

**TOPOLOGY :-** Network topology plays a crucial role in determining the performance, reliability, and scalability of a computer network. It influences factors such as data transmission efficiency, fault tolerance, and ease of network management. Various types of network topologies exist, each with its own characteristics, advantages, and disadvantages.

### Types of Network Topologies

#### Ring Topology

**Description:** In a ring topology, devices are connected in a circular chain, with each device connected to two neighboring devices. Data travels around the ring in one direction until it reaches its destination.

**Advantages:**

Simple and easy to implement.

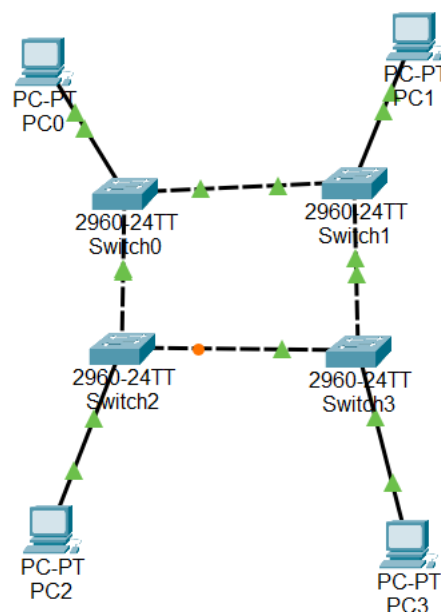
Equal access to network resources for all devices.

**Disadvantages:**

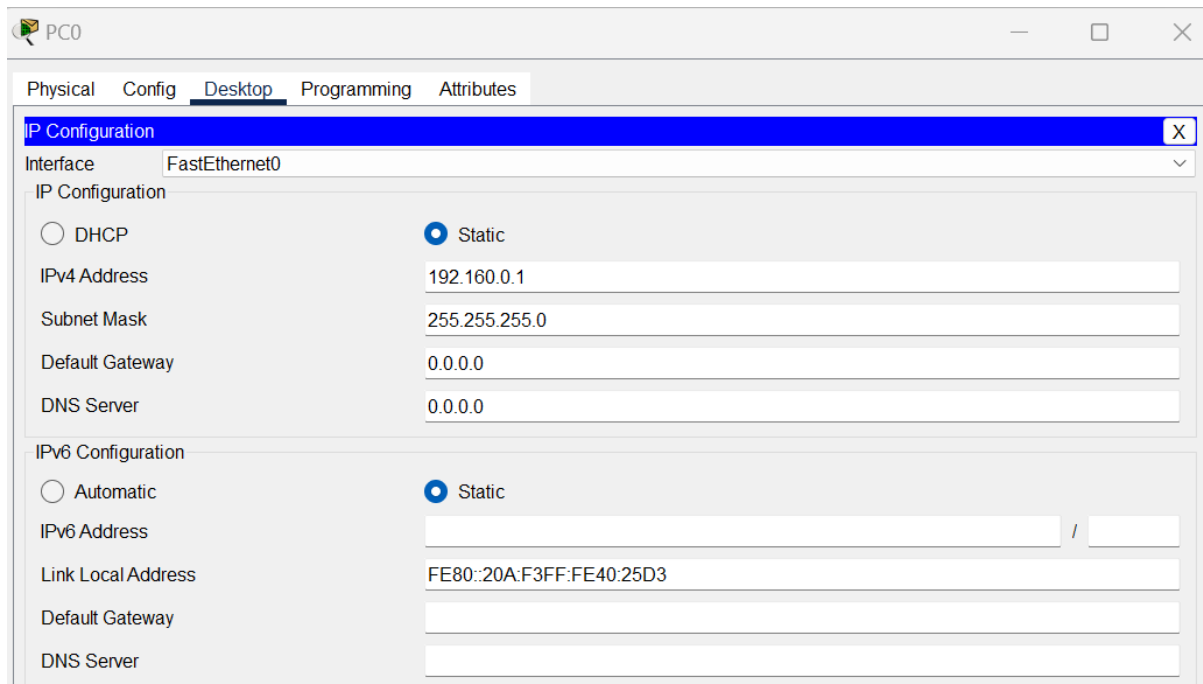
Vulnerable to cable failures; a single break in the ring can disrupt the entire network.

