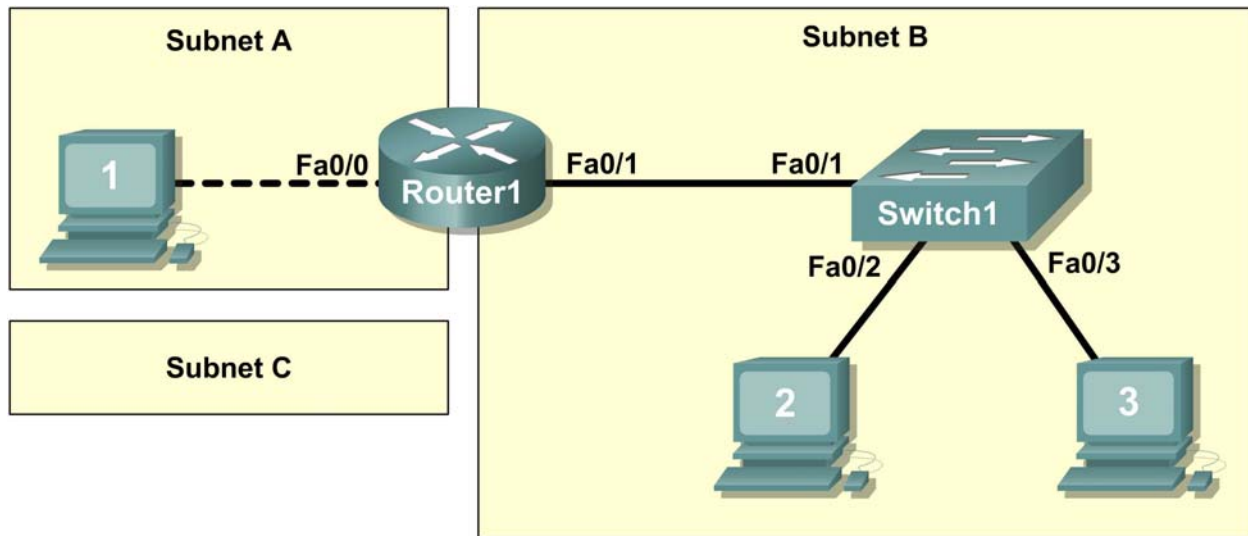


## Lab 11.5.5: Network Documentation with Utility Commands

### Topology Diagram



### Learning Objectives

- Design the logical lab topology.
- Configure the physical lab topology.
- Design and configure the logical LAN topology.
- Verify LAN connectivity.
- Document the network.

### 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 Eagle 1 lab.

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

In this lab router and host output will be copied from the devices and into Notepad for use in network documentation. Appendix1 contains tables that can be used to copy output into, or create your own tables.

## Scenario

Network documentation is a very important tool for the organization. A well-documented network enables network engineers to save significant time in troubleshooting and planning future growth.

In this lab students will create a small network that requires connecting network devices and configuring Host computers for basic network connectivity. Subnet A and Subnet B are subnets that are currently needed. Subnet C is an anticipated subnet, not yet connected to the network.

## Task 1: Configure the logical lab topology.

Given an IP address of 209.165.200.224 / 27 (address / mask), design an IP addressing scheme that satisfies the following requirements:

Subnet	Number of Hosts
Subnet A	2
Subnet B	Between 2 - 6
Subnet C	Between 10 – 12

### Step 1: Design Subnet C address block.

Begin the logical network design by satisfying the requirement for Subnet C, the largest IP address block. Using binary numbers to create your subnet chart, pick the next available address block that will support Subnet C.

Fill in the following table with IP address information for Subnet C:

Network Address	Mask	First Host address	Last Host address	Broadcast

What is the bit mask in binary? \_\_\_\_\_

### Step 2: Design Subnet B address block.

Satisfy the requirement of Subnet B, the next largest block of IP addresses. Using binary numbers to create your subnet chart, pick the first address block that will support Subnet B.

