DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF TECHNOLOGY
Pandit Deendayal Energy University
SESSION 2025-26

Computer Network LAB(20CP301P)

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Division: 1 Group: 1x

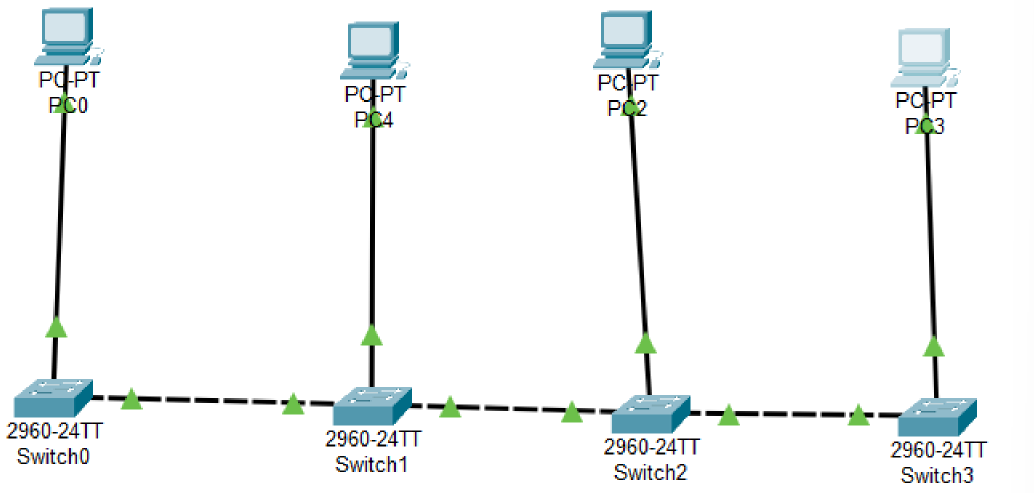
EXPERMINET NO 1

Aim: To understand and implement different Topologies in Computer Network

Tools: Cisco Packet Tracer

Setup and Theory:

- **Bus Topology**




```
C:\>ping 192.168.1.255

Pinging 192.168.1.255 with 32 bytes of data:

Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.1: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=1ms TTL=128
Reply from 192.168.1.2: bytes=32 time=1ms TTL=128
Reply from 192.168.1.1: bytes=32 time=2ms TTL=128
Reply from 192.168.1.3: bytes=32 time=2ms TTL=128
Reply from 192.168.1.2: bytes=32 time=2ms TTL=128
Reply from 192.168.1.1: bytes=32 time=2ms TTL=128
Reply from 192.168.1.3: bytes=32 time=1ms TTL=128
Reply from 192.168.1.2: bytes=32 time=1ms TTL=128
Reply from 192.168.1.1: bytes=32 time=2ms TTL=128

Ping statistics for 192.168.1.255:
    Packets: Sent = 4, Received = 12, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 1ms
```

In a Bus topology, all devices are connected to a single central cable known as the backbone. Data sent by a device is broadcast to all devices on the network, but only the target device accepts and processes it. This topology operates on a single communication channel and requires that devices take turns to transmit to avoid data collisions.

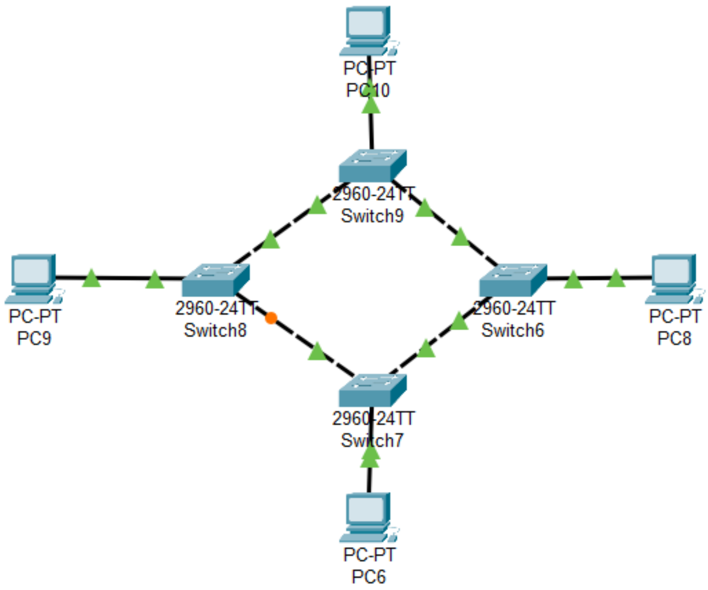
Advantages

- Simple and cost-effective setup
- Requires minimal cabling

Disadvantages

- Poor scalability
- Entire network fails if the backbone is damage

- **Ring Topology**



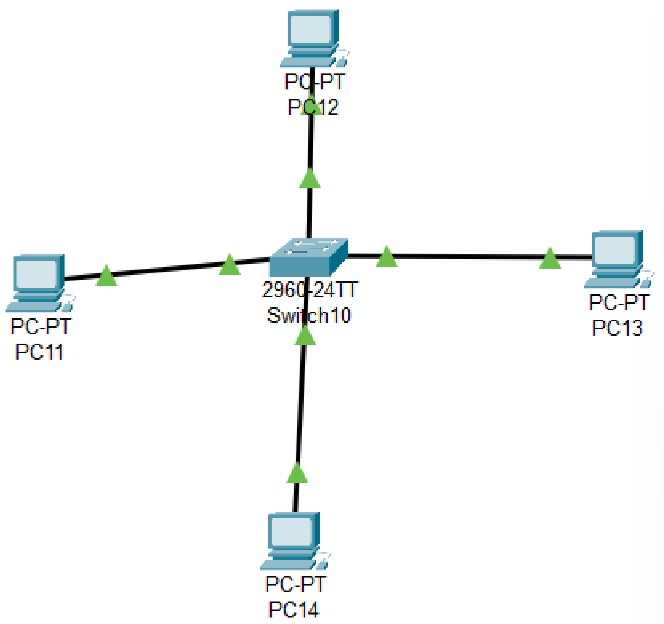

```
Pinging 192.168.1.255 with 32 bytes of data:

Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.7: bytes=32 time<1ms TTL=128
Reply from 192.168.1.8: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Reply from 192.168.1.8: bytes=32 time=1ms TTL=128
Reply from 192.168.1.7: bytes=32 time=2ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.7: bytes=32 time=1ms TTL=128
Reply from 192.168.1.8: bytes=32 time<1ms TTL=128
Reply from 192.168.1.7: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Reply from 192.168.1.8: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.255:
    Packets: Sent = 4, Received = 12, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 0ms
```

In a **Ring topology**, each device connects to exactly two other devices, forming a closed loop. Data travels in a specific direction and passes through each device until it reaches its destination. This structure ensures orderly data transmission but lacks fault tolerance unless a dual-ring setup is used.

