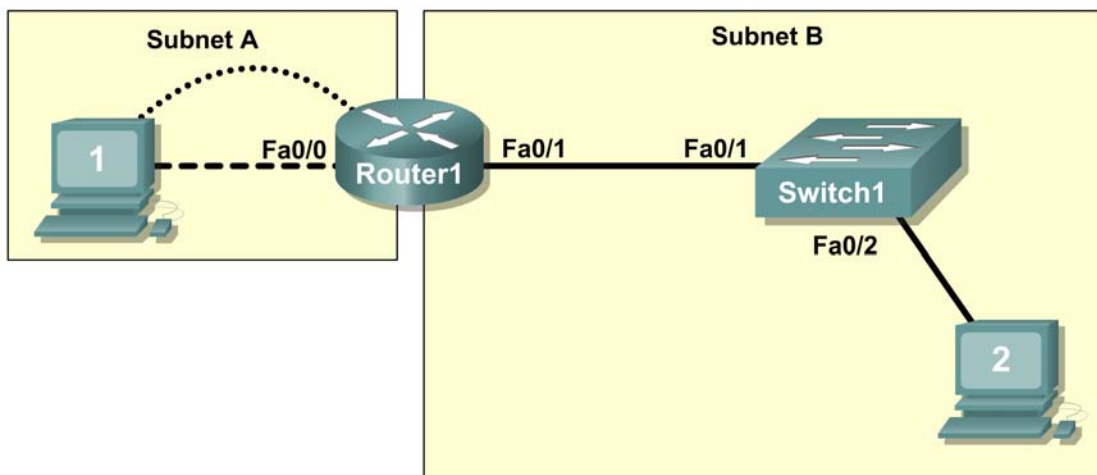


## Lab 1.3.1: Review of Concepts from Exploration 1

### Topology Diagram



### Learning Objectives

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

- Create a logical topology given network requirements
- Create subnets to meet host requirements
- Configure the physical topology
- Configure the logical topology
- Verify network connectivity
- Configure and verify passwords

### Scenario

In this lab, you will design and configure a small routed network and verify connectivity across multiple network devices. This requires creating and assigning two subnetwork blocks, connecting hosts and network devices, and configuring host computers and one Cisco router for basic network connectivity. Switch1 has a default configuration and does not require additional configuration. You will use common commands to test and document the network. The zero subnet is used.

## Task 1: Design a Logical LAN Topology

### Step 1: Design an IP addressing scheme.

Given the IP address block of **192.168.7.0 /24**, design an IP addressing scheme that satisfies the following requirements:

Subnet	Number of Hosts
Subnet A	110
Subnet B	54

The 0 subnet is used. No subnet calculators may be used. Create the smallest possible subnets that satisfy the requirements for hosts. Assign the first usable subnet to Subnet A.

Subnet A	
Specification	Student Input
Number of bits in the subnet	
IP mask (binary)	
New IP mask (decimal)	
Maximum number of usable subnets (including the 0 subnet)	
Number of usable hosts per subnet	
IP subnetwork address	
First IP host address	
Last IP host address	

Subnet B	
Specification	Student Input
Number of bits in the subnet	
IP mask (binary)	
New IP mask (decimal)	
Maximum number of usable subnets (including the 0 subnet)	
Number of usable hosts per subnet	
IP network address	
First IP host address	
Last IP host address	

Host computers will use the first usable IP address in the subnet. The network router will use the last usable IP address in the subnet.

### Step 2: Write down the IP address information for each device.

Device	IP address	Mask	Gateway
Host1			
Router1-Fa0/0			
Host2			
Router1-Fa0/1			

Table 1. IP Address Assignments

Before proceeding, verify your IP addresses with the instructor.

## Task 2: Configure the Physical Topology

### Step 1: Cable the network.

Refer to the figure and table below for the necessary cables.

