



Final Project Report

CPIT 470

By

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Phase 1

Task 1: IP addressing

The subnetwork addresses for each student is based on her own KAU ID. Here is an example to generate your network address based on your KAU ID.

- KU ID: 1743998
- Reverse ID: 8993471
- Add number 2 in front of the reversed ID: 28993471

Now, split this number into an IP address with every two digits forming a part: 28.99.34.71

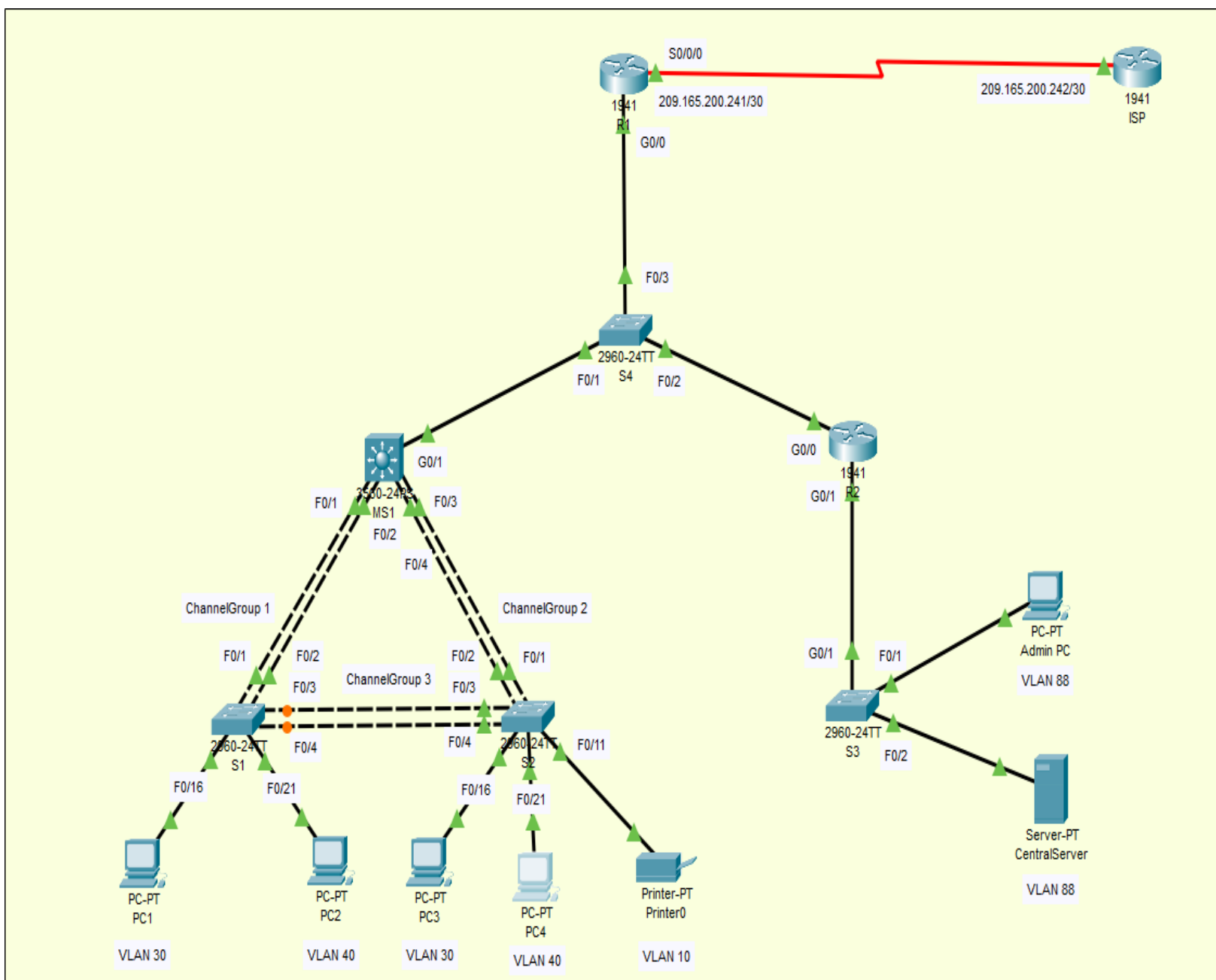
- Consider the network address as: 28.99.34.71/22
- The following table illustrates the needed host for each subnet associated with a different example of IP addresses.

VLSM Table

Subnet Name	Needed Size	Allocated Size	Address	Mask	Dec Mask	Assignable Range	Broadcast Address
VLAN 30	500	510	28.99.34.0	/23	255.255.254.0	28.99.34.1 - 28.99.35.254	28.99.35.255
VLAN 40	60	62	28.99.36.0	/26	255.255.255.192	28.99.36.1 - 28.99.36.62	28.99.36.63
VLAN 10	30	30	28.99.36.64	/27	255.255.255.224	28.99.36.65 - 28.99.36.94	28.99.36.95
Multiaccess	4	6	28.99.36.96	/29	255.255.255.248	28.99.36.97 - 28.99.36.102	28.99.36.103
VLAN 88	4	6	28.99.36.104	/29	255.255.255.248	28.99.36.105 - 28.99.36.110	28.99.36.111
VLAN 99	4	6	28.99.36.112	/29	255.255.255.248	28.99.36.113 - 28.99.36.118	28.99.36.119

Device	Interface	IP Address	Subnet Mask	Default Gateway
S1	VLAN 99	28.99.36.114	255.255.255.248	28.99.36.113
S2	VLAN 99	28.99.36.115	255.255.255.248	28.99.36.113
S3	VLAN 88	28.99.36.106	255.255.255.248	28.99.36.105
S4	Multiaccess	28.99.36.98	255.255.255.248	28.99.36.97
MS1	G0/1	28.99.36.97	255.255.255.248	N/A
	VLAN 10	28.99.36.65	255.255.255.224	N/A
	VLAN 30	28.99.34.1	255.255.254.0	N/A
	VLAN 40	28.99.36.1	255.255.255.192	N/A
	VLAN 99	28.99.36.113	255.255.255.248	N/A
R1	S0/0/0	209.165.200.241	255.255.255.252	N/A
	G0/0	28.99.36.99	255.255.255.248	N/A
R2	G0/0	28.99.36.100	255.255.255.248	N/A
	G0/1	28.99.36.105	255.255.255.248	N/A
Admin PC	NIC	28.99.36.107	255.255.255.248	28.99.36.105
CentralServer	NIC	28.99.36.108	255.255.255.248	28.99.36.105
PC1	NIC	28.99.34.2	255.255.254.0	28.99.34.1
PC2	NIC	28.99.36.2	255.255.255.192	28.99.36.1
PC3	NIC	28.99.34.3	255.255.254.0	28.99.34.1
PC4	NIC	28.99.36.3	255.255.255.192	28.99.36.1
Printer	NIC	28.99.36.66	255.255.255.224	28.99.36.65

Task 2: Cable the network as shown in the topology



Task 3: Configure host PCs

Configure all PCs with IP addresses and default gateways according to your addressing table.