Fill in the following table with IP address information for Subnet B:

Network Address	Mask	First Host address	Last Host address	Broadcast

What is the bit mask in binary? \_\_\_\_\_

### Step 3: Design Subnet A address block.

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

Fill in the following table with IP address information for Subnet A:

Network Address	Mask	First Host address	Last Host address	Broadcast

What is the bit mask in binary? \_\_\_\_\_

## Task 2: Configure the Physical Lab Topology.

### Step 1: Physically connect lab devices.

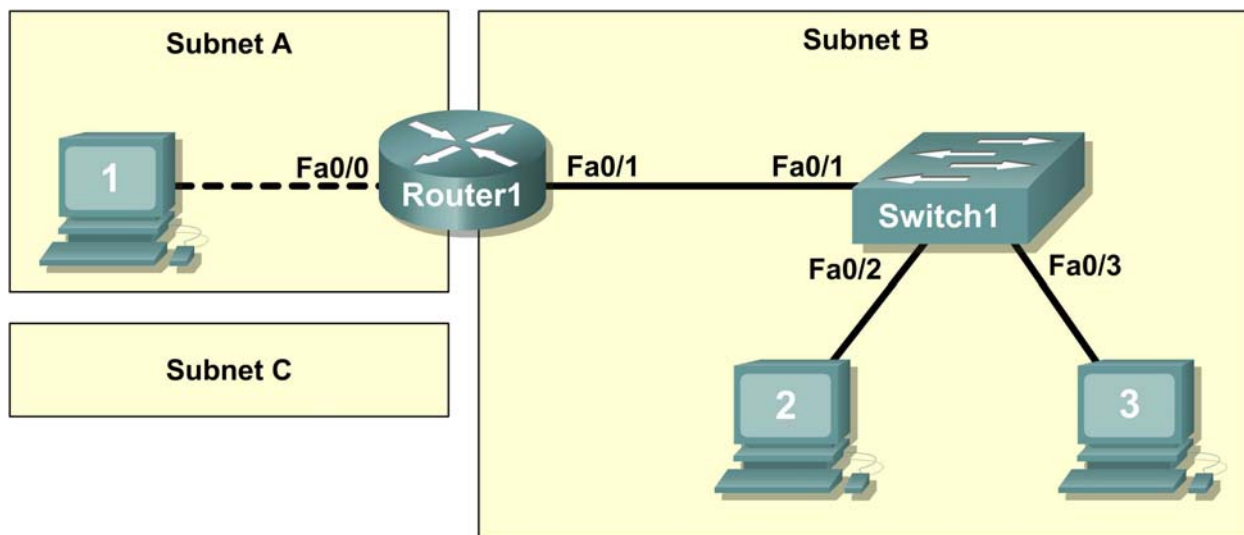


Figure 1. Cabling the network.

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

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 network connectivity issues later.

## Task 3: Configure the Logical Topology.

### Step 1: Document logical network settings.

Host computers will use the first two IP addresses in the subnetwork. The network router will use the LAST network host address. Write down the IP address information for each device:

Device	Subnet	IP address	Mask	Gateway
Router1-Fa0/0				
Host1				
Router1-Fa0/1				
Host2				
Host3				
Switch1	N/A	N/A	N/A	N/A

## Step 2: Configure host computers.

On each computer in turn, select start | Control Panel | Network Connections. Identify the Local Area Connection device icon. Use the mouse pointer to highlight the icon, right-click, and select properties. Highlight Internet Protocol (TCP/IP), and select Properties.

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 /all** command. Record your information in Appendix1, Network Documentation:

## Step 3: Configure Router1.

From the Widows taskbar, start the HyperTerminal program by clicking on Start | Programs | Accessories | Communications | HyperTerminal. Configure HyperTerminal for access to Router1. Configuration tasks for Router1 include the following:

Task
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- set the description set the Layer 3 address issue <b>no shutdown</b>
Configure Router1 interface Fa0/1- set the description set the Layer 3 address issue <b>no shutdown</b>

Save the configuration in NVRAM.

