5. Given an IP address range of 192.168.1.0/24, divide the network into 4 subnets. ask: Manually calculate the new subnet mask and the range of valid IP addresses for ach subnet. ssign IP addresses from these subnets to devices in Cisco Packet Tracer and verify onnectivity using ping between them.

Manual Calculation of subnet :

IP address: 192.168.1.0/24

Default subnet Mask : 255.255.255.0

CIDR notation: /24 (24 bits are network, and 8 bits are for the host)

We need 4 Subnets then I will borrow 2 bits

No. of Subnets $= 2^{N+borrowed\ bits} = 2^2 = 4$ Subnets

Now dividing into 4 Subnets

Subnet : 192.168.1.0/26

Network Address : 192.168.1.0

Broadcast Address : 192.168.1.63

First IP : 192.168.1.1

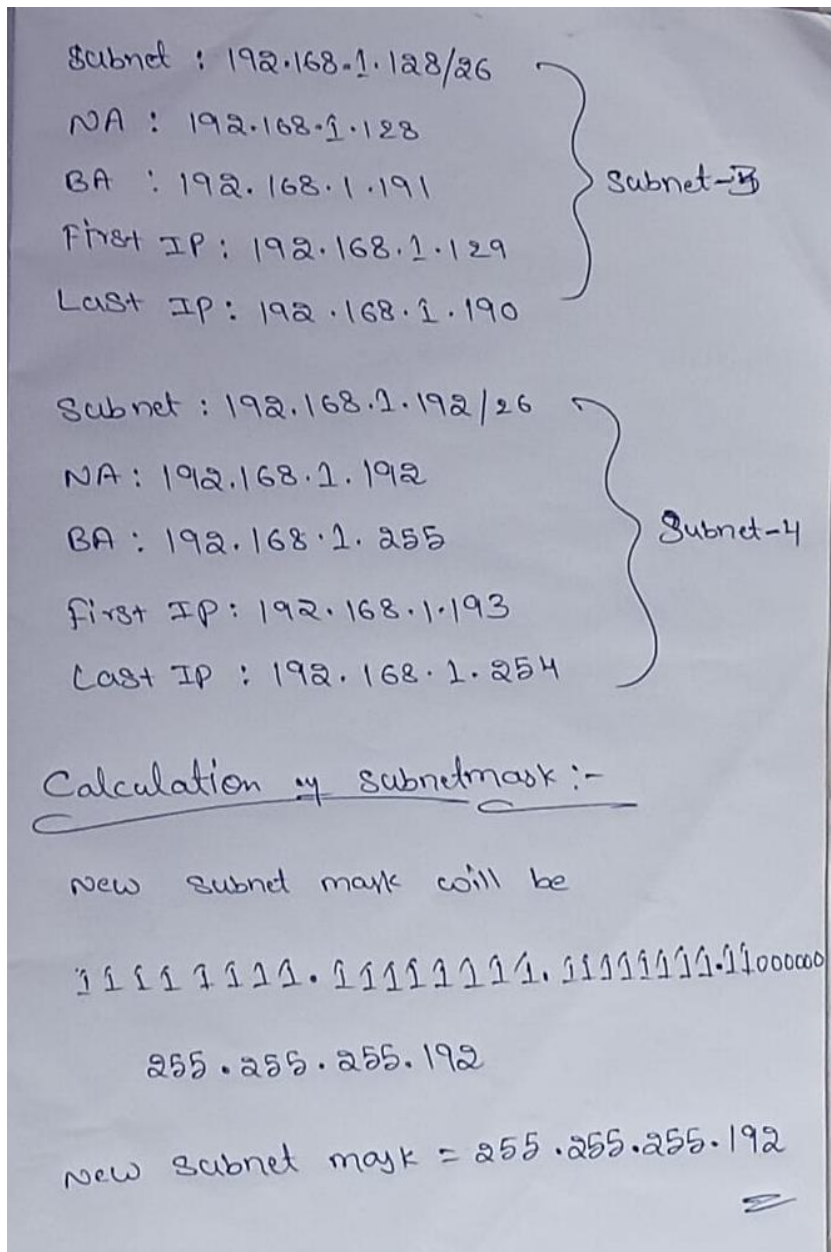Last IP : 192.168.1.62

} Subnet -1

Subnet : 192.168.1.64/26

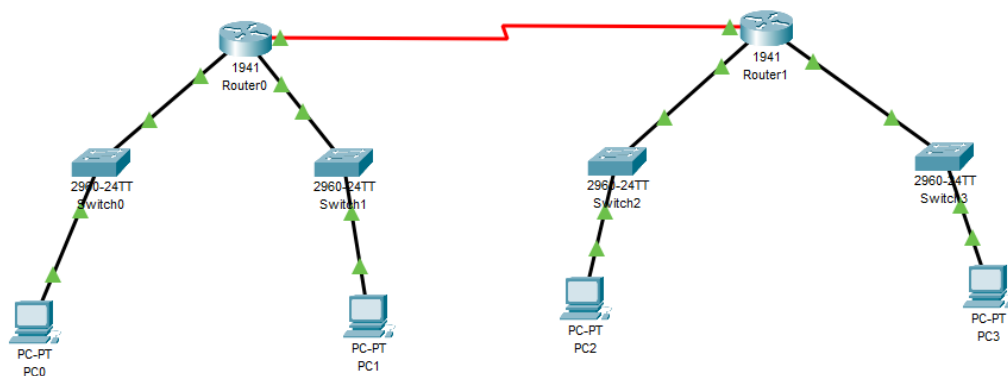NA : 192.168.1.64/26

BA : 192.168.1.127/26

First IP : 192.168.1.65

Last IP : 192.168.1.126

} subnet -2

Subnet : 192.168.1.128/26

NA : 192.168.1.128

BA : 192.168.1.191   } Subnet-3

First IP : 192.168.1.129

Last IP : 192.168.1.190

Subnet : 192.168.1.192/26

NA : 192.168.1.192

BA : 192.168.1.255   } Subnet-4

First IP : 192.168.1.193

Last IP : 192.168.1.254

Calculation of subnetmask :-

New subnet mask will be

11111111.11111111.11111111.11000000
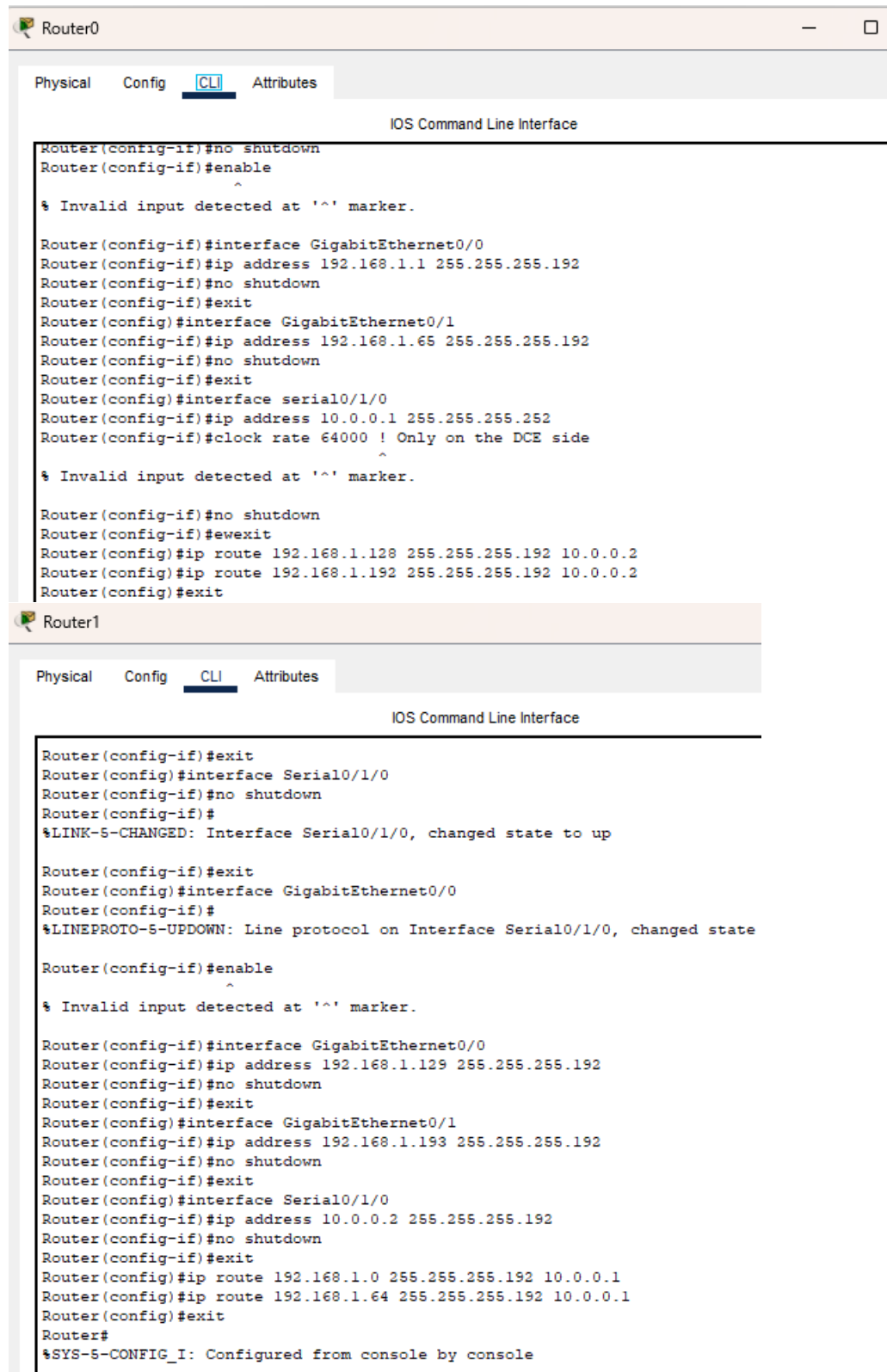
255.255.255.192

