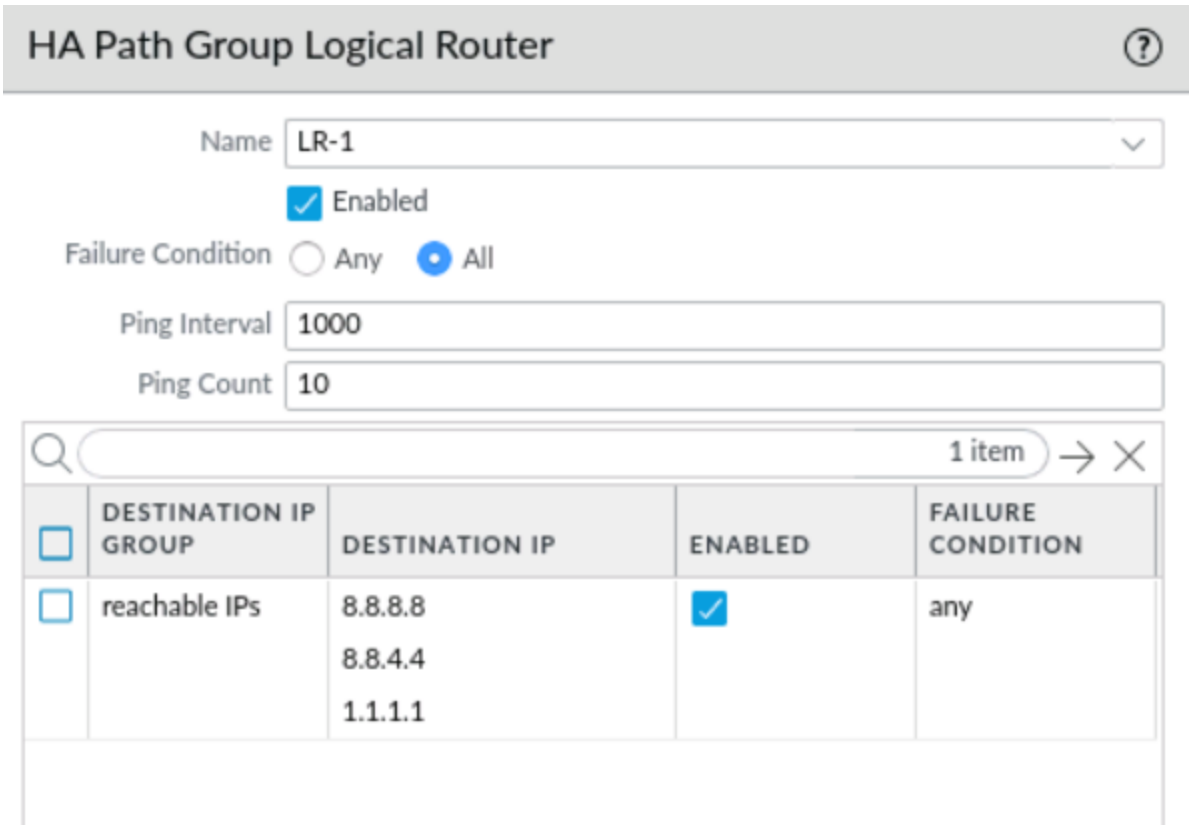
    The **HA Logical Router Path** configuration window should open.

    Note: Path Monitoring should only be used if both FireWalls have two independent network routes were link-monitoring would not cover all failure conditions. In order to avoid HA flapping, it is important to monitor multiple IP addresses and only trigger a failover if all IPs are not reachable.



46. Configure the following:

Parameter	Value
Name	Select **`LR-1`**
Enabled	☑ Enabled
Failure Condition	Select the **All** radio button
Destination IP Group	Click **Add** and create **`reachable IPs`** destination IP group
Destination IP	Click **`Add`** and type **`8.8.8.8`** Click **`Add`** and type **`8.8.4.4`** Click **`Add`** and type **`1.1.1.1`** Click **`OK`**
Ping Interval	Change from **200** to **1000** as a ping every 200ms is quite aggressive

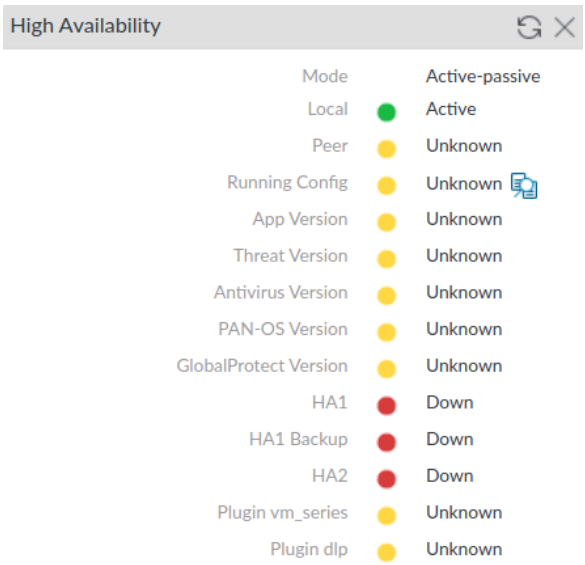


47. Click **OK** to close the **HA Path Group Logical Router** configuration window.
48. **Commit** all changes.

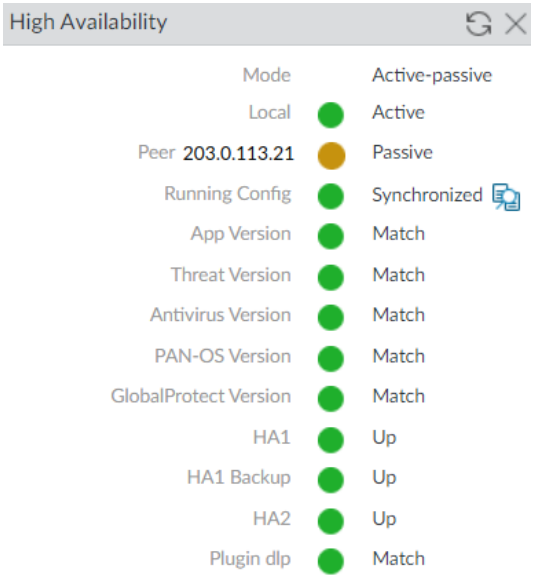
14.5 Observe the Behavior of the HA Widget

