

Computer Communication and Networks Lab

Exp 1 & 2

Components in Computer Networking

Hardware Components

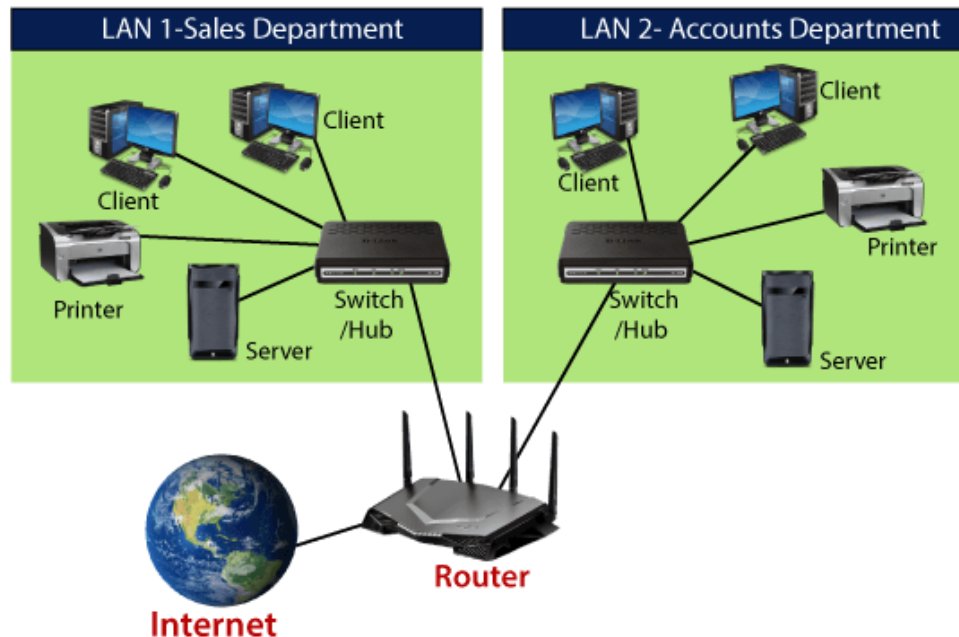
- Routers / Switches / Bridge / Repeater / Firewall / NIC Card

Wires

Components :

Router

- Routers **guide** and **direct network data**
 - Packets that contain various kinds of data
 - Such as files, communications, and simple transmissions like web interactions.



TP-Link Archer C6 Gigabit
MU-MIMO Wireless Router

Components :

Switch

- Is **networking hardware** that **connects devices on a computer network**
- By using **packet switching** to **receive and forward data** to the destination device.
- Also called **switching hub**, **bridging hub**



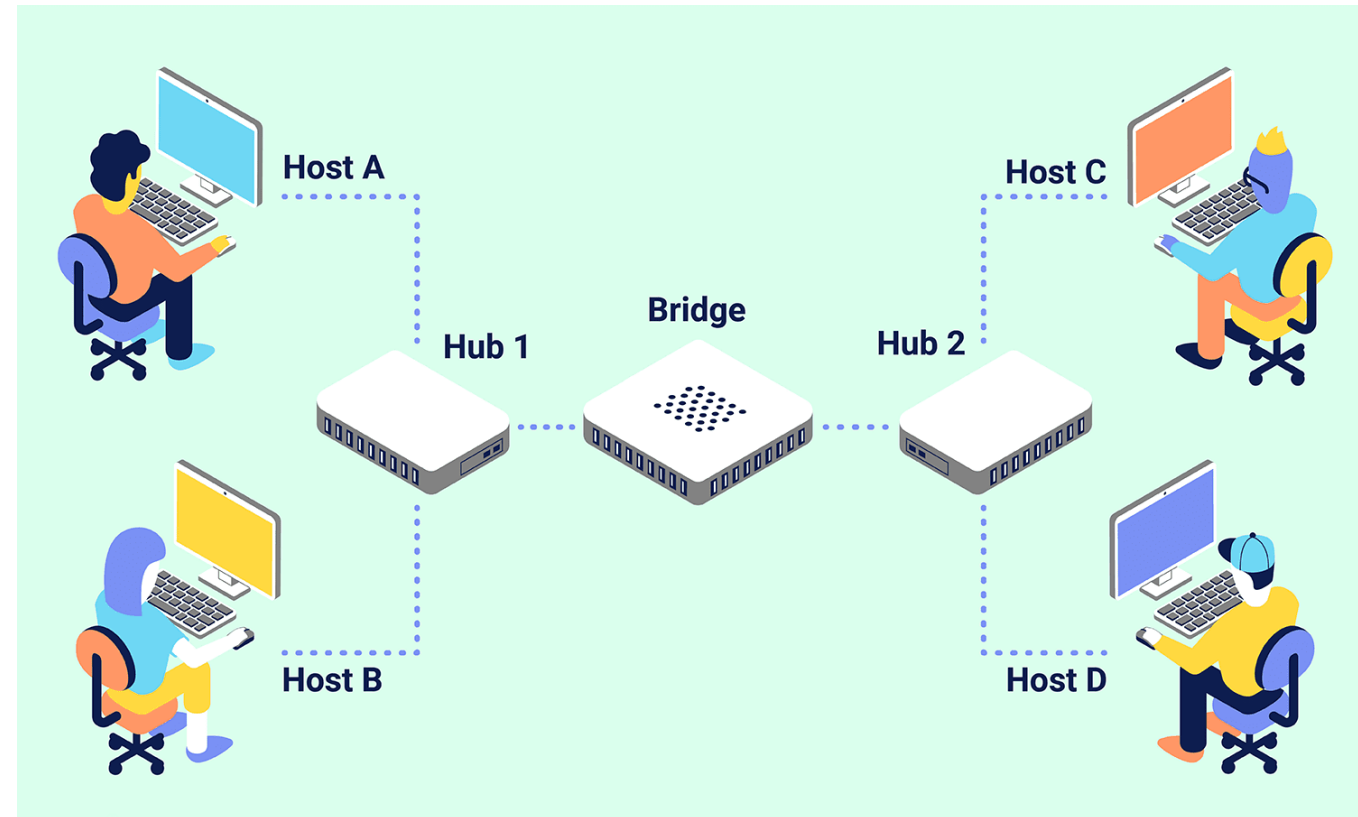
Avaya ERS 2550T-PWR, a 50-port Ethernet switch



TP-Link TL-SF1008D 8-Port
10/100Mbps Desktop Switch

Components : Bridge

- A network bridge joins **two separate computer networks**.
- The network bridge enables communication between the two networks and **provides a way for them to work as a single network**.
- Bridges **extend local area networks to cover a larger physical area** than the LAN can reach.



Components :

Repeater

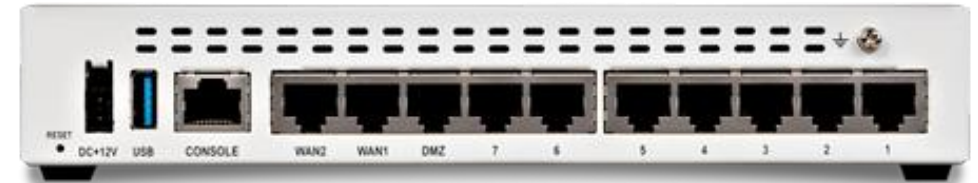
- An electronic device that receives a signal and retransmits it at a higher level or higher power
- So that the signal can cover longer distances.



Components :

Firewall

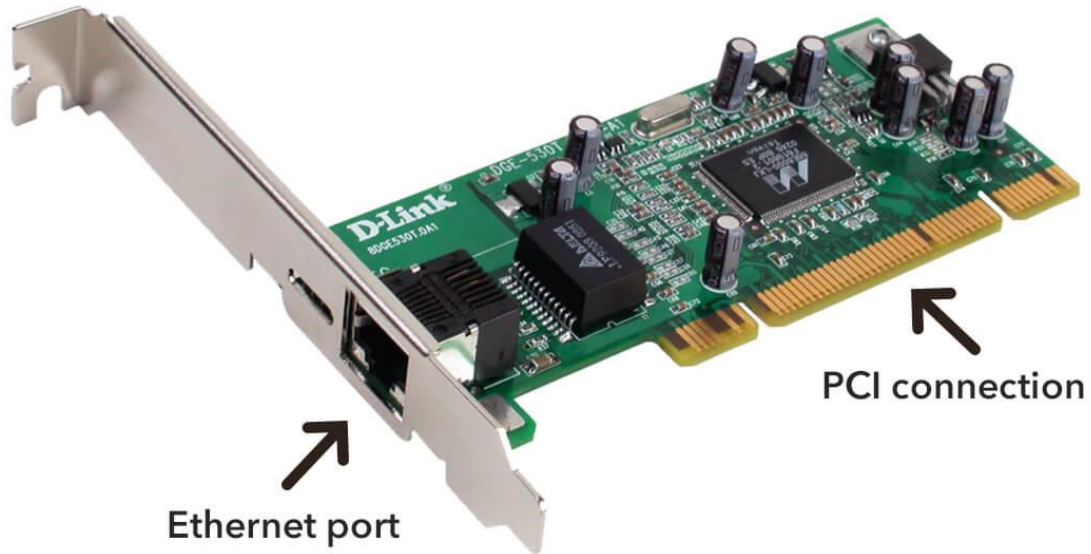
- A Firewall is a network security device that monitors and filters incoming and outgoing network traffic based on an organization's previously established security policies.
- At its most basic, a firewall is essentially the barrier that is placed in between a private internal network and the public Internet.



