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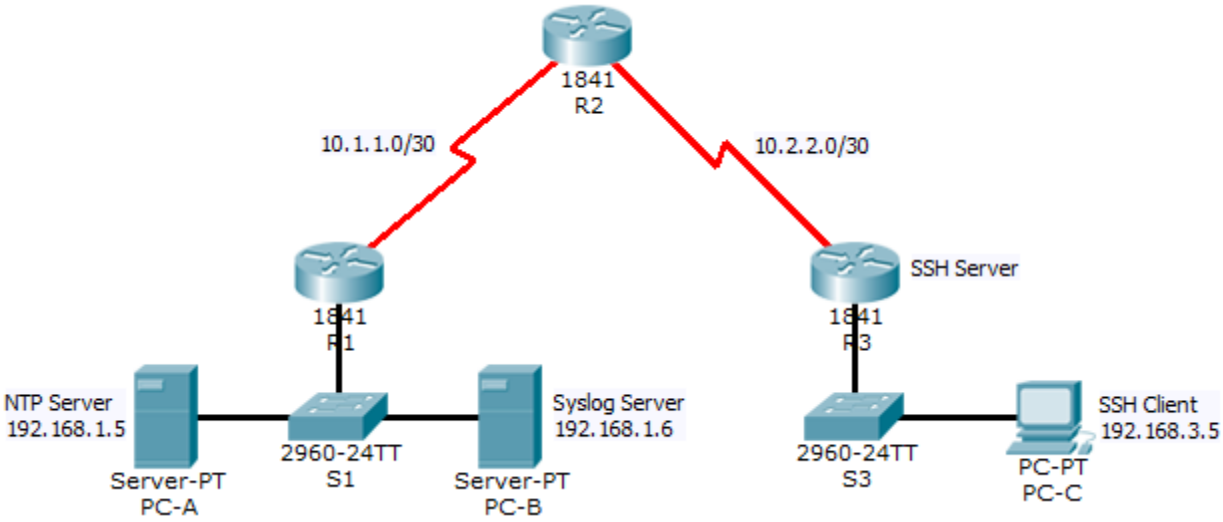
CCNA Security 1.2

Instructor Packet Tracer Manual

Packet Tracer - Configure Cisco Routers for Syslog, NTP, and SSH Operations (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	Fa0/1	192.168.1.1	255.255.255.0	N/A	S1 Fa0/5
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A	N/A
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A	N/A
R3	Fa0/1	192.168.3.1	255.255.255.0	N/A	S3 Fa0/5
	S0/0/1	10.2.2.1	255.255.255.252	N/A	N/A
PC-A	NIC	192.168.1.5	255.255.255.0	192.168.1.1	S1 Fa0/6
PC-B	NIC	192.168.1.6	255.255.255.0	192.168.1.1	S2 Fa0/18
PC-C	NIC	192.168.3.5	255.255.255.0	192.168.3.1	S3 Fa0/18

Objectives

- Configure routers as NTP clients.
- Configure routers to update the hardware clock using NTP.
- Configure routers to log messages to the syslog server.
- Configure routers to timestamp log messages.
- Configure local users.

- Configure VTY lines to accept SSH connections only.
- Configure RSA key pair on SSH server.
- Verify SSH connectivity from PC client and router client.

Background / Scenario

The network topology shows three routers. You will configure NTP and Syslog on all routers. You will configure SSH on R3.

Network Time Protocol (NTP) allows routers on the network to synchronize their time settings with an NTP server. A group of NTP clients that obtain time and date information from a single source have more consistent time settings and Syslog messages generated can be analyzed more easily. This can help when troubleshooting issues with network problems and attacks. When NTP is implemented in the network, it can be set up to synchronize to a private master clock, or to a publicly available NTP server on the Internet.

The NTP Server is the master NTP server in this lab. You will configure the routers to allow the software clock to be synchronized by NTP to the time server. Also, you will configure the routers to periodically update the hardware clock with the time learned from NTP. Otherwise, the hardware clock will tend to gradually lose or gain time (drift) and the software clock and hardware clock may become out of synchronization with each other.

The Syslog Server will provide message logging in this lab. You will configure the routers to identify the remote host (Syslog server) that will receive logging messages.

You will need to configure timestamp service for logging on the routers. Displaying the correct time and date in Syslog messages is vital when using Syslog to monitor a network. If the correct time and date of a message is not known, it can be difficult to determine what network event caused the message.

R2 is an ISP connected to two remote networks: R1 and R3. The local administrator at R3 can perform most router configurations and troubleshooting; however, because R3 is a managed router, the ISP needs access to R3 for occasional troubleshooting or updates. To provide this access in a secure manner, the administrators have agreed to use Secure Shell (SSH).

You use the CLI to configure the router to be managed securely using SSH instead of Telnet. SSH is a network protocol that establishes a secure terminal emulation connection to a router or other networking device. SSH encrypts all information that passes over the network link and provides authentication of the remote computer. SSH is rapidly replacing Telnet as the remote login tool of choice for network professionals.

The servers have been pre-configured for NTP and Syslog services respectively. NTP will not require authentication. The routers have been pre-configured with the following:

- Enable password: **ciscoenpa55**
- Password for vty lines: **ciscovtypa55**
- Static routing

Part 1: Configure Routers as NTP Clients

Step 1: Test Connectivity.

- Ping from **PC-C** to **R3**.
- Ping from **R2** to **R3**.
- Telnet from **PC-C** to **R3**. Exit the Telnet session.
- Telnet from **R2** to **R3**. Exit the Telnet session.

Step 2: Configure R1, R2, and R3 as NTP clients.

```
R1(config)# ntp server 192.168.1.5
R2(config)# ntp server 192.168.1.5
R3(config)# ntp server 192.168.1.5
```

Verify client configuration using the command **show ntp status**.

Step 3: Configure routers to update hardware clock.

Configure **R1**, **R2**, **and R3** to periodically update the hardware clock with the time learned from NTP.

```
R1(config)# ntp update-calendar
R2(config)# ntp update-calendar
R3(config)# ntp update-calendar
```

Verify that the hardware clock was updated using the command **show clock**.

Step 4: Configure routers to timestamp log messages.

Configure timestamp service for logging on the routers.

```
R1(config)# service timestamps log datetime msec
R2(config)# service timestamps log datetime msec
R3(config)# service timestamps log datetime msec
```

Part 2: Configure Routers to Log Messages to the Syslog Server

Step 1: Configure the routers to identify the remote host (Syslog Server) that will receive logging messages.

```
R1(config)# logging host 192.168.1.6
R2(config)# logging host 192.168.1.6
R3(config)# logging host 192.168.1.6
```

The router console will display a message that logging has started.

Step 2: Verify logging configuration using the command show logging.

Step 3: Examine logs of the Syslog Server.

From the **Services** tab of the **Syslog Server**'s dialogue box, select the **Syslog** services button. Observe the logging messages received from the routers.

Note: Log messages can be generated on the server by executing commands on the router. For example, entering and exiting global configuration mode will generate an informational configuration message.

Part 3: Configure R3 to Support SSH Connections

Step 1: Configure a domain name.

Configure a domain name of **ccnasecurity.com** on **R3**.

```
R3(config)# ip domain-name ccnasecurity.com
```

Step 2: Configure users for login to the SSH server on R3.

Create a user ID of **SSHadmin** with the highest possible privilege level and a secret password of **ciscosshpa55**.

```
R3(config)# username SSHadmin privilege 15 secret ciscosshpa55
```

Step 3: Configure the incoming VTY lines on R3.

Use the local user accounts for mandatory login and validation. Accept only SSH connections.

```
R3 (config)# line vty 0 4
R3 (config-line)# login local
R3(config-line)# transport input ssh
```

Step 4: Erase existing key pairs on R3.

Any existing RSA key pairs should be erased on the router.

```
R3(config)# crypto key zeroize rsa
```

Note: If no keys exist, you might receive this message: `% No Signature RSA Keys found in configuration`.

Step 5: Generate the RSA encryption key pair for R3.

The router uses the RSA key pair for authentication and encryption of transmitted SSH data. Configure the RSA keys with a modulus of **1024**. The default is 512, and the range is from 360 to 2048.

```
R3(config)# crypto key generate rsa
The name for the keys will be: R3.ccnasecurity.com
Choose the size of the key modulus in the range of 360 to 2048 for your
  General Purpose Keys. Choosing a key modulus greater than 512 may take
  a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
```

Note: The command to generate RSA encryption key pairs for **R3** in Packet Tracer differs from those used in the lab.

Step 6: Verify the SSH configuration.

Use the **show ip ssh** command to see the current settings. Verify that the authentication timeout and retries are at their default values of 120 and 3.

Step 7: Configure SSH timeouts and authentication parameters.

The default SSH timeouts and authentication parameters can be altered to be more restrictive. Set the timeout to **90** seconds, the number of authentication retries to **2**, and the version to **2**.

```
R3(config)# ip ssh time-out 90
R3(config)# ip ssh authentication-retries 2
R3(config)# ip ssh version 2
```

Issue the **show ip ssh** command again to confirm that the values have been changed.

Step 8: Attempt to connect to R3 via Telnet from PC-C.

Open the Desktop of **PC-C**. Select the Command Prompt icon. From **PC-C**, enter the command to connect to **R3** via Telnet.

```
PC> telnet 192.168.3.1
```

This connection should fail because **R3** has been configured to accept only SSH connections on the virtual terminal lines.

Step 9: Connect to R3 using SSH on PC-C.

Open the Desktop of **PC-C**. Select the Command Prompt icon. From **PC-C**, enter the command to connect to R3 via SSH. When prompted for the password, enter the password configured for the administrator **ciscosshpa55**.

```
PC> ssh –l SSHadmin 192.168.3.1
```

Step 10: Connect to R3 using SSH on R2.

In order to troubleshoot and maintain **R3**, the administrator at the ISP must use SSH to access the router CLI. From the CLI of **R2**, enter the command to connect to **R3** via SSH version **2** using the **SSHadmin** user account. When prompted for the password, enter the password configured for the administrator: **ciscosshpa55**.

```
R2# ssh –v 2 –l SSHadmin 10.2.2.1
```

Step 11: Check results.

Your completion percentage should be 100%. Click **Check Results** to view the feedback and verification of which required components have been completed.

!!!Scripts for R1 and R2!!!!

```
conf t
service timestamps log datetime msec
logging 192.168.1.6
ntp server 192.168.1.5
ntp update-calendar
end
```

!!!Scripts for R3!!!!

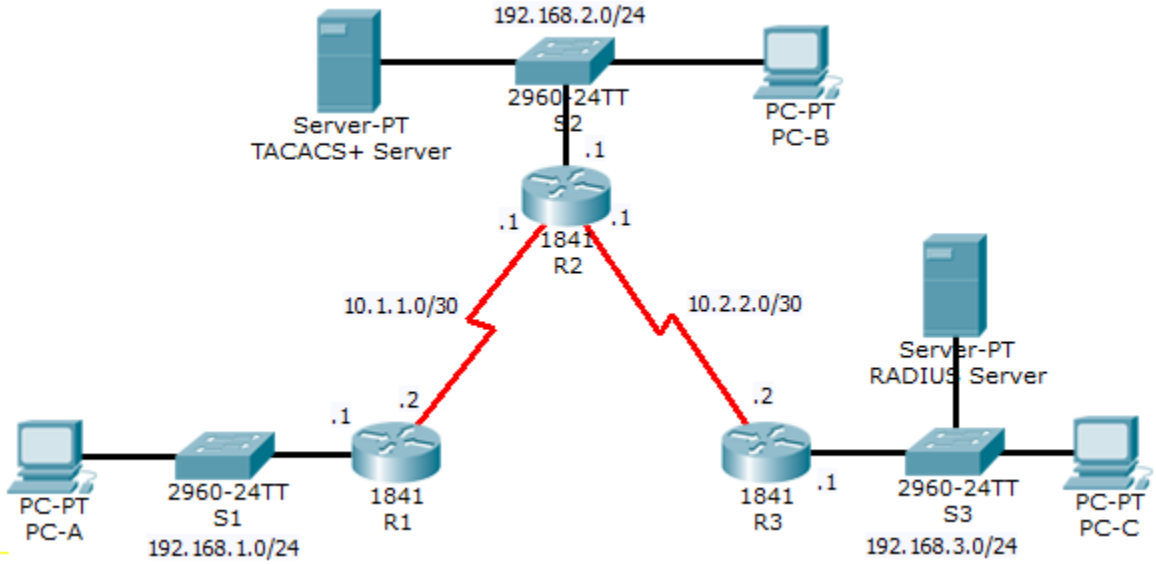
```
conf t
service timestamps log datetime msec
logging 192.168.1.6
ntp server 192.168.1.5
ntp update-calendar
ip domain-name ccnasecurity.com
username SSHadmin privilege 15 secret ciscosshpa55
 line vty 0 4
 login local
 transport input ssh
crypto key zeroize rsa
crypto key generate rsa
1024
ip ssh time-out 90
```

```
ip ssh authentication-retries 2
ip ssh version 2
end
```

Packet Tracer - Configure AAA Authentication on Cisco Routers (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	Fa0/0	192.168.1.1	255.255.255.0	N/A	S1 Fa0/1
	S0/0/0 (DCE)	10.1.1.2	255.255.255.252	N/A	N/A
R2	Fa0/0	192.168.2.1	255.255.255.0	N/A	S2 Fa0/2
	S0/0/0	10.1.1.1	255.255.255.252	N/A	N/A
	S0/0/1 (DCE)	10.2.2.1	255.255.255.252	N/A	N/A
R3	Fa0/1	192.168.3.1	255.255.255.0	N/A	S3 Fa0/5
	S0/0/1	10.2.2.2	255.255.255.252	N/A	N/A
TACACS+ Server	NIC	192.168.2.2	255.255.255.0	192.168.2.1	S2 Fa0/6
RADIUS Server	NIC	192.168.3.2	255.255.255.0	192.168.3.1	S3 Fa0/1
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1	S1 Fa0/2
PC-B	NIC	192.168.2.3	255.255.255.0	192.168.2.1	S2 Fa0/1
PC-C	NIC	192.168.3.3	255.255.255.0	192.168.3.1	S3 Fa0/18

Objectives

- Configure a local user account on R1 and authenticate on the console and VTY lines using local AAA.

- Verify local AAA authentication from the R1 console and the PC-A client.
- Configure a server-based AAA authentication using TACACS+.
- Verify server-based AAA authentication from PC-B client.
- Configure a server-based AAA authentication using RADIUS.
- Verify server-based AAA authentication from PC-C client.

Background / Scenario

The network topology shows routers R1, R2 and R3. Currently all administrative security is based on knowledge of the enable secret password. Your task is to configure and test local and server-based AAA solutions.

You will create a local user account and configure local AAA on router R1 to test the console and VTY logins.

