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Semester: 5 | Enrollment No: 23162171032|Batch:52

# Institute of Computer Technology
# B. Tech Computer Science and Engineering

## Sub:CN
## Practical 6

**Aim:**

**Design a Network of an organization using fundamentals of subnetting.**

**Scenario:**

**Organization named Zenith enterprise has setup a branch office at Noida and hired you as a Network Engineer. The branch office will be having 5 different departments and each department has its own network. Each department has actually 14 devices (including network devices). The IP address range given to you is 192.XX.10.0/24. Design the network such that wastage of IP address is less. So, for designing purpose you can take 2 devices in each department (as first device and last device in network) for ease of the implementation.**

**Calculation:**

**Reserved address:**

- **Network Address**
- **Broadcast Address**

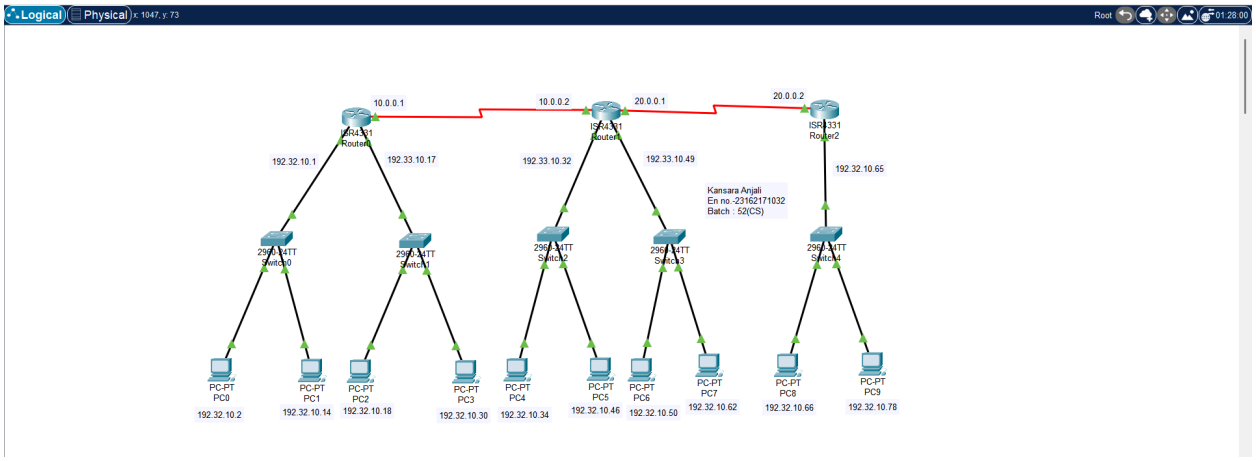
**Min host bit requirement:**

**No. of devices ≤ 2**

**n − 2**

**Procedure:**

**1) Create network as given below**




**2) Calculate the number of bits required for host as per the given problem.**

ANS: For host bit => n : 4 : 2^4 - 2 = 16-2 = 14

32 bit – 4 bit = 28 bit =>subnet

**3) Get subnet mask for subnetting.**

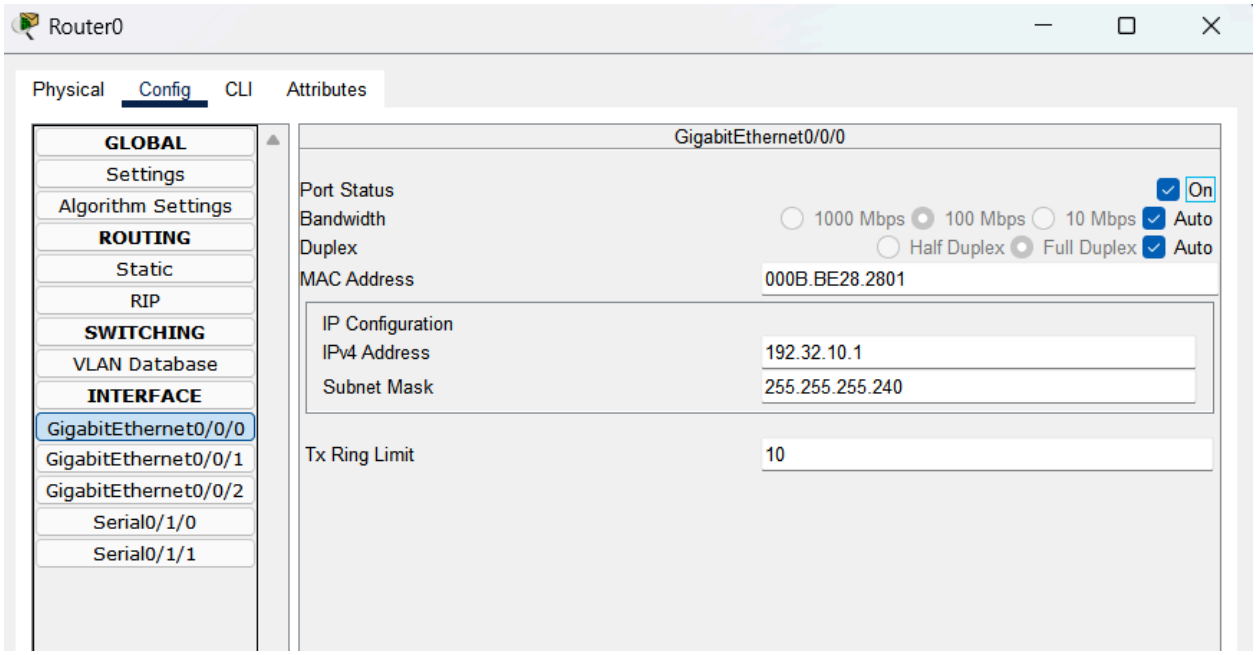
| | |
|---|---|
| Old Subnet mask (Decimal form) | 255.255.255.0 |
| Old Subnet mask (Binary form) | 11111111. 11111111. 11111111. 00000000 |
| New Subnet mask (Binary form) | 11111111.11111111.11111111.11110000 |
| New Subnet mask (Decimal form) | 255.255.255.240 (/28) |

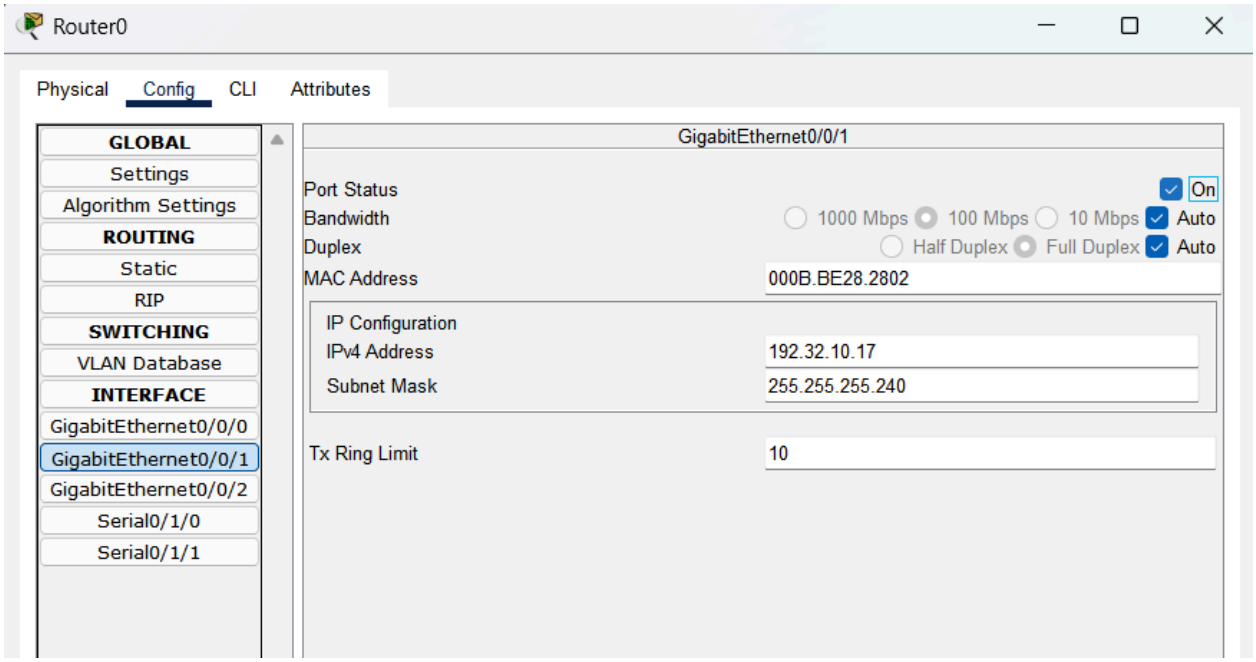
## 4) Calculate IP address and design a network Dept. Device IP Address Subnet Mask

