**Net 1060 Introduction to Networks Lab: 10.4.4**

**Name: Andrew Koenig**

**Follow the instructions down below for the lab itself. For this lab, all answers need to be in blue font. For the questions right below, answer in complete sentences. You will also have to copy and paste your running configurations of each device configured to the bottom of this document. Let the instructor know if you have any questions.**

***Lab Analysis Report***

1. Using complete sentences summarize work you completed during the lab.

I configured a router and switch network and their interfaces.

2. Using complete sentences describe what you learned from the lab. Hint; look at the lab objectives listed at the top of the lab section.

I learned how to set up the interfaces and addresses on a switch and router network.

***Problems Encountered***

1. Using complete sentences describe any problem(s) experienced during lab.

No problems

2. Using complete sentences describe how you solved your problem(s).

No problems

3. Using complete sentences explain if you needed any assistance with the lab; then list what you learned from that assistance. No problems

Lab - Build a Switch and Router Network

# Topology



# Addressing Table

| Device | Interface | IP Address / Prefix | Default Gateway |
| --- | --- | --- | --- |
| R1 | G0/0/0 | 192.168.0.1 /24 | N/A |
| R1 | G0/0/0 | 2001:db8:acad::1/64 | N/A |
| R1 | G0/0/0 | fe80::1 | N/A |
| R1 | G0/0/1 | 192.168.1.1 /24 | N/A |
| R1 | G0/0/1 | 200:db8:acad:1::1/64 | N/A |
| R1 | G0/0/1 | fe80::1 | N/A |
| S1 | VLAN 1 | 192.168.1.2 /24 | 192.168.1.1 |
| PC-A | NIC | 192.168.1.3 /24 | 192.168.1.1 |
| PC-A | NIC | 2001:db8:acad:1::3/64 | fe80::1 |
| PC-B | NIC | 192.168.0.3 /24 | 192.168.0.1 |
| PC-B | NIC | 2001:db8:acad::3/64 | fe80::1 |

# Objectives

Part 1: Set Up the Topology and Initialize Devices

Part 2: Configure Devices and Verify Connectivity

# Background / Scenario

This is a comprehensive lab to review previously covered IOS commands. In this lab, you will cable the equipment as shown in the topology diagram. You will then configure the devices to match the addressing table. After the configurations have been saved, you will verify your configurations by testing for network connectivity.

After the devices have been configured and network connectivity has been verified, you will use IOS commands to retrieve information from the devices to answer questions about your network equipment.

This lab provides minimal assistance with the actual commands necessary to configure the router. Test your knowledge by trying to configure the devices without referring to the content or previous activities.

**Note**: The routers used with CCNA hands-on labs are Cisco 4221 with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

**Note**: Ensure that the routers and switches have been erased and have no startup configurations. Consult with your instructor for the procedure to initialize and reload a router and switch.

The **default bias** template used by the Switch Database Manager (SDM) does not provide IPv6 address capabilities. Verify that SDM is using either the **dual-ipv4-and-ipv6** template or the **lanbase-routing** template. The new template will be used after reboot even if the configuration is not saved.

S1# **show sdm prefer**

Use the following commands to assign the **dual-ipv4-and-ipv6** template as the default SDM template.

S1# **configure terminal**

S1(config)# **sdm prefer dual-ipv4-and-ipv6 default**

S1(config)# **end**

S1# **reload**

# Required Resources

* 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
* 1 Switch (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
* 2 PCs (Windows with a terminal emulation program, such as Tera Term)
* Console cables to configure the Cisco IOS devices via the console ports
* Ethernet cables as shown in the topology

**Note**: The Gigabit Ethernet interfaces on Cisco 4221 routers are autosensing and an Ethernet straight-through cable may be used between the router and PC-B. If using another model Cisco router, it may be necessary to use an Ethernet crossover cable.

# Instructions

## Set Up Topology and Initialize Devices

### Cable the network as shown in the topology.

* + - 1. Attach the devices shown in the topology diagram, and cable, as necessary.
      2. Power on all the devices in the topology.

### Initialize and reload the router and switch.

If configuration files were previously saved on the router and switch, initialize and reload these devices back to their default configurations.

## Configure Devices and Verify Connectivity

In Part 2, you will set up the network topology and configure basic settings, such as the interface IP addresses, device access, and passwords. Refer to the **Error! Reference source not found.** and **Error! Reference source not found.** at the beginning of this lab for device names and address information.

### Assign static IP information to the PC interfaces.

* + - 1. Configure the IP address, subnet mask, and default gateway settings on PC-A.
      2. Configure the IP address, subnet mask, and default gateway settings on PC-B.
      3. Ping PC-B from a command prompt window on PC-A.

**Note**: If pings are not successful, the Windows Firewall may need to be turned off.

#### Question:

Why were the pings not successful?

Type your Because the windows firewall is blocking the ping here.