Device Name: PC1
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Up	28.99.34.2/23	<not set>	0003.E468.7604
Bluetooth	Down	<not set>	<not set>	000A.41D7.E595

Gateway: 28.99.34.1
DNS Server: <not set>
Line Number: <not set>

Physical Location: Intercity > Home City > Corporate Office > PC1

Device Name: PC2
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Up	28.99.36.2/26	<not set>	00D0.BC6D.83CC
Bluetooth	Down	<not set>	<not set>	0002.4AEC.D09D

Gateway: 28.99.36.1
DNS Server: <not set>
Line Number: <not set>

Physical Location: Intercity > Home City > Corporate Office > PC2

Device Name: PC4
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Up	28.99.36.3/26	<not set>	0040.0BCE.85CB
Bluetooth	Down	<not set>	<not set>	0090.2BE0.E4E0

Gateway: 28.99.36.1
DNS Server: <not set>
Line Number: <not set>

Physical Location: Intercity > Home City > Corporate Office > PC4

Device Name: Printer0
Device Model: Printer-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Up	28.99.36.66/27	<not set>	0060.2F10.0148

Gateway: 28.99.36.65
DNS Server: <not set>
Line Number: <not set>

Physical Location: Intercity > Home City > Corporate Office > Printer0

Device Name: CentralServer
Device Model: Server-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Up	28.99.36.108/29	<not set>	0060.7087.C812

Gateway: 28.99.36.105
DNS Server: <not set>
Line Number: <not set>

Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > CentralServer

Device Name: Admin PC
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Up	28.99.36.107/29	<not set>	0030.F29E.1656
Bluetooth	Down	<not set>	<not set>	00D0.FF6C.3D75

Gateway: 28.99.36.105
DNS Server: <not set>
Line Number: <not set>

Physical Location: Intercity > Home City > Corporate Office > Admin PC

Device Name: PC3
Device Model: PC-PT

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0	Up	28.99.34.3/23	<not set>	0030.A391.68AD
Bluetooth	Down	<not set>	<not set>	0001.9639.AA09

Gateway: 28.99.34.1
DNS Server: <not set>
Line Number: <not set>

Physical Location: Intercity > Home City > Corporate Office > PC3

Task 4: Configure device basic settings (Switches, Routers)

- Configure device names as shown in the topology.
Commands: enable; configure terminal; hostname S1, S2, S3, S4, R1, R2, MS1;
- Configure the IP address and default gateway listed in your addressing table for SVIs on switches.
- Configure routers' interfaces.

The image displays four screenshots of network device configuration interfaces, arranged in a 2x2 grid. The top row shows configurations for router R1, and the bottom row shows configurations for router R2.

Top Left (R1): Configuration for interface GigabitEthernet0/0. The interface is enabled. Port Status is On. Bandwidth is 100 Mbps. Duplex is Full Duplex. MAC Address is 0009.7C95.7601. IP Configuration: IPv4 Address is 28.99.36.99, Subnet Mask is 255.255.255.248. Tx Ring Limit is 10.

Top Right (R1): Configuration for interface Serial0/0/0. The interface is enabled. Port Status is On. Duplex is Full Duplex. Clock Rate is 2000000. IP Configuration: IPv4 Address is 209.165.200.241, Subnet Mask is 255.255.255.252. Tx Ring Limit is 10.

Bottom Left (R2): Configuration for interface GigabitEthernet0/0. The interface is enabled. Port Status is On. Bandwidth is 100 Mbps. Duplex is Full Duplex. MAC Address is 0001.64D5.3401. IP Configuration: IPv4 Address is 28.99.36.100, Subnet Mask is 255.255.255.248. Tx Ring Limit is 10.

Bottom Right (R2): Configuration for interface GigabitEthernet0/1. The interface is enabled. Port Status is On. Bandwidth is 1000 Mbps. Duplex is Full Duplex. MAC Address is 0001.64D5.3402. IP Configuration: IPv4 Address is 28.99.36.105, Subnet Mask is 255.255.255.248. Tx Ring Limit is 10.

Task 5: Configure VLANs on Switches

a. Create the VLANs on switches.

S1

Physical Config CLI Attributes

IOS Command Line Interface

```
Password:
S1>enable
Password:
S1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#
S1(config)#ex
S1#
%SYS-5-CONFIG_I: Configured from console by console

S1#show vlan status
^
% Invalid input detected at '^' marker.

S1#show vlan ?
  brief VTP all VLAN status in brief
  id    VTP VLAN status by VLAN id
  name  VTP VLAN status by VLAN name
  <cr>
S1#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Gig0/1, Gig0/2
10	V10	active	Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15
30	V30	active	Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20
40	V40	active	Fa0/21, Fa0/22, Fa0/23, Fa0/24
99	V99	active	Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

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Top

S2

Physical Config CLI Attributes

IOS Command Line Interface

```
User Access Verification

Password:
S2>enable
Password:
S2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S2(config)#
S2(config)#show vlan breif
^
% Invalid input detected at '^' marker.

S2(config)#show vlan brief
^
% Invalid input detected at '^' marker.