Advantages
• Equal data access for all devices
• Predictable data flow reduces collisions

Disadvantages
• A single failure can break the loop
• Troubleshooting and expansion are challenging

- **Star Topology**



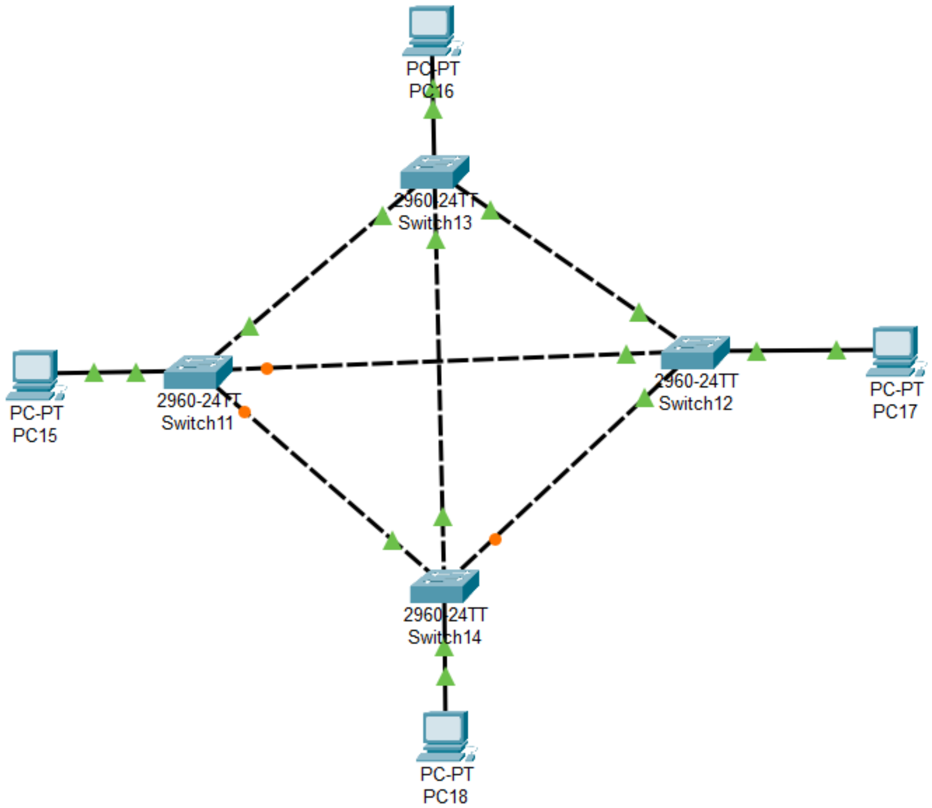
```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.255

Pinging 192.168.1.255 with 32 bytes of data:

Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.13: bytes=32 time<1ms TTL=128
Reply from 192.168.1.14: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.13: bytes=32 time<1ms TTL=128
Reply from 192.168.1.14: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.13: bytes=32 time<1ms TTL=128
Reply from 192.168.1.14: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.13: bytes=32 time<1ms TTL=128
Reply from 192.168.1.14: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.255:
    Packets: Sent = 4, Received = 12, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

In a **Star topology**, all devices are individually connected to a central hub or switch. The central device manages and directs data traffic. Each node communicates only with the hub, making fault isolation simple and minimizing the impact of individual device failures.

Advantages
- Easy to install, manage, and troubleshoot
- Failure of one device or cable doesn’t affect others

Disadvantages
- Central device is a single point of failure
- Requires more cabling than bus or ring topologies

- **Mesh Topology**




```
C:\>ping 192.168.1.255

Pinging 192.168.1.255 with 32 bytes of data:

Reply from 192.168.1.16: bytes=32 time<1ms TTL=128
Reply from 192.168.1.15: bytes=32 time<1ms TTL=128
Reply from 192.168.1.17: bytes=32 time<1ms TTL=128
Reply from 192.168.1.16: bytes=32 time<1ms TTL=128
Reply from 192.168.1.15: bytes=32 time<1ms TTL=128
Reply from 192.168.1.17: bytes=32 time<1ms TTL=128
Reply from 192.168.1.16: bytes=32 time<1ms TTL=128
Reply from 192.168.1.15: bytes=32 time<1ms TTL=128
Reply from 192.168.1.17: bytes=32 time<1ms TTL=128
Reply from 192.168.1.16: bytes=32 time=1ms TTL=128
Reply from 192.168.1.15: bytes=32 time=1ms TTL=128
Reply from 192.168.1.17: bytes=32 time=1ms TTL=128

Ping statistics for 192.168.1.255:
    Packets: Sent = 4, Received = 12, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

A **Mesh topology** features direct connections between every pair of devices. Each device can communicate with any other through multiple pathways, offering high redundancy and fault tolerance. Mesh topologies are best suited for critical applications where uptime is essential.

Advantages

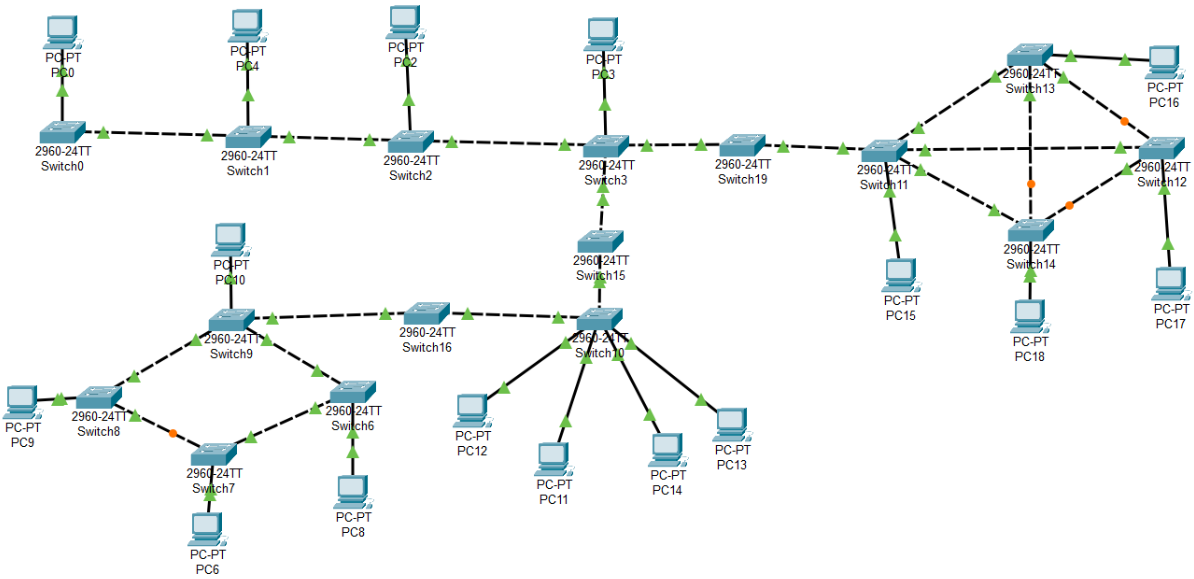
- Extremely reliable and fault-tolerant
- Supports multiple simultaneous data paths

Disadvantages

• High cost due to excessive cabling

• Complex installation and management

- **Hybrid Topology**



```
C:\>ping 192.168.1.255

Pinging 192.168.1.255 with 32 bytes of data:

Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=40ms TTL=128
Reply from 192.168.1.15: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.18: bytes=32 time=1ms TTL=128
Reply from 192.168.1.11: bytes=32 time=76ms TTL=128
Reply from 192.168.1.16: bytes=32 time=77ms TTL=128
Reply from 192.168.1.17: bytes=32 time=76ms TTL=128
Reply from 192.168.1.14: bytes=32 time=91ms TTL=128
Reply from 192.168.1.5: bytes=32 time=91ms TTL=128
Reply from 192.168.1.8: bytes=32 time=91ms TTL=128
Reply from 192.168.1.6: bytes=32 time=91ms TTL=128
Reply from 192.168.1.7: bytes=32 time=92ms TTL=128
Reply from 192.168.1.13: bytes=32 time=91ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time=1ms TTL=128
Reply from 192.168.1.15: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.16: bytes=32 time<1ms TTL=128
Reply from 192.168.1.13: bytes=32 time<1ms TTL=128
Reply from 192.168.1.17: bytes=32 time<1ms TTL=128
Reply from 192.168.1.14: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Reply from 192.168.1.8: bytes=32 time=1ms TTL=128
Reply from 192.168.1.6: bytes=32 time=1ms TTL=128
Reply from 192.168.1.7: bytes=32 time=1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=1ms TTL=128
Reply from 192.168.1.18: bytes=32 time=1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.13: bytes=32 time<1ms TTL=128
Reply from 192.168.1.5: bytes=32 time<1ms TTL=128
Reply from 192.168.1.6: bytes=32 time<1ms TTL=128
Reply from 192.168.1.14: bytes=32 time=1ms TTL=128
Reply from 192.168.1.15: bytes=32 time=1ms TTL=128
Reply from 192.168.1.7: bytes=32 time=1ms TTL=128
Reply from 192.168.1.18: bytes=32 time=26ms TTL=128
Reply from 192.168.1.16: bytes=32 time=26ms TTL=128
Reply from 192.168.1.17: bytes=32 time=26ms TTL=128
Reply from 192.168.1.8: bytes=32 time=26ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
```

```
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.15: bytes=32 time<1ms TTL=128
Reply from 192.168.1.4: bytes=32 time=1ms TTL=128
Reply from 192.168.1.11: bytes=32 time=1ms TTL=128
Reply from 192.168.1.12: bytes=32 time=1ms TTL=128
Reply from 192.168.1.18: bytes=32 time=20ms TTL=128
Reply from 192.168.1.16: bytes=32 time=1ms TTL=128
Reply from 192.168.1.13: bytes=32 time=1ms TTL=128
Reply from 192.168.1.14: bytes=32 time=1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Reply from 192.168.1.8: bytes=32 time=1ms TTL=128
Reply from 192.168.1.17: bytes=32 time=1ms TTL=128
Reply from 192.168.1.7: bytes=32 time=10ms TTL=128
Reply from 192.168.1.6: bytes=32 time=38ms TTL=128

Ping statistics for 192.168.1.255:
    Packets: Sent = 4, Received = 60, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 92ms, Average = 16ms
```