### Configure the router.

* + - 1. Console into the router and enable privileged EXEC mode.

Open configuration window

* + - 1. Enter configuration mode.
      2. Assign a device name to the router.
      3. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.
      4. Assign **class** as the privileged EXEC encrypted password.
      5. Assign **cisco** as the console password and enable login.
      6. Assign **cisco** as the VTY password and enable login.
      7. Encrypt the plaintext passwords.
      8. Create a banner that warns anyone accessing the device that unauthorized access is prohibited.
      9. Configure and activate both interfaces on the router.
      10. Configure an interface description for each interface indicating which device is connected to it.
      11. To enable IPv6 routing, enter the command ipv6 unicast-routing.

R1(config)# **ipv6 unicast-routing**

* + - 1. Save the running configuration to the startup configuration file.
      2. Set the clock on the router.

**Note**: Use the question mark (**?**) to help with the correct sequence of parameters needed to execute this command.

Close configuration window

* + - 1. Ping PC-B from a command prompt window on PC-A.

**Note**: If pings are not successful, the Windows Firewall may need to be turned off.

#### Question:

Were the pings successful? Explain.

Type No, they are blocked by the firewall answers here.

### Configure the switch.

In this step, you will configure the hostname, the VLAN 1 interface and its default gateway.

Open configuration window

* + - 1. Console into the switch and enable privileged EXEC mode.
      2. Enter configuration mode.
      3. Assign a device name to the switch.
      4. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.
      5. Configure and activate the VLAN interface on the switch S1.
      6. Configure the default gateway for the switch S1.
      7. Save the running configuration to the startup configuration file.

### Verify connectivity end-to-end connectivity.

* + - 1. From PC-A, ping PC-B.
      2. From S1, ping PC-B.

All the pings should be successful.

Close configuration window

## Display Device Information

In Part 3, you will use **show** commands to retrieve interface and routing information from the router and switch.

### Display the routing table on the router.

* + - 1. Use the **show ip route** command on the router R1 to answer the following questions.

Open configuration window

#### Questions:

What code is used in the routing table to indicate a directly connected network?

Type your C here.

How many route entries are coded with a C code in the routing table?

Type your2 answers here.

What interface types are associated to the C coded routes?

Type your Directly connected such as G0/0/0 and G0/0/1 here.

* + - 1. Use the **show ipv6 route** command on router R1 to display the IPv6 routes.

### Display interface information on the router R1.

* + - 1. Use the **show ip interface g0/0/1** to answer the following questions.

#### Questions:

What is the operational status of the G0/0/1 interface?

Type your it is up here.

What is the Media Access Control (MAC) address of the G0/1 interface?

Type your answers here.0F54.D427.7E7E

How is the Internet address displayed in this command?

Type your answers here.192.168.1.1/24

* + - 1. For the IPv6 information, enter the **show ipv6 interface *interface*** command.

### Display a summary list of the interfaces on the router and switch.

There are several commands that can be used to verify an interface configuration. One of the most useful of these is the **show ip interface brief** command. The command output displays a summary list of the interfaces on the device and provides immediate feedback to the status of each interface.

* + - 1. Enter the **show ip interface brief** command on the router R1.

R1# **show ip interface brief**

* + - 1. To see the IPv6 interface information, enter the **show ipv6 interface brief** command on R1.

R1# **show ipv6 interface brief**

Close configuration window

* + - 1. Enter the **show ip interface brief** command on the switch S1.

Open configuration window

S1# **show ip interface brief**

Close configuration window

# Reflection Questions

* 1. If the G0/0/1 interface showed that it was administratively down, what interface configuration command would you use to turn the interface up? No shutdown

Type your answers here.

* 1. What would happen if you had incorrectly configured interface G0/0/1 on the router with an IP address of 192.168.1.2? You would not be able to ping on the network

Type your answers here.

# Router Interface Summary Table

| Router Model | Ethernet Interface #1 | Ethernet Interface #2 | Serial Interface #1 | Serial Interface #2 |
| --- | --- | --- | --- | --- |
| 1800 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 1900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2801 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |
| 2811 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 4221 | Gigabit Ethernet 0/0/0 (G0/0/0) | Gigabit Ethernet 0/0/1 (G0/0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |
| 4300 | Gigabit Ethernet 0/0/0 (G0/0/0) | Gigabit Ethernet 0/0/1 (G0/0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |

**Note**: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.

End of Document

R1#show running-config

Building configuration...

Current configuration : 1535 bytes

!

! Last configuration change at 18:28:18 UTC Wed Oct 5 2022

!

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R1

!

boot-start-marker

boot-end-marker

!

!

enable secret 5 $1$lwX9$w5UAlJWU7kKuKYvzQ64j10

!

no aaa new-model

ethernet lmi ce

!

!

!

!

!

!

!

!

!

!

!