49. In the web interface, click the **Dashboard** tab and view the **High Availability** status widget for the firewall.

    Active/passive mode should be enabled, and the local firewall should be active (green). You may need to refresh the **High Availability** pane if the local firewall still shows that it is initializing. However, because there is no peer firewall, the status of most monitored items is unknown (yellow). Because HA1 has no peer, its state is down (red):



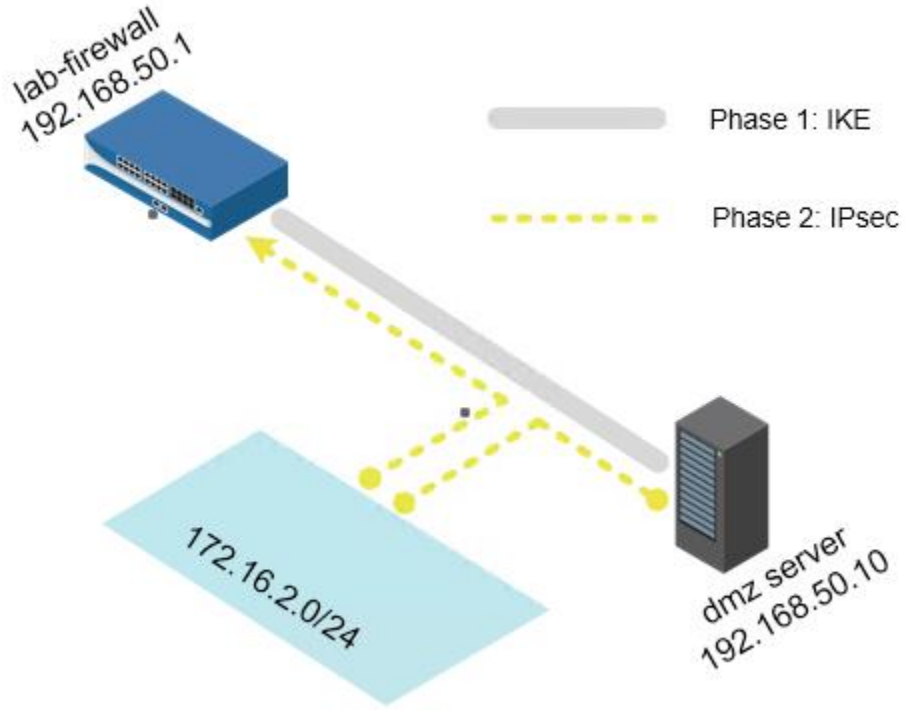
50. If a peer was configured and was operating in passive mode, the **High Availability** widget on the **Dashboard** would display as follows:



To avoid overwriting the wrong firewall configuration, the firewalls are not automatically synchronized. You must manually synchronize a firewall to the firewall with the “valid” configuration by clicking **Sync to peer**.

Stop. This is the end of the Active/Passive High Availability lab.

Appendix C - Site-to-Site VPN



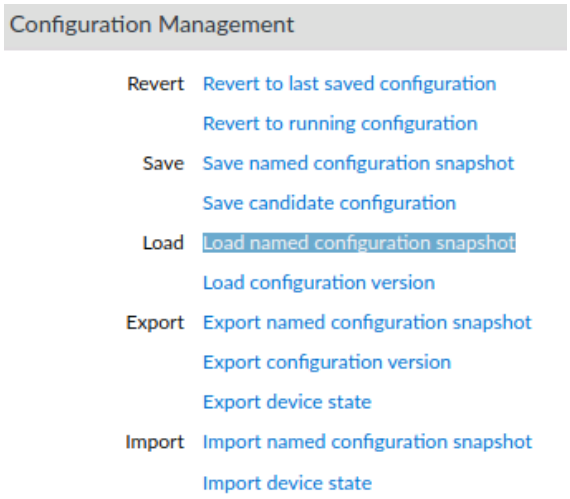
Lab Objectives

- Create and configure a tunnel interface to use in the site-to-site VPN connection.
- Configure the IKE gateway and IKE Crypto Profile.
- Configure the IPsec Crypto Profile and IPsec tunnel.
- Test connectivity.

12.0 Load a Lab Configuration

To start this lab exercise, you will load a preconfigured firewall configuration file.

1. In the Palo Alto Networks firewall web interface, select **Device > Setup > Operations**.
2. Click **Load named configuration snapshot**:



A **Load Named Configuration** dialog box opens.

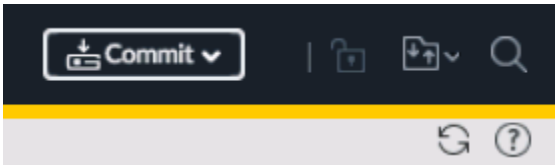
3. Click the drop-down arrow next to the **Name** field and select **edu-210-11.1a-14.xml**.