Tree topology is a hierarchical structure combining multiple star topologies connected to a central backbone, similar to a bus. It is highly scalable and suitable for networks with layered administration, like universities or large enterprises.

Advantages
• Supports network expansion efficiently
• Combines advantages of star and bus topologies

Disadvantages
• Backbone failure can impact multiple branches
• Increased complexity in design and management

Conclusion:

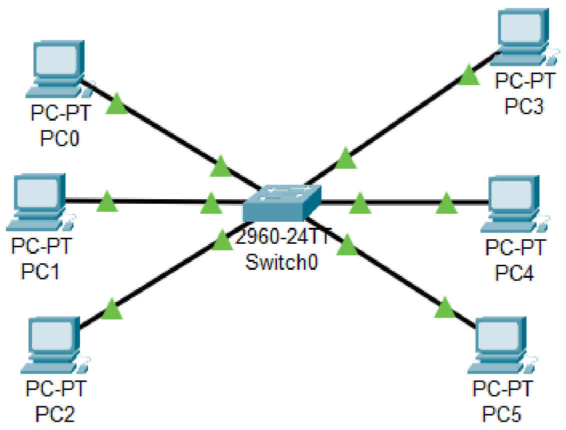
Each network topology offers distinct advantages and trade-offs:
• Bus is economical for small setups but has limited scalability.
• Ring ensures structured data flow but is vulnerable to failures.
• Star is widely used for its simplicity and manageability.
• Mesh delivers maximum reliability at the cost of complexity and expense.
• Tree and Hybrid offer scalability and flexibility, making them ideal for large organizations.

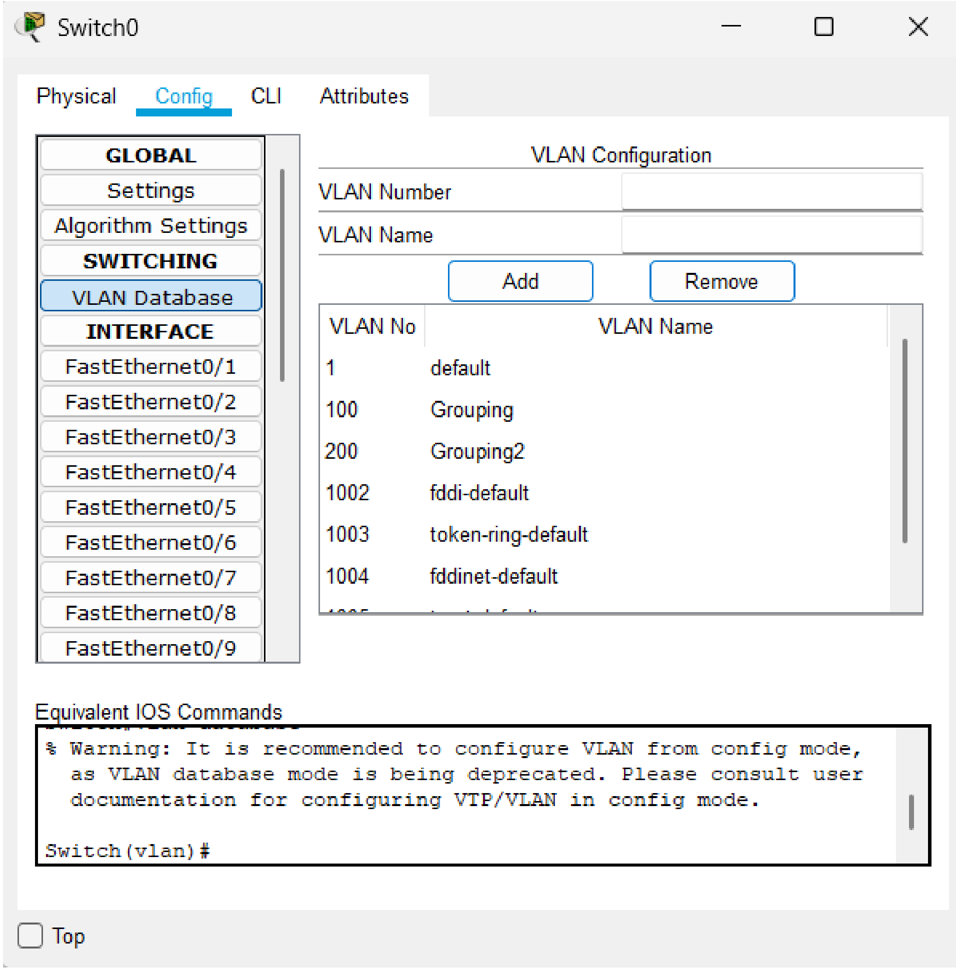
EXPERMINET NO 2

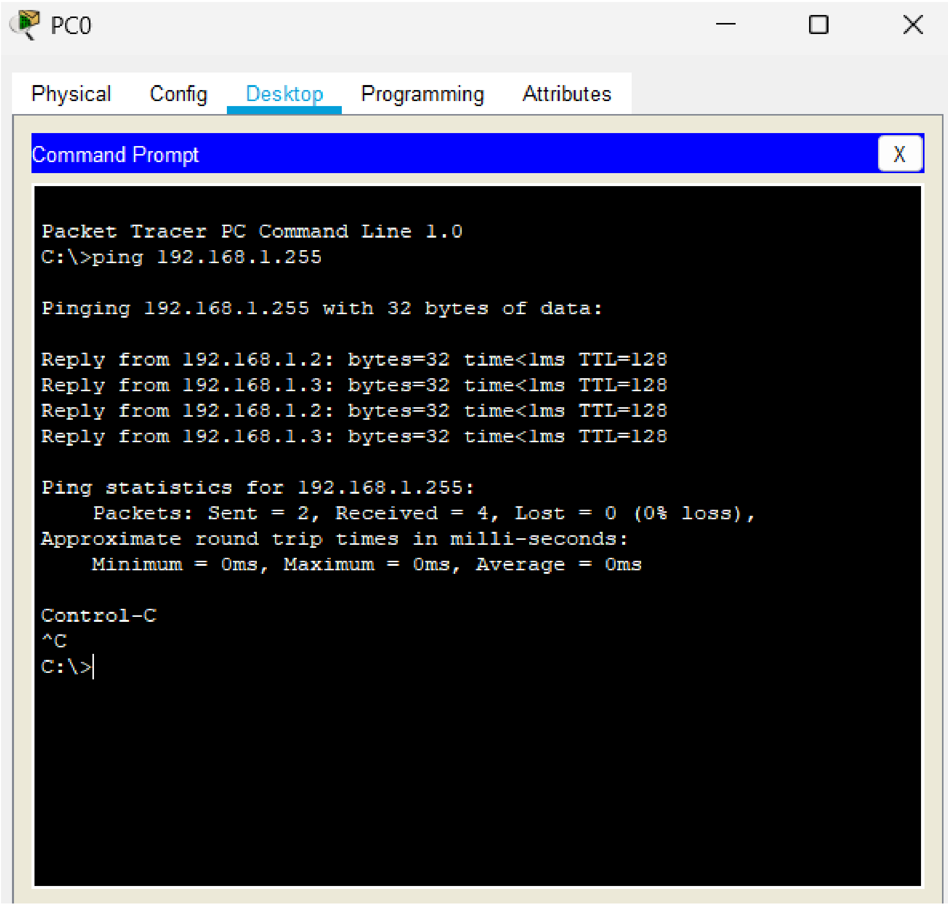
Aim: To study and configure VLAN (Virtual Local Area Network) in a network to understand how it segments network traffic, improves performance, and enhances security.