Limited scalability.

Example: Token Ring networks (less common today).



## Configuration of IP And Subnet Mask:



The screenshot shows the 'IP Configuration' window for 'PC0'. The 'Interface' is set to 'FastEthernet0'. Under 'IP Configuration', 'Static' is selected for IPv4. The IPv4 Address is '192.160.0.1', Subnet Mask is '255.255.255.0', Default Gateway is '0.0.0.0', and DNS Server is '0.0.0.0'. Under 'IPv6 Configuration', 'Static' is selected. The IPv6 Address is empty, Link Local Address is 'FE80::20A:F3FF:FE40:25D3', Default Gateway is empty, and DNS Server is empty.

Configuration Type	Option	Field	Value
IPv4 Configuration	Static	IPv4 Address	192.160.0.1
		Subnet Mask	255.255.255.0
		Default Gateway	0.0.0.0
		DNS Server	0.0.0.0
IPv6 Configuration	Static	IPv6 Address	
		Link Local Address	FE80::20A:F3FF:FE40:25D3
		Default Gateway	
		DNS Server	

IP of Desk 0 = 192.160.0.1

Subnet Mask = 255.255.255.0

IP of Desk 1 = 192.160.0.2

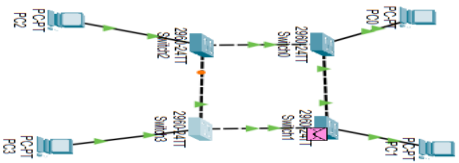
Subnet Mask = 255.255.255.0

IP of Desk 2 = 192.160.0.3

Subnet Mask = 255.255.255.0

IP of Desk 3 = 192.160.0.4

Subnet Mask = 255.255.255.0



#### Simulation Panel



##### Event List

Vs	Time(sec)	Last Device	AI Device	Type
0.330	-	Switch1	Switch0	STP
0.331	Switch1	Switch0	PC1	STP
0.331	Switch1	Switch3	Switch2	STP
0.332	Switch0	PC0	Switch2	STP
0.332	Switch3	Switch2	PC3	STP
0.333	Switch2	PC2	Switch1	STP
Visible 2.330	-	Switch1	Switch1	STP

Reset Simulation Constant Delay

Captured to:  
2.330 s

Play Controls



Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoTv6, LACP, LDAP, MIB, NDP, NETFLOW, NTP, OSPF, OSPFv6, Ping, PINGv6, PPP, PPPoE, PPTP, RADIUS, REP, RIP, RIPng, RTT, SCGP, SNMP, SNMPv6, SSH, STP, Syslog, TACACS, TFTP, Telnet, UDP, USB, VPP

Full Filters

Show All

Output:

## Ring Topology

Description: In a ring topology, devices are connected in a circular chain, with each device connected to two neighboring devices. Data travels around the ring in one direction until it reaches its destination.

Advantages:

Simple and easy to implement.

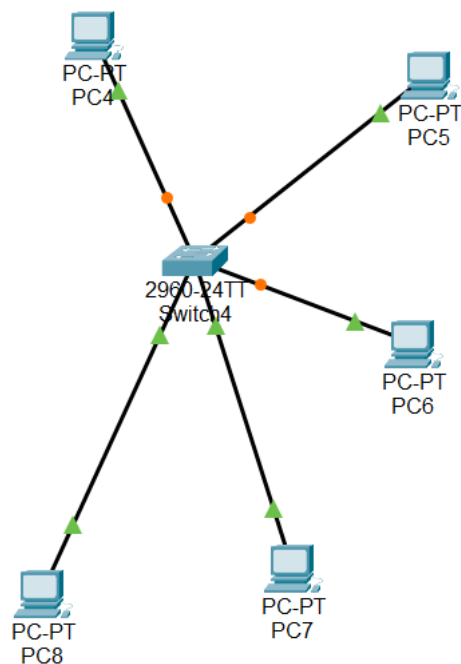
Equal access to network resources for all devices.