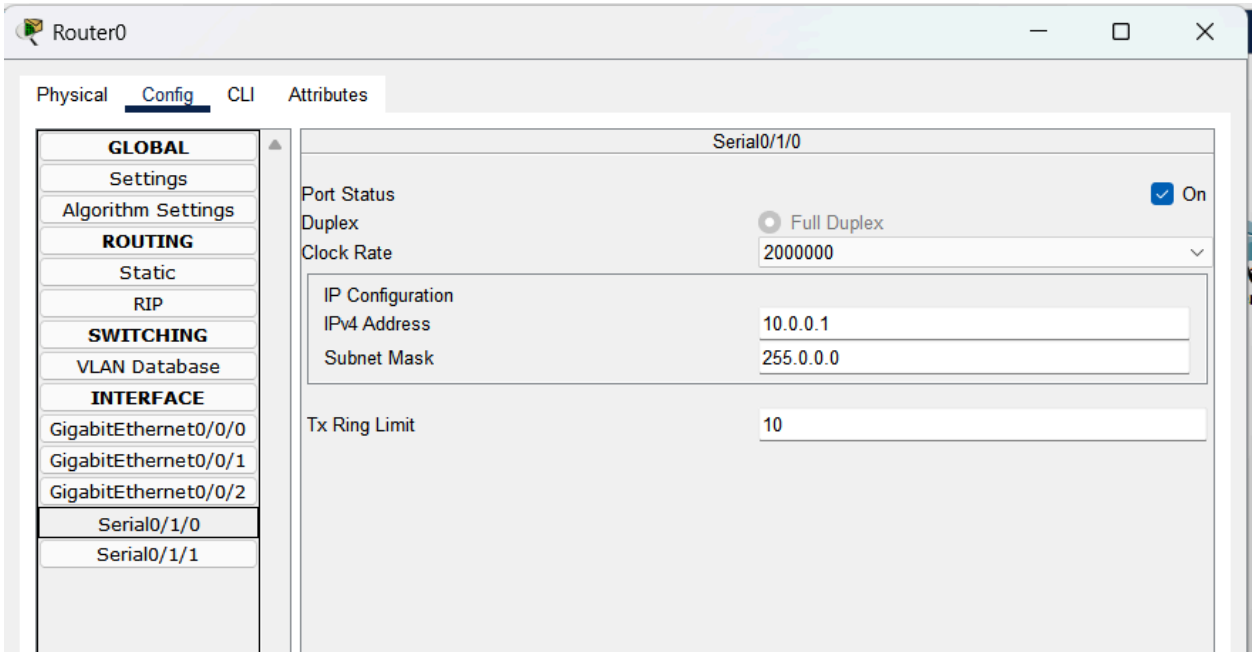
| Dept. | Device | IP Address | Subnet Mask |
|---|---|---|---|
| Dept. 1 | Network | 192.33.10.0 | 255.255.255.240 |
| | Default Gateway | 192.33.10.1 | 255.255.255.240 |
| | Host (First) | 192.33.10.2 | 255.255.255.240 |
| | Host (Last) | 192.33.10.14 | 255.255.255.240 |
| | Broadcast | 192.33.10.15 | 255.255.255.240 |
| Dept. 2 | Network | 192.33.10.16 | 255.255.255.240 |
| | Default Gateway | 192.33.10.17 | 255.255.255.240 |
| | Host (First) | 192.33.10.18 | 255.255.255.240 |
| | Host (Last) | 192.33.10.30 | 255.255.255.240 |
| | Broadcast | 192.33.10.31 | 255.255.255.240 |
| Dept. 3 | Network | 192.33.10.32 | 255.255.255.240 |
| | Default Gateway | 192.33.10.33 | 255.255.255.240 |
| | Host (First) | 192.33.10.34 | 255.255.255.240 |
| | Host (Last) | 192.33.10.46 | 255.255.255.240 |
| | Broadcast | 192.33.10.47 | 255.255.255.240 |
| Dept. 4 | Network | 192.33.10.48 | 255.255.255.240 |
| | Default Gateway | 192.33.10.49 | 255.255.255.240 |

