

# Computer Networks: Lab Record

## Week 1

### Experiment 1: Hubs and Switches

Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping message.

1A: Hubs:

25/9/24 6

LAB - No 1  
HUB AND SWITCH

**AIM:** Create a Topology and simulate sending a simple PDU from source to destination using hub/switch

**HUB:**  
Simple networking device that connects multiple computers or other devices in a Local Area Network (LAN)

- Operates at physical layer (layer 1)
- Central connection point for devices in a network
- When device sends data to the hub, the hub broadcasts this data to all other devices connected to it
- All devices <sup>receive</sup> same data, only intended recipient processes it.

**STRUCTURE:**

- Ports: Physical connection for devices via ethernet cables
- LED indicators: display status of each port

**FUNCTIONS & BEHAVIOR:**

- Broadcasting data - Unintelligent (no routing/files)
- Collision prone
- Half Duplex communication
- Used in STAR TOPOLOGY

## CREATING THE NETWORK: PROCEDURE

### 1.] ADD DEVICES:

- Select End Device  $\rightarrow$  PC
- Add multiple PC's, here lets say '3'
- Select Network Device  $\rightarrow$  Hubs  $\rightarrow$  Hub
- Now we add Hub to the workspace
- We have added 4 devices: one networking, three end devices

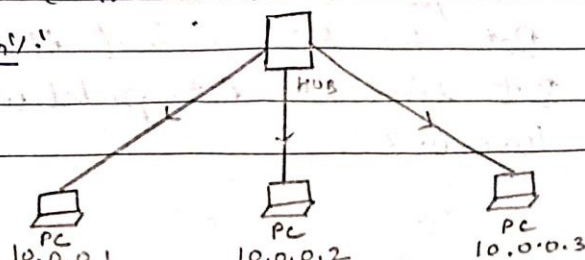
### 2.] CONNECT DEVICES:

- Select Connections  $\rightarrow$  Copper Straight Through as this is for connected devices of different types
- Click on PC and then click on Hub to form a connection:
- Click PC  $\rightarrow$  Fast Ethernet 0
- Click Hub  $\rightarrow$  Fast Ethernet 0 [0-5 : 6 ports]
- Connect all three PC's to the Hub

### 3.] CONFIGURE DEVICES:

- click on PC  $\rightarrow$  Config  $\rightarrow$  Fast Ethernet 0
- Enter the IPv4 Address: 10.0.0.1  
Then click on subnet Mask to auto generate the address 255.0.0.0, then close window
- Immediately name the device with its assigned IP address: 10.0.0.1 by double clicking on the PC
- Repeat these steps to configure all the PC's and the hub

### TOPOLOGY:






#### 4. PING: TEST CONNECTIVITY:

- click on any one of the devices, say 10.0.0.1  
click 10.0.0.1 PC → Desktop → Command prompt
- Type 'ping ip-address'  
replace ip-address with actual address  
say, ping 10.0.0.3
- This is done to check if both the devices are connected/reachable
- On pinging, it was observed that both the devices were connected: Use simulation

#### 5. OBSERVATIONS:

- go to simulation mode at the right bottom corner
- Select PC 10.0.0.1 → Desktop → Command Prompt
- ping 10.0.0.3 - enter the command
- A message icon is popped on the PC 10.0.0.1 from where the ping command was run
- In the simulation panel at the right side, there are simulation play buttons
- clicked on play buttons
- The data transfer was simulated

- ① Data packet  was sent from PC 10.0.0.1 to the hub
- ② The hub received it, then broadcasted the packet to the rest two PCs
- ③ Both the PCs received the data packets
- ④ But since the data packet was pinged to 10.0.0.3:

- The PC 10.0.0.2 on receiving showed/  
displayed blinking <sup>red</sup> cross mark: X  
Indicates → The data packet was not  
for them


- The PC 10.0.0.3 displayed nothing,  
indicating the data transfer was correct

⑤ PC 10.0.0.3 then replied with 32 bytes  
of data: sent the data packet to the hub

⑥ The hub received it, then again broadcasted  
it to the other two PC's

⑦ Both the PC's received the data packets

⑧ PC 10.0.0.1 showed blinking tick  
symbol in green: ✓, indicating the  
right device, the PC 10.0.0.2 displayed  
cross symbol X


- The data packet icon  changed  
colour for each cycle indicating different  
messages

### CONCLUSION:

- Hub is an unintelligent Broadcasting device

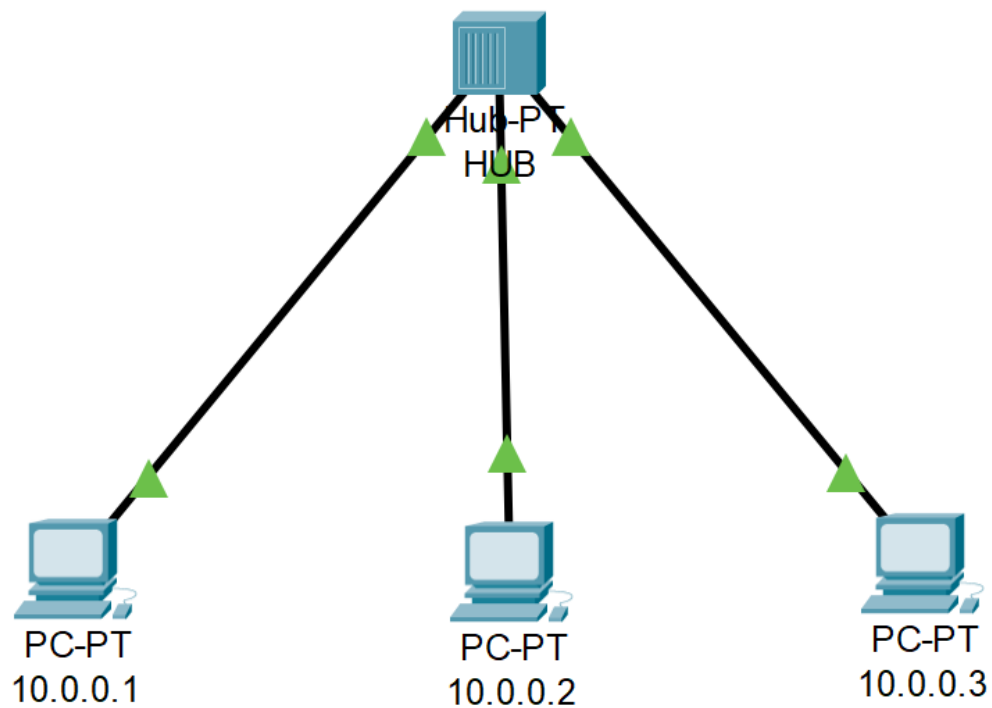
- It is a half Duplex communication

- Collisions:

- Added 6 devices, tried sending two packets  
from different devices at same time: collision  
occured : fire symbol

- Hubs are collision prone: they cannot  
handle collisions

Screenshots:



10.0.0.1

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=20ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 20ms, Average = 5ms
```



```
C:\>ping 10.0.0.2
```

```
Pinging 10.0.0.2 with 32 bytes of data:
```

```
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
```

```
Reply from 10.0.0.2: bytes=32 time=1ms TTL=128
```

```
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
```

```
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
```

```
Ping statistics for 10.0.0.2:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
```

```
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

 10.0.0.2

Physical

Config

Desktop

Programming

Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
```

```
C:\>ping 10.0.0.1
```

```
Pinging 10.0.0.1 with 32 bytes of data:
```

```
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
```

```
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
```

```
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
```

```
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
```

```
Ping statistics for 10.0.0.1:
```

```
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
```

```
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```