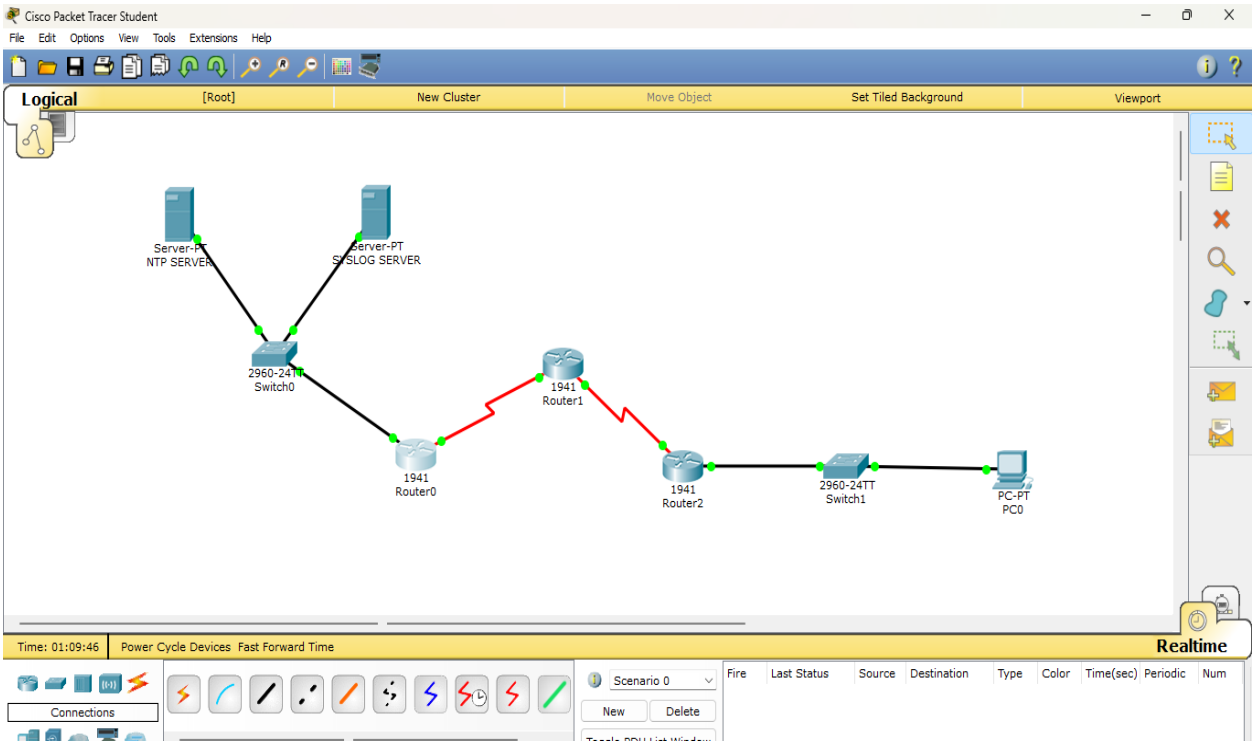
T.Y.B.SC.I.T.
IT21005

Date: 10/01/2024 **Security in Computing**

Practical 1:

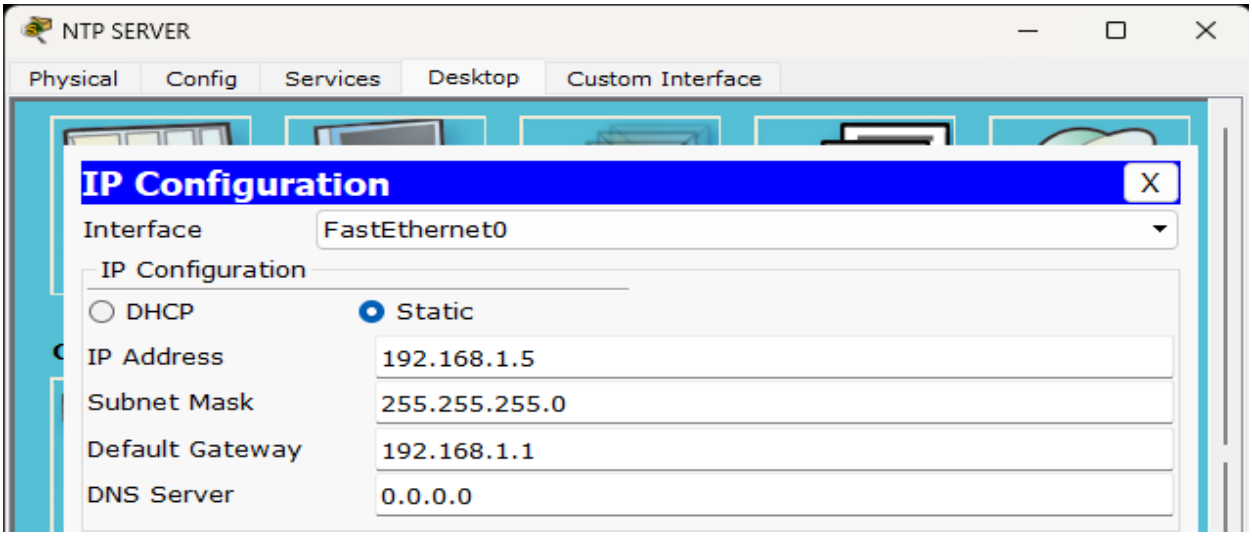
- **Aim: Configure Routers**
  a. OSPF MD5 authentication
  b. NTP
  c. to log messages to the SYSLOG server
  d. to support SSH connections.

