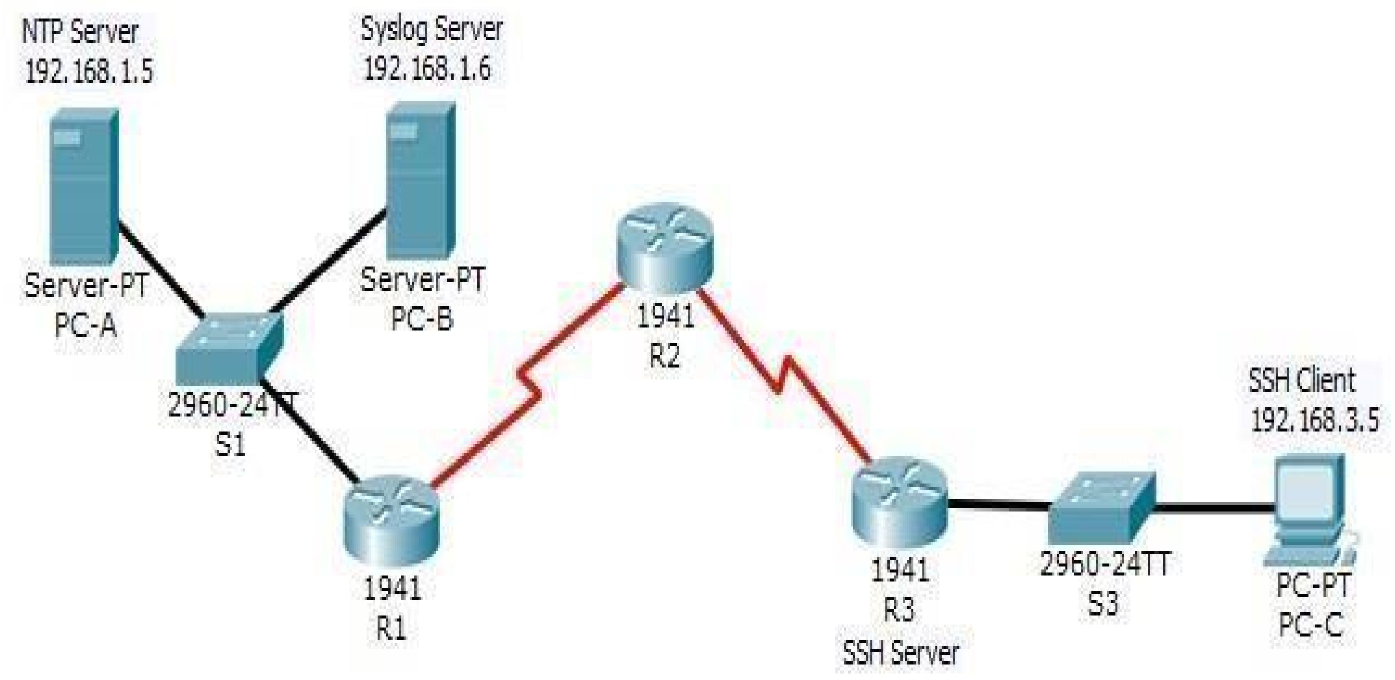
Practical 1: Configure Routers for Syslog, NTP and SSH operation

Topology:



Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	gig0/0	192.168.1.1	255.255.255.0	N/A
	Se0/1/0	10.1.1.1	255.255.255.252	N/A
R2	Se0/1/0	10.1.1.2	255.255.255.252	N/A
	Se0/1/1	10.2.2.2	255.255.255.252	N/A
R3	gig0/0	192.168.3.1	255.255.255.0	N/A
	Se0/1/0	10.2.2.1	255.255.255.252	N/A
PC-A	NIC	192.168.1.5	255.255.255.0	192.168.1.1
PC-B	NIC	192.168.1.6	255.255.255.0	192.168.1.1
PC-C	NIC	192.168.3.5	255.255.255.0	192.168.3.1

Objectives:

- Configure OSPF MD5 authentication.
- Configure NTP.
- Configure routers to log messages to the syslog server.
- Configure R3 to support SSH connections.

Configure Router with password

Step 1: Configure password for vty lines

Execute Command on all routers

```
R(config) # line vty 0 4
R(config-line) #password vtypa55
R(config-line) #login
```

Step 2: Configure secret on router

Execute Command on all routers

```
R(config) # enable secret enpa55
```

Step 3: Configure OSPF on routers

```
R1(config) #router ospf 1
R1(config-router) #network 192.168.1.0 0.0.0.255 area 0
R1(config-router) #network 10.1.1.0 0.0.0.3 area 0
```

```
R2(config) #router ospf 1
R2(config-router) #network 10.1.1.0 0.0.0.3 area 0
```

```
R2(config-router) #network 10.2.2.0 0.0.0.3 area 0
```

```
R3(config) #router ospf 1
R3(config-router) #network 192.168.3.0 0.0.0.255 area 0
R3(config-router) #network 10.2.2.0 0.0.0.3 area 0
```

Step 4: Test Connectivity

```
PC-A > ping 192.168.3.5
Successful
PC-B > ping 192.168.3.5
Successful
```

Part 1: Configure OSPF MD5 Authentication

Step 1: Test connectivity. All devices should be able to ping all other IP addresses.