Cabling	Cable Type
LAN cable between Host1 and Router1 Fa0/0	Crossover
LAN cable between Switch1 and Router1 Fa0/1	Straight-through
LAN cable between Switch1 and Host2	Straight-through
Console cable between Host1 and Router1	Rollover

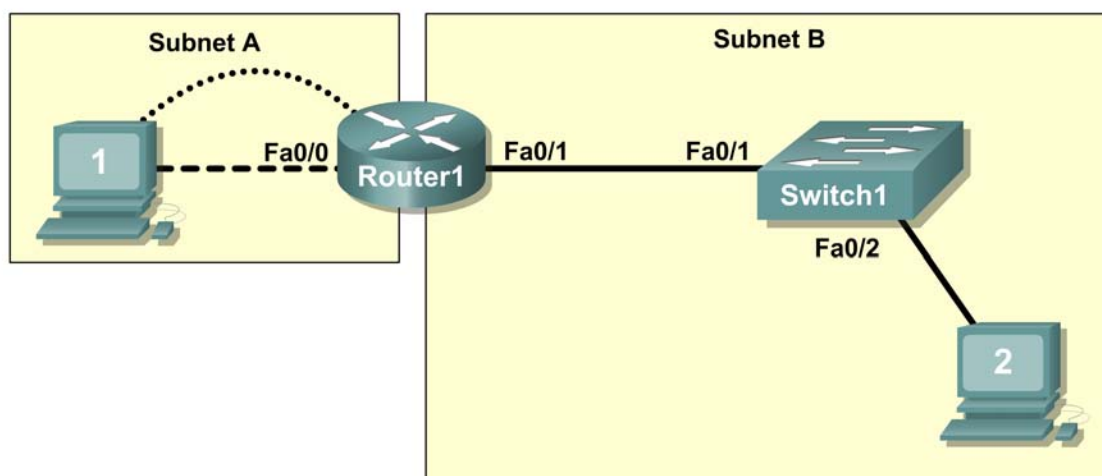


Figure 1. Cabling the network

### Step 2: Physically connect lab devices.

Cable the network devices as shown in Figure 1. Turn power on to all devices if it is not already on.

### Step 3: Inspect the network connections.

Verify the connections visually.

## Task 3: Configure the Logical Topology

### Step 1: Configure the host computers.

Configure the static IP address, subnet mask, and gateway for each host computer.

Note: The following directions are for Windows XP. To configure hosts using other operating systems, refer to the operating system manual.

To configure the host, go to **Start > Control Panel > Network Connections > Local Area Connection**. In the Local Area Connection Properties window, select **Internet Protocol (TCP/IP)** and click the **Properties** button.

