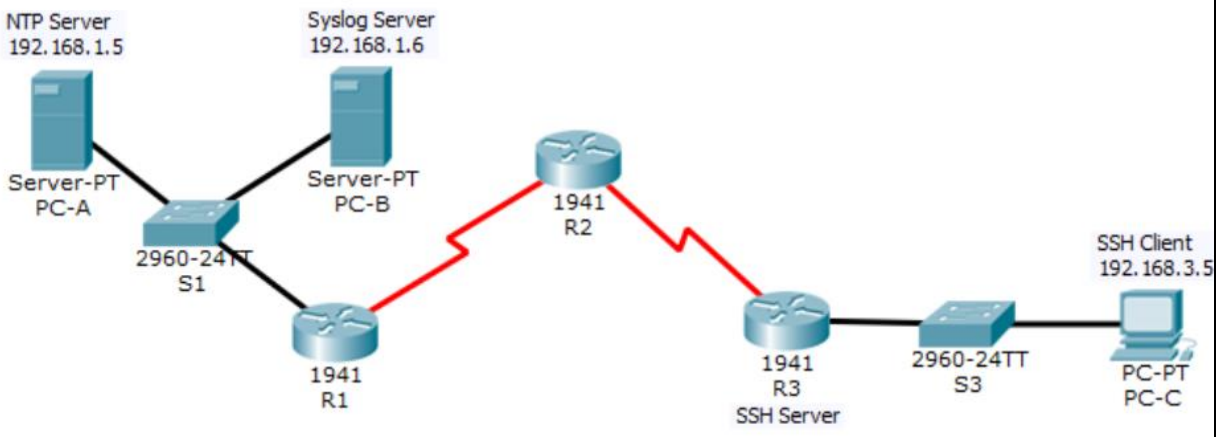
Name:_____Student ID:_____

Lab 3-1: Network Security Fall 108@NTHU

Packet Tracer - Configure Cisco Routers for Syslog, NTP, and SSH Operations

Topology



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	G0/1	192.168.1.1	255.255.255.0	N/A	S1 F0/5
	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	G0/1	192.168.3.1	255.255.255.0	N/A	S3 F0/5
	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 F0/6
PC-B	NIC	192.168.1.6	255.255.255.0	192.168.1.1	S2 F0/18
PC-C	NIC	192.168.3.5	255.255.255.0	192.168.3.1	S3 F0/18

Objectives

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

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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.

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 **MD5nthu** for key 1.

```
R1(config)# interface s0/0/0
R1(config-if)# ip ospf message-digest-key 1 md5 MD5nthu
R2(config)# interface s0/0/0
R2(config-if)# ip ospf message-digest-key 1 md5 MD5nthu
R2(config-if)# interface s0/0/1
R2(config-if)# ip ospf message-digest-key 1 md5 MD5nthu
R3(config)# interface s0/0/1
R3(config-if)# ip ospf message-digest-key 1 md5 MD5nthu
```

Step 4: Verify configurations.

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

b. Verify end-to-end connectivity.

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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 **NTPnthu** 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
```

Exit global configuration and verify that the hardware clock was updated using the command **show clock**.

Step 4: Configure NTP authentication on the routers.

Configure NTP authentication on R1, R2, and R3 using key 1 and password **NTPnthu**.

```
R1(config)# ntp authenticate
R1(config)# ntp trusted-key 1
R1(config)# ntp authentication-key 1 md5 NTPnthu
R2(config)# ntp authenticate
R2(config)# ntp trusted-key 1
R2(config)# ntp authentication-key 1 md5 NTPnthu
R3(config)# ntp authenticate
R3(config)# ntp trusted-key 1
R3(config)# ntp authentication-key 1 md5 NTPnthu
```

Step 5: 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
```

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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 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.

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Part 4: 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 nthusecurity.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 **ciscosshnthu**.

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

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 **ciscosshnthu**.

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

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: **ciscosshnthu**.

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

Step 11: Check results

When you finished, raise your hand and the TA will go to check your simulation.