**1. Wired Media**

**A. Twisted Pair Copper Cable**

* **Categories**:
  + **CAT-5**: Up to 100 Mbps
  + **CAT-5E**: Supports Gigabit speeds
  + **CAT-6**: 10 Gbps (short distance)
  + **CAT-7**: 10 Gbps (shielded for noise reduction)
  + **CAT-8**: 25-40 Gbps (short-range, used in data centers)
* **Wiring Standards**:
  + **EIA/TIA 568B**:
    1. Orange/White
    2. Orange
    3. Green/White
    4. Green
    5. Blue/White
    6. Blue
    7. Brown/White
    8. Brown
  + **EIA/TIA 568A**:
    1. Green/White
    2. Green
    3. Orange/White
    4. Blue
    5. Blue/White
    6. Orange
    7. Brown/White
    8. Brown

**B. Cable Types**

1. **Straight Cable**: Used for connecting different devices (Router → Switch, Switch → PC).
   * **Wiring**: Both sides 568B.
2. **Cross-over Cable**: Used for connecting similar devices (Switch → Switch, PC → PC).
   * **Wiring**: Side A 568B, Side B 568A.
3. **Roll-over Cable**: Used to access device terminals (console cable for routers/switches).
   * **Wiring**: Side A 568B, Side B 568B (reversed).
4. **Fiber Optic Cable**:
   * **Single-Core**: For single device communication.
   * **Multi-Core**: 2, 4, 6, 12, 20 cores for multiple devices.

**2. Switch Port Speeds**

* **Ethernet Port**: 10 Mbps
* **Fast Ethernet**: 100 Mbps
* **Gigabit Ethernet**: 1000 Mbps (1 Gbps)

**3. Prerequisites for Internet Connection**

**A. Devices & Medium**

* **Devices**: Router, End Devices (PCs, Switches, etc.)
* **Medium**:
  + **Wired**: Twisted pair cables (CAT5/6), Fiber optic.
  + **Wireless**: Wi-Fi (Wireless Access Points).

**B. IP Addressing**

* **IP Address Classes**:
  + **Class A**: 0.0.0.0 - 127.255.255.255 (Subnet Mask: 255.0.0.0)
    - Usable Hosts: 16,777,214
  + **Class B**: 128.0.0.0 - 191.255.255.255 (Subnet Mask: 255.255.0.0)
    - Usable Hosts: 65,534
  + **Class C**: 192.0.0.0 - 223.255.255.255 (Subnet Mask: 255.255.255.0)
    - Usable Hosts: 254
  + **Class D**: 224.0.0.0 - 239.255.255.255 (Multicast)
  + **Class E**: 240.0.0.0 - 255.255.255.255 (Reserved)
* **Subnet Mask**: Divides the IP address into network and host parts.
  + Network bits = 1
  + Host bits = 0
* **Default IP Ranges**:
  + **Class A**: 10.0.0.0 - 10.255.255.255
  + **Class B**: 172.16.0.0 - 172.31.255.255
  + **Class C**: 192.168.0.0 - 192.168.255.255

**4. Assigning IP to End Devices**

1. **Static IP Configuration**:
   * Open PC → Desktop → IP Configuration → Static
   * Assign the IP address manually.
2. **Verify IP Address**:
   * Open Command Prompt → ipconfig

**5. Verifying Network Connection**

1. **Ping Command**:
   * ping [destination IP] to test connectivity.
2. **Troubleshooting**:
   * Disable Windows Firewall:
     + Run → firewall.cpl → Turn off Firewall for Private & Public networks.

**6. Accessing Shared Resources**

* **Access Files**:
  + Run → \\[IP\_address] to access shared folders on a server.

**7. User Account Types**

1. **Admin User**: Full access, administrative rights.
2. **System User**: Limited access can perform admin tasks if given privileges.
3. **Guest User**: Restricted access, no admin rights.

**8. Customizing User Settings on Windows**

1. **Local User Management**:
   * Run → lusrmgr.msc to manage users and groups.

**9. Example Network Addresses**

* **Network**: 148.131.0.0 → **Broadcast**: 148.131.255.255
* **Host IP**: 148.131.34.45
* **Network**: 223.34.54.0 → **Broadcast**: 223.34.54.255
* **Host IP**: 223.34.54.67

Types of switch

-managed switch

-Unmanaged switch

Note- in managed switch connection can be disconnected and controlled

Hardware properties in switch

-RAM

Running configuration

-NVRAM (nonvolatile) it is permanent

Startup configuration

-Flash memory

Operation system

Configure Switch

Goto terminal of pc connected to switch with consol

1.User exec mode

Prompt: Switch> (this is user executive mode)

Task: View system information

Command: show version

Command for next mode: enable

2.Privileged Exec mode

Prompt: switch#

Features:

-View running configuration

- view startup configuration

- view port Status

- view mac Address table

- view VLAN database / status

- view all system configuration

Command: show interface status

Global configuration mode

Prompt: switch(config)#

Switch> enable

Switch(config)# hostname ….

Switch(config)# enable password ….

Interface configuration mode

Prompt: switch (config-if)#

Van configuration mode

Prompt= switch(config-vlan)#

Used to create VLan

Use Rename/customize VLan database

Line configuration mode

Prompt – switch(config-line)#

Command: switch(config)#line vty 0

Slack

Iaas-AWS EC2, AZURE virtual machine

Saas – Google Drive

Paas- Google App Engin

Host Roles:

Email server

File server

Web server

Email server:

Incoming of email server – IMAP(can be accessed when online)/POP3(can be accessed when downloaded)

Outgoing of email server- SMPT(Simple mail transfer protocol )

Broadband- speed of the internet provided to the user(highest speed)

VLAN

* Separate switch port into multiple groups.
* VLAN ID is used to separate switch ports.
* VLAN ID Range (0 - 4094)
* VLAN ID 0 & 4094 are reserved VLAN ID.
* Only same VLAN ID can communicate with each other in LAN
* Default VLAN id is 1
  + 1. Private VLAN : 1 to 1000/
    2. 1002 to 1005 : reserved for token ring
    3. 1006 to 4094 : For public Internet management(Extended range VLAN)

Assign VLAN:

Configure switch and go to global configuration

Type:#vlan 10

#name Admin

#vlan 10

#name HR

#vlan 20

#name Sales

#vlan 30

To save

in Exec mode

# write

Then go to global config mode

Interface fa0/1

Switchport mode access

Switchport access vlan 10

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Vlan trunking protocol(VTP)

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- used to replicate VLAN database to different switches

- It has different 3 modes:

1. server mode

2. transparent mode

3. client mode

-VTP Domain (unique identifier for VTP)

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- Same domain name on different switches called VTP group

show vtp mode

- switcheport must be in trunkmode for VTP

(config-if)interface fa0/1

(config-if)switchport mode trunk

#show interface trunk

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configuration VTP as per senario

sw1(config)#vtp domain techspire.edu

#show vtp status

sw2(config)#vtp domain techspire.edu

#show vtp status

(config)#vtp mode transparent

sw3(config)#vtp domain techspire.edu

#show vtp status