Step 2: Configure OSPF MD5 authentication for all the routers in area 0.

```
R1(config)# router ospf 1
R1(config-router)# area 0 authentication message-digest
R2(config)# router ospf 1
R2(config-router)# area 0 authentication message-digest

R3(config)# router ospf 1
R3(config-router)# area 0 authentication message-digest
```

Step 3: Configure the MD5 key for all the routers in area 0. Configure an MD5 key on the serial interfaces on R1, R2 and R3. Use the password MD5pa55 for key 1.

```
R1(config)# interface s0/1/0
R1(config-if)# ip ospf message-digest-key 1 md5 MD5pa55
```

```
R2(config)# interface s0/1/0
R2(config-if)# ip ospf message-digest-key 1 md5
MD5pa55 R2(config-if)# interface s0/1/1
R2(config-if)# ip ospf message-digest-key 1 md5 MD5pa55
```

```
R3(config)# interface s0/1/0
R3(config-if)# ip ospf message-digest-key 1 md5 MD5pa55
```

Step 4: Verify configurations.

a. Verify the MD5 authentication configurations using the commands show ip ospf interface.

b. Verify end-to-end connectivity.

Output should be shown in all the routers :

```
R# show ip ospf interface
Message-digest Authentication Enabled
Youngest key ID is 1
```

Part 2: Configure NTP

Step 1: Enable NTP authentication on PC-A.

a. On PC-A, click NTP under the Services tab to verify NTP service is enabled.

b. To configure NTP authentication, click Enable under Authentication. Use key 1 and password NTPpa55

for authentication.

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

```
R# show clock
```

Step 4: Configure NTP authentication on the routers. Configure NTP authentication on R1, R2, and R3 using key 1 and password NTPpa55.

```
R1(config)# ntp authenticate
R1(config)# ntp trusted-key 1
R1(config)# ntp authentication-key 1 md5 NTPpa55


R2(config)# ntp authenticate
R2(config)# ntp trusted-key 1
R2(config)# ntp authentication-key 1 md5 NTPpa55


R3(config)# ntp authenticate
R3(config)# ntp trusted-key 1
```

```
R3(config)# ntp authentication-key 1 md5 NTPpa55
```

Step 5: Configure routers to timestamp log messages.

Execute commands on all routers

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

Part 3: 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.

Use the command

```
R# show logging
```

to verify logging has been enabled.

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. You may need to click a different service and then click Syslog again to refresh the message display.

Part 4: Configure R3 to Support SSH Connections

Step 1: 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 sshpa55.

```
R3(config)# username SSHadmin privilege 15 secret sshpa55
```

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.

```
R3# show ip ssh
SSH enabled-version 1.99
Authentication time out: 120 secs; Authentication retries : 3
R#
```

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
```

Verify the SSH configuration

```
R3# show ip ssh
SSH enabled-version 2.0
```

```
Authentication time out: 90 secs; Authentication retries : 2
R#
```

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 shpa55.

```
PC> ssh –l SSHadmin 192.168.3.1
Password: sshpa55
```

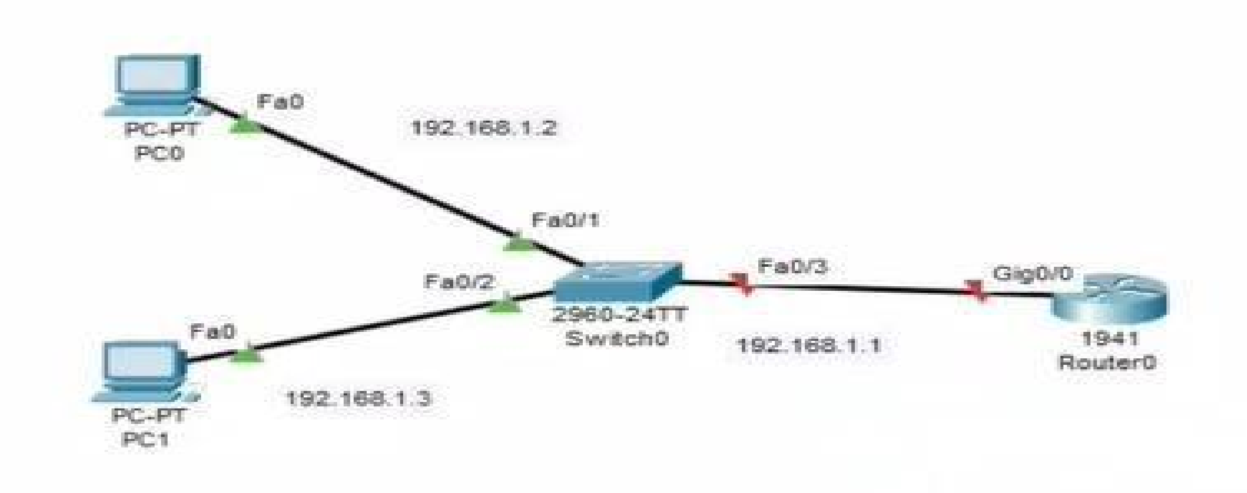
Step 10: Connect to R3 using SSH on R2.

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
Password: sshpa55
```

