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Network for you



**Welcome
To
Network for you
Physical interface and cable
Types and issues
&
POE**



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Physical Interfaces:

Cisco network devices can have either fixed ports or hot-pluggable transceivers slots.



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What is Fiber Optic cable?

- A cable consisting of one or more thin flexible fibers with a glass core through which light signals can be sent with very little loss of strength.
- There are two primary types of fibre – multimode and singlemode.

Fiber Single Mode Fiber:

- In Optical fiber technology, single mode fiber (SMF) or monomode fiber, is an optical fiber that is designed for the transmission of a single ray or mode of light as carrier to propagate at a time.
- **Normally use in WAN.**



OS1 and OS2 are standard single mode optical cables respectively used with wavelengths of 1310nm and 1550nm with a maximum attenuation of 1 dB/km and 0.4 dB/km.

| Name | OS1 | OS2 |
|---------------------|--------------------|----------------|
| Standards | ITU-T G.652A/B/C/D | ITU-T G.652C/D |
| Cable Construction | Tight buffered | Loose tube |
| Application | Indoor | Outdoor |
| Maximum Attenuation | 1.0dB/km | 0.4dB/km |
| Distance | 10km | 200km |
| Price | Low | High |

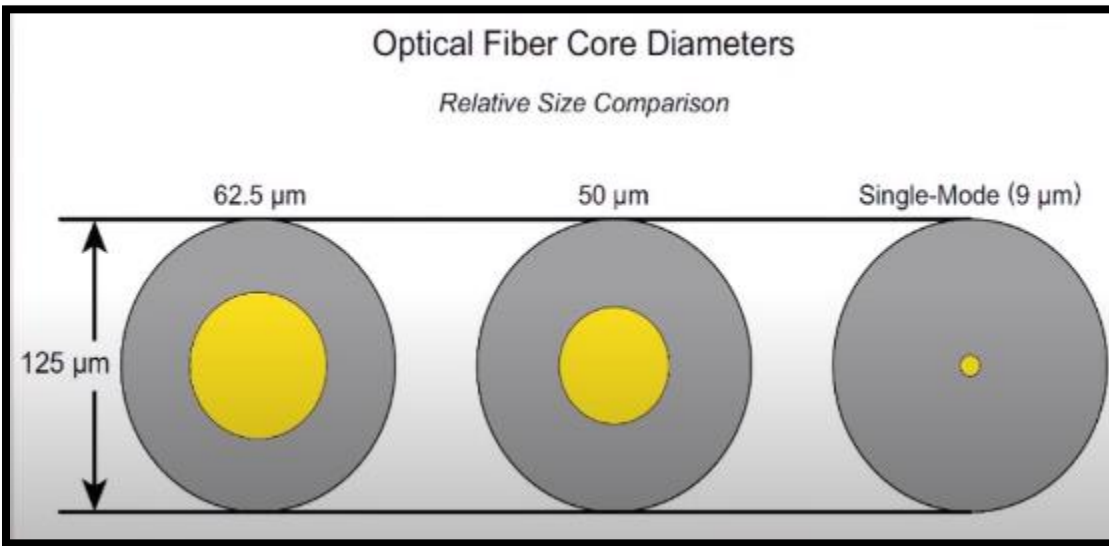
Multi-Mode Fiber:

- In Optical fiber technology, multimode fiber is optical fiber that is designed to carry multiple light rays or modes concurrently, each at a slightly different reflection angle within the optical fiber core.
- Multimode fiber has a larger core than single mode.
- **Normally used in LAN.**

