

COURSE: CLOUD AND NETWORK SECURITY _C1_2025

STUDENT NAME: DIANA ROSE OGUDA

STUDENT NUMBER: CS-CNS09-25172

MONDAY ,27 MAY,2025

WEEK 2 ASSIGNMENT 1

PACKET TRACER - BUILD A SWITCH AND ROUTER NETWORK

- ASSIGNMENT REPORT

1. Objective

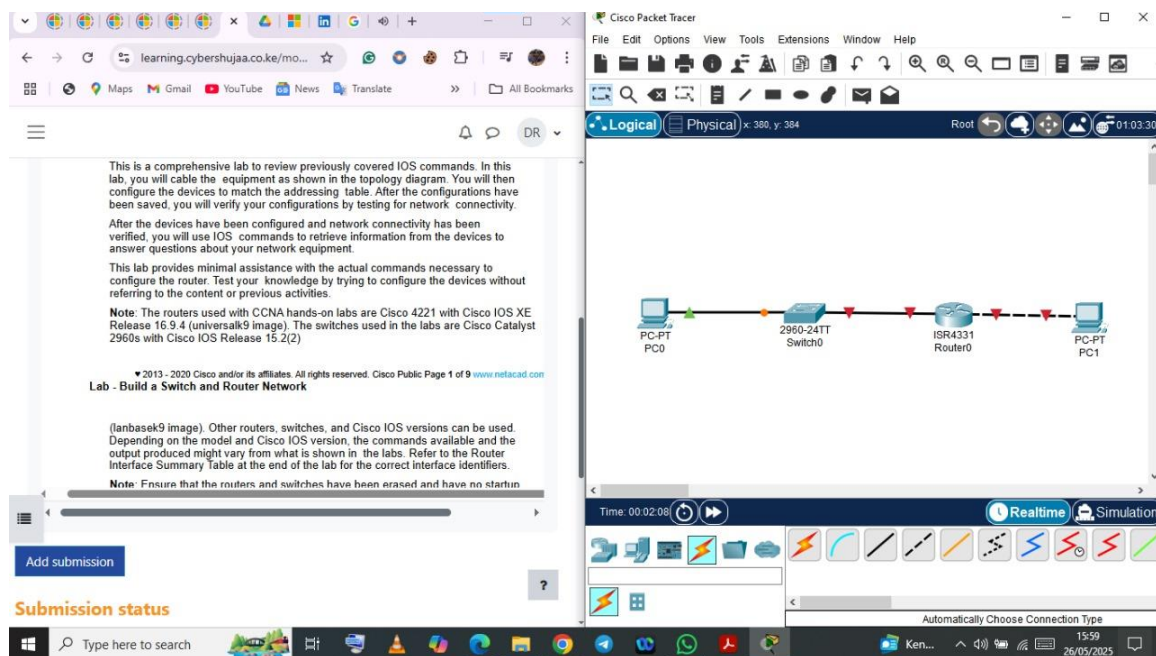
The objective of this lab was to design and configure a basic local area network (LAN) using Cisco Packet Tracer. The network includes a router, a switch, and two end devices (PCs). The aim was to ensure end-to-end communication across the network and understand how switches and routers function in a LAN environment.

2. Network Design Overview

The network topology consists of:

- One Router (R1)
- One Switch (S1)
- Two PCs (PC-A and PC-B)

All devices are interconnected using Ethernet cables. The switch serves as the intermediary between the PCs and the router. IP addresses were manually assigned to ensure devices are in the same subnet.



3. Configuration Details

IP Addressing Table

| Device | Interface | IP Address | Subnet Mask | Default Gateway |
|--------|-----------|------------|-------------|-----------------|
|--------|-----------|------------|-------------|-----------------|

| | | | | |
|------|--------------------|-------------|---------------|-------------|
| PC-A | FastEthernet0 | 192.168.1.2 | 255.255.255.0 | 192.168.1.1 |
| PC-B | FastEthernet0 | 192.168.1.3 | 255.255.255.0 | 192.168.1.1 |
| R1 | GigabitEthernet0/1 | 192.168.1.1 | 255.255.255.0 | N/A |

Router Configuration (CLI)

Router> enable

Router# configure terminal

Router(config)# interface gigabitEthernet 0/1

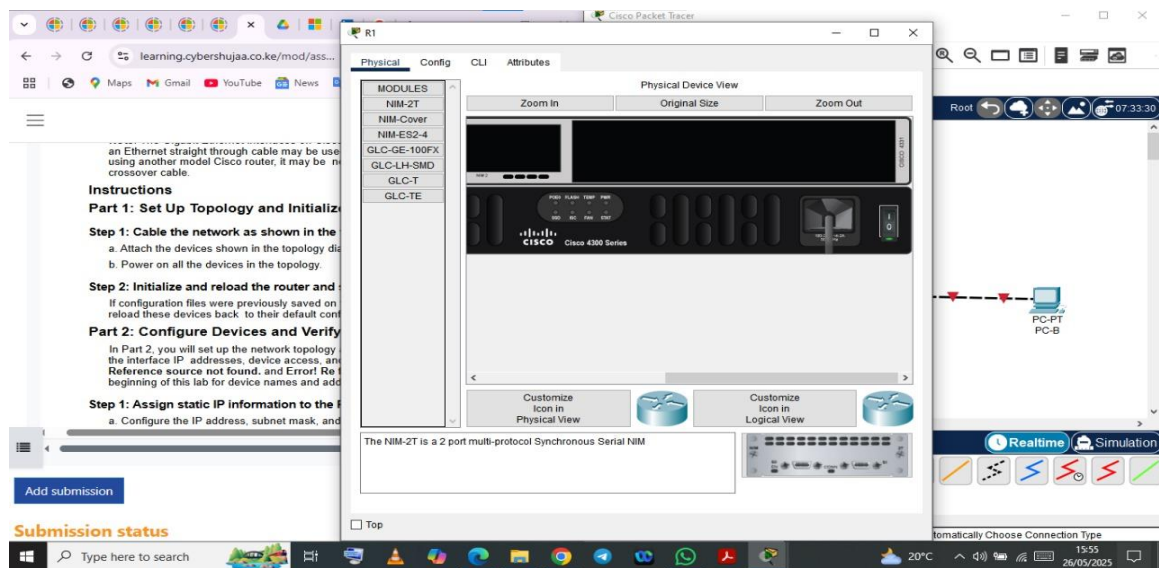
Router(config-if)# ip address 192.168.1.1 255.255.255.0