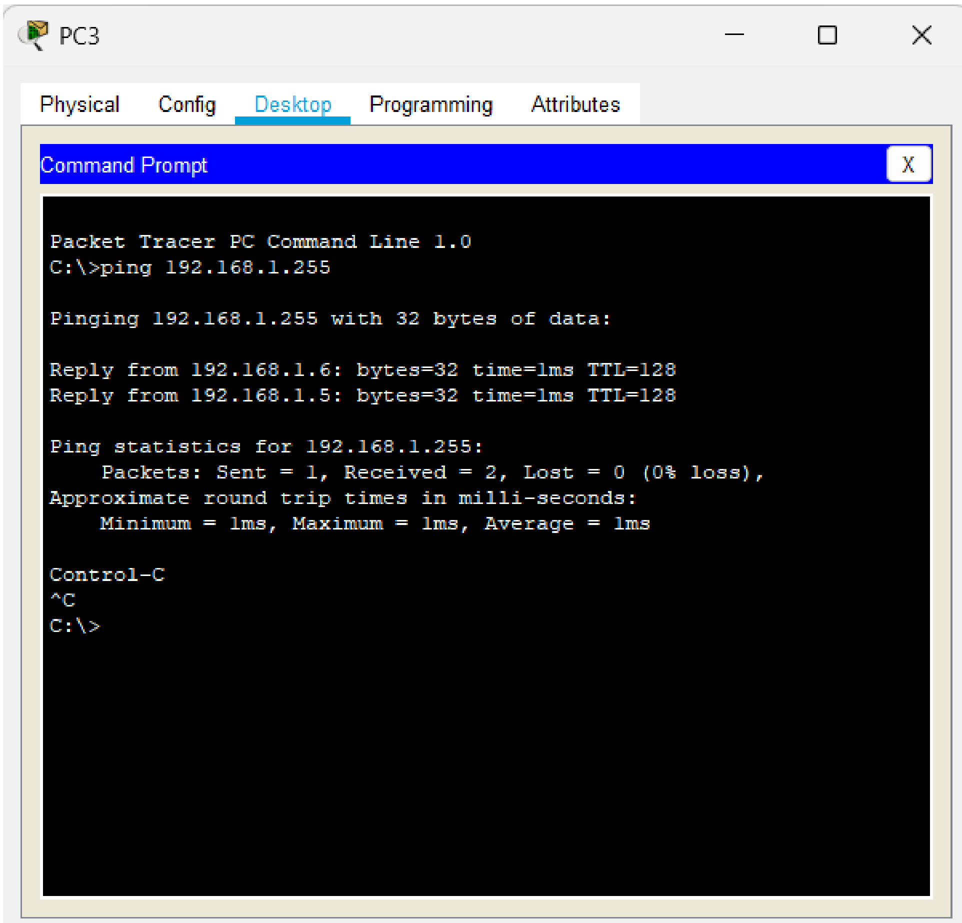
Tools: Cisco Packet Tracer

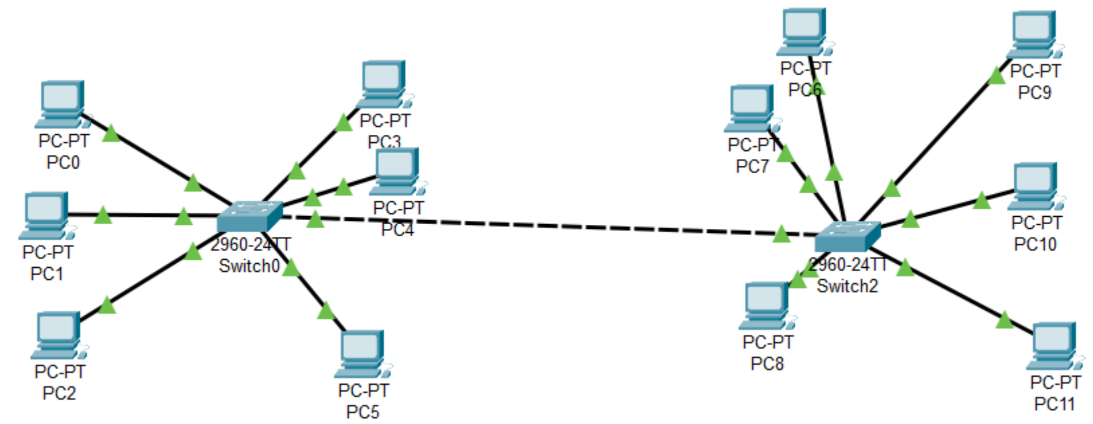
Setup and Theory:

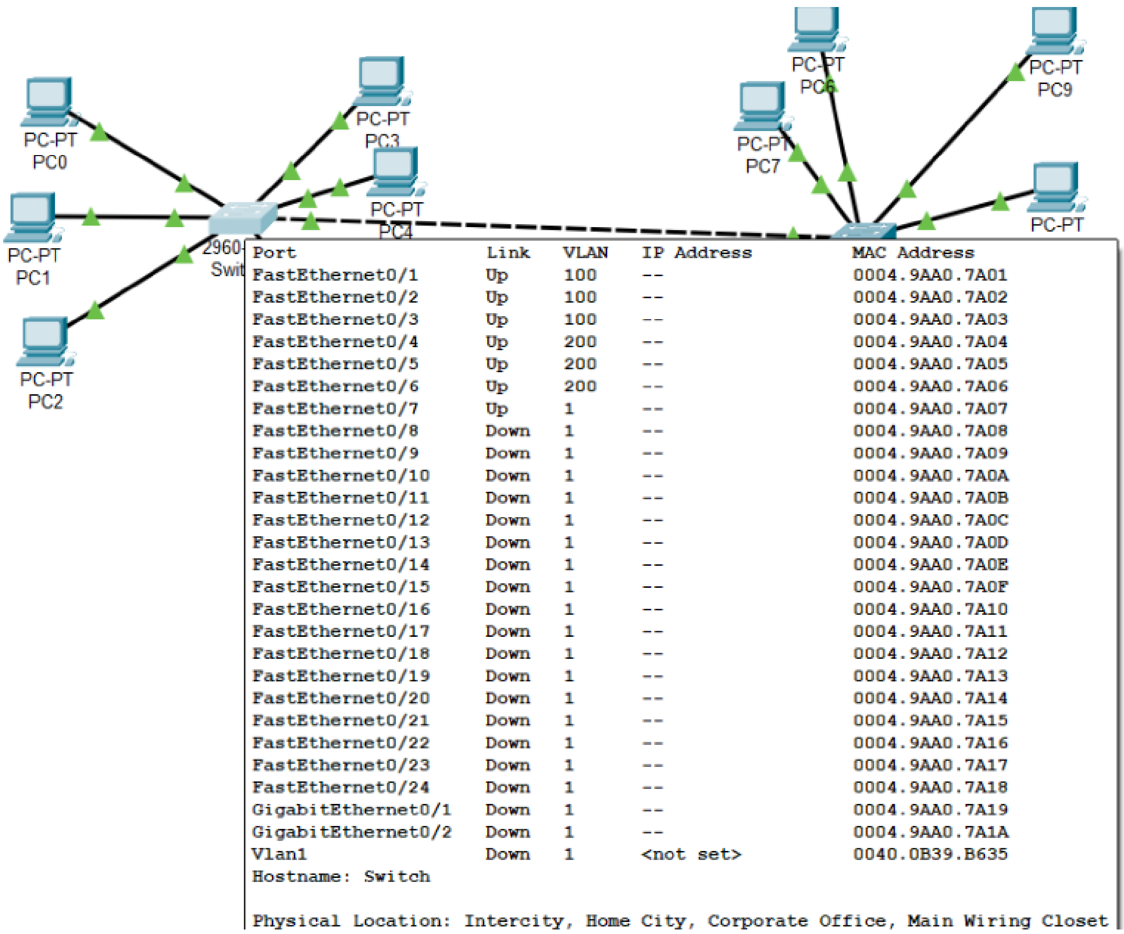



Switch0
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/1
FastEthernet0/2
FastEthernet0/3
FastEthernet0/4
FastEthernet0/5
FastEthernet0/6
FastEthernet0/7
FastEthernet0/8
FastEthernet0/9
VLAN Configuration
VLAN Number
VLAN Name
Add
Remove
VLAN No
VLAN Name
1 default
100 Grouping
200 Grouping2
1002 fddi-default
1003 token-ring-default
1004 fddinet-default
Equivalent IOS Commands
% Warning: It is recommended to configure VLAN from config mode,
as VLAN database mode is being deprecated. Please consult user
documentation for configuring VTP/VLAN in config mode.
Switch(vlan)#
Top


PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.255
Pinging 192.168.1.255 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.3: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.255:
Packets: Sent = 2, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
C:\>


PC3
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.255
Pinging 192.168.1.255 with 32 bytes of data:
Reply from 192.168.1.6: bytes=32 time=1ms TTL=128
Reply from 192.168.1.5: bytes=32 time=1ms TTL=128
Ping statistics for 192.168.1.255:
Packets: Sent = 1, Received = 2, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 1ms, Average = 1ms
Control-C
^C
C:\>

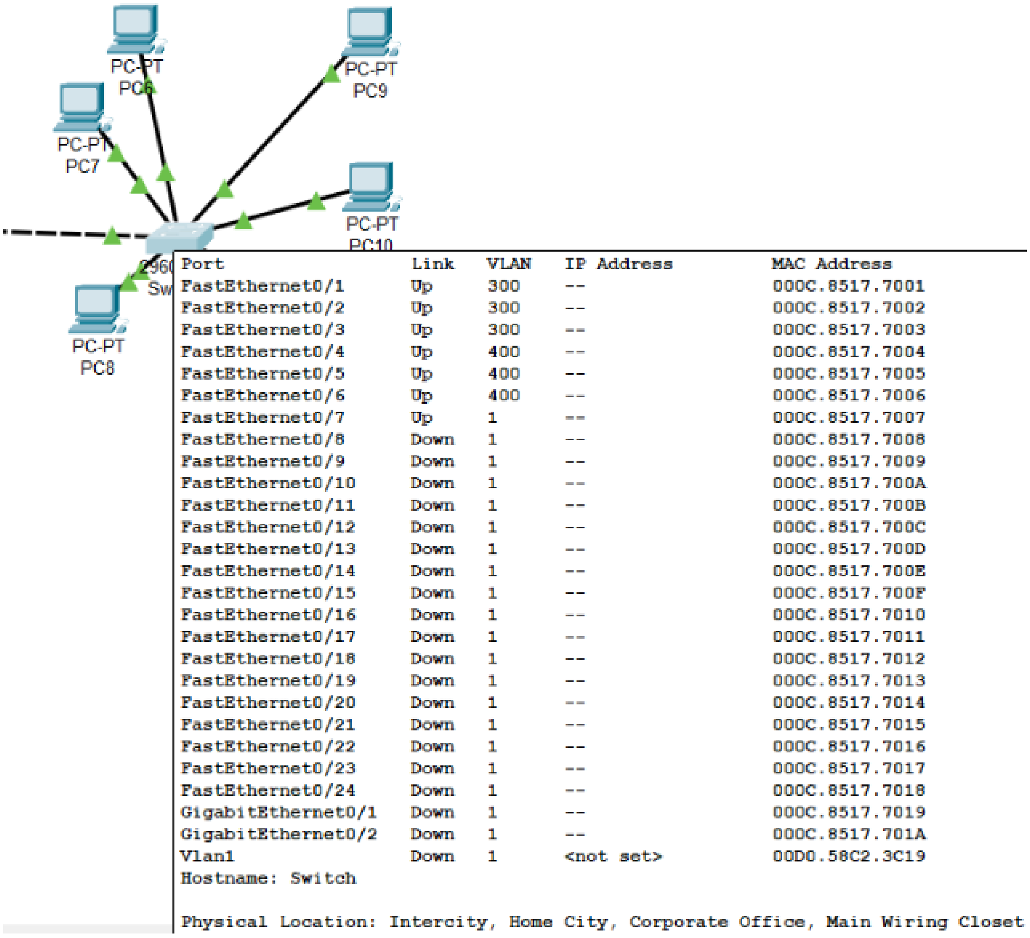




Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	100	--	0004.9AA0.7A01
FastEthernet0/2	Up	100	--	0004.9AA0.7A02
FastEthernet0/3	Up	100	--	0004.9AA0.7A03
FastEthernet0/4	Up	200	--	0004.9AA0.7A04
FastEthernet0/5	Up	200	--	0004.9AA0.7A05
FastEthernet0/6	Up	200	--	0004.9AA0.7A06
FastEthernet0/7	Up	1	--	0004.9AA0.7A07
FastEthernet0/8	Down	1	--	0004.9AA0.7A08
FastEthernet0/9	Down	1	--	0004.9AA0.7A09
FastEthernet0/10	Down	1	--	0004.9AA0.7A0A
FastEthernet0/11	Down	1	--	0004.9AA0.7A0B
FastEthernet0/12	Down	1	--	0004.9AA0.7A0C
FastEthernet0/13	Down	1	--	0004.9AA0.7A0D
FastEthernet0/14	Down	1	--	0004.9AA0.7A0E
FastEthernet0/15	Down	1	--	0004.9AA0.7A0F
FastEthernet0/16	Down	1	--	0004.9AA0.7A10
FastEthernet0/17	Down	1	--	0004.9AA0.7A11
FastEthernet0/18	Down	1	--	0004.9AA0.7A12
FastEthernet0/19	Down	1	--	0004.9AA0.7A13
FastEthernet0/20	Down	1	--	0004.9AA0.7A14
FastEthernet0/21	Down	1	--	0004.9AA0.7A15
FastEthernet0/22	Down	1	--	0004.9AA0.7A16
FastEthernet0/23	Down	1	--	0004.9AA0.7A17
FastEthernet0/24	Down	1	--	0004.9AA0.7A18
GigabitEthernet0/1	Down	1	--	0004.9AA0.7A19
GigabitEthernet0/2	Down	1	--	0004.9AA0.7A1A
Vlan1	Down	1	<not set>	0040.0B39.B635

Hostname: Switch

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet



Port	Link	VLAN	IP Address	MAC Address
FastEthernet0/1	Up	300	--	000C.8517.7001
FastEthernet0/2	Up	300	--	000C.8517.7002
FastEthernet0/3	Up	300	--	000C.8517.7003
FastEthernet0/4	Up	400	--	000C.8517.7004
FastEthernet0/5	Up	400	--	000C.8517.7005
FastEthernet0/6	Up	400	--	000C.8517.7006
FastEthernet0/7	Up	1	--	000C.8517.7007
FastEthernet0/8	Down	1	--	000C.8517.7008
FastEthernet0/9	Down	1	--	000C.8517.7009
FastEthernet0/10	Down	1	--	000C.8517.700A
FastEthernet0/11	Down	1	--	000C.8517.700B
FastEthernet0/12	Down	1	--	000C.8517.700C
FastEthernet0/13	Down	1	--	000C.8517.700D
FastEthernet0/14	Down	1	--	000C.8517.700E
FastEthernet0/15	Down	1	--	000C.8517.700F
FastEthernet0/16	Down	1	--	000C.8517.7010
FastEthernet0/17	Down	1	--	000C.8517.7011
FastEthernet0/18	Down	1	--	000C.8517.7012
FastEthernet0/19	Down	1	--	000C.8517.7013
FastEthernet0/20	Down	1	--	000C.8517.7014
FastEthernet0/21	Down	1	--	000C.8517.7015
FastEthernet0/22	Down	1	--	000C.8517.7016
FastEthernet0/23	Down	1	--	000C.8517.7017
FastEthernet0/24	Down	1	--	000C.8517.7018
GigabitEthernet0/1	Down	1	--	000C.8517.7019
GigabitEthernet0/2	Down	1	--	000C.8517.701A
Vlan1	Down	1	<not set>	00D0.58C2.3C19

Hostname: Switch

Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

A **VLAN (Virtual Local Area Network)** is a logical grouping of devices in a LAN, configured to communicate as if they are on the same physical network, regardless of their actual location. VLANs operate at **Layer 2 (Data Link Layer)** of the OSI model.