   Note: Look for **edu-210** in the filename because the drop-down list might contain lab configuration files for other course numbers.

4. Click **OK** to close the **Load Named Configuration** window.

   A window should open that confirms that the configuration is being loaded.

5. Click **Close** to close the **Loading Configuration** window.
6. Click the **Commit** link at the upper right of the web interface:



   A **Commit** window should open.

7. Click **Commit** and wait until the commit process is complete.

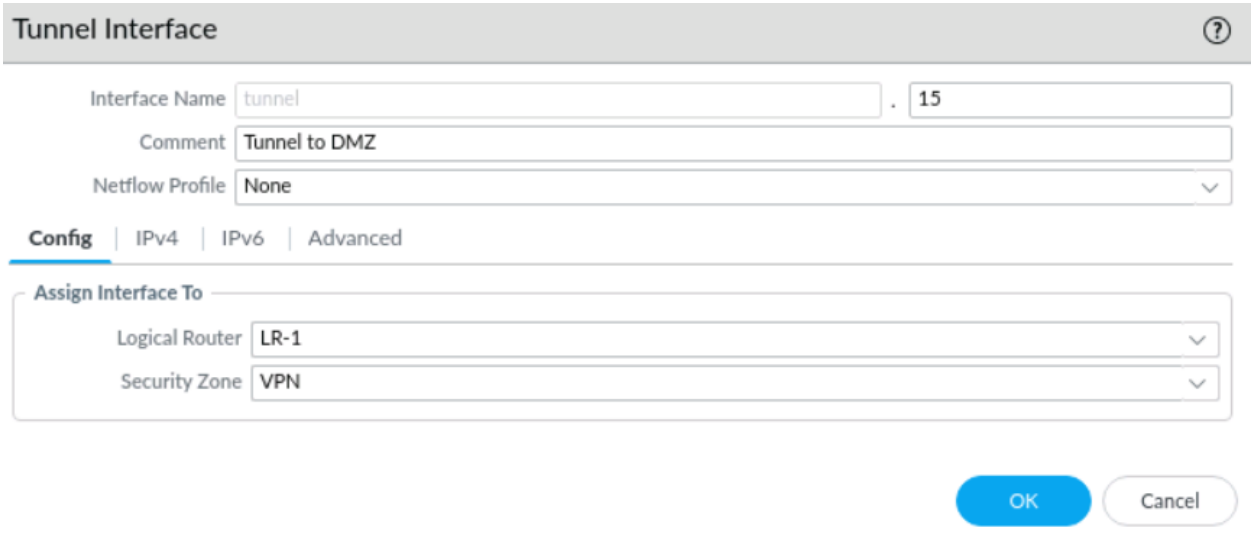
A **Commit Status** window should open that confirms that the configuration was committed successfully.

8. Click **Close** to continue.

12.1 Configure the Tunnel Interface

9. In the web interface, select **Network** > **Interfaces**.
10. Click the **Tunnel** tab.
11. Click **Add** to configure a tunnel interface:

Parameter	Value
Interface Name	In the text box to the right of **tunnel**, type **`15`**
Comment	Type **`Tunnel to DMZ`**
Logical Router	Select **LR-1** from the drop-down list
Security Zone	Create and assign a new Layer 3 zone named **`VPN`** New Zone

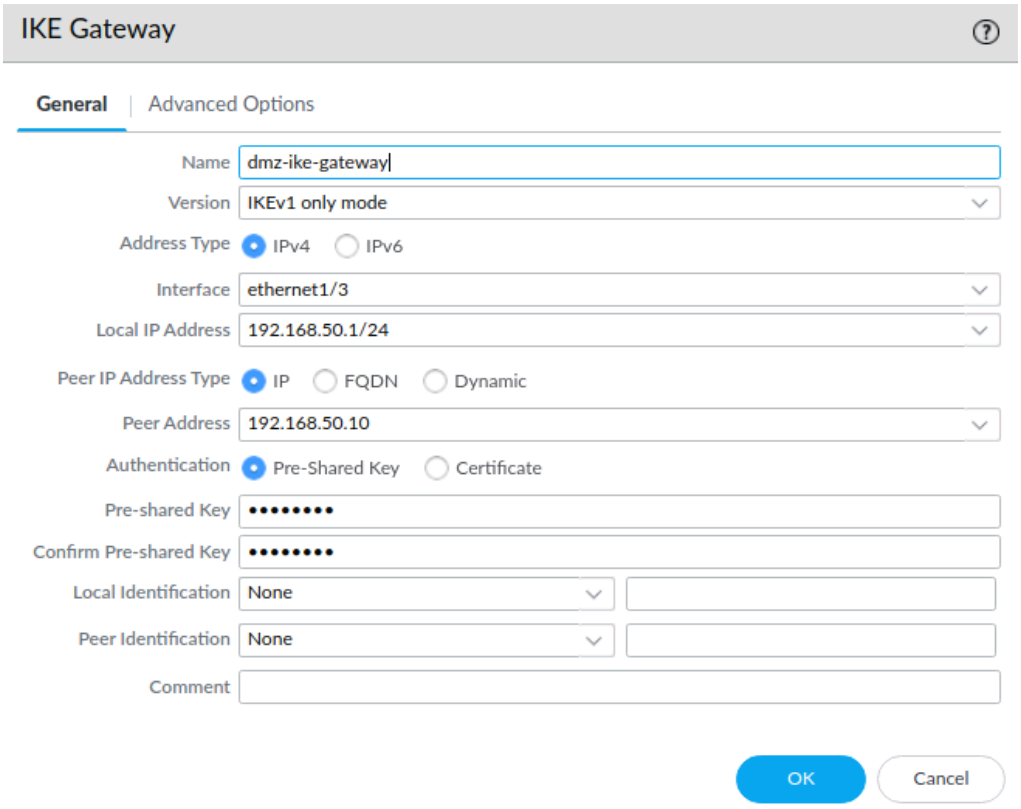


12. Click **OK** to close the **Tunnel Interface** configuration window.

12.2 Configure the IKE Gateway

13. In the web interface, select **Network > Network Profiles > IKE Gateways**.
14. Click **Add** to create the gateway.
    The **IKE Gateway** configuration window should open.
15. Configure the following:

Parameter	Value
Name	Type **`dmz-ike-gateway`**
Version	Verify that **IKEv1 only mode** is selected
Interface	Select **ethernet1/3** from the drop-down list
Local IP Address	Select **192.168.50.1/24** from the drop-down list
Peer IP Address Type	Verify that the **IP** radio button is selected
Peer Address	Type **`192.168.50.10`**
Pre-shared Key	Type **`paloalto`**

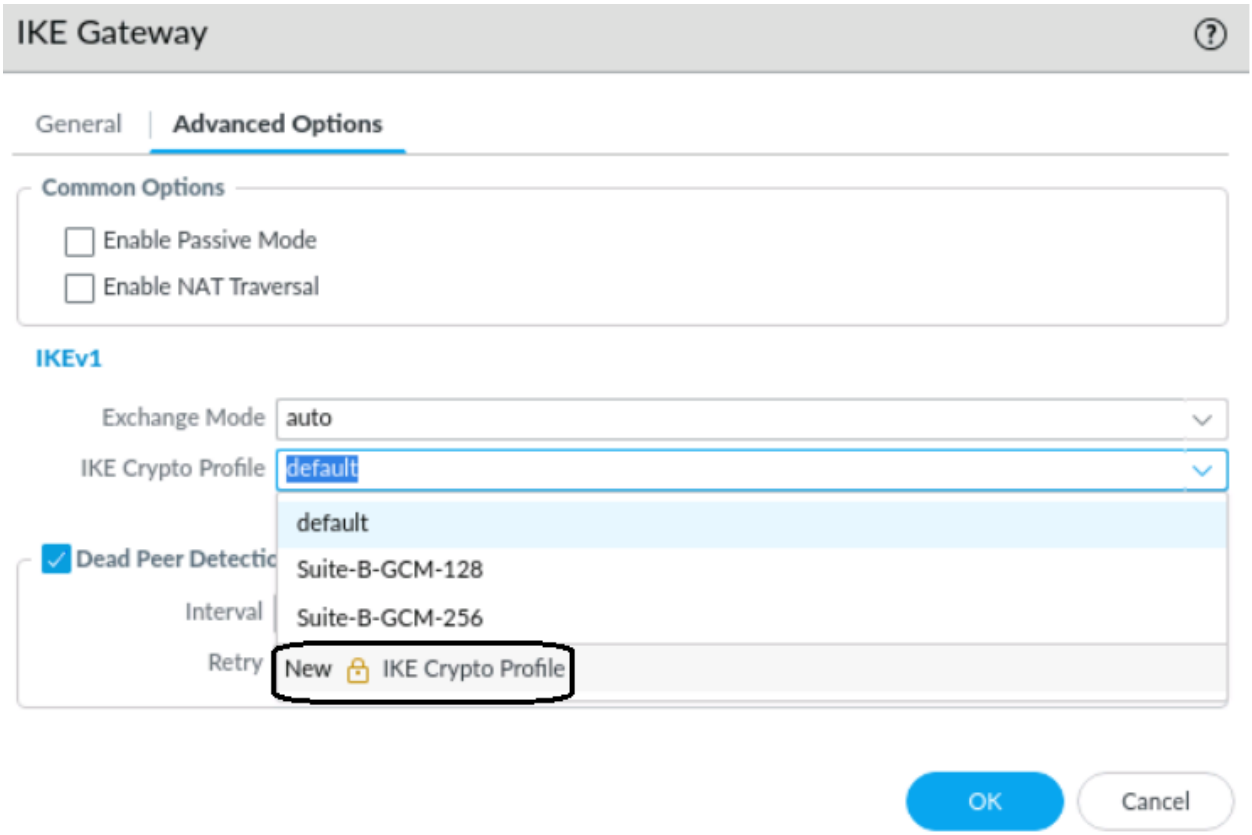


16. Click the **Advanced Options** tab.

17. On the **IKEv1** subtab configure the following:

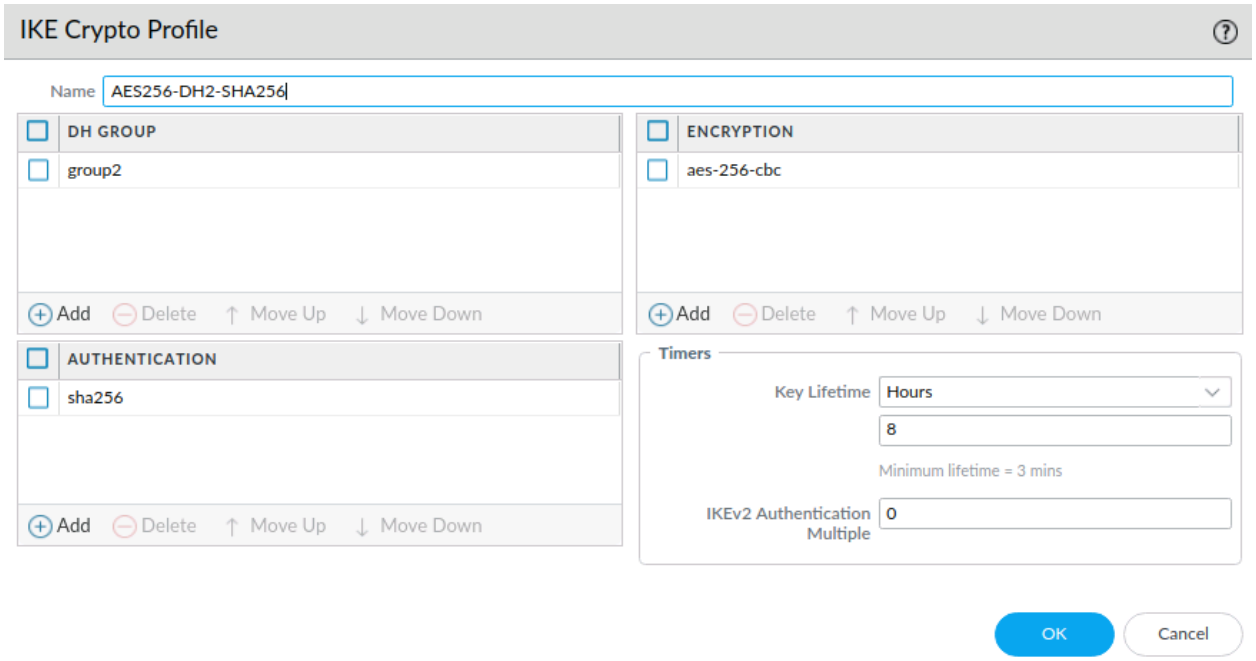
Parameter	Value
IKE Crypto Profile	Select New IKE Crypto Profile