Router(config-if)# no shutdown

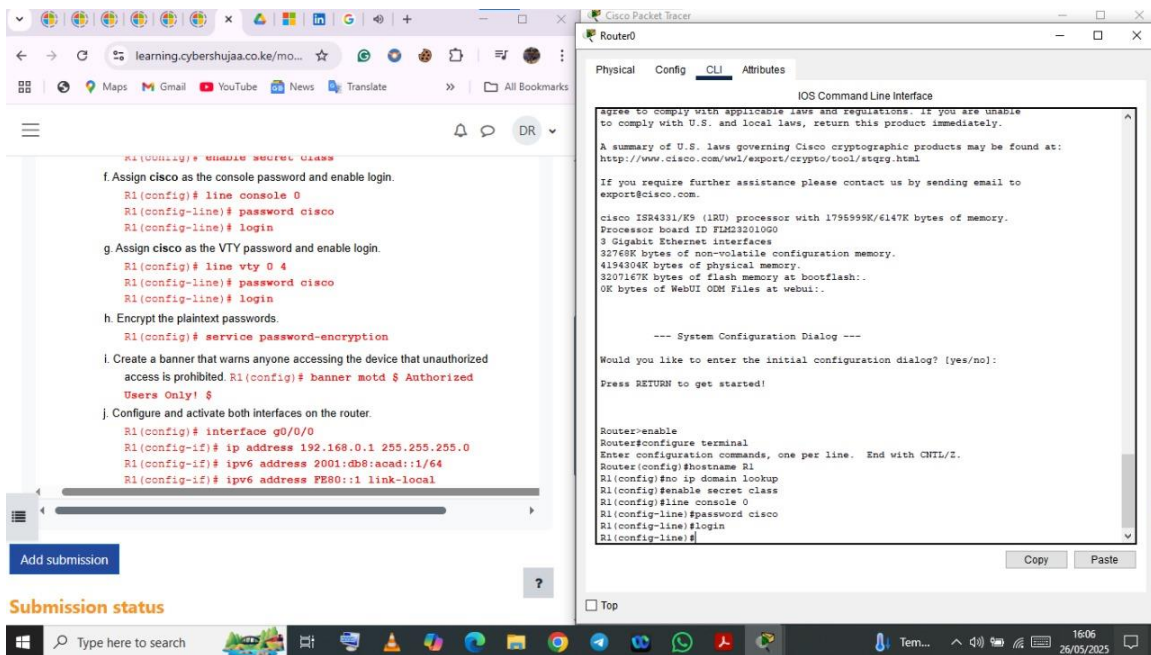
Router(config-if)# exit

Router(config)# exit

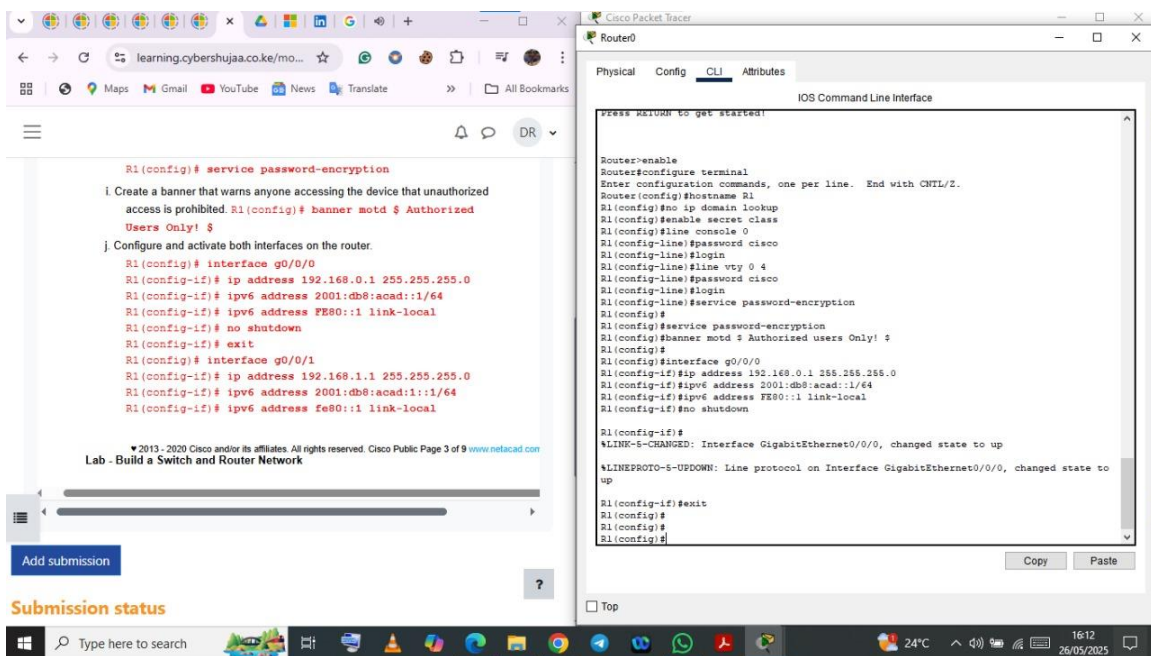
Router# write memory



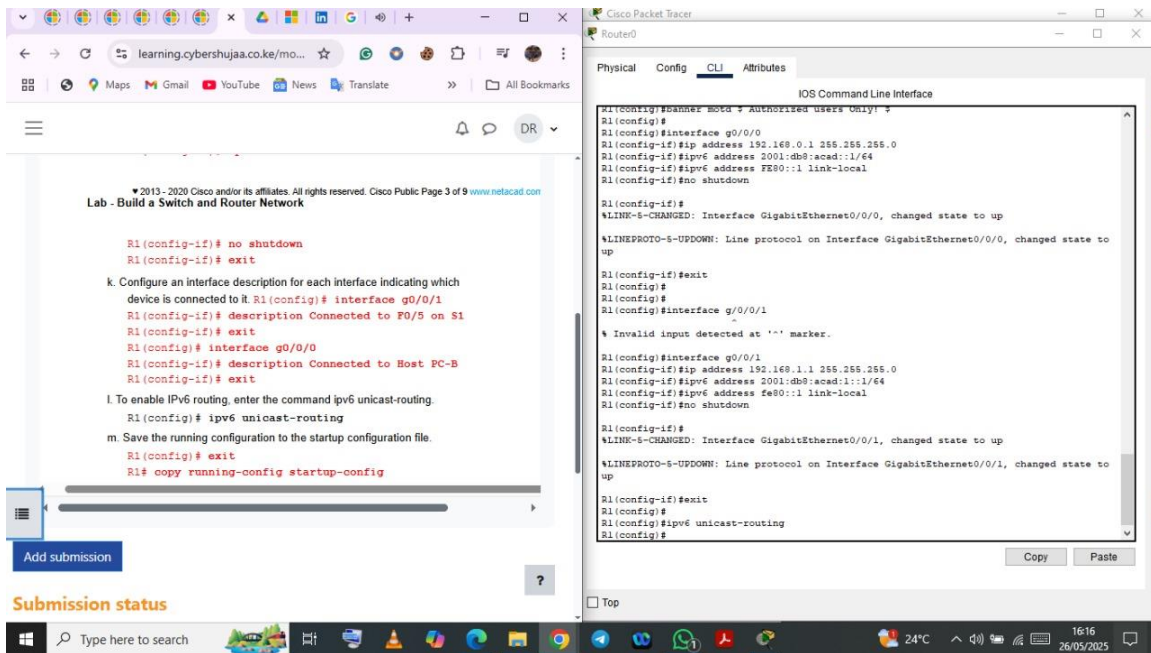
Powering on the router.