Practical 2: Configure AAA Authentication on Cisco routers

Topology:



Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	gig0/0	192.168.1.1	255.255.255.0	N/A
PC0	NIC	192.168.1.2	255.255.255.0	192.168.1.1
PC1	NIC	192.168.1.3	255.255.255.0	192.168.1.1

Objectives:

- Configure a local user account on R1 and configure authenticate on the console and vty lines using local AAA.
- Verify local AAA authentication from the R1 console and the PC0 client and PC1 Client.

Configure Router:

Step 1: Configure password for vty lines

```
R1(config) # line vty 0 4
R1(config-line) #password vtypa55
```

```
R1(config-line) #login
```

Step 2: Configure secret on router

```
R1(config) # enable secret enpa55
```

Step 3: Configure OSPF on routers

```
R1(config) #router ospf 1
R1(config-router) #network 192.168.1.0 0.0.0.255 area 0
```

Step 4: Configure OSPF MD5 authentication for all router in area 0

```
R1(config) #router ospf 1
R1(config-router)# area 0 authentication message-digest
```

Step 5: Configure MD5 key for all routers in area 0

```
R1(config)# int gig0/0
R1(config-if)# ip ospf message-digest-key 1 md5 pa55
```

Step 6: Verify configurations.

a. Verify the MD5 authentication configurations using the commands show ip ospf interface.

b. Verify end-to-end connectivity.

Output should be shown in all the routers :

```
R1# show ip ospf interface
Message-digest Authentication Enabled
Youngest key ID is 1
```

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

Step 1: Test Connectivity

```
PC0 > ping 192.168.1.3
Successful
PC1 > ping 192.168.1.2
Successful
```

Step 2: Configure Local username on R1

```
R1(config)# username admin secret adminpa55
```

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

```
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.

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

Step 5: Verify the AAA authentication method.

```
R1(config-line)# end
User Access Verification
Username: admin
Password: adminpa55
R1>
```

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

Step 1: Configure domain name and crypto key for use with SSH.

```
R1(config)# ip domain-name ccnasecurity.com

R1(config)# crypto key generate rsa

How many bits in the modulus [512]: 1024
```

Step 2: Configure a named list AAA authentication method for the vty lines on R1.

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

Step 3: Configure the vty lines to use the defined AAA authentication method.

```
R1(config)# line vty 0 4

R1(config-line)# login authentication SSH-LOGIN

R1(config-line)# transport input ssh

R1(config-line)# end
```

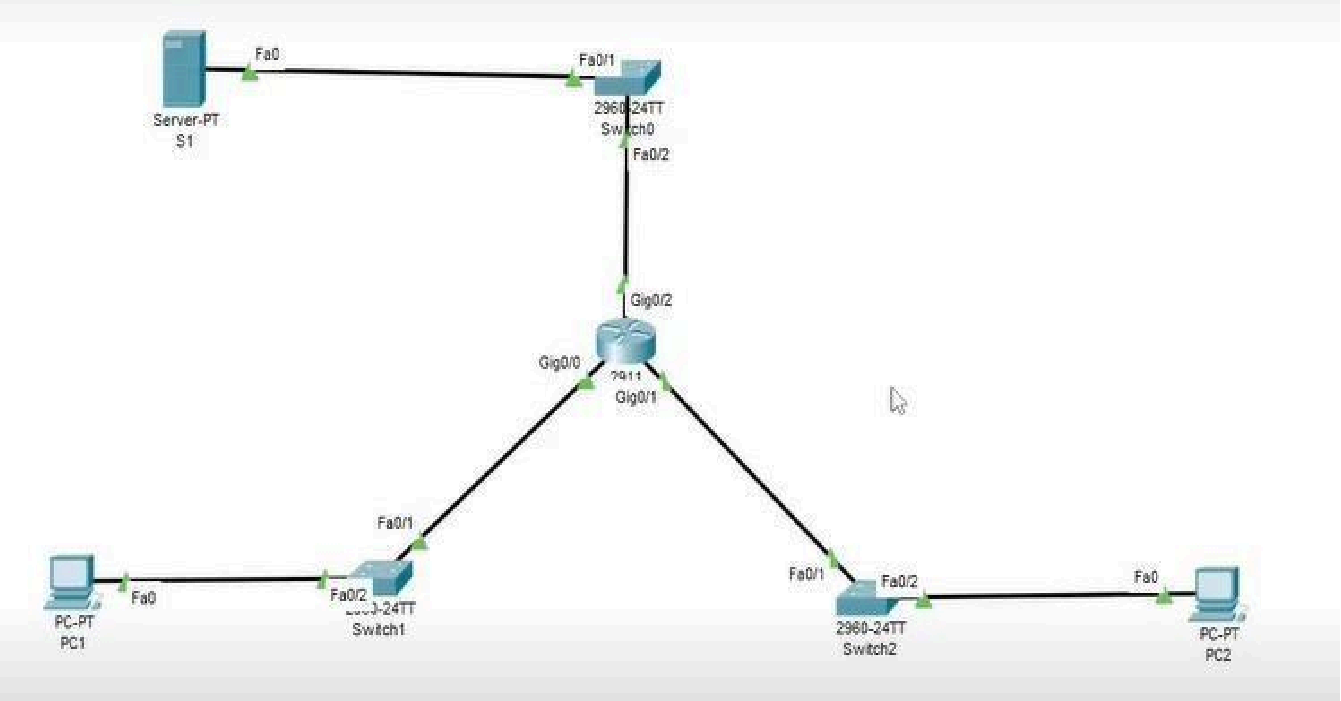
Step 4: Verify the AAA authentication method.