The **IKE Crypto Profile** configuration window should open.



18. Configure the following IKE Crypto Profile values:

Parameter	Value
Name	Type **`AES256-DH2-SHA256`**
DH Group	Click **`Add`** and select **group 2** from the drop-down list
Authentication	Click **`Add`** and select **sha256** from the drop-down list
Encryption	Click **`Add`** and select **aes-256-cbc** from the drop-down list



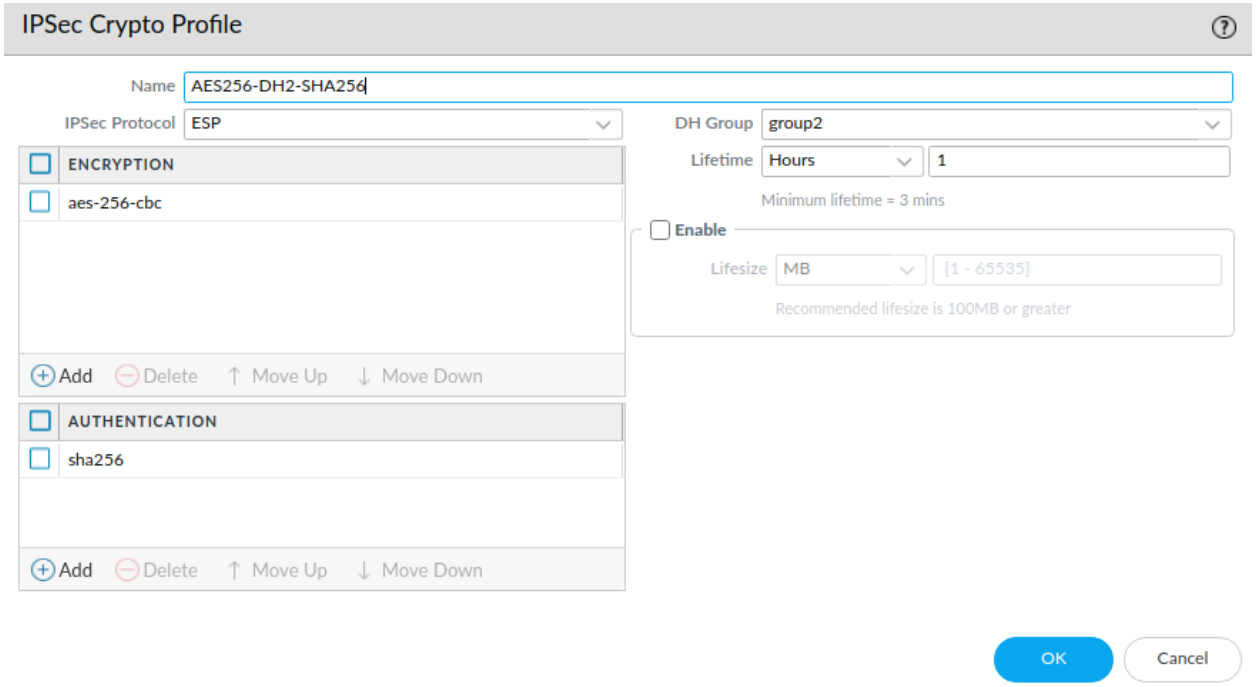
19. Click **OK** to close the **IKE Crypto Profile** configuration window.
20. Click **OK** to close the **IKE Gateway** configuration window.
    A new IKE gateway should display in the web interface.