Key Concepts:

- **Segmentation**: VLANs logically divide a single physical network into multiple isolated broadcast domains.
- **Broadcast Domain Isolation**: Devices in different VLANs cannot communicate directly without a Layer 3 device (router or Layer 3 switch).
- **Trunking**: Trunk ports carry traffic from multiple VLANs across a single physical link using tagging protocols like **IEEE 802.1Q**.

Benefits of VLAN:

- **Improved Security**: Sensitive data can be isolated within specific VLANs.

- **Reduced Congestion**: Smaller broadcast domains mean less unnecessary traffic.
- **Improved Performance**: Network efficiency is increased through logical segmentation.
- **Flexibility and Scalability**: Devices can be moved across VLANs without changing physical connections.

Conclusion:

VLANs are essential in modern networking for creating logical groupings of devices, improving network security, managing broadcast domains, and optimizing performance. By implementing VLANs, network administrators can reduce congestion, enhance data privacy, and scale networks efficiently. The practical configuration of VLANs reinforces the understanding of how Layer 2 segmentation is achieved in enterprise networks.

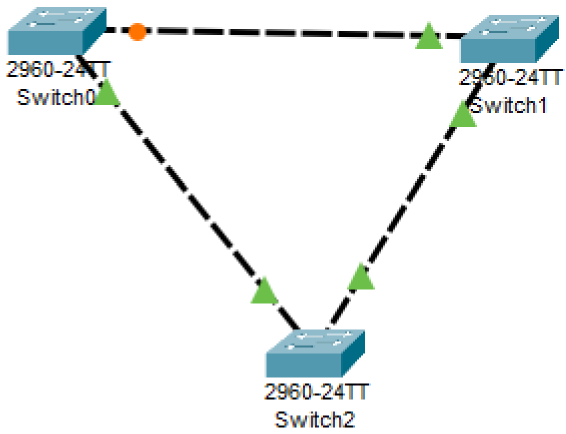
EXPERMINET NO 3

Aim: Check whether loop exist in network or not if yes identify it and block it anyway network do

Tools: Cisco Packet Tracer

Setup and Theory:

- **Step 1:**Take three switches and connect all of them.
- **Step 2:**Check whether a loop exists or not.



- **Step 3: "show spanning-tree"** command for checking blocking and forwarding ports.

```
Switch>sh
Switch>show sp
Switch>show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0000.0CC8.21AE
             Cost        19
             Port        2(FastEthernet0/2)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     00D0.BA20.8175
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- --------
--------------------------------
Fa0/2            Root FWD 19        128.2    P2p
Fa0/3            Altn BLK 19        128.3    P2p

Switch>
```

IOS Command Line Interface

```
Switch>show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0000.0CC8.21AE
             This bridge is the root
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    24577  (priority 24576 sys-id-ext 1)
             Address     0000.0CC8.21AE
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- --------
--------------------------------
Fa0/1            Desg FWD 19        128.1    P2p
Fa0/2            Desg FWD 19        128.2    P2p

Switch>
```

IOS Command Line Interface

```
Switch>show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0000.0CC8.21AE
             Cost        19
             Port        3(FastEthernet0/3)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     0006.2AE5.6028
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- --------
--------------------------------
Fa0/1            Desg FWD 19        128.1    P2p
Fa0/3            Root FWD 19        128.3    P2p

Switch>
Switch>
```

- **Step 4:**

  “

  enable

  configure terminal

  spanning-tree vlan 1 priority

  24576

  end

  ” command to set manually priority. Default priority is 32768.