```
PC0> ssh –l Admin 192.168.1.1

Password: adminpa55

R1>

PC1> ssh –l Admin 192.168.1.1

Password: adminpa55

R1>
```

Practical 3: Configuring Extended ACLs

A]

Topology:



Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	gig0/0	172.22.34.65	255.255.255.224	N/A
	gig0/1	172.22.34.97	255.255.255.240	N/A
	gig0/2	172.22.34.1	255.255.255.192	N/A
Server	NIC	172.22.34.62	255.255.255.192	172.22.34.1
PC1	NIC	172.22.34.66	255.255.255.224	172.22.34.65
PC2	NIC	172.22.34.98	255.255.255.240	172.22.34.97

Objectives:

- **Configure, Apply and Verify an Extended Numbered ACL**

- **Configure, Apply and Verify an Extended Named ACL**

Scenario:

- PC1 Should be allowed only FTP access
- PC2 Should be allowed only web access
- Both PCs must ping server but not each other’s

Configure Router:

Step 1: Configure password for vty lines

```
R1(config) # line vty 0 4
R1(config-line) #password vtypa55
R1(config-line) #login
```

Step 2: Configure secret on router

```
R1(config) # enable secret enpa55
```

Part 1: Configure, Apply and Verify an Extended Numbered ACL

Step 1: Configure an ACL to permit FTP and ICMP. (Use Router 2911)

```
R1(config)# access-list 100 permit tcp 172.22.34.64 0.0.0.31 host 172.22.34.62 eq ftp
R1(config)# access-list 100 permit icmp 172.22.34.64 0.0.0.31 host 172.22.34.62
```

Step 2: Apply the ACL on the correct interface to filter traffic.

```
R1(config)# int gig 0/0
R1(config-if)# ip access-group 100 in
```

Step 3: Verify the ACL implementation.

a. Ping from PC1 to Server. PC1> ping 172.22.34.62 (Successful)

b. FTP from PC1 to Server. The username and password are both cisco.

```
PC1> ftp 172.22.34.62
```

c. Exit the FTP service of the Server.

```
ftp> quit
```

d. Ping from PC1 to PC2.

```
PC1> ping 172.22.34.98
(Unsuccessful) destination host unreachable
```

Part 2: Configure, Apply and Verify an Extended Named ACL

Step 1: Configure an ACL to permit HTTP access and ICMP.

```
R1(config)# ip access-list extended HTTP_ONLY
R1(config-ext-nacl)# permit tcp 172.22.34.96 0.0.0.15 host 172.22.34.62 eq www
R1(config-ext-nacl)# permit icmp 172.22.34.96 0.0.0.15 host 172.22.34.62
```

Step 2: Apply the ACL on the correct interface to filter traffic.