- User account: **Admin1** and password **admin1pa55**

You will then configure router R2 to support server-based authentication using the TACACS+ protocol. The TACACS+ server has been pre-configured with the following:

- Client: **R2** using the keyword **tacacspa55**
- User account: **Admin2** and password **admin2pa55**

Finally, you will configure router R3 to support server-based authentication using the RADIUS protocol. The RADIUS server has been pre-configured with the following:

- Client: **R3** using the keyword **radiuspa55**
- User account: **Admin3** and password **admin3pa55**

The routers have also been pre-configured with the following:

- Enable secret password: **ciscoenpa55**
- RIP version 2

Note: The console and VTY lines have not been pre-configured.

Part 1: Configure Local AAA Authentication for Console Access on R1

Step 1: Test connectivity.

- Ping from **PC-A** to **PC-B**.
- Ping from **PC-A** to **PC-C**.
- Ping from **PC-B** to **PC-C**.

Step 2: Configure a local username on R1.

Configure a username of **Admin1** and secret password of **admin1pa55**.

```
R1(config)# username Admin1 secret admin1pa55
```

Step 3: Configure local AAA authentication for console access on R1.

Enable AAA on R1 and configure AAA authentication for console login to use the local database.

```
R1(config)# aaa new-model
R1(config)# aaa authentication login default local
```

Step 4: Configure the line console to use the defined AAA authentication method.

Enable AAA on **R1** and configure AAA authentication for console login to use the default method list.

```
R1(config)# line console 0
R1(config-line)# login authentication default
```

Step 5: Verify the AAA authentication method.

Verify the user EXEC login using the local database.

```
R1(config-line)# end
%SYS-5-CONFIG_I: Configured from console by console
R1# exit

R1 con0 is now available
Press RETURN to get started.

************ AUTHORIZED ACCESS ONLY *************
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED.


User Access Verification

Username: Admin1
Password: admin1pa55
R1>
```

Part 2: Configure Local AAA Authentication for VTY Lines on R1

Step 1: Configure a named list AAA authentication method for VTY lines on R1.

Configure a named list called **TELNET-LOGIN** to authenticate logins using local AAA.

```
R1(config)# aaa authentication login TELNET-LOGIN local
```

Step 2: Configure the VTY lines to use the defined AAA authentication method.

Configure the VTY lines to use the named AAA method.

```
R1(config)# line vty 0 4
R1(config-line)# login authentication TELNET-LOGIN
R1(config-line)# end
```

Step 3: Verify the AAA authentication method.

Verify the Telnet configuration. From the command prompt of **PC-A**, Telnet to **R1**.

```
PC> telnet 192.168.1.1


************ AUTHORIZED ACCESS ONLY *************
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED.
```

```
User Access Verification

Username: Admin1
Password: admin1pa55
R1>
```

Part 3: Configure Server-Based AAA Authentication Using TACACS+ on R2

Step 1: Configure a backup local database entry called Admin.

For backup purposes, configure a local username of **Admin2** and secret password of **admin2pa55**.

```
R2(config)# username Admin2 secret admin2pa55
```

Step 2: Verify the TACACS+ Server configuration.

Select the TACACS+ Server and from the Services tab, click on **AAA**. Notice that there is a Network configuration entry for **R2** and a User Setup entry for **Admin2**.

Step 3: Configure the TACACS+ server specifics on R2.

Configure the AAA TACACS server IP address and secret key on **R2**.

```
R2(config)# tacacs-server host 192.168.2.2
R2(config)# tacacs-server key tacacspa55
```

Step 4: Configure AAA login authentication for console access on R2.

Enable AAA on **R2** and configure all logins to authenticate using the AAA TACACS+ server and if not available, then use the local database.

```
R2(config)# aaa new-model
R2(config)# aaa authentication login default group tacacs+ local
```

Step 5: Configure the line console to use the defined AAA authentication method.

Configure AAA authentication for console login to use the default AAA authentication method.

```
R2(config)# line console 0
R2(config-line)# login authentication default
```

Step 6: Verify the AAA authentication method.

Verify the user EXEC login using the AAA TACACS+ server.

```
R2(config-line)# end
%SYS-5-CONFIG_I: Configured from console by console
R2# exit

R2 con0 is now available
Press RETURN to get started.

************ AUTHORIZED ACCESS ONLY *************
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED.
```

```
User Access Verification

Username: Admin2
Password: admin2pa55
R2>
```

Part 4: Configure Server-Based AAA Authentication Using RADIUS on R3

Step 1: Configure a backup local database entry called Admin.

For backup purposes, configure a local username of **Admin3** and secret password of **admin3pa55**.

```
R3(config)# username Admin3 secret admin3pa55
```

Step 2: Verify the RADIUS Server configuration.

Select the RADIUS Server and from the Services tab, click on **AAA**. Notice that there is a Network configuration entry for **R3** and a User Setup entry for **Admin3**.

Step 3: Configure the RADIUS server specifics on R3.

Configure the AAA RADIUS server IP address and secret key on **R3**.

```
R3(config)# radius-server host 192.168.3.2
R3(config)# radius-server key radiuspa55
```

Step 4: Configure AAA login authentication for console access on R3.

Enable AAA on **R3** and configure all logins to authenticate using the AAA RADIUS server and if not available, then use the local database.

```
R3(config)# aaa new-model
R3(config)# aaa authentication login default group radius local
```

Step 5: Configure the line console to use the defined AAA authentication method.

Configure AAA authentication for console login to use the default AAA authentication method.

```
R3(config)# line console 0
R3(config-line)# login authentication default
```

Step 6: Verify the AAA authentication method.

Verify the user EXEC login using the AAA RADIUS server.

```
R3(config-line)# end
%SYS-5-CONFIG_I: Configured from console by console
R3# exit

R3 con0 is now available
Press RETURN to get started.

************ AUTHORIZED ACCESS ONLY *************
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED.
```

```
User Access Verification

Username: Admin3
Password: admin3pa55
R3>
```

Step 7: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

!!!Script for R1

```
!!!Part 1
config t
username Admin1 secret admin1pa55
aaa new-model
aaa authentication login default local
line console 0
 login authentication default
!!!Part 2
aaa authentication login TELNET-LOGIN local
line vty 0 4
 login authentication TELNET-LOGIN
```

!!!!Script for R2

```
conf t
username Admin2 secret admin2pa55
tacacs-server host 192.168.2.2
tacacs-server key tacacspa55
aaa new-model
aaa authentication login default group tacacs+ local
line console 0
 login authentication default
```

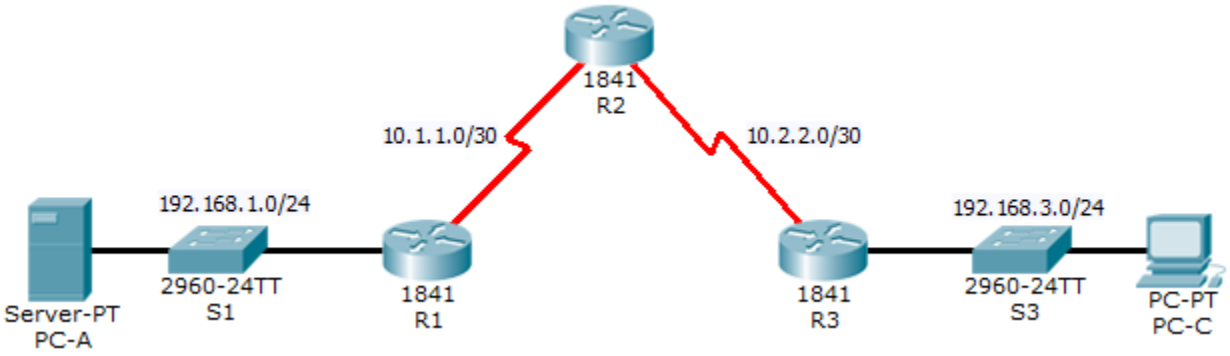
!!!!Script for R3

```
conf t
username Admin3 secret admin3pa55
radius-server host 192.168.3.2
radius-server key radiuspa55
aaa new-model
aaa authentication login default group radius local
line console 0
login authentication default
```

Packet Tracer - Configure IP ACLs to Mitigate Attacks (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



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R2	S0/0/0	10.1.1.2	255.255.255.252	N/A	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A	N/A
	Lo0	192.168.2.1	255.255.255.0	N/A	N/A
R3	Fa0/1	192.168.3.1	255.255.255.0	N/A	S3 Fa0/5
	S0/0/1	10.2.2.1	255.255.255.252	N/A	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1	S1 Fa0/6
PC-C	NIC	192.168.3.3	255.255.255.0	192.168.3.1	S3 Fa0/18

Objectives

- Verify connectivity among devices before firewall configuration.
- Use ACLs to ensure remote access to the routers is available only from management station PC-C.
- Configure ACLs on R1 and R3 to mitigate attacks.
- Verify ACL functionality.

Background / Scenario

Access to routers R1, R2, and R3 should only be permitted from PC-C, the management station. PC-C is also used for connectivity testing to PC-A, a server providing DNS, SMTP, FTP, and HTTPS services.

Standard operating procedure is to apply ACLs on edge routers to mitigate common threats based on source and/or destination IP address. In this activity, you create ACLs on edge routers R1 and R3 to achieve this goal. You then verify ACL functionality from internal and external hosts.

The routers have been pre-configured with the following:

- Enable password: **ciscoenpa55**
- Password for console: **ciscoconpa55**
- Username for VTY lines: **SSHadmin**
- Password for VTY lines: **ciscosshpa55**
- IP addressing
- Static routing

Part 1: Verify Basic Network Connectivity

Verify network connectivity prior to configuring the IP ACLs.

Step 1: From PC-A, verify connectivity to PC-C and R2.

a. From the command prompt, ping **PC-C** (192.168.3.3).

b. From the command prompt, establish a SSH session to **R2** Lo0 interface (192.168.2.1) using username **SSHadmin** and password **ciscosshpa55**. When finished, exit the SSH session.

```
PC> ssh -l SSHadmin 192.168.2.1
```

Step 2: From PC-C, verify connectivity to PC-A and R2.

a. From the command prompt, ping **PC-A** (192.168.1.3).

b. From the command prompt, establish a SSH session to **R2** Lo0 interface (192.168.2.1) using username **SSHadmin** and password **ciscosshpa55**. Close the SSH session when finished.

```
PC> ssh -l SSHadmin 192.168.2.1
```

c. Open a web browser to the **PC-A** server (192.168.1.3) to display the web page. Close the browser when done.

Part 2: Secure Access to Routers

Step 1: Configure ACL 10 to block all remote access to the routers except from PC-C.

Use the **access-list** command to create a numbered IP ACL on **R1**, **R2**, and **R3**.

```
R1(config)# access-list 10 permit 192.168.3.3 0.0.0.0
R2(config)# access-list 10 permit 192.168.3.3 0.0.0.0
R3(config)# access-list 10 permit 192.168.3.3 0.0.0.0
```

Step 2: Apply ACL 10 to ingress traffic on the VTY lines.

Use the **access-class** command to apply the access list to incoming traffic on the VTY lines.

```
R1(config-line)# access-class 10 in
R2(config-line)# access-class 10 in
R3(config-line)# access-class 10 in
```

Step 3: Verify exclusive access from management station PC-C.

a. Establish a SSH session to 192.168.2.1 from **PC-C** (should be successful).

```
PC> ssh -l SSHadmin 192.168.2.1
```

b. Establish a SSH session to 192.168.2.1 from **PC-A** (should fail).

Part 3: Create a Numbered IP ACL 120 on R1

Permit any outside host to access DNS, SMTP, and FTP services on server **PC-A**, deny any outside host access to HTTPS services on **PC-A**, and permit **PC-C** to access **R1** via SSH.

Step 1: Verify that PC-C can access the PC-A via HTTPS using the web browser.

Be sure to disable HTTP and enable HTTPS on server **PC-A**.

Step 2: Configure ACL 120 to specifically permit and deny the specified traffic.

Use the **access-list** command to create a numbered IP ACL.

```
R1(config)# access-list 120 permit udp any host 192.168.1.3 eq domain
R1(config)# access-list 120 permit tcp any host 192.168.1.3 eq smtp
R1(config)# access-list 120 permit tcp any host 192.168.1.3 eq ftp
R1(config)# access-list 120 deny tcp any host 192.168.1.3 eq 443
R1(config)# access-list 120 permit tcp host 192.168.3.3 host 10.1.1.1 eq 22
```

Step 3: Apply the ACL to interface S0/0/0.

Use the **ip access-group** command to apply the access list to incoming traffic on interface S0/0/0.

```
R1(config)# interface s0/0/0
R1(config-if)# ip access-group 120 in
```

Step 4: Verify that PC-C cannot access PC-A via HTTPS using the web browser.

Part 4: Modify An Existing ACL on R1

Permit ICMP echo replies and destination unreachable messages from the outside network (relative to **R1**); deny all other incoming ICMP packets.

Step 1: Verify that PC-A cannot successfully ping the loopback interface on R2.

Step 2: Make any necessary changes to ACL 120 to permit and deny the specified traffic.

Use the **access-list** command to create a numbered IP ACL.

```
R1(config)# access-list 120 permit icmp any any echo-reply
R1(config)# access-list 120 permit icmp any any unreachable
R1(config)# access-list 120 deny icmp any any
R1(config)# access-list 120 permit ip any any
```

Step 3: Verify that PC-A can successfully ping the loopback interface on R2.

Part 5: Create a Numbered IP ACL 110 on R3

Deny all outbound packets with source address outside the range of internal IP addresses on **R3**.

Step 1: Configure ACL 110 to permit only traffic from the inside network.

Use the **access-list** command to create a numbered IP ACL.

```
R3(config)# access-list 110 permit ip 192.168.3.0 0.0.0.255 any
```

Step 2: Apply the ACL to interface F0/1.

Use the **ip access-group** command to apply the access list to incoming traffic on interface F0/1.

```
R3(config)# interface fa0/1
R3(config-if)# ip access-group 110 in
```

Part 6: Create a Numbered IP ACL 100 on R3

On **R3**, block all packets containing the source IP address from the following pool of addresses: 127.0.0.0/8, any RFC 1918 private addresses, and any IP multicast address.

Step 1: Configure ACL 100 to block all specified traffic from the outside network.

You should also block traffic sourced from your own internal address space if it is not an RFC 1918 address (in this activity, your internal address space is part of the private address space specified in RFC 1918).

Use the **access-list** command to create a numbered IP ACL.

```
R3(config)# access-list 100 deny ip 10.0.0.0 0.255.255.255 any
R3(config)# access-list 100 deny ip 172.16.0.0 0.15.255.255 any
R3(config)# access-list 100 deny ip 192.168.0.0 0.0.255.255 any
R3(config)# access-list 100 deny ip 127.0.0.0 0.255.255.255 any
R3(config)# access-list 100 deny ip 224.0.0.0 15.255.255.255 any
R3(config)# access-list 100 permit ip any any
```

Step 2: Apply the ACL to interface Serial 0/0/1.