S2(config)#ex
S2#
%SYS-5-CONFIG_I: Configured from console by console

S2#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Gig0/1, Gig0/2
10	V10	active	Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15
30	V30	active	Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20
40	V40	active	Fa0/21, Fa0/22, Fa0/23, Fa0/24
99	V99	active	Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

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Top

S3

Physical Config CLI Attributes

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

User Access Verification

Password:
S3>enable
Password:
S3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S3(config)#
S3(config)#ex
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4, Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24, Gig0/1, Gig0/2
99	V99	active	
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

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S4

Physical Config CLI Attributes

IOS Command Line Interface

```
User Access Verification

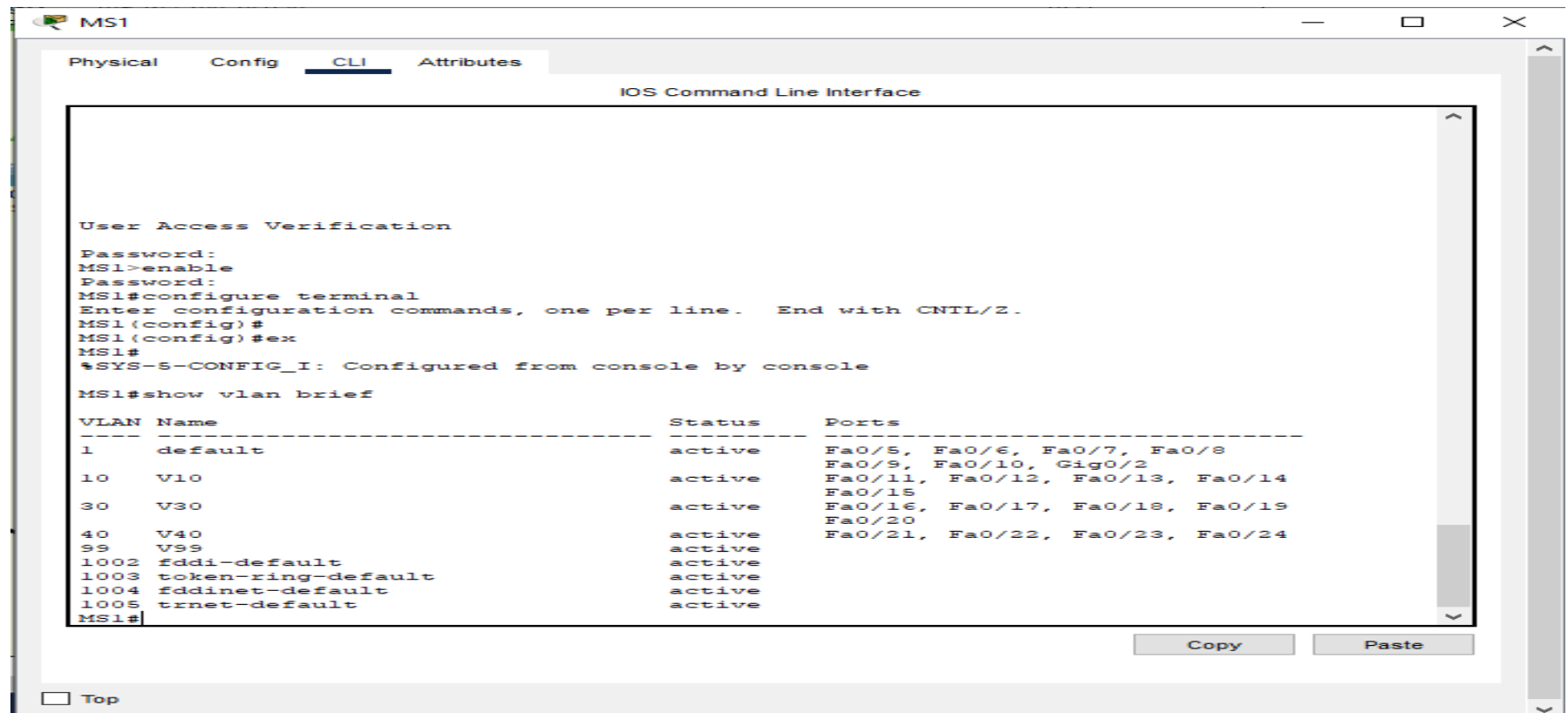
Password:
S4>enable
Password:
S4#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S4(config)#
S4(config)#ex
S4#
%SYS-5-CONFIG_I: Configured from console by console

S4#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4, Fa0/5, Fa0/6, Fa0/7, Fa0/8, Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13, Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19, Fa0/20, Fa0/21, Fa0/22, Fa0/23, Fa0/24, Gig0/1, Gig0/2
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

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Top



Task 6: Configure VLAN ports and trunk ports on the switches

- Configure the access ports on switches.
- Configure the trunk ports on switches.
- Shut down all interfaces that will not be used.

Phase 2

Task 7: Configure Inter-VLAN Routing on MS1

- a. Configure the sub-interfaces IP addresses listed in your addressing table.

```
MS1#show vlan brief

VLAN Name                Status    Ports
-----
1    default                active    Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                           Fa0/9, Fa0/10, Gig0/2
10   V10                    active    Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                           Fa0/15
30   V30                    active    Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                           Fa0/20
40   V40                    active    Fa0/21, Fa0/22, Fa0/23, Fa0/24
99   V99                    active
1002 fddi-default          active
1003 token-ring-default    active
1004 fddinet-default        active
1005 trnet-default          active

MS1#show ip route
Codes: C - connected, S - static, I - IGRP, 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

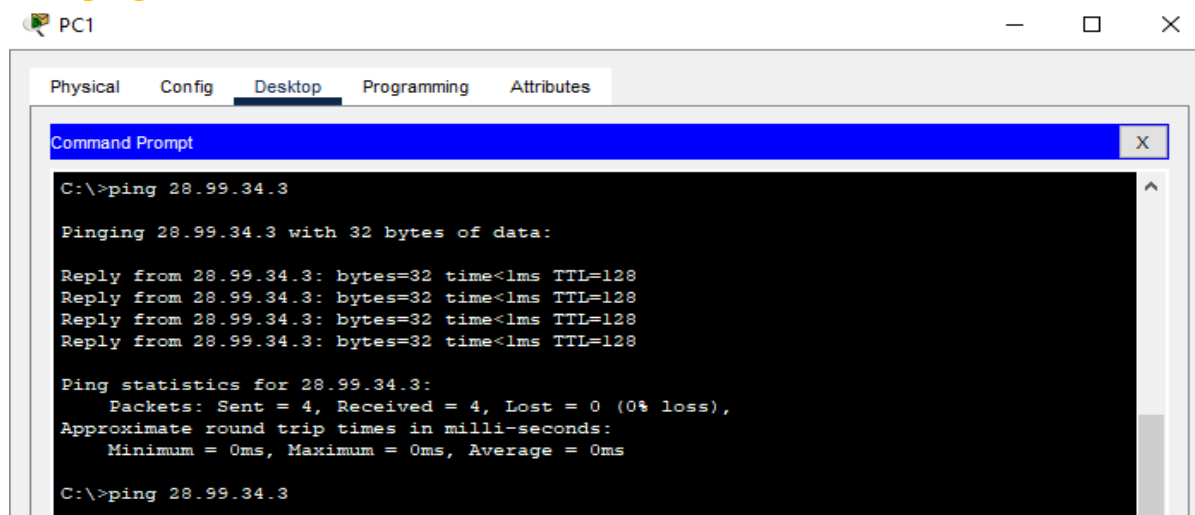
    28.0.0.0/8 is variably subnetted, 6 subnets, 4 masks
C       28.99.34.0/23 is directly connected, Vlan30
C       28.99.36.0/26 is directly connected, Vlan40
C       28.99.36.64/27 is directly connected, Vlan10
C       28.99.36.96/29 is directly connected, GigabitEthernet0/1
O       28.99.36.104/29 [110/2] via 28.99.36.100, 02:11:49, GigabitEthernet0/1
C       28.99.36.112/29 is directly connected, Vlan99