```
R1(config)# int gig0/1
R1(config-if)# ip access-group HTTP_ONLY in
```

Step 3: Verify the ACL implementation.

a. Ping from PC2 to Server. PC2> ping 172.22.34.62 (Successful)

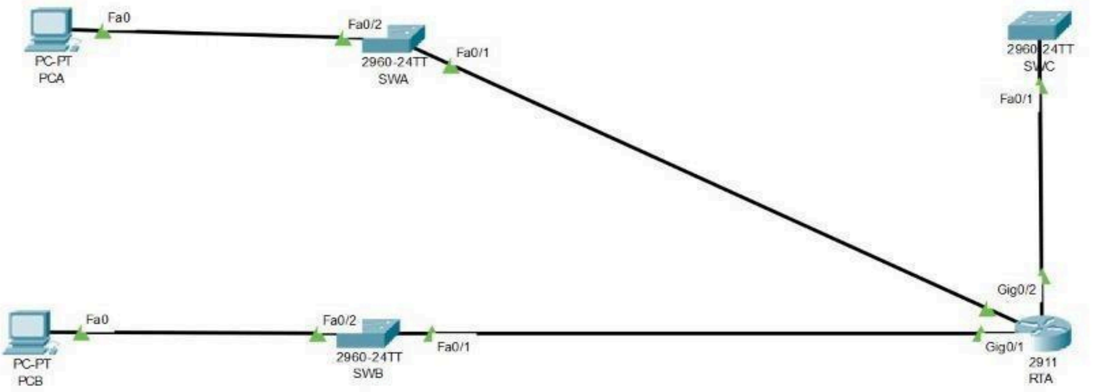
b. FTP from PC2 to Server PC2> ftp 172.22.34.62 (Unsuccessful)

c. Open the web browser on PC2. URL -> http://172.22.34.62 (Successful)

d. Ping from PC2 to PC1. PC> ping 172.22.34.66 (Unsuccessful)

B]

Topology:



Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
RTA	gig0/0	10.101.117.49	255.255.255.248	N/A
	gig0/1	10.101.117.33	255.255.255.240	N/A
	gig0/2	10.101.117.1	255.255.255.224	N/A
PCA	NIC	10.101.117.51	255.255.255.248	10.101.117.49
PCB	NIC	10.101.117.35	255.255.255.240	10.101.117.33
SWA	VLAN 1	10.101.117.50	255.255.255.248	10.101.117.49
SWB	VLAN 1	10.101.117.34	255.255.255.240	10.101.117.33
SWC	VLAN 1	10.101.117.2	255.255.255.224	10.101.117.1

Objectives:

- **Configure, Apply and Verify an Extended Numbered ACL**

Scenario:

- Device on one LAN are allowed to remotely access device in another LAN using SSH protocol
- Besides ICMP all traffic from other network is denied

Configure Switch and Router:

Step 1: Configure the IP address on switch

```
SWA(config)# int vlan 1

SWA(config-if)# ip address 10.101.117.50 255.255.255.248

SWA(config-if)# no shut

SWA(config-if)# ip default-gateway 10.101.117.49


SWB(config)# int vlan 1

SWB(config-if)# ip address 10.101.117.34 255.255.255.240

SWB(config-if)# no shut

SWB(config-if)# ip default-gateway 10.101.117.33
```

```
SWC(config)# int vlan 1
SWC(config-if)# ip address 10.101.117.2 255.255.255.224
SWC(config-if)# no shut
SWC(config-if)# ip default-gateway 10.101.117.1
```

Step 2: Configure the secret on router and switch

```
RTA/SW(config)# enable secret enpa55
```

Step 3: Configure the console password on router and switch

```
RTA/SW(config)# line console 0
RTA/SW(config)#  password  tyit
RTA/SW(config)# login
```

Step 4: Test connectivity

Ping from PCA to PC-B.

```
PCA>ping 10.101.117.35
```

(Successful)

Ping from PCA to SWC.

```
PCA>ping 10.101.117.2
```

(Successful)

Ping from PCB to SWC.

```
PCB>ping 10.101.117.2
```

(Successful)

Part 1: Configure Switch and Router to support SSH Connection

Step 1: Configure domain name and crypto key for use with

SSH. RTA/SW(config)# ip domain-name ccnasecurity.com

Step 2: Configure users to login to SSH

```
RTA/SW(config)# username admin secret adminpa55
```

Step 3: Configure incoming vty lines

```
RTA/SW(config)# line vty 0 4
RTA/SW(config-line)# login local
RTA/SW(config)# crypto key generate rsa
How many bits in the modulus [512]:
```

1024 **Step 4: Verify the SSH Connection**

```
PCA> ssh -l Admin 10.101.117.34
Password: adminpa55

SWB>
PCA> ssh -l Admin 10.101.117.2
Password: adminpa55
SWC>

PCB> ssh -l Admin 10.101.117.50
Password: adminpa55
SWA>
PCB> ssh -l Admin 10.101.117.2
Password: adminpa55
SWC>

SWC> ssh -l Admin 10.101.117.50
Password: adminpa55
SWA>
SWC> ssh -l Admin 10.101.117.34
```

```
Password: adminpa55
SWB>
SWB> exit
```

Part 2: Configure, Apply and Verify an Extended Numbered ACL

Step 1: Configure the extended ACL.

```
RTA(config)# access-list 199 permit tcp 10.101.117.32 0.0.0.15 10.101.117.0
0.0.0.31 eq 22
RTA(config)# access-list 199 permit icmp any any
```

Step 2: Apply the extended ACL.

```
RTA(config)# int gig0/2
RTA(config-if)# ip access-group 199 out
```

Step 3: Verify the extended ACL implementation.

a. Ping from PCB to all of the other IP addresses in the network.

```
PCB> ping 10.101.117.51
(Successful)
PCB> ping 10.101.117.2
(Successful)
```

b. SSH from PCB to SWC.