Use the **ip access-group** command to apply the access list to incoming traffic on interface Serial 0/0/1.

```
R3(config)# interface s0/0/1
R3(config-if)# ip access-group 100 in
```

Step 3: Confirm that the specified traffic entering interface Serial 0/0/1 is dropped.

From the **PC-C** command prompt, ping the **PC-A** server. The ICMP echo *replies* are blocked by the ACL since they are sourced from the 192.168.0.0/16 address space.

Step 4: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

!!!Script for R1

```
access-list 10 permit 192.168.3.3 0.0.0.0
line vty 0 4
 access-class 10 in
access-list 120 permit udp any host 192.168.1.3 eq domain
access-list 120 permit tcp any host 192.168.1.3 eq smtp
access-list 120 permit tcp any host 192.168.1.3 eq ftp
access-list 120 deny tcp any host 192.168.1.3 eq 443
```

```
access-list 120 permit tcp host 192.168.3.3 host 10.1.1.1 eq 22
interface s0/0/0
 ip access-group 120 in
access-list 120 permit icmp any any echo-reply
access-list 120 permit icmp any any unreachable
access-list 120 deny icmp any any
access-list 120 permit ip any any
```

!!!Script for R2

```
access-list 10 permit 192.168.3.3 0.0.0.0
line vty 0 4
 access-class 10 in
```

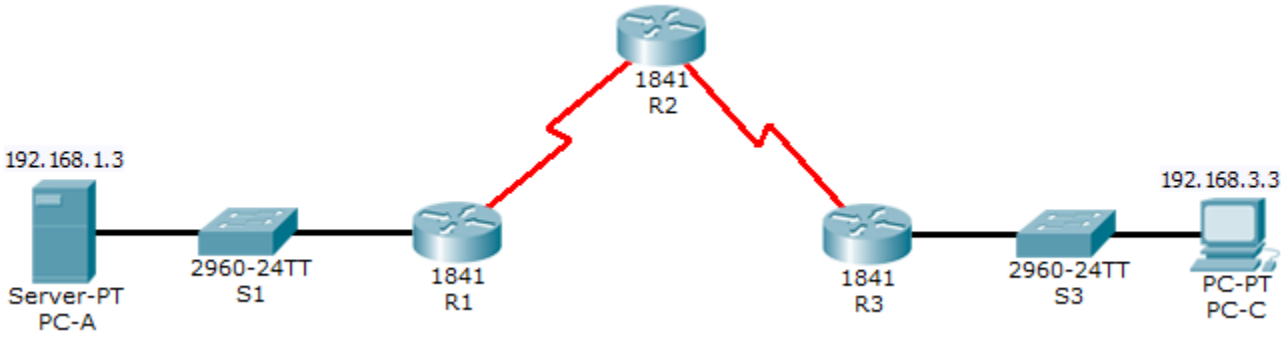
!!!Script for R3

```
access-list 10 permit 192.168.3.3 0.0.0.0
line vty 0 4
 access-class 10 in
access-list 100 deny ip 10.0.0.0 0.255.255.255 any
access-list 100 deny ip 172.16.0.0 0.15.255.255 any
access-list 100 deny ip 192.168.0.0 0.0.255.255 any
access-list 100 deny ip 127.0.0.0 0.255.255.255 any
access-list 100 deny ip 224.0.0.0 15.255.255.255 any
access-list 100 permit ip any any
interface s0/0/1
 ip access-group 100 in
access-list 110 permit ip 192.168.3.0 0.0.0.255 any
interface fa0/1
 ip access-group 110 in
```

Packet Tracer - Configuring a Zone-Based Policy Firewall (ZPF) (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	Fa0/1	192.168.1.1	255.255.255.0	N/A	S1 Fa0/5
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A	N/A
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A	N/A
R3	Fa0/1	192.168.3.1	255.255.255.0	N/A	S3 Fa0/5
	S0/0/1	10.2.2.1	255.255.255.252	N/A	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1	S1 Fa0/6
PC-C	NIC	192.168.3.3	255.255.255.0	192.168.3.1	S3 Fa0/18

Objectives

- Verify connectivity among devices before firewall configuration.
- Configure a zone-based policy (ZPF) firewall on router R3.
- Verify ZPF firewall functionality using ping, Telnet and a web browser.

Background / Scenario

Zone-based policy (ZPF) firewalls are the latest development in the evolution of Cisco firewall technologies. In this activity, you configure a basic ZPF on an edge router R3 that allows internal hosts access to external resources and blocks external hosts from accessing internal resources. You then verify firewall functionality from internal and external hosts.

The routers have been pre-configured with the following:

- Console password: **ciscoconpa55**

- Password for vty lines: **ciscovtypa55**
- Enable password: **ciscoenpa55**
- Host names and IP addressing
- Static routing

Part 1: Verify Basic Network Connectivity

Verify network connectivity prior to configuring the zone-based policy firewall.

Step 1: From the PC-A command prompt, ping PC-C at 192.168.3.3.

Step 2: From the PC-C command prompt, telnet to the Router R2 S0/0/1 interface at 10.2.2.2. Exit the Telnet session.

Step 3: From PC-C, open a web browser to the PC-A server.

a. Click the **Desktop** tab and click the **Web Browser** application. Enter the **PC-A** IP address **192.168.1.3** as the URL. The Packet Tracer welcome page from the web server should be displayed.

b. Close the browser on **PC-C**.

Part 2: Create the Firewall Zones on Router R3

Note: For all configuration tasks, be sure to use the exact names as specified.

Step 1: Create an internal zone.

Use the **zone security** command to create a zone named **IN-ZONE**.

```
R3(config)# zone security IN-ZONE
```

Step 2: Create an external zone.

Use the **zone security** command to create a zone named **OUT-ZONE**.

```
R3(config-sec-zone)# zone security OUT-ZONE
R3(config-sec-zone)# exit
```

Part 3: Define a Traffic Class and Access List

Step 1: Create an ACL that defines internal traffic.

Use the **access-list** command to create extended ACL **101** to permit all IP protocols from the **192.168.3.0/24** source network to any destination.

```
R3(config)# access-list 101 permit ip 192.168.3.0 0.0.0.255 any
```

Step 2: Create a class map referencing the internal traffic ACL.

Use the **class-map type inspect** command with the match-all option to create a class map named **IN-NET-CLASS-MAP**. Use the **match access-group** command to match ACL **101**.

```
R3(config)# class-map type inspect match-all IN-NET-CLASS-MAP
R3(config-cmap)# match access-group 101
R3(config-cmap)# exit
```

Note: Although not supported in this Packet Tracer exercise, individual protocols (HTTP, FTP, etc.) can be specific to be matched using the match-any option in order to provide more precise control over what type of traffic is inspected.

Part 4: Specify Firewall Policies

Step 1: Create a policy map to determine what to do with matched traffic.

Use the **policy-map type inspect** command and create a policy map named **IN-2-OUT-PMAP**.

```
R3(config)# policy-map type inspect IN-2-OUT-PMAP
```

Step 2: Specify a class type of inspect and reference class map IN-NET-CLASS-MAP.

```
R3(config-pmap)# class type inspect IN-NET-CLASS-MAP
```

Step 3: Specify the action of inspect for this policy map.

The use of the **inspect** command invokes context-based access control (other options include pass and drop).

```
R3(config-pmap-c)# inspect

%No specific protocol configured in class IN-NET-CLASS-MAP for inspection. All
protocols will be inspected.
```

Issue the **exit** command twice to leave **config-pmap-c** mode and return to **config** mode.

```
R3(config-pmap-c)# exit
R3(config-pmap)# exit
```

Part 5: Apply Firewall Policies

Step 1: Create a pair of zones.

Using the **zone-pair security** command, create a zone pair named **IN-2-OUT-ZPAIR**. Specify the source and destination zones that were created in Task 1.

```
R3(config)# zone-pair security IN-2-OUT-ZPAIR source IN-ZONE destination OUT-
ZONE
```

Step 2: Specify the policy map for handling the traffic between the two zones.

Attach a policy-map and its associated actions to the zone pair using the **service-policy type inspect** command and reference the policy map previously created, **IN-2-OUT-PMAP**.

```
R3(config-sec-zone-pair)# service-policy type inspect IN-2-OUT-PMAP
R3(config-sec-zone-pair)# exit
R3(config)#
```

Step 3: Assign interfaces to the appropriate security zones.

Use the **zone-member security** command in interface configuration mode to assign Fa0/1 to **IN-ZONE** and S0/0/1 to **OUT-ZONE**.

```
R3(config)# interface fa0/1
R3(config-if)# zone-member security IN-ZONE
R3(config-if)# exit
```

```
R3(config)# interface s0/0/1
R3(config-if)# zone-member security OUT-ZONE
R3(config-if)# exit
```

Step 4: Copy the running configuration to the startup configuration.

Part 6: Test Firewall Functionality from IN-ZONE to OUT-ZONE

Verify that internal hosts can still access external resources after configuring the zone-based policy firewall.

Step 1: From internal PC-C, ping the external PC-A server.

From the **PC-C** command prompt, ping **PC-A** at 192.168.1.3. The ping should succeed.

Step 2: From internal PC-C, telnet to the router R2 S0/0/1 interface.

a. From the **PC-C** command prompt, telnet to **R2** at 10.2.2.2 and provide the vty password **ciscovtypa55**. The Telnet session should succeed.

b. While the Telnet session is active, issue the command **show policy-map type inspect zone-pair sessions** on **R3** to view established sessions.

```
R3# show policy-map type inspect zone-pair sessions
 Zone-pair: IN-ZONE-OUT-ZONE

  Service-policy inspect : IN-2-OUT-PMAP

    Class-map: IN-NET-CLASS-MAP (match-all)
      Match: access-group 101
      Inspect
        Established Sessions
         Session 218154328 (192.168.3.3:1025)=>(10.2.2.2:23) :tcp SIS_OPEN
          Created 00:03:07, Last heard  00:02:54
          Bytes sent (initiator:responder) [0:0]
    Class-map: class-default (match-any)
      Match: any
      Drop (default action)
        0 packets, 0 bytes
```

What is the source IP address and port number?

_____

192.168.3.3:1025 (port 1025 is random)

What is the destination IP address and port number?

_____

10.2.2.2:23 (Telnet = port 23)

Step 3: From PC-C, exit the Telnet session on R2 and close the command prompt window.

Step 4: From internal PC-C, open a web browser to the PC-A server web page.

Enter the server IP address **192.168.1.3** in the browser URL field, and click **Go**. The HTTP session should succeed. While the HTTP session is active, issue the command **show policy-map type inspect zone-pair sessions** on **R3** to view established sessions.

Note: If the HTTP session times out before you execute the command on **R3**, you will have to click the **Go** button on **PC-C** to generate a session between **PC-C** and **PC-A**.

```
R3# show policy-map type inspect zone-pair sessions
Zone-pair: IN-ZONE-OUT-ZONE

  Service-policy inspect : IN-2-OUT-PMAP

    Class-map: IN-NET-CLASS-MAP (match-all)
      Match: access-group 101
      Inspect
        Established Sessions
         Session 167029736 (192.168.3.3:1027)=>(192.168.1.3:80) :tcp SIS_OPEN
          Created 00:00:01, Last heard  00:00:01
          Bytes sent (initiator:responder) [0:0]
    Class-map: class-default (match-any)
      Match: any
      Drop (default action)
        0 packets, 0 bytes
```

What is the source IP address and port number?

_____

192.168.3.3:1027 (port 1027 is random)

What is the destination IP address and port number?

_____

192.168.1.3:80 (HTTP web = port 80)

Step 5: Close the Browser on PC-C.

Part 7: Test Firewall Functionality from OUT-ZONE to IN-ZONE

Verify that external hosts CANNOT access internal resources after configuring the zone-based policy firewall.

Step 1: From the PC-A server command prompt, ping PC-C.

From the **PC-A** command prompt, ping **PC-C** at 192.168.3.3. The ping should fail.

Step 2: From router R2, ping PC-C.

From **R2**, ping **PC-C** at 192.168.3.3. The ping should fail.

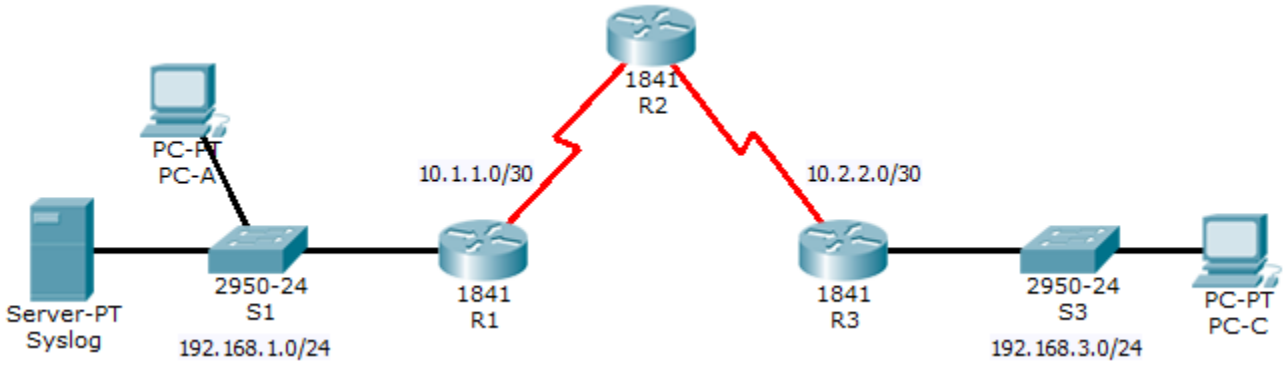
Step 3: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

Packet Tracer - Configure IOS Intrusion Prevention System (IPS) Using CLI (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	Fa0/0	192.168.1.1	255.255.255.0	N/A	S1 Fa0/1
	S0/0/0	10.1.1.1	255.255.255.252	N/A	N/A
R2	S0/0/0 (DCE)	10.1.1.2	255.255.255.252	N/A	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A	N/A
R3	Fa0/0	192.168.3.1	255.255.255.0	N/A	S3 Fa0/1
	S0/0/0	10.2.2.1	255.255.255.252	N/A	N/A
Syslog	NIC	192.168.1.50	255.255.255.0	192.168.1.1	S1 Fa0/2
PC-A	NIC	192.168.1.2	255.255.255.0	192.168.1.1	S1 Fa0/3
PC-C	NIC	192.168.3.2	255.255.255.0	192.168.3.1	S3 Fa0/2

Objectives

- Enable IOS IPS.
- Configure logging.
- Modify an IPS signature.
- Verify IPS.

Background / Scenario

Your task is to enable IPS on R1 to scan traffic entering the 192.168.1.0 network.