NAME	PEER ADDRESS	Local Address		Peer ID		Local ID		VERSION	IKE Advanced Options				
		INTERFACE	IP	ID	TYPE	ID	TYPE		MODE	PASSIVE MODE	NAT TRAVERSAL	CRYPTO PROFILE	DPD
dmz-ike-gateway	192.168.50.10	ethernet1/3	192.168.50.1/24					ikev1	auto			AES256-DH2-SHA256	enabled/default/default

12.3 Create an IPSec Crypto Profile

21. In the web interface, select **Network > Network Profiles > IPSec Crypto**.
22. Click **Add** to open the configuration window.
    The **IPSec Crypto Profile** configuration window should open.
23. Configure the following:

Parameter	Value
Name	Type **`AES256-DH2-SHA256`**
IPSec Protocol	Verify that **ESP** is selected
Encryption	Click **`Add`** and select **aes-256-cbc** from the drop-down list
Authentication	Click **`Add`** and select **sha256** from the drop-down list
DH Groups	Verify that **group2** is selected



24. Click **OK** to close the **IPSec Crypto Profile** configuration window.

    A new IPsec Crypto Profile should display in the web interface.

NAME	ESP/AH	ENCRYPTION	AUTHENTICATION	DH GROUP	LIFETIME
default	ESP	aes-128-cbc, 3des	sha1	group2	1 hours
Suite-B-GCM-128	ESP	aes-128-gcm	none	group19	1 hours
Suite-B-GCM-256	ESP	aes-256-gcm	none	group20	1 hours
AES256-DH2-SHA256	ESP	aes-256-cbc	sha256	group2	1 hours

12.4 Configure the IPsec Tunnel

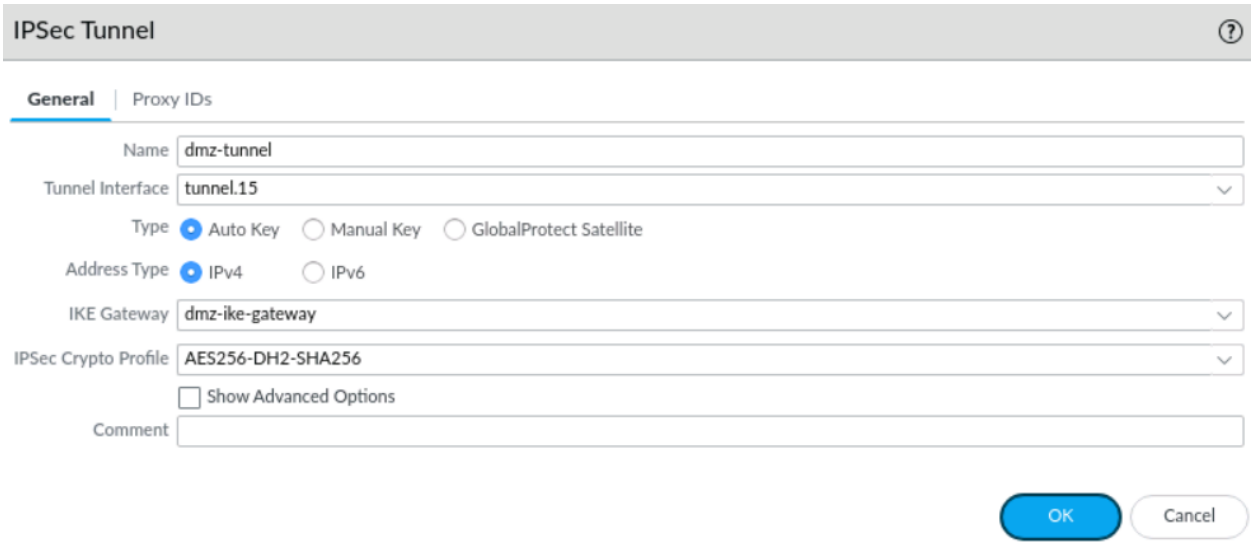
25. In the web interface, select **Network** > **IPSec Tunnels**.
26. Click **Add** to define a new tunnel.

    The **IPSec Tunnel** configuration window should open.

27. On the **General** tab configure the following:

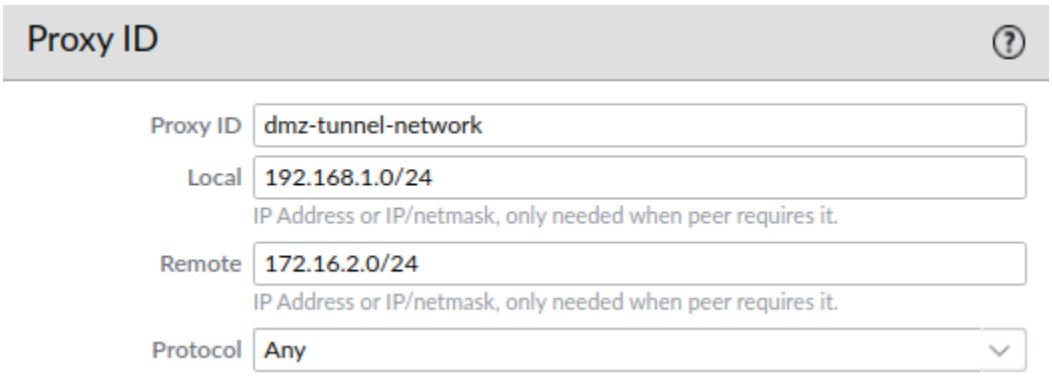
Parameter	Value
Name	Type **`dmz-tunnel`**
Tunnel Interface	Select **tunnel.15** from the drop-down list
Type	Verify that the **Auto Key** radio button is selected

Parameter	Value
Address Type	Verify that the **IPv4** radio button is selected
IKE Gateway	Select **dmz-ike-gateway** from the drop-down list
IPSec Crypto Profile	Select **AES256-DH2-SHA256** from the drop-down list