```
PCB> ssh -l Admin 10.101.117.2
Password:adminpa55
SWC>
```

c. Exit the SSH session to SWC.

```
SWC>exit
```

d. Ping from PCA to all of the other IP addresses in the network.

```
PCA> ping 10.101.117.35
(Successful)
PCA> ping 10.101.117.2
(Successful)
```

e. SSH from PCA to SWC

```
PCA> ssh -l Admin 10.101.117.2
Connection timed out. Remote host not responding
```

f. SSH from PCA to SWB.

```
PCA> ssh -l Admin 10.101.117.34
Password: adminpa55
SWB>
```

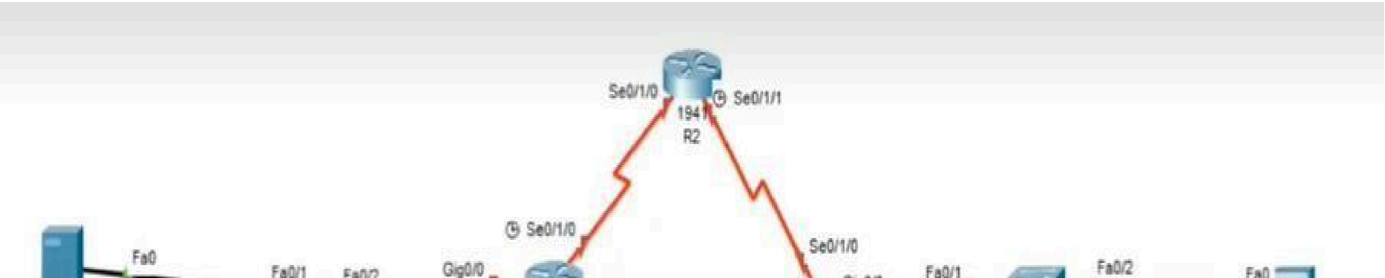
g. After logging into SWB, do not log out. SSH to SWC in privileged EXEC mode.

```
SWB# ssh -l Admin 10.101.117.2
Password: adminpa55
SWC>
```

Practical 4: Configure IP ACLs to Mitigate Attacks

A]

Topology:



Addressing Table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	gig0/0	192.168.1.1	255.255.255.0	N/A
	Se0/1/0 (DCE)	10.1.1.1	255.255.255.252	N/A
R2	Se0/1/0	10.1.1.2	255.255.255.252	N/A
	Se0/1/1 (DCE)	10.2.2.2	255.255.255.252	N/A
	Lo0	192.168.2.1	255.255.255.0	N/A
R3	gig0/0	192.168.3.1	255.255.255.0	N/A
	Se0/1/0	10.2.2.1	255.255.255.252	N/A
PC-A	Fa0	192.168.1.3	255.255.255.0	192.168.1.1
PC-C	Fa0	192.168.3.3	255.255.255.0	192.168.3.1

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.

Configure Router:

Step 1: Configure secret on router

```
R(config) # enable secret enpa55
```

Step 2: Configure console password on router

```
R(config) # line console 0
R(config-line) #password conpa55
R(config-line) #login
```

Step 3: Configure SSH login on router

Execute command on all routers

```
R(config)# ip domain-name ccnasecurity.com
R(config)# username admin secret
adminpa55 R(config)# line vty 0 4
R(config-line)# login local
R(config-line)# crypto key generate rsa
How many bits in the modulus [512]:
1024
```

Step 4: Configure loop back address on Router 2

```
R2(config)#int loopback 0
R2(config-if)#ip address 192.168.2.1 255.255.255.0
R2(config-if)# no shut
```

Step 5: Configure static routing on routers

Execute command on all routers

```
R1(config)#ip route 192.168.3.0 255.255.255.0 10.1.1.2
R1(config)#ip route 10.2.2.0 255.255.255.252 10.1.1.2
R1(config)#ip route 192.168.2.0 255.255.255.0 10.1.1.2

R2(config)#ip route 192.168.1.0 255.255.255.0 10.1.1.1
R2(config)#ip route 192.168.3.0 255.255.255.0 10.2.2.1

R3(config)#ip route 192.168.1.0 255.255.255.0 10.2.2.2
R3(config)#ip route 192.168.2.0 255.255.255.0 10.2.2.2
R3(config)#ip route 10.1.1.0 255.255.255.0 10.2.2.2
```

Part 2: Verify Basic Network Connectivity

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

```
PCA> ping 192.168.3.3
(Successful)
PCA> ping 192.168.2.1
(Successful)
PCA> ssh –l admin 192.168.2.1
Password: adminpa55
R2>exit
```

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

```
PCC> ping 192.168.1.3
(Successful)
PCC> ping 192.168.2.1
(Successful)
PCC> ssh –l admin 192.168.2.1
Password: adminpa55
R2>exit
```

Open a web browser to the PC-A server (192.168.1.3) to display the web page.

Close the browser when done.

Desktop->Web Browser->192.168.1.3

(Successful)

Part 3: Secure Access to Routers

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

Execute command on all routers

```
R(config)# access-list 10 permit host 192.168.3.3
```

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

Execute command on all routers

```
R(config)# line vty 0 4
R(config-line)# access-class 10 in
```

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

```
PCC> ssh –l admin 192.168.2.1
Password: adminpa55
R2>exit
```

Step 4: Verify denial from PC-A.