Physical Config CLI Attributes

IOS Command Line Interface

```
                Port        2(FastEthernet0/2)
                Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID     Priority    32769  (priority 32768 sys-id-ext 1)
                Address     00D0.BA20.8175
                Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
                Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- --------
--------------------------------
Fa0/2            Root FWD 19        128.2    P2p
Fa0/3            Altn BLK 19        128.3    P2p

Switch#Enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#sp
Switch(config)#spanning-tree vl
Switch(config)#spanning-tree vlan 1 pri
Switch(config)#spanning-tree vlan 1 priority 24576
Switch(config)#End
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

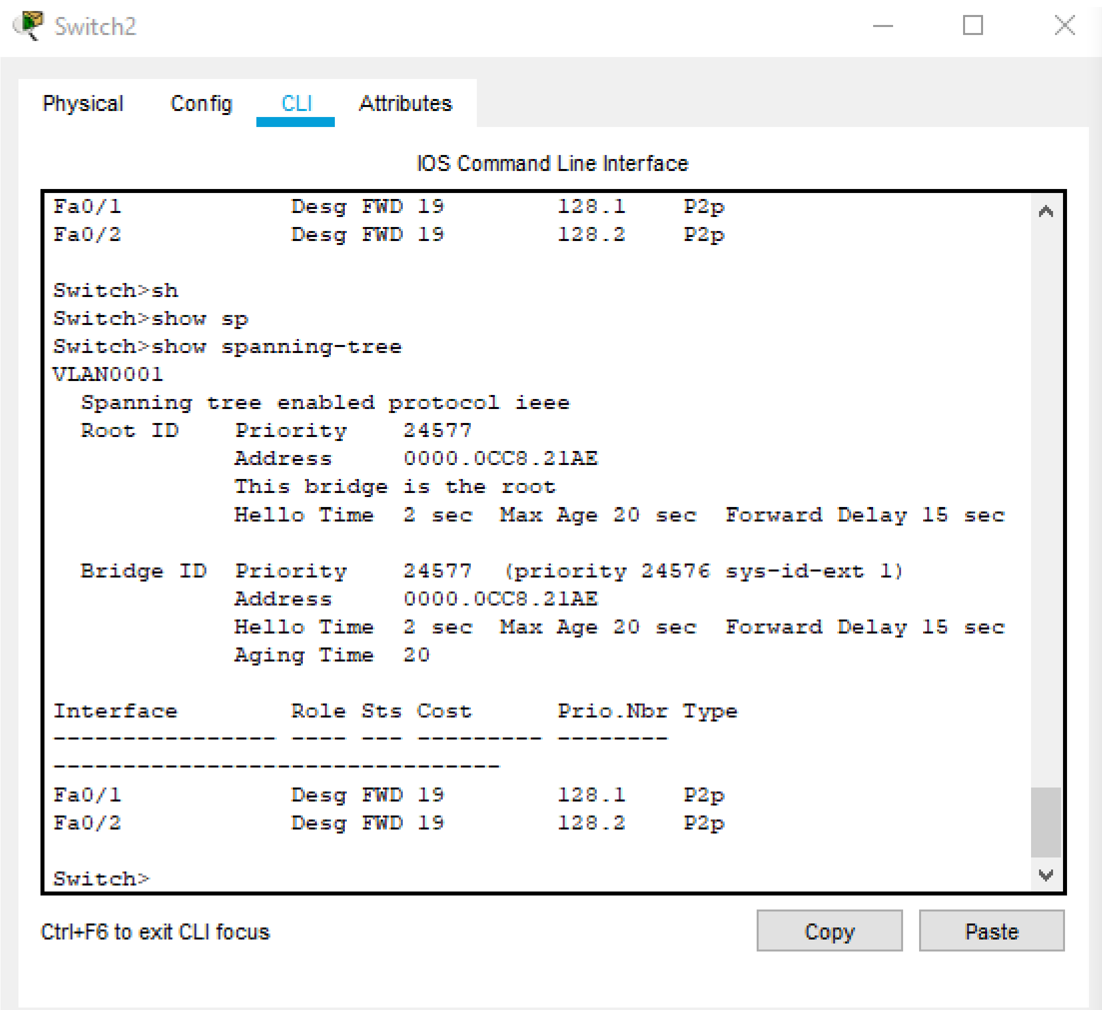
Ctrl+F6 to exit CLI focus Copy Paste

Physical Config CLI Attributes

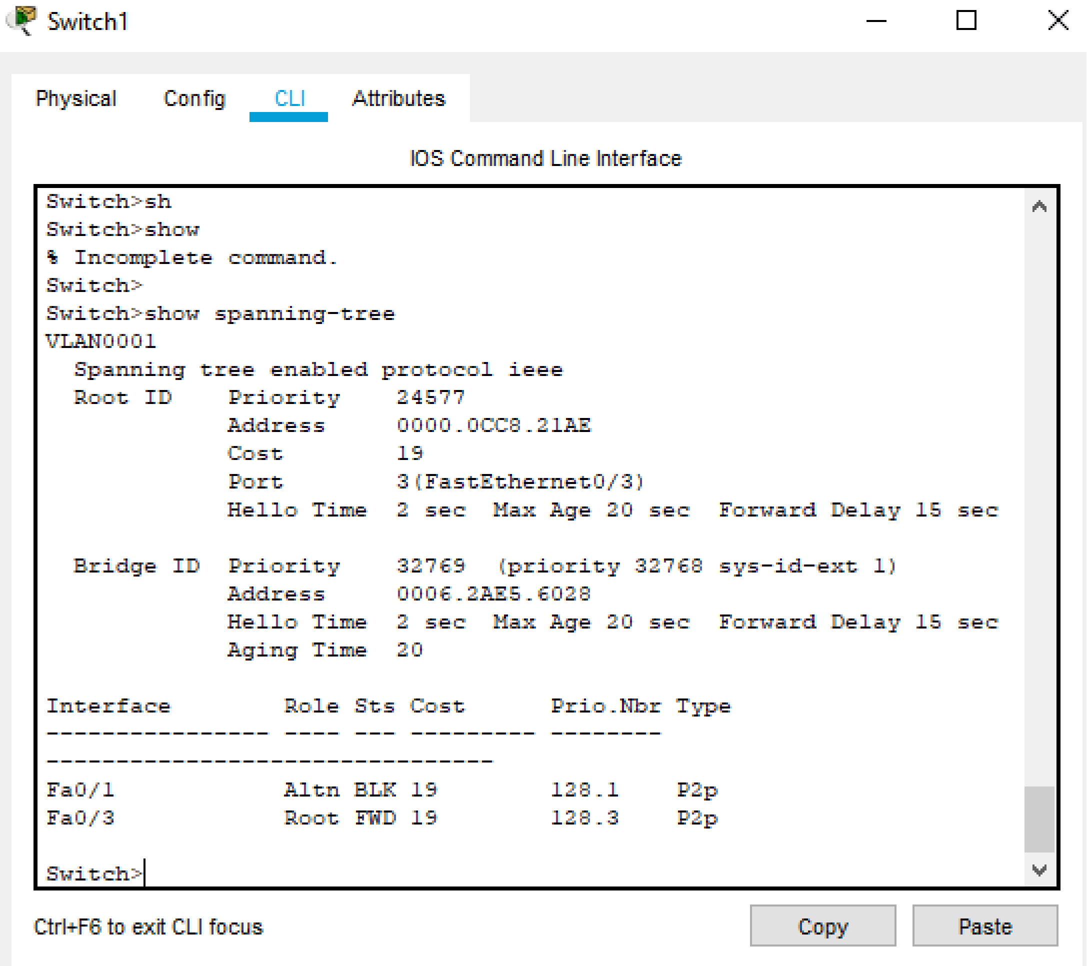
IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console

Switch#show
Switch#show spanni
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    24577
              Address     0000.0CC8.21AE
              Cost        19
              Port        2(FastEthernet0/2)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    24577  (priority 24576 sys-id-ext 1)
              Address     00D0.BA20.8175
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- --------
--------------------------------
Fa0/2            Root FWD 19        128.2    P2p
Fa0/3            Desg FWD 19        128.3    P2p

Switch#
```

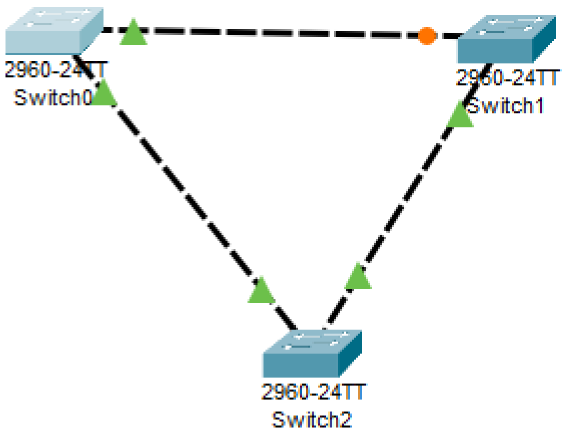
Ctrl+F6 to exit CLI focus Copy Paste


Switch2
Physical
Config
CLI
Attributes
IOS Command Line Interface
Fa0/1 Desg FWD 19 128.1 P2p
Fa0/2 Desg FWD 19 128.2 P2p
Switch>sh
Switch>show sp
Switch>show spanning-tree
VLAN0001
Spanning tree enabled protocol ieee
Root ID Priority 24577
Address 0000.0CC8.21AE
This bridge is the root
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 24577 (priority 24576 sys-id-ext 1)
Address 0000.0CC8.21AE
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 20
Interface Role Sts Cost Prio.Nbr Type
---------------- ---- --- --------- --------

Fa0/1 Desg FWD 19 128.1 P2p
Fa0/2 Desg FWD 19 128.2 P2p
Switch>
Ctrl+F6 to exit CLI focus
Copy
Paste




```
Switch>sh
Switch>show
% Incomplete command.
Switch>
Switch>show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0000.0CC8.21AE
             Cost        19
             Port        3(FastEthernet0/3)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     0006.2AE5.6028
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- --------
--------------------------------
Fa0/1            Altn BLK 19        128.1    P2p
Fa0/3            Root FWD 19        128.3    P2p

Switch>
```



Conclusion:

The experiment showed that network loops cause broadcast storms and instability. When a loop was formed, the Spanning Tree Protocol (STP) detected it and blocked the redundant path, ensuring a stable and loop-free topology. Thus, loops can exist physically, but STP prevents their negative effects by maintaining proper network operation.