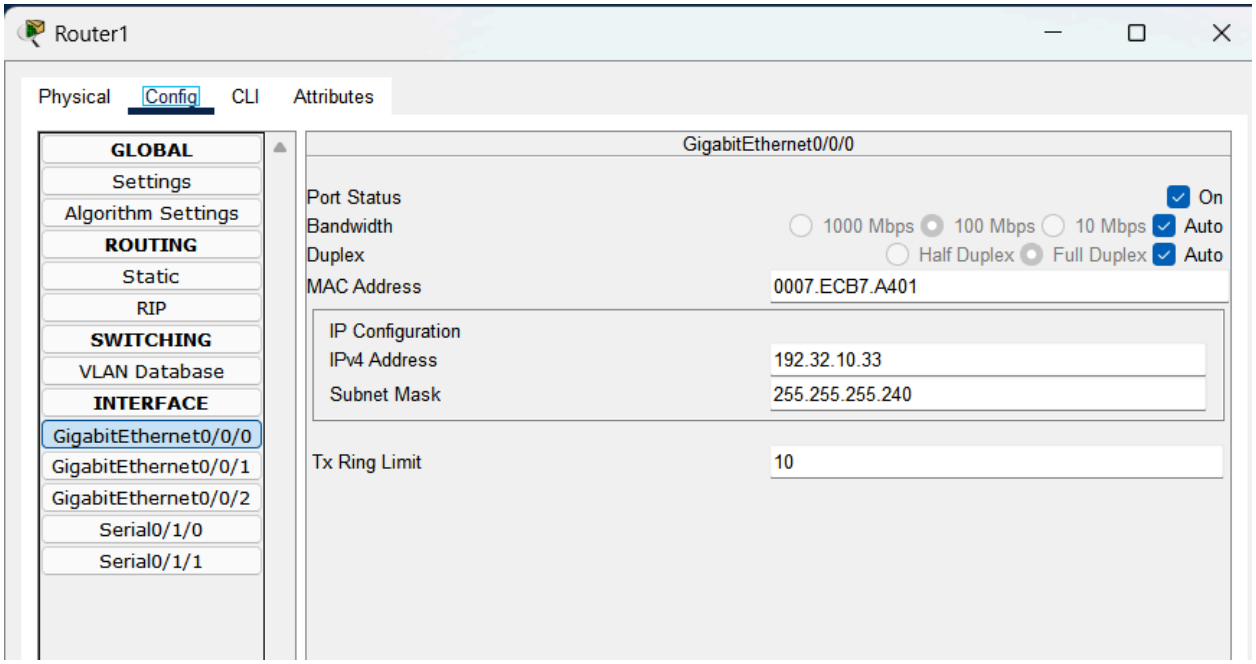
| | | | |
|---|---|---|---|
| | Host (First) | 192.33.10.50 | 255.255.255.240 |
| | Host (Last) | 192.33.10.62 | 255.255.255.240 |
| | Broadcast | 192.33.10.63 | 255.255.255.240 |
| Dept. 5 | Network | 192.33.10.64 | 255.255.255.240 |
| | Default Gateway | 192.33.10.65 | 255.255.255.240 |
| | Host (First) | 192.33.10.66 | 255.255.255.240 |
| | Host (Last) | 192.33.10.78 | 255.255.255.240 |
| | Broadcast | 192.33.10.79 | 255.255.255.240 |

