

LAB NO: 5

Computer Network Design using HUB in Cisco Packet Tracer

Objective:

To design and simulate a computer network using a HUB in Cisco Packet Tracer to understand basic network connectivity, communication, and packet transfer between devices.

Apparatus/Software Required:

- Cisco Packet Tracer Software (Version 7.2 or later)
- Network Devices: HUB, PCs
- Cables: Copper straight-through cables

Theory:

A HUB is a basic networking device used to connect multiple devices in a Local Area Network (LAN). It operates at the Physical Layer (Layer 1) of the OSI model and forwards data it receives to all ports, which can lead to increased collisions in large networks. HUBs do not filter data and thus broadcast the data to all connected devices.

In a HUB-based network, the devices share the same bandwidth, and data sent by one device is available to all other devices on the network, although only the intended recipient accepts and processes the data. HUBs are considered less efficient than switches, but they help demonstrate the fundamentals of networking.

Network Design Overview:

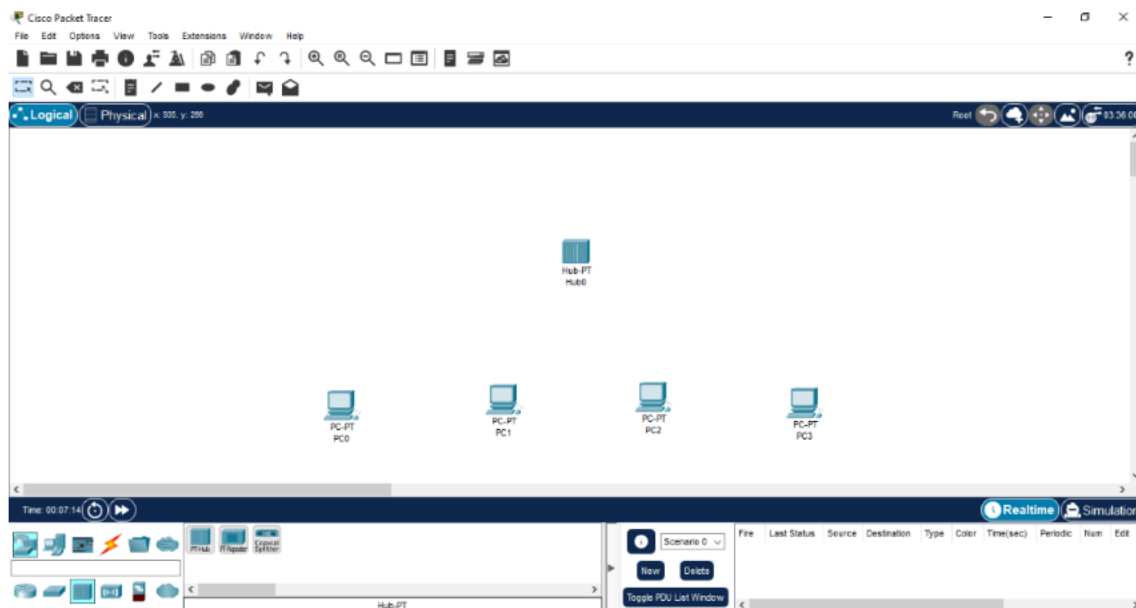
In this experiment, we will design a small network with a HUB, connecting multiple PCs to simulate basic communication. The network design will consist of:

- A HUB
- Three PCs
- Copper straight-through cables for connections

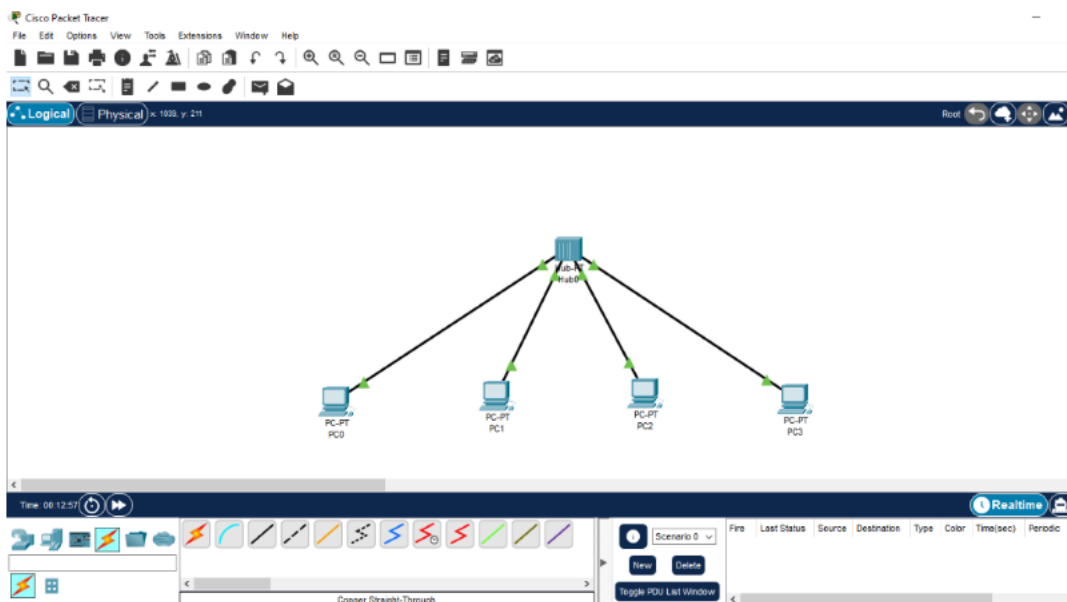
Procedure:

Step 1: Open the Cisco Packet Tracer.

Step 2: On opening Cisco packet tracer, click on End devices from bottom left icon menus, Add four PCs and a hub into the screen of the simulator.



Step 3: Connect all PCs and hub with copper straight cable by selecting it through the cables menu from the bottom left menus in the simulator. Green signal in the wire shows they're ready to communicate.



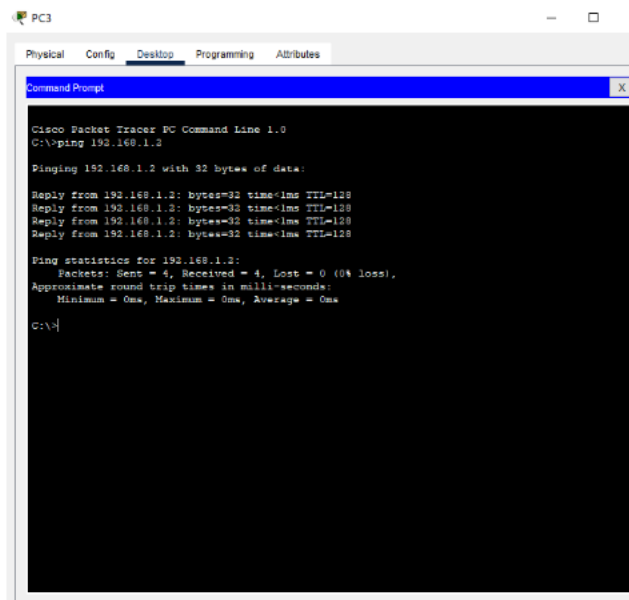
Step 4: Now, we've to give unique IP address to each PC. Click on each PC, go to Desktop section and then click on IP configuration to give IP address.

IP Address	Subnet Mask
192.168.1.1	255.255.255.0
192.168.1.2	255.255.255.0
192.168.1.3	255.255.255.0
192.168.1.4	255.255.255.0

Step 5: Click on a PC, go to Desktop and then click on Command prompt.

Step 6: After that test the ping command in command prompt to check the connectivity between these PCs.

For eg : ping 192.168.1.3



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PC3
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:

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

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
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Step 7: If ping command works successfully, then it means all these PCs are able to communicate and share data between them and we've build our network of four PCs and a Hub successfully.

Analyze Results:

In simulation mode, observe how the packets are transmitted from one PC to the HUB and then broadcast to all devices. Note that the HUB forwards the packet to all connected PCs, even if it is not the intended recipient.

Observations:

The HUB broadcasts the packets to all devices connected to it.

Only the intended device (the one with the matching IP address) accepts and processes the packet, while others discard it.

Packet collisions can occur when multiple devices try to send data simultaneously in a real-world scenario.

Result:

The network was successfully designed and simulated using a HUB in Cisco Packet Tracer. Data packets were transmitted and received between PCs using the HUB, demonstrating basic network connectivity and packet flow in a LAN setup.