The server labeled Syslog is used to log IPS messages. You must configure the router to identify the syslog server to receive logging messages. Displaying the correct time and date in syslog messages is vital when

using syslog to monitor the network. Set the clock and configure timestamp service for logging on the routers. Finally, enable IPS to produce an alert and drop ICMP echo reply packets inline.

The server and PCs have been preconfigured. The routers have also been preconfigured with the following:

- Enable password: **ciscoenpa55**
- Console password: **ciscoconpa55**
- VTY line password: **ciscovtypa55**
- OSPF 101

Part 1: Enable IOS IPS

Note: Within Packet Tracer, the routers already have the signature files imported and in place. They are the default xml files in flash. For this reason, it is not necessary to configure the public crypto key and complete a manual import of the signature files.

Step 1: Verify network connectivity.

a. Ping from **PC-C** to **PC-A**. The ping should be successful.

b. Ping from **PC-A** to **PC-C**. The ping should be successful.

Step 2: Create an IOS IPS configuration directory in flash.

On **R1**, create a directory in flash using the **mkdir** command. Name the directory **ipsdir**.

```
R1# mkdir ipsdir
Create directory filename [ipsdir]? <Enter>
Created dir flash:ipsdir
```

Step 3: Configure the IPS signature storage location.

On **R1**, configure the IPS signature storage location to be the directory you just created.

```
R1(config)# ip ips config location flash:ipsdir
```

Step 4: Create an IPS rule.

On **R1**, create an IPS rule name using the **ip ips name** *name* command in global configuration mode. Name the IPS rule **iosips**.

```
R1(config)# ip ips name iosips
```

Step 5: Enable logging.

IOS IPS supports the use of syslog to send event notification. Syslog notification is enabled by default. If logging console is enabled, IPS syslog messages display.

a. Enable syslog if it is not enabled.

```
R1(config)# ip ips notify log
```

b. If necessary, use the **clock set** command from privileged EXEC mode to reset the clock.

```
R1# clock set 10:20:00 10 january 2014
```

c. Verify that the timestamp service for logging is enabled on the router using the **show run** command. Enable the timestamp service if it is not enabled.

```
R1(config)# service timestamps log datetime msec
```

d. Send log messages to the syslog server at IP address 192.168.1.50.

```
R1(config)# logging host 192.168.1.50
```

Step 6: Configure IOS IPS to use the signature categories.

Retire the **all** signature category with the **retired true** command (all signatures within the signature release). Unretire the **IOS_IPS Basic** category with the **retired false** command.

```
R1(config)# ip ips signature-category
R1(config-ips-category)# category all
R1(config-ips-category-action)# retired true
R1(config-ips-category-action)# exit
R1(config-ips-category)# category ios_ips basic
R1(config-ips-category-action)# retired false
R1(config-ips-category-action)# exit
R1(config-ips-cateogry)# exit
Do you want to accept these changes? [confirm] <Enter>
```

Step 7: Apply the IPS rule to an interface.

Apply the IPS rule to an interface with the **ip ips name** *direction* command in interface configuration mode. Apply the rule outbound on the Fa0/0 interface of **R1**. After you enable IPS, some log messages will be sent to the console line indicating that the IPS engines are being initialized.

Note: The direction **in** means that IPS inspects only traffic going into the interface. Similarly, **out** means only traffic going out the interface.

```
R1(config)# interface fa0/0
R1(config-if)# ip ips iosips out
```

Part 2: Modify the Signature

Step 1: Change the event-action of a signature.

Un-retire the echo request signature (signature 2004, subsig ID 0), enable it, and change the signature action to alert and drop.

```
R1(config)# ip ips signature-definition
R1(config-sigdef)# signature 2004 0
R1(config-sigdef-sig)# status
R1(config-sigdef-sig-status)# retired false
R1(config-sigdef-sig-status)# enabled true
R1(config-sigdef-sig-status)# exit
R1(config-sigdef-sig)# engine
R1(config-sigdef-sig-engine)# event-action produce-alert
R1(config-sigdef-sig-engine)# event-action deny-packet-inline
R1(config-sigdef-sig-engine)# exit
R1(config-sigdef-sig)# exit
R1(config-sigdef)# exit
Do you want to accept these changes? [confirm] <Enter>
```

Step 2: Use show commands to verify IPS.

Use the **show ip ips all** command to view the IPS configuration status summary.

To which interfaces and in which direction is the **iosips** rule applied?

_____

Fa0/0 outbound.

Step 3: Verify that IPS is working properly.

a. From **PC-C**, attempt to ping **PC-A**. Were the pings successful? Why or why not?

_____

_____

The pings should fail. This is because the IPS rule for event-action of an echo request was set to “deny-packet-inline”.

b. From **PC-A**, attempt to ping **PC-C**. Were the pings successful? Why or why not?

_____

_____

The ping should be successful. This is because the IPS rule does not cover echo reply. When PC-A pings PC-C, PC-C responds with an echo reply.

Step 4: View the syslog messages.

a. Click the **Syslog** server.

b. Select the **Services** tab.

c. In the left navigation menu, select **SYSLOG** to view the log file.

Step 5: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

!!!Scritpt for R1

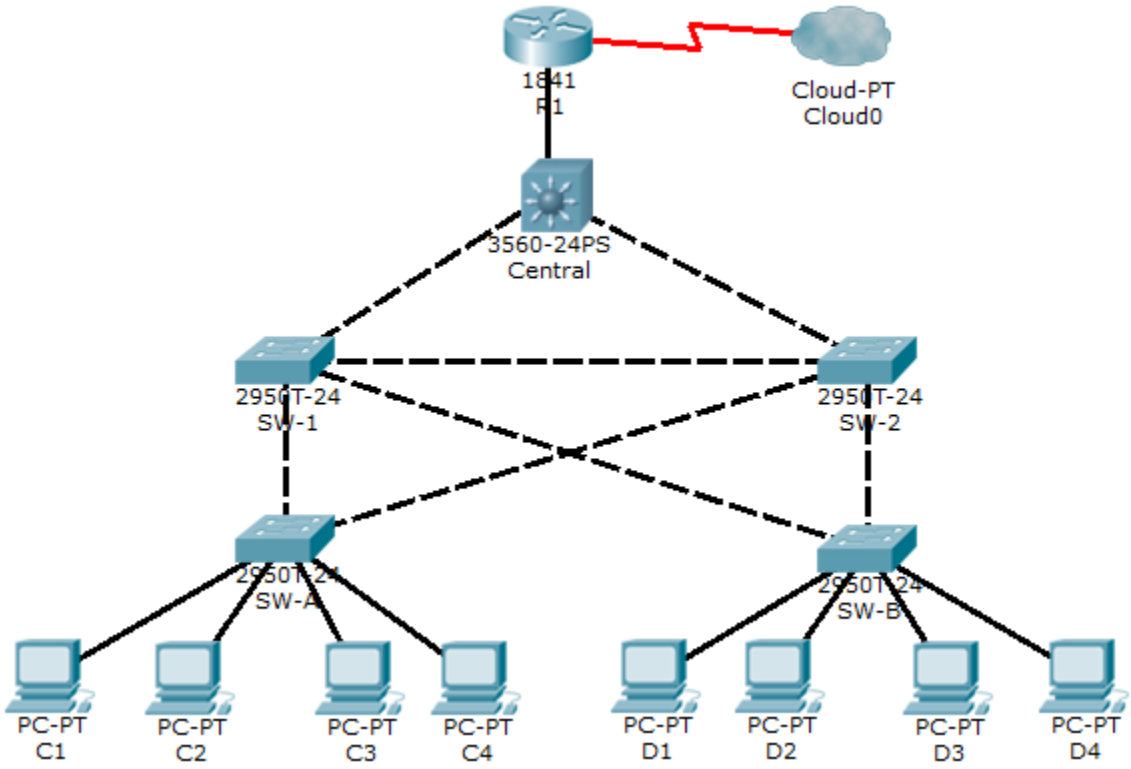
```
clock set 10:20:00 10 january 2014
mkdir ipsdir

config t
ip ips config location flash:ipsdir
ip ips name iosips
ip ips notify log
service timestamps log datetime msec
logging host 192.168.1.50

ip ips signature-category
 category all
 retired true
 exit
 category ios_ips basic
 retired false
 exit
 exit
```

```
interface fa0/0
 ip ips iosips out
 exit
ip ips signature-definition
 signature 2004 0
 status
 retired false
 enabled true
 exit
 engine
 event-action produce-alert
 event-action deny-packet-inline
 exit
 exit
 exit
```

Packet Tracer - Layer 2 Security (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Objectives

- Assign the Central switch as the root bridge.
- Secure spanning-tree parameters to prevent STP manipulation attacks.
- Enable storm control to prevent broadcast storms.
- Enable port security to prevent MAC address table overflow attacks.

Background / Scenario

There have been a number of attacks on the network recently. For this reason, the network administrator has assigned you the task of configuring Layer 2 security.

For optimum performance and security, the administrator would like to ensure that the root bridge is the 3560 Central switch. To prevent against spanning-tree manipulation attacks, the administrator wants to ensure that the STP parameters are secure. In addition, the network administrator would like to enable storm control to prevent broadcast storms. Finally, to prevent against MAC address table overflow attacks, the network administrator has decided to configure port security to limit the number of MAC addresses that can be learned per switch port. If the number of MAC addresses exceeds the set limit, the administrator would like the port to be shutdown.

All switch devices have been preconfigured with the following:

- Enable password: **ciscoenpa55**

- Console password: **ciscoconpa55**
- VTY line password: **ciscovtypa55**

Part 1: Configure Root Bridge

Step 1: Determine the current root bridge.

From **Central**, issue the **show spanning-tree** command to determine the current root bridge and to see the ports in use and their status.

Which switch is the current root bridge?

_____

Current root is SW-1

Based on the current root bridge, what is the resulting spanning tree? (Draw the spanning-tree topology.)

Step 2: Assign Central as the primary root bridge.

Using the **spanning-tree vlan 1 root primary** command, assign **Central** as the root bridge.

```
Central(config)# spanning-tree vlan 1 root primary
```

Step 3: Assign SW-1 as a secondary root bridge.

Assign **SW-1** as the secondary root bridge using the **spanning-tree vlan 1 root secondary** command.

```
SW-1(config)# spanning-tree vlan 1 root secondary
```

Step 4: Verify the spanning-tree configuration.

Issue the **show spanning-tree** command to verify that **Central** is the root bridge.

Which switch is the current root bridge?

_____

Current root is Central

Based on the new root-bridge, what is the resulting spanning tree? (Draw the spanning-tree topology.)

Part 2: Protect Against STP Attacks

Secure the STP parameters to prevent STP manipulation attacks.

Step 1: Enable PortFast on all access ports.

PortFast is configured on access ports that connect to a single workstation or server to enable them to become active more quickly. On the connected access ports of the **SW-A** and **SW-B**, use the **spanning-tree portfast** command.

```
SW-A(config)# interface range fastethernet 0/1 - 4
SW-A(config-if-range)# spanning-tree portfast

SW-B(config)# interface range fastethernet 0/1 - 4
SW-B(config-if-range)# spanning-tree portfast
```

Step 2: Enable BPDU guard on all access ports.

BPDU guard is a feature that can help prevent rogue switches and spoofing on access ports. Enable BPDU guard on **SW-A** and **SW-B** access ports.

```
SW-A(config)# interface range fastethernet 0/1 - 4
SW-A(config-if-range)# spanning-tree bpduguard enable

SW-B(config)# interface range fastethernet 0/1 - 4
SW-B(config-if-range)# spanning-tree bpduguard enable
```

Note: Spanning-tree BPDU guard can be enabled on each individual port using the **spanning-tree bpduguard enable** command in the interface configuration mode or the **spanning-tree portfast bpduguard default** command in the global configuration mode. For grading purposes in this activity, please use the **spanning-tree bpduguard enable** command.

Step 3: Enable root guard.

Root guard can be enabled on all ports on a switch that are not root ports. It is best deployed on ports that connect to other non-root switches. Use the **show spanning-tree** command to determine the location of the root port on each switch.

On **SW-1**, enable root guard on ports Fa0/23 and Fa0/24. On **SW-2**, enable root guard on ports Fa0/23 and Fa0/24.

```
SW-1(config)# interface range fa0/23 - 24
SW-1(config-if-range)# spanning-tree guard root

SW-2(config)# interface range fa0/23 - 24
SW-2(config-if-range)# spanning-tree guard root
```

Part 3: Enable Storm Control

Step 1: Enable storm control for broadcasts.

a. Enable storm control for broadcasts on all ports connecting switches (trunk ports).

b. Enable storm control on interfaces connecting **Central**, **SW-1**, and **SW-2**. Set a **50** percent rising suppression level using the **storm-control broadcast** command.

```
SW-1(config)# interface range gi1/1 , fa0/1 , fa0/23 - 24
SW-1(config-if)# storm-control broadcast level 50

SW-2(config)# interface range gi1/1 , fa0/1 , fa0/23 - 24
SW-2(config-if)# storm-control broadcast level 50

Central(config-if)# interface range gi0/1 , gi0/2 , fa0/1
Central(config-if)# storm-control broadcast level 50
```

Step 2: Verify storm control configuration.

Verify your configuration with the **show storm-control broadcast** and the **show run** commands.

Part 4: Configure Port Security and Disable Unused Ports

Step 1: Configure basic port security on all ports connected to host devices.

This procedure should be performed on all access ports on **SW-A** and **SW-B**. Set the maximum number of learned MAC address to **2**, allow the MAC address to be learned dynamically, and set the violation to **shutdown**.

Note: A switch port must be configured as an access port to enable port security.

```
SW-A(config)# interface range fa0/1 - 22
SW-A(config-if-range)# switchport mode access
SW-A(config-if-range)# switchport port-security
SW-A(config-if-range)# switchport port-security maximum 2
SW-A(config-if-range)# switchport port-security violation shutdown
SW-A(config-if-range)# switchport port-security mac-address sticky

SW-B(config)# interface range fa0/1 - 22
SW-B(config-if-range)# switchport mode access
SW-B(config-if-range)# switchport port-security
SW-B(config-if-range)# switchport port-security maximum 2
SW-B(config-if-range)# switchport port-security violation shutdown
SW-B(config-if-range)# switchport port-security mac-address sticky
```

Why would you not want to enable port security on ports connected to other switches or routers?

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Ports connected to other switch devices and routers can, and should, have a multitude of MAC addresses learned for that single port. Limiting the number of MAC addresses that can be learned on these ports can significantly impact network functionality.

Step 2: Verify port security.

On **SW-A**, issue the **show port-security interface fa0/1** command to verify that port security has been configured.

Step 3: Disable unused ports.