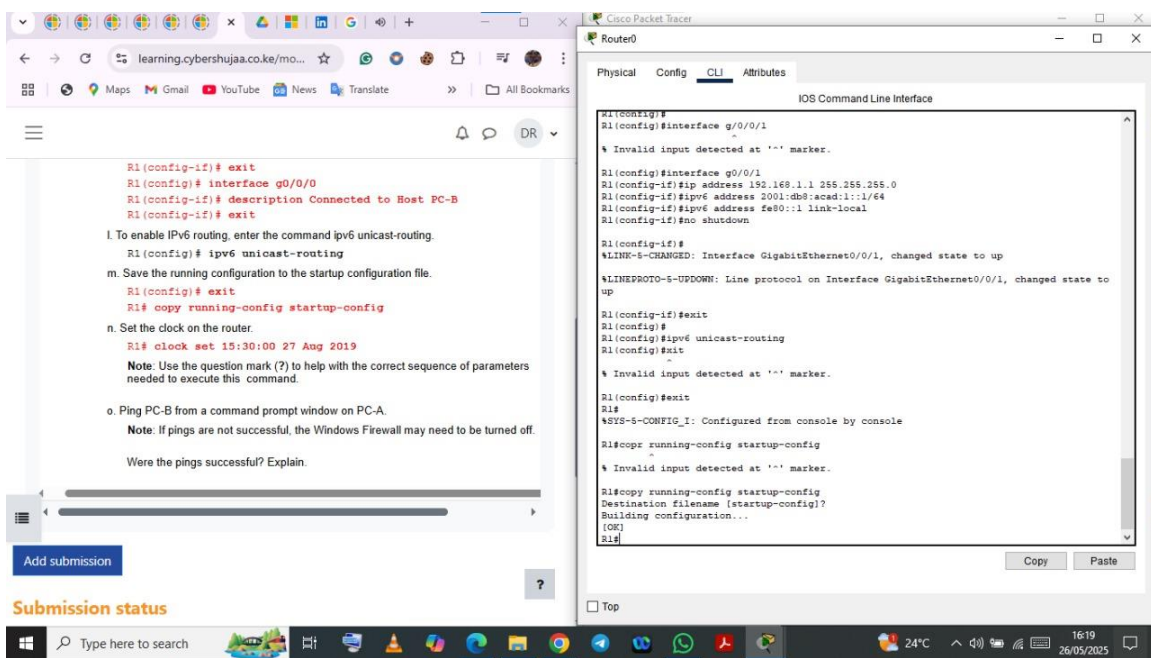
Configuring router: console, VTY, line passwords and encrypting the passwords.