New subnet mask = 255.255.255.192

CISCO PACKET TRACER :

Network topology :

Two Routers were taken and each router can be assigned as one subnet

Configuring the Routers :

Router0 — IOS Command Line Interface

```
Router(config-if)#no shutdown
Router(config-if)#enable
                 ^
% Invalid input detected at '^' marker.

Router(config-if)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 192.168.1.65 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface serial0/1/0
Router(config-if)#ip address 10.0.0.1 255.255.255.252
Router(config-if)#clock rate 64000 ! Only on the DCE side
                                ^
% Invalid input detected at '^' marker.

Router(config-if)#no shutdown
Router(config-if)#ewexit
Router(config)#ip route 192.168.1.128 255.255.255.192 10.0.0.2
Router(config)#ip route 192.168.1.192 255.255.255.192 10.0.0.2
Router(config)#exit
```
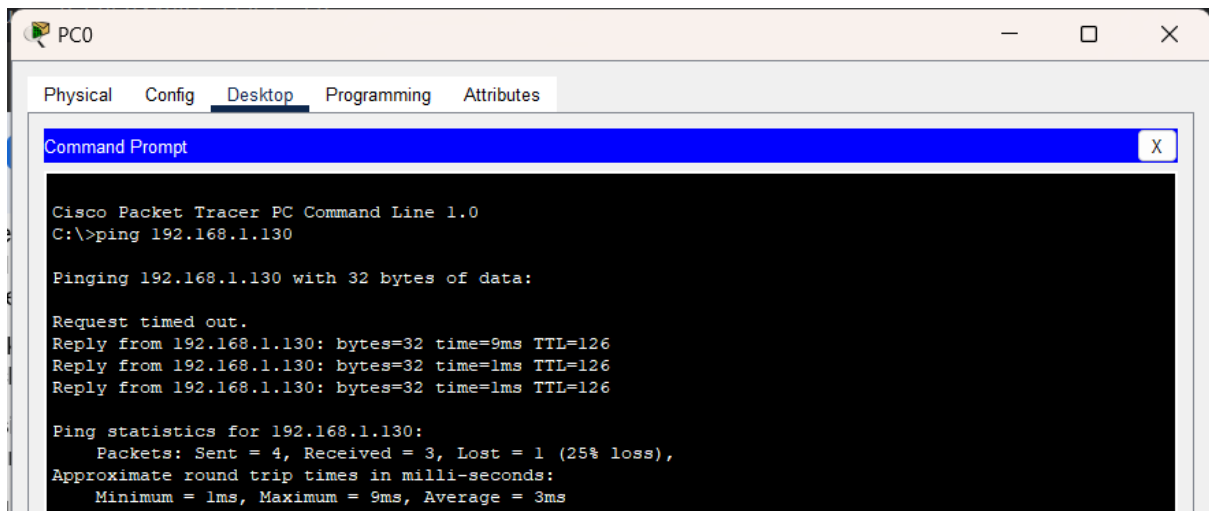
Router1 — IOS Command Line Interface

```
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state

Router(config-if)#enable
                 ^
% Invalid input detected at '^' marker.

Router(config-if)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.1.129 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#ip address 192.168.1.193 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 10.0.0.2 255.255.255.192
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ip route 192.168.1.0 255.255.255.192 10.0.0.1
Router(config)#ip route 192.168.1.64 255.255.255.192 10.0.0.1
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

Pinging from pc 0 to pc3