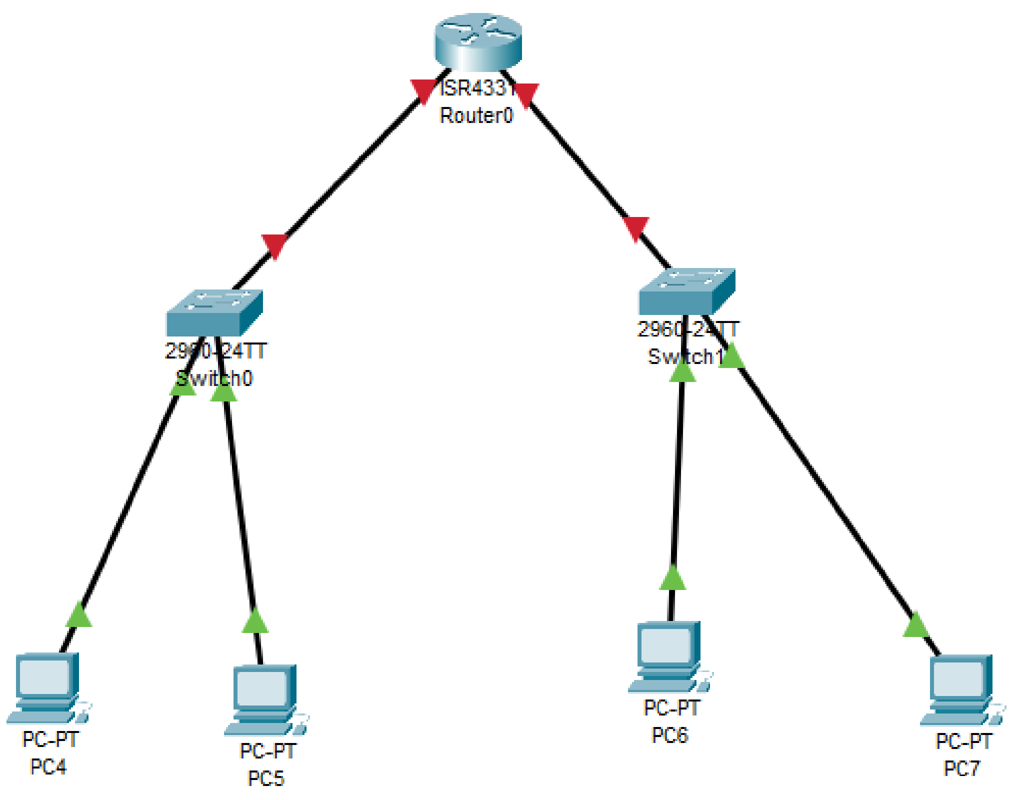
EXPERMINET NO 4

Aim: Simulation of static Routing configuration.

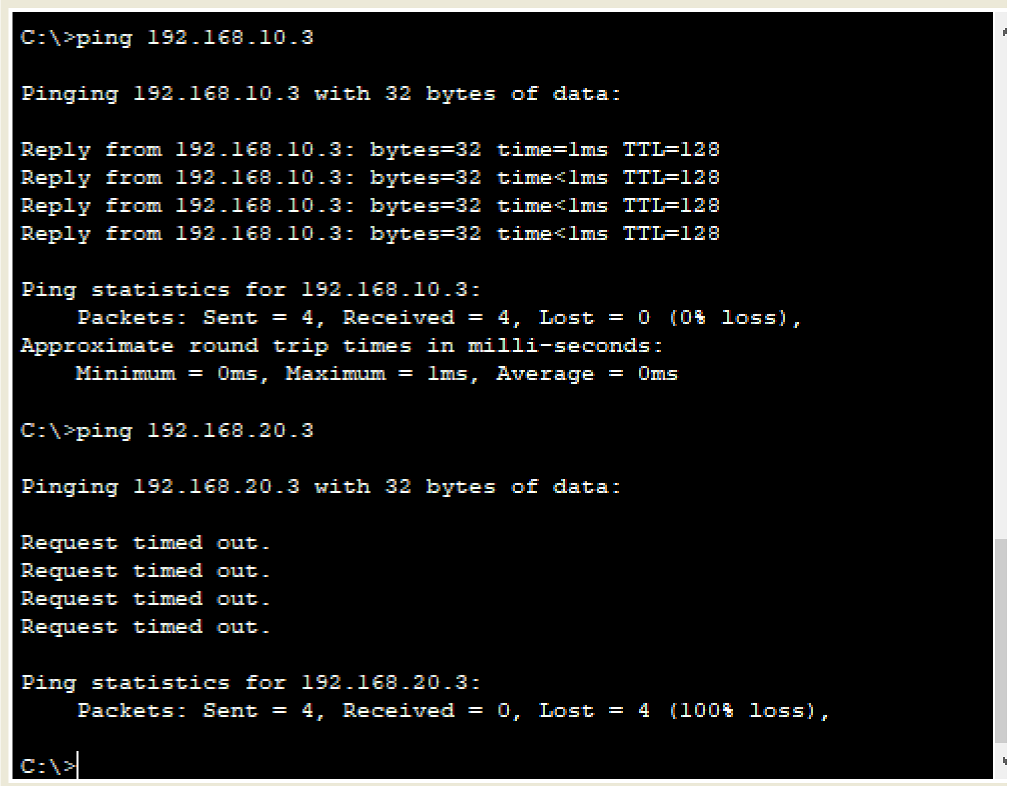
Tools: Cisco Packet Tracer

Setup and Theory:

- **Step 1:** Drag and drop the required routers, switches, and PCs onto the workspace.
- **Step 2:** Connect the devices using appropriate cables.
- **Step 3:** Assign IP addresses to all PCs.

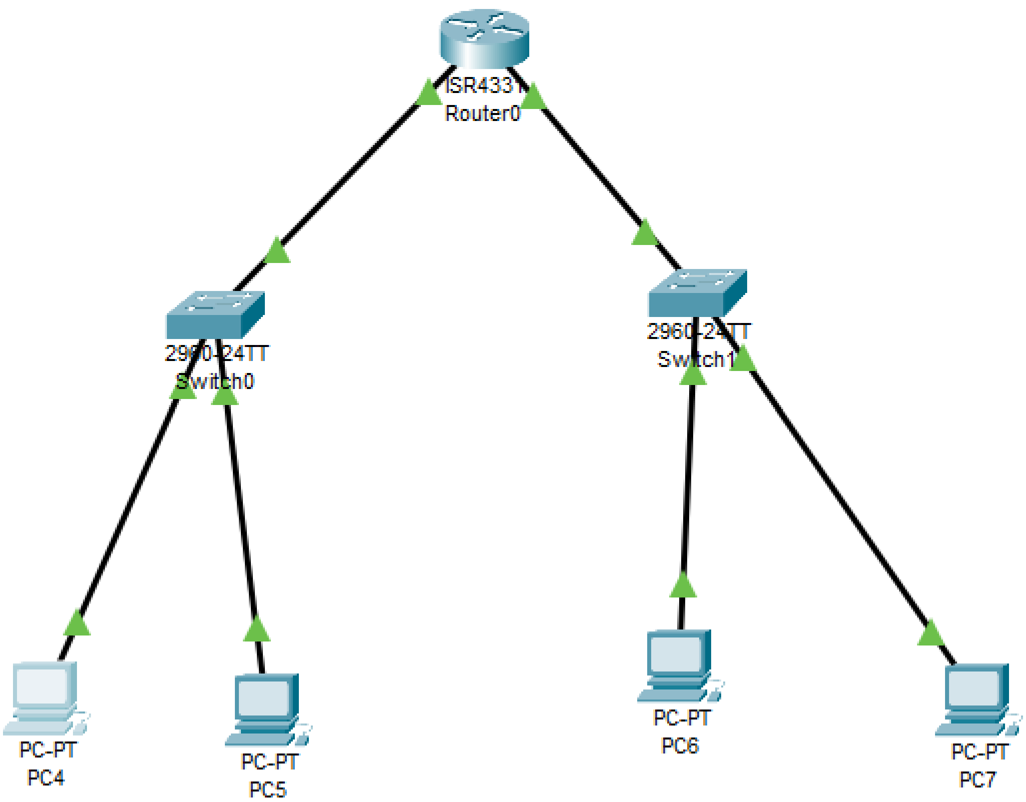


- **Step 4:** Run ping command



```
C:\>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:

Reply from 192.168.10.3: bytes=32 time=1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

- **Step 5:** enable ports of routers and provide routers IP address.



- **Step 6:** set gateway of each networks PCs based on there networks.
- **Step 7:** run ping command.

```
Control-C
^C
C:\>ping 192.168.20.3

Pinging 192.168.20.3 with 32 bytes of data:

Request timed out.
Reply from 192.168.20.3: bytes=32 time<1ms TTL=127
Reply from 192.168.20.3: bytes=32 time<1ms TTL=127
Reply from 192.168.20.3: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.20.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:

Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128
Reply from 192.168.10.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Conclusion:

The simulation successfully demonstrated static routing. Each router was manually configured with routes to other networks, enabling end-to-end communication. The experiment shows that static routing provides simple and reliable path selection but requires manual updates, making it less scalable for large networks.