MS1#MS1#
```

Task 8: Verify connectivity (screenshots)

- Verify connectivity between the same VLANs.

PC1 pings PC3



The screenshot shows the PC1 window with the Desktop tab selected. A Command Prompt window is open, displaying the results of a ping command to 28.99.34.3. The output shows four successful replies with 32 bytes of data, a time of less than 1ms, and a TTL of 128. The ping statistics show 4 packets sent, 4 received, and 0 lost (0% loss).

```
C:\>ping 28.99.34.3

Pinging 28.99.34.3 with 32 bytes of data:

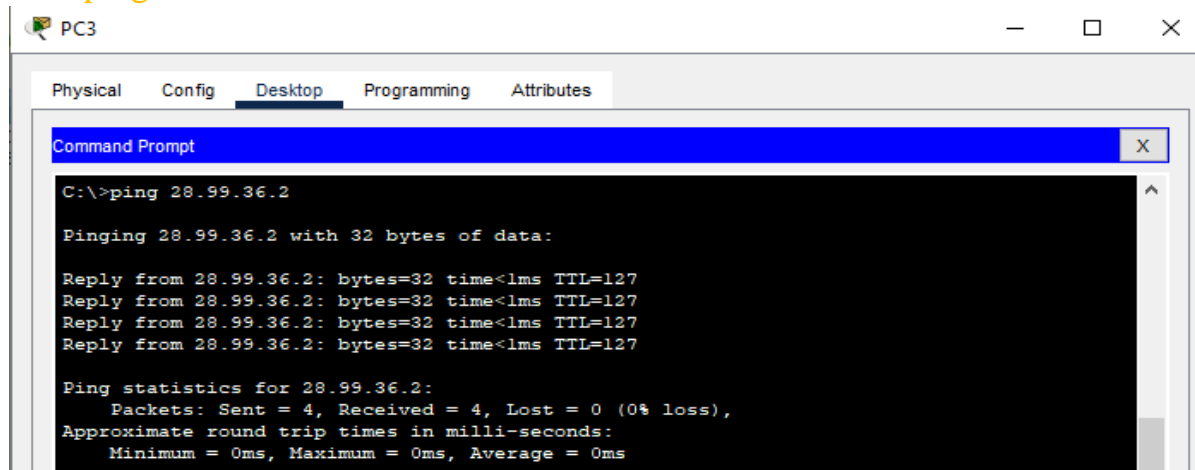
Reply from 28.99.34.3: bytes=32 time<1ms TTL=128
Reply from 28.99.34.3: bytes=32 time<1ms TTL=128
Reply from 28.99.34.3: bytes=32 time<1ms TTL=128
Reply from 28.99.34.3: bytes=32 time<1ms TTL=128

Ping statistics for 28.99.34.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 28.99.34.3
```

- Verify connectivity between different VLANs.

PC3 pings PC2



The screenshot shows the PC3 window with the Desktop tab selected. A Command Prompt window is open, displaying the results of a ping command to 28.99.36.2. The output shows four successful replies with 32 bytes of data, a time of less than 1ms, and a TTL of 127. The ping statistics show 4 packets sent, 4 received, and 0 lost (0% loss).

```
C:\>ping 28.99.36.2

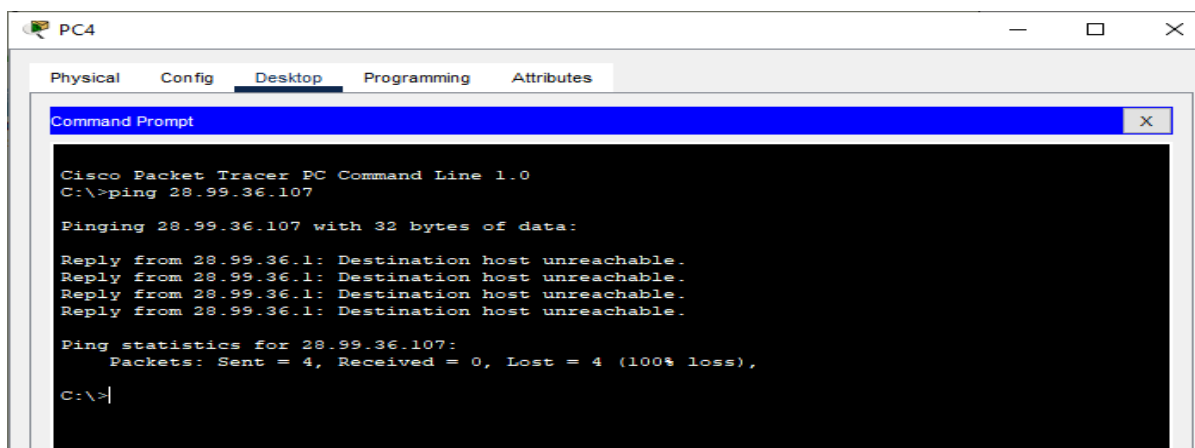
Pinging 28.99.36.2 with 32 bytes of data:

Reply from 28.99.36.2: bytes=32 time<1ms TTL=127
Reply from 28.99.36.2: bytes=32 time<1ms TTL=127
Reply from 28.99.36.2: bytes=32 time<1ms TTL=127
Reply from 28.99.36.2: bytes=32 time<1ms TTL=127

Ping statistics for 28.99.36.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

- Can PC4 ping AdminPC? Why?

No, it cannot ping because MS1 does not have route for VLAN 88 that is why we have received message as “destination host unreachable”.