Components :

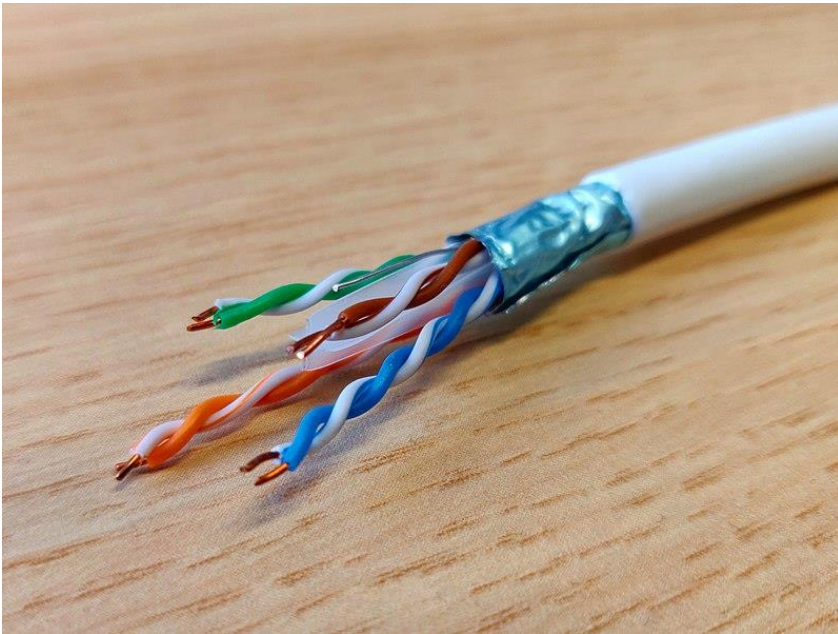
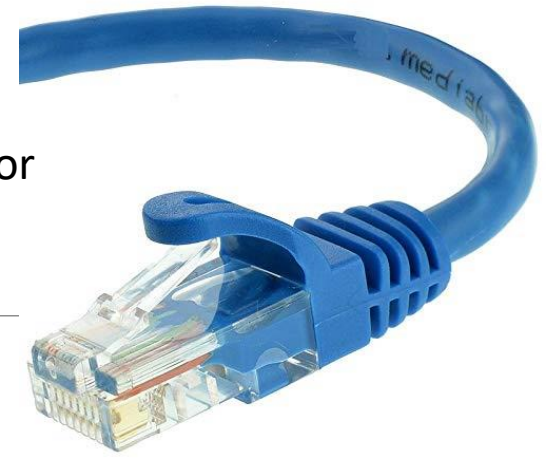
NIC Card

Gigabit Ethernet NIC

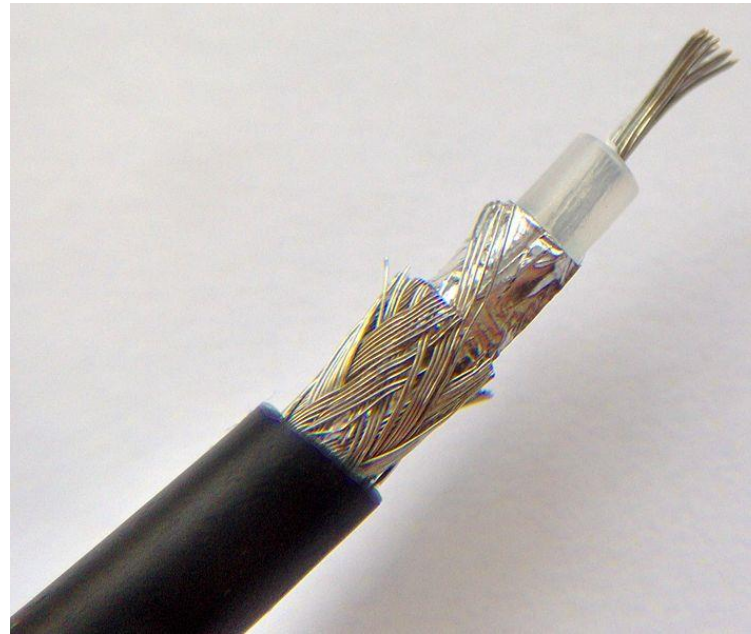


Wires

RJ45 Connector



Twisted Pair Cable
(Unshielded & Shielded)



Coaxial Cable



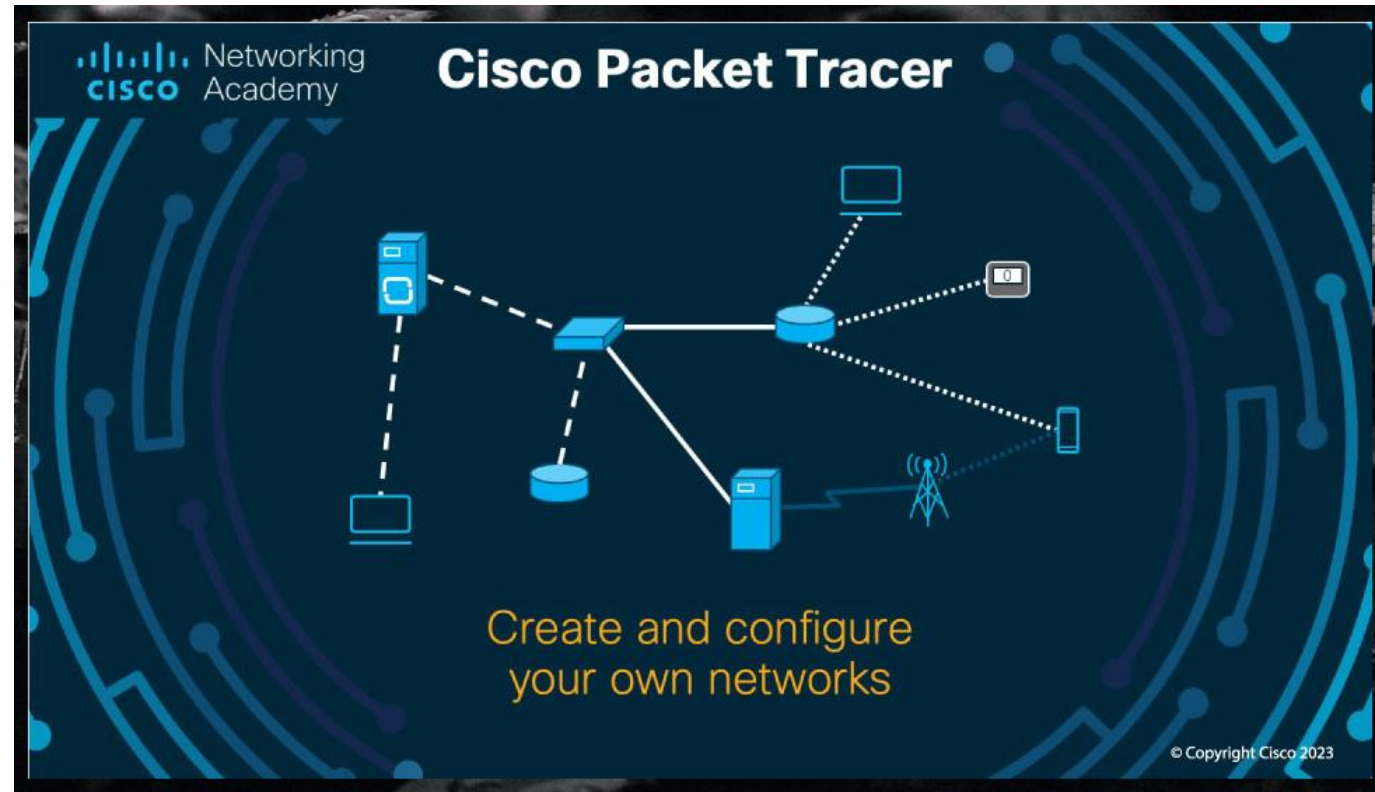
OFC

Cisco Packet Tracer

Cisco Packet Tracer

Packet Tracer is a **cross-platform visual simulation tool** designed by Cisco Systems that allows users **to create network topologies** and **imitate modern computer networks**.