Disadvantages:

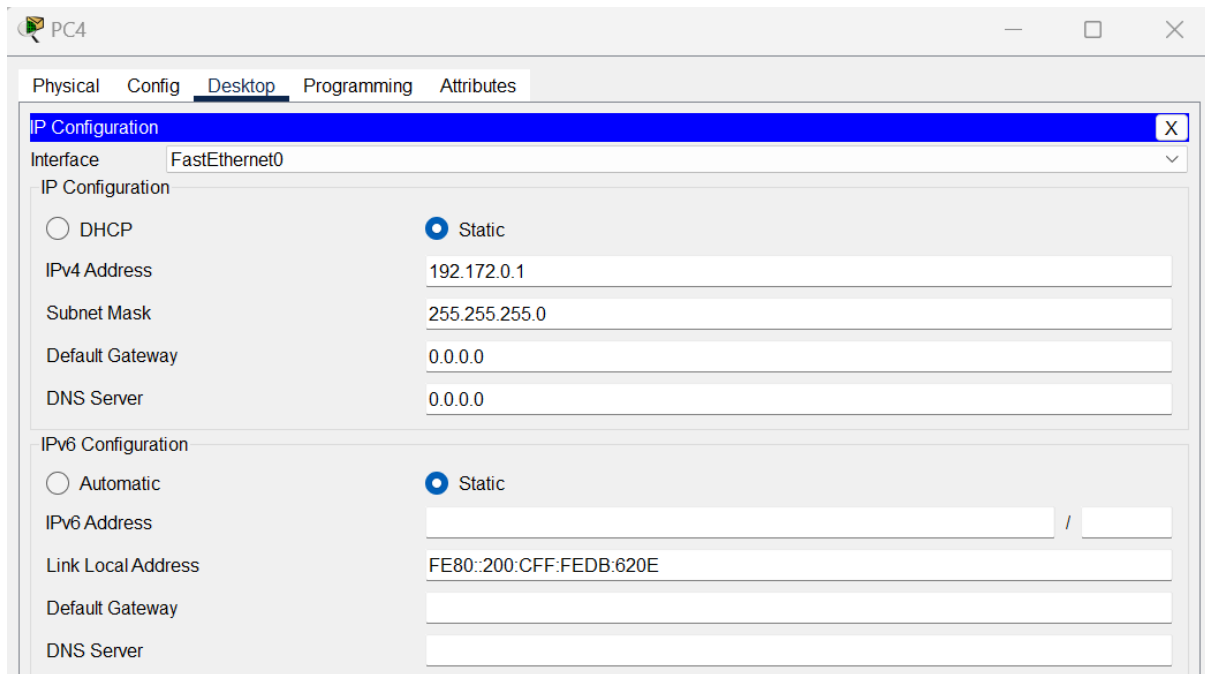
Vulnerable to cable failures; a single break in the ring can disrupt the entire network.

Limited scalability.

Example: Token Ring networks (less common today).



## Configuration of IP And Subnet Mask:



IP of Desk 0 = 192.172.0.1

Subnet Mask = 255.255.255.0

IP of Desk 1 = 192.172.0.2

Subnet Mask = 255.255.255.0

IP of Desk 2 = 192.172.0.3

Subnet Mask = 255.255.255.0

IP of Desk 3 = 192.172.0.4

Subnet Mask = 255.255.255.0

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	1.965	--	Switch4	DTP
	1.966	Switch4	PC5	DTP
	2.001	--	Switch4	STP
	2.002	Switch4	PC8	STP
	2.002	Switch4	PC5	STP
	2.002	Switch4	PC7	STP
	2.002	Switch4	PC6	STP
	2.002	Switch4	PC4	STP
	4.001	--	Switch4	STP
	Visible 4.002	Switch4	PC8	STP
	Visible 4.002	Switch4	PC5	STP
	Visible 4.002	Switch4	PC7	STP
	Visible 4.002	Switch4	PC6	STP
	Visible 4.002	Switch4	PC4	STP

Play Controls



Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Mcast, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAggr, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters

Show AllNone

Output:

## Bus Topology

**Description:** In a bus topology, all devices are connected to a single communication line, called the bus or backbone. Data transmitted by any device is received by all other devices on the network, but only the intended recipient processes the data.

**Advantages:**

Simple and easy to implement.