The screenshot shows the PC4 window with the Desktop tab selected. A Command Prompt window is open, displaying the results of a ping command to 28.99.36.107. The output shows four failed replies with the message "Destination host unreachable". The ping statistics show 4 packets sent, 0 received, and 4 lost (100% loss).

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 28.99.36.107

Pinging 28.99.36.107 with 32 bytes of data:

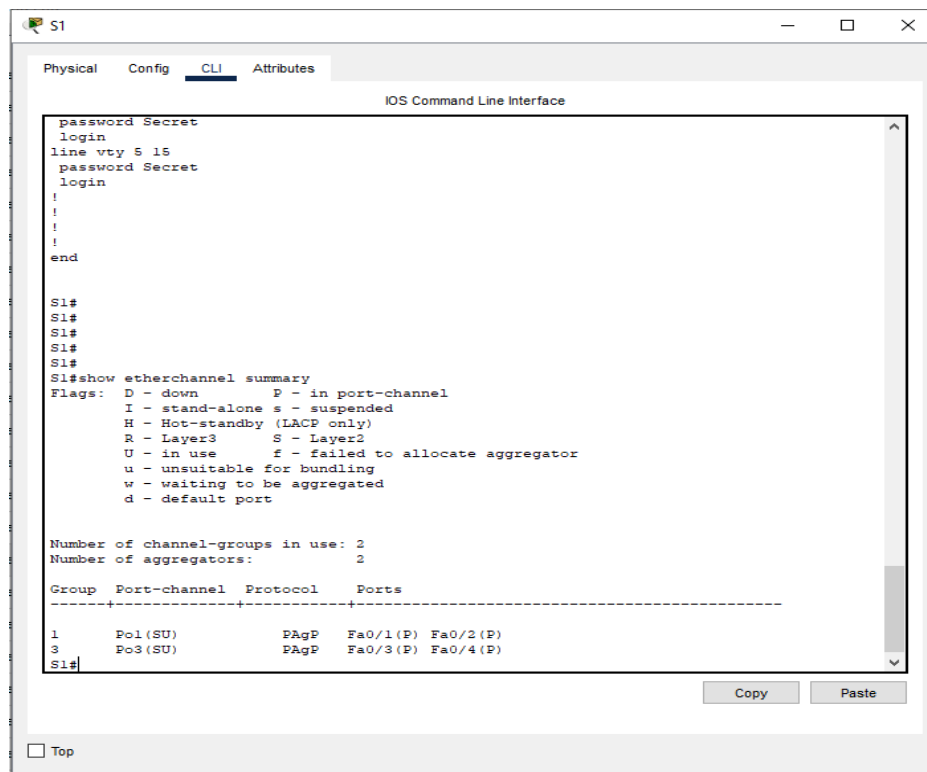
Reply from 28.99.36.1: Destination host unreachable.
Reply from 28.99.36.1: Destination host unreachable.
Reply from 28.99.36.1: Destination host unreachable.
Reply from 28.99.36.1: Destination host unreachable.

Ping statistics for 28.99.36.107:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Task 9: Configure EtherChannel

- Configure the link aggregation with Etherchannel between switches with Cisco PAgP. Port Channel 1,2, and 3.



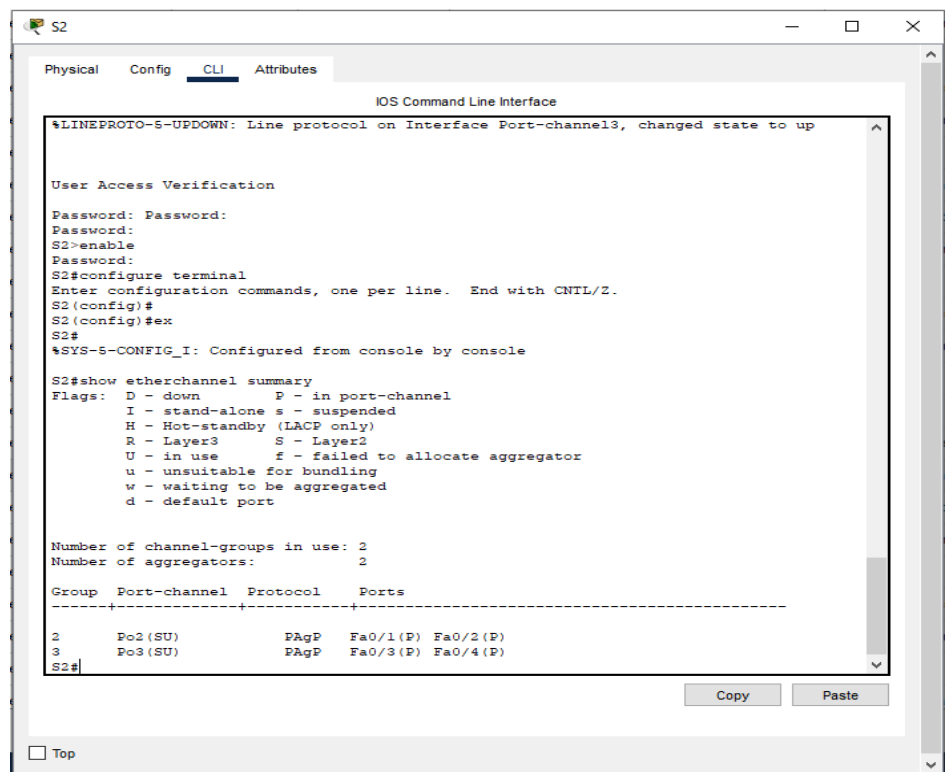
```
S1
Physical Config CLI Attributes
IOS Command Line Interface

password Secret
login
line vty 5 15
password Secret
login
!
!
!
!
end

S1#
S1#
S1#
S1#
S1#
S1#
S1#show etherchannel summary
Flags: D - down        P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3      S - Layer2
       U - in use      f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1 (SU)          PAgP        Fa0/1 (P) Fa0/2 (P)
3      Po3 (SU)          PAgP        Fa0/3 (P) Fa0/4 (P)
S1#
```



```
S2
Physical Config CLI Attributes
IOS Command Line Interface

%LINEPROTO-5-UPDOWN: Line protocol on Interface Port-channel3, changed state to up


User Access Verification

Password: Password:
Password:
S2>enable
Password:
S2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S2(config)#
S2(config)#ex
S2#
%SYS-5-CONFIG_I: Configured from console by console

S2#show etherchannel summary
Flags: D - down        P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3      S - Layer2
       U - in use      f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
2      Po2 (SU)          PAgP        Fa0/1 (P) Fa0/2 (P)
3      Po3 (SU)          PAgP        Fa0/3 (P) Fa0/4 (P)
S2#
```



```
MS1
Physical Config CLI Attributes
IOS Command Line Interface

!
line aux 0
!
!
line vty 0 4
password Secret
login
line vty 5 15
password Secret
login
!
!
!
!
end

MS1#
MS1#show etherchannel summary
Flags: D - down        P - in port-channel
       I - stand-alone s - suspended
       H - Hot-standby (LACP only)
       R - Layer3      S - Layer2
       U - in use      f - failed to allocate aggregator
       u - unsuitable for bundling
       w - waiting to be aggregated
       d - default port

Number of channel-groups in use: 2
Number of aggregators:          2

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1 (SU)          PAgP        Fa0/1 (P) Fa0/2 (P)
2      Po2 (SU)          PAgP        Fa0/3 (P) Fa0/4 (P)
MS1#
```

