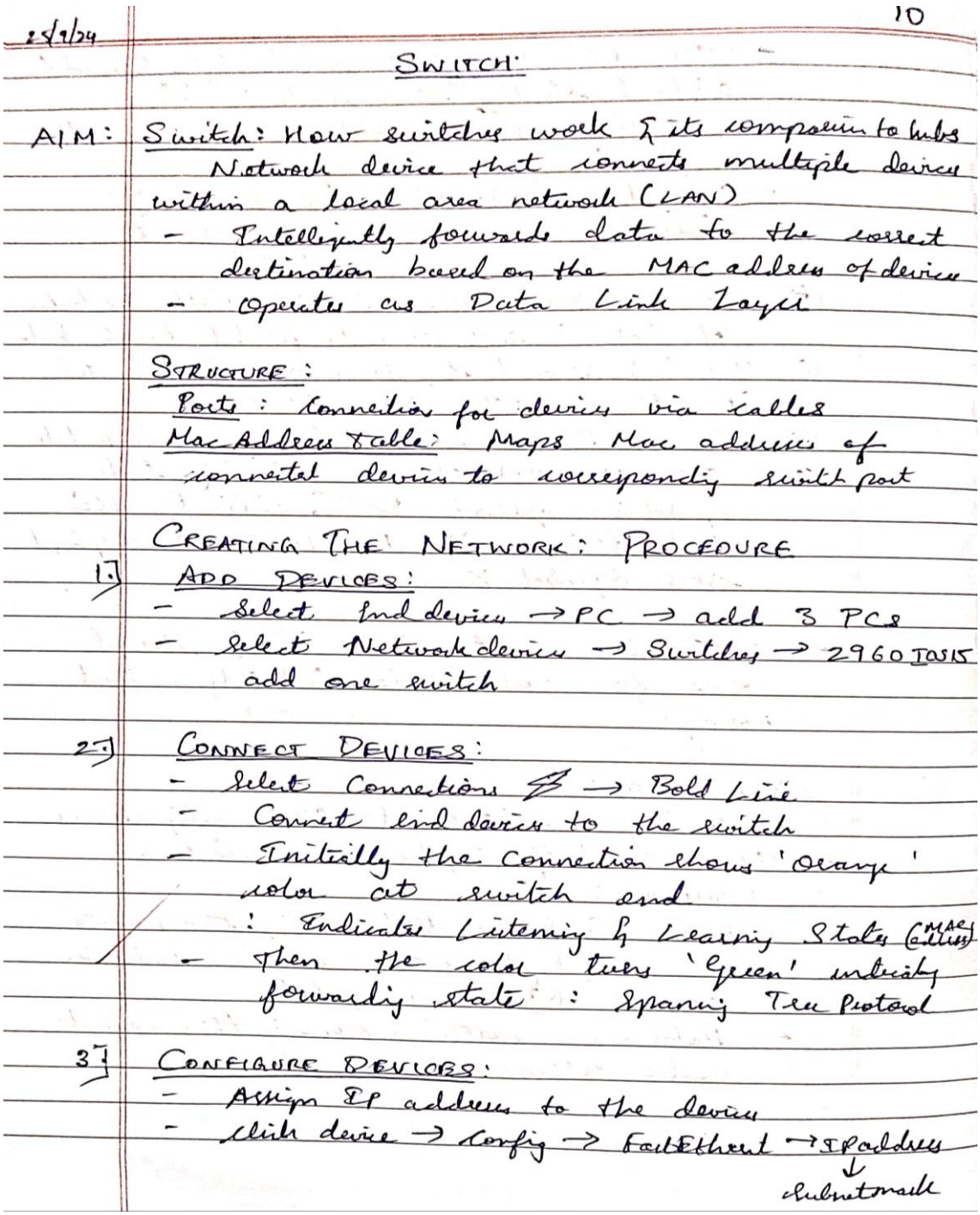
Computer Networks: Lab Record

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.