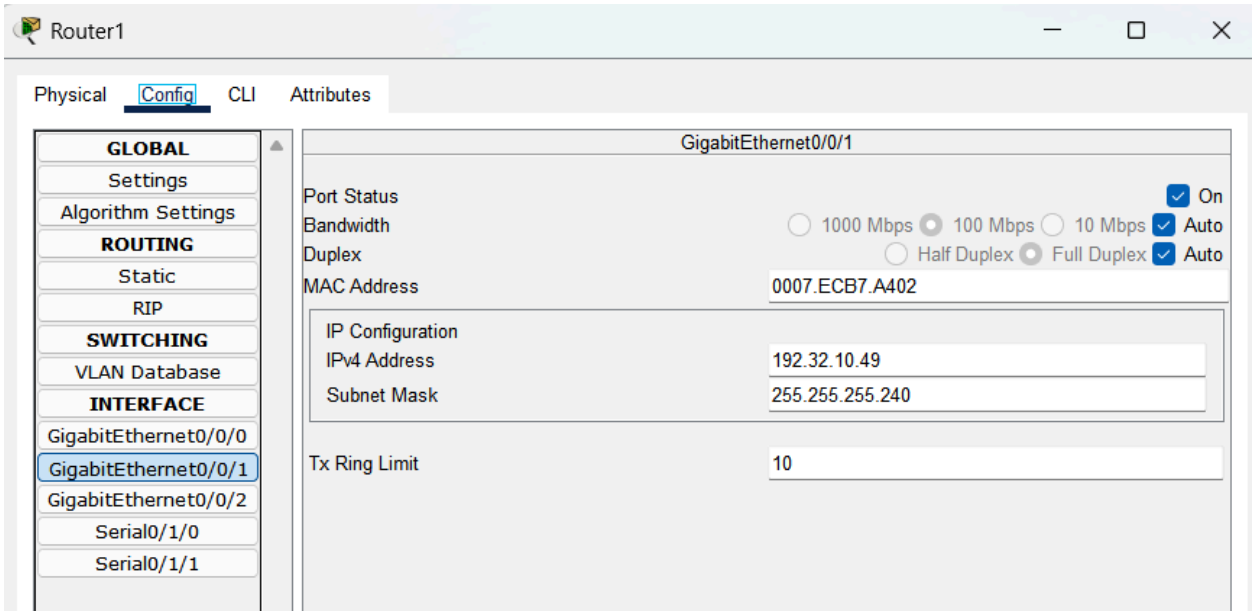
# 5) Configure IP address (All Devices, Routers)