Task 10: Configure default static route between R1 and ISP

- Change IP address for interface s0/0/0 on R1 to 209.165.200.241/30 and 209.165.200.242/30 for interface s0/0/0 on ISP
- Configure default static route in R1

The screenshot shows the configuration window for R1, specifically for the Serial0/0/0 interface. The left sidebar contains a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, the following interfaces are listed: GigabitEthernet0/0, GigabitEthernet0/1, Serial0/0/0 (selected), and Serial0/0/1. The main configuration area for Serial0/0/0 includes the following settings:

- Port Status: ☒ On
- Duplex: ☐ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
 - IPv4 Address: 209.165.200.241
 - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

The screenshot shows the configuration window for the ISP, specifically for the Serial0/0/0 interface. The left sidebar contains a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, the following interfaces are listed: GigabitEthernet0/0, GigabitEthernet0/1, Serial0/0/0 (selected), and Serial0/0/1. The main configuration area for Serial0/0/0 includes the following settings:

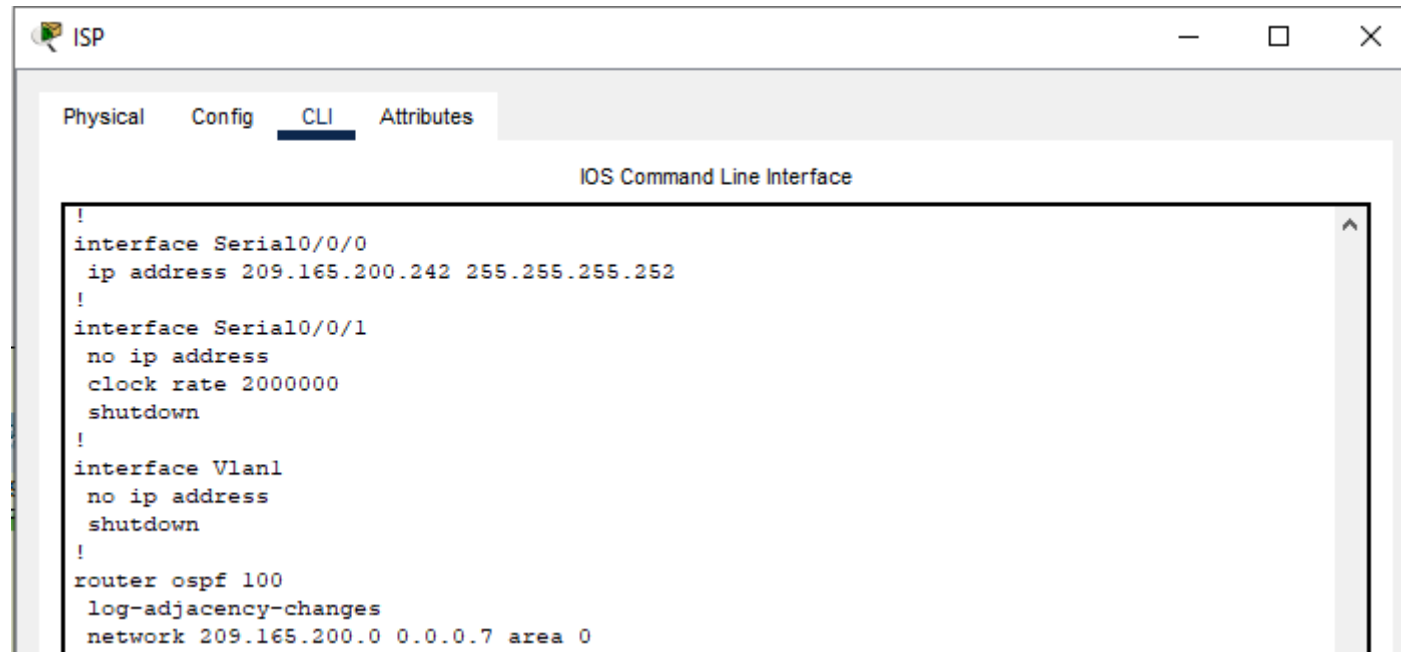
- Port Status: ☒ On
- Duplex: ☐ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
 - IPv4 Address: 209.165.200.242
 - Subnet Mask: 255.255.255.252
- Tx Ring Limit: 10

Task 11: Configure Single-Area OSPFv2

- Configure OSPFv2 for the networks directly connected.