- **Topology Diagram**

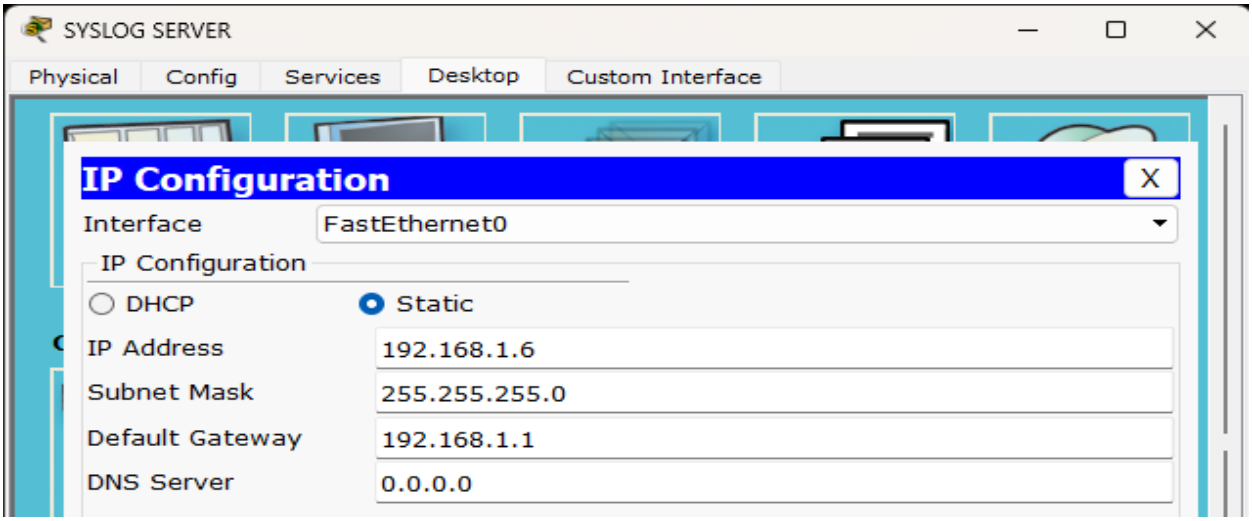


➢ Assigning IP Addresses

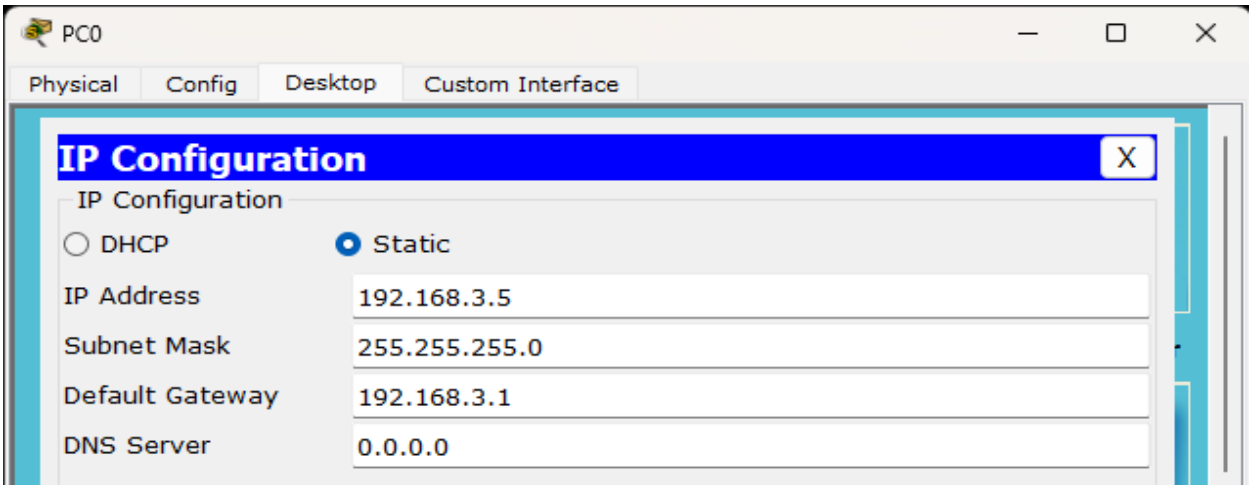
1.NTP Server



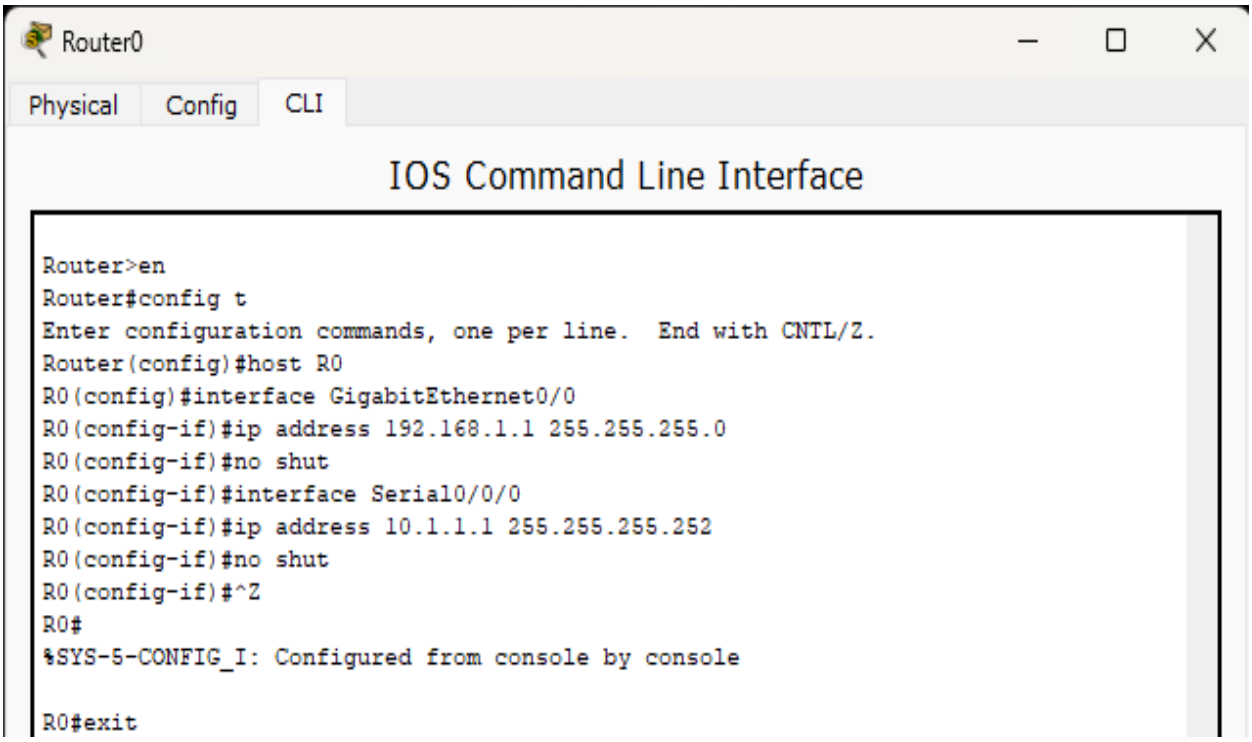
2. SYSLOG Server



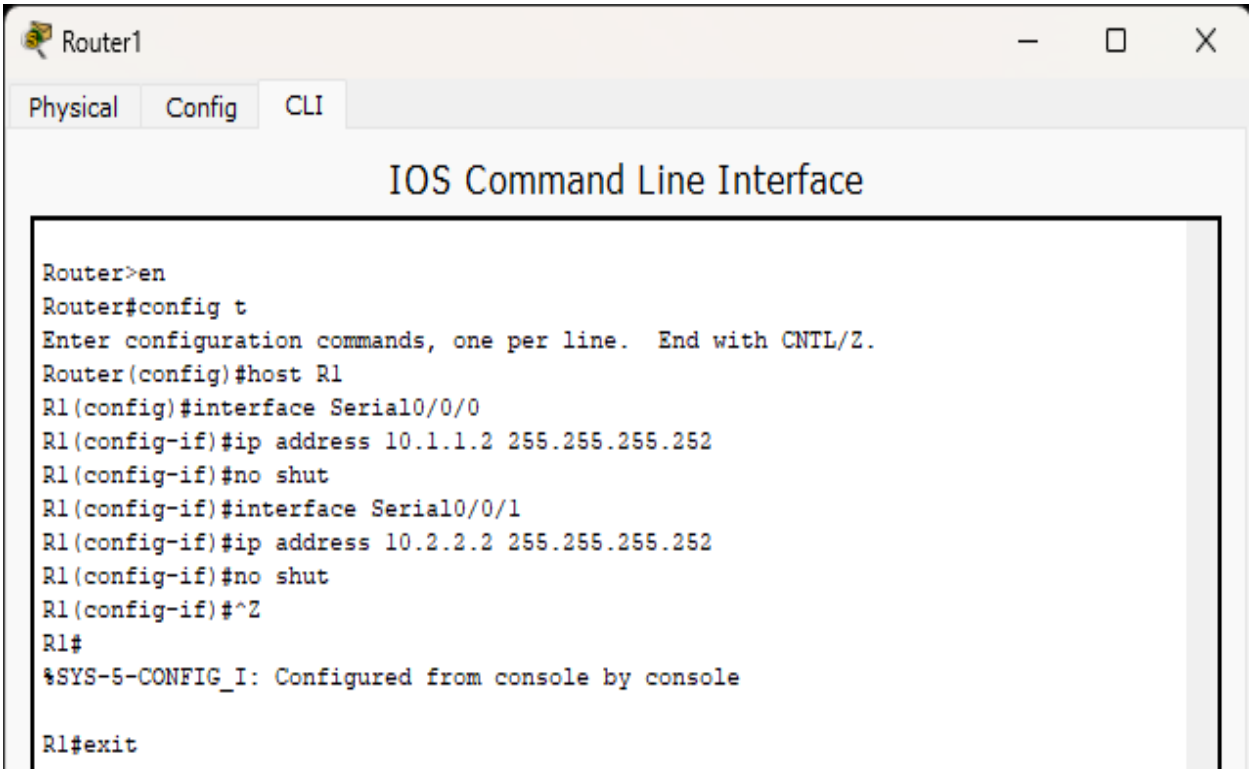
3. PC-0



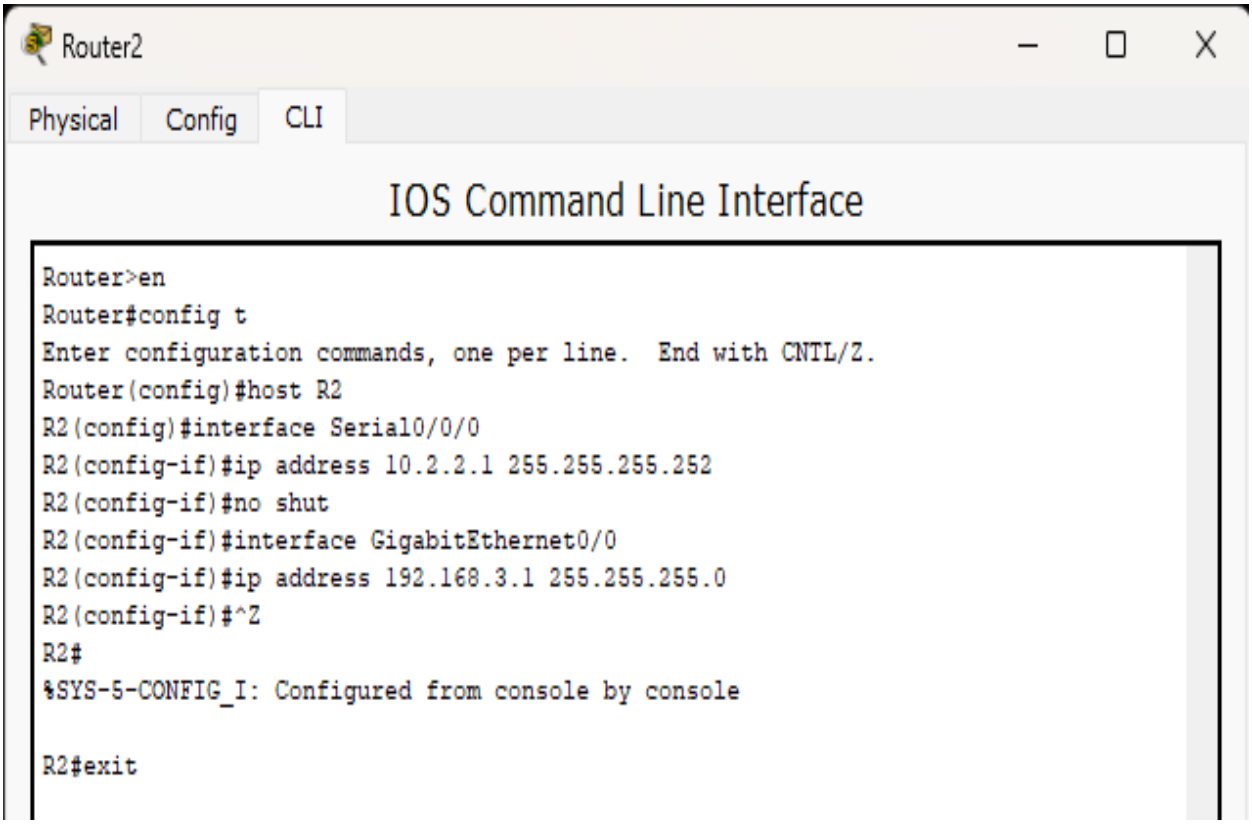
4. Router 0



5. Router 1



6. Router 2



➢ Displaying IP Address Details of Routers

1. Router 0

```
R0>show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol

GigabitEthernet0/0     192.168.1.1     YES manual up                    up

GigabitEthernet0/1     unassigned      YES unset  administratively down down

Serial0/0/0            10.1.1.1        YES manual up                    up

Serial0/0/1            unassigned      YES unset  administratively down down

Vlan1                  unassigned      YES unset  administratively down down
```

2. Router 1

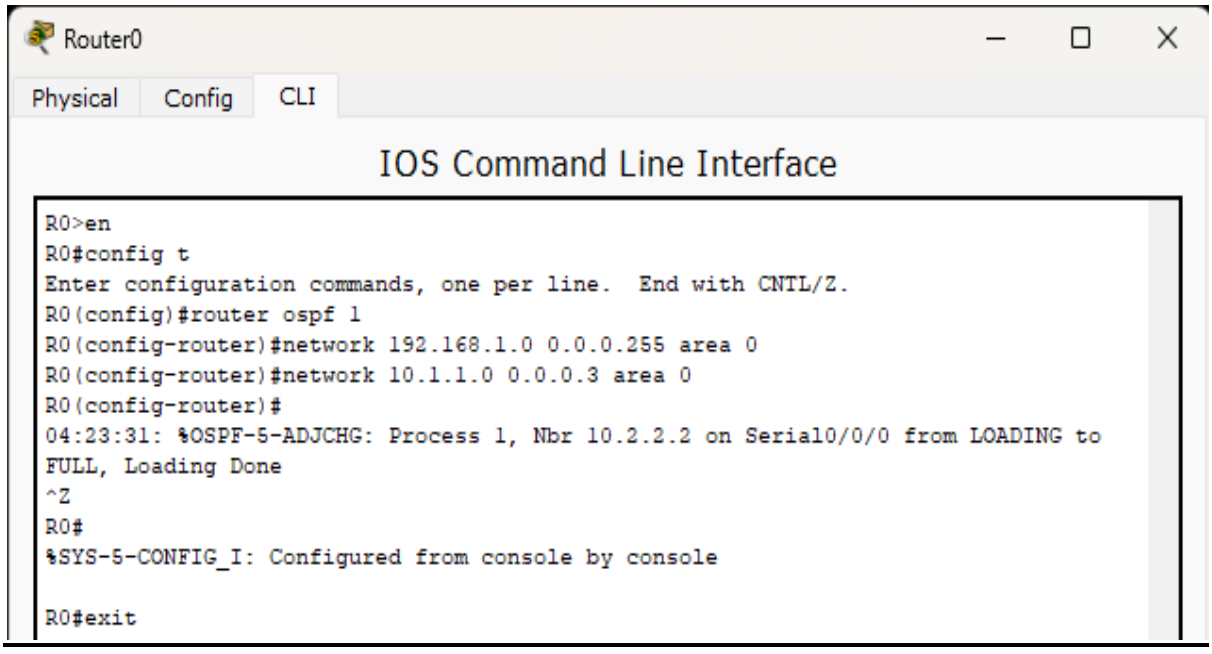
```
R1>show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol

GigabitEthernet0/0     unassigned      YES unset  administratively down down

GigabitEthernet0/1     unassigned      YES unset  administratively down down

Serial0/0/0            10.1.1.2        YES manual up                    up

Serial0/0/1            10.2.2.2        YES manual up                    up

Vlan1                  unassigned      YES unset  administratively down down
```

3. Router 2

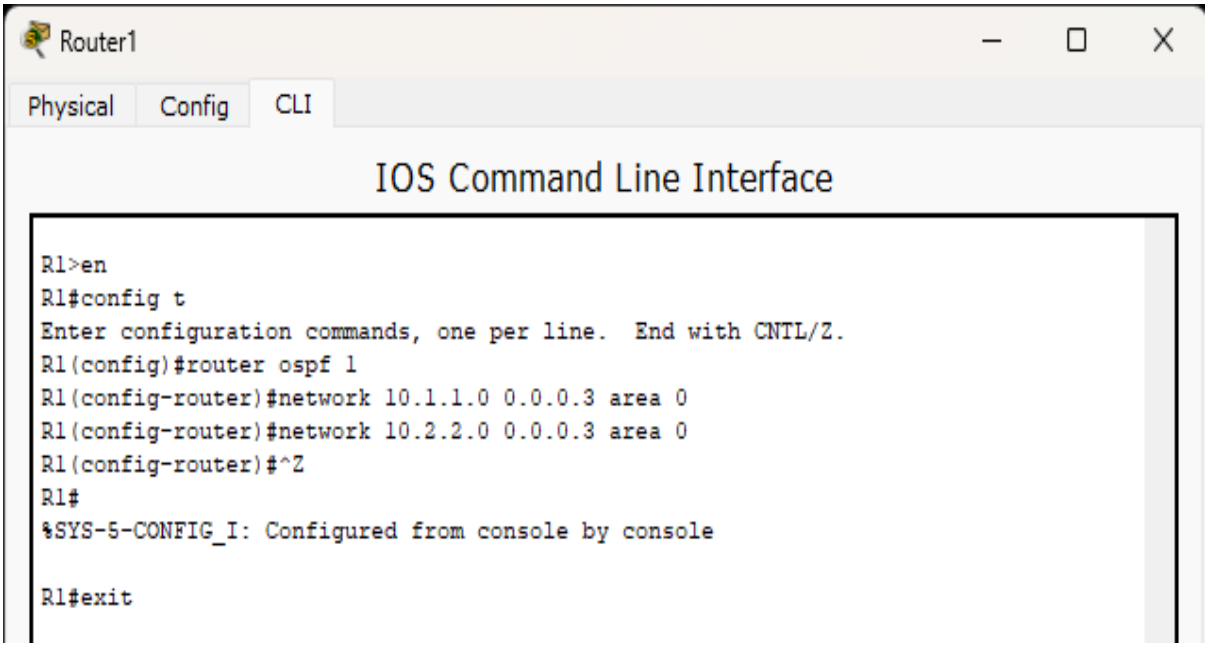
```
R2>show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol

GigabitEthernet0/0     192.168.3.1     YES manual up                    up

GigabitEthernet0/1     unassigned      YES unset  administratively down down

Serial0/0/0            10.2.2.1        YES manual up                    up

Serial0/0/1            unassigned      YES unset  administratively down down

Vlan1                  unassigned      YES unset  administratively down down
```