!

no ip domain lookup

ip cef

ipv6 unicast-routing

ipv6 cef

multilink bundle-name authenticated

!

!

!

!

license udi pid CISCO2901/K9 sn FJC2048A0UC

!

!

!

redundancy

!

!

!

!

!

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

ip address 192.168.0.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/1

ip address 192.168.1.1 255.255.255.0

duplex auto

speed auto

!

interface Serial0/0/0

no ip address

shutdown

clock rate 2000000

!

interface Serial0/0/1

no ip address

shutdown

clock rate 2000000

!

interface Serial0/1/0

no ip address

shutdown

clock rate 2000000

!

interface Serial0/1/1

no ip address

shutdown

clock rate 2000000

!

ip forward-protocol nd

!

no ip http server

no ip http secure-server

!

!

!

!

!

control-plane

!

!

vstack

banner motd ^CUnauthorized access is prohibited^C

!

line con 0

password cisco

line aux 0

line 2

no activation-character

no exec

transport preferred none

transport output pad telnet rlogin lapb-ta mop udptn v120 ssh

stopbits 1

line vty 0 4

password cisco

login

transport input none

line vty 5 15

password cisco

login

transport input none

!

scheduler allocate 20000 1000

!

End

S1#show runn

S1#show running-config

Building configuration...

Current configuration : 2974 bytes

!

! Last configuration change at 01:04:53 UTC Mon Mar 1 1993

!

version 15.0

no service pad

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname S1

!

boot-start-marker

boot-end-marker

!

!

no aaa new-model

system mtu routing 1500

!

!

no ip domain-lookup

!

!

crypto pki trustpoint TP-self-signed-1631757696

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-1631757696

revocation-check none

rsakeypair TP-self-signed-1631757696

!

!

crypto pki certificate chain TP-self-signed-1631757696

certificate self-signed 01

3082022B 30820194 A0030201 02020101 300D0609 2A864886 F70D0101 05050030

31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274

69666963 6174652D 31363331 37353736 3936301E 170D3933 30333031 30303031

30335A17 0D323030 31303130 30303030 305A3031 312F302D 06035504 03132649

4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D31 36333137

35373639 3630819F 300D0609 2A864886 F70D0101 01050003 818D0030 81890281

8100A618 C55854DE 696DC285 9DA88DCA DA5BC019 8D27D8EE 882E19DB 0754848E

4F799D33 C80F4465 32181714 AC9F59A7 C7454229 BF4088A1 A8B62B79 ACB21392

20EFCE38 FEAEC7EF 98B7AAD4 8E3214E4 6565E2EC 935FF767 391523DB 1131C0C0

E9504A76 94DB2BD3 622701A8 A0C706D5 A1F8CD2C 6D7EE90C 2FDCD980 0EAF22E4

72610203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF 301F0603

551D2304 18301680 14020FE6 A62B49EC F7832A4C 724193C4 B95DDB21 7E301D06

03551D0E 04160414 020FE6A6 2B49ECF7 832A4C72 4193C4B9 5DDB217E 300D0609

2A864886 F70D0101 05050003 8181008C A1DE8BF7 FE464297 69C49611 E0DB0768

DB9B4F14 96FEDE05 5412366A 60B82485 D06D6A3B 8D2BBC70 7B4C227D 6DAD3DDD

1417C229 B18E2C86 63D1556F F678D044 555F0F7A 084F5C19 D05FAB26 F0EF8634

071F6E77 7FEC81B1 A9ECF84D CDB1B371 6A5ADF91 BF5EDB9D C13469BA 79CFED74

0F65D5FE 14465E3B 99CBEEB2 6A8927

quit

!

!

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

vlan internal allocation policy ascending

!

!

!

!

!

!

interface FastEthernet0/1

!

interface FastEthernet0/2

!

interface FastEthernet0/3

!

interface FastEthernet0/4

!

interface FastEthernet0/5

!

interface FastEthernet0/6

!

interface FastEthernet0/7

!

interface FastEthernet0/8

!

interface FastEthernet0/9

!

interface FastEthernet0/10

!

interface FastEthernet0/11

!

interface FastEthernet0/12

!

interface FastEthernet0/13

!

interface FastEthernet0/14

!

interface FastEthernet0/15

!

interface FastEthernet0/16

!

interface FastEthernet0/17

!

interface FastEthernet0/18

!

interface FastEthernet0/19

!

interface FastEthernet0/20

!

interface FastEthernet0/21

!

interface FastEthernet0/22

!

interface FastEthernet0/23

!

interface FastEthernet0/24

!

interface GigabitEthernet0/1

!

interface GigabitEthernet0/2

!

interface Vlan1

ip address 192.168.1.2 255.255.255.0

!

ip default-gateway 192.168.1.1

ip http server

ip http secure-server

!

!

!

line con 0

line vty 0 4

login

line vty 5 15

login

!

end