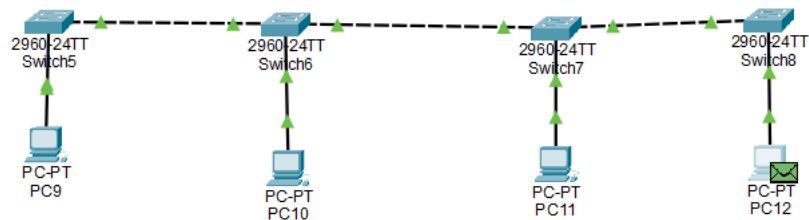
Requires minimal cabling.

**Disadvantages:**

Limited scalability.

Susceptible to cable failures, which can disrupt the entire network.

**Example:** Ethernet networks using coaxial cables.



## Configuration of IP And Subnet Mask:

The screenshot shows a network configuration window titled "IP Configuration" with a close button (X) in the top right corner. The window has tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes", with "Desktop" currently selected. Below the tabs, there is a dropdown menu for "Interface" set to "FastEthernet0". The "IP Configuration" section contains two radio buttons: "DHCP" (unselected) and "Static" (selected). Below these are input fields for "IPv4 Address" (192.167.0.1), "Subnet Mask" (255.255.255.0), "Default Gateway" (0.0.0.0), and "DNS Server" (0.0.0.0). The "IPv6 Configuration" section has two radio buttons: "Automatic" (selected) and "Static" (unselected). To the right of the "Static" button is the text "Ipv6 request failed.". Below these are input fields for "IPv6 Address" (empty), "Link Local Address" (FE80::290:CFF:FE5C:D416), "Default Gateway" (empty), and "DNS Server" (empty).

IP Configuration	
Interface	FastEthernet0
IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	192.167.0.1
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0
IPv6 Configuration	
<input checked="" type="radio"/> Automatic	<input type="radio"/> Static Ipv6 request failed.
IPv6 Address	/
Link Local Address	FE80::290:CFF:FE5C:D416
Default Gateway	
DNS Server	