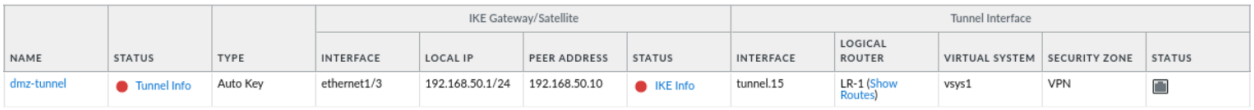


28. Click the **Proxy IDs** tab.
29. Click **Add** and configure the following:

Parameter	Value
Proxy ID	Type **`dmz-tunnel-network`**
Local	Type **`192.168.1.0/24`**
Remote	Type **`172.16.2.0/24`**
Protocol	Verify that **`Any`** is selected



30. Click **OK** to close the **Proxy ID** configuration window.
31. Click **OK** to close the **IPSec Tunnel** configuration window:



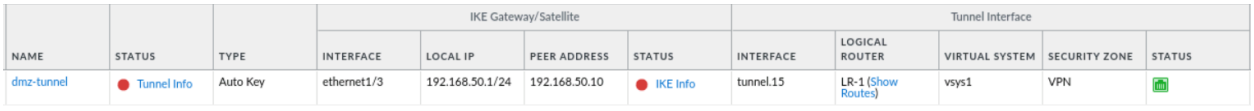
NAME	STATUS	TYPE	IKE Gateway/Satellite				Tunnel Interface				
			INTERFACE	LOCAL IP	PEER ADDRESS	STATUS	INTERFACE	LOGICAL ROUTER	VIRTUAL SYSTEM	SECURITY ZONE	STATUS
dmz-tunnel	Tunnel Info	Auto Key	ethernet1/3	192.168.50.1/24	192.168.50.10	IKE Info	tunnel.15	LR-1 (Show Routes)	vsys1	VPN	

A new IPsec tunnel should display in the web interface.

32. **Commit** all changes.

12.5 Test the Connectivity

33. In the web interface, select **Network > IPSec Tunnels**:

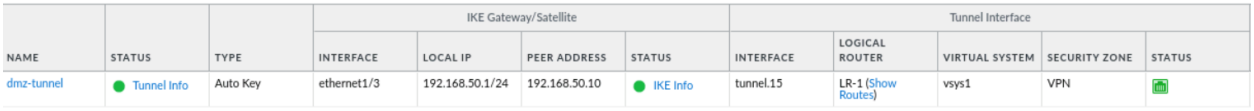


NAME	STATUS	TYPE	IKE Gateway/Satellite				Tunnel Interface				
			INTERFACE	LOCAL IP	PEER ADDRESS	STATUS	INTERFACE	LOGICAL ROUTER	VIRTUAL SYSTEM	SECURITY ZONE	STATUS
dmz-tunnel	Tunnel Info	Auto Key	ethernet1/3	192.168.50.1/24	192.168.50.10	IKE Info	tunnel.15	LR-1 (Show Routes)	vsys1	VPN	

A red **Status** column indicator on the VPN tunnel means that the VPN tunnel is not connected.

34. Refresh  the **Network > IPSec Tunnels** page.

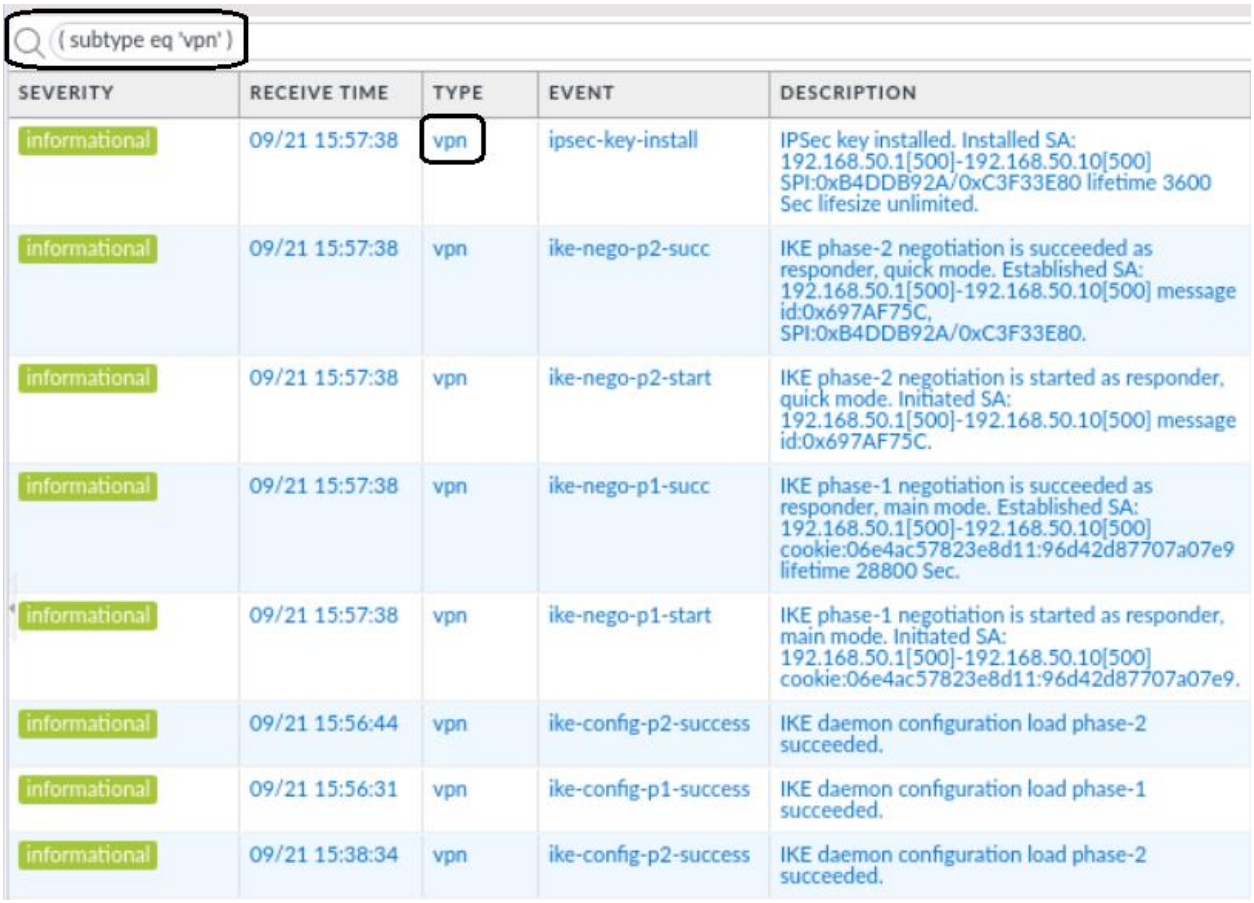
The **Status** column indicators now are green, which means that the VPN tunnel is connected:



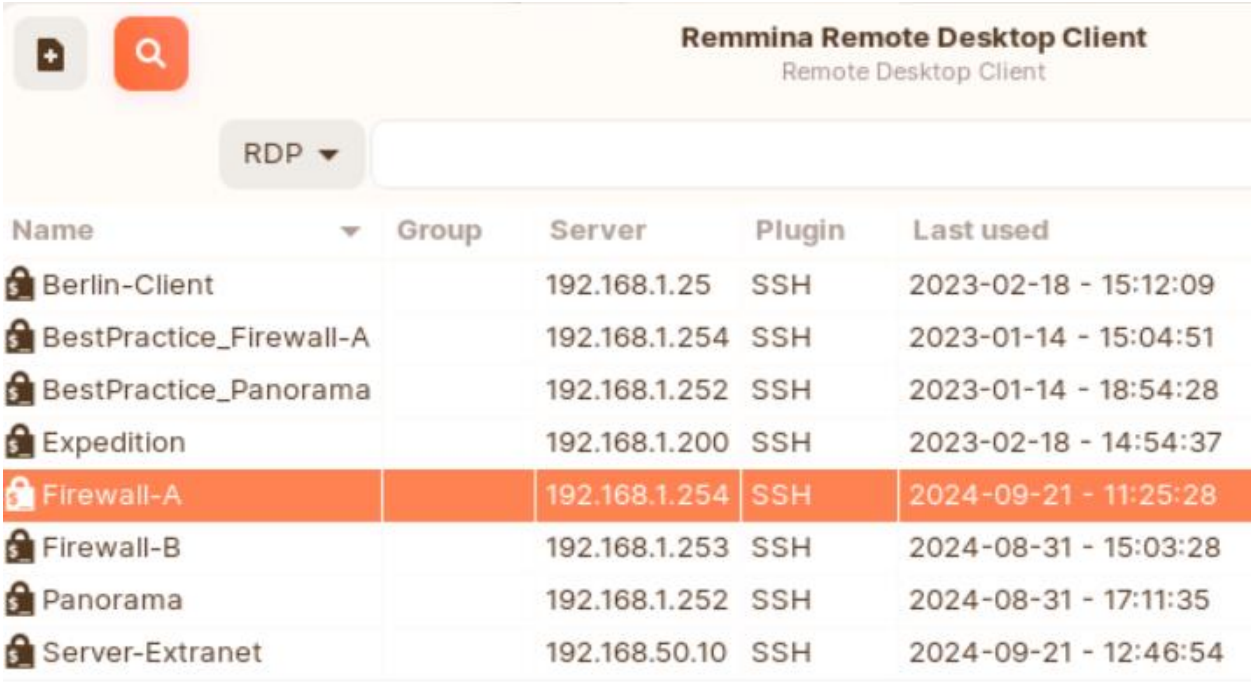
NAME	STATUS	TYPE	IKE Gateway/Satellite				Tunnel Interface				
			INTERFACE	LOCAL IP	PEER ADDRESS	STATUS	INTERFACE	LOGICAL ROUTER	VIRTUAL SYSTEM	SECURITY ZONE	STATUS
dmz-tunnel	Tunnel Info	Auto Key	ethernet1/3	192.168.50.1/24	192.168.50.10	IKE Info	tunnel.15	LR-1 (Show Routes)	vsys1	VPN	

35. In the web interface, select **Monitor > Logs > System**.
36. Review the **VPN** log entries:

To display only VPN entries, you can click **vpn** in the **Type** column to add a filter:



37. On the client desktop, open the **Remmina** application.
38. Double-click the entry for **Firewall-A**:



39. After the VPN tunnel is connected, type the following CLI commands and observe the output:

    `show vpn ike-sa`

    `show vpn ipsec-sa tunnel dmz-tunnel:dmz-tunnel-network`

    `show vpn flow name dmz-tunnel:dmz-tunnel-network`

    `show running tunnel flow`

40. Type **exit** to close the **Remmina** connection to the firewall.
41. Close the Remmina desktop application window.

Stop. This is the end of the Site-to-Site VPN lab.