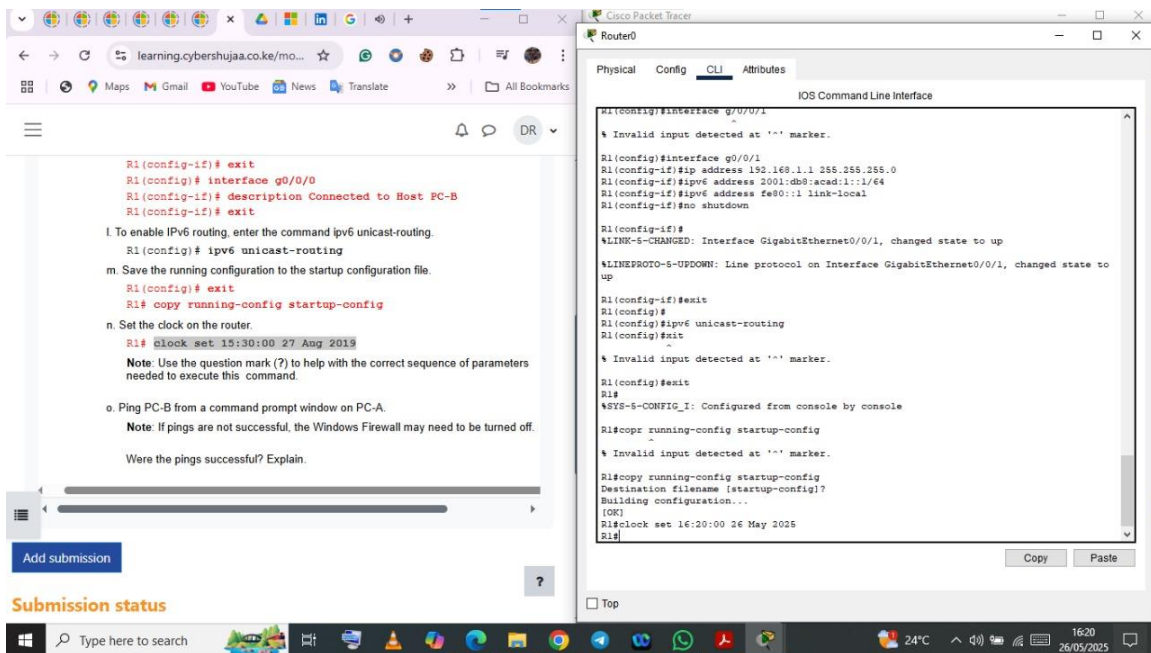
Configuring interface G0/0/0



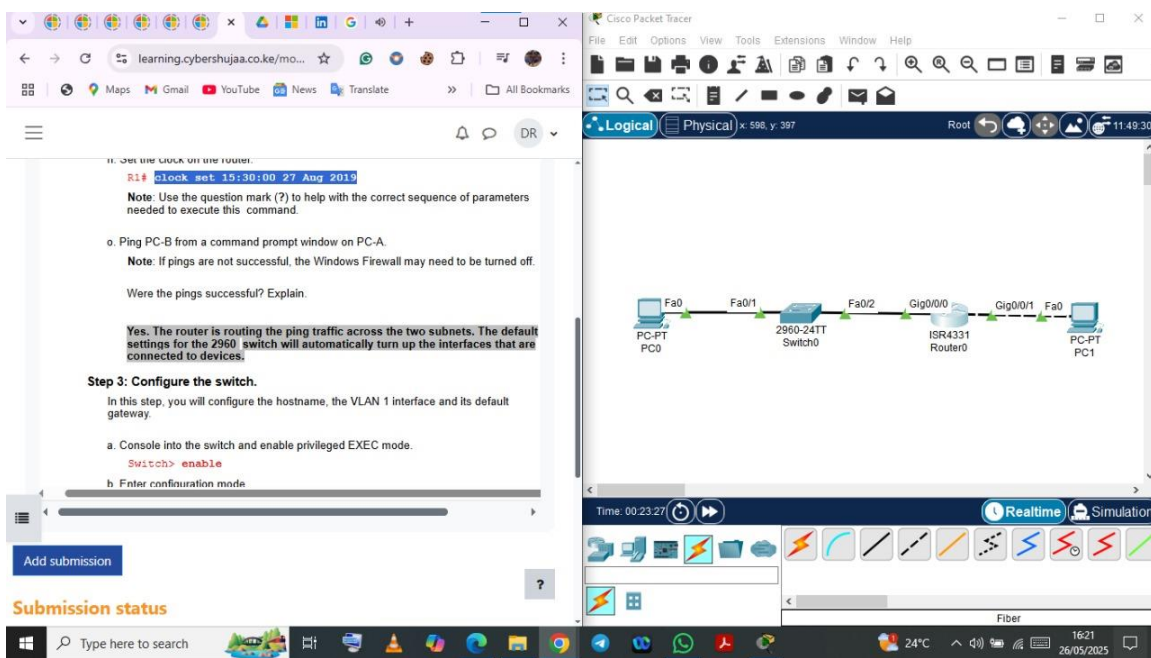
Configuring interface G0/0/1



Saving running configurations' file to startup file



Clock setup on router



Router successfully set up in the network.

Question

Ping PC-B from command prompt window on PC-A

Were the pings successful? Explain

Answer

Pings were not successful as I had not set up IP addresses for the end point devices and the switch.