Disable all ports that are currently unused.

```
SW-A(config)# interface range fa0/5 - 22
SW-A(config-if-range)# shutdown

SW-B(config)# interface range fa0/5 - 22
SW-B(config-if-range)# shutdown
```

Step 4: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

!!!Script for Central

```
conf t
spanning-tree vlan 1 root primary
interface range gi0/1 , gi0/2 , fa0/1
 storm-control broadcast level 50
end
```

!!!Script for SW-1

```
conf t
spanning-tree vlan 1 root secondary
interface range fa0/23 - 24
 spanning-tree guard root
interface range gi1/1 , fa0/1 , fa0/23 - 24
 storm-control broadcast level 50
end
```

!!!Script for SW-2

```
conf t
interface range fa0/23 - 24
 spanning-tree guard root
interface range gi1/1 , fa0/1 , fa0/23 - 24
 storm-control broadcast level 50
end
```

!!!Script for SW-A

```
conf t
interface range fastethernet 0/1 - 4
 spanning-tree portfast
 spanning-tree bpduguard enable
interface range fa0/1 - 22
 switchport mode access
 switchport port-security
 switchport port-security maximum 2
 switchport port-security violation shutdown
 switchport port-security mac-address sticky
interface range fa0/5 - 22
 shutdown
end
```

!!!Script for SW-B

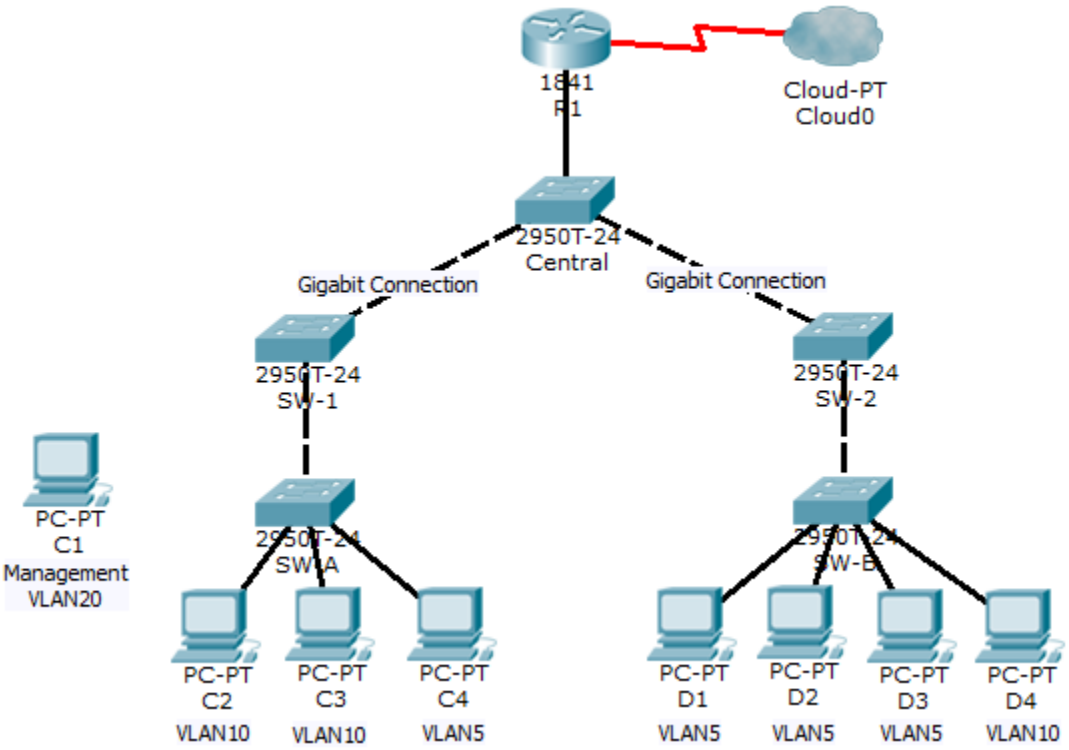
```
conf t
interface range fastethernet 0/1 - 4
 spanning-tree portfast
```

```
 spanning-tree bpduguard enable
interface range fa0/1 - 22
 switchport mode access
 switchport port-security
 switchport port-security maximum 2
 switchport port-security violation shutdown
 switchport port-security mac-address sticky
interface range fa0/5 - 22
 shutdown
end
```

Packet Tracer - Layer 2 VLAN Security (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Objectives

- Connect a new redundant link between SW-1 and SW-2.
- Enable trunking and configure security on the new trunk link between SW-1 and SW-2.
- Create a new management VLAN (VLAN 20) and attach a management PC to that VLAN.
- Implement an ACL to prevent outside users from accessing the management VLAN.

Background / Scenario

A company's network is currently set up using two separate VLANs: VLAN 5 and VLAN 10. In addition, all trunk ports are configured with native VLAN 15. A network administrator wants to add a redundant link between switch SW-1 and SW-2. The link must have trunking enabled and all security requirements should be in place.

In addition, the network administrator wants to connect a management PC to switch SW-A. The administrator would like to allow the management PC to be able to connect to all switches and the router, but does not want any other devices to connect to the management PC or the switches. The administrator would like to create a new VLAN 20 for management purposes.

All devices have been preconfigured with:

- Enable secret password: **ciscoenpa55**
- Console password: **ciscoconpa55**

- VTY line password: **ciscovtypa55**

Part 1: Verify Connectivity

Step 1: Verify connectivity between C2 (VLAN 10) and C3 (VLAN 10).

Step 2: Verify connectivity between C2 (VLAN 10) and D1 (VLAN 5).

Note: If using the simple PDU GUI packet, be sure to ping twice to allow for ARP.

Part 2: Create a Redundant Link Between SW-1 and SW-2

Step 1: Connect SW-1 and SW-2.

Using a crossover cable, connect port Fa0/23 on **SW-1** to port Fa0/23 on **SW-2**.

Step 2: Enable trunking, including all trunk security mechanisms on the link between SW-1 and SW-2.

Trunking has already been configured on all pre-existing trunk interfaces. The new link must be configured for trunking, including all trunk security mechanisms. On both **SW-1** and **SW-2**, set the port to trunk, assign native VLAN 15 to the trunk port, and disable auto-negotiation.

```
SW-1(config)# interface fa0/23
SW-1(config-if)# switchport mode trunk
SW-1(config-if)# switchport trunk native vlan 15
SW-1(config-if)# switchport nonegotiate
SW-1(config-if)# no shutdown

SW-2(config)# interface fa0/23
SW-2(config-if)# switchport mode trunk
SW-2(config-if)# switchport trunk native vlan 15
SW-2(config-if)# switchport nonegotiate
SW-2(config-if)# no shutdown
```

Part 3: Enable VLAN 20 as a Management VLAN

The network administrator wants to access all switch and routing devices using a management PC. For security, the administrator wants to ensure that all managed devices are on a separate VLAN.

Step 1: Enable a management VLAN (VLAN 20) on SW-A.

a. Enable VLAN 20 on **SW-A**.

```
SW-A(config)# vlan 20
SW-A(config-vlan)# exit
```

b. Create an interface VLAN 20 and assign an IP address within the 192.168.20.0/24 network.

```
SW-A(config)# interface vlan 20
SW-A(config-if)# ip address 192.168.20.1 255.255.255.0
```

Step 2: Enable the same management VLAN on all other switches.

a. Create the management VLAN on all switches: **SW-B**, **SW-1**, **SW-2**, and **Central**.

```
SW-B(config)# vlan 20
SW-B(config-vlan)# exit

SW-1(config)# vlan 20
SW-1(config-vlan)# exit

SW-2(config)# vlan 20
SW-2(config-vlan)# exit

Central(config)# vlan 20
Central(config-vlan)# exit
```

b. Create an interface VLAN 20 on all switches and assign an IP address within the 192.168.20.0/24 network.

```
SW-B(config)# interface vlan 20
SW-B(config-if)# ip address 192.168.20.2 255.255.255.0

SW-1(config)# interface vlan 20
SW-1(config-if)# ip address 192.168.20.3 255.255.255.0

SW-2(config)# interface vlan 20
SW-2(config-if)# ip address 192.168.20.4 255.255.255.0

Central(config)# interface vlan 20
Central(config-if)# ip address 192.168.20.5 255.255.255.0
```

Step 3: Configure the management PC and connect it to SW-A port Fa0/1.

Ensure that the management PC is assigned an IP address within the 192.168.20.0/24 network. Connect the management PC to **SW-A** port Fa0/1.

Step 4: On SW-A, ensure the management PC is part of VLAN 20.

Interface Fa0/1 must be part of VLAN 20.

```
SW-A(config)# interface fa0/1
SW-A(config-if)# switchport access vlan 20
SW-A(config-if)# no shutdown
```

Step 5: Verify connectivity of the management PC to all switches.

The management PC should be able to ping **SW-A**, **SW-B**, **SW-1**, **SW-2**, and **Central**.

Part 4: Enable the Management PC to Access Router R1

Step 1: Enable a new subinterface on router R1.

a. Create subinterface Fa0/0.3 and set encapsulation to dot1q 20 to account for VLAN 20.

```
R1(config)# interface fa0/0.3
R1(config-subif)# encapsulation dot1q 20
```

b. Assign an IP address within the 192.168.20.0/24 network.

```
R1(config)# interface fa0/0.3
R1(config-subif)# ip address 192.168.20.100 255.255.255.0
```

Step 2: Verify connectivity between the management PC and R1.

Be sure to configure the default gateway on the management PC to allow for connectivity.

Step 3: Enable security.

While the management PC must be able to access the router, no other PC should be able to access the management VLAN.

a. Create an ACL that denies any network from accessing the 192.168.20.0/24 network, but permits all other networks to access one another.

Example: (may vary from student configuration)

```
R1(config)# access-list 101 deny ip any 192.168.20.0 0.0.0.255
R1(config)# access-list 101 permit ip any any
```

b. Apply the ACL to the proper interface(s).

Example: (may vary from student configuration)

```
R1(config)# interface fa0/0.1
R1(config-subif)# ip access-group 101 in
R1(config-subif)# interface fa0/0.2
R1(config-subif)# ip access-group 101 in
```

Note: There are multiple ways in which an ACL can be created to accomplish the necessary security. For this reason, grading on this portion of the activity is based on the correct connectivity requirements. The management PC must be able to connect to all switches and the router. All other PCs should not be able to connect to any devices within the management VLAN.

Step 4: Verify security.

a. From the management PC, ping **SW-A**, **SW-B**, and **R1**. Were the pings successful? Explain.

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The pings should have been successful because all devices within the 192.168.20.0 network should be able to ping one another. Devices within VLAN20 are not required to route through the router.

b. From **D1**, ping the management PC. Were the pings successful? Explain.

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The ping should have failed. This is because in order for a device within a different VLAN to successfully ping a device within VLAN20, it must be routed. The router has an ACL that prevents all packets from accessing the 192.168.20.0 network.

Step 5: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

If all components appear to be correct and the activity still shows incomplete, it could be due to the connectivity tests that verify the ACL operation.

!!! Script for SW-1

```
conf t
interface fa0/23
 switchport mode trunk
 switchport trunk native vlan 15
 switchport nonegotiate
 no shutdown
vlan 20
 exit
interface vlan 20
 ip address 192.168.20.3 255.255.255.0
```

!!! Script for SW-2

```
conf t
interface fa0/23
 switchport mode trunk
 switchport trunk native vlan 15
 switchport nonegotiate
 no shutdown
vlan 20
 exit
interface vlan 20
 ip address 192.168.20.4 255.255.255.0
```

!!! Script for SW-A

```
conf t
vlan 20
 exit
interface vlan 20
 ip address 192.168.20.1 255.255.255.0
interface fa0/1
 switchport access vlan 20
 no shutdown
```

!!! Script for SW-B

```
conf t
vlan 20
 exit
interface vlan 20
 ip address 192.168.20.2 255.255.255.0
```

!!! Script for Central

```
conf t
vlan 20
 exit
interface vlan 20
 ip address 192.168.20.5 255.255.255.0
```

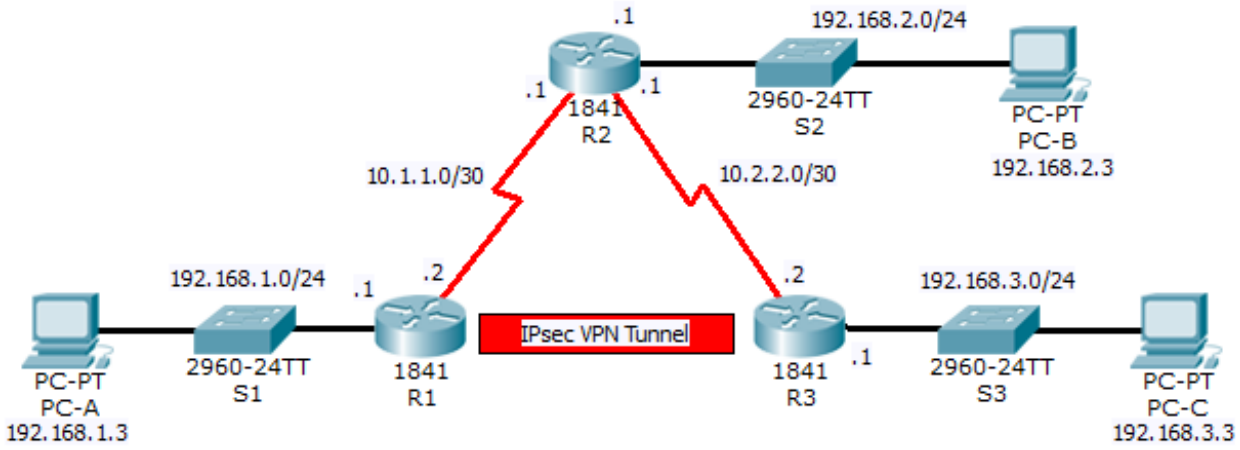
!!! Script for R1

```
conf t
interface fa0/0.3
 encapsulation dot1q 20
 ip address 192.168.20.100 255.255.255.0
access-list 101 deny ip any 192.168.20.0 0.0.0.255
access-list 101 permit ip any any
interface FastEthernet0/0.1
 ip access-group 101 in
interface FastEthernet0/0.2
 ip access-group 101 in
```

Packet Tracer - Configure and Verify a Site-to-Site IPsec VPN Using CLI (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	Fa0/0	192.168.1.1	255.255.255.0	N/A	S1 Fa0/1
	S0/0/0 (DCE)	10.1.1.2	255.255.255.252	N/A	N/A
R2	Fa0/0	192.168.2.1	255.255.255.0	N/A	S2 Fa0/2
	S0/0/0	10.1.1.1	255.255.255.252	N/A	N/A
	S0/0/1 (DCE)	10.2.2.1	255.255.255.252	N/A	N/A
R3	Fa0/0	192.168.3.1	255.255.255.0	N/A	S3 Fa0/5
	S0/0/1	10.2.2.2	255.255.255.252	N/A	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1	S1 Fa0/2
PC-B	NIC	192.168.2.3	255.255.255.0	192.168.2.1	S2 Fa0/1
PC-C	NIC	192.168.3.3	255.255.255.0	192.168.3.1	S3 Fa0/18

Objectives

- Verify connectivity throughout the network.
- Configure router R1 to support a site-to-site IPsec VPN with R3.