1B: Switches



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SWITCH

AIM: Switch: How switches work & its comparison to hubs
Network device that connects multiple devices within a local area network (LAN)
- Intelligently forwards data to the correct destination based on the MAC address of device
- Operates as Data Link Layer

STRUCTURE:
Ports: Connection for devices via cables
Mac Address Table: Maps Mac address of connected devices to corresponding switch port

CREATING THE NETWORK: PROCEDURE

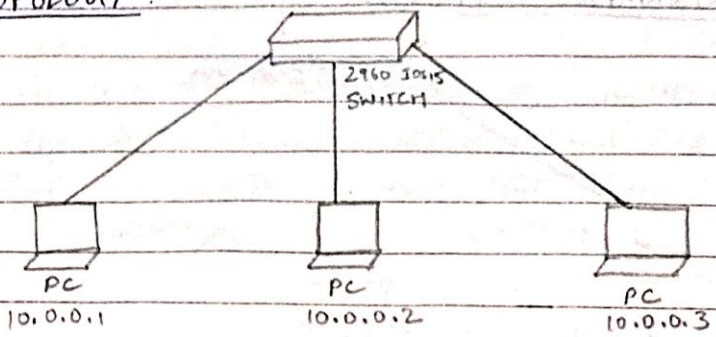
1] ADD DEVICES:
- Select End devices → PC → add 3 PCs
- Select Network devices → Switches → 2960 IOS15 add one switch

2] CONNECT DEVICES:
- Select Connections ⚡ → Bold Line
- Connect end devices to the switch
- Initially the connection shows 'Orange' color at switch end
: Indicates Listening & Learning States (MAC address)
- Then the color turns 'Green' indicating forwarding state : Spanning Tree Protocol

3] CONFIGURE DEVICES:
- Assign IP address to the devices
- click device → Config → FastEthernet → IP address
↓
subnet mask

Bafna Gold
Date: Page:

TOPOLOGY:



4. PING: TEST CONNECTIVITY:
- click PC 10.0.0.1 → Desktop → Cmd Prompt
- Enter ping 10.0.0.3 to ping that device

5. Observations:
- Data pack was sent to switch from 10.0.0.1
- The switch then processed it, and sent it to its destination 10.0.0.3 only
- The PC 10.0.0.3 replied to the switch
- The switch processed it, then sent the packet back to 10.0.0.1 PC
- Then a green tick mark '✓' was blinking at PC 10.0.0.1 showing success

CONCLUSION: OBSERVATIONS:
- Switch is an intelligent networking device
- It stores MAC addresses of the devices
- It doesn't broadcast data, but it unicasts data
- It only sends data to its destination
- It is collision resistant: handles collisions

Difference :

Switch	Hub
- Forwards data only to intended device	Broadcasts data to all connected devices
- Operates at layer 2 (Data link)	Operates at layer 1 (Physical link)
- Uses MAC address to forward data	- Doesn't use MAC address
- More efficient	Less efficient
- Dedicated bandwidth per port	Shared bandwidth across all ports
- Each port has its own collision domain	All devices share the same collision domain
- Supports full duplex communication	Only supports half duplex communication
- More expensive	Cheaper