```
PC0                                                           —    □    X

Physical   Config   Desktop   Programming   Attributes

Command Prompt                                                          X

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.130

Pinging 192.168.1.130 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.130: bytes=32 time=9ms TTL=126
Reply from 192.168.1.130: bytes=32 time=1ms TTL=126
Reply from 192.168.1.130: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.130:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 9ms, Average = 3ms
```
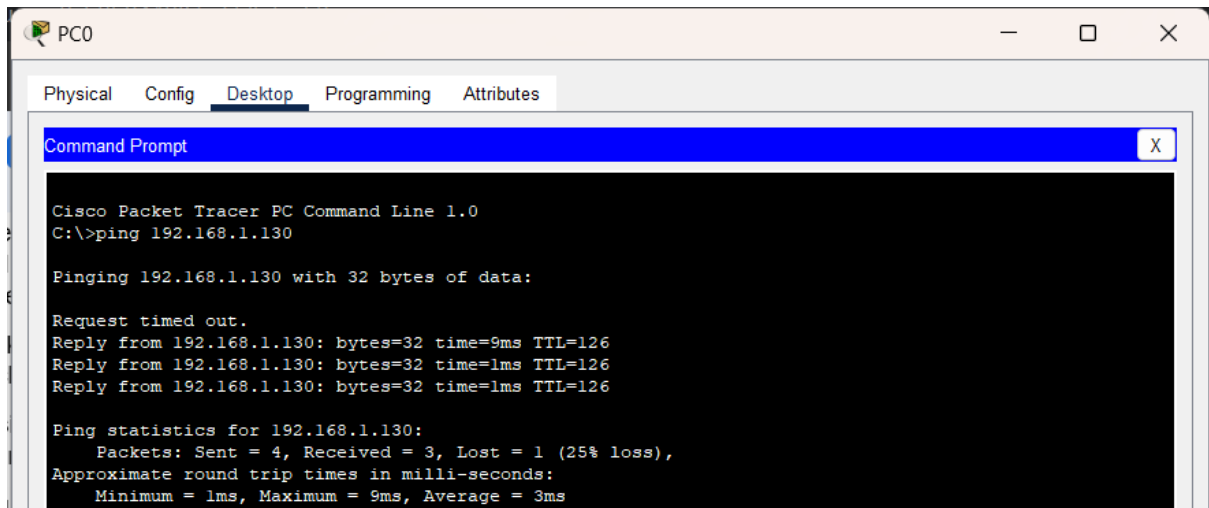
Pinging pc1 to pc4

```
PC0                                                           —    □    X

Physical   Config   Desktop   Programming   Attributes

Command Prompt                                                          X

Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.130

Pinging 192.168.1.130 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.130: bytes=32 time=9ms TTL=126
Reply from 192.168.1.130: bytes=32 time=1ms TTL=126
Reply from 192.168.1.130: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.1.130:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 9ms, Average = 3ms
```

ARP TABLE OF ROUTER 0 and ROUTER 1 :

```
Router>show arp
Protocol  Address         Age (min)  Hardware Addr   Type   Interface
Internet  192.168.1.1         -      0009.7C32.6B01  ARPA   GigabitEthernet0/0
Internet  192.168.1.2        24      0040.0BB8.7C63  ARPA   GigabitEthernet0/0
Internet  192.168.1.65        -      0009.7C32.6B02  ARPA   GigabitEthernet0/1
Internet  192.168.1.66       23      00E0.F7EB.C85E  ARPA   GigabitEthernet0/1
Router>
```

```
Router>show arp
Protocol  Address         Age (min)  Hardware Addr   Type   Interface
Internet  192.168.1.129       -      0050.0FD1.7501  ARPA   GigabitEthernet0/0
Internet  192.168.1.130      25      00D0.BA7B.26C9  ARPA   GigabitEthernet0/0
Internet  192.168.1.193       -      0050.0FD1.7502  ARPA   GigabitEthernet0/1
Internet  192.168.1.194      25      0002.177E.1C5B  ARPA   GigabitEthernet0/1
Router>
```