Background / Scenario

The network topology shows three routers. Your task is to configure routers R1 and R3 to support a site-to-site IPsec VPN when traffic flows between their respective LANs. The IPsec VPN tunnel is from router R1 to

router R3 via R2. R2 acts as a pass-through and has no knowledge of the VPN. IPsec provides secure transmission of sensitive information over unprotected networks, such as the Internet. IPsec operates at the network layer, protecting and authenticating IP packets between participating IPsec devices (peers), such as Cisco routers.

ISAKMP Phase 1 Policy Parameters

Parameters		R1	R3
Key distribution method	Manual or **ISAKMP**	**ISAKMP**	**ISAKMP**
Encryption algorithm	**DES**, 3DES, or AES	AES	AES
Hash algorithm	MD5 or **SHA-1**	**SHA-1**	**SHA-1**
Authentication method	Pre-shared keys or **RSA**	pre-share	pre-share
Key exchange	DH Group 1, 2, or 5	DH 2	DH 2
IKE SA Lifetime	86400 seconds or less	**86400**	**86400**
ISAKMP Key		vpnpa55	vpnpa55

Note: Bolded parameters are defaults. Only unbolded parameters have to be explicitly configured.

IPsec Phase 2 Policy Parameters

Parameters	R1	R3
Transform Set	VPN-SET	VPN-SET
Peer Hostname	R3	R1
Peer IP Address	10.2.2.2	10.1.1.2
Network to be encrypted	192.168.1.0/24	192.168.3.0/24
Crypto Map name	VPN-MAP	VPN-MAP
SA Establishment	ipsec-isakmp	ipsec-isakmp

The routers have been pre-configured with the following:

- Password for console line: **ciscoconpa55**
- Password for vty lines: **ciscovtypa55**
- Enable password: **ciscoenpa55**
- RIP version 2

Part 1: Configure IPsec Parameters on R1

Step 1: Test connectivity.

Ping from **PC-A** to **PC-C**.

Step 2: Identify interesting traffic on R1.

Configure ACL **110** to identify the traffic from the LAN on **R1** to the LAN on **R3** as interesting. This interesting traffic will trigger the IPsec VPN to be implemented whenever there is traffic between **R1** to **R3** LANs. All

other traffic sourced from the LANs will not be encrypted. Because of the implicit deny all, there is no need to configure a **deny any any** statement.

```
R1(config)# access-list 110 permit ip 192.168.1.0 0.0.0.255 192.168.3.0
0.0.0.255
```

Step 3: Configure the ISAKMP Phase 1 properties on R1.

Configure the crypto ISAKMP policy **10** properties on **R1** along with the shared crypto key **vpnpa55**. Refer to the ISAKMP Phase 1 table for the specific parameters to configure. Default values do not have to be configured; therefore, only the encryption, key exchange method, and DH method must be configured.

```
R1(config)# crypto isakmp policy 10
R1(config-isakmp)# encryption aes
R1(config-isakmp)# authentication pre-share
R1(config-isakmp)# group 2
R1(config-isakmp)# exit
R1(config)# crypto isakmp key vpnpa55 address 10.2.2.2
```

Step 4: Configure the ISAKMP Phase 2 properties on R1.

a. Create the transform-set **VPN-SET** to use **esp-3des** and **esp-sha-hmac**.

```
R1(config)# crypto ipsec transform-set VPN-SET esp-3des esp-sha-hmac
```

b. Create the crypto map **VPN-MAP** that binds all of the Phase 2 parameters together. Use sequence number **10** and identify it as an **ipsec-isakmp** map.

```
R1(config)# crypto map VPN-MAP 10 ipsec-isakmp
R1(config-crypto-map)# description VPN connection to R3
R1(config-crypto-map)# set peer 10.2.2.2
R1(config-crypto-map)# set transform-set VPN-SET
R1(config-crypto-map)# match address 110
R1(config-crypto-map)# exit
```

Step 5: Configure the crypto map on the outgoing interface.

Bind the **VPN-MAP** crypto map to the outgoing Serial 0/0/0 interface.

```
R1(config)# interface S0/0/0
R1(config-if)# crypto map VPN-MAP
```

Part 2: Configure IPsec Parameters on R3

Step 1: Configure router R3 to support a site-to-site VPN with R1.

Now configure reciprocating parameters on **R3**. Configure ACL **110** identifying the traffic from the LAN on **R3** to the LAN on **R1** as interesting.

```
R3(config)# access-list 110 permit ip 192.168.3.0 0.0.0.255 192.168.1.0
0.0.0.255
```

Step 2: Configure the ISAKMP Phase 1 properties on R3.

Configure the crypto ISAKMP policy **10** properties on **R3** along with the shared crypto key **vpnpa55**.

```
R3(config)# crypto isakmp policy 10
R3(config-isakmp)# encryption aes
```

```
R3(config-isakmp)# authentication pre-share
R3(config-isakmp)# group 2
R3(config-isakmp)# exit
R3(config)# crypto isakmp key vpnpa55 address 10.1.1.2
```

Step 3: Configure the ISAKMP Phase 2 properties on R1.

a. Like you did on **R1**, create the transform-set **VPN-SET** to use **esp-3des** and **esp-sha-hmac**.

```
R3(config)# crypto ipsec transform-set VPN-SET esp-3des esp-sha-hmac
```

b. Create the crypto map **VPN-MAP** that binds all of the Phase 2 parameters together. Use sequence number **10** and identify it as an **ipsec-isakmp** map.

```
R3(config)# crypto map VPN-MAP 10 ipsec-isakmp
R3(config-crypto-map)# description VPN connection to R1
R3(config-crypto-map)# set peer 10.1.1.2
R3(config-crypto-map)# set transform-set VPN-SET
R3(config-crypto-map)# match address 110
R3(config-crypto-map)# exit
```

Step 4: Configure the crypto map on the outgoing interface.

Bind the **VPN-MAP** crypto map to the outgoing Serial 0/0/1 interface. **Note**: This is not graded.

```
R3(config)# interface S0/0/1
R3(config-if)# crypto map VPN-MAP
```

Part 3: Verify the IPsec VPN

Step 1: Verify the tunnel prior to interesting traffic.

Issue the **show crypto ipsec sa** command on **R1**. Notice that the number of packets encapsulated, encrypted, decapsulated and decrypted are all set to 0.

Step 2: Create interesting traffic.

From **PC-A**, ping **PC-C**.

Step 3: Verify the tunnel after interesting traffic.

On **R1**, re-issue the **show crypto ipsec sa** command. Now notice that the number of packets is more than 0 indicating that the IPsec VPN tunnel is working.

Step 4: Create uninteresting traffic.

From **PC-A**, ping **PC-B**.

Step 5: Verify the tunnel.

On R1, re-issue the **show crypto ipsec sa** command. Notice that the number of packets has not changed verifying that uninteresting traffic is not encrypted.

Step 6: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

!!! Script for R1

```
config t
access-list 110 permit ip 192.168.1.0 0.0.0.255 192.168.3.0 0.0.0.255
crypto isakmp policy 10
 encryption aes
 authentication pre-share
 group 2
 exit
crypto isakmp key vpnpa55 address 10.2.2.2
crypto ipsec transform-set VPN-SET esp-3des esp-sha-hmac
crypto map VPN-MAP 10 ipsec-isakmp
 description VPN connection to R3
 set peer 10.2.2.2
 set transform-set VPN-SET
 match address 110
 exit
interface S0/0/0
 crypto map VPN-MAP
```

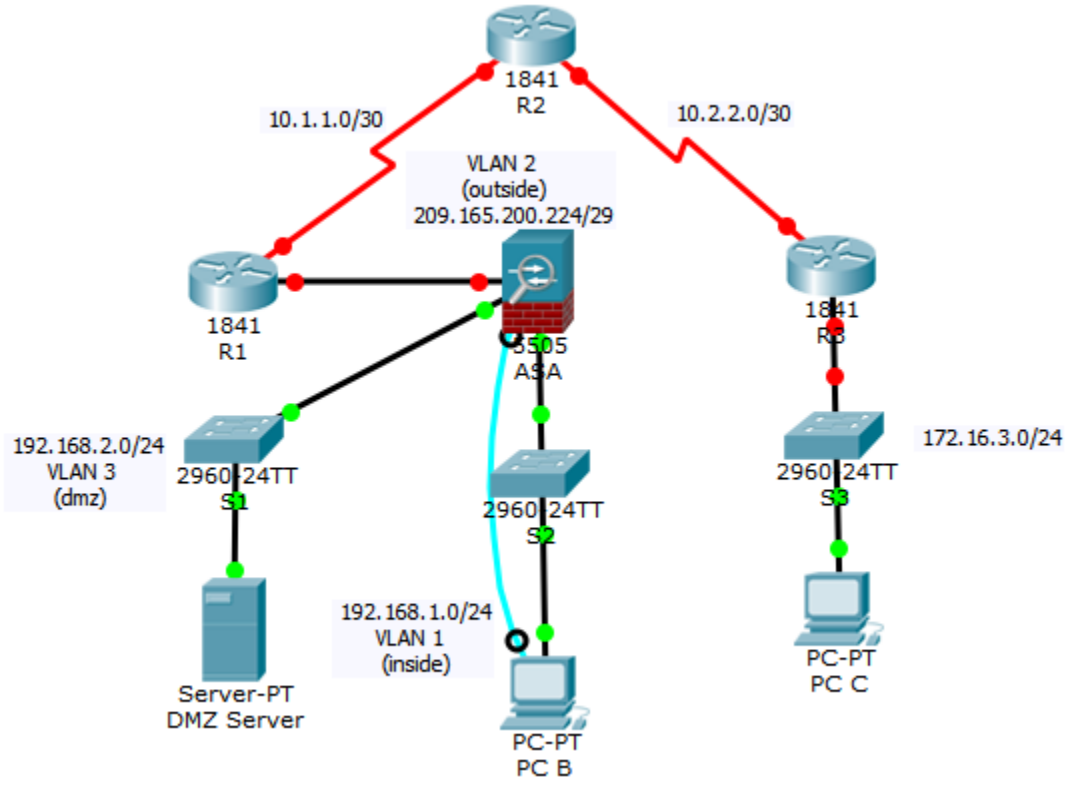
!!! Script for R3

```
config t
access-list 110 permit ip 192.168.3.0 0.0.0.255 192.168.1.0 0.0.0.255
crypto isakmp policy 10
 encryption aes
 authentication pre-share
 group 2
 exit
crypto isakmp key vpnpa55 address 10.1.1.2
crypto ipsec transform-set VPN-SET esp-3des esp-sha-hmac
 crypto map VPN-MAP 10 ipsec-isakmp
 description VPN connection to R1
 set peer 10.1.1.2
 set transform-set VPN-SET
 match address 110
 exit
interface S0/0/1
 crypto map VPN-MAP
```

Packet Tracer - Configuring ASA Basic Settings and Firewall Using CLI (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



IP Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	209.165.200.225	255.255.255.248	N/A
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A
R3	Fa0/1	172.16.3.1	255.255.255.0	N/A
	S0/0/1	10.2.2.1	255.255.255.252	N/A
ASA	VLAN 1 (E0/1)	192.168.1.1	255.255.255.0	NA
ASA	VLAN 2 (E0/0)	209.165.200.226	255.255.255.248	NA
ASA	VLAN 3 (E0/2)	192.168.2.1	255.255.255.0	NA
DMZ Server	NIC	192.168.2.3	255.255.255.0	192.168.2.1
PC-B	NIC	192.168.1.3	255.255.255.0	192.168.1.1
PC-C	NIC	172.16.3.3	255.255.255.0	172.16.3.1

Objectives

- Verify Connectivity and Explore the ASA
- Configure Basic ASA Settings and Interface Security Levels Using CLI
- Configure Routing, Address Translation, and Inspection Policy Using CLI
- Configure DHCP, AAA, and SSH
- Configure a DMZ, Static NAT, and ACLs

Scenario

Your company has one location connected to an ISP. R1 represents a customer premises equipment (CPE) device managed by the ISP. R2 represents an intermediate Internet router. R3 represents an ISP that connects an administrator from a network management company, who has been hired to manage your network remotely. The ASA is an edge CPE security device that connects the internal corporate network and DMZ to the ISP while providing NAT and DHCP services to inside hosts. The ASA will be configured for management by an administrator on the internal network and by the remote administrator. Layer 3 VLAN interfaces provide access to the three areas created in the activity: Inside, Outside, and DMZ. The ISP has assigned the public IP address space of 209.165.200.224/29, which will be used for address translation on the ASA.

Note: This Packet Tracer activity is not a substitute for doing the ASA labs. This activity provides additional practice and simulates most of the ASA 5505 configurations. When compared to a real ASA 5505, there may be slight differences in command output or commands that are not yet supported in Packet Tracer.

Part 1: Verify Connectivity and Explore the ASA

Note: This Packet Tracer activity starts 9 of 45 Assessment Items marked as complete to verify that you do not inadvertently remove or change a default configuration.

Step 1: Verify connectivity.

The **ASA** is currently not configured. However, all routers, PCs, and the DMZ Server are configured. Verify that **PC-C** can ping any router interface. **PC-C** is unable to ping the **ASA**, **PC-B**, or the **DMZ** Server.

Step 2: Determine the ASA version, interfaces, and license.

Use the **show version** command to determine various aspects of this ASA device.

Step 3: Determine the file system and contents of flash memory.

a. Enter privileged EXEC mode. No password is set yet. Press **Enter** when prompted for a password.

b. Use the **show file system** command to display the ASA file system and to determine what prefixes are supported.

c. Use the **show flash:** or **show disk0:** command to display the contents of flash memory.

Part 2: Configure ASA Settings and Interface Security Using the CLI

Tip: You will find that many ASA CLI commands are similar to, if not the same, as those used with the Cisco IOS CLI. In addition, moving between configuration modes and submodes is essentially the same.

Step 1: Configure the hostname and domain name.

a. Configure the ASA hostname as **CCNAS-ASA**.

b. Configure the domain name as **ccnasecurity.com**.

Step 2: Configure the enable mode password.

Use the **enable password** command to change the privileged EXEC mode password to **class**.

Step 3: Set the date and time.

Use the **clock set** command to manually set the date and time (although not scored).

Step 4: Configure the inside and outside interfaces.

