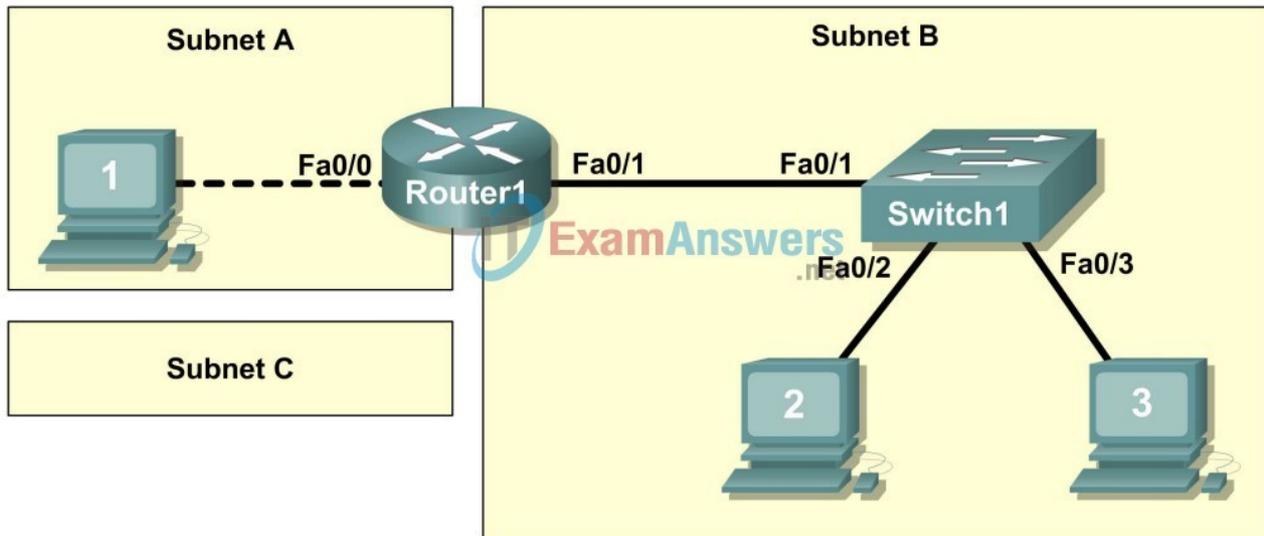# Lab 11.5.5 – Net Documentation with Utility Commands

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

Table 1. Equipment and hardware for Eagle 1 lab.

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

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

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.

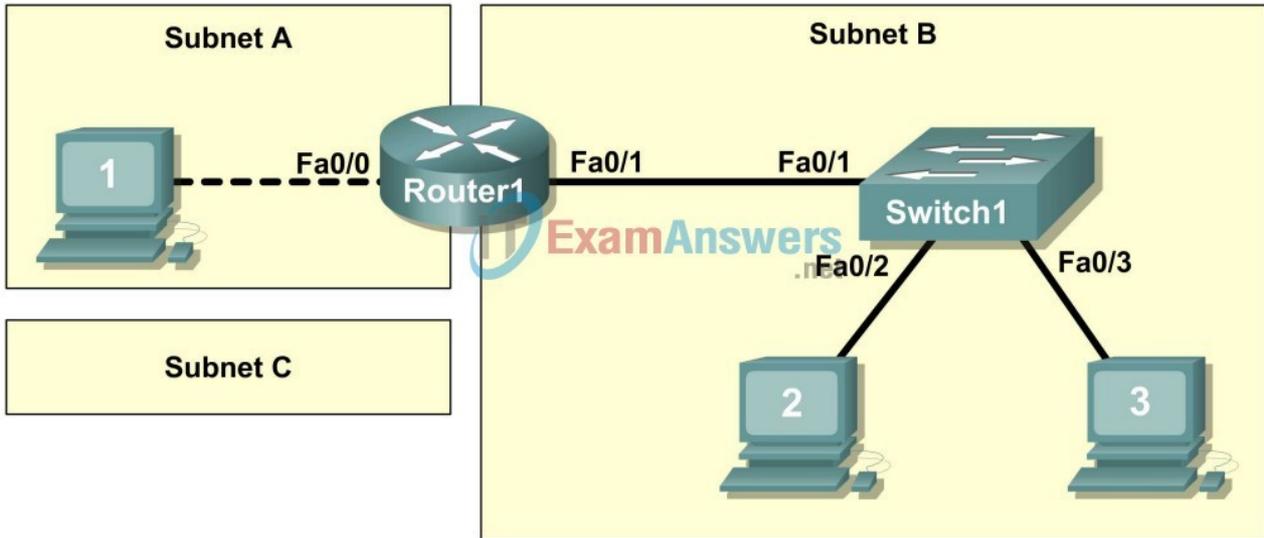## Step 1: Physically connect lab devices.