```
PCA> ssh –l admin 192.168.2.1
Connection refused by remote host
```

Part 4: Create a Numbered IP ACL 120 on R1

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 in Services tab.

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

```
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

```
R1(config)# int se0/1/0
```

```
R1(config-if)# ip access-group 120 in
```

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

Desktop->Web Browser->192.168.1.3

(Unsuccessful) Request timed out

Part 5: Modify an Existing ACL on R1

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

```
PCA> ping 192.168.2.1
 (Unsuccessful) Request timed out
```

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

```
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.

```
PCA> ping 192.168.2.1 (Successful)
```

Part 6: Create a Numbered IP ACL 110 on R3

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

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

Step 2: Apply the ACL to interface

```
R3(config)# int gig0/1
```

```
R3(config-if)# ip access-group 110 in
```

Part 7: Create a Numbered IP ACL 100 on R3

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

```
R3(config)# access-list 100 permit tcp 10.0.0.0 0.255.255.255 host 192.168.3.3
eq 22

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

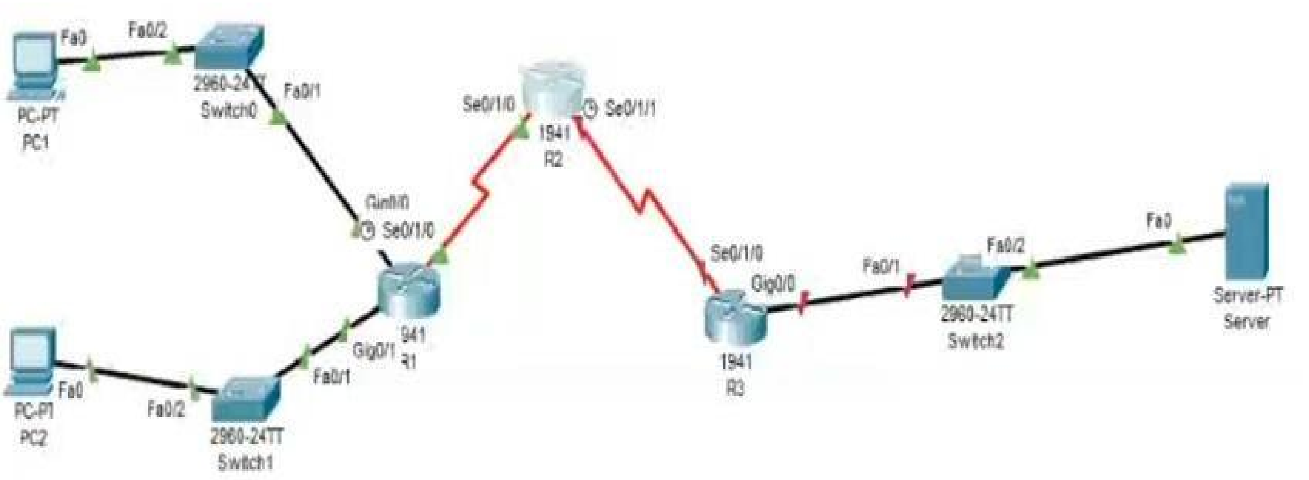
```
R3(config)# interface se0/1/0

R3(config-if)# ip access-group 100

in
```

Step 3: Confirm that the specified traffic entering interface Serial is handled correctly.

```
PCC> ping 192.168.1.3

(Unsuccessful)

PCC> ssh –l admin 192.168.2.1

Password: adminpa55

R2>exit
```

B]

Topology:



Addressing Table:

Device	Interface	IPv6 Address/Prefix	Default Gateway
PC1	NIC	2001:DB8:1:10::10/64	FE80::1
PC2	NIC	2001:DB8:1:11:11/64	FE80::1
	gig0/0	2001:DB8:1:10::1/64	FE80::1
R1	se0/1/0	2001:DB8:1:1::1/64	FE80::1
	gig0/1	2001:DB8:1:11::1/64	FE80::1
R3	se0/1/0	2001:DB8:1:1::2/64	FE80::2
	se0/1/1	2001:DB8:1:2::2/64	FE80::2
R3	gig0/0	2001:DB8:1:30::1/64	FE80::3
	se0/1/0	2001:DB8:1:2::1/64	FE80::3
Server	NIC	2001:DB8:1:30::30/64	FE80::3

Objective:

- Configure, Apply, and Verify an IPv6 ACL
- Configure, Apply, and Verify a Second IPv6 ACL