You will only configure the VLAN 1 (inside) and VLAN 2 (outside) interfaces at this time. The VLAN 3 (dmz) interface will be configured in Part 6 of the activity.

a. Configure a logical VLAN 1 interface for the inside network, 192.168.1.0/24, and set the security level to the highest setting of 100.

```
CCNAS-ASA(config)# interface vlan 1
CCNAS-ASA(config-if)# nameif inside
CCNAS-ASA(config-if)# ip address 192.168.1.1 255.255.255.0
CCNAS-ASA(config-if)# security-level 100
```

b. Create a logical VLAN 2 interface for the outside network, 209.165.200.224/29, set the security level to the lowest setting of 0, and bring up the VLAN 2 interface.

```
CCNAS-ASA(config-if)# interface vlan 2
CCNAS-ASA(config-if)# nameif outside
CCNAS-ASA(config-if)# ip address 209.165.200.226 255.255.255.248
CCNAS-ASA(config-if)# security-level 0
```

c. Use the following verification commands to check your configurations:

1) Use the **show interface ip brief** command to display the status for all ASA interfaces. **Note**: This command is different from the IOS command **show ip interface brief**. If any of the physical or logical interfaces previously configured are not up/up, troubleshoot as necessary before continuing.

   Tip: Most ASA **show** commands, including **ping**, **copy**, and others, can be issued from within any configuration mode prompt without the **do** command required with the IOS CLI.

2) Use the **show ip address** command to display the information for the Layer 3 VLAN interfaces.

3) Use the **show switch vlan** command to display the inside and outside VLANs configured on the ASA and to display the assigned ports.

Step 5: Test connectivity to the ASA.

a. You should be able to ping from **PC-B** to the **ASA** inside interface address (192.168.1.1). If the pings fail, troubleshoot the configuration as necessary.

b. From **PC-B**, ping the VLAN 2 (outside) interface at IP address 209.165.200.226. You should not be able to ping this address.

Part 3: Configure Routing, Address Translation, and Inspection Policy Using the CLI

Step 1: Configure a static default route for the ASA.

To enable the ASA to reach external networks, you will configure a default static route on the ASA outside interface.

a. Create a “quad zero” default route using the **route** command, associate it with the ASA outside interface, and point to the **R1** Fa0/0 IP address 209.165.200.225 as the gateway of last resort.

```
CCNAS-ASA(config)# route outside 0.0.0.0 0.0.0.0 209.165.200.225
```

b. Issue the **show route** command to verify the static default route is in the ASA routing table.

c. Verify the **ASA** can ping the **R1** S0/0/0 IP address 10.1.1.1. If the ping is unsuccessful, troubleshoot, as necessary.

Step 2: Configure address translation using PAT and network objects.

a. Create network object **inside-net** and assign attributes to it using the **subnet** and **nat** commands.

```
CCNAS-ASA(config)# object network inside-net
CCNAS-ASA(config-network-object)# subnet 192.168.1.0 255.255.255.0
CCNAS-ASA(config-network-object)# nat (inside,outside) dynamic interface
CCNAS-ASA(config-network-object)# end
```

b. The ASA splits the configuration into the object portion that defines the network to be translated and the actual **nat** command parameters. These appear in two different places in the running configuration. Display the NAT object configuration using the **show run** command.

c. From **PC-B** attempt to ping the **R1** Fa0/0 interface at IP address 209.165.200.225. The pings should fail.

d. Issue the **show nat** command on the ASA to see the translated and untranslated hits. Notice that, of the pings from **PC-B**, four were translated and four were not. The outgoing pings (echos) were translated and sent to the destination. The returning echo replies were blocked by the firewall policy. You will configure the default inspection policy to allow ICMP in the next step.

Step 3: Modify the default MPF application inspection global service policy.

For application layer inspection and other advanced options, the Cisco Modular Policy Framework (MPF) is available on ASAs.

The Packet Tracer ASA device does not have an MPF policy map in place, by default; therefore, as a modification, we can create the default policy map that will perform the inspection on inside-to-outside traffic. When configured correctly only traffic initiated from the inside is allowed back in to the outside interface. You will need to add ICMP to the inspection list.

a. Create the **class-map**, **policy-map**, and **service-policy**. Add the inspection of ICMP traffic to the policy map list using the following commands:

```
CCNAS-ASA(config)# class-map inspection_default
CCNAS-ASA(config-cmap)# match default-inspection-traffic
CCNAS-ASA(config-cmap)# exit
CCNAS-ASA(config)# policy-map global_policy
CCNAS-ASA(config-pmap)# class inspection_default
CCNAS-ASA(config-pmap-c)# inspect icmp
CCNAS-ASA(config-pmap-c)# exit
CCNAS-ASA(config)# service-policy global_policy global
```

b. From **PC-B**, attempt to ping the **R1** Fa0/0 interface at IP address 209.165.200.225. The pings should be successful this time because ICMP traffic is now being inspected and legitimate return traffic is being allowed. If the pings fail, troubleshoot your configurations.

Part 4: Configure DHCP, AAA, and SSH

Step 1: Configure the ASA as a DHCP server.

a. Configure a DHCP address pool and enable it on the ASA inside interface.

```
CCNAS-ASA(config)# dhcpd address 192.168.1.5-192.168.1.36 inside
```

b. (Optional) Specify the IP address of the DNS server to be given to clients.

```
CCNAS-ASA(config)# dhcpd dns 209.165.201.2 interface inside
```

c. Enable the DHCP daemon within the ASA to listen for DHCP client requests on the enabled interface (inside).

```
CCNAS-ASA(config)# dhcpd enable inside
```

d. Change **PC-B** from a static IP address to a DHCP client, and verify that it receives IP addressing information. Troubleshoot, as necessary, to resolve any problems.

Step 2: Configure AAA to use the local database for authentication.

a. Define a local user named **admin** by entering the **username** command. Specify a password of **cisco123**.

```
CCNAS-ASA(config)# username admin password cisco123
```

b. Configure AAA to use the local ASA database for Telnet and SSH user authentication.

```
CCNAS-ASA(config)# aaa authentication ssh console LOCAL
CCNAS-ASA(config)# aaa authentication telnet console LOCAL
```

Step 3: Configure remote access to the ASA.

You can configure the ASA to accept connections from a single host or a range of hosts on the inside or outside network. In this step, hosts from the outside network can only use SSH to communicate with the ASA. SSH and Telnet sessions can be used access the ASA from the inside network.

a. Generate an RSA key pair, which is required to support SSH connections. Because the ASA device has RSA keys already in place, enter **no** when prompted to replace them.

```
CCNAS-ASA(config)# crypto key generate rsa modulus 1024
WARNING: You have a RSA keypair already defined named <Default-RSA-Key>.

Do you really want to replace them? [yes/no]: no
ERROR: Failed to create new RSA keys named <Default-RSA-Key>
```

b. Configure the ASA to allow Telnet connection from any host on the inside network 192.168.1.0/24. Set the Telnet session timeout to 10 minutes.

```
CCNAS-ASA(config)# telnet 192.168.1.0 255.255.255.0 inside
CCNAS-ASA(config)# telnet timeout 10
```

c. Configure the ASA to allow SSH connections from any host on the inside network 192.168.1.0/24 and from the remote management host at the branch office (172.16.3.3) on the outside network. Set the SSH timeout to 10 minutes (the default is 5 minutes).

```
CCNAS-ASA(config)# ssh 192.168.1.0 255.255.255.0 inside
CCNAS-ASA(config)# ssh 172.16.3.3 255.255.255.255 outside
CCNAS-ASA(config)# ssh timeout 10
```

Part 5: Configure a DMZ, Static NAT, and ACLs

R1 Fa0/0 and the **ASA** outside interface already use 209.165.200.225 and .226, respectively. You will use public address 209.165.200.227 and static NAT to provide address translation access to the server.

Step 1: Configure the DMZ interface VLAN 3 on the ASA.

a. Configure DMZ VLAN 3, which is where the public access web server will reside. Assign it IP address 192.168.2.1/24, name it **dmz**, and assign it a security level of 70. Because the server does not need to initiate communication with the inside users, disable forwarding to interface VLAN 1.

```
CCNAS-ASA(config)# interface vlan 3
CCNAS-ASA(config-if)# ip address 192.168.2.1 255.255.255.0
CCNAS-ASA(config-if)# no forward interface vlan 1
CCNAS-ASA(config-if)# nameif dmz
INFO: Security level for "dmz" set to 0 by default.
CCNAS-ASA(config-if)# security-level 70
```

b. Assign **ASA** physical interface E0/2 to DMZ VLAN 3 and enable the interface.

```
CCNAS-ASA(config-if)# interface Ethernet0/2
CCNAS-ASA(config-if)# switchport access vlan 3
```

c. Use the following verification commands to check your configurations:

1) Use the **show interface ip brief** command to display the status for all **ASA** interfaces.

2) Use the **show ip address** command to display the information for the Layer 3 VLAN interfaces.

3) Use the **show switch vlan** command to display the inside and outside VLANs configured on the **ASA** and to display the assigned ports.

Step 2: Configure static NAT to the DMZ server using a network object.

Configure a network object named **dmz-server** and assign it the static IP address of the **DMZ** server (192.168.2.3). While in object definition mode, use the **nat** command to specify that this object is used to translate a DMZ address to an outside address using static NAT, and specify a public translated address of 209.165.200.227.

```
CCNAS-ASA(config)# object network dmz-server
CCNAS-ASA(config-network-object)# host 192.168.2.3
CCNAS-ASA(config-network-object)# nat (dmz,outside) static 209.165.200.227
CCNAS-ASA(config-network-object)# exit
```

Step 3: Configure an ACL to allow access to the DMZ server from the Internet.

Configure a named access list **OUTSIDE-DMZ** that permits the TCP protocol on port 80 from any external host to the internal IP address of the DMZ server. Apply the access list to the **ASA** outside interface in the "IN" direction.

```
CCNAS-ASA(config)# access-list OUTSIDE-DMZ permit icmp any host 192.168.2.3
CCNAS-ASA(config)# access-list OUTSIDE-DMZ permit tcp any host 192.168.2.3 eq
80
CCNAS-ASA(config)# access-group OUTSIDE-DMZ in interface outside
```

Note: Unlike IOS ACLs, the **ASA** ACL **permit** statement must permit access to the internal private DMZ address. External hosts access the server using its public static NAT address, and the **ASA** translates it to the internal host IP address and applies the ACL.

Step 4: Test access to the DMZ server.

At the time this Packet Tracer activity was created, the ability to successfully test outside access to the DMZ web server was not in place; therefore, successful testing is not required.

Step 5: Check results.

Your completion percentage should be 100%. Click **Check Results** to see feedback and verification of which required components have been completed.

Scripts

ASA

```
enable
!<Enter> for password
conf t
hostname CCNAS-ASA
domain-name ccnasecurity.com
enable password class
clock set 13:12:51 June 30 2014
interface vlan 1
 nameif inside
 ip address 192.168.1.1 255.255.255.0
 security-level 100
interface vlan 2
```

```
 nameif outside
 ip address 209.165.200.226 255.255.255.248
 security-level 0
route outside 0.0.0.0 0.0.0.0 209.165.200.225
object network inside-net
 subnet 192.168.1.0 255.255.255.0
 nat (inside,outside) dynamic interface
class-map inspection_default
 match default-inspection-traffic
 exit
policy-map global_policy
 class inspection_default
 inspect icmp
 exit
service-policy global_policy global
dhcpd address 192.168.1.5-192.168.1.36 inside
dhcpd dns 209.165.201.2 interface inside
dhcpd enable inside
username admin password cisco123
aaa authentication ssh console LOCAL
aaa authentication telnet console LOCAL
crypto key generate rsa modulus 1024
no
telnet 192.168.1.0 255.255.255.0 inside
telnet timeout 10
ssh 192.168.1.0 255.255.255.0 inside
ssh 172.16.3.3 255.255.255.255 outside
ssh timeout 10
interface vlan 3
 ip address 192.168.2.1 255.255.255.0
 no forward interface vlan 1
 nameif dmz
 security-level 70
interface Ethernet0/2
 switchport access vlan 3
object network dmz-server
 host 192.168.2.3
 nat (dmz,outside) static 209.165.200.227
access-list OUTSIDE-DMZ permit icmp any host 192.168.2.3
access-list OUTSIDE-DMZ permit tcp any host 192.168.2.3 eq 80
access-group OUTSIDE-DMZ in interface outside
```

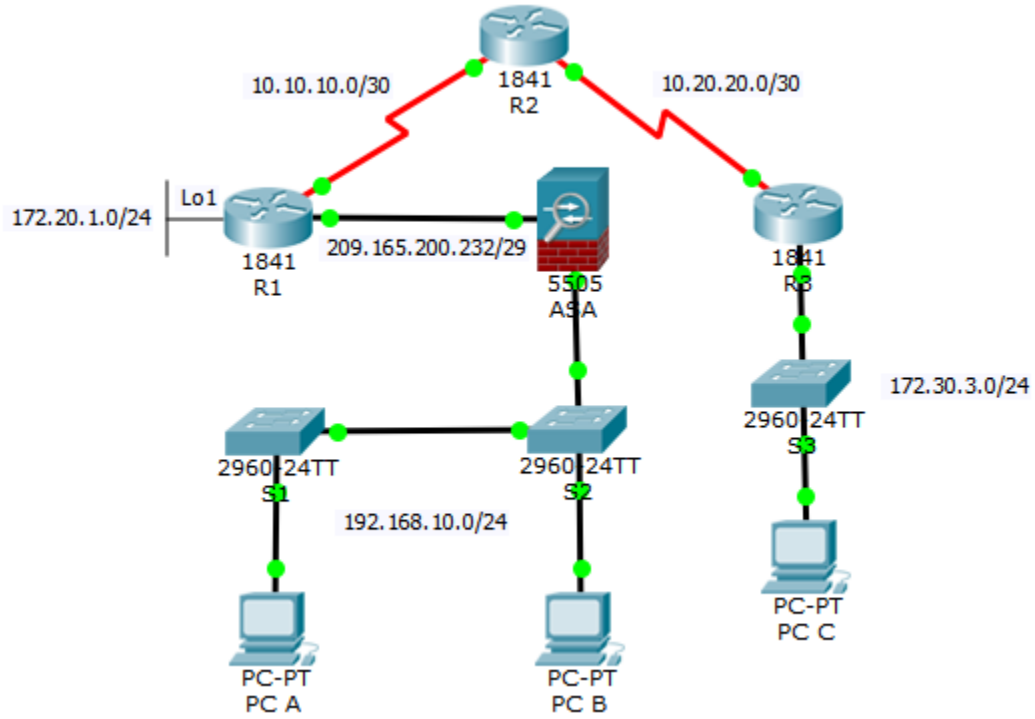
PC-B

```
-Change from static to DHCP addressing
```

Packet Tracer - Skills Integration Challenge (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	209.165.200.233	255.255.255.248	N/A
	S0/0/0 (DCE)	10.10.10.1	255.255.255.252	N/A
	Loopback 1	172.20.1.1	255.255.255.0	N/A
R2	S0/0/0	10.10.10.2	255.255.255.252	N/A
	S0/0/1 (DCE)	10.20.20.2	255.255.255.252	N/A
R3	Fa0/1	172.30.3.1	255.255.255.0	N/A
	S0/0/1	10.20.20.1	255.255.255.252	N/A
S1	VLAN 1	192.168.10.11	255.255.255.0	192.168.10.1
S2	VLAN 1	192.168.10.12	255.255.255.0	192.168.10.1
S3	VLAN 1	172.30.3.11	255.255.255.0	172.30.3.1
ASA	VLAN 1 (E0/1)	192.168.10.1	255.255.255.0	N/A
	VLAN 2 (E0/0)	209.165.200.234	255.255.255.248	N/A
PC-A	NIC	192.168.10.2	255.255.255.0	192.168.10.1
PC-B	NIC	192.168.10.3	255.255.255.0	192.168.10.1
PC-C	NIC	172.16.3.3	255.255.255.0	172.16.3.1

Objectives

- Configure Basic Router Security
- Configure Basic Switch Security
- Configure AAA Local Authentication
- Configure SSH
- Secure Against Login Attacks
- Configure Site-to-Site IPsec VPNs
- Configure Firewall and IPS Settings
- Configure ASA Basic Security and Firewall Settings

Scenario

This culminating activity includes many of the skills that you have acquired during this course. The routers and switches are preconfigured with the basic device settings, such as IP addressing and routing. You will secure routers using the CLI to configure various IOS features, including AAA, SSH, and Zone-Based Policy Firewall (ZPF). You will also configure a site-to-site VPN between R1 and R3. You will also secure the switches on the network. In addition, you will also configure firewall functionality on the ASA.