Display the contents of RAM:

Copy the output of the configuration into the Router1 configuration table, Appendix 1.

Copy the output of the **show interface fa0/0** and **show interface fa0/1** commands into the Router1 Interface configuration tables, Appendix 1.

Copy the output of the **show ip interface brief** command into the Router1 IP Address configuration table, Appendix1.

#### Step 4: Configure Switch1.

Move the console cable from Router1 to Switch1. Press Enter until a response is received. Configuration tasks for Switch1 include the following:

Task
Specify Switch name- <code>Switch1</code>
Specify an encrypted privileged exec password- <code>cisco</code>
Specify a console access password- <code>class</code>
Specify a telnet access password- <code>class</code>
Configure the MOTD banner.
Configure Switch1 interface Fa0/1- set the description
Configure Switch1 interface Fa0/2- set the description
Configure Switch1 interface Fa0/3- set the description

Display the contents of RAM:

Copy the output of the configuration into the Switch1 configuration table, Appendix 1.

Copy the output of the `show mac address-table` command into the Switch1 MAC address table, Appendix 1.

#### Task 4: Verify Network Connectivity.

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

Network connectivity can be verified with the `ping` command. It is very important that connectivity exists throughout the network. Corrective action must be taken if there is a failure.

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

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

From	To	IP Address	Ping results
Host1	LocalHost (127.0.0.1)		
Host1	NIC IP address		
Host1	Gateway (Router1, Fa0/0)		
Host1	Router1, Fa0/1		
Host1	Host2		
Host1	Host3		
Host2	LocalHost (127.0.0.1)		
Host2	NIC IP address		
Host2	Host3		
Host2	Gateway (Router1, Fa0/1)		
Host2	Router1, Fa0/0		
Host2	Host1		
Host3	LocalHost (127.0.0.1)		
Host3	NIC IP address		
Host3	Host2		
Host3	Gateway (Router1, Fa0/1)		
Host3	Router1, Fa0/0		
Host3	Host1		

### Step 2: Use the `tracert` command to verify local connectivity.

In addition to connectivity testing, the `tracert` command may also be used as a crude throughput tester for network baselining. That is, with minimal traffic, `tracert` results can be compared against periods of high traffic. Results can be used to justify equipment upgrades or new purchases.

From Host1, issue the `tracert` command to Router1, Host2, and Host3. Record the results in the Host1 Tracert output, Appendix A.

From Host2, issue the `tracert` command to Host3, Router1, and Host1. Record the results in the Host2 Tracert output, Appendix A.

From Host3, issue the `tracert` command to Host2, Router1, and Host1. Record the results in the Host3 Tracert output, Appendix A.

### Task 5: Document the Network.

With all the work performed so far, it would seem that there is nothing left to do. The network was physically and logically configured, verified, and command output copied into tables.

The last step in network documentation is to organize your output. As you organize, think what might be needed six months or a year from now. For example:

When was the network created?

When was the network documented?

Were there any significant challenges that were overcome?

Who performed the configuration (talent like this needs to be tracked)?

Who performed the documentation (talent like this needs to be tracked)?

These questions should be answered in the documentation, perhaps in a cover letter.

Be sure to include the following information:

A copy of the physical topology.

A copy of the logical topology.

Prepare your documentation in a professional format, and submit it to your instructor.

## Task 6: Reflection

Review any physical or logical configuration problems encountered during this lab. Insure a thorough understanding of the procedures used to verify network connectivity.

## Task 7: Challenge

Ask your instructor or another student to introduce one or two problems in your network when you aren't looking or are out of the lab room. Problems can be either physical (cables moved on the switch) or logical (wrong IP address or gateway).

Use your network documentation to troubleshoot and remedy the problems:

1. Perform a good visual inspection. Look for green link lights on Switch1.
2. Use your network documentation to compare what should be to what is:

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3. Write down your proposed solution(s):

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4. Test your solution. If the solution fixed the problem, document the solution. If the solution did not fix the problem, continue troubleshooting.

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## Task 8: Clean Up.