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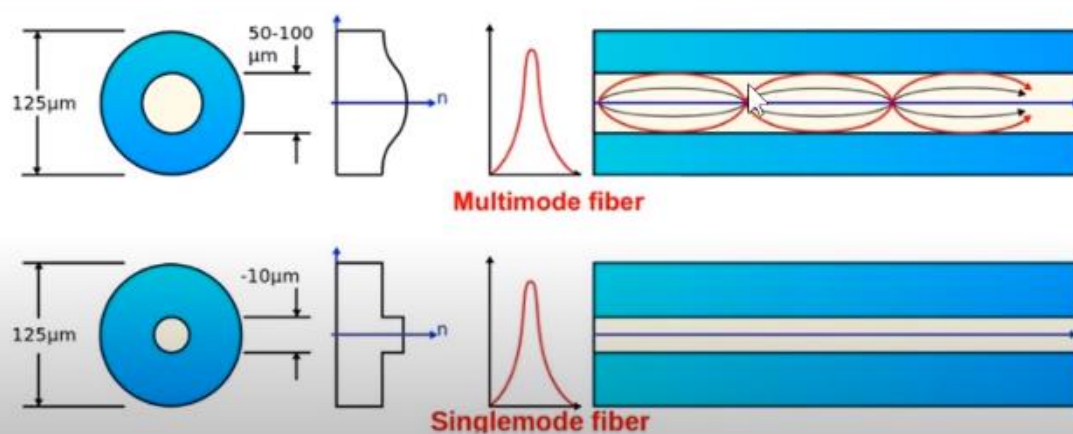
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MODEL COMPARISON



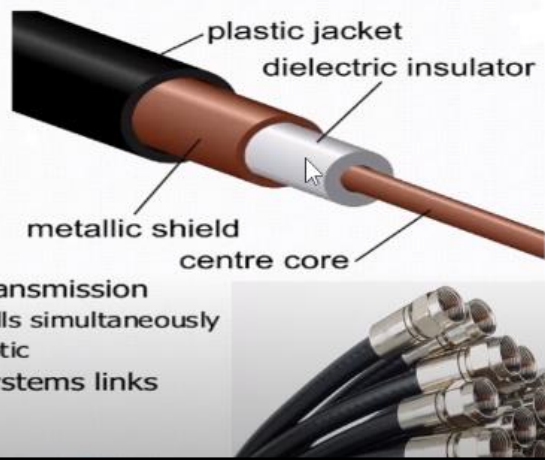
Copper Cable:

- Copper cable uses electrical signals to pass data between networks.
- There are three types of copper cable: Coaxial, unshielded twisted pair and Shielded twisted pair.
- Coaxial degenerates over long distances.
- Unshielded twisted pair is made by twisting the copper cables around each other and this reduces degeneration.

Coaxial Cable

Applications

- Most versatile medium
- Television distribution
 - Ariel to TV
 - Cable TV
- Long distance telephone transmission
 - Can carry 10,000 voice calls simultaneously
 - Being replaced by fiber optic
- Short distance computer systems links
- Local area networks



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UTP VS STP:

The basic difference between UTP and STP is:

UTP (Unshielded twisted pair) is a cable with wires that are twisted together to reduce noise and crosstalk.

STP (Shielded twisted pair) is a twisted pair cable confined in foil or mesh shield that guards the cable against electromagnetic interference.

| BASIS FOR COMPARISON | UTP | STP |
|--------------------------------|--|--|
| Basic | UTP (Unshielded twisted pair) is a cable with wires that are twisted together. | STP (Shielded twisted pair) is a twisted pair cable enclosed in foil or mesh shield. |
| Noise and crosstalk generation | High comparatively. | Less susceptible to noise and crosstalk. |
| Grounding cable | Not required | Necessarily required |
| Ease of handling | Easily installed as cables are smaller, lighter, and flexible. | Installation of cables is difficult comparatively. |
| Cost | Cheaper and does not require much maintenance. | Moderately expensive. |
| Data Rates | Slow comparatively. | Provides high data rates |

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Shared Media Environment:

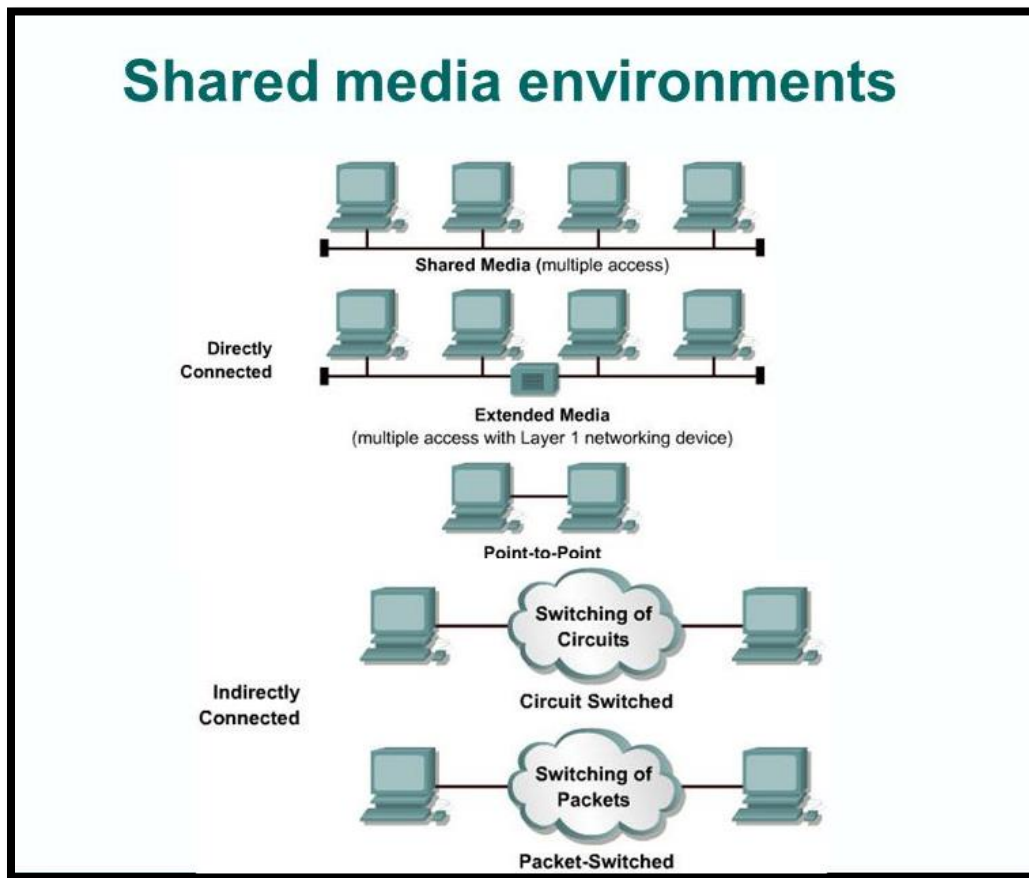
- Multiple hosts have access to the same medium

Extended Shared Media Environment:

- Using networking devices extends the environment to accommodate multiple access or longer cable distances.

Point-to-Point Network Environment:

- One device is connected to only one other device
- Example: dialup network connections.



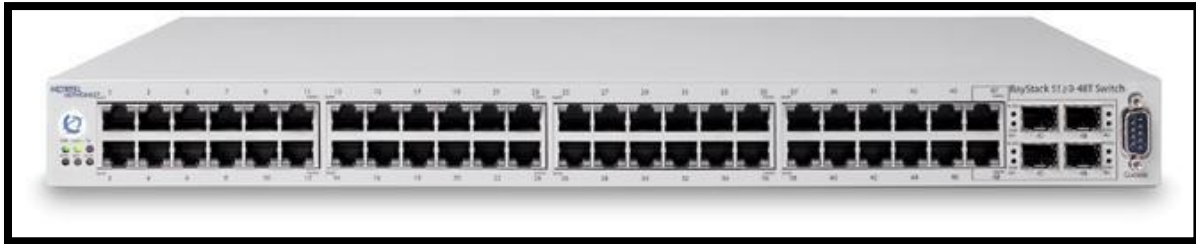
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Power over Ethernet (POE):

- **Power over Ethernet (PoE) is a means of carrying electrical power through data cables.**
- With POE enabled devices, electrical current passes through the Ethernet cable along with the data normally carried by an Ethernet cable.
- The main advantage of POE is that it reduces the cabling requirements for network devices.
- Any device which normally connects to an internet or LAN network with an Ethernet cable will also need a power cable
- One to carry the data, one to carry the electrical current to power the device.
- With a POE connection, there is no need for the additional power cable.
- The Ethernet also carries the electrical current.