The screenshot shows a Cisco Packet Tracer interface with a PC-A window open. The Command Prompt displays the following output:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.0.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
    C:\>
```

The background shows a network diagram with a router (ISR4331) connected to a switch (S1) and two PCs (PC-A and PC-B). The switch has a VLAN 1 configuration table visible.

| Device | Interface | IP Address / Prefix | Default Gateway |
|--------|-----------|----------------------|-----------------|
| R1 | G0/0/0 | 192.168.0.1/24 | N/A |
| | | 2001.db8.acad:1/64 | |
| | | fe80::1 | |
| | G0/0/1 | 192.168.1.1/24 | N/A |
| | | 200.db8.acad:1:1/64 | |
| | | fe80::1 | |
| S1 | VLAN 1 | 192.168.1.2/24 | 192.168.1.1 |
| PC-A | NIC | 192.168.1.3/24 | 192.168.1.1 |
| | | 2001.db8.acad:1:3/64 | fe80::1 |
| PC-B | NIC | 192.168.0.3/24 | 192.168.0.1 |
| | | 2001.db8.acad:3/64 | fe80::1 |

PCs Configuration

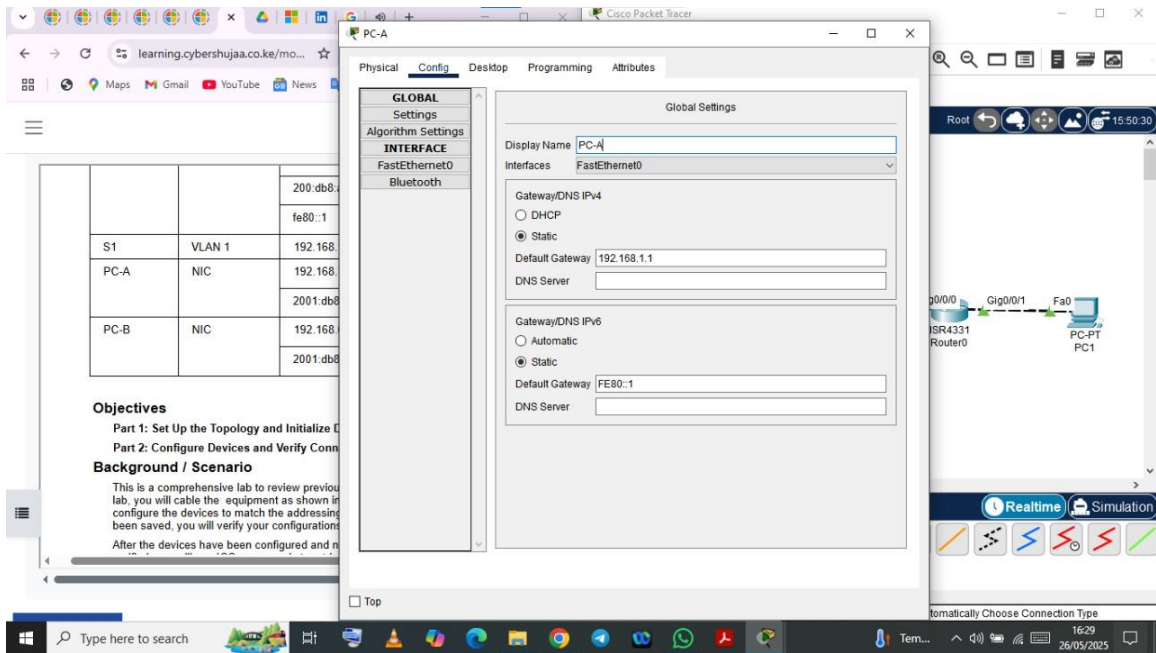
The screenshot shows the configuration window for PC-A in Cisco Packet Tracer. The configuration is as follows:

| Device | Interface | IP Address / Prefix | Default Gateway |
|--------|-----------|----------------------|-----------------|
| R1 | G0/0/0 | 192.168.0.1/24 | N/A |
| | | 2001.db8.acad:1/64 | |
| | | fe80::1 | |
| | G0/0/1 | 192.168.1.1/24 | N/A |
| | | 200.db8.acad:1:1/64 | |
| | | fe80::1 | |
| S1 | VLAN 1 | 192.168.1.2/24 | 192.168.1.1 |
| PC-A | NIC | 192.168.1.3/24 | 192.168.1.1 |
| | | 2001.db8.acad:1:3/64 | fe80::1 |
| PC-B | NIC | 192.168.0.3/24 | 192.168.0.1 |
| | | 2001.db8.acad:3/64 | fe80::1 |

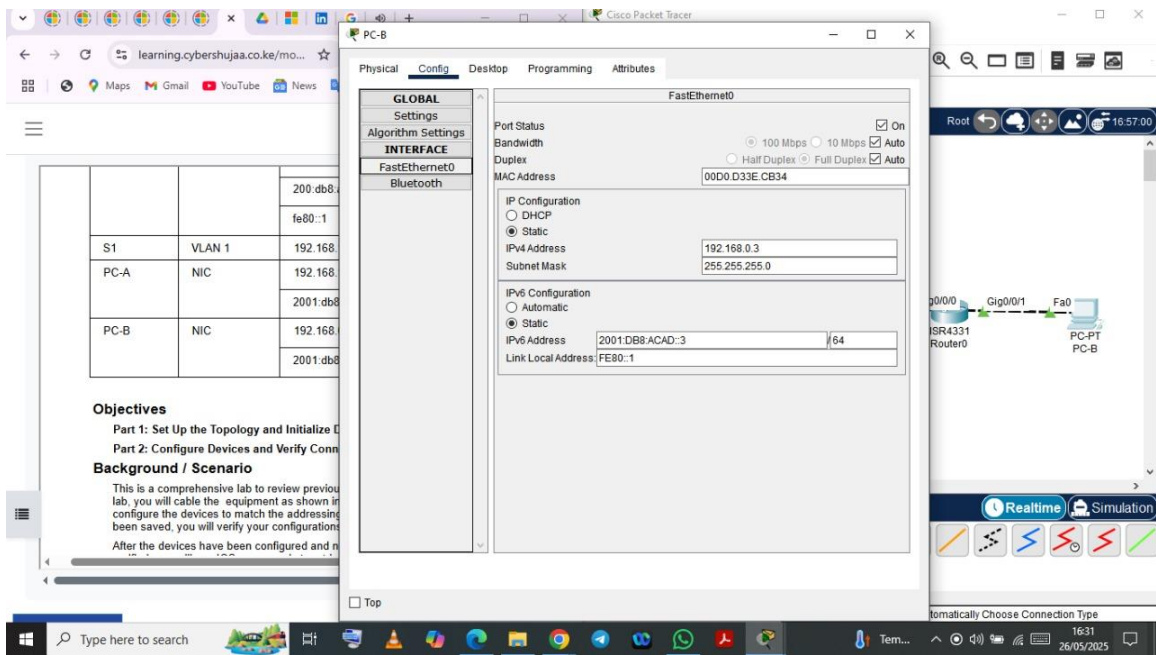
The configuration window for PC-A shows the following settings:

- Port Status:** On
- Bandwidth:** 100 Mbps
- Duplex:** Full Duplex
- MAC Address:** 000C.CF49.E8D3
- IP Configuration:** Static
 - IPv4 Address:** 192.168.1.3
 - Subnet Mask:** 255.255.255.0
- IPv6 Configuration:** Static
 - IPv6 Address:** 2001.db8.acad:1:3/64
 - Link Local Address:** fe80::1

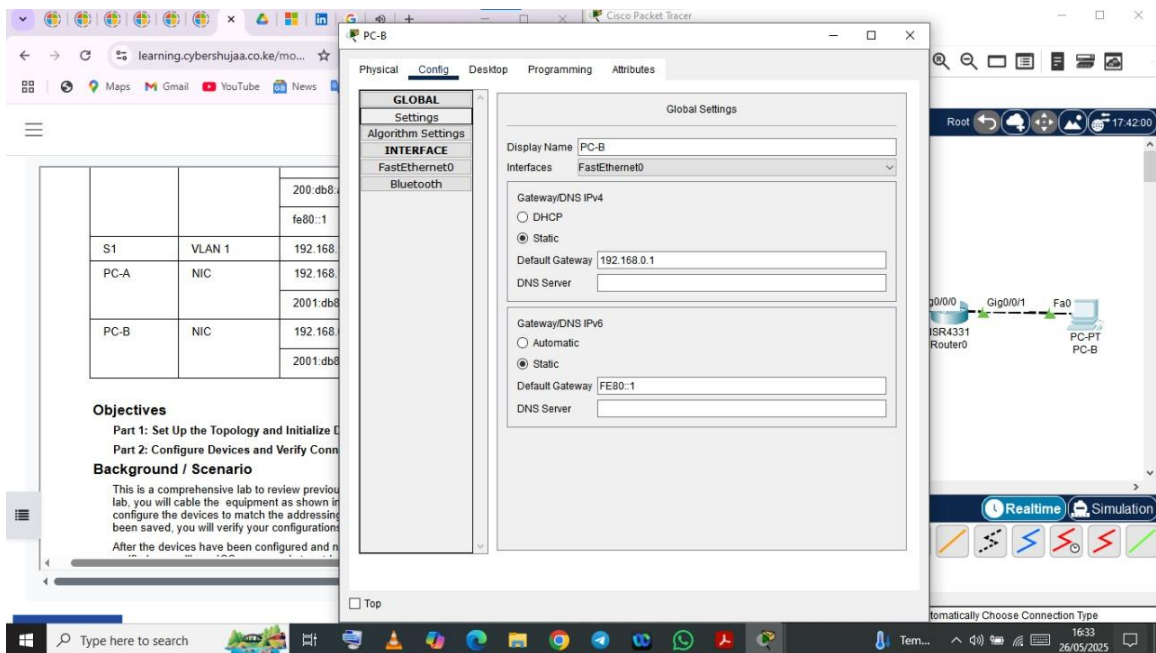
Configuring IP addresses on PC-A.



Configuring default gateway address and name on PC-A



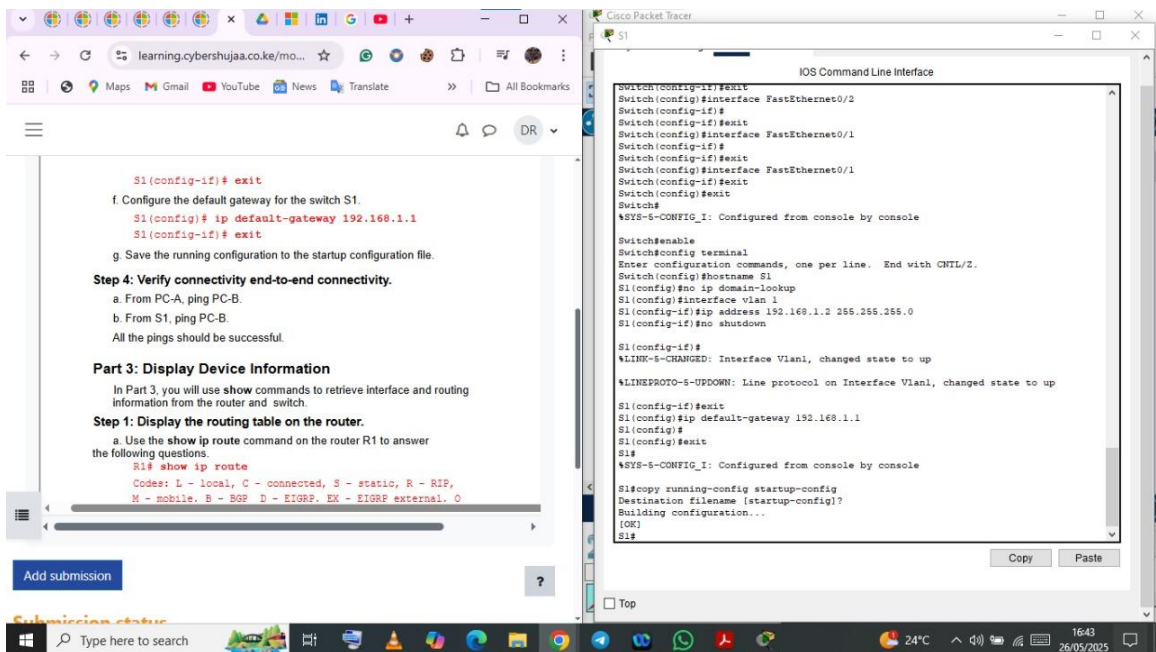
Configuring IP addresses on PC-B.



Configuring default gateway address and name on PC-A

Switch Configuration

This included configuring the name, IP addresses, subnet mask, and interface VLAN 1.



Question

Ping PC-B from command prompt window on PC-A

Were the pings successful? Explain

Answer

Pings were not successful as I had not set up the router interfaces correctly

After arranging the interfaces well, the pings were successful.

The screenshot shows the Cisco Packet Tracer interface. On the left, the configuration table for PC-A is visible:

| Interface | IP Address | Subnet Mask | Default Gateway |
|-----------|----------------------|-------------|---------------------|
| G0/0/0 | 192.168.0.1 | /24 | 2001.db8.acad:1/64 |
| | fe80::1 | | |
| G0/0/1 | 192.168.1.1 | /24 | 200.db8.acad:1:1/64 |
| | fe80::1 | | |
| VLAN 1 | 192.168.1.2 | /24 | |
| NIC | 192.168.1.3 | /24 | |
| | 2001.db8.acad:1:3/64 | | |
| NIC | 192.168.0.3 | /24 | |
| | 2001.db8.acad:3/64 | | |

In the center, the Command Prompt for PC-A shows the following output:

```
Pinging 192.168.0.3 with 32 bytes of data:  
Request timed out.  
Request timed out.  
Request timed out.  
Request timed out.  
  
Ping statistics for 192.168.0.3:  
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),  
  
C:\>ping 192.168.0.3  
  
Pinging 192.168.0.3 with 32 bytes of data:  
Request timed out.  
Reply from 192.168.0.3: bytes=32 time=27ms TTL=127  
Reply from 192.168.0.3: bytes=32 time=1ms TTL=127  
Reply from 192.168.0.3: bytes=32 time=1ms TTL=127  
  
Ping statistics for 192.168.0.3:  
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 27ms, Average = 9ms  
  
C:\>ping 192.168.0.3  
  
Pinging 192.168.0.3 with 32 bytes of data:  
Reply from 192.168.0.3: bytes=32 time=1ms TTL=127  
Reply from 192.168.0.3: bytes=32 time=1ms TTL=127  
Reply from 192.168.0.3: bytes=32 time=1ms TTL=127  
  
Ping statistics for 192.168.0.3:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 1ms, Average = 0ms  
  
C:\>
```

On the right, the network diagram shows a connection between S1 (S0-24TT) and PC-A (Fa0).

The screenshot shows the Cisco Packet Tracer interface. On the left, the configuration table for PC-A is visible:

| Interface | IP Address | Subnet Mask | Default Gateway |
|-----------|----------------------|-------------|-----------------|
| G0/0/0 | 192.168.0.1 | /24 | N/A |
| | 2001.db8.acad:1/64 | | |
| | fe80::1 | | |
| G0/0/1 | 192.168.1.1 | /24 | N/A |
| | 200.db8.acad:1:1/64 | | |
| | fe80::1 | | |
| VLAN 1 | 192.168.1.2 | /24 | 192.168.1.1 |
| NIC | 192.168.1.3 | /24 | 192.168.1.1 |
| | 2001.db8.acad:1:3/64 | | fe80::1 |
| NIC | 192.168.0.3 | /24 | 192.168.0.1 |
| | 2001.db8.acad:3/64 | | fe80::1 |

In the center, the S1 command line interface shows the following output:

```
Switch0>show ip interface fastethernet0/2, changed state to up  
  
S1 con0 is now available  
  
Press RETURN to get started.  
  
S1>ping 192.168.0.3  
Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 192.168.0.3, timeout is 2 seconds:  
.....  
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms  
S1>
```

4. Display Device Information

The screenshot shows a Cisco Packet Tracer environment. On the left, a web browser displays a lab guide titled "Part 3: Display Device Information". The guide instructs the user to use the `show ip route` command on router R1. It includes a legend for 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), 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), F (periodic downloaded static route), R (RRRP), l (LISP), and + (replicated route). It also notes that the "Gateway of last resort is not set".

On the right, the Cisco Packet Tracer interface shows Router0's CLI window. The user has entered the `show ip route` command, and the output displays the routing table. The output shows two entries for directly connected networks (C):

```
C 192.168.0.0/24 is variably subnetted, 3 subnets, 2 masks
  C 192.168.0.0/24 is directly connected, GigabitEthernet0/0/0
  L 192.168.0.1/32 is directly connected, GigabitEthernet0/0/0
C 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
  C 192.168.1.0/24 is directly connected, GigabitEthernet0/0/1
  L 192.168.1.1/32 is directly connected, GigabitEthernet0/0/1
```

Displaying routing table on router.

Question

What code is used in the routing table to indicate a directly connected network?

Answer

The C for directly connected subnet. An L for a local interface.

Question

How many route entries are coded with a C code in the routing table?

Answer

2

Question

What interface types are associated to the C coded routes?

Answer

G0/0/0 and G0/0/1.

learning.cybershujaa.co.ke/mod/assi...

2013 - 2020 Cisco and/or its affiliates. All rights reserved. Cisco Public Page 5 of 9 www.netacad.com

Lab - Build a Switch and Router Network

Answers may vary depending of router type, but on the 4221 the correct answer is G0/0/0 and G0/0/1.

b. Use the `show ipv6 route` command on router R1 to display the IPv6 routes.

