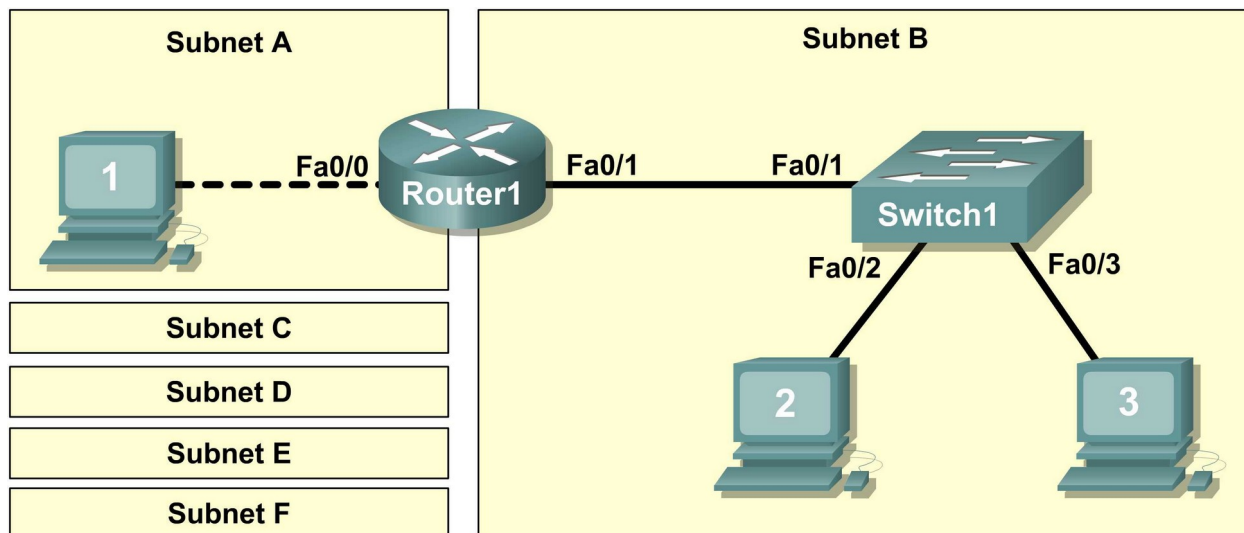


Lab 11.5.4: Network Testing

Topology Diagram



Learning Objectives

Upon completion of this lab, you will be able to:

- Design the logical lab topology.
- Configure the physical lab topology.
- Configure the logical LAN topology.
- Verify LAN connectivity.

Background

Hardware	Qty	Description
Cisco Router	1	Part of CCNA Lab bundle
Cisco Switch	1	Part of CCNA Lab bundle
*Computer (Host)	3	Lab computer
CAT-5 or better straight-through UTP cables	3	Connects Router1, Host1, and Host2 to switch1
CAT-5 crossover UTP cable	1	Connects Host 1 to Router1
Console (rollover) cable	1	Connects Host1 to Router1 console

Table 1. Equipment and Hardware for this Lab

Gather the necessary equipment and cables. To configure the lab, make sure the equipment listed in Table 1 is available.

The Appendix contains Cisco IOS configuration syntax for this lab.

Scenario

In this lab, you will create a small network that requires connecting network devices and configuring host computers for basic network connectivity. SubnetA and SubnetB are

subnets that are currently needed. SubnetC, SubnetD, SubnetE, and SubnetF are anticipated subnets, not yet connected to the network.

Task 1: Design the Logical Lab Topology.

Given an IP address and mask of 172.20.0.0 / 24 (address / mask), design an IP addressing scheme that satisfies the following requirements:

Subnet	Number of Hosts
SubnetA	As shown in topology diagram 2
SubnetB	Between 80 - 100
SubnetC	Between 40 - 52
SubnetD	Between 20 - 29
SubnetE	12
SubnetF	5

Note: Always start with the subnet with the largest number of hosts and work your way down. Therefore, you should start with SubnetB and finish with SubnetA.

Step 1: Design SubnetB address block.

Begin the logical network design by satisfying the requirement of SubnetB, which requires the largest block of IP addresses. Using binary numbers to create your subnet chart, pick the first address block that will support SubnetB.

- Fill in the following table with IP address information for SubnetB:

Network Address	Mask	First Host Address	Last Host Address	Broadcast
172.20.0.128	255.255.255.128	172.20.0.129	172.20.0.254	172.20.0.255

- What is the bit mask in binary? 11111111.11111111.11111111.10000000

Step 2: Design SubnetC address block.

Satisfy the requirement of SubnetC, the next largest IP address block. Using binary numbers to create your subnet chart, pick the next available address block that will support SubnetC.

- Fill in the following table with IP address information for SubnetC:

Network Address	Mask	First Host Address	Last Host Address	Broadcast
172.20.0.64	255.255.255.192	172.20.0.65	172.20.0.126	172.20.0.127

- What is the bit mask in binary? 11111111.11111111.11111111.11000000

Step 3: Design SubnetD address block.