IP of Desk 0 = 192.167.0.1

Subnet Mask = 255.255.255.0

IP of Desk 1 = 192.167.0.2

Subnet Mask = 255.255.255.0

IP of Desk 2 = 192.167.0.3

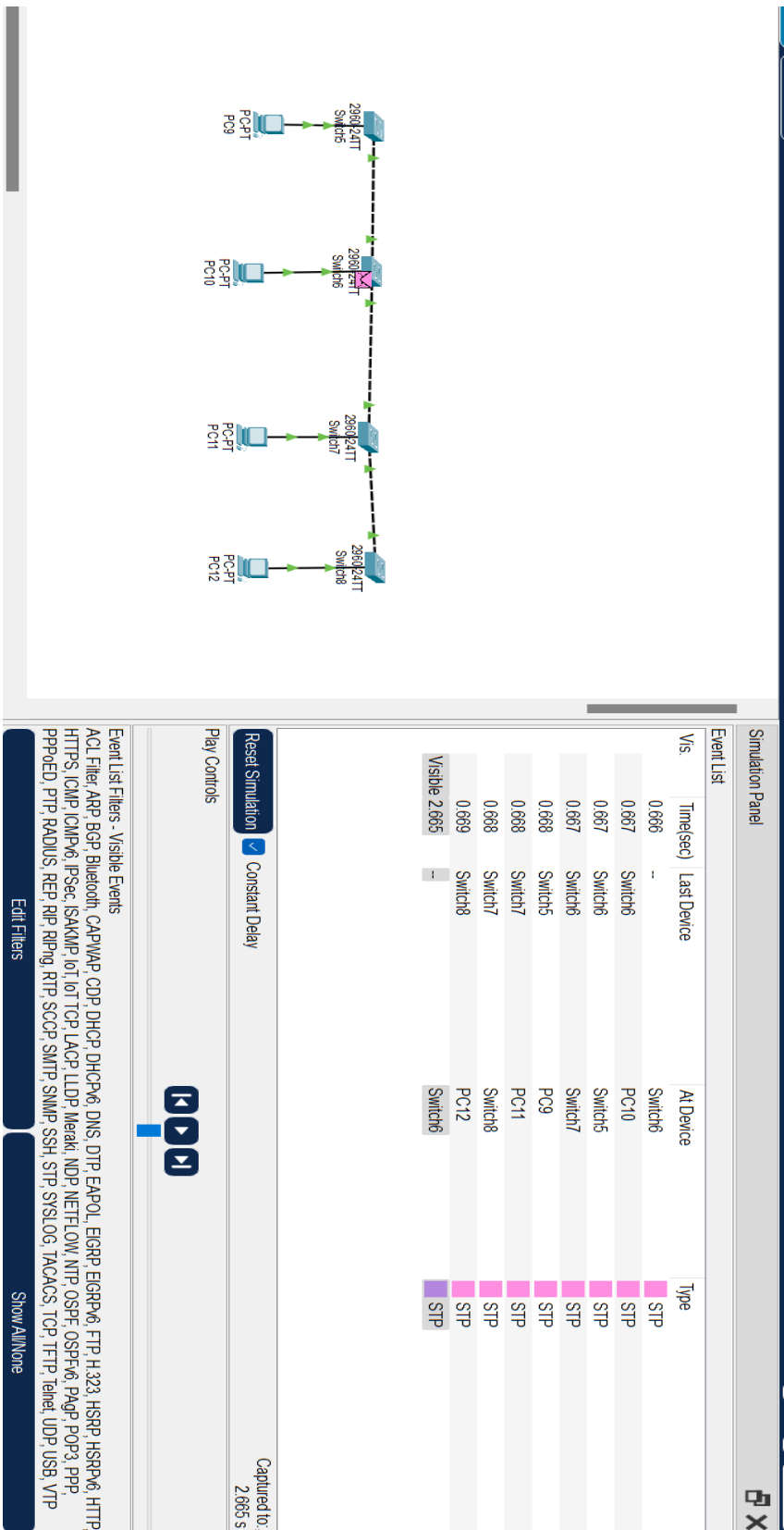
Subnet Mask = 255.255.255.0

IP of Desk 3 = 192.167.0.4

Subnet Mask = 255.255.255.0



Output :



## Mesh Topology

Description: In a mesh topology, every device is connected to every other device in the network. This results in redundant paths between devices, which improves fault tolerance and network reliability.

Advantages:

High fault tolerance; multiple paths ensure data can still be transmitted even if one path fails.

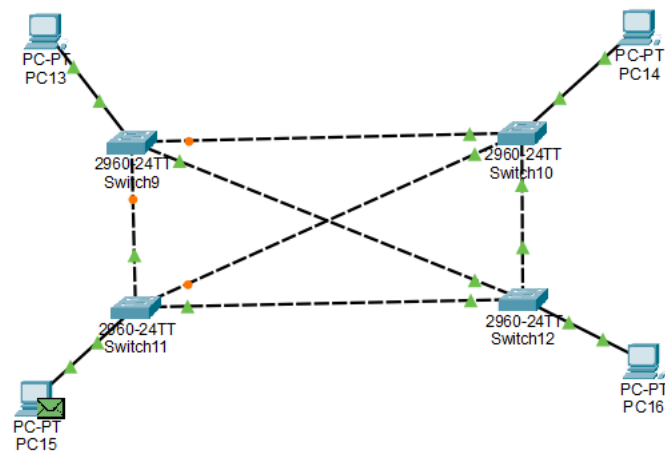
Scalable and flexible.

Disadvantages:

Expensive to implement due to the high number of connections required.

Complex to manage and troubleshoot.

Example: Wide area networks (WANs) and internet backbone networks.



## Configuration of IP And Subnet Mask:

The screenshot shows a network configuration window with tabs for Physical, Config, Desktop, Programming, and Attributes. The 'Desktop' tab is active, and the 'IP Configuration' window is open. The interface is set to 'FastEthernet0'. Under 'IP Configuration', the 'Static' radio button is selected. The IPv4 Address is set to 192.162.0.1, the Subnet Mask is 255.255.255.0, the Default Gateway is 0.0.0.0, and the DNS Server is 0.0.0.0. Under 'IPv6 Configuration', the 'Static' radio button is also selected. The IPv6 Address field is empty, the Link Local Address is FE80::202:4AFF:FE04:8EE4, and the Default Gateway and DNS Server fields are empty. Under '802.1X', the 'Use 802.1X Security' checkbox is unchecked, the Authentication is set to MD5, and the Username and Password fields are empty.