Requirements

Note: Not all security features will be configured on all devices, although they normally would be in a production network.

Configure Basic Router Security

- Configure the following on **R1**:
  - Minimum password length is 10 characters.
  - Encrypt plaintext passwords.
  - Privileged EXEC mode secret password is **ciscoenapa55**.
  - Console line password is **ciscoconpa55**, timeout is **15** minutes, and console messages should not interrupt command entry.
  - A message-of-the-day (MOTD) banner should include the word **unauthorized**.
- Configure the following on **R2**:
  - Privileged EXEC mode secret password is **ciscoenapa55**.
  - Password for the vty lines is **ciscovtypa55**, timeout is **15** minutes, and login is required.

Configure Basic Switch Security

- Configure the following on S1:
  - Encrypt plaintext passwords.
  - Privileged EXEC mode secret password is **ciscoenapa55**.
  - Console line password is **ciscoconpa55**, timeout is **5** minutes, and consoles messages should not interrupt command entry.
  - Password for the vty lines is **ciscovtypa55**, timeout is **5** minutes, and login is required.
  - A MOTD banner should include the word **unauthorized**.
- Configure trunking between S1 and S2 with the following settings:
  - Set the mode to **trunk** and assign VLAN **99** as the native VLAN.
  - Disable the generation of DTP frames.
  - Enable storm control for broadcasts to a **50** percent suppression level.
- Configure the S1 with the following port settings:
  - Fa0/6 should only allow access mode, set to **PortFast**, and enable BPDU guard.
  - Fa0/6 uses basic default port security with dynamically learned MAC addresses added to the running configuration.
  - All other ports should be disabled.

    Note: Although not all ports are checked, your instructor may want to verify that all unused ports are disabled.

Configure AAA Local Authentication

- Configure the following on **R1**:
  - Create a local user account of **Admin01**, a secret password of **Admin01pa55**, and a privilege level of **15**.
  - Enable AAA services.
  - Implement AAA services using the local database as the first option and then the **enable** password as the backup option.

Configure SSH

- Configure the following on **R1**:

  Note: The RSA key is already generated.

  - The domain name is **ccnasecurity.com**
  - The RSA key should be generated with a **1024** modulus bits.
  - Only SSH version 2 is allowed.
  - Only SSH is allowed on vty lines.
- Verify that **PC-C** can remotely access **R1** (209.165.200.233) using SSH.

Secure Against Login Attacks

- Configure the following on **R1**:
  - If a user fails to log in twice within a 30-second time span, then disable logins for one minute.
  - Log all failed login attempts.

Configure Site-to-Site IPsec VPNs

Note: Some VPN configurations are not scored. However, you should be able to verify connectivity across the IPsec VPN tunnel.

Instructor Note: Packet Tracer 6.1.0.0110 is crashes if any observables in the "IKE > Crypto Map Sets" branch are checked off and then the activity is tested.

- Configure the following on **R1**:
  - Create an access-list to identify interesting traffic on **R1**.
    - Configure ACL **101** to allow traffic from the **R1** Lo1 network to the R3 Fa0/1 LAN.
    - Explicitly deny all other traffic.
  - Configure the **crypto isakmp policy 10** Phase 1 properties on **R1** along with the shared crypto key **ciscovpnpa55**. Use the following parameters:
    - Key distribution method: **ISAKMP**
    - Encryption: **aes 256**
    - Hash: **sha-1**
    - Authentication method: **pre-shared**
    - Key exchange: **DH Group 5**
    - IKE SA lifetime: **3600**
    - ISAKMP key: **ciscovpnpa55**
  - Create the transform set **VPN-SET** to use **esp-aes 256** and **esp-sha-hmac**. Then create the crypto map **CMAP** that binds all of the Phase 2 parameters together. Use sequence number **10** and identify it as an **ipsec-isakmp** map. Use the following parameters:
    - Transform Set: **VPN-SET**
    - Transform Encryption: **esp-aes 256**
    - Transform Authentication: **esp-sha-hmac**
    - Perfect Forward Secrecy (PFS): **group5**
    - Crypto Map name: **CMAP**
    - SA Establishment: **ipsec-isakmp**
  - Bind the crypto map **CMAP** to the outgoing interface.
- Repeat the site-to-site VPN configurations on **R3** so that they mirror all configurations from **R1**.
- Ping the Lo1 interface (172.20.1.1) on **R1** from **PC-C**. Then on **R3**, use the **show crypto ipsec sa** command to verify the number of packets is more than 0, indicating that the IPsec VPN tunnel is working.

Configure Firewall and IPS Settings

- Configure a ZPF on **R3** using the following requirements:

- Create zones named **IN-ZONE** and **OUT-ZONE**.
- Create an ACL number **110** that defines internal traffic, permitting all IP protocols from the **172.30.3.0/24** source network to any destination. Explicitly deny all other traffic.
- Create a class map named **INTERNAL-CLASS-MAP** that uses the **match-all** option and ACL **110**.
- Create a policy map named **IN-2-OUT-PMAP** that uses the class map **INTERNAL-CLASS-MAP** to **inspect** all matched traffic.
- Create a zone pair named **IN-2-OUT-ZPAIR** that identifies **IN-ZONE** as the source zone and **OUT-ZONE** as the destination zone.
- Specify that the **IN-2-OUT-PMAP** policy map is to be used to **inspect** traffic between the two zones.
- Assign Fa0/1 as an **IN-ZONE** member and S0/0/1 as an **OUT-ZONE** member.

- Configure an IPS on **R3** using the following requirements:

  Note: Within Packet Tracer, the routers already have the signature files imported and in place. They are the default XML files in flash. For this reason, it is not necessary to configure the public crypto key and complete a manual import of the signature files.

  - Create a directory in flash named **ipsdir** and set it as the location for IPS signature storage.
  - Create an IPS rule named **IPS-RULE**.
  - Retire the **all** signature category with the **retired true** command (all signatures within the signature release).
  - Unretire the **IOS_IPS Basic** category with the **retired false** command.
  - Apply the rule inbound on the S0/0/1 interface.

Configure ASA Basic Security and Firewall Settings

- Configure VLAN interfaces with the following settings:
  - For the VLAN 1 interface, configure the addressing to use **192.168.10.1/24**.
  - For the VLAN 2 interface, remove the default DHCP setting and configure the addressing to use **209.165.200.234/29**.
- Configure hostname, domain name, enable password, and Telnet console password using the following settings:
  - The ASA hostname is **CCNAS-ASA**.
  - The domain name is **ccnasecurity.com**.
  - The enable mode password is **ciscoenapa55**.
- Create a user and configure AAA to use the local database for remote authentication.
  - Create a local user account of **Admin01** with a secret password of **Admin01pa55** and a privilege level of **15**.
  - Configure a local user account named **admin** with the password **adminpa55**. Do not use the **encrypted** attribute.
  - Configure AAA to use the local ASA database for Telnet and SSH user authentication.
- Configure Telnet for local ASA console access and SSH for remote ASA console access.
  - Allow Telnet access from the inside **192.168.10.0/24** network with a timeout of **10** minutes.
  - Allow SSH access from the outside host **172.30.3.3** with a timeout of **10** minutes.
- Configure the ASA as a DHCP server using the following settings:
  - Assign IP addresses to inside DHCP clients from 192.168.10.5 to 192.168.10.30.

- Enable DHCP to listen for DHCP client requests.

- Configure static routing and NAT.
  - Create a static default route to the next hop router (**R1**) IP address.
  - Create a network object named **inside-net** and assign attributes to it using the **subnet** and **nat** commands.
  - Create a dynamic NAT translation to the outside interface.
- Modify the Cisco Modular Policy Framework (MPF) on the ASA using the following settings:
  - Configure **class-map inspection_default** to **match default-inspection-traffic**, and then exit to global configuration mode.
  - Configure the **policy-map** list, **global_policy**. Enter the **class inspection_default** and enter the command to **inspect icmp**. Then exit to global config mode.
  - Configure the MPF **service-policy** to make the **global_policy** apply globally.

Step-by-Step Scripts

```
!------------------------------
!Configure Basic Router Security
!------------------------------
!R1
conf t
security passwords min-length 10
enable secret ciscoenapa55
service password-encryption
line console 0
 password ciscoconpa55
 exec-timeout 15 0
 login
 logging synchronous
banner motd $Unauthorized access strictly prohibited and prosecuted to the full
extent of the law!$
end

!R2
conf t
enable secret ciscoenapa55
line vty 0 4
 password ciscovtypa55
 exec-timeout 15 0
 login
end

!-------------------------
!Configure Switch Security
!-------------------------
!S1
conf t
service password-encryption
enable secret ciscoenapa55
```

```
line console 0
 password ciscoconpa55
 exec-timeout 5 0
 login
 logging synchronous
line vty 0 4
 password ciscovtypa55
 exec-timeout 5 0
 login
banner motd $Unauthorized access strictly prohibited and prosecuted to the full
extent of the law!$
end

!Trunking
!S1 and S2
conf t
interface FastEthernet 0/1
 switchport mode trunk
 switchport trunk native vlan 99
 switchport nonegotiate
 storm-control broadcast level 50
end

!S1 Port Security
conf t
interface FastEthernet 0/6
 switchport mode access
 spanning-tree portfast
 spanning-tree bpduguard enable
 shutdown
 switchport port-security
 switchport port-security mac-address sticky
 no shutdown
interface range Fa0/2 - 5 , Fa0/7 - 24 , G0/1 - 2
 shutdown
end

!---------------------------------
!Configure AAA Local Authentication
!---------------------------------
!R1
conf t
username Admin01 privilege 15 secret Admin01pa55
aaa new-model
aaa authentication login default local enable
end

!-------------------------
!Configure SSH
```

```
!-------------------------
!R1
conf t
ip domain-name ccnasecurity.com
ip ssh version 2
line vty 0 4
 transport input ssh
end

!----------------------------
!Secure Against Login Attacks
!----------------------------
!R1
conf t
login block-for 60 attempts 2 within 30
login on-failure log

!--------------------------------
!Configure Site-to-Site IPsec VPNs
!--------------------------------
!R1
conf t
access-list 101 permit ip 172.20.1.0 0.0.0.255 172.30.3.0 0.0.0.255
crypto isakmp policy 10
 encryption aes 256
 authentication pre-share
 hash sha
 group 5
 lifetime 3600
 exit
crypto isakmp key ciscovpnpa55 address 10.20.20.1
crypto ipsec transform-set VPN-SET esp-aes 256 esp-sha-hmac
crypto map CMAP 10 ipsec-isakmp
 set peer 10.20.20.1
 set pfs group5
 set transform-set VPN-SET
 match address 101
 exit
interface S0/0/0
  crypto map CMAP
end

!R3
conf t
access-list 101 permit ip 172.30.3.0 0.0.0.255 172.20.1.0 0.0.0.255
crypto isakmp policy 10
 encryption aes 256
 authentication pre-share
 hash sha
```

```
 group 5
 lifetime 3600
 exit
crypto isakmp key ciscovpnpa55 address 10.10.10.1
crypto ipsec transform-set VPN-SET esp-aes 256 esp-sha-hmac
crypto map CMAP 10 ipsec-isakmp
 set peer 10.10.10.1
 set transform-set VPN-SET
 match address 101
 exit
interface S0/0/1
 crypto map CMAP
end

!----------------------------------
!Configure Firewall and IPS Settings
!----------------------------------
!R3
conf t
!Firewall configs
zone security IN-ZONE
zone security OUT-ZONE
access-list 110 permit ip 172.30.3.0 0.0.0.255 any
class-map type inspect match-all INTERNAL-CLASS-MAP
match access-group 110
exit
policy-map type inspect IN-2-OUT-PMAP
class type inspect INTERNAL-CLASS-MAP
inspect
zone-pair security IN-2-OUT-ZPAIR source IN-ZONE destination OUT-ZONE
service-policy type inspect IN-2-OUT-PMAP
exit
interface fa0/1
zone-member security IN-ZONE
exit
interface s0/0/1
zone-member security OUT-ZONE
end
!IPS configs
mkdir ipsdir
conf t
ip ips config location flash:ipsdir
ip ips name IPS-RULE
ip ips signature-category
 category all
 retired true
 exit
category ios_ips basic
 retired false
```

```
 exit
 exit
<Enter>
interface s0/0/1
 ip ips IPS-RULE in

!--------------------------------------------------
!Configure ASA Basic Security and Firewall Settings
!--------------------------------------------------
!CCNAS-ASA
enable
<Enter>
conf t
interface vlan 1
 nameif inside
 security-level 100
 ip address 192.168.10.1 255.255.255.0
interface vlan 2
 nameif outside
 security-level 0
 no ip address dhcp
 ip address 209.165.200.234 255.255.255.248
 exit
hostname CCNAS-ASA1
domain-name ccnasecurity.com
enable password ciscoenapa55
username admin password adminpa55
aaa authentication ssh console LOCAL
aaa authentication telnet console LOCAL
telnet 192.168.10.0 255.255.255.0 inside
telnet timeout 10
ssh 172.30.3.3 255.255.255.255 outside
ssh timeout 10
dhcpd address 192.168.10.5-192.168.10.30 inside
dhcpd enable inside
route outside 0.0.0.0 0.0.0.0 209.165.200.233
object network inside-net
 subnet 192.168.10.0 255.255.255.0
 nat (inside,outside) dynamic interface
 exit
conf t
class-map inspection_default
 match default-inspection-traffic
 exit
policy-map global_policy
 class inspection_default
 inspect icmp
 exit
service-policy global_policy global
```