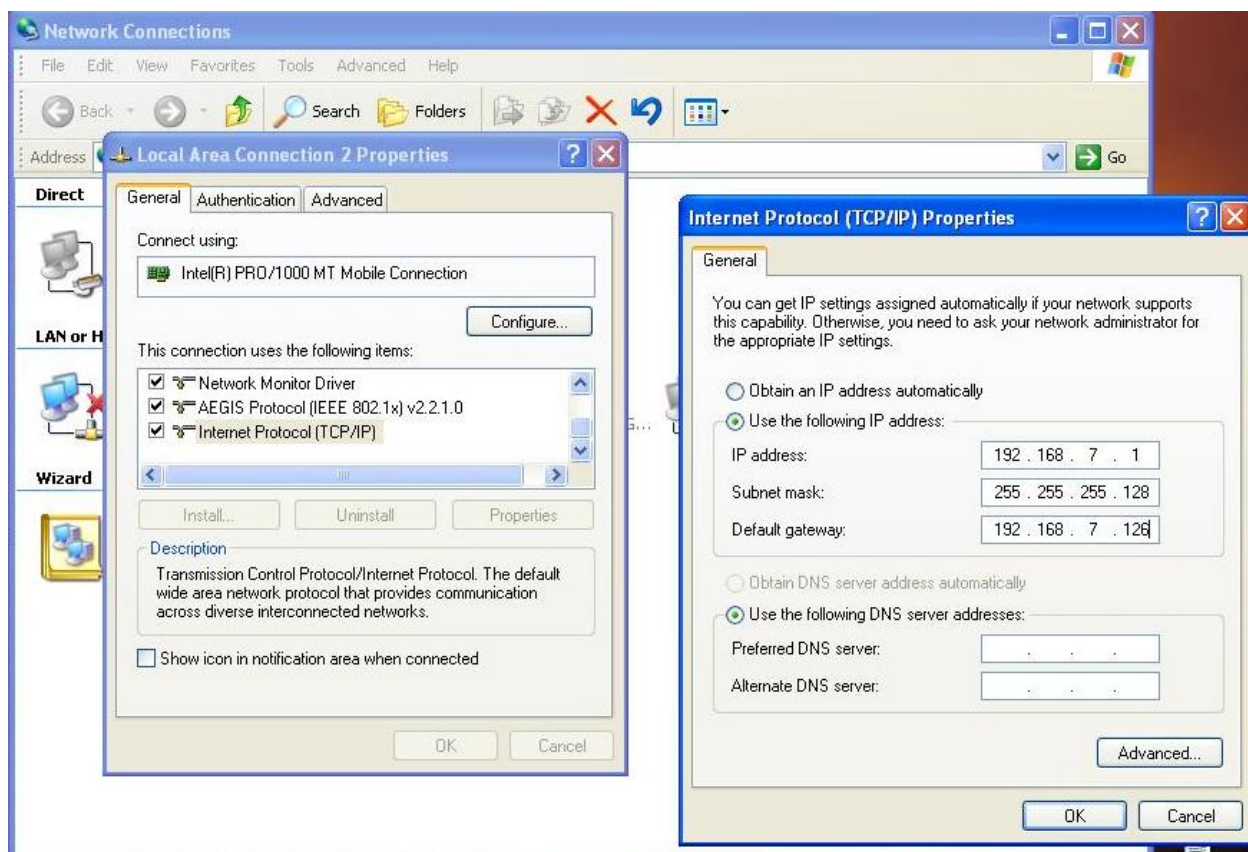


Figure 2. Setting Properties for Internet Protocol (TCP/IP)

In the TCP/IP Properties dialog box for each host, enter the IP address, network mask, and the gateway from Table 1.

After configuring each host computer, open a command window on the host by selecting **Start > Run**. When prompted to type the name of a program, enter **cmd** in the text box. From the command window, display and verify the host network settings with the **ipconfig /all** command. The settings should match those in the tables below:

Host1 Network Configuration	
IP address	192.168.7.1
Subnet mask	255.255.255.128
Default gateway	192.168.7.126

Host2 Network Configuration	
IP address	192.168.7.129
Subnet mask	255.255.255.192
Default gateway	192.168.7.190

Are the host settings in agreement with the tables? \_\_\_\_\_ If not, reconfigure as necessary.

## Step 2: Configure Router1.

From Host1, connect to the console of Router 1 and establish a console session. Directions for creating a console connection using HyperTerminal are in Appendix 2.

From the router console, configure the following:

Task	Specification
Router name	Router1
Encrypted privileged exec password	class
Console access password	cisco
Telnet access password	cisco
Router1 interface Fa0/0	Set the description Set the Layer 3 address
Router1 interface Fa0/1	Set the description Set the Layer 3 address

Enter the following commands on the router:

```
Router>enable
Router#config term
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router1
Router1(config)#enable secret class
Router1(config)#line console 0
Router1(config-line)#password cisco
Router1(config-line)#login
Router1(config-line)#line vty 0 4
Router1(config-line)#password cisco
Router1(config-line)#login
Router1(config-line)#interface fa0/0
Router1(config-if)#ip address 192.168.7.126 255.255.255.128
Router1(config-if)#no shutdown
Router1(config-if)#description connection to host1
Router1(config-if)#interface fa0/1
Router1(config-if)#description connection to switch1
Router1(config-if)#ip address 192.168.7.190 255.255.255.192
Router1(config-if)#no shutdown
Router1(config-if)#end
Router1#
```

## Task 4: Verify Network Connectivity

### Step 1: Use the ping command to verify network connectivity.

You can verify network connectivity using the **ping** command.

Note: If pings to the host computers fail, temporarily disable the computer firewall and retest. To disable a Windows firewall, select **Start > Control Panel > Windows Firewall**, select **OFF**, and then **OK**.

Use the following table to verify connectivity with each network device. Take corrective action to establish connectivity if a test fails.