Unless directed otherwise by the instructor, restore host computer network connectivity, 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 1- Network Documentation

Host tables created from Task 3, Step 2:

Host1 Network Configuration	
Host Name	
IP Routing Enabled	
Ethernet adapter	
Description	
Physical Address	
IP Address	
Subnet Mask	
Default Gateway	

Host2 Network Configuration	
Host Name	
IP Routing Enabled	
Ethernet adapter	
Description	
Physical Address	
IP Address	
Subnet Mask	
Default Gateway	

Host3 Network Configuration	
Host Name	
IP Routing Enabled	
Ethernet adapter	
Description	
Physical Address	
IP Address	
Subnet Mask	
Default Gateway	



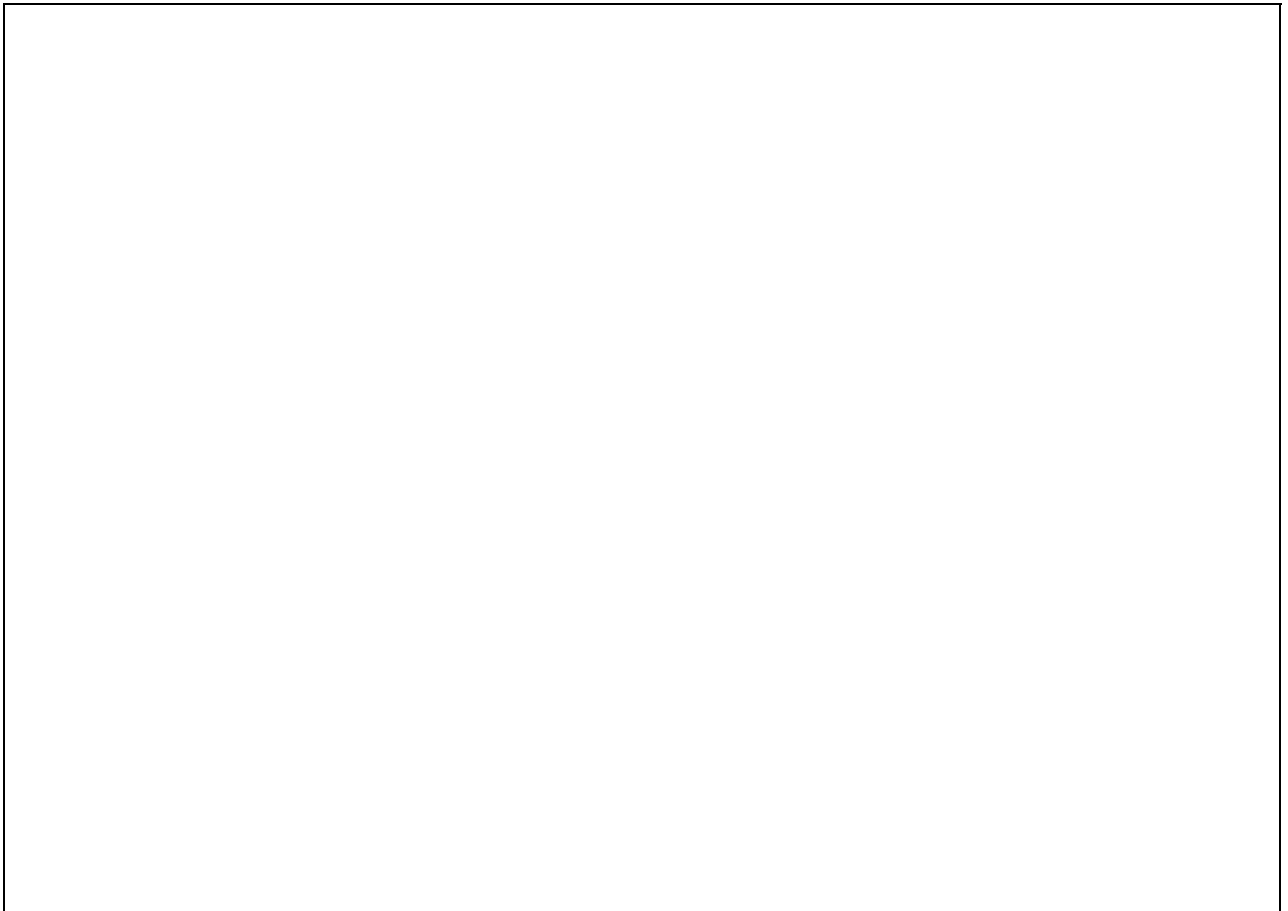
**Router1 configuration from Task 3, Step 3:**