Satisfy the requirement of SubnetD, the next largest IP address block. Using binary numbers to create your subnet chart, pick the next available address block that will support SubnetD.

1. Fill in the following table with IP address information for SubnetD:

Network Address	Mask	First Host Address	Last Host Address	Broadcast
172.20.0.32	255.255.255.224	172.20.0.33	172.20.0.62	172.20.0.63

2. What is the bit mask in binary? 11111111.11111111.11111111.11100000

Step 4: Design SubnetE address block.

Satisfy the requirement of SubnetE, the next largest IP address block. Using binary numbers to create your subnet chart, pick the next available address block that will support SubnetE.

1. Fill in the following table with IP address information for SubnetE:

Network Address	Mask	First Host Address	Last Host Address	Broadcast
172.20.0.16	255.255.255.240	172.20.0.17	172.20.0.30	172.20.0.31

2. What is the bit mask in binary? 11111111.11111111.11111111.11110000

Step 5: Design SubnetF address block.

Satisfy the requirement of SubnetF, the next largest IP address block. Using binary numbers to create your subnet chart, pick the next available address block that will support SubnetF.

1. Fill in the following table with IP address information for SubnetF:

Network Address	Mask	First Host Address	Last Host Address	Broadcast
172.20.0.8	255.255.255.248	172.20.0.9	172.20.0.14	172.20.0.15

2. What is the bit mask in binary? 11111111.11111111.11111111.11111000

Step 6: Design SubnetA address block.

Satisfy the requirement of SubnetA, the smallest IP address block. Using binary numbers to create your subnet chart, pick the next available address block that will support SubnetA.

1. Fill in the following table with IP address information for SubnetA:

Network Address	Mask	First Host Address	Last Host Address	Broadcast
172.20.0.0	255.255.255.252	172.20.0.1	172.20.0.2	172.20.0.3

2. What is the bit mask in binary? 11111111.11111111.11111111.11111100

Task 2: Configure the Physical Lab Topology.

Step 1: Physically connect lab devices.

1. Cable the network devices as shown in Figure 1. Pay special attention to the crossover cable required between Host1 and Router1.

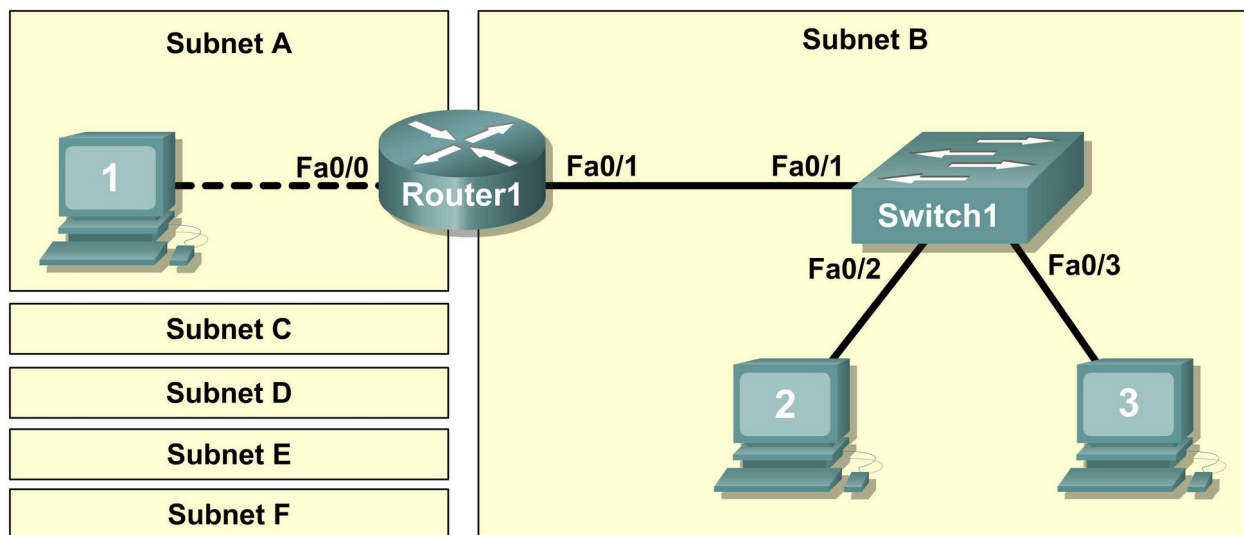


Figure 1. Cabling the Network

2. If not already enabled, turn power on to all devices.

Step 2: Visually inspect network connections.

After cabling the network devices, take a moment to verify the connections. Attention to detail now will minimize the time required to troubleshoot Layer 1 connectivity issues later.

Task 3: Configure the Logical Topology.

Step 1: Document logical network settings.

On SubnetA, Host1 will use the first IP address in the subnet. Router1, interface Fa0/0, will use the last host address. On SubnetB, host computers will use the first and second IP addresses in the subnet, respectively. Router1, interface Fa0/1, will use the last network host address.