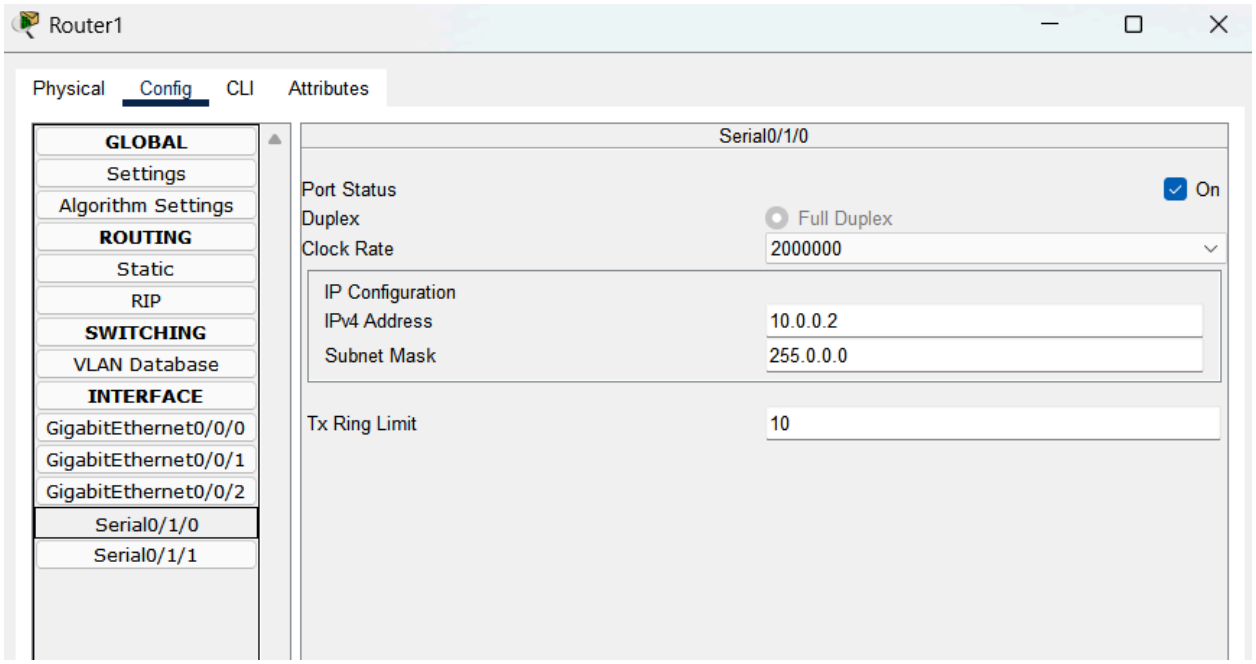


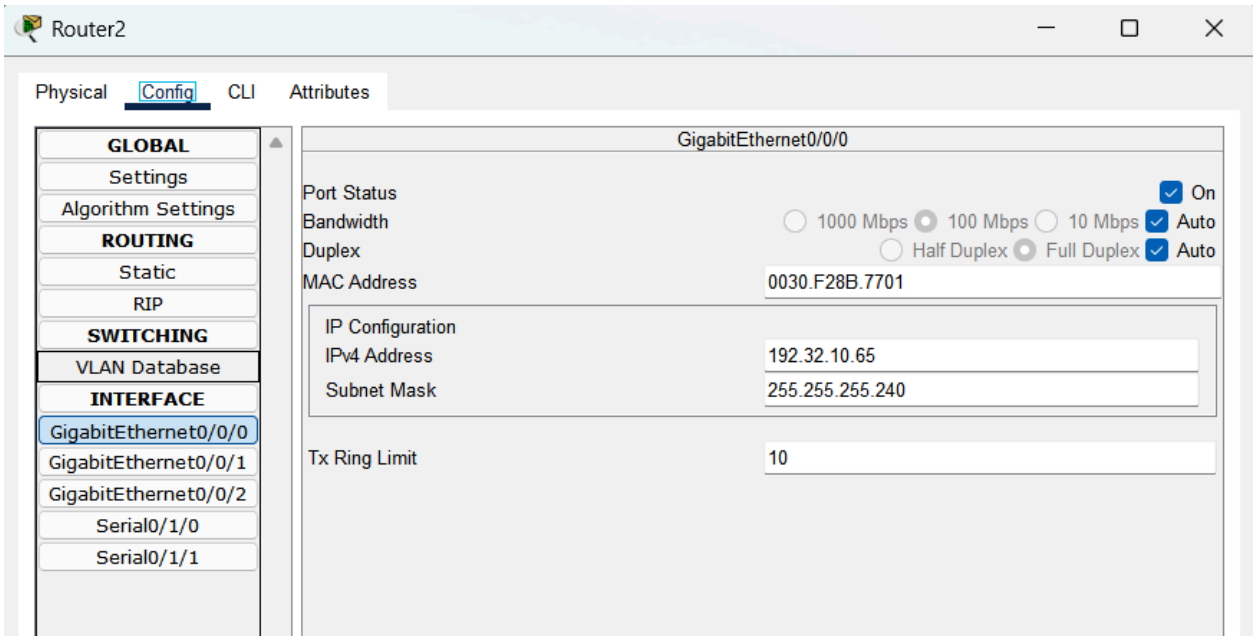

Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
GigabitEthernet0/0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000B.BE28.2802
IP Configuration
IPv4 Address
192.32.10.17
Subnet Mask
255.255.255.240
Tx Ring Limit
10

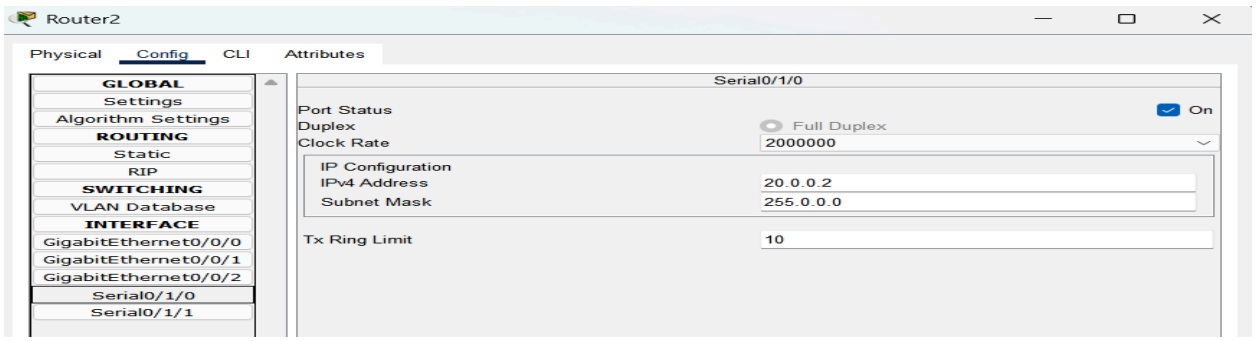

Router0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
Serial0/1/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IPv4 Address
10.0.0.1
Subnet Mask
255.0.0.0
Tx Ring Limit
10


Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
GigabitEthernet0/0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0007.ECB7.A401
IP Configuration
IPv4 Address
192.32.10.33
Subnet Mask
255.255.255.240
Tx Ring Limit
10


Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
GigabitEthernet0/0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0007.ECB7.A402
IP Configuration
IPv4 Address
192.32.10.49
Subnet Mask
255.255.255.240
Tx Ring Limit
10


Router1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
Serial0/1/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IPv4 Address
10.0.0.2
Subnet Mask
255.0.0.0
Tx Ring Limit
10