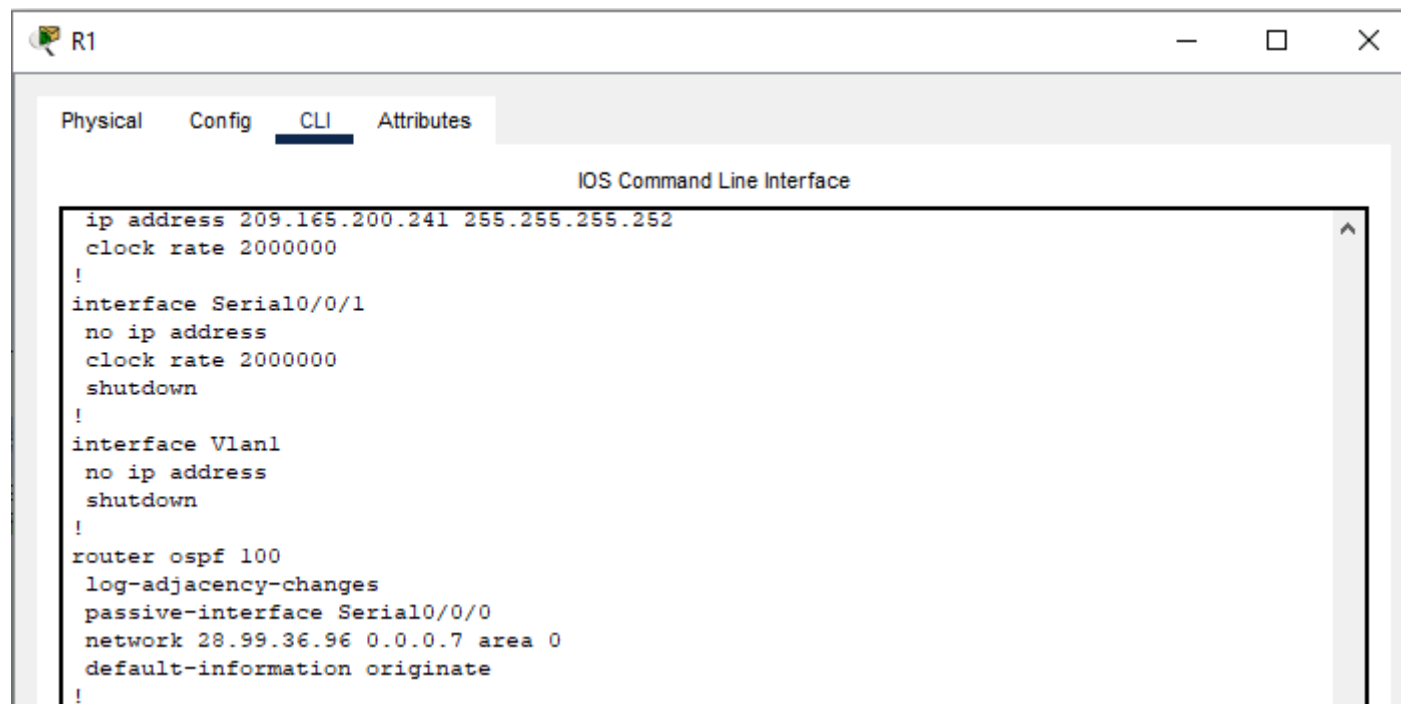
ISP:

```
router ospf 100
network 209.165.200.0 0.0.0.7 area 0
```



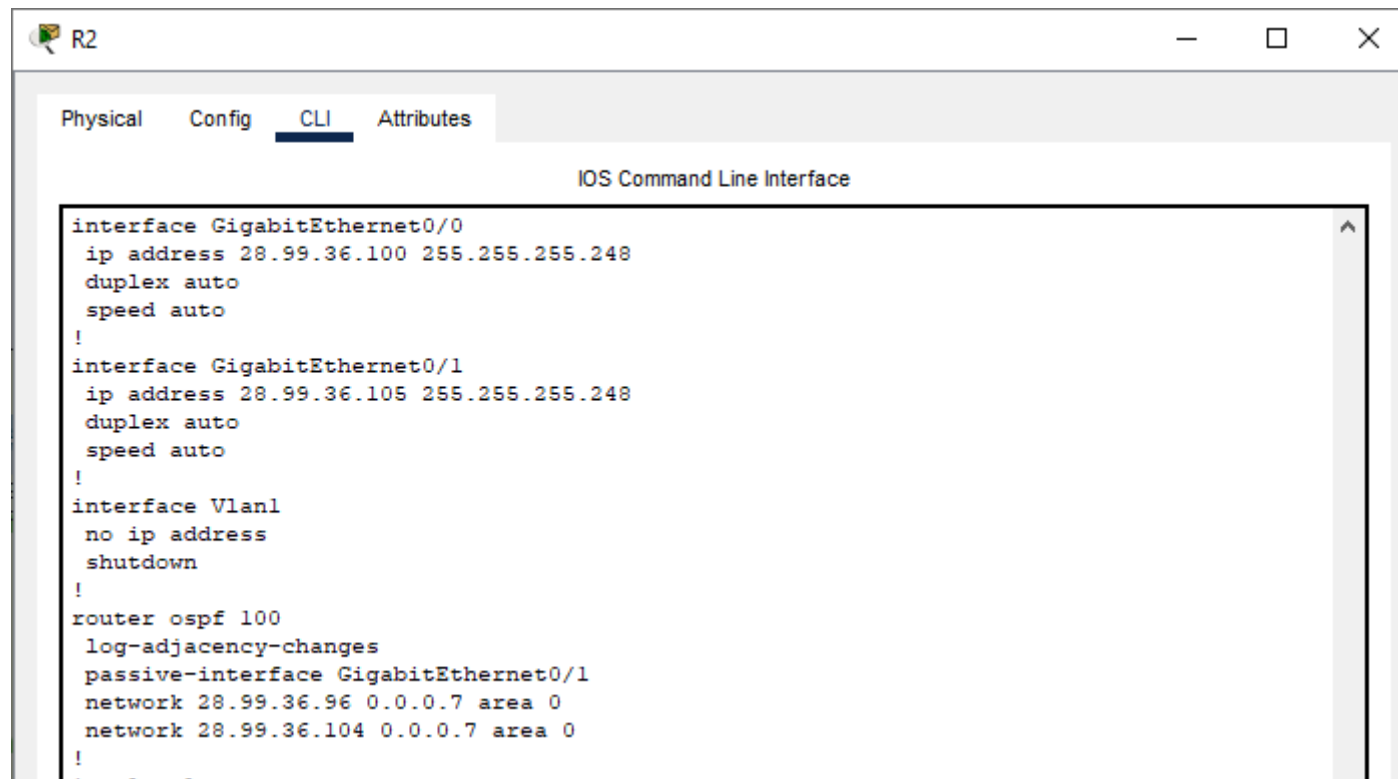
R1:

```
router ospf 100
network 28.99.36.96 0.0.0.7 area 0
```



R2:

```
router ospf 100
network 28.99.36.96 0.0.0.7 area 0
network 28.99.36.104 0.0.0.7 area 0
```



b. Configure the passive interface.