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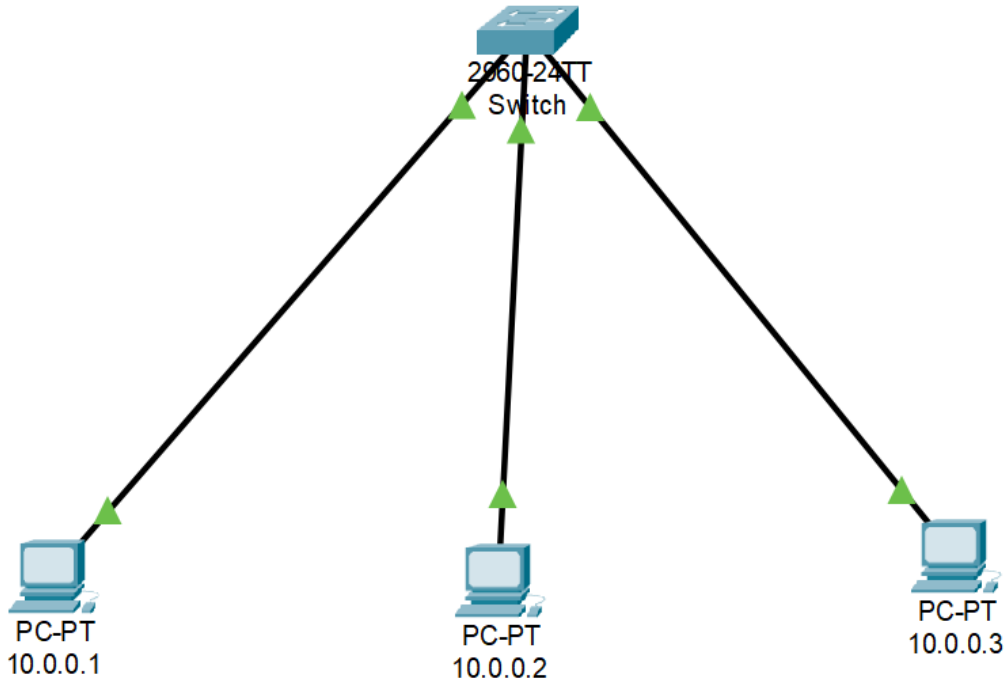
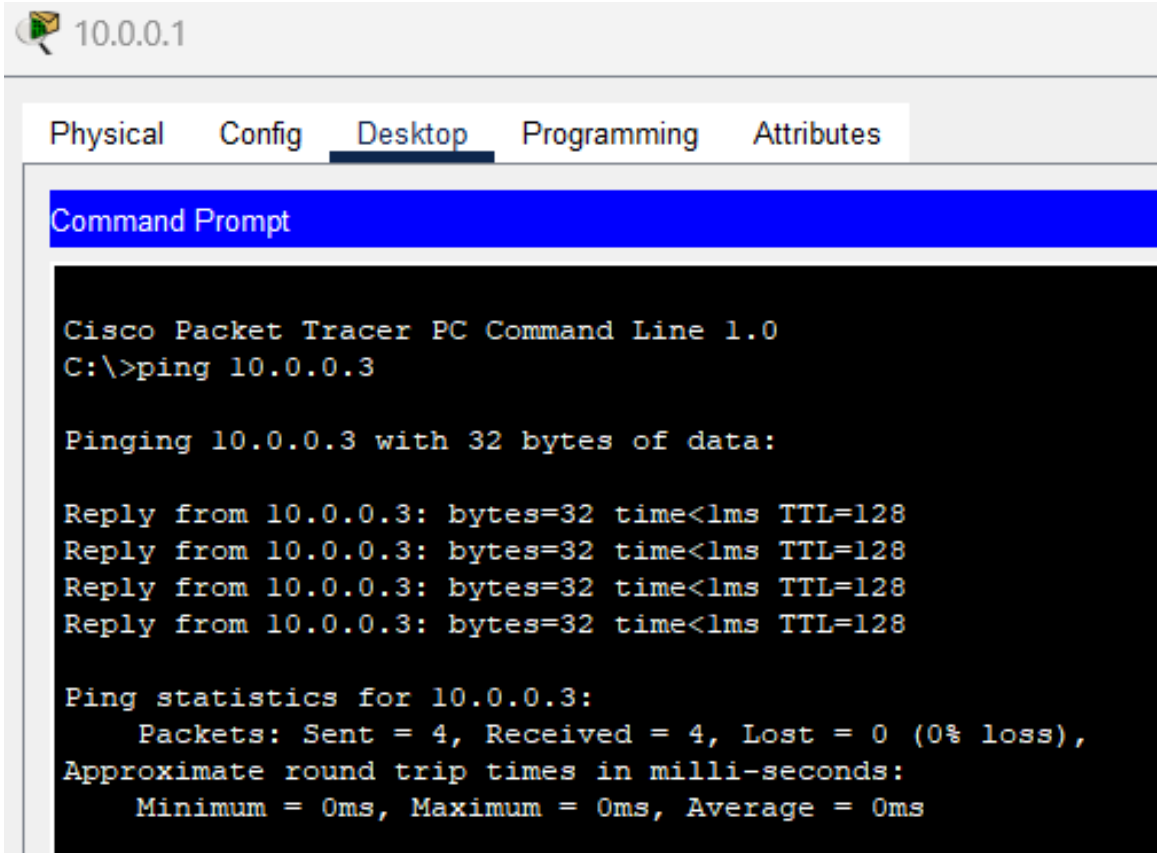
Screenshots:





```
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
```