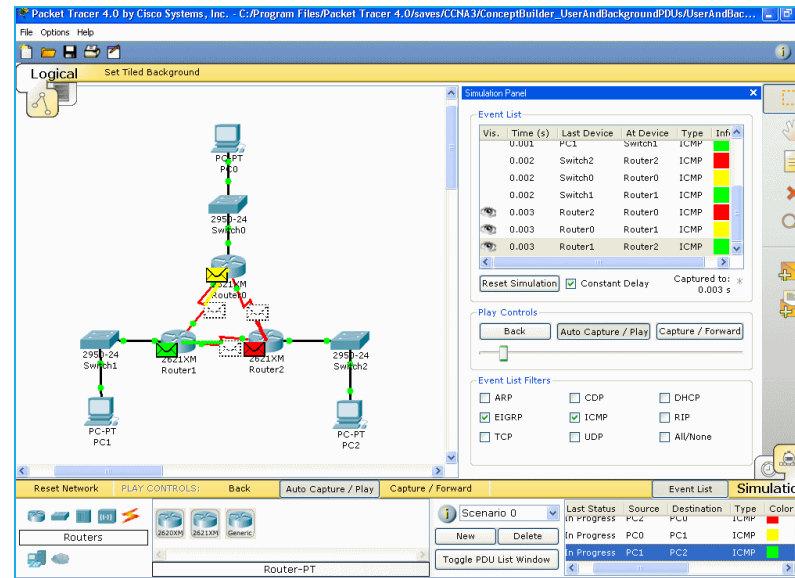
Packet Tracer makes use of a **drag and drop user interface**, allowing users to add and remove simulated network devices as they see fit.



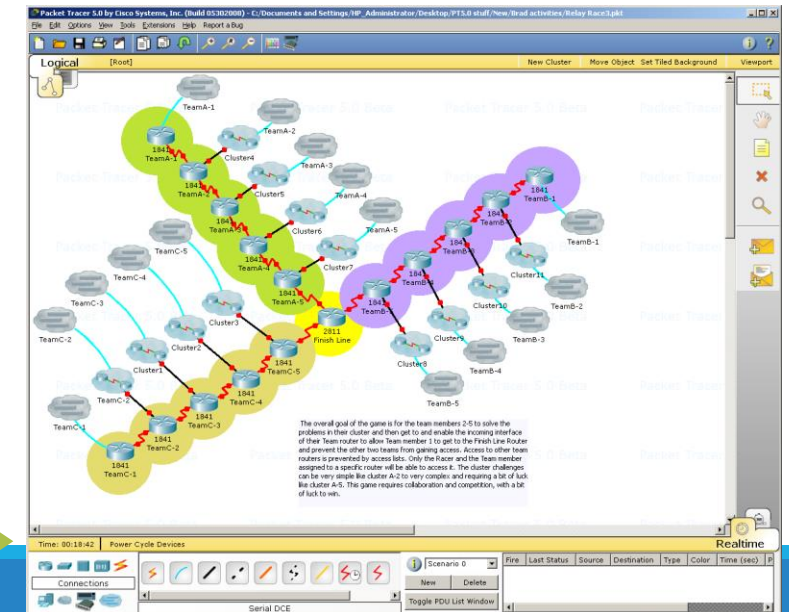
Simulation, Visualization, Collaboration

```
SiteB
Physical Config CLI
IOS Command Line Interface
00:00:20: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.0.226 on Serial0/1 from Down to FULL, Loading Done
SiteB>ena
SiteB#sho ip rout
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
    192.168.0.0/24 is variably subnetted, 7 subnets, 3 masks
    C    192.168.0.0/25 is directly connected, FastEthernet0/1
    O    192.168.0.128/27 [110/129] via 192.168.0.229, 00:00:10, Serial0/1
    C    192.168.0.160/27 is directly connected, FastEthernet0/0
    O    192.168.0.192/27 [110/65] via 192.168.0.234, 00:00:20, Serial0/0
    O    192.168.0.224/30 [110/128] via 192.168.0.229, 00:00:20, Serial0/1
    C    192.168.0.228/30 is directly connected, Serial0/1
    C    192.168.0.232/30 is directly connected, Serial0/0
SiteB#
00:00:45: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.0.226 on FastEthernet0/1 from E
XCHANGE to FULL, Exchange Done
00:00:55: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.0.234 on FastEthernet0/1 from E
XCHANGE to FULL, Exchange Done
```

simulate IOS commands



visualize network traffic



collaborate on multiuser activities

Various Networking Specific Commands

- **ipconfig**

- Displays all current TCP/IP network configuration

- **ping**

- Syntax: ping [target address].
- e.g. ping www.google.com

- **tracert**

- Determines the path taken to a destination by sending Internet Control Message Protocol (ICMP) echo.
- e.g. tracert www.google.com

- **netstat**

- Displays active TCP connections, ports on which the computer is listening

- **nslookup**

- Lets users enter a host name and find out the corresponding IP address or domain name system (DNS) record.

Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

Objectives:

1. Set-up a simple point-to-point network between two hosts.
2. Setup a local area network using star topology using a Data Link Layer Switch
3. Setup a Server Client Topology

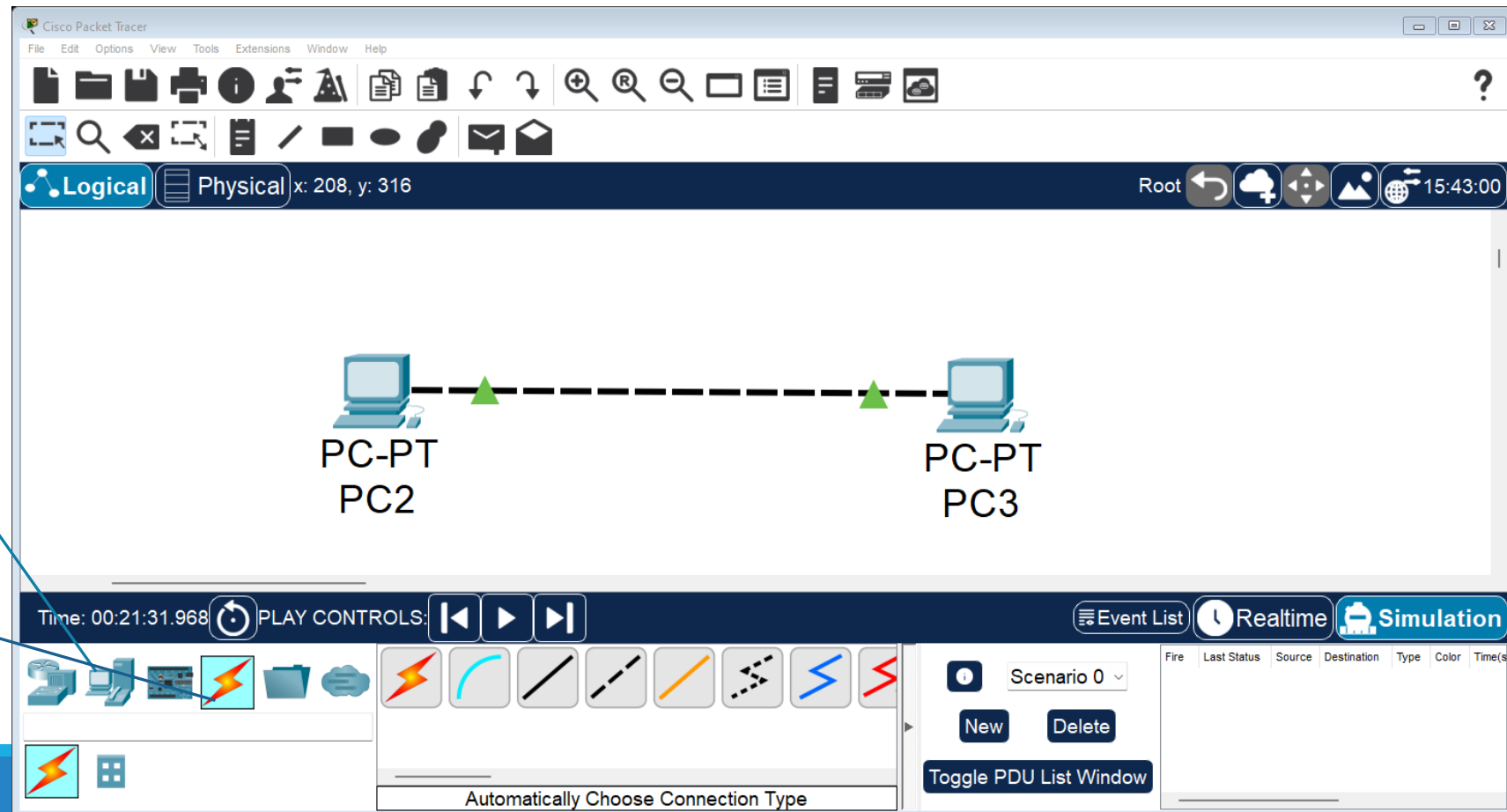
Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

Objective 1: Set-up a simple point-to-point network between two hosts.