From	To	IP Address	Ping Results
Host1	NIC IP address	192.168.7.1	
Host1	Router1, Fa0/0	192.168.7.126	
Host1	Router1, Fa0/1	192.168.7.190	
Host1	Host2	192.168.7.129	
Host2	NIC IP address	192.168.7.129	
Host2	Router1, Fa0/1	192.168.7.190	
Host2	Router1, Fa0/0	192.168.7.126	
Host2	Host1	192.168.7.1	

In addition to the **ping** command, what other Windows command is useful in displaying network delay and breaks in the path to the destination? \_\_\_\_\_

## Task 5: Verify Passwords

### Step 1: Telnet to the router from Host2 and verify the Telnet password.

You should be able to telnet to either Fast Ethernet interface of the router.

In a command window on Host 2, type:

```
telnet 192.168.7.190
```

When you are prompted for the Telnet password, type **cisco** and press Enter.

Was the telnet successful? \_\_\_\_\_

### Step 2: Verify that the enable secret password has been set.

From the Telnet session, enter privilege exec mode and verify it is password protected:

```
Router>enable
```

Were you prompted for the enable secret password? \_\_\_\_\_

### Step 3: Verify that the console is password protected.

Terminate and then re-establish the console connection from Host1 to the router to verify that the console is password protected.

Depending on the Telnet client that you are using, the session can usually be terminated with Ctrl-]. When the session is re-established, you should be prompted for the console password before being allowed access to the command line interface.

### Task 6: Reflection

How are Telnet access and console access different? When might it make sense to set different passwords on these two access ports? \_\_\_\_\_

Why does the switch between Host2 and the router not require configuration with an IP address to forward packets? \_\_\_\_\_

### Task 7: Clean Up

Unless directed otherwise by your instructor, erase the configurations and reload the switches. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.

## Appendix 1: Last Octet Subnet Chart

Subnet Addressing for Last Octet							
	25 (1 subnet bit) 1 subnet 126 hosts	26 (2 subnet bits) 3 subnets 62 hosts	27 (3 subnet bits) 7 subnets 30 hosts	28 (4 subnet bits) 15 subnets 14 hosts	29 (5 subnet bits) 31 subnets 6 hosts	30 (6 subnet bits) 63 subnets 2 hosts	
0	.0	.0 (1-62)	.0 (1-30)	.0 (1-14)	.0 (1-6)	.0 (1-2)	
.4						.4 (5-6)	
.8				.16 (17-30)	.16 (17-22)	.8 (9-14)	
.12						.12 (13-14)	
.16			.32 (33-62)	.32 (33-46)	.48 (49-54)	.16 (17-18)	
.20						.20 (21-22)	
.24					.56 (57-62)	.24 (25-26)	
.28						.28 (29-30)	
.32		.64 (65-126)	.64 (65-94)	.48 (49-62)	.64 (65-70)	.32 (33-34)	
.36						.36 (37-38)	
.40				.80 (81-94)	.72 (73-78)	.40 (41-42)	
.44						.44 (45-46)	
.48			.96 (97-110)	.96 (97-102)	.88 (89-94)	.48 (49-50)	
.52						.52 (53-54)	
.56					.104 (105-110)	.56 (57-58)	
.60						.60 (61-62)	
.64			.112 (113-126)	.104 (105-106)	.104 (105-110)	.64 (65-66)	
.68						.68 (69-70)	
.72			.128 (129-158)	.128 (129-142)	.136 (137-142)	.72 (73-74)	
.76						.76 (77-78)	
.80			.144 (145-158)	.144 (145-150)	.152 (153-158)	.80 (81-82)	
.84						.84 (85-86)	
.88		.160 (161-190)	.160 (161-190)	.160 (161-174)	.168 (169-174)	.88 (89-90)	
.92						.92 (93-94)	
.96				.176 (177-190)	.184 (185-190)	.96 (97-98)	
.100						.100 (101-102)	
.104			.192 (193-222)	.200 (201-206)	.208 (209-214)	.104 (105-106)	
.108						.108 (109-110)	
.112			.224 (225-254)	.232 (233-238)	.240 (241-246)	.112 (113-114)	
.116						.116 (117-118)	
.120			.248 (249-250)	.252 (253-254)		.120 (121-122)	
.124						.124 (125-126)	
.128	.128	.128 (129-190)	.128 (129-158)	.128 (129-142)	.136 (137-142)	.128 (129-130)	
.132						.132 (133-134)	
.136				.144 (145-158)	.152 (153-158)	.136 (137-138)	
.140						.140 (141-142)	
.144			.160 (161-190)	.160 (161-174)	.168 (169-174)	.144 (145-146)	
.148						.148 (149-150)	
.152			.192 (193-222)	.200 (201-206)	.208 (209-214)	.152 (153-154)	
.156						.156 (157-158)	
.160			.224 (225-254)	.232 (233-238)	.240 (241-246)	.160 (161-162)	
.164						.164 (165-166)	
.168			.248 (249-250)	.252 (253-254)		.168 (169-170)	
.172						.172 (173-174)	
.176		.192 (193-254)	.192 (193-222)	.200 (201-206)	.208 (209-214)	.176 (177-178)	
.180						.180 (181-182)	
.184				.216 (217-222)	.224 (225-230)	.184 (185-186)	
.188						.188 (189-190)	
.192			.240 (241-246)	.248 (249-250)		.192 (193-194)	
.196						.196 (197-198)	
.200			.252 (253-254)	.256 (257-258)		.200 (201-202)	
.204						.204 (205-206)	
.208			.256 (257-258)	.260 (261-262)		.208 (209-210)	
.212						.212 (213-214)	
.216			.264 (265-266)	.268 (269-270)		.216 (217-218)	
.220						.220 (221-222)	
.224			.272 (273-274)	.276 (277-278)		.224 (225-226)	
.228						.228 (229-230)	
.232			.280 (281-282)	.284 (285-286)		.232 (233-234)	
.236						.236 (237-238)	
.240			.288 (289-290)	.292 (293-294)		.240 (241-242)	
.244						.244 (245-246)	
.248			.296 (297-298)	.300 (299-300)		.248 (249-250)	
.252						.252 (253-254)	