Configure Router:

Step 1: Configure secret on router

Execute command on all routers

```
R(config)# enable secret enpa55
```

Step 2: Assign static ipv6 address

```
R1(config)# int gig0/0
R1(config-if)# ipv6 address
2001:DB8:1:10::1/64 R1(config-if)# ipv6
address FE80::1 link-local R1(config-if)# no shut

R1(config)# int gig0/1
R1(config-if)# ipv6 address 2001:DB8:1:11::1/64
R1(config-if)# ipv6 address FE80::1 link-local
R1(config-if)# no shut

R1(config)# int se0/1/0
R1(config-if)# ipv6 address 2001:DB8:1:1::1/64
R1(config-if)# ipv6 address FE80::1 link-local
R1(config-if)# no shut

R2(config)# int se0/1/0
R2(config-if)# ipv6 address 2001:DB8:1:1::2/64
R2(config-if)# ipv6 address FE80::2 link-local
R2(config-if)# no shut

R2(config)# int se0/1/1
R2(config-if)# ipv6 address 2001:DB8:1:2::2/64
R2(config-if)# ipv6 address FE80::2 link-local
R2(config-if)# no shut
```

```
R3(config)# int gig0/0
R3(config-if)# ipv6 address
2001:DB8:1:30::1/64 R3(config-if)# ipv6
address FE80::3 link-local R3(config-if)# no shut

R3(config)# int se0/1/0
R3(config-if)# ipv6 address 2001:DB8:1:2::1/64
R3(config-if)# ipv6 address FE80::3 link-local
R3(config-if)# no shut
```

Step 3: Enable IPv6 routing

```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 route 2001:DB8:1:2::0/64 2001:DB8:1:1::2
R1(config)# ipv6 route 2001:DB8:1:30::0/64 2001:DB8:1:1::2

R2(config)# ipv6 unicast-routing
R2(config)# ipv6 route 2001:DB8:1:10::0/64
2001:DB8:1:1::1 R2(config)# ipv6 route
2001:DB8:1:11::0/64 2001:DB8:1:1::1 R2(config)# ipv6
route 2001:DB8:1:30::0/64 2001:DB8:1:2::1

R3(config)# ipv6 unicast-routing
R3(config)# ipv6 route 2001:DB8:1:10::0/64
2001:DB8:1:2::2 R3(config)# ipv6 route
2001:DB8:1:11::0/64 2001:DB8:1:2::2

R3(config)# ipv6 route 2001:DB8:1:1::0/64 2001:DB8:1:2::2
```

Step 4: Verify connectivity

```
PC1> ping 2001:DB8:1:30::30
```

(Successful)

```
PC2> ping 2001:DB8:1:30::30
```

(Successful)

Part 2: Configure, Apply, and Verify an IPv6 ACL

Step 1: Configure an ACL that will block HTTP and HTTPS access.

```
R1(config)# ipv6 access-list BLOCK_HTTP
R1(config-ipv6-acl)# deny tcp any host 2001:DB8:1:30::30 eq
www R1(config-ipv6-acl)# deny tcp any host 2001:DB8:1:30::30
eq 443 R1(config-ipv6-acl)# permit ipv6 any any
R1(config-ipv6-acl)# exit
```

Step 2: Apply the ACL to the correct interface.

```
R1(config)# int gig0/1
R1(config-if)# ipv6 traffic-filter BLOCK_HTTP in
```

Step 3: Verify the ACL implementation

Open a web browser to the PC1 to display the web page. Desktop->Web Browser->http://2001:DB8:1:30::30 (Successful)

Desktop->Web Browser->https://2001:DB8:1:30::30 (Successful)

Open a web browser to the PC2 to display the web page.

Desktop->Web Browser->http://2001:DB8:1:30::30 (Unsuccessful) – Request Timeout

Desktop->Web Browser->https://2001:DB8:1:30::30

(Unsuccessful) – Request Timeout

PC2> ping 2001:DB8:1:30::30

(Successful)

Part 3: Configure, Apply, and Verify a Second IPv6 ACL

Step 1: Create an access list to block ICMP.

```
R3(config)# ipv6 access-list BLOCK_ICMP
R3(config-ipv6-acl)# deny icmp any any
R3(config-ipv6-acl)# permit ipv6 any any
R3(config-ipv6-acl)# exit
```

Step 2: Apply the ACL to the correct interface.

```
R3(config)# int gig0/0
R3(config-if)# ipv6 traffic-filter BLOCK_ICMP out
```

Step 3: Verify that the proper access list functions.

PC2> ping 2001:DB8:1:30::30

(Unsuccessful) - Destination host unreachable

PC1> ping 2001:DB8:1:30::30

(Unsuccessful) - Destination host unreachable

Open a web browser to the PC1 to display the web page. Desktop->Web Browser->http://2001:DB8:1:30::30

(Successful)

Desktop->Web Browser->https://2001:DB8:1:30::30

(Successful)