Router1 Configuration

**Router1 Interface Fa0/0 configuration from Task 2, Step 3:**

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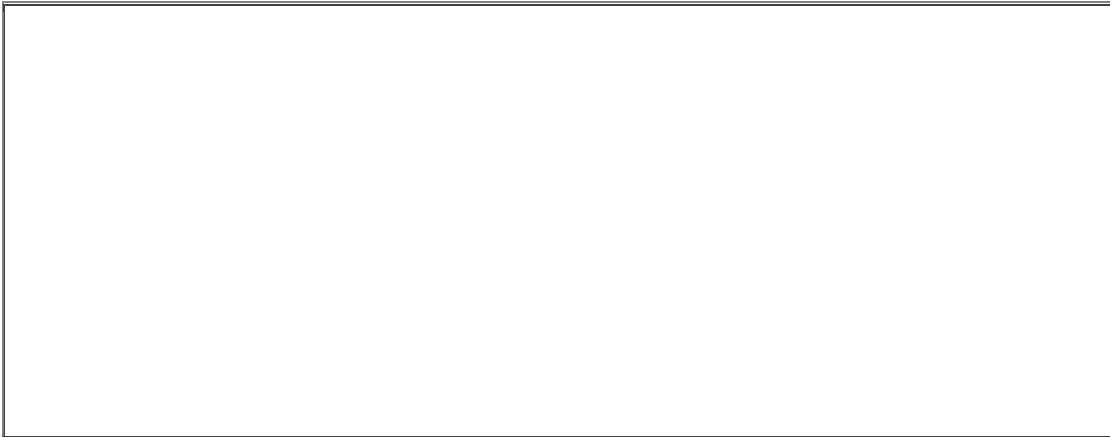
**Router1 Interface fa0/1 configuration from Task 3, Step 3:**



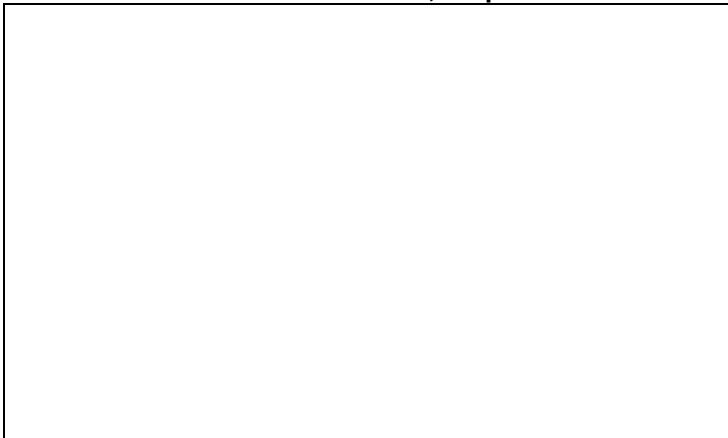
**Router1 IP Address configuration from Task 3, Step 3:**



**Switch1 Configuration from Task 3, Step 4:**

A large, empty rectangular box with a thin black border, intended for the configuration of Switch1.

**Switch1 MAC address-table from Task 3, Step 4:**

A rectangular box with a thin black border, intended for the MAC address-table of Switch1.

**Traceroute results from Host1 Task 4, Step 2:**

A large, empty rectangular box with a thin black border, intended for the traceroute results from Host1.

**Traceroute results from Host2 Task 4, Step 2:**

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**Traceroute results from Host3 Task 4, Step 2:**

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