Step 1 Choose the Hosts

Step 2 Choose the Connecting cable



Expt. 1:

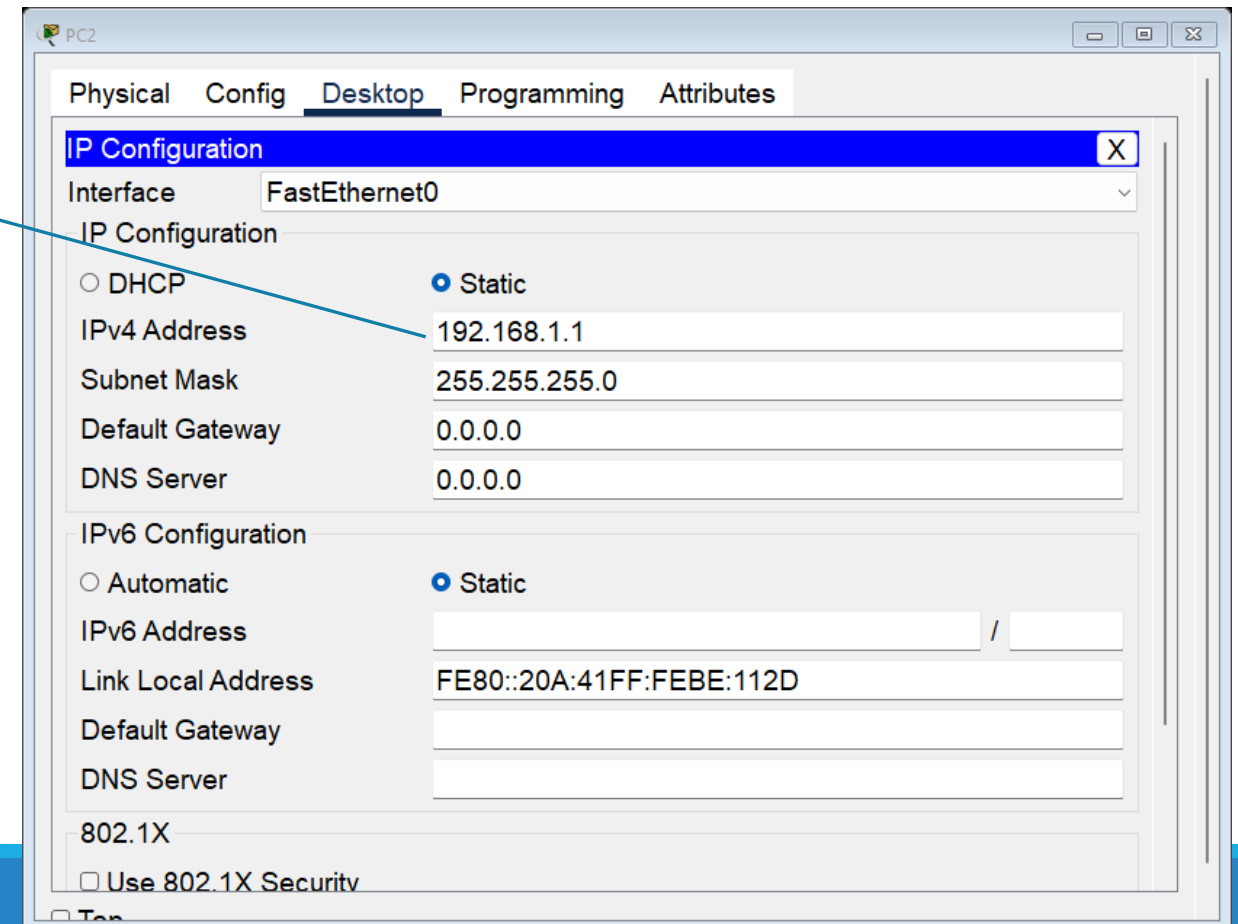
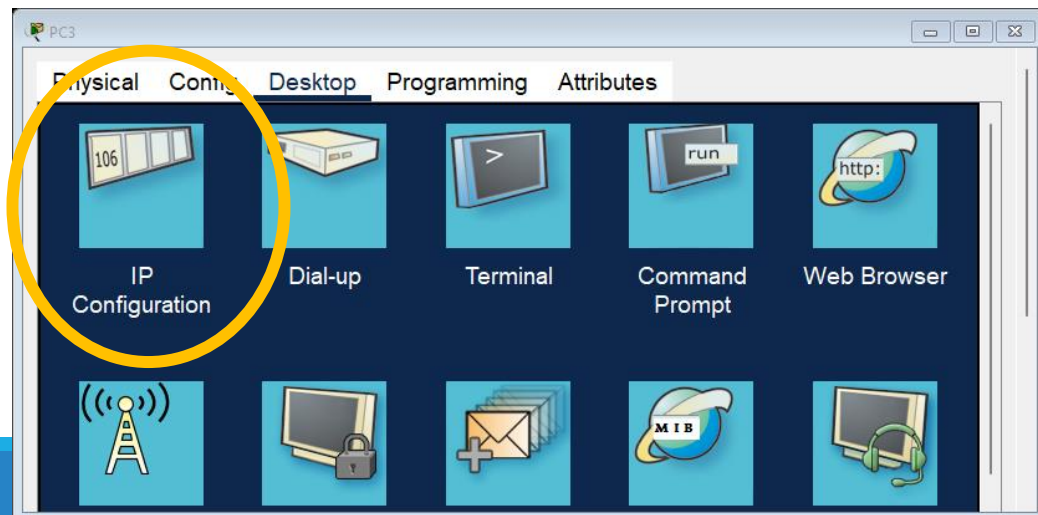
Client-Server Network Topology using Cisco Packet Tracer

Objective 1: Set-up a simple point-to-point network between two hosts.

Step 3 Configure the IP Address of each Host as:

Host 1 : 192.168.1.1

Host 2 : 192.168.1.2



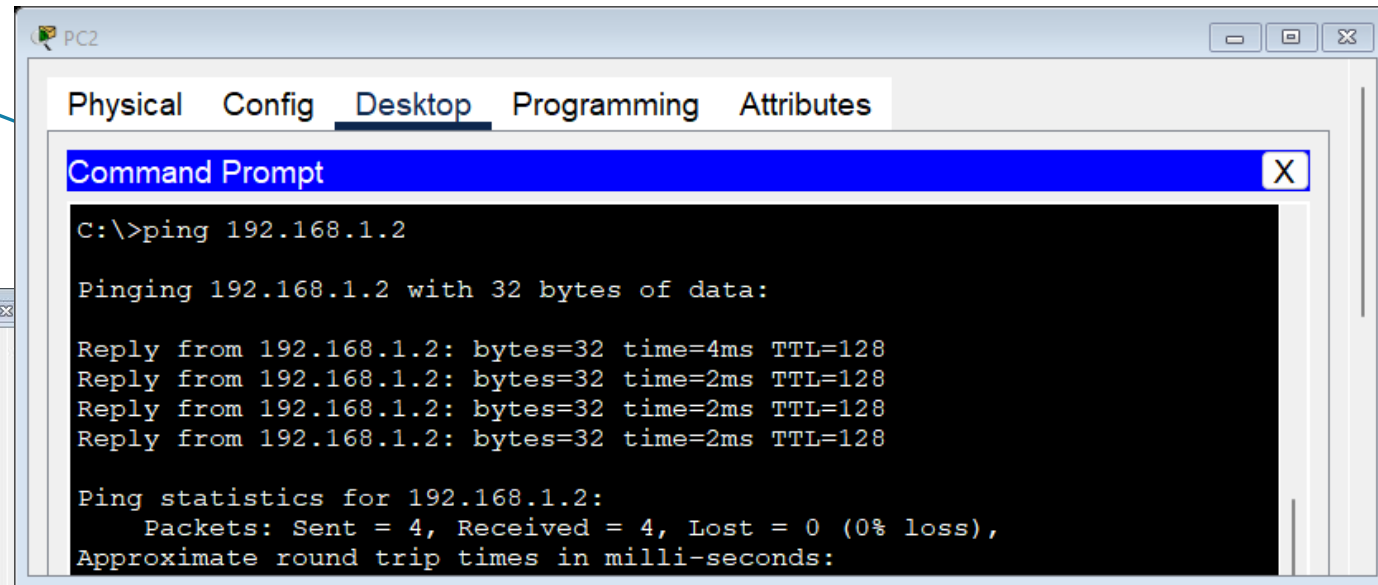
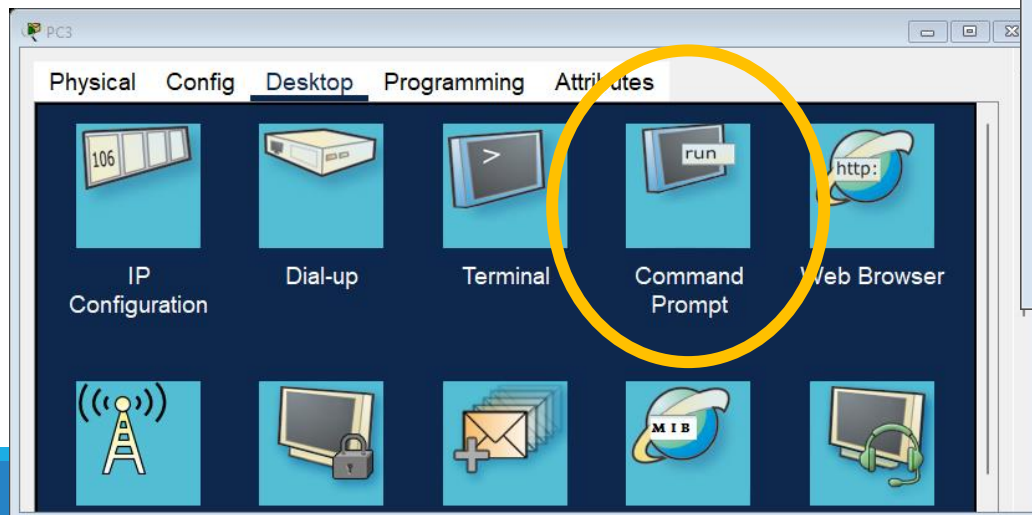
Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

Objective 1: Set-up a simple point-to-point network between two hosts.