Section	Option	Value
IP Configuration	DHCP	<input type="radio"/>
	Static	<input checked="" type="radio"/>
	IPv4 Address	192.162.0.1
	Subnet Mask	255.255.255.0
	Default Gateway	0.0.0.0
DNS Server	0.0.0.0	
IPv6 Configuration	Automatic	<input type="radio"/>
	Static	<input checked="" type="radio"/>
	IPv6 Address	
	Link Local Address	FE80::202:4AFF:FE04:8EE4
	Default Gateway	
	DNS Server	
802.1X	Use 802.1X Security	<input type="checkbox"/>
	Authentication	MD5
	Username	
	Password	

IP of Desk 0 = 192.162.0.1

Subnet Mask = 255.255.255.0

IP of Desk 1 = 192.162.0.2

Subnet Mask = 255.255.255.0

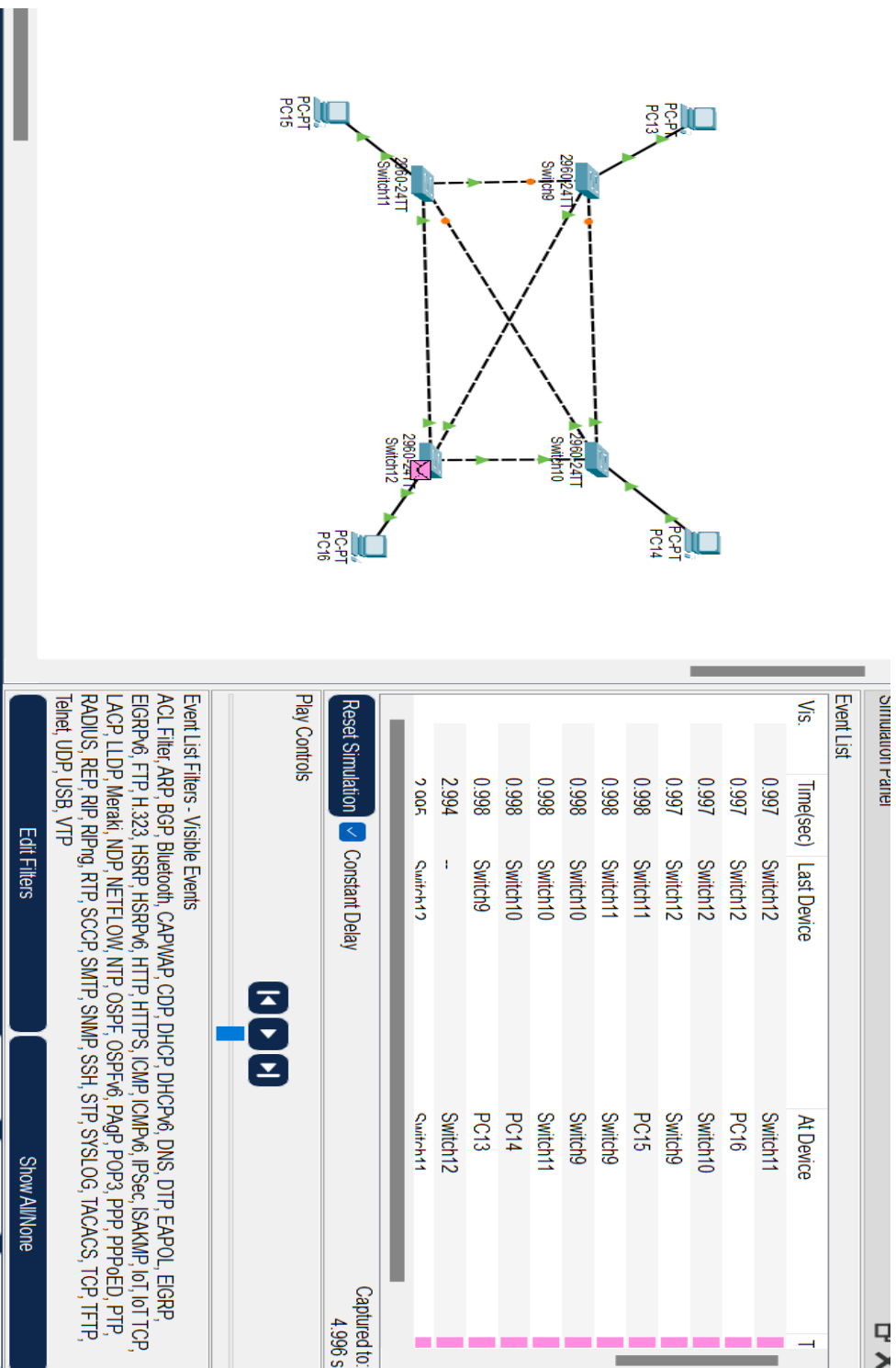
IP of Desk 2 = 192.162.0.3

Subnet Mask = 255.255.255.0

IP of Desk 3 = 192.162.0.4

Subnet Mask = 255.255.255.0

Output:



## Hybrid Topology

**Description:** A hybrid topology is a combination of two or more basic network topologies. For example, a network may combine elements of star and bus topologies or star and ring topologies.

### Advantages:

Provides flexibility to meet specific network requirements.

Can leverage the strengths of different topologies while mitigating their weaknesses.

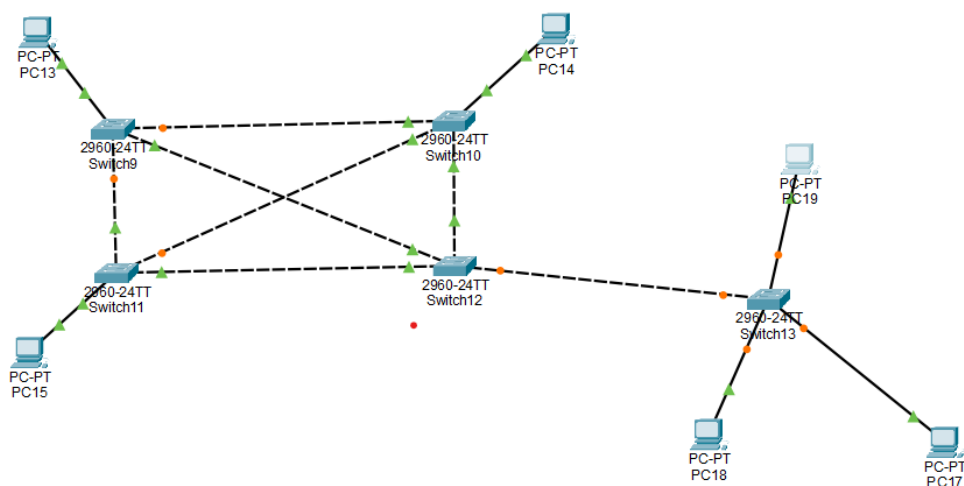
### Disadvantages:

Can be complex to design and implement.

Requires careful planning to ensure interoperability between different topology components.

**Example:** Large enterprise networks with multiple interconnected segments.

Hybrid = mesh + Star



## Configuration of IP And Subnet Mask:

Physical Config **Desktop** Programming Attributes

IP Configuration [X]

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.162.0.1

Subnet Mask 255.255.255.0

Default Gateway 0.0.0.0

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::202:4AFF:FE04:8EE4

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

IP of Desk 0 = 192.162.0.1

Subnet Mask = 255.255.255.0

IP of Desk 1 = 192.162.0.2

Subnet Mask = 255.255.255.0

IP of Desk 2 = 192.162.0.3

Subnet Mask = 255.255.255.0

IP of Desk 3 = 192.162.0.4

Subnet Mask = 255.255.255.0

IP of Desk 4 = 192.162.0.5

Subnet Mask = 255.255.255.0

IP of Desk 5 = 192.162.0.6

Subnet Mask = 255.255.255.0

Output :

Simulation Panel

Event List

Vis	Time(sec)	Last Device	At Device	Type
1.654	--	Switch12	Switch12	STP
1.655		Switch12	Switch11	STP
1.655		Switch12	Switch13	STP
1.655		Switch12	Switch10	STP
1.655		Switch12	Switch9	STP
1.656		Switch11	PC15	STP
1.656		Switch11	Switch9	STP
1.656		Switch13	PC18	STP
1.656		Switch13	PC17	STP
1.656		Switch13	PC19	STP
1.656		Switch10	Switch9	STP
1.656		Switch10	Switch11	STP
1.656		Switch10	PC14	STP

Reset Simulation

☒ Constant Delay

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPsec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, Page, POP3, PPP, PPOE, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TFTP, Telnet, UDP, USB, VTP

Edit Filters

Show AllNone

Captured to: 3.794 s