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LAB 1:

10.3.4: Packet Tracer - Connect a Router to a LAN

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.10.1	255.255.255.0	N/A
	G0/1	192.168.11.1	255.255.255.0	N/A
	S0/0/0 (DCE)	209.165.200.225	255.255.255.252	N/A
R2	G0/0	10.1.1.1	255.255.255.0	N/A
	G0/1	10.1.2.1	255.255.255.0	N/A
	S0/0/0	209.165.200.226	255.255.255.252	N/A
PC1	NIC	192.168.10.10	255.255.255.0	192.168.10.1
PC2	NIC	192.168.11.10	255.255.255.0	192.168.11.1
PC3	NIC	10.1.1.10	255.255.255.0	10.1.1.1
PC4	NIC	10.1.2.10	255.255.255.0	10.1.2.1

Objectives

Part 1: Display Router Information

Part 2: Configure Router Interfaces

Part 3: Verify the Configuration

Background

In this activity, you will use various **show** commands to display the current state of the router. You will then use the Addressing Table to configure router Ethernet interfaces. Finally, you will use commands to verify and test your configurations.

Note: The routers in this activity are partially configured. Some of the configurations are not covered in this course but they are provided to assist you in using verification commands.

Screenshots

A. Results:

Cisco Packet Tracer - C:/Users/IDEAPAD SLIM/AppData/Local/Microsoft/Windows/INetCache/IE/2VK8VA...

File Edit Options View Tools Extensions Window Help

Activity Results Time Elapsed: 00:44:06

Congratulations BEATRICE ANN DAVID! You completed the activity.

Overall Feedback Assessment Items Connectivity Tests

Congratulations! You successfully completed the **Packet Tracer - Connect a Router to a LAN** activity. However, your final score may change based on your answers to the questions in the Instructions. Consult your instructor.

Cisco Packet Tracer - C:/Users/IDEAPAD SLIM/AppData/Local/Microsoft/Windows/INetCache/IE/2VK8VA...

File Edit Options View Tools Extensions Window Help

Activity Results Time Elapsed: 00:44:21

Congratulations BEATRICE ANN DAVID! You completed the activity.

Overall Feedback Assessment Items Connectivity Tests

Expand/Collapse All Show Incorrect Items

Assessment Items	Status	Points	Component(s)
Network			
R1			
Ports			
GigabitEthernet0/0			
✓ Description	Correct	3	Device Interface
✓ IP Address	Correct	3	Device Interface
✓ Port Status	Correct	3	Device Interface
✓ Subnet Mask	Correct	3	Device Interface
GigabitEthernet0/1			
✓ Description	Correct	3	Device Interface
✓ IP Address	Correct	3	Device Interface
✓ Port Status	Correct	3	Device Interface
✓ Subnet Mask	Correct	3	Device Interface
✓ Startup Config	Correct	3	Configuration M
R2			
Ports			
GigabitEthernet0/0			
✓ Description	Correct	3	Device Interface
✓ IP Address	Correct	3	Device Interface
✓ Port Status	Correct	3	Device Interface
✓ Subnet Mask	Correct	3	Device Interface
GigabitEthernet0/1			
✓ Description	Correct	3	Device Interface
✓ IP Address	Correct	3	Device Interface
✓ Port Status	Correct	3	Device Interface
✓ Subnet Mask	Correct	3	Device Interface
✓ Startup Config	Correct	3	Configuration M

Component	Items/Total	Score
Configuration Management	2/2	6/6
Device Interface Configuration	16/16	48/48

Score : 54/54
Item Count : 18/18

B. Working:

Part 1: Display Router Information

Step 1: Display interface information on R1.

Note: Click a device and then click the **CLI** tab to access the command line directly. The console password is **cisco**. The privileged EXEC password is **class**.

- a. Which command displays the statistics for all interfaces configured on a router?

show interface

- b. Which command displays the information about the Serial 0/0/0 interface only?

show interface serial 0/0/0

- c. Enter the command to display the statistics for the Serial 0/0/0 interface on R1 and answer the following questions:
- 1) What is the IP address configured on **R1**?
209.165.200.225/30
 - 2) What is the bandwidth on the Serial 0/0/0 interface?
1544 Kbit
- d. Enter the command to display the statistics for the GigabitEthernet 0/0 interface and answer the following questions:
- 1) What is the IP address on **R1**?
IP address is not set
 - 2) What is the MAC address of the GigabitEthernet 0/0 interface?
000d.bd6c.7d01
 - 3) What is the bandwidth (BW) of the GigabitEthernet 0/0 interface?
1000000 Kbit

Step 2: Display a summary list of the interfaces on R1.