- **<u>Configure OSPF on routes</u>**

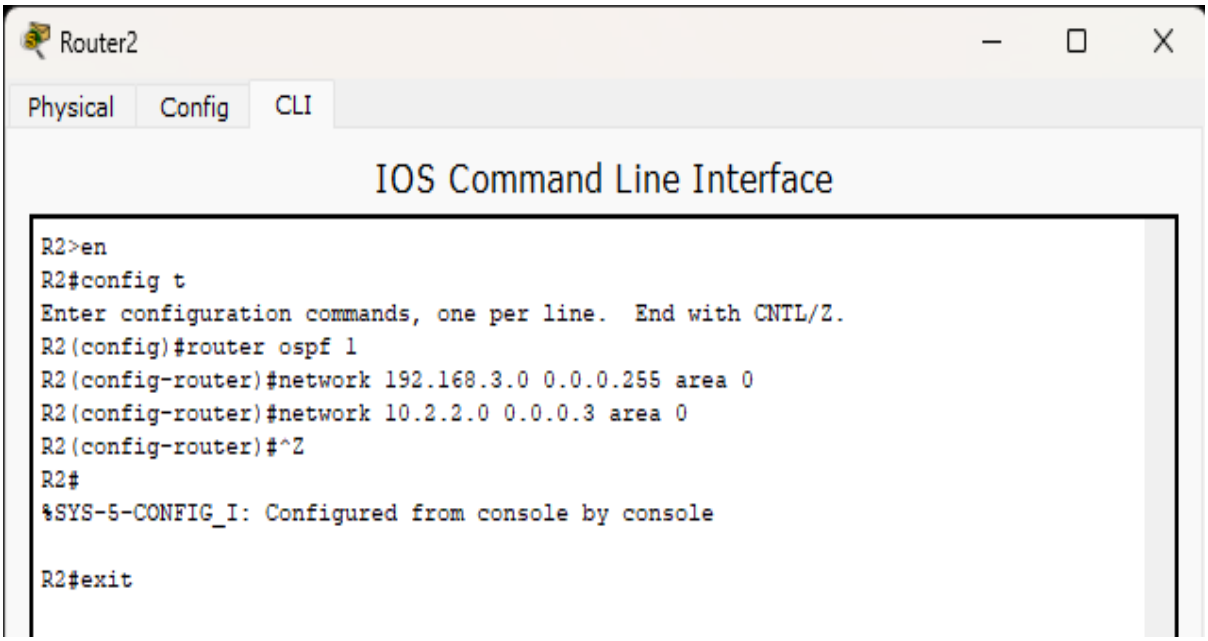
1. Router 0



2. Router 1

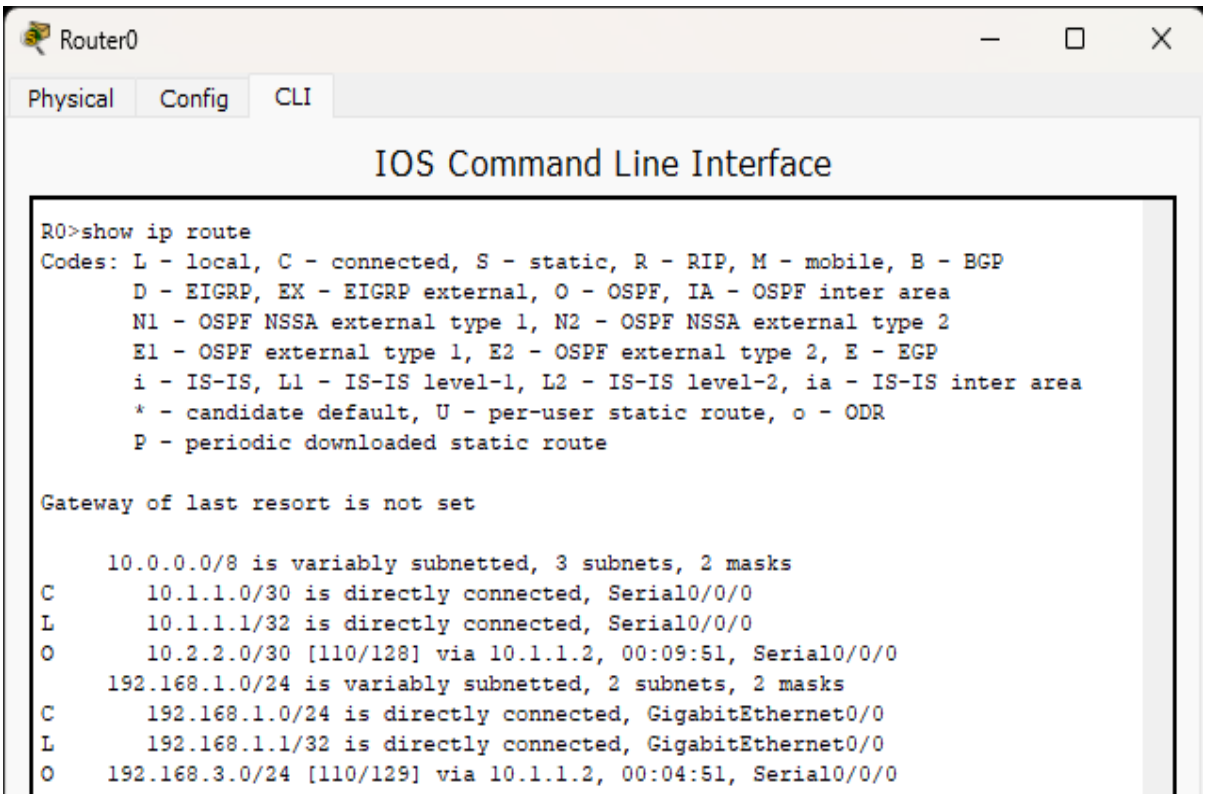


3. Router 2

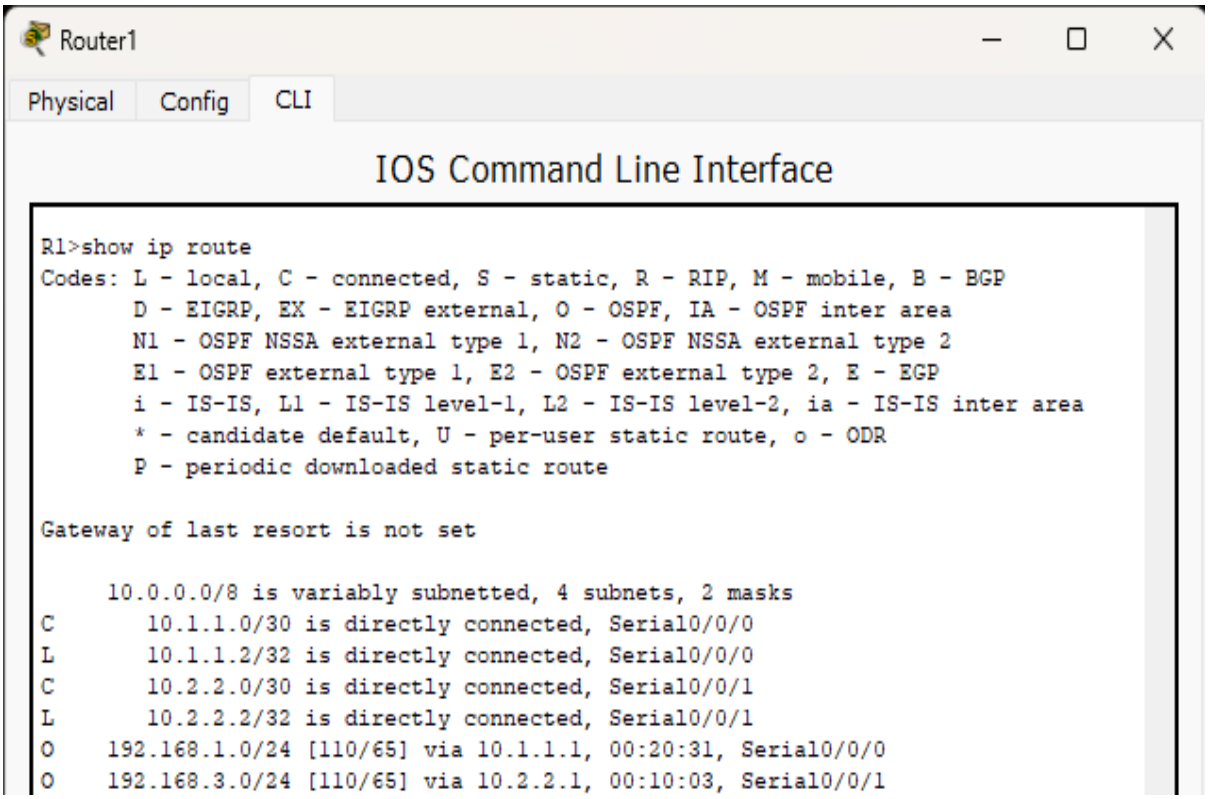


- **Displaying routing table of routers**

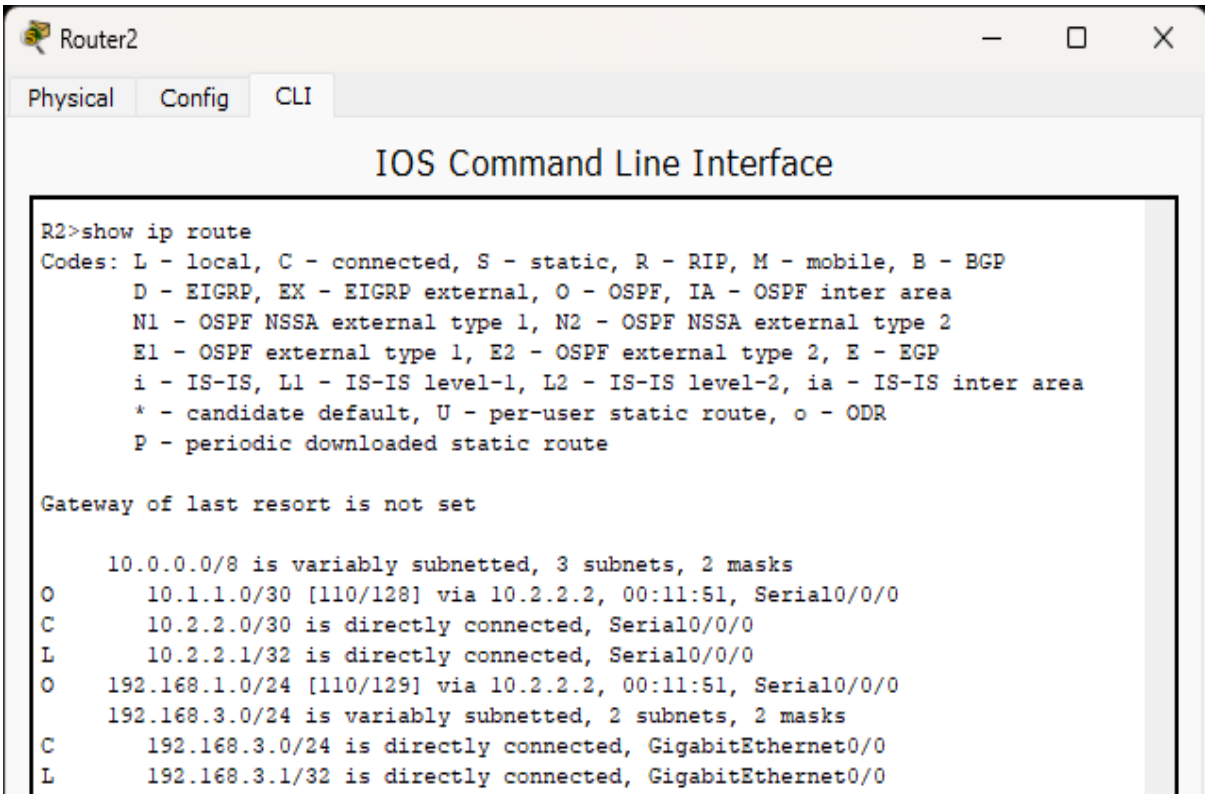
1. Router 0



2. Router 1



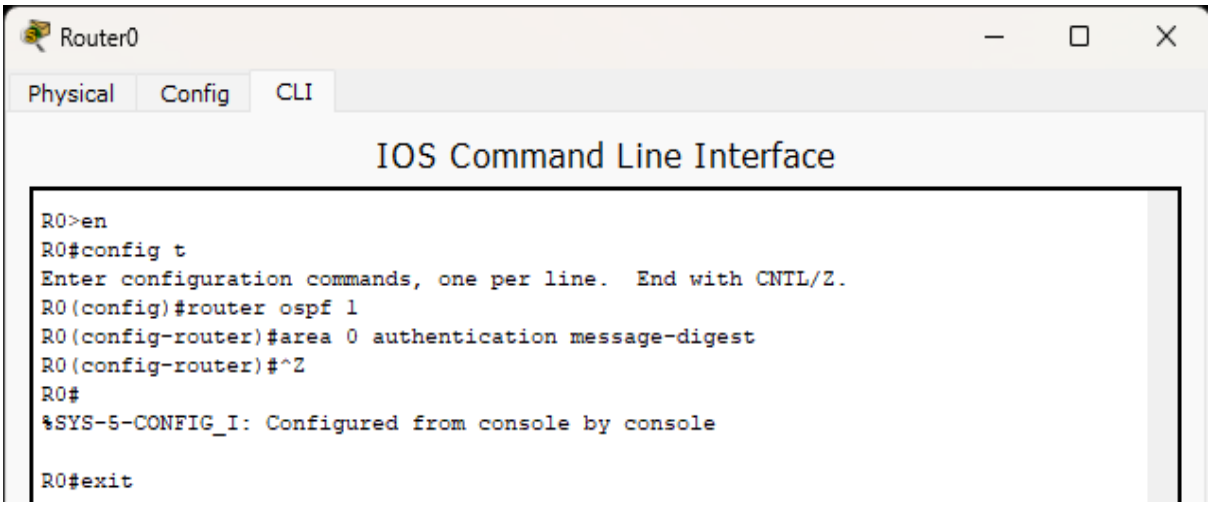
3. Router 2


Router2
Physical
Config
CLI
IOS Command Line Interface
R2>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
10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
O 10.1.1.0/30 [110/128] via 10.2.2.2, 00:11:51, Serial0/0/0
C 10.2.2.0/30 is directly connected, Serial0/0/0
L 10.2.2.1/32 is directly connected, Serial0/0/0
O 192.168.1.0/24 [110/129] via 10.2.2.2, 00:11:51, Serial0/0/0
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.3.0/24 is directly connected, GigabitEthernet0/0
L 192.168.3.1/32 is directly connected, GigabitEthernet0/0