Step 4 use *ping* command to access the Host 2 from Host 1 to verify if they are connected.

Host 1 : ping 192.168.1.2



Expt. 1:

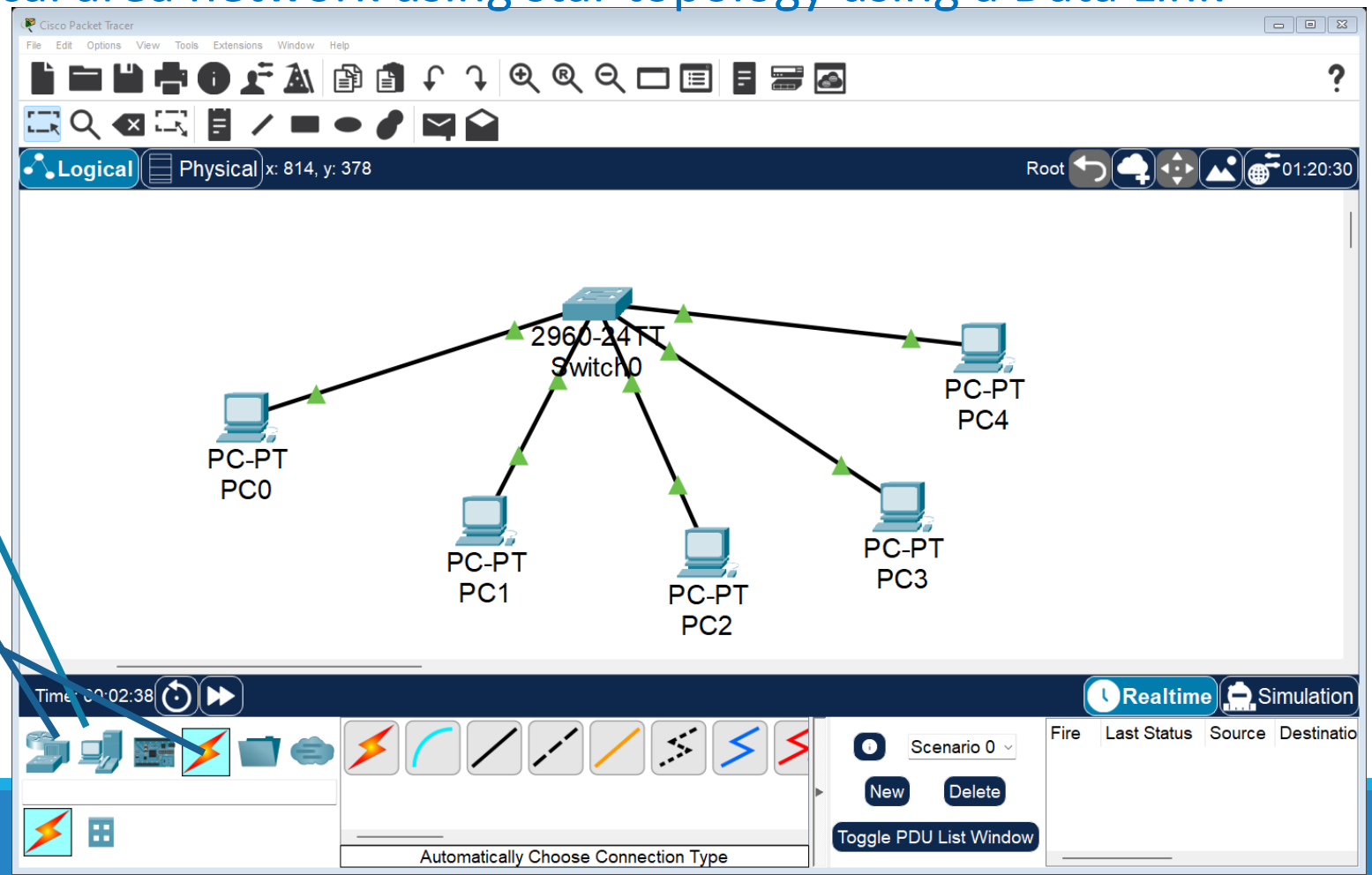
Client-Server Network Topology using Cisco Packet Tracer

Objective 2: Setup a local area network using star topology using a Data Link Layer Switch.

Step 1 Choose the Hosts

Step 2 Choose the Switch

Step 3 Choose the Connecting cable



Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

Objective 2: Setup a local area network using star topology using a Data Link Layer Switch.

Step 3 Configure the IP Address of each Host as:

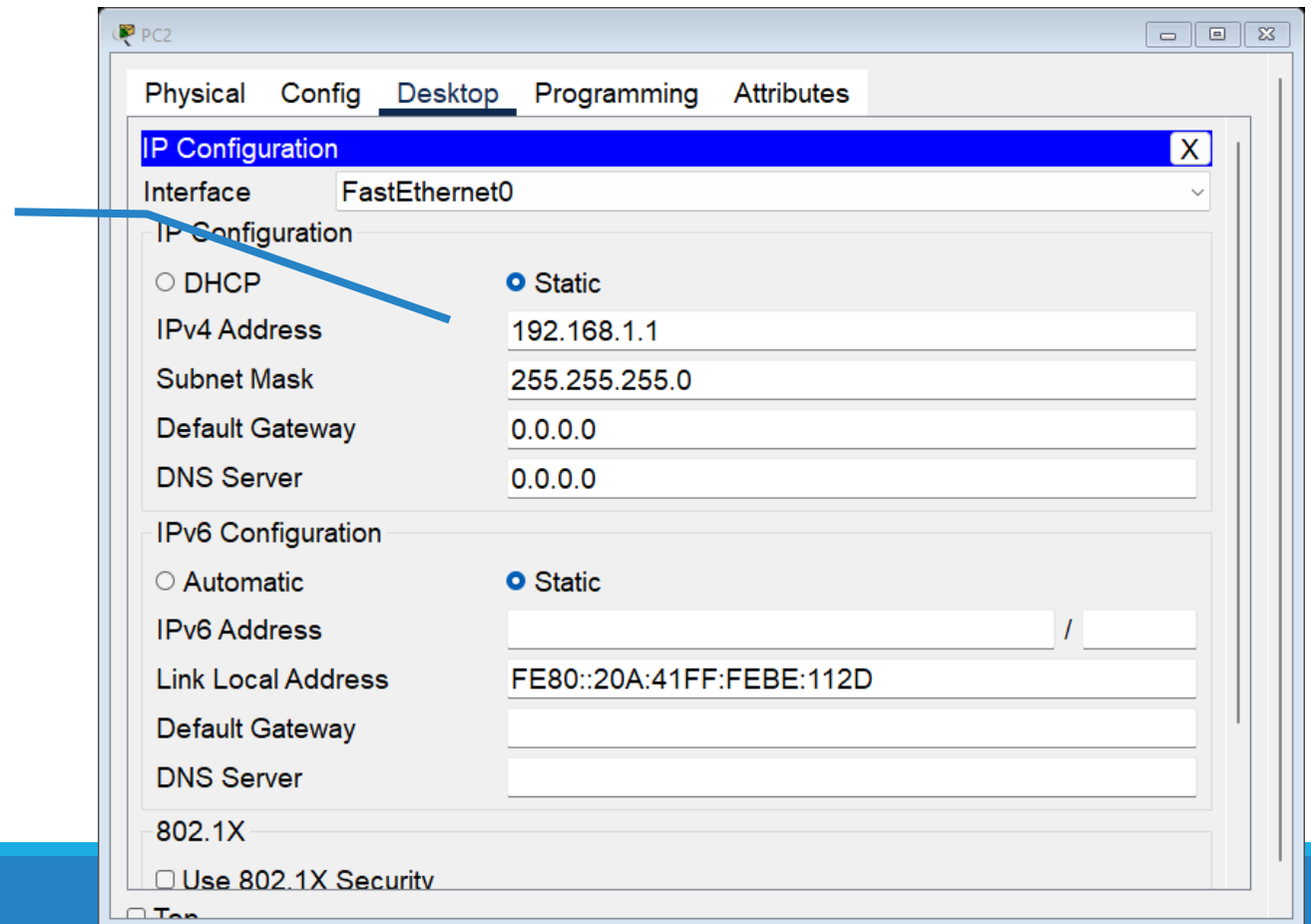
Host 1 : 192.168.1.1

Host 2 : 192.168.1.2

Host 3 : 192.168.1.3

Host 4 : 192.168.1.4

Host 5 : 192.168.1.5



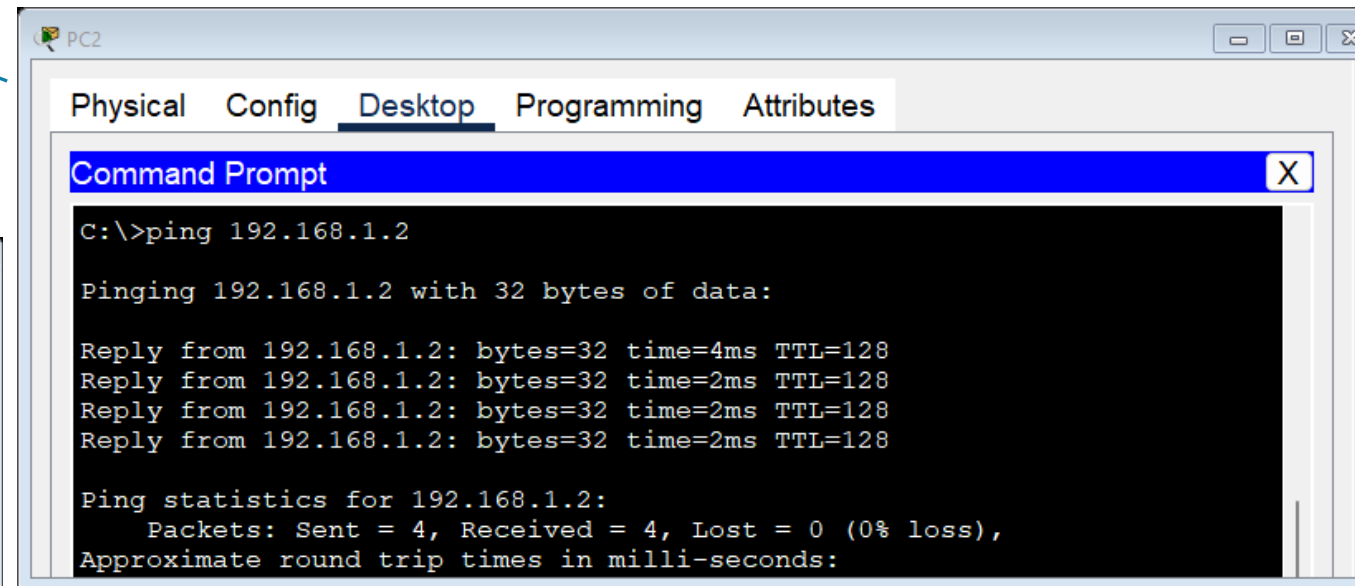
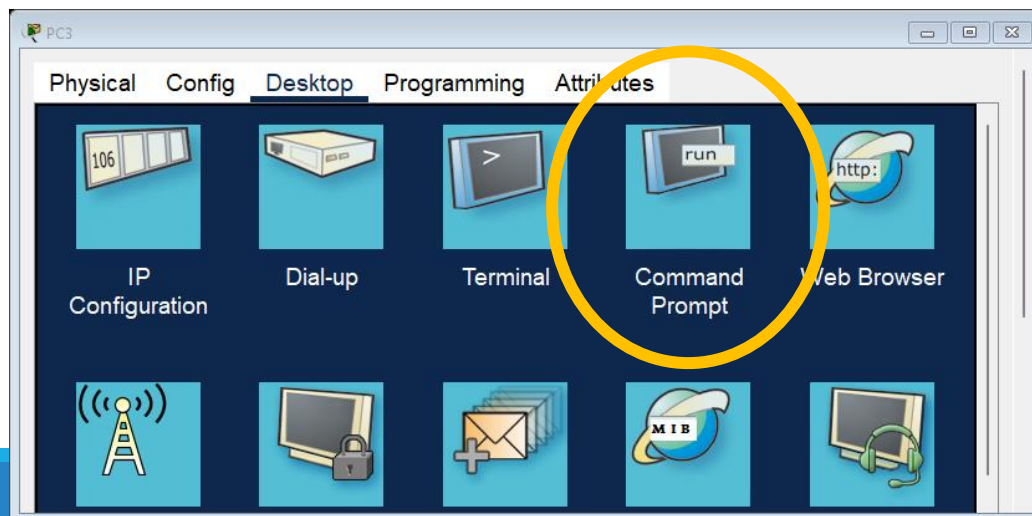
Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

Objective 2: Setup a local area network using star topology using a Data Link Layer Switch

Step 4 use ping command to access the Host 4 from Host 1 to verify if they are connected.

Host 1 : ping 192.168.1.4



Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

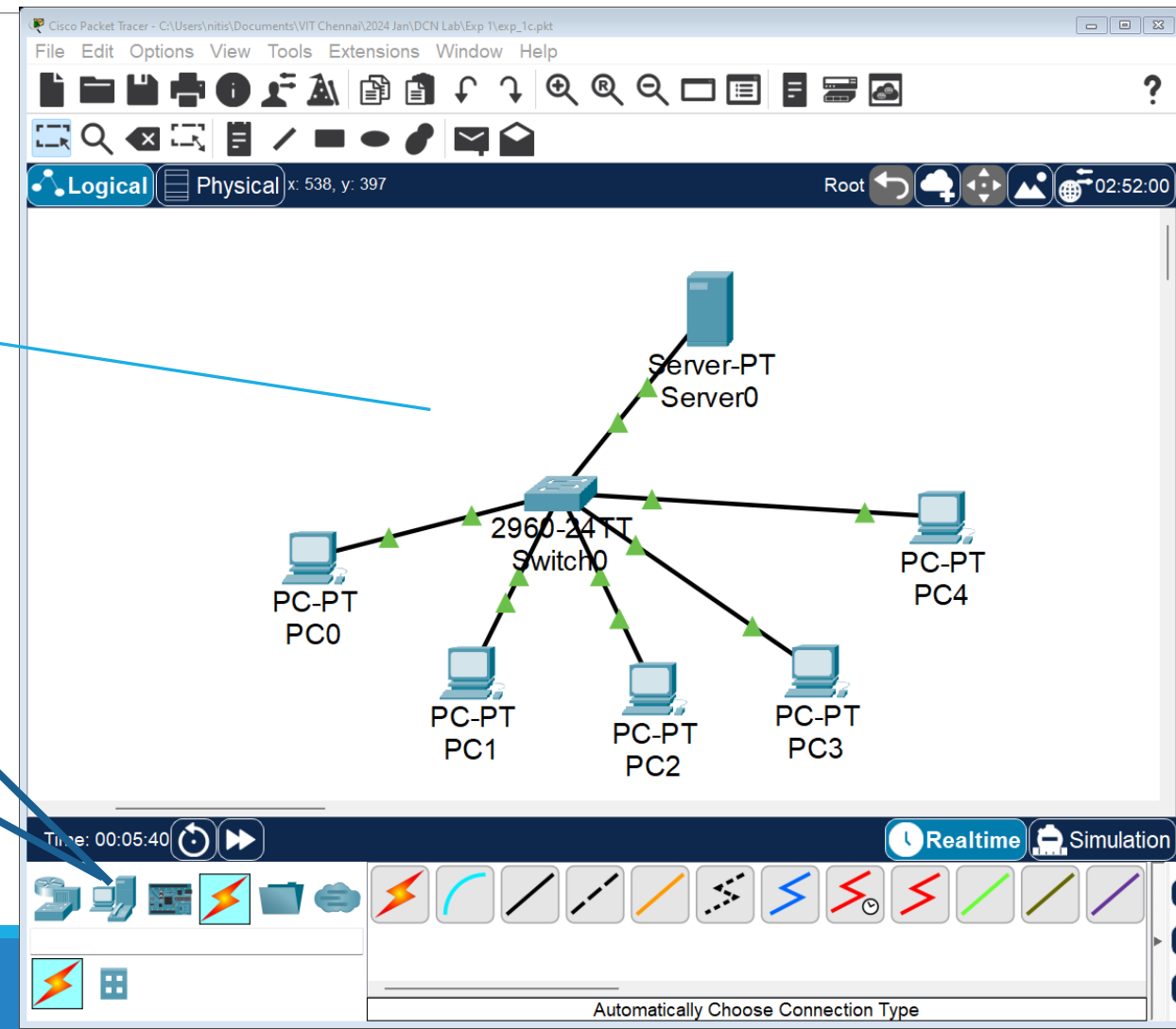
Objective 3:

Setup a Server Client Topology

Setup the network as done
in Objective 2

Step 1 Choose the Server

Step 2 Configure the Server



Expt. 1:

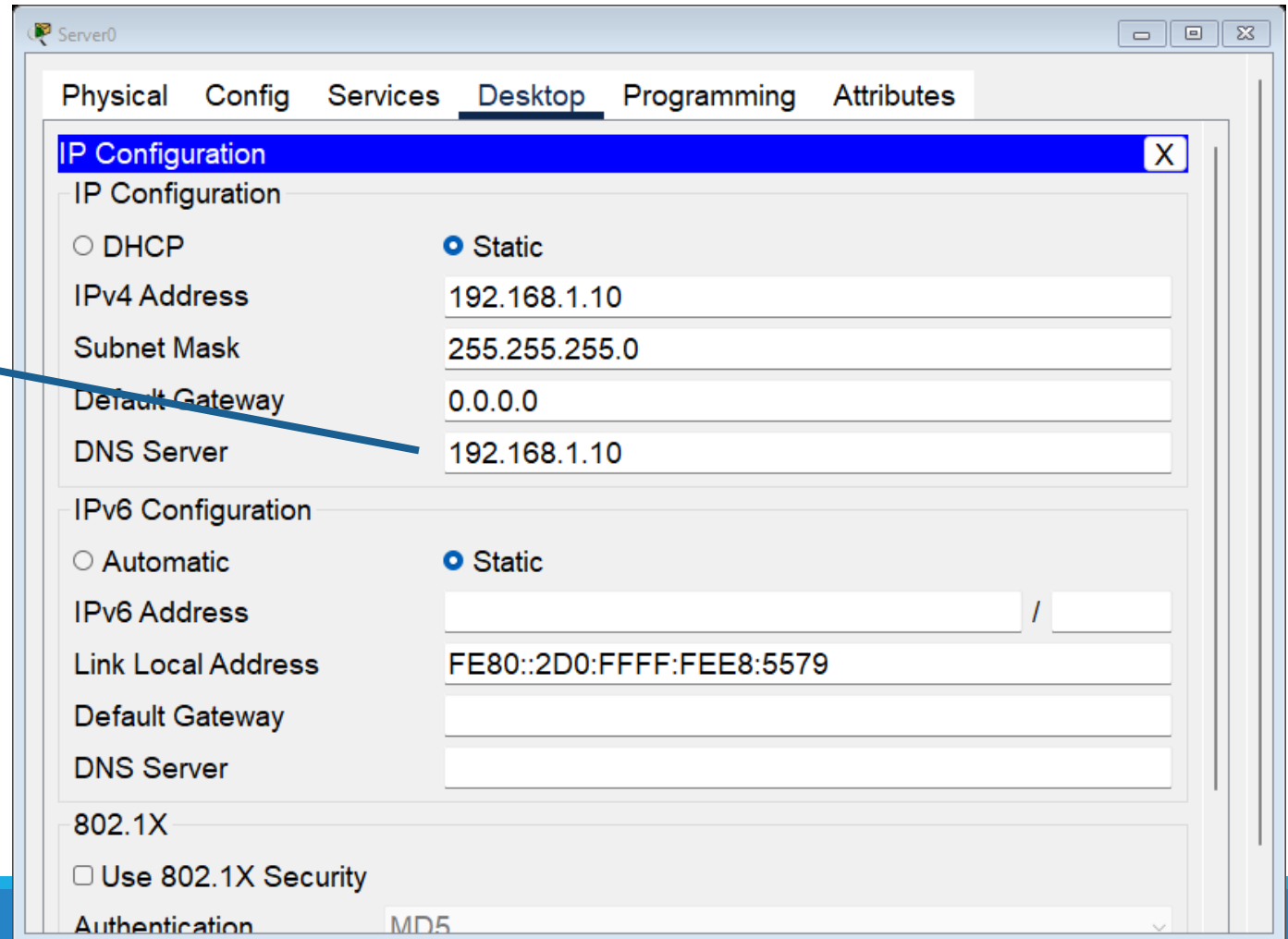
Client-Server Network Topology using Cisco Packet Tracer

Objective 3:

Setup a Server Client Topology

Step 3 Configure the Server

Give the same IP as the DNS
Server IP



The screenshot shows the configuration window for a device named 'Server0' in Cisco Packet Tracer. The 'Desktop' tab is selected, and the 'IP Configuration' window is open. The configuration is as follows:

IP Configuration	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IPv4 Address	192.168.1.10
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	192.168.1.10

IPv6 Configuration	
<input type="radio"/> Automatic <input checked="" type="radio"/> Static	
IPv6 Address	
Link Local Address	FE80::2D0:FFFF:FEE8:5579
Default Gateway	
DNS Server	

802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5

A blue arrow points from the text 'Give the same IP as the DNS Server IP' to the 'DNS Server' field in the IPv4 Configuration section, which contains the value '192.168.1.10'.

Expt. 1:

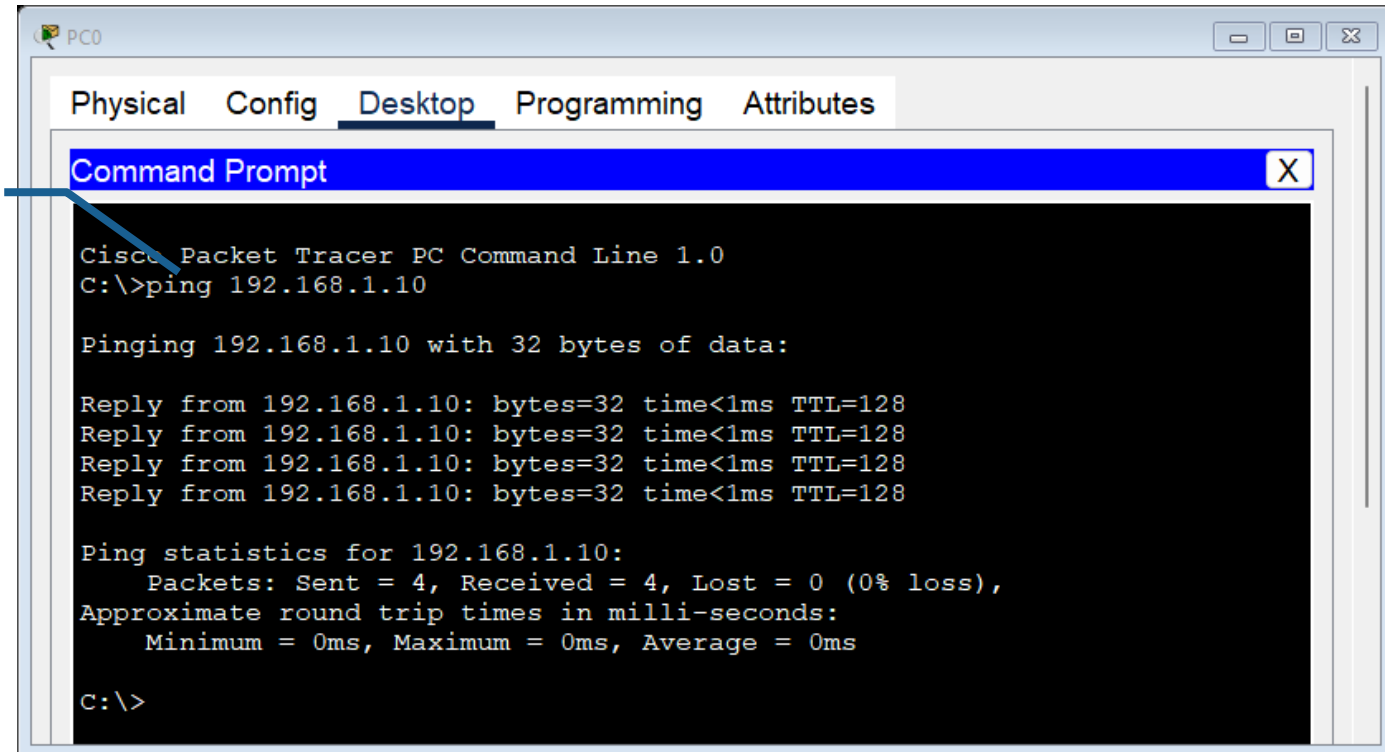
Client-Server Network Topology using Cisco Packet Tracer

Objective 3:

Setup a Server Client Topology

Step 4 Check for Connectivity from Hosts

Using the ping command from hosts
ping 192.168.1.10



The screenshot shows a Cisco Packet Tracer PC Command Line window for PC0. The 'Desktop' tab is selected. The command prompt displays the output of the 'ping 192.168.1.10' command, which is successful. The output shows four replies from 192.168.1.10 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% loss.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128
Reply from 192.168.1.10: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

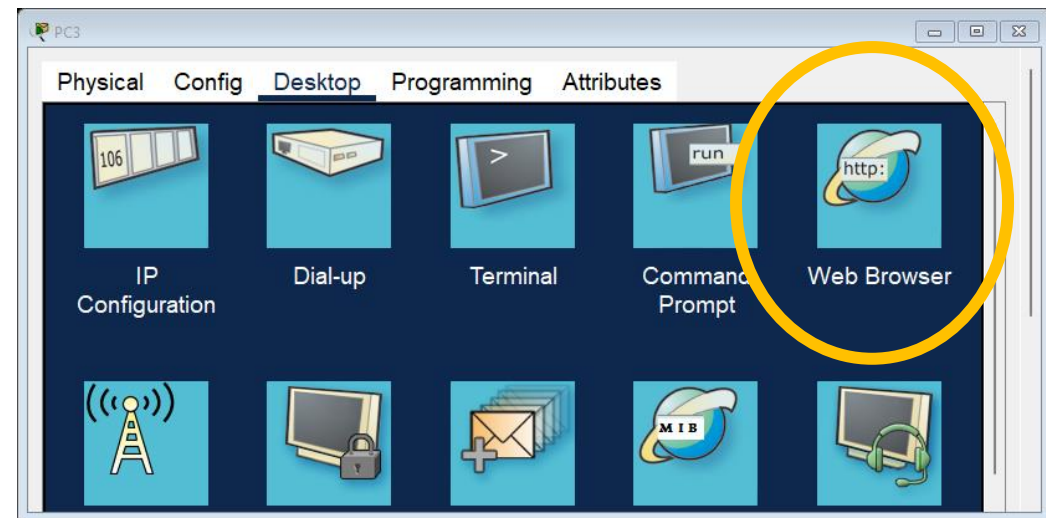
Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