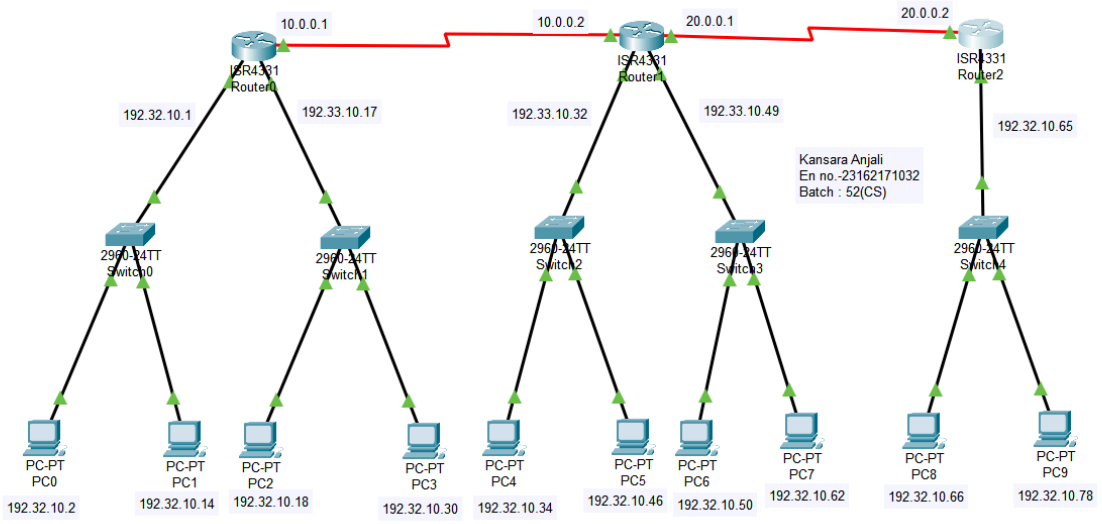

Router2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
GigabitEthernet0/0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0030.F28B.7701
IP Configuration
IPv4 Address
192.32.10.65
Subnet Mask
255.255.255.240
Tx Ring Limit
10

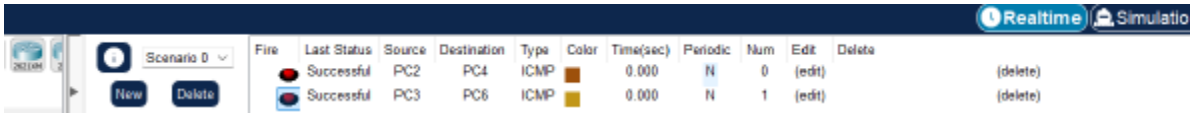

Router2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
Serial0/1/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IPv4 Address
20.0.0.2
Subnet Mask
255.0.0.0
Tx Ring Limit
10

## 6) Configure static routing table (STATIC in routers)

| Router | Dept. | Network | Subnet Mask | Next Hop |
|---|---|---|---|---|
| Router0 | Dept.3 | 192.33.10.32 | 255.255.255.240 | 10.0.0.2 |
| | Dept.4 | 192.33.10.48 | 255.255.255.240 | 10.0.0.2 |
| | Dept.5 | 192.33.10.64 | 255.255.255.240 | 10.0.0.2 |
| Router1 | Dept.1 | 192.33.10.0 | 255.255.255.240 | 10.0.0.1 |
| | Dept.2 | 192.33.10.16 | 255.255.255.240 | 10.0.0.1 |
| | Dept.5 | 192.33.10.64 | 255.255.255.240 | 20.0.0.2 |
| Router2 | Dept.1 | 192.33.10.0 | 255.255.255.240 | 20.0.0.1 |
| | Dept.2 | 192.33.10.16 | 255.255.255.240 | 20.0.0.1 |
| | Dept.3 | 192.33.10.32 | 255.255.255.240 | 20.0.0.1 |
| | Dept.4 | 192.33.10.64 | 255.255.255.240 | 20.0.0.1 |

## OUTPUT:


10.0.0.1
10.0.0.2
20.0.0.1
20.0.0.2
ISR4331
Router0
ISR4331
Router1
ISR4331
Router2
192.32.10.1
192.33.10.17
192.33.10.32
192.33.10.49
192.32.10.65
Kansara Anjali
En no.-23162171032
Batch : 52(CS)
2960-24TT
Switch0
2960-24TT
Switch1
2960-24TT
Switch2
2960-24TT
Switch3
2960-24TT
Switch4
PC-PT
PC0
192.32.10.2
PC-PT
PC1
192.32.10.14
PC-PT
PC2
192.32.10.18
PC-PT
PC3
192.32.10.30
PC-PT
PC4
192.32.10.34
PC-PT
PC5
192.32.10.46
PC-PT
PC6
192.32.10.50
PC-PT
PC7
192.32.10.62
PC-PT
PC8
192.32.10.66
PC-PT
PC9
192.32.10.78


Realtime
Simulatio
Scenario 0
New
Delete
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Successful
PC2
PC4
ICMP
0.000
N
0
(edit)
(delete)
Successful
PC3
PC6
ICMP
0.000
N
1
(edit)
(delete)