```
R1# show ipv6 route
IPv6 Routing Table - default - 5 entries
Codes: C - Connected, L - Local, S - Static, U -
Per-user Static route, B - BGP, R - RIP, H - NHRP,
I1 - ISIS L1
I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D -
EIGRP EX - EIGRP external, ND - ND Default, NDp - ND
Prefix, DCE - Destination, NDR - Redirect, RL - RPL, O -
OSPF Intra, OI - OSPF Inter
OE1 - OSPF ext 1, OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1
ON2 - OSPF NSSA ext 2, IA - LISP int, IA - LISP site-
registrations, ld - LISP dyn-eid, IA - LISP away, le -
LISP extranet-policy, a - Application
```

Router0

Physical Config CLI Attributes

IOS Command Line Interface

```
Codes: L - Local, U - Unconnected, S - Static, R - RIP, H - NHRP, 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

192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.0.0/24 is directly connected, GigabitEthernet0/0/0
L 192.168.0.1/32 is directly connected, GigabitEthernet0/0/0
L 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.1.0/24 is directly connected, GigabitEthernet0/0/1
L 192.168.1.1/32 is directly connected, GigabitEthernet0/0/1

R1# show ipv6 route
IPv6 Routing Table - 5 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
U - Per-user Static route, H - MIPv6
I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
ND - ND Default, NDp - ND Prefix, DCE - Destination, NDR - Redirect
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
C 2001:DB8:ACAD::/64 [0/0]
via GigabitEthernet0/0/0, directly connected
L 2001:DB8:ACAD::1/128 [0/0]
via GigabitEthernet0/0/0, receive
C 2001:DB8:ACAD::1::/64 [0/0]
via GigabitEthernet0/0/1, directly connected
L 2001:DB8:ACAD::1::1/128 [0/0]
via GigabitEthernet0/0/1, receive
L FF00::/8 [0/0]
via Null0, receive

R1#
```

Copy Paste

Top

Type here to search

23°C 18:23 26/05/2025

Showing ipv6 routes

learning.cybershujaa.co.ke/mod/assi...

Step 2: Display interface information on the router R1.

a. Use the `show ip interface g0/0/1` to answer the following questions.

```
R1# show ip interface g0/0/1
GigabitEthernet0/0/1 is up, line protocol is up
Hardware is ISR4321-2x1GE, address is a0e0.af0d.e141
(bia a0e0.af0d.e141) Description: Connected to F0/5 on
S1
Internet address is 192.168.1.1/24
MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive not supported
Full Duplex, 100Mbps, link type is auto, media type is RJ45
output flow-control is off, input flow-control is off
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:00, output 00:00:19, output hang never
Last clearing of "show interface" counters never
Input queue: 0/375/0/0 (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
```

Router0

Physical Config CLI Attributes

IOS Command Line Interface

```
O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
D - EIGRP, EX - EIGRP external
C 2001:DB8:ACAD::/64 [0/0]
via GigabitEthernet0/0/0, directly connected
L 2001:DB8:ACAD::1/128 [0/0]
via GigabitEthernet0/0/0, receive
C 2001:DB8:ACAD::1::/64 [0/0]
via GigabitEthernet0/0/1, directly connected
L 2001:DB8:ACAD::1::1/128 [0/0]
via GigabitEthernet0/0/1, receive
L FF00::/8 [0/0]
via Null0, receive

R1# show ip interface g0/0/1
GigabitEthernet0/0/1 is up, line protocol is up (connected)
Internet address is 192.168.1.1/24
Broadcast address is 255.255.255.255
Address determined by setup command
MTU is 1500 bytes
Helper address is not set
Directed broadcast forwarding is disabled
Outgoing access list is not set
Inbound access list is not set
Proxy ARP is enabled
Security level is default
Split horizon is enabled
ICMP redirects are always sent
ICMP unreachable are always sent
ICMP mask replies are never sent
IP fast switching is disabled
IP fast switching on the same interface is disabled
IP Flow switching is disabled
IP Fast switching turbo vector
IP multicast fast switching is disabled
IP multicast distributed fast switching is disabled
Router Discovery is disabled