Objective 3:

Setup a Server Client Topology

Step 5 use the services of Server
from any host open the browser and enter
the URL as
`http://192.168.1.10/index.html`



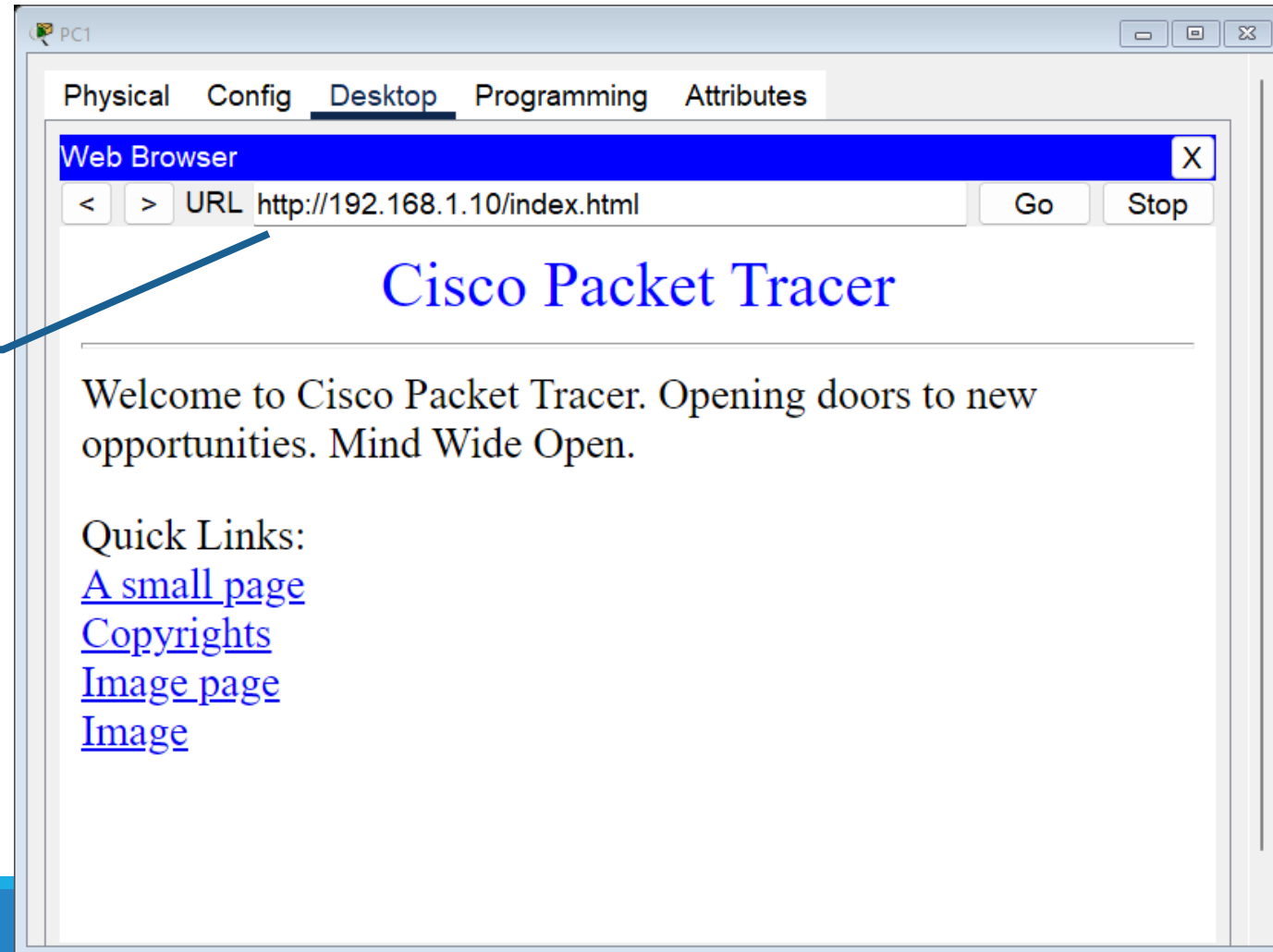
Expt. 1:

Client-Server Network Topology using Cisco Packet Tracer

Objective 3:

Setup a Server Client Topology

Step 5 use the services of Server
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Expt. 2:

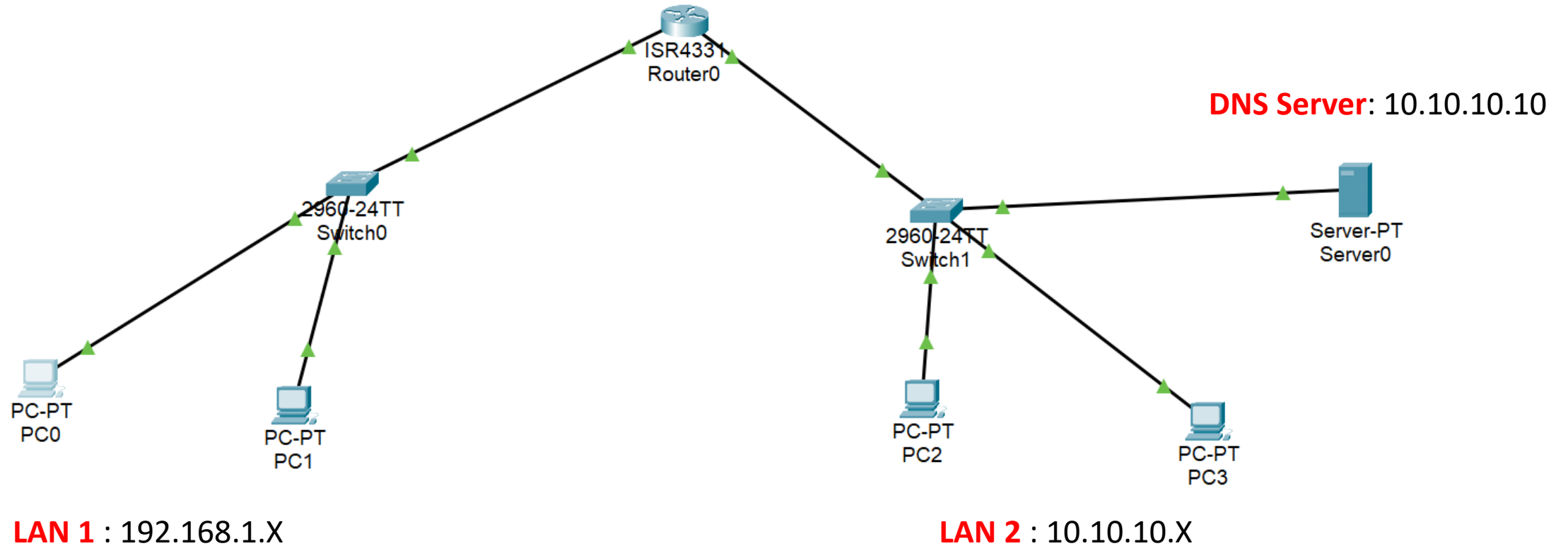
Set-up a Wide Area Network using a router in Cisco Packet Tracer

Objectives:

1. To set-up a physical network wide area network using a router
2. Configure a server on LAN-2
3. Try to access the server on LAN-1

Expt. 2:

Set-up a Wide Area Network using a router in Cisco Packet Tracer



Expt. 2:

Set-up a Wide Area Network using a router in Cisco Packet Tracer

Step 1:

Select the following components:

- a. End Devices > PC
- b. Network Devices > Switches > Switch 2960
- c. Network Devices > Routers > Router 2911

Step 2:

Form 2 LANs, and connect PCs to each via a 2960 switch via straight cables

a. Assign IP Addresses to LAN 1

- i. Assign IP address '192.168.1.X' to PCX

b. Assign IP Addresses to LAN 2

- i. Assign IP address '10.10.10.Y' to PCY

Expt. 2:

Set-up a Wide Area Network using a router in Cisco Packet Tracer

Step 3:

Connect the Switches to the Router 2911 via Gigabit interface

i. Connect Gig0/1 of SW 1 to Gig0/0 of Router

- Assign IP Addresses '192.168.1.X' to the Gig0/0 interface of the router 2911 and
- Check 'Port Status' to 'On'

ii. Connect Gig0/1 of SW 2 to Gig0/1 of Router

- Assign IP Addresses '10.10.10.Y' to the Gig0/1 interface of the router 2911 and
- Check 'Port Status' to 'On'

Expt. 2:

Set-up a Wide Area Network using a router in Cisco Packet Tracer

Step 4:

Assign Default Gateway Addresses:

- i. GW Address '192.168.1.4' to LAN 1
- ii. GW Address '10.10.10.4' to LAN 2

Step 5:

Configure Server on LAN-2

Step 6:

- i. *ping LAN 2 from LAN 1 to check for connectivity*
- ii. *Access DNS server on LAN 1*