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				N/A
Host1				
Router1-Fa0/1				
Host2				
Host3				
Switch1				

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 subnetwork 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 **no shutdown**
Configure Router1 interface Fa0/1- set the description set the Layer 3 address issue **no shutdown**

Save the configuration in NVRAM.

Display the contents of RAM: **show running-configuration**

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- **Switch1**
Specify an encrypted privileged exec password- **cisco**
Specify a console access password- **class**
Specify a telnet access password- **class**
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: **show running-config**

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)	127.0.0.1	Should be success.
Host1	NIC IP address		Should be success.
Host1	Gateway (Router1, Fa0/0)		Should be success.
Host1	Router1, Fa0/1		Should be success.
Host1	Host2		Should be success.
Host1	Host3		Should be success.

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

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:

3. Write down your proposed solution(s):

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

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	Answers will vary.
IP Routing Enabled	Answers will vary.
Ethernet adapter	Answers will vary.
Description	Answers will vary.
Physical Address	Answers will vary.
IP Address	
Subnet Mask	
Default Gateway	

Host2 Network Configuration

Host Name	Answers will vary.
IP Routing Enabled	Answers will vary.
Ethernet adapter	Answers will vary.
Description	Answers will vary.
Physical Address	Answers will vary.
IP Address	
Subnet Mask	
Default Gateway	

Host3 Network Configuration

Host Name	Answers will vary.
IP Routing Enabled	Answers will vary.
Ethernet adapter	Answers will vary.
Description	Answers will vary.
Physical Address	Answers will vary.
IP Address	
Subnet Mask	
Default Gateway	

Router1 configuration from Task 3, Step 3:

```
Current configuration : 1138 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router1
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$sqIx$iKGfkjNa6IlaBVnPnGrVR0
!
no aaa new-model
ip cef
!
interface FastEthernet0/0
description connection to Host1
ip address 209.165.200.250 255.255.255.252
duplex auto
speed auto
!
interface FastEthernet0/1
description connection to Switch1
ip address 209.165.200.240 255.255.255.248
duplex auto
speed auto
!
interface Serial0/1/0
no ip address
shutdown
no fair-queue
!
interface Serial0/1/1
no ip address
shutdown
clock rate 2000000
!
interface Vlan1
no ip address
!
ip http server
no ip http secure-server
!
control-plane
!
banner motd ^C
**** ABC network device ****
**** Authorized access only ****
**** Logging is enabled *****
^C
!
line con 0
password class
login
line aux 0
line vty 0 4
```

```
password class
login
!
scheduler allocate 20000 1000
end
```

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

```
Router1# show interface fa0/0
Router1#sh int fa0/0
FastEthernet0/0 is up, line protocol is up
  Hardware is Gt96k FE, address is 001b.530c.cdee (bia 001b.530c.cdee)
  Description: connection to Host1
  Internet address is 172.25.100.6/29
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:01:27, output 00:00:02, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     54 packets input, 8915 bytes
     Received 44 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog
     0 input packets with dribble condition detected
     277 packets output, 88733 bytes, 0 underruns
     0 output errors, 0 collisions, 4 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Router1#
```

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

```
Router1# show interface fa0/1
FastEthernet0/1 is up, line protocol is up
  Hardware is Gt96k FE, address is 001b.530c.cdef (bia 001b.530c.cdef)
  Description: connection to Switch1
  Internet address is 172.25.100.14/29
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive not set
  Auto-duplex, Auto Speed, 100BaseTX/FX
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog
     0 input packets with dribble condition detected
     91 packets output, 14481 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Router1#
```

Router1 IP Address configuration from Task 3, Step 3:

```
Router1#sh ip int brief
Interface         IP-Address       OK? Method Status                 Protocol
FastEthernet0/0   209.165.200.250  YES manual up                     up
FastEthernet0/1   209.165.200.246  YES manual up                     up
Serial0/1/0       unassigned       YES unset  administratively down down
Serial0/1/1       unassigned       YES unset  administratively down down
Router1#
```