Nowadays, we use POE for many devices. For example:

- VoIP phones
- IP cameras
- Wireless access points
- POS devices
- Small routers and switches



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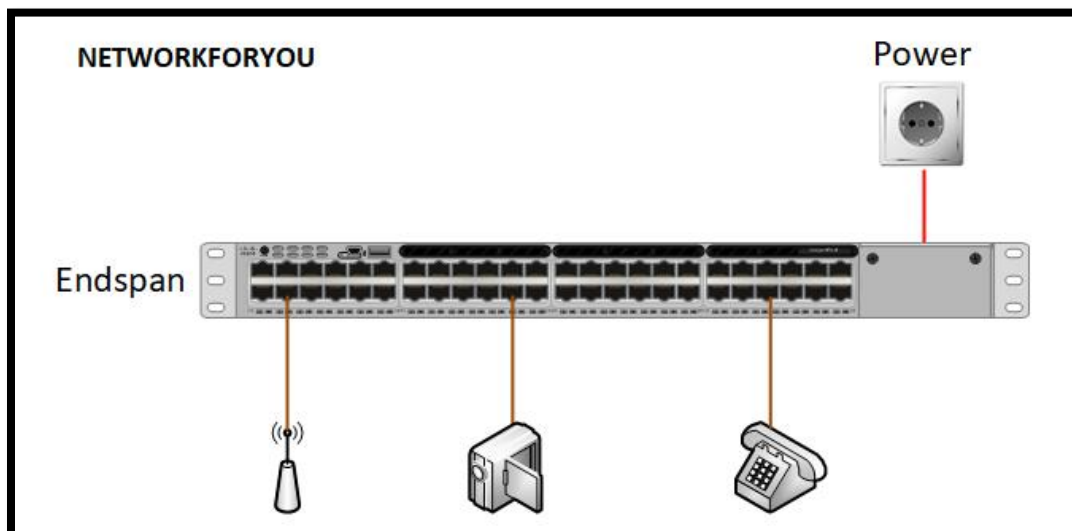
A device that is powered by PoE is called a powered device (PD).

How do we put power on an Ethernet cable?

- A device that provides power on the cable is called Power Sourcing Equipment (PSE).
- We have two options: Mid span and End span

End span:

- The POE end span method uses a switch with integrated POE. You connect your end device to the switch, and it will detect whether the end device is POE compatible and, if so, enables power automatically.
- POE switches come in multiple sizes. There are unmanaged switches with ~4 ports or large managed switches with dozens of ports.



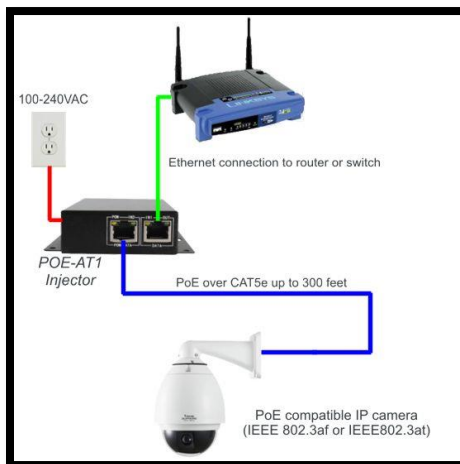
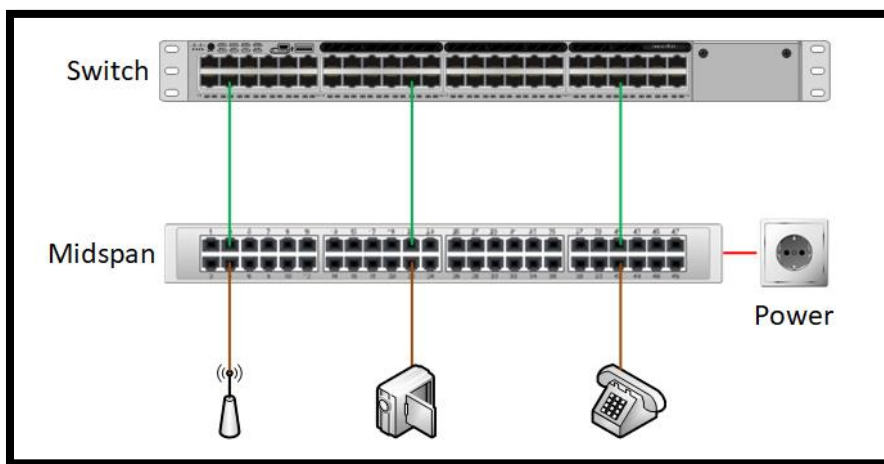
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Mid span:

- The POE mid span method uses POE injectors to add POE to regular non-POE links.
- You can use these to add POE to your network without adding or replacing your non-POE switches.
- These are intelligent devices, and like a POE switch, they detect whether the PD requires power and, if so, enables power. POE injectors are useful when you only have a few devices you want to power.

There are (rackmount) mid spans that can power many cables:



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Identify interface and cable issues (collisions, errors, mismatch duplex, and/or speed):

- In this we are going to discussion about interface issues and Cable issues like collisions, errors, mismatch duplex or speed.
- When every you have any issues first you need to look Interface should up with IP address.
- We can check interface status by typing `show interface <no>`

Example:

Sh int f0/0 or show ip int br

As screen short is given below.

```
Switch#sh int f0/1
FastEthernet0/1 is up, line protocol is up (connected)
  Hardware is Lance, address is 0001.4381.e801 (bia 0001.4381.e801)
  BW 100000 Kbit, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue :0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    956 packets input, 193351 bytes, 0 no buffer
    Received 956 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 watchdog, 0 multicast, 0 pause input
    0 input packets with dribble condition detected
  2357 packets output, 263570 bytes, 0 underruns
```

- If you see in this above screen short we can see FastEthernet 0/1 is up and line protocol is up so we don't have interface issues. See this port is Full-duplex and its speed is 100Mb/s so if we connect this port to another switch then we should take care that other interface which is connecting to this interface should have Full-duplex and speed 100Mb/s else we will have error.
- In full-duplex Ethernet, collision detection is disabled

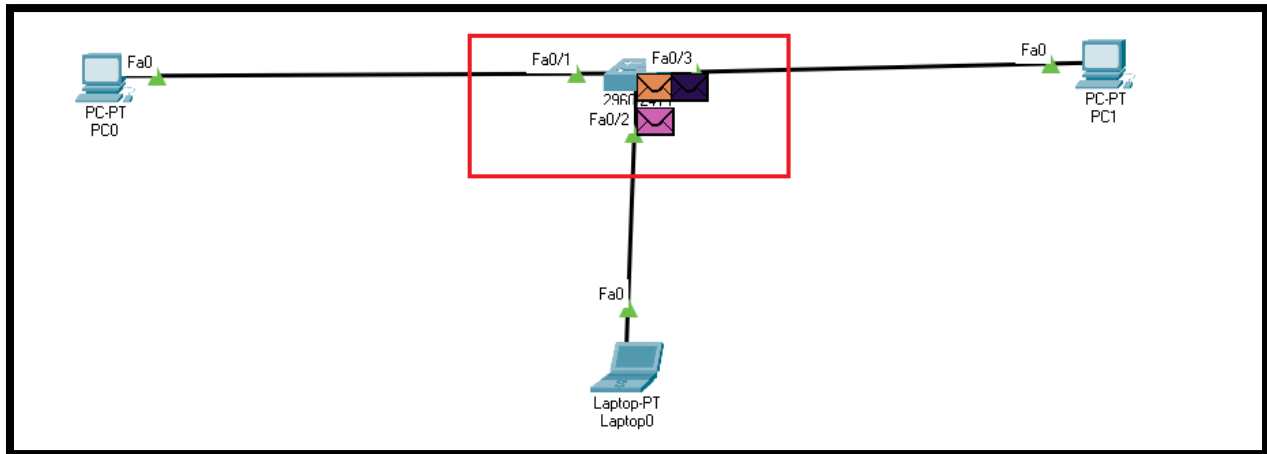
Let see what collisions is.

- Here no collisions because here we use switch and its interface is full duplex.