- a. Which command displays a brief summary of the current interfaces, interface status, and the IP addresses assigned to them?
- show ip interface brief**
- b. Enter the command on each router and answer the following questions:
- 1) How many serial interfaces are there on **R1** and **R2**?
Both have 2.
 - 2) How many Ethernet interfaces are there on **R1** and **R2**?
R1: 6
R2: 2
 - 3) Are all the Ethernet interfaces on **R1** the same? If no, explain the difference(s).
No. Fast Ethernet provides speed of 1Mb to 100 Mbps while Gigabit Ethernet has 1Gbps.

Packet Tracer - Connect a Router to a LAN

```
R2>enable
Password:
R2#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	unassigned	YES	unset	administratively down	down
GigabitEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/0/0	209.165.200.226	YES	manual	up	up
Serial0/0/1	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

```
R2#
```

Copy

```
R1#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	unassigned	YES	unset	administratively down	down
GigabitEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/0/0	209.165.200.225	YES	manual	up	up
Serial0/0/1	unassigned	YES	unset	administratively down	down
FastEthernet0/1/0	unassigned	YES	unset	administratively down	down
FastEthernet0/1/1	unassigned	YES	unset	administratively down	down
FastEthernet0/1/2	unassigned	YES	unset	administratively down	down
FastEthernet0/1/3	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

```
R1#
```

Step 3: Display the routing table on R1.

- a. What command displays the contents of the routing table?

show ip route

- b. Enter the command on **R1** and answer the following questions:

- 1) How many connected routes are there (uses the **C** code)?

1

- 2) Which route is listed?

209.165.200.224/30 is directly connected

- 3) How does a router handle a packet destined for a network that is not listed in the routing table?

Router will drop the packet

```
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

      209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.200.224/30 is directly connected, Serial0/0/0
L       209.165.200.225/32 is directly connected, Serial0/0/0

R1#
```

Part 2: Configure Router Interfaces

Step 1: Configure the GigabitEthernet 0/0 interface on R1.

- a. Enter the following commands to address and activate the GigabitEthernet 0/0 interface on **R1**:

```
R1(config)# interface gigabitethernet 0/0
R1(config-if)# ip address 192.168.10.1 255.255.255.0
R1(config-if)# no shutdown
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed
state to up

R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#interface gigabitethernet 0/0
R1(config-if)#ip address 192.168.10.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

R1(config-if)#
```

- b. It is good practice to configure a description for each interface to help document the network. Configure an interface description that indicates the device to which it is connected.

```
R1(config-if)# description LAN connection to S1
```

- c. **R1** should now be able to ping PC1.

```
R1(config-if)# end
%SYS-5-CONFIG_I: Configured from console by console
R1# ping 192.168.10.10
```

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Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.10.10, timeout is 2 seconds:

.!!!!

Success rate is 80 percent (4/5), round-trip min/avg/max = 0/2/8 ms

```
R1(config-if)#description LAN connection to S1
```

```
R1(config-if)#end
```

```
R1#
```

```
%SYS-5-CONFIG_I: Configured from console by console
```

```
R1#ping 192.168.10.10
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.10.10, timeout is 2 seconds:

.!!!!

Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms

```
R1#ping 192.168.10.10
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 192.168.10.10, timeout is 2 seconds:

!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms

```
R1#
```

Step 2: Configure the remaining Gigabit Ethernet Interfaces on R1 and R2.

- a. Use the information in the Addressing Table to finish the interface configurations for **R1** and **R2**. For each interface, do the following:

- 1) Enter the IP address and activate the interface.