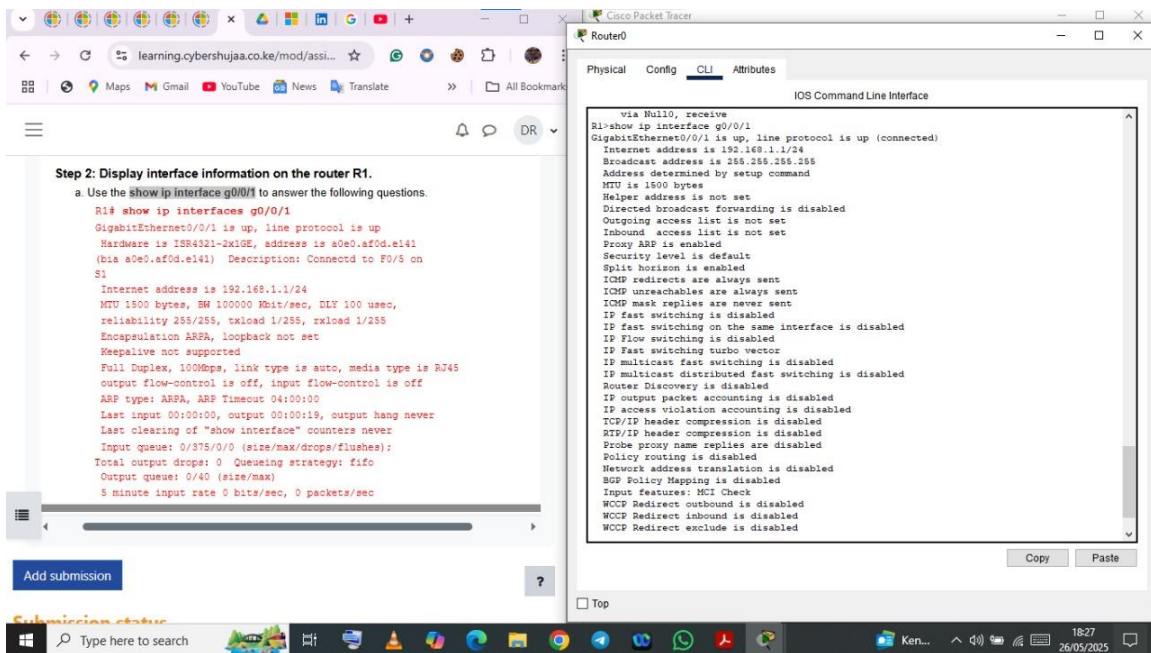
--More--
```

Copy Paste

Top

Type here to search

18:25 26/05/2025



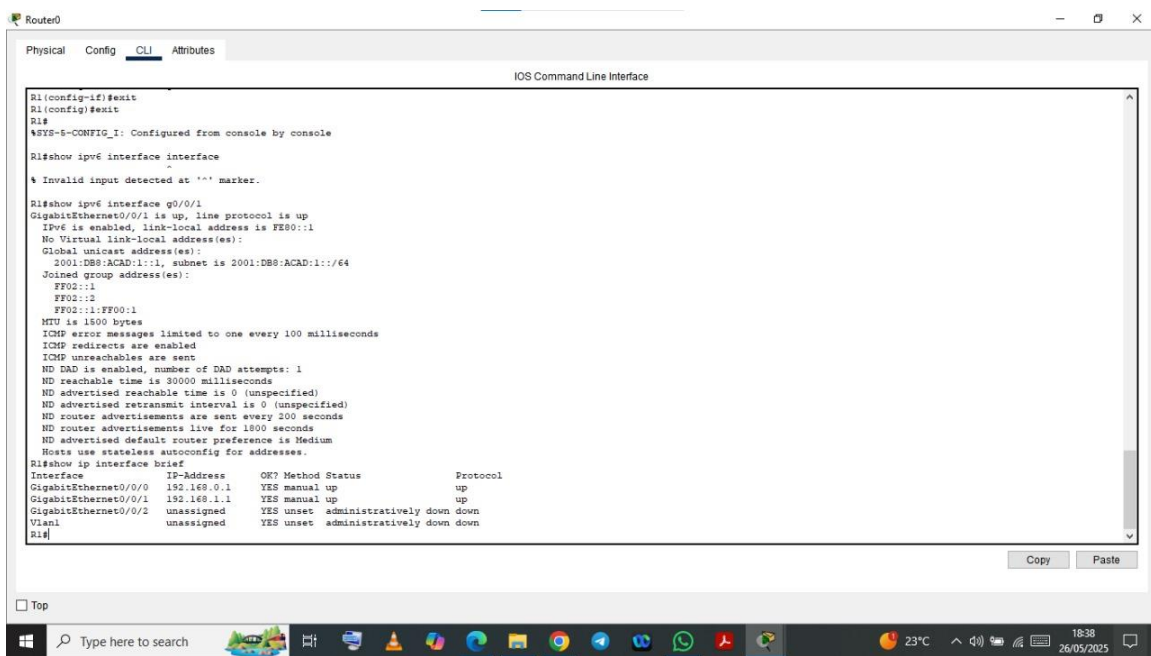
Displaying interface on router.

Question

What is the operational status of the G0/0/1 interface?

Answer

G0/0/1 is up, line protocol is up.



Question

What is the Media Access Control (MAC) address of the G0/1 interface?

Answer

00D0.D3B6.2B02

The screenshot shows a web browser window on the left with a quiz question: "What is the Media Access Control (MAC) address of the G0/1 interface?". The answer is "00D0.D3B6.2B02". The browser also shows a list of other questions and answers related to network interfaces. On the right, the Cisco Packet Tracer interface is visible, showing the configuration of the GigabitEthernet0/1 interface. The MAC address is set to 00D0.D3B6.2B02. The interface is configured with IP address 192.168.1.1 and subnet mask 255.255.255.0. The Tx Ring Limit is set to 10.

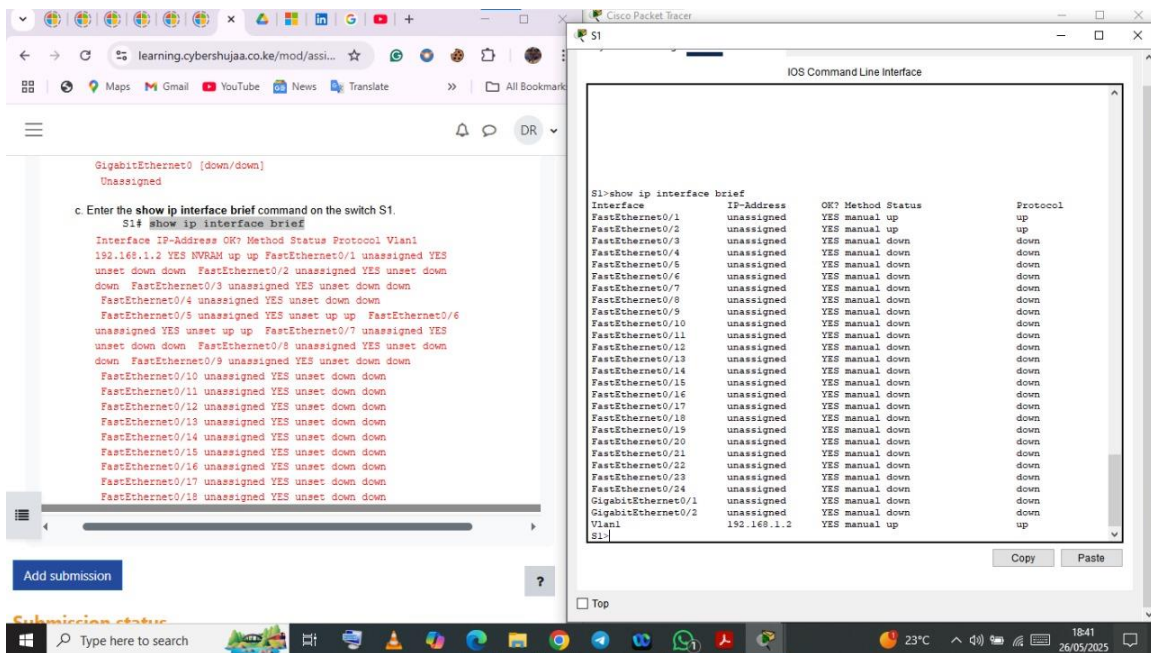
Question

How is the Internet address displayed in this command?

Answer

192.168.1.1/24.

The screenshot shows a web browser window on the left with a quiz question: "How is the Internet address displayed in this command?". The answer is "192.168.1.1/24.". The browser also shows a list of other questions and answers related to network interfaces. On the right, the Cisco Packet Tracer interface is visible, showing the configuration of the GigabitEthernet0/1 interface. The MAC address is set to 00D0.D3B6.2B02. The interface is configured with IP address 192.168.1.1 and subnet mask 255.255.255.0. The Tx Ring Limit is set to 10.



Interface brief

Reflection Questions

1. If the G0/0/1 interface showed that it was administratively down, what interface configuration command would you use to turn the interface up?

Answer

R1(config-if) # no shutdown

2. What would happen if you had incorrectly configured interface G0/0/1 on the router with an IP address of 192.168.1.2?

Answer

PC-A would not be able to ping PC-B. This is because PC-B is on a different network than PC-A which requires the default-gateway router to route these packets. PC-A is configured to use the IP address of 192.168.1.1 for the default-gateway router, but this address is not assigned to any device on the LAN. Any packets that need to be sent to the default-gateway for routing will never reach their destination.

5. Challenges Faced

- Arranged the devices to wrong interfaces that prevented PC-A and switch from pinging PC-B

These issues were identified and resolved through step-by-step troubleshooting.

6. Conclusion

This lab helped reinforce practical skills in building a LAN using Cisco Packet Tracer. It demonstrated how routers and switches work together to enable communication between end devices and how proper configuration and IP addressing are crucial to network functionality.