Switch1 Configuration from Task 3, Step 4:

```
Building configuration...

Current configuration : 1862 bytesad 1/255
!
version 12.1

no service padARPA, loopback
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch1
!
enable secret 5 $1$X9tO$93NSNcI66s8ESanQ/o3A60
!
interface FastEthernet0/1
description connection to Router1
no ip address
!
interface FastEthernet0/2
description connection to Host2
no ip address
!
interface FastEthernet0/3
description connection to Host3
no ip address
!
interface FastEthernet0/4
no ip address
!
interface FastEthernet0/5
no ip address
!
interface FastEthernet0/6
no ip address
!
interface FastEthernet0/7
no ip address
!
interface FastEthernet0/8
no ip address
!
interface FastEthernet0/9
no ip address
!
interface FastEthernet0/10
no ip address
!
interface FastEthernet0/11
no ip address
!
interface FastEthernet0/12
no ip address
!
interface FastEthernet0/13
no ip address
!
interface FastEthernet0/14
```

```
no ip address
!
interface FastEthernet0/15
no ip address
!
interface FastEthernet0/16
no ip address
!
interface FastEthernet0/17
no ip address


!
interface FastEthernet0/18
no ip address
!
Interface FastEthernet0/19
no ip address
!
Interface FastEthernet0/20
no ip address
!
Interface FastEthernet0/21
no ip address
!
interface FastEthernet0/22
no ip address
!
interface FastEthernet0/23
no ip address
!
interface FastEthernet0/24
no ip address
!
interface GigabitEthernet0/1
no ip address
!s
interface GigabitEthernet0/2
no ip address
!
ip http server
!
banner motd ^C
**** ABC network device ****

**** Authorized access only ****

**** Logging is enabled *****
^C
!
line con 0
password class
login
line vty 0 4
password class
login
line vty 5 15
password class
login
```

```
!
end

Switch1#
```

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

```
          Mac Address Table
-------------------------------------------
Vlan    Mac Address      Type        Ports
----    -----------      --------    -----
All     000f.f79f.6cc0   STATIC      CPU
All     0100.0ccc.cccc   STATIC      CPU
All     0100.0ccc.cccd   STATIC      CPU
All     0100.0cdd.dddd   STATIC      CPU
  1     0016.76ac.a76a   DYNAMIC     Fa0/3
  1     0018.8bb4.3c3a   DYNAMIC     Fa0/2
  1     001b.530c.cdef   DYNAMIC     Fa0/1
Total Mac Addresses for this criterion: 7
Switch1#
```

Traceroute results from Host1 Task 4, Step 2:

```
C:\> tracert 209.165.200.250
Tracing route to 209.165.200.250 over a maximum of 30 hops
  1    <1 ms    <1 ms    <1 ms  209.165.200.250
Trace complete.


C:\> tracert 209.165.200.241
Tracing route to 209.165.200.241 over a maximum of 30 hops
  1    <1 ms    <1 ms    <1 ms  209.165.200.250
  2     1 ms    <1 ms    <1 ms  209.165.200.241
Trace complete.


C:\> tracert 209.165.200.242
Tracing route to 209.165.200.242 over a maximum of 30 hops
  1    <1 ms    <1 ms    <1 ms   209.165.200.250
  2     1 ms    <1 ms    <1 ms   209.165.200.241
Trace complete. C:\>
```

Traceroute results from Host2 Task 4, Step 2:

```
C:\> tracert 209.165.200.242
Tracing route to 209.165.200.242 over a maximum of 30 hops
 1 <1 ms <1 ms <1 ms 209.165.200.242
Trace complete.


C:\> tracert 209.165.200.246
Tracing route to 209.165.200.246 over a maximum of 30 hops
 1 <1 ms <1 ms <1 ms 209.165.200.246
Trace complete.


C:\> tracert 209.165.200.249
Tracing route to 209.165.200.249 over a maximum of 30 hops
 1 1 ms <1 ms <1 ms 209.165.200.246
 2 <1 ms <1 ms <1 ms 209.165.200.249
Trace complete.
C:\>
```

Traceroute results from Host3 Task 4, Step 2:

```
C:\> tracert 209.165.200.241
Tracing route to 209.165.200.241 over a maximum of 30 hops
 1 <1 ms <1 ms <1 ms 209.165.200.241
Trace complete.

C:\> tracert 209.165.200.246
Tracing route to 209.165.200.246 over a maximum of 30 hops
 1 <1 ms <1 ms <1 ms 209.165.200.246
Trace complete.

C:\> tracert 209.165.200.249
Tracing route to 209.165.200.249 over a maximum of 30 hops
 1 1 ms <1 ms <1 ms 209.165.200.246
 2 <1 ms <1 ms <1 ms 209.165.200.249
Trace complete.
C:\>
```

Post navigation