Originally Authored by Dale Henninger  
Compiled by Lee Todrick

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## Appendix 2: Creating a Router Console Session using HyperTerminal

### Task 1: Connect a Router and Computer with a Console Cable

#### Step 1: Set up a basic physical connection.

Connect the console (rollover) cable to the console port on the router. Connect the other cable end to the host computer with a DB-9 or DB-25 adapter to the COM 1 port.

#### Step 2: Power on devices.

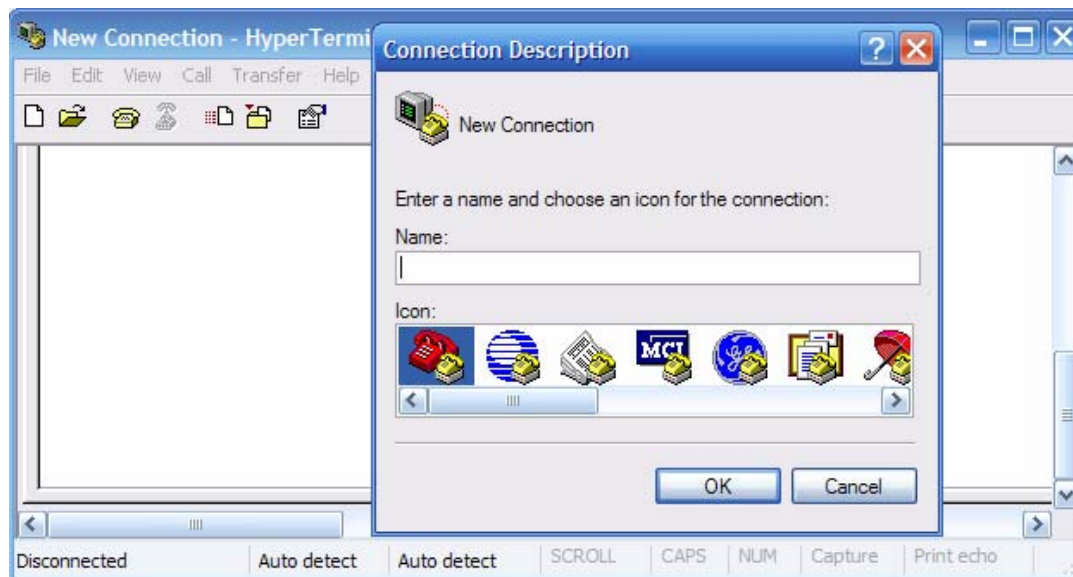
If not already powered on, enable power to the computer and router.