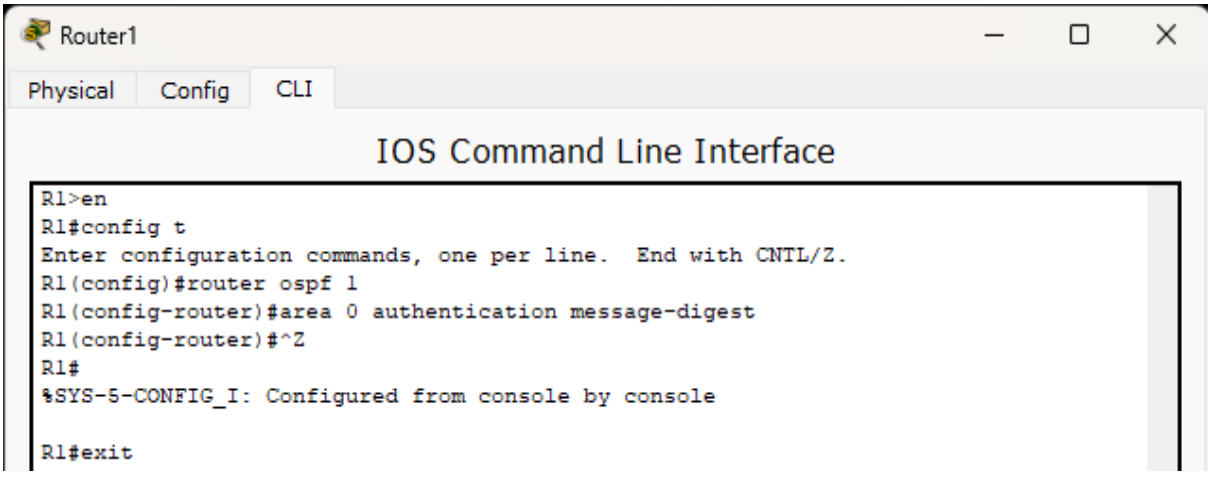
A. OSPF MD5 authentication

➢ Configure OSPF MD5 authentication on Routers

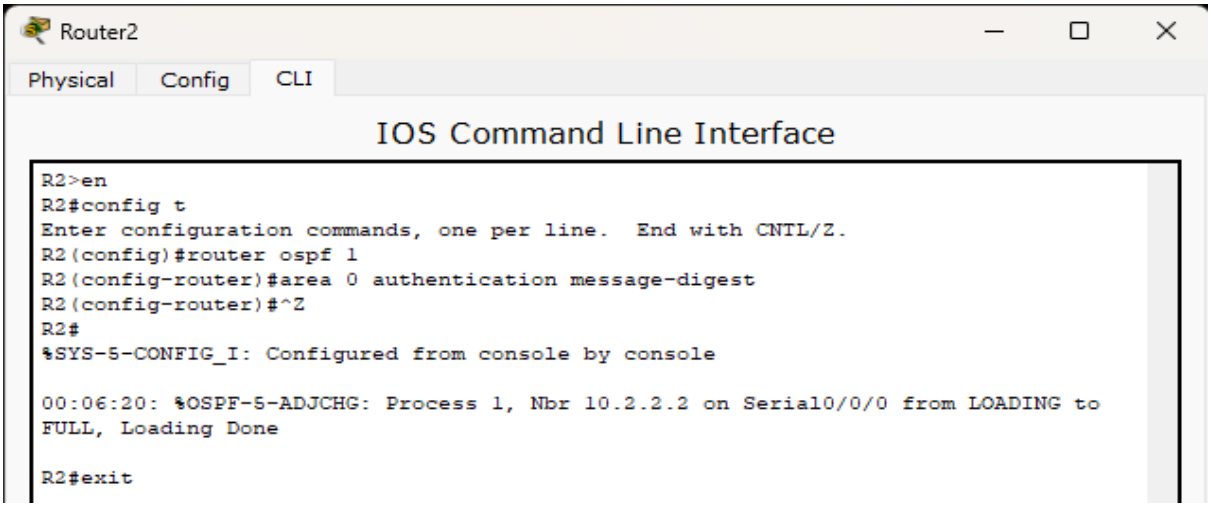
1. Router 0



2. Router 1

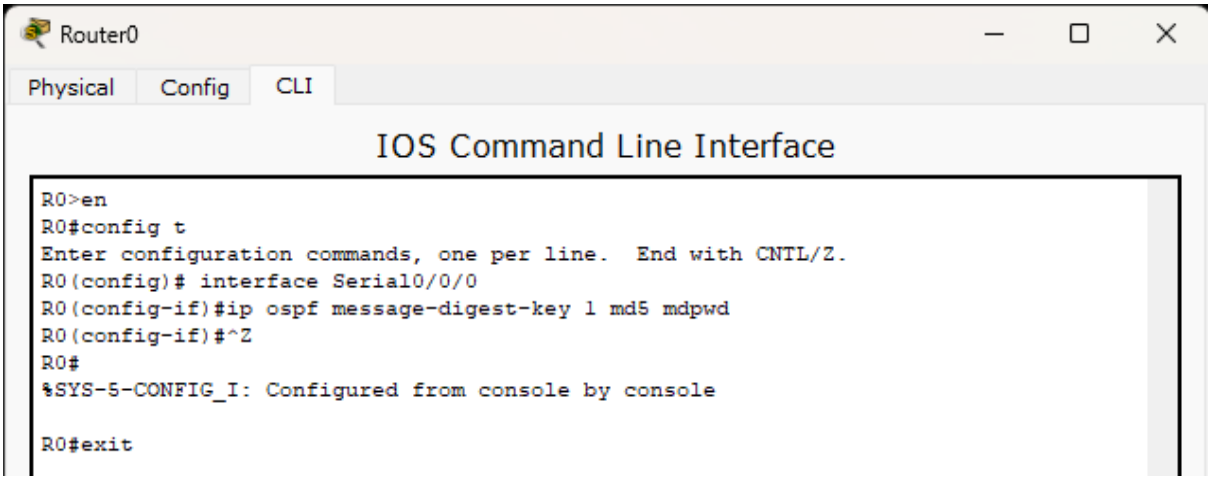


3. Router 2

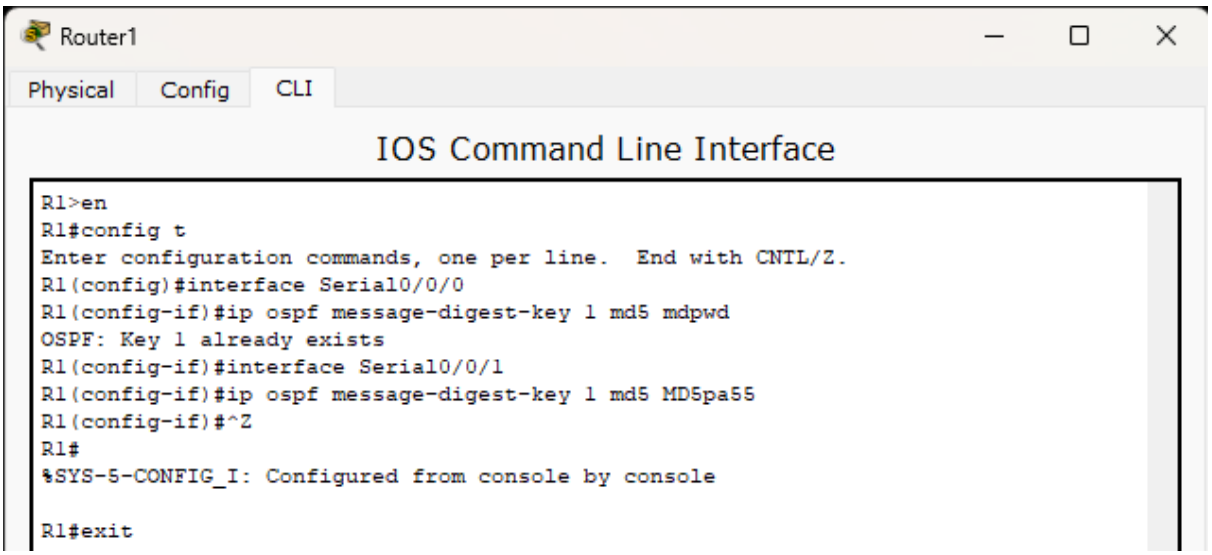


- **Configure the MD5 key for all the routers**

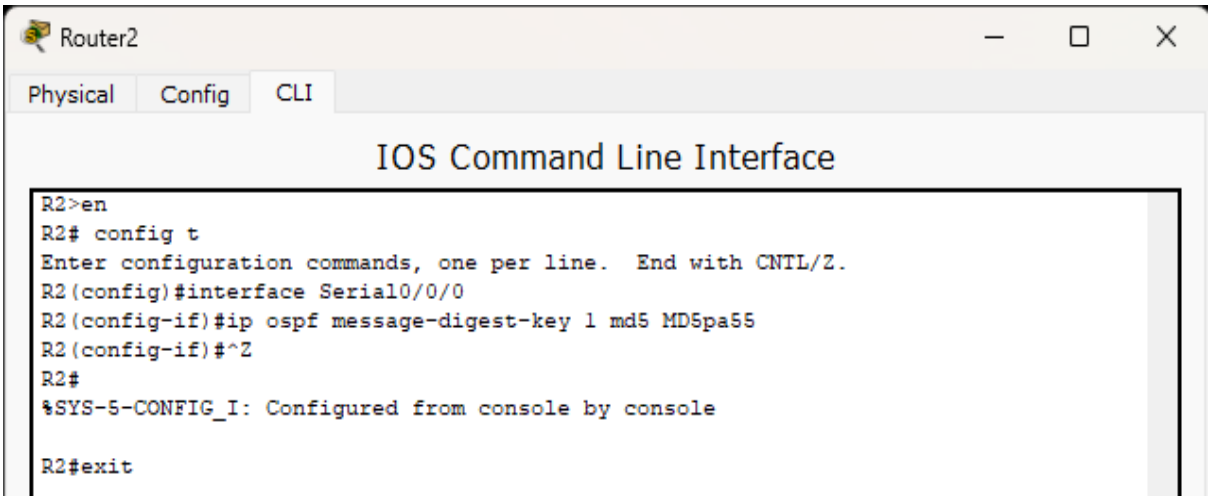
1. Router 0



2. Router 1

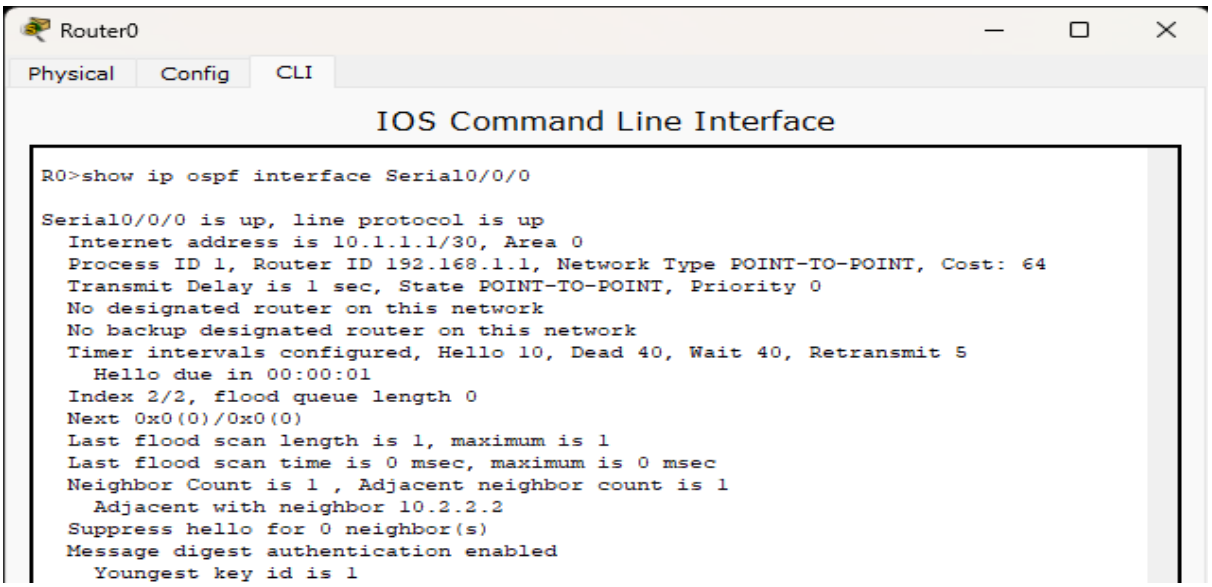


3. Router 2

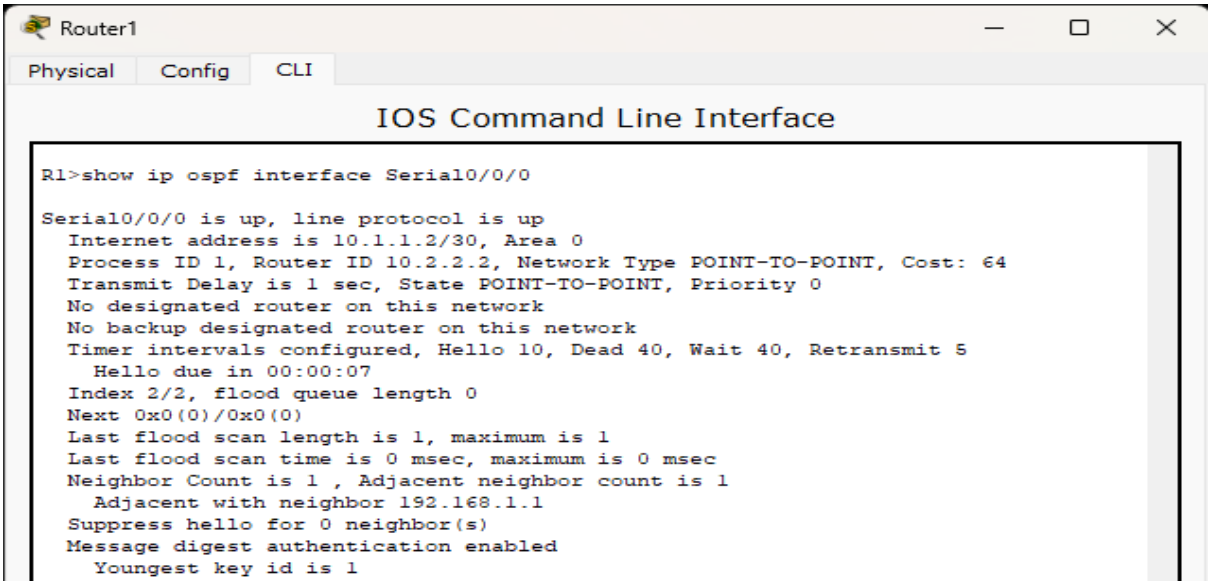


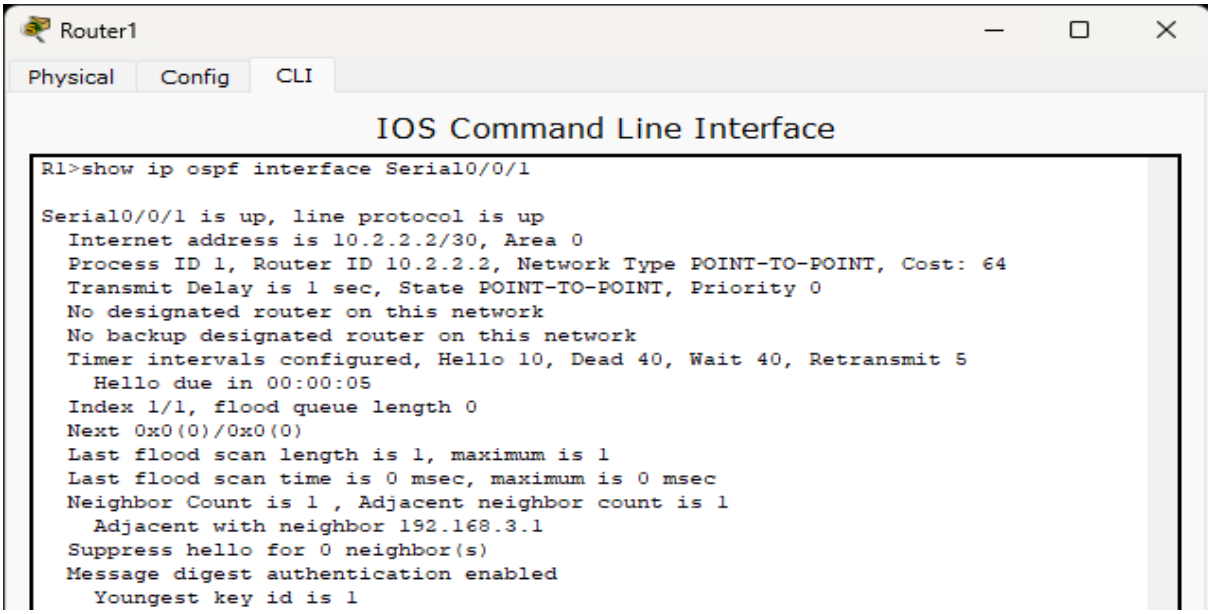
- **Displaying OSPF details of all the routers**

1. Router 0

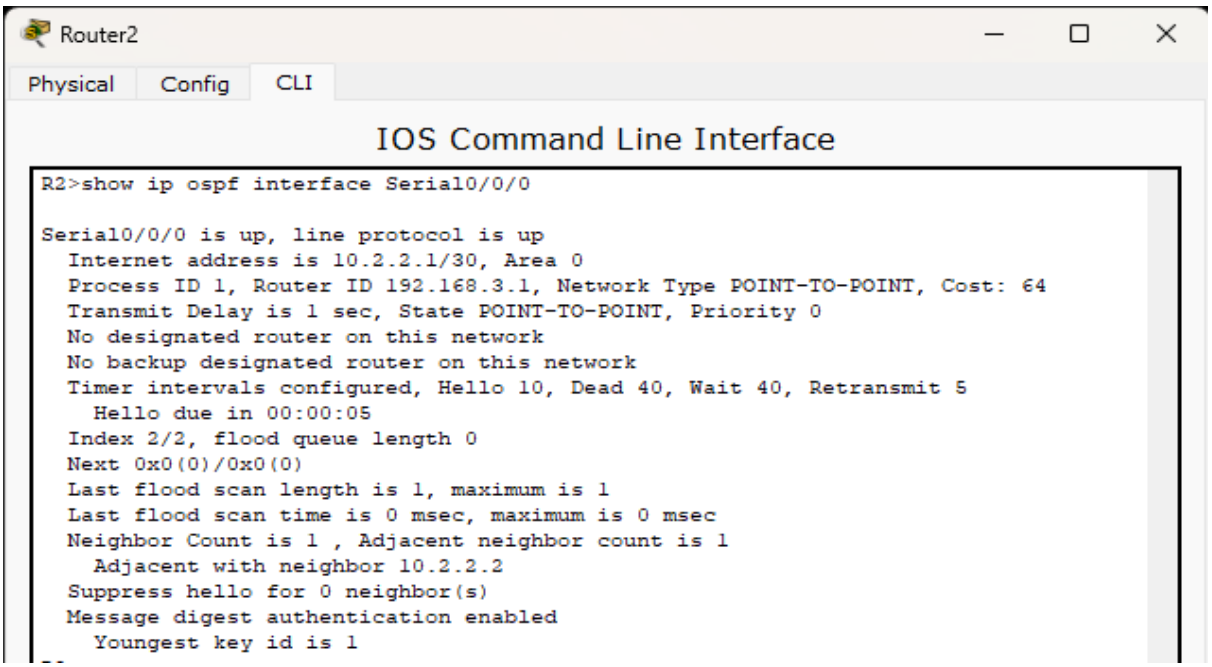


2. Router 1




Router1
Physical
Config
CLI
IOS Command Line Interface
R1>show ip ospf interface Serial0/0/1
Serial0/0/1 is up, line protocol is up
Internet address is 10.2.2.2/30, Area 0
Process ID 1, Router ID 10.2.2.2, Network Type POINT-TO-POINT, Cost: 64
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:05