- 2) Configure an appropriate description.

```
R1#configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
R1(config)#interface gigabitethernet 0/1
```

```
R1(config-if)#ip address 192.168.11.1
```

```
% Incomplete command.
```

```
R1(config-if)#ip address 192.168.11.1 255.255.255.0
```

```
R1(config-if)#no shutdown
```

```
R1(config-if)#
```

```
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
```

```
R1(config-if)#description LAN connecting to S2
```

```
R1(config-if)#
```

Packet Tracer - Connect a Router to a LAN

```
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#interface gigabit 0/0
R2(config-if)#ip address 10.1.1.1 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

R2(config-if)#description LAN connection to S3
R2(config-if)#

R2(config)#interface gig 0/1
R2(config-if)#ip address 10.1.2.1 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

R2(config-if)#description LAN connecting to S4
R2(config-if)#
```

- b. Verify interface configurations.

```
R2#show interfaces gigabitEthernet 0/0
GigabitEthernet0/0 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0002.16cb.1d01 (bia 0002.16cb.1d01)
  Description: LAN connection to S3
  Internet address is 10.1.1.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); 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 95 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 1017 multicast, 0 pause input
    0 input packets with dribble condition detected
  61 packets output, 3736 bytes, 0 underruns
  0 output errors, 0 collisions, 2 interface resets
  0 unknown protocol drops
  0 babbles, 0 late collision, 0 deferred
  0 lost carrier, 0 no carrier
  0 output buffer failures, 0 output buffers swapped out
```



```
R2#show interfaces gigabitEthernet 0/1
GigabitEthernet0/1 is up, line protocol is up (connected)
  Hardware is CN Gigabit Ethernet, address is 0002.16cb.1d02 (bia 0002.16cb.1d02)
  Description: LAN connecting to S4
  Internet address is 10.1.2.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, media type is RJ45
  output flow-control is unsupported, input flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00,
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); 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 64 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 1017 multicast, 0 pause input
    0 input packets with dribble condition detected
    41 packets output, 2512 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

Step 3: Back up the configurations to NVRAM.

Save the configuration files on both routers to NVRAM. What command did you use?

```
R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#

-----
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#
```

copy running-config startup-config

Part 3: Verify the Configuration

Step 1: Use verification commands to check your interface configurations.

- a. Use the **show ip interface brief** command on both **R1** and **R2** to quickly verify that the interfaces are configured with the correct IP address and are active.

How many interfaces on **R1** and **R2** are configured with IP addresses and in the “up” and “up” state?

R1: 3 interfaces

R2: 3 interfaces

What part of the interface configuration is NOT displayed in the command output?
Subnet mask

What commands can you use to verify this part of the configuration?
show interface [Ethernet Name]
Example: show interface gigabitEthernet 0/0

- b. Use the **show ip route** command on both **R1** and **R2** to view the current routing tables and answer the following questions:

- 1) How many connected routes (uses the **C** code) do you see on each router?

R1: 3 routes

R2: 3 routes

- 2) How many OSPF routes (uses the **O** code) do you see on each router?

R1: 2 OSPF

R2: 2 OSPF

- 3) If the router knows all the routes in the network, then the number of connected routes and dynamically learned routes (OSPF) should equal the total number of LANs and WANs. How many LANs and WANs are in the topology?

4 LANs and 1 WAN

- 4) Does this number match the number of C and O routes shown in the routing table?
Yes, it matches for both routers

Note: If your answer is “no”, then you are missing a required configuration. Review the steps in Part 2.

Step 2: Test end-to-end connectivity across the network.

You should now be able to ping from any PC to any other PC on the network. In addition, you should be able to ping the active interfaces on the routers. For example, the following tests should be successful:

- From the command line on PC1, ping PC4.
- From the command line on R2, ping PC2.

Note: For simplicity in this activity, the switches are not configured. You will not be able to ping them.

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```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.1.2.10

Pinging 10.1.2.10 with 32 bytes of data:

Request timed out.
Reply from 10.1.2.10: bytes=32 time=1ms TTL=126
Reply from 10.1.2.10: bytes=32 time=8ms TTL=126
Reply from 10.1.2.10: bytes=32 time=9ms TTL=126

Ping statistics for 10.1.2.10:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 9ms, Average = 6ms

C:\>|
```

```
R2#ping 192.168.11.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.11.10, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/7/12 ms

R2#ping 192.168.11.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.11.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/10/25 ms

R2#
```