### Task 2: Configure HyperTerminal to Establish a Console Session with a Cisco IOS Router

#### Step 1: Start the HyperTerminal application.

Start the HyperTerminal program by clicking **Start > Programs > Accessories > Communications > HyperTerminal**.

#### Step 2: Configure HyperTerminal.



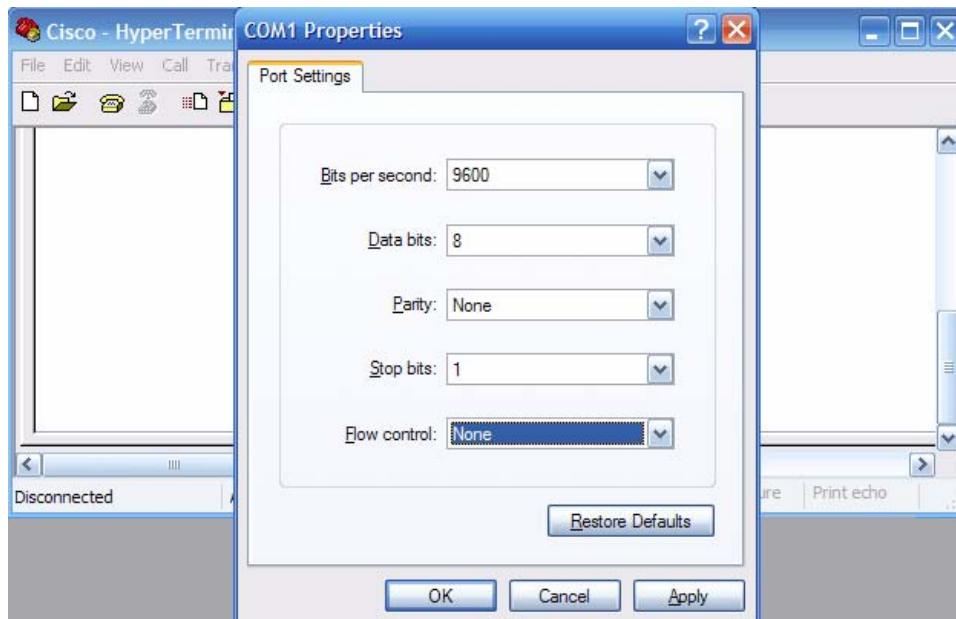
**Figure 3. HyperTerminal Name Configuration Window**

In the Connection Description window, enter a session name in the Name field. Select an appropriate icon, or keep the default. Click **OK**.



**Figure 4. HyperTerminal Connection Type**

Enter COM 1 in the Connect Using field, and then click **OK**. (Depending upon the PC you are using, it may be necessary to use a different COM port. If COM1 does not work, then systematically try the additional COM ports until you are successful.)



**Figure 5. HyperTerminal COM1 Port Settings**

As shown in Figure 3, change port settings to the following values, and then click **OK**:

Setting	Value
Bits per second	<b>9600</b>
Data bits	<b>8</b>
Parity	<b>None</b>
Stop bits	<b>1</b>
Flow control	<b>None</b>

When the HyperTerminal session window appears, press **Enter**. There should be a response from the router. This indicates that the connection has been successfully completed. If there is no connection, troubleshoot as necessary. For example, verify that the router has power. Check the connection to the COM 1 port on the PC and the console port on the router. If there is still no connection, ask the instructor for assistance.

### **Step 3: Close HyperTerminal.**

When finished, close the HyperTerminal session by choosing **File > Exit**. When asked whether to save the session, click **Yes**. Enter a name for the session.

### **Step 4: Reconnect the HyperTerminal session.**

Reopen the HyperTerminal session as described in Task 2, Step 1. This time, when the Connection Description window appears (see Figure 3), click **Cancel**.

Choose **File > Open**. Select the saved session and then click **Open**. Use this step to reconnect the HyperTerminal session to a Cisco device without reconfiguring a new session.

When finished, exit HyperTerminal.