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 192.168.3.1
Suppress hello for 0 neighbor(s)
Message digest authentication enabled
Youngest key id is 1

3. Router 2


Router2
Physical
Config
CLI
IOS Command Line Interface
R2>show ip ospf interface Serial0/0/0
Serial0/0/0 is up, line protocol is up
Internet address is 10.2.2.1/30, Area 0
Process ID 1, Router ID 192.168.3.1, Network Type POINT-TO-POINT, Cost: 64
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:05
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 10.2.2.2
Suppress hello for 0 neighbor(s)
Message digest authentication enabled
Youngest key id is 1

B. NTP

➢ Check Clock Time in the routers

1. Router 0

```
R0>show clock
*0:49:14.954 UTC Mon Mar 1 1993
R0>
```

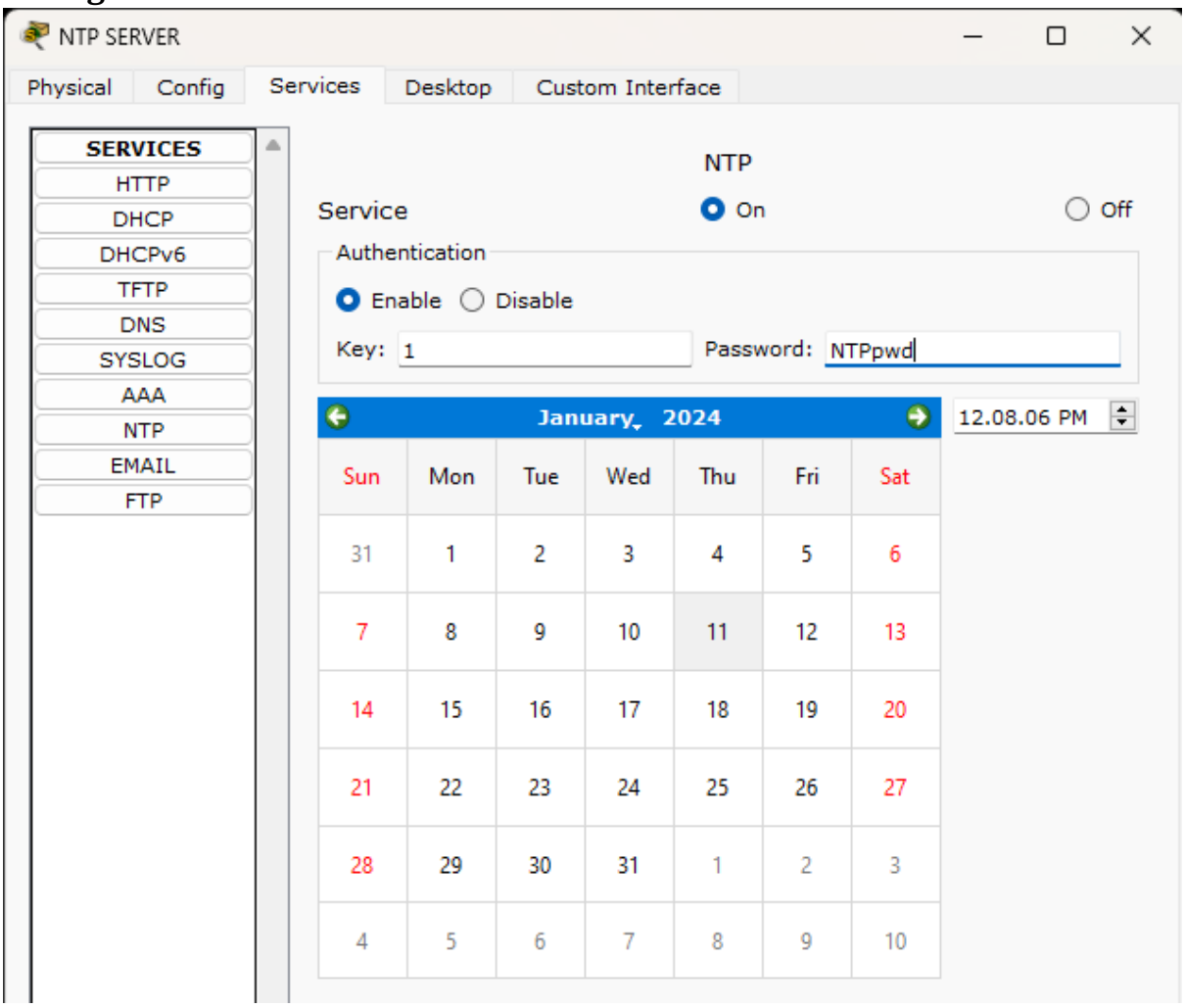
2. Router 1

```
R1>show clock
*0:51:40.343 UTC Mon Mar 1 1993
R1>
```

3. Router 2

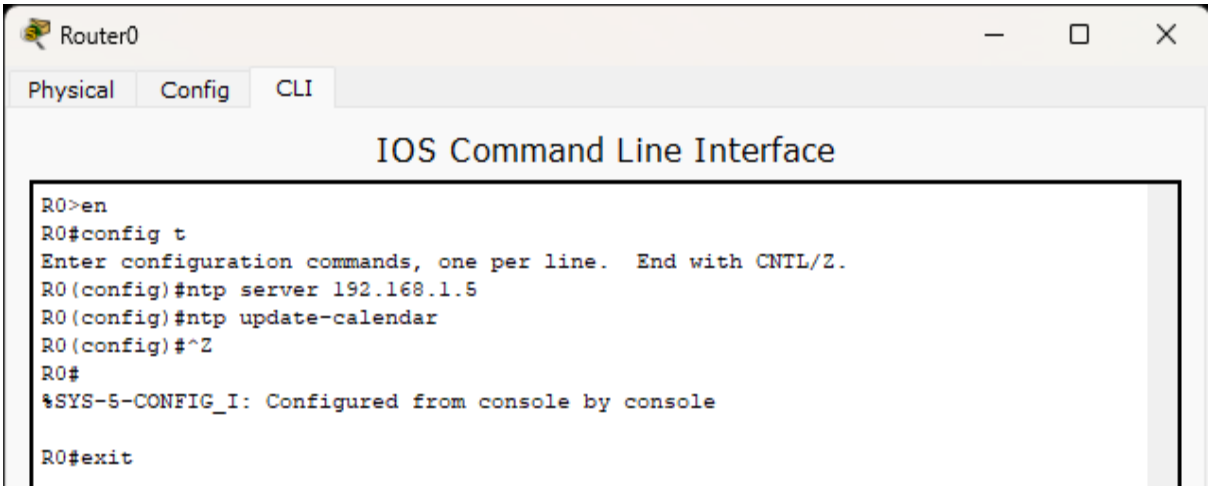
```
R2>show clock
*0:53:5.140 UTC Mon Mar 1 1993
R2>
```