To properly route Layer 2 frames between LAN devices, Switch1 does not require Layer 3 configuration. The IP address assigned to Switch 1, interface VLAN 1, is used to establish Layer 3 connectivity between external devices and the switch. Without an IP address, upper-layer protocols such as TELNET and HTTP will not work. The default gateway address permits the switch to respond to protocol requests from devices on distant networks. For example, the IP gateway address extends Layer 3 connectivity beyond Subnet B. Switch1 will use the next-to-last host address.

Write down the IP address information for each device:

Device	Subnet	IP Address	Mask	Gateway
Host1	172.20.0.0	172.20.0.1	255.255.255.252	172.20.0.2

Router1- Fa0/0	172.20.0.0	172.20.0.2	255.255.255.252	N/A
Host2	172.20.0.128	172.20.0.129	255.255.255.128	172.20.0.254
Host3	172.20.0.128	172.20.0.130	255.255.255.128	172.20.0.254
Switch1	172.20.0.128	172.20.0.253	255.255.255.128	172.20.0.254
Router1- Fa0/1	172.20.0.128	172.20.0.126	255.255.255.128	N/A

Step 2: Configure host computers.

- On each computer, in turn, click **Start > Control Panel > Network Connections**. Right-click the LAN icon, and choose **Properties**. On the **General** tab, select **Internet Protocol (TCP/IP)**, and then click the, **Properties** button.
- Verify that the Host1 Layer 3 IP address is on a different subnet than Host2 and Host3. Configure each host computer using the IP address information recorded in Step 1.
- Verify proper configuration of each host computer with the **ipconfig** command and fill in the following table:

Device	IP Address	Mask	Default Gateway
Host1	172.20.0.1	255.255.255.252	172.20.0.2
Host2	172.20.0.129	255.255.255.128	172.20.0.254
Host3	172.20.0.130	255.255.255.128	172.20.0.254

Step 3: Configure Router1.

- From the Windows taskbar, start the HyperTerminal program by clicking **Start > Programs > Accessories > Communications > HyperTerminal**. Configure HyperTerminal for access to Router1. Configuration for Router1 includes the following tasks:

Tasks (Refer to the Appendix for help with commands)
Specify Router name: Router1
Specify an encrypted privileged EXEC password: cisco
Specify a console access password: class
Specify a telnet access password: class
Configure the MOTD banner
Configure Router1 interface Fa0/0: <ul style="list-style-type: none"> Set the description

- Set the Layer 3 address
- Issue **no shutdown**

Configure Router1 interface Fa0/1:

- Set the description
- Set the Layer 3 address
- Issue **no shutdown**

2. Save the configuration in NVRAM.
3. Display the contents of RAM: **show running-config**
4. Write the configuration specifications below:
Hostname: **Router1**
Enable secret password: **cisco**
Console access password: **class**
Telnet access password: **class**
MOTD banner: **Answer ...**
5. Display configuration information for interface Fa0/0: **show interface Fa0/0**
FastEthernet 0/0 status (up / down): **should be up**
Line protocol: **is up**
MAC Address: **0009.7ccc.7401**
6. Display configuration information for interface Fa0/1: **show interface Fa0/1**
FastEthernet 0/1 status (up / down): **should be up**
Line protocol: **is up**
MAC Address: **0009.7ccc.7402**
7. Display brief IP address information about each interface: **show ip interface brief**

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	172.20.0.2	YES	manual	up	up
FastEthernet0/1	172.20.0.254	YES	manual	up	up
8. Take corrective action with any problems, and retest.

Task 4: Clean Up.

Unless directed otherwise by the instructor, restore host computer network connectivity, and then turn off power to the host computers.

Before turning off power to the router and switch, remove the NVRAM configuration file from each device with the privileged exec command **erase startup-config**.

Carefully remove cables and return them neatly to their storage. Reconnect cables that were disconnected for this lab.

Remove anything that was brought into the lab, and leave the room ready for the next class.

Appendix—List of Cisco IOS commands used in this lab

Purpose	Command
Enter the global configuration mode.	configure terminal Example: Router> enable Router# configure terminal Router(config)#
Specify the name for the Cisco device.	hostname <i>name</i> Example: Router(config)# hostname Router1 Router(config)#
Specify an encrypted password to prevent unauthorized access to the privileged EXEC mode.	Enable secret <i>password</i> Example: Router(config)# enable secret cisco Router(config)#
Specify a password to prevent unauthorized access to the console.	password <i>password</i> login Example: Router(config)# line con 0 Router(config-line)# password class Router(config-line)# login Router(config)#
Specify a password to prevent unauthorized Telnet access. Router vty lines: 0 4 Switch vty lines: 0 15	password <i>password</i> login Example: Router(config)# line vty 0 4 Router(config-line)# password class Router(config-line)# login Router(config-line)#
Configure the MOTD banner.	Banner motd % Example: Router(config)# banner motd % Router(config)#
Configure a Router interface. Router interface is OFF by default	Example: Router(config)# interface Fa0/0 Router(config-if)# description <i>description</i> Router(config-if)# ip address <i>address mask</i> Router(config-if)# no shutdown Router(config-if)#
Save the configuration to NVRAM.	copy running-config startup-config Example: Router# copy running-config startup-config