R1:

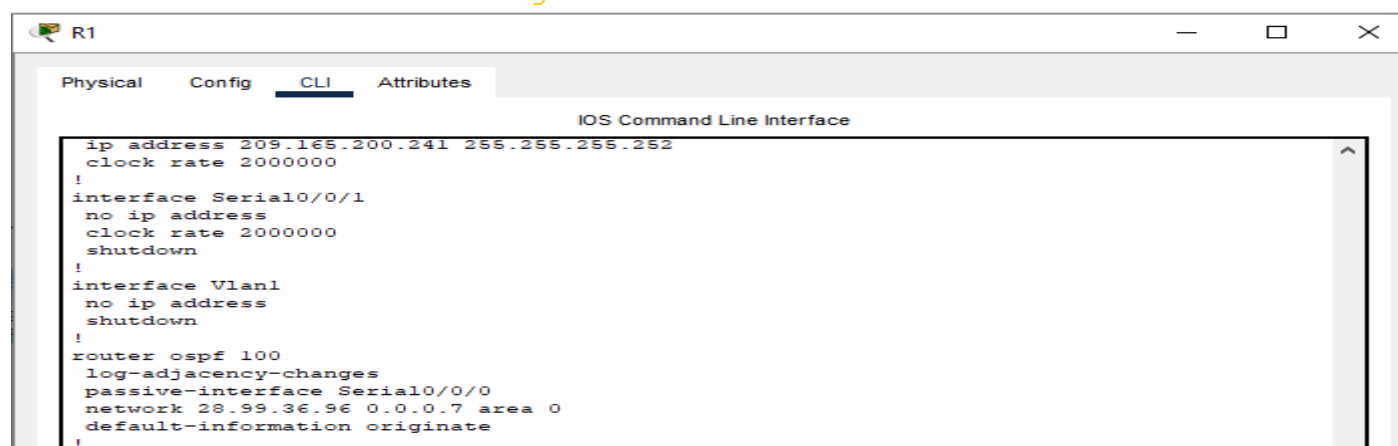
```
passive-interface Serial0/0/0
```

R2:

```
passive-interface GigabitEthernet0/1
```

c. On R1, automatically distribute the default route to all routers in the network.

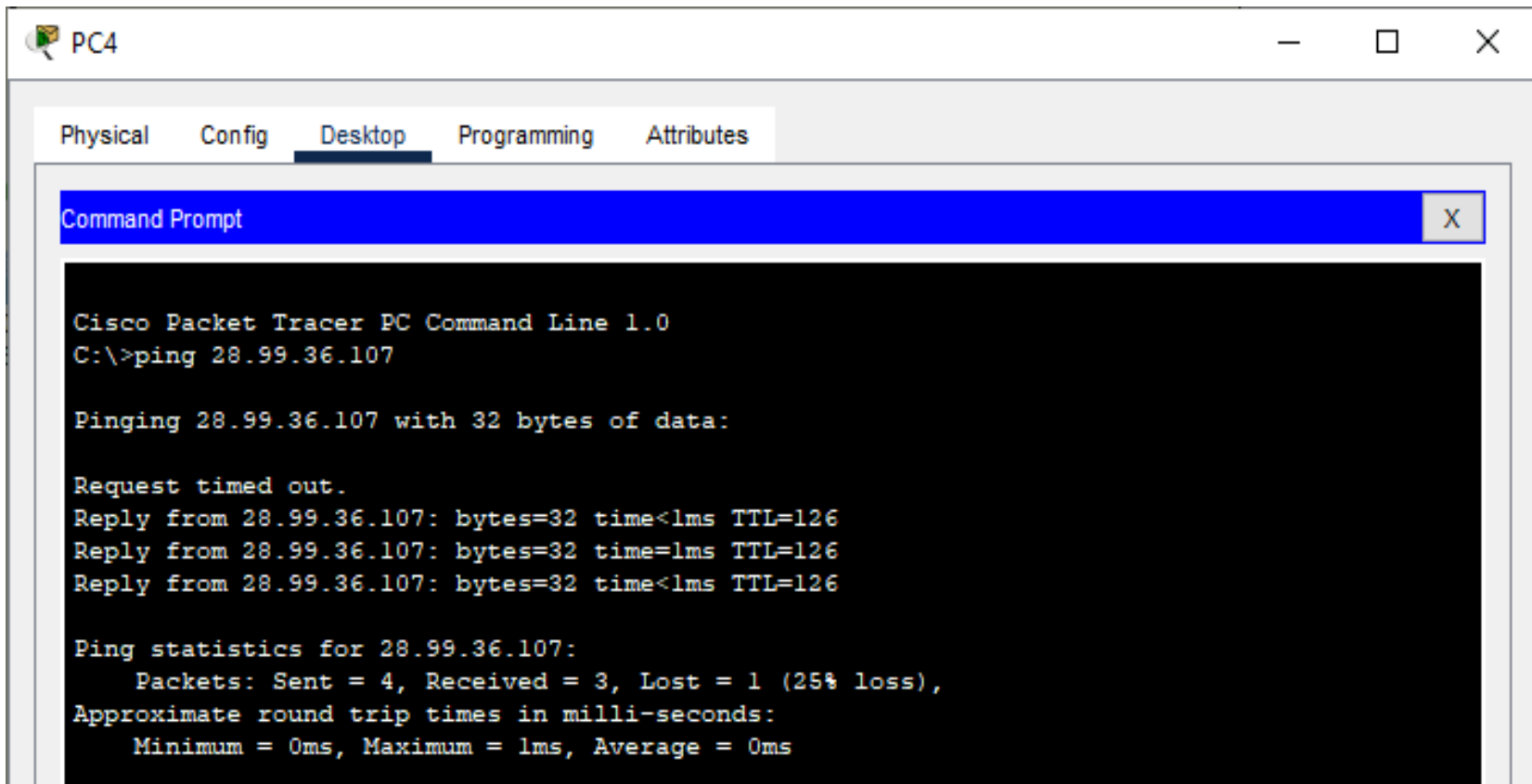
```
default-information originate
```



Task 12: Verify connectivity

a. Can PC4 ping AdminPC? Why?

Yes, ping is successful because MS1 knows the route for VLAN 88 and R2 have path for MS1 VLANs.



The screenshot shows a Cisco Packet Tracer interface for PC4. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The window title is 'Command Prompt' with a close button 'X'. The text inside the command prompt is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 28.99.36.107

Pinging 28.99.36.107 with 32 bytes of data:

Request timed out.
Reply from 28.99.36.107: bytes=32 time<1ms TTL=126
Reply from 28.99.36.107: bytes=32 time=1ms TTL=126
Reply from 28.99.36.107: bytes=32 time<1ms TTL=126

Ping statistics for 28.99.36.107:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```