➢ Configure NTP Server

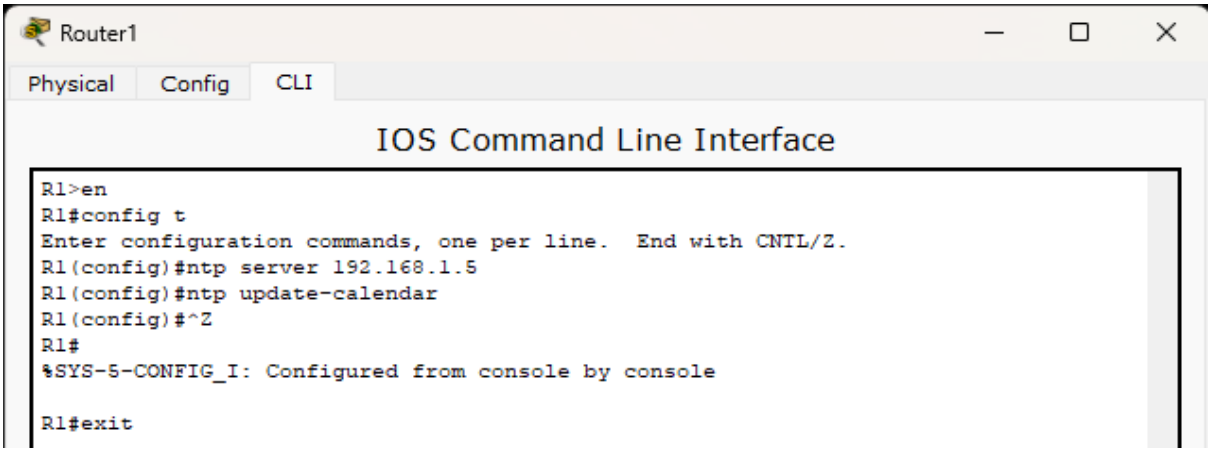


➢ Configure NTP Client

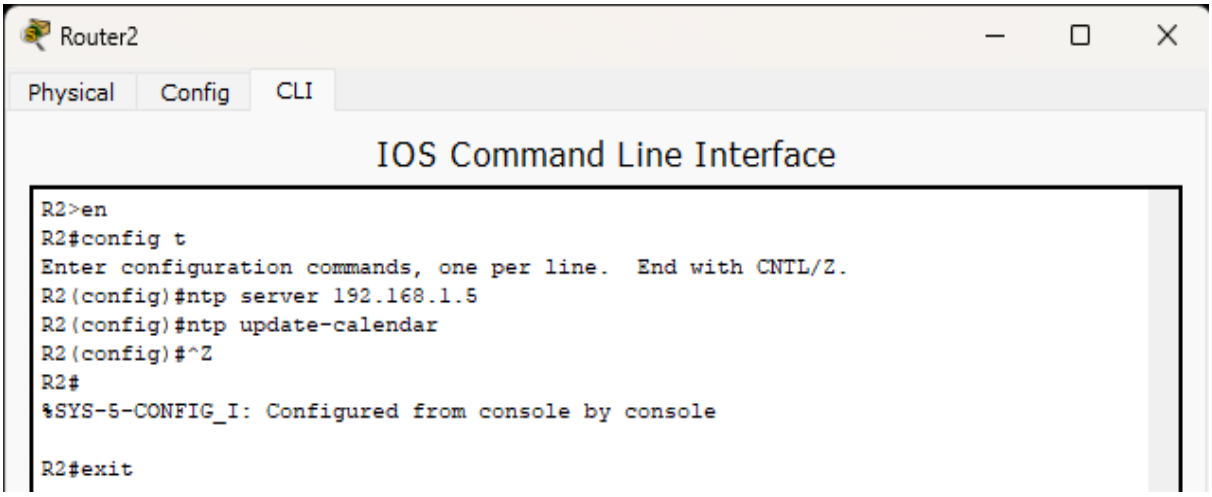
1. Router 0



2. Router 1

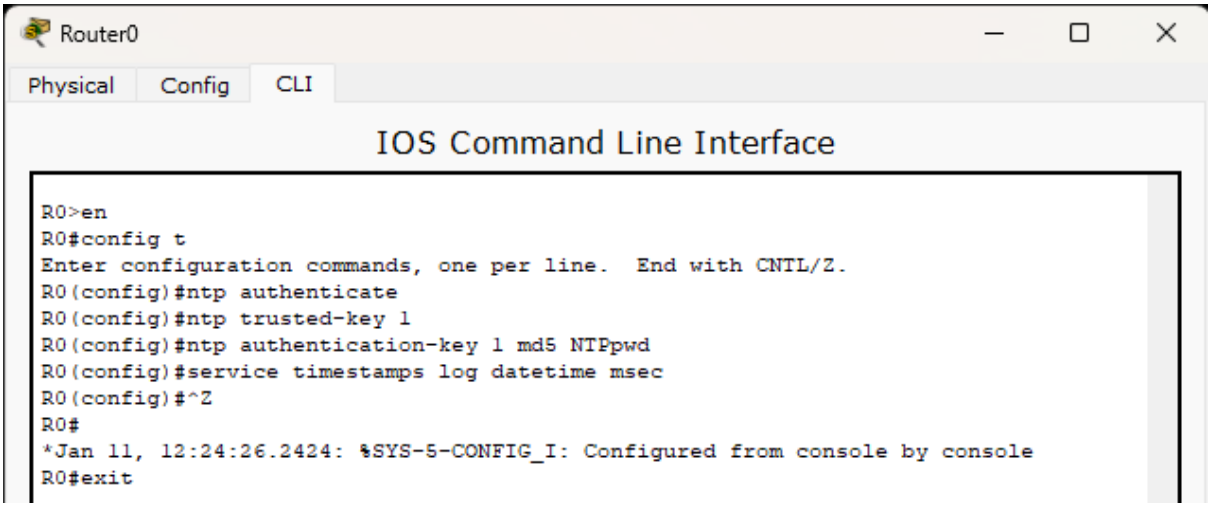


3. Router 2

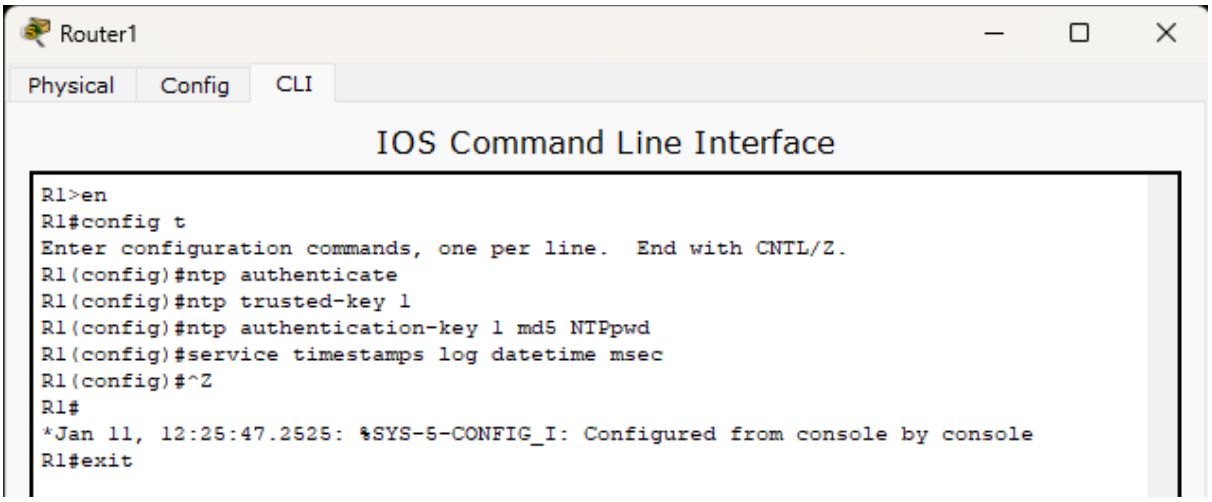


- **Configure NTP authentication and to timestamp log messages on the routers**

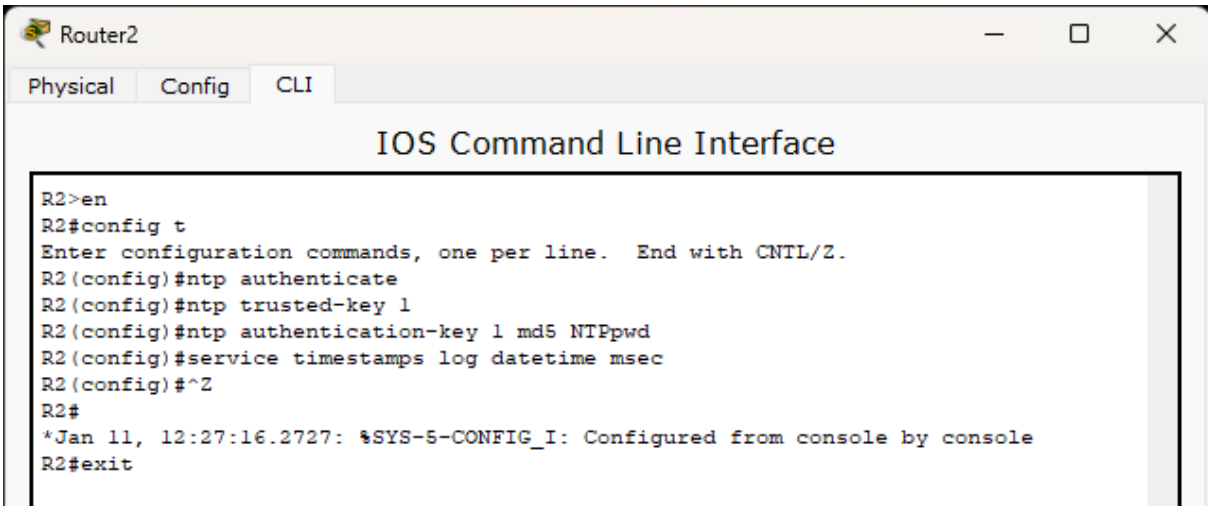
1. Router 0



2. Router 1



3. Router 2



- **Check updated UTC Clock Time in the routers**

1. Router 0

```
R0>show clock
*12:30:36.142 UTC Thu Jan 11 2024
R0>
```

2. Router 1

```
R1>show clock
*12:30:54.211 UTC Thu Jan 11 2024
R1>
```

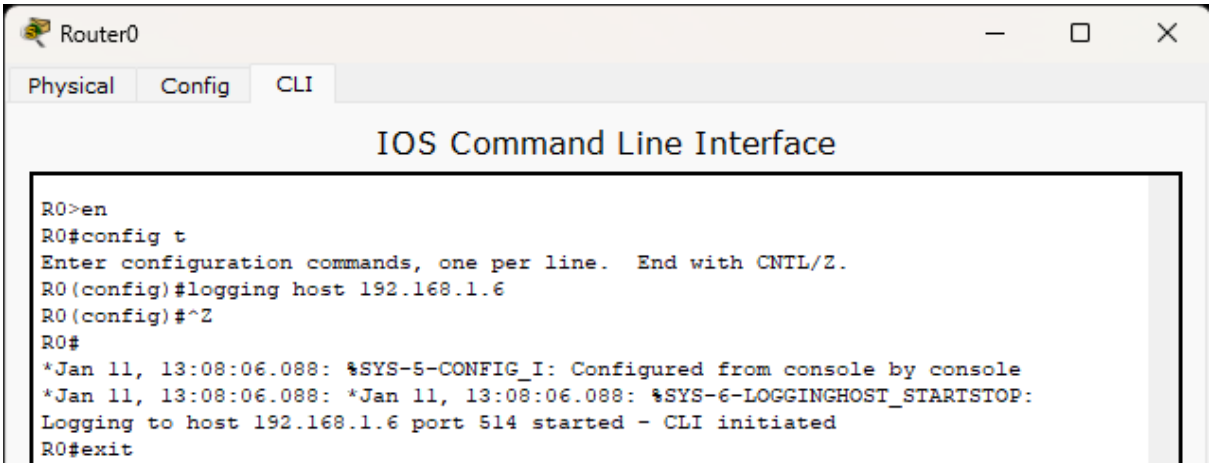
3. Router 2

```
R2>show clock
*12:31:2.851 UTC Thu Jan 11 2024
R2>
```

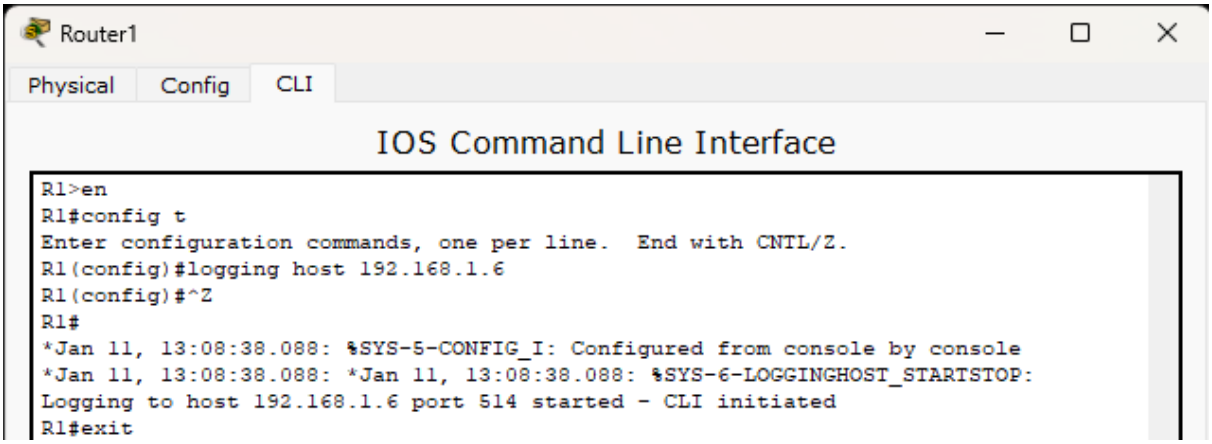
C. SYSLOG

- **Configure Routers to Log Messages to the SYSLOG Server**

1. Router 0



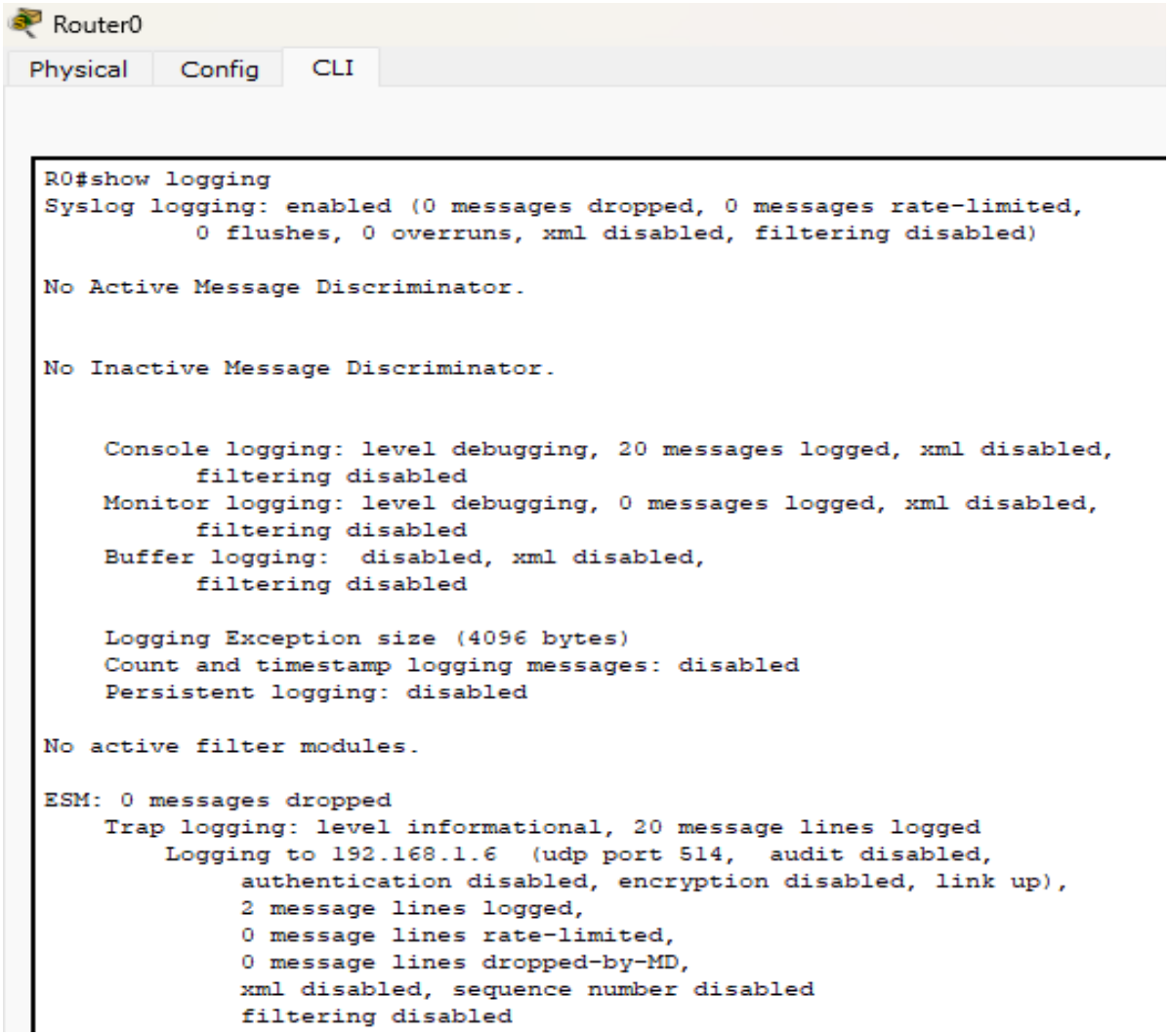
2. Router 1



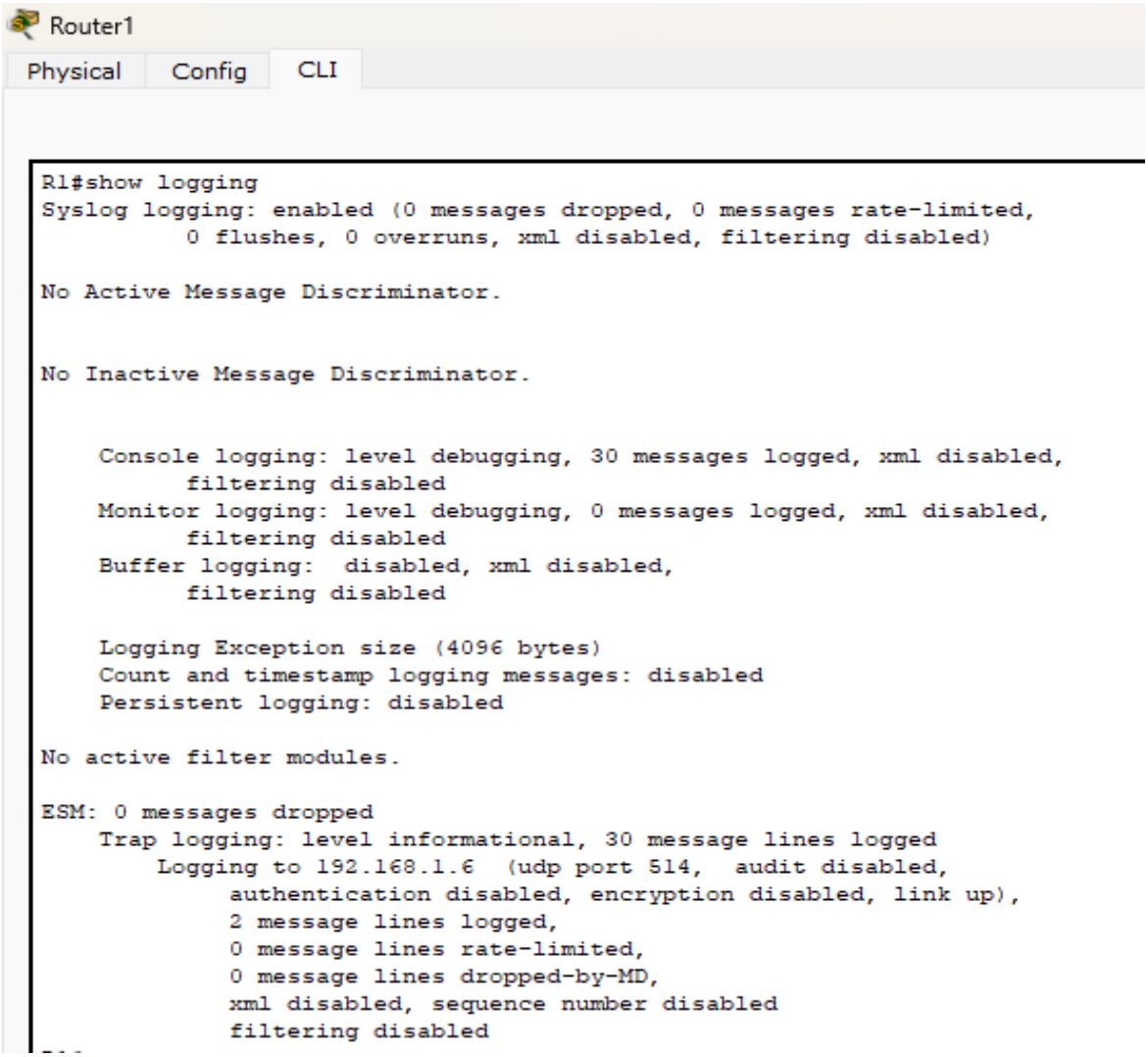
3. Router 2

- **Verify logging configuration on Routers**

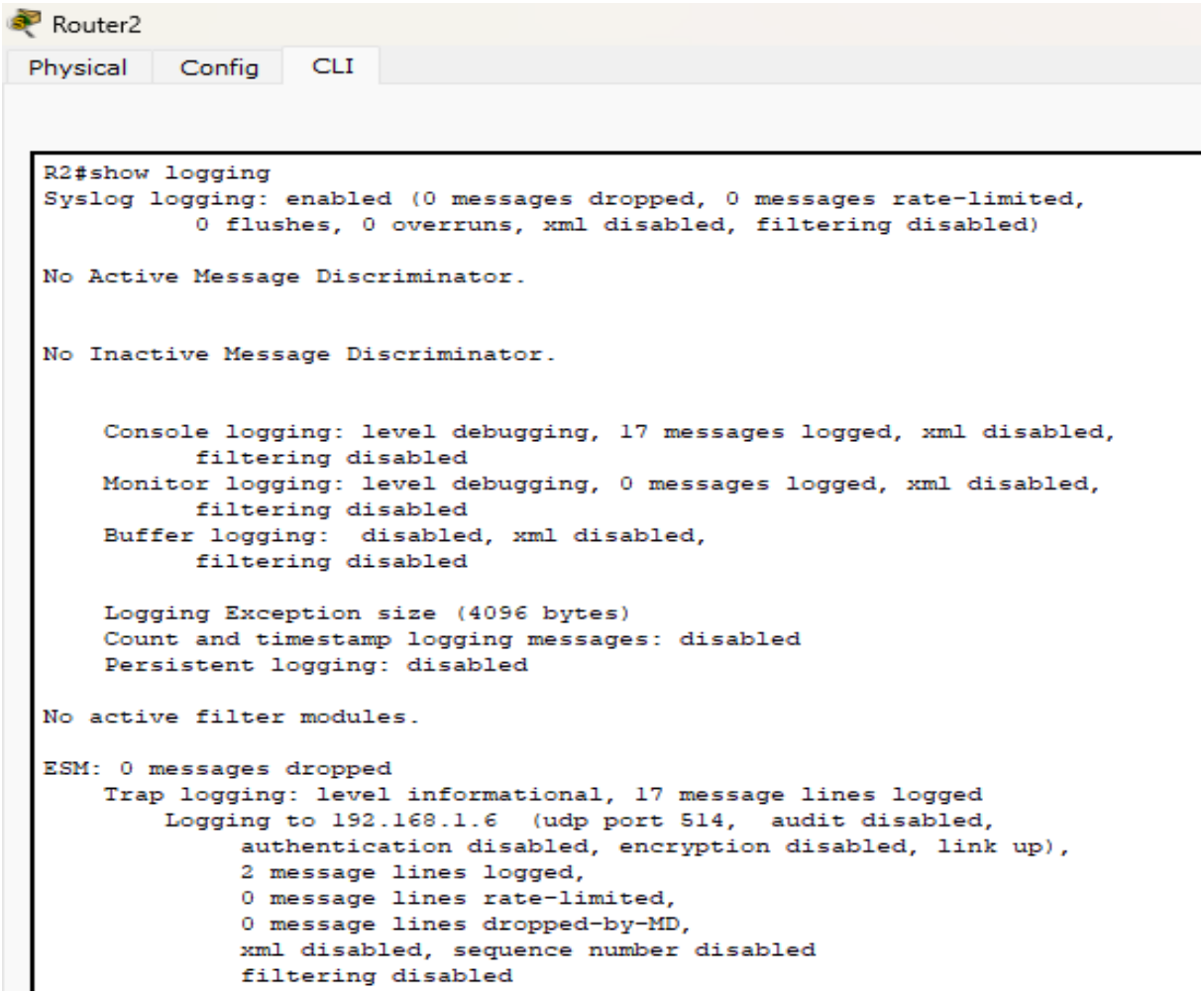
1. Router 0



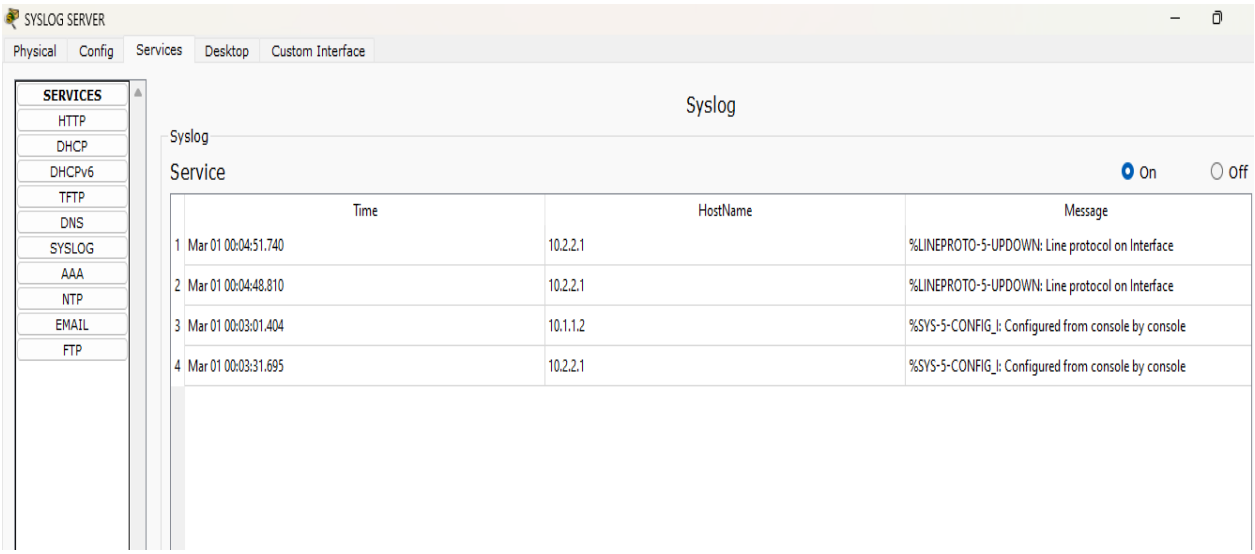
2. Router 1


Router1
Physical
Config
CLI
R1#show logging
Syslog logging: enabled (0 messages dropped, 0 messages rate-limited,
0 flushes, 0 overruns, xml disabled, filtering disabled)
No Active Message Discriminator.
No Inactive Message Discriminator.
Console logging: level debugging, 30 messages logged, xml disabled,
filtering disabled
Monitor logging: level debugging, 0 messages logged, xml disabled,
filtering disabled
Buffer logging: disabled, xml disabled,
filtering disabled
Logging Exception size (4096 bytes)
Count and timestamp logging messages: disabled
Persistent logging: disabled
No active filter modules.
ESM: 0 messages dropped
Trap logging: level informational, 30 message lines logged
Logging to 192.168.1.6 (udp port 514, audit disabled,
authentication disabled, encryption disabled, link up),
2 message lines logged,
0 message lines rate-limited,
0 message lines dropped-by-MD,
xml disabled, sequence number disabled
filtering disabled

3. Router 2



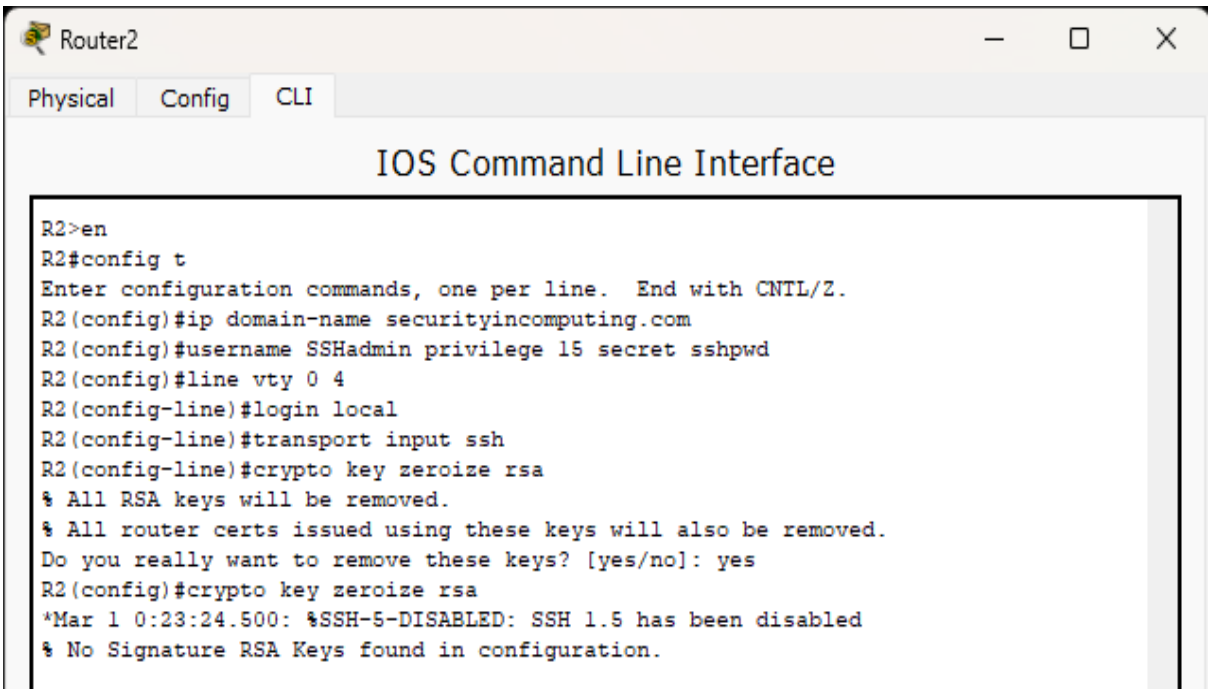
➢ Examine logs of the SYSLOG Server

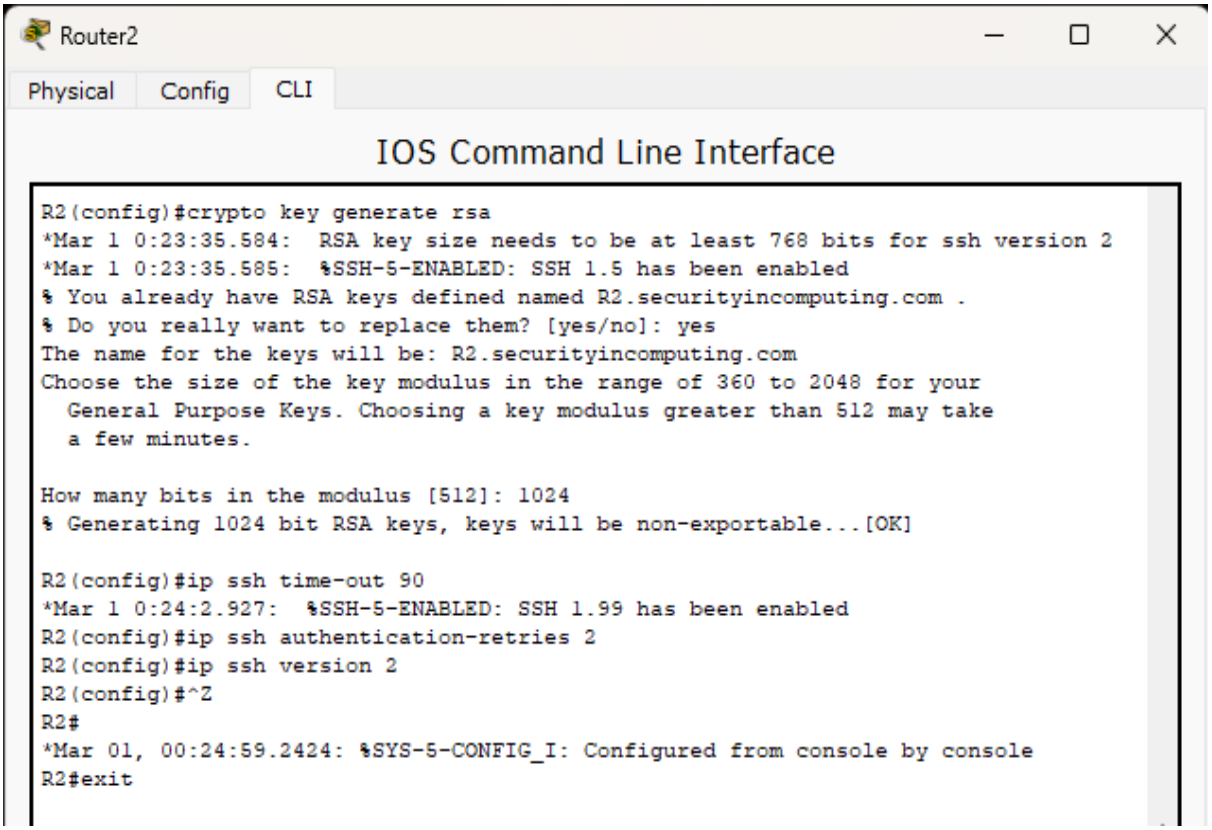


D. SSH

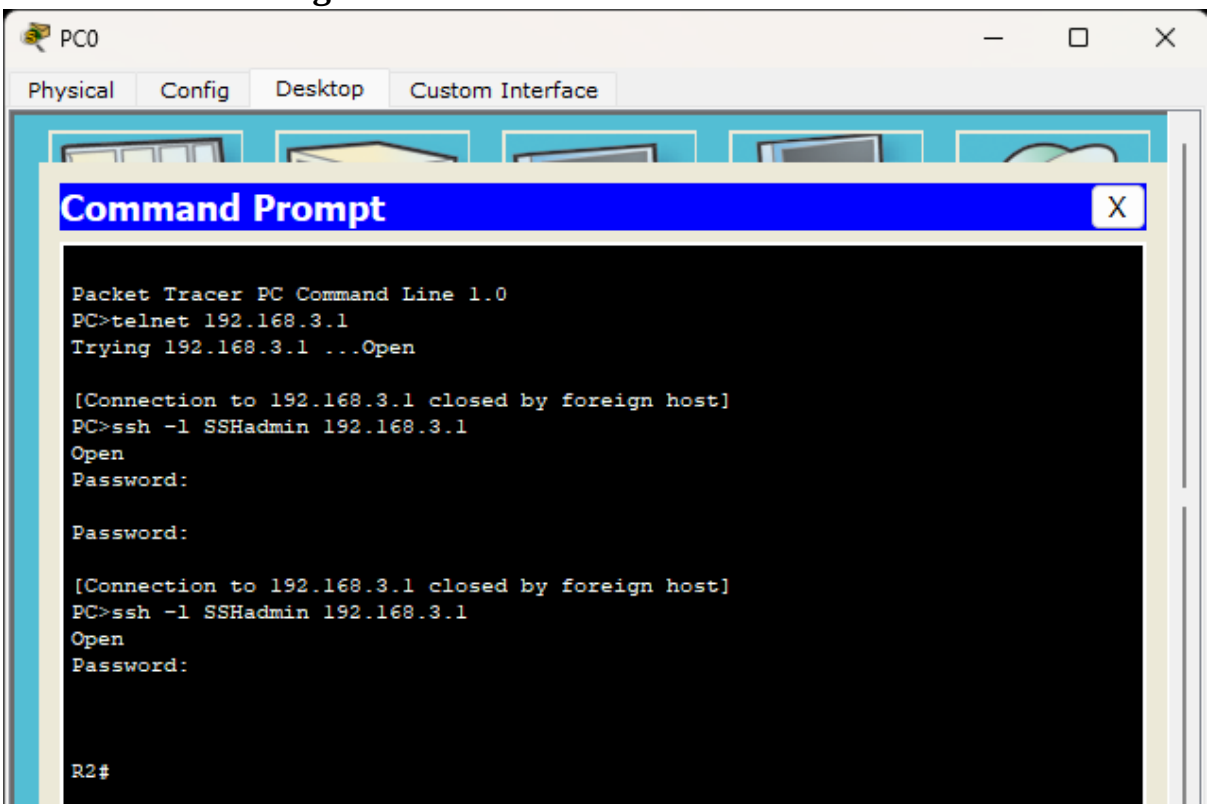
- **Configure SSH on R2**

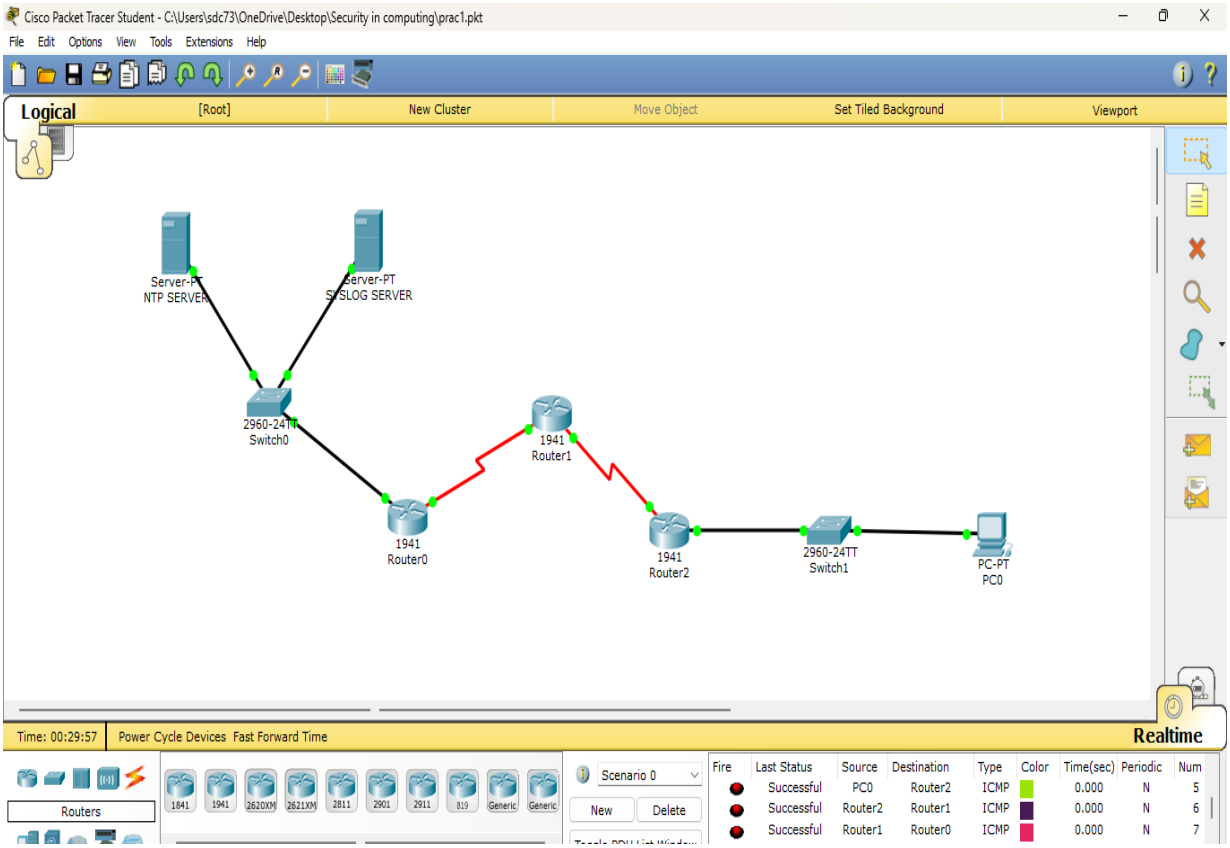
Router 2





➢ Connect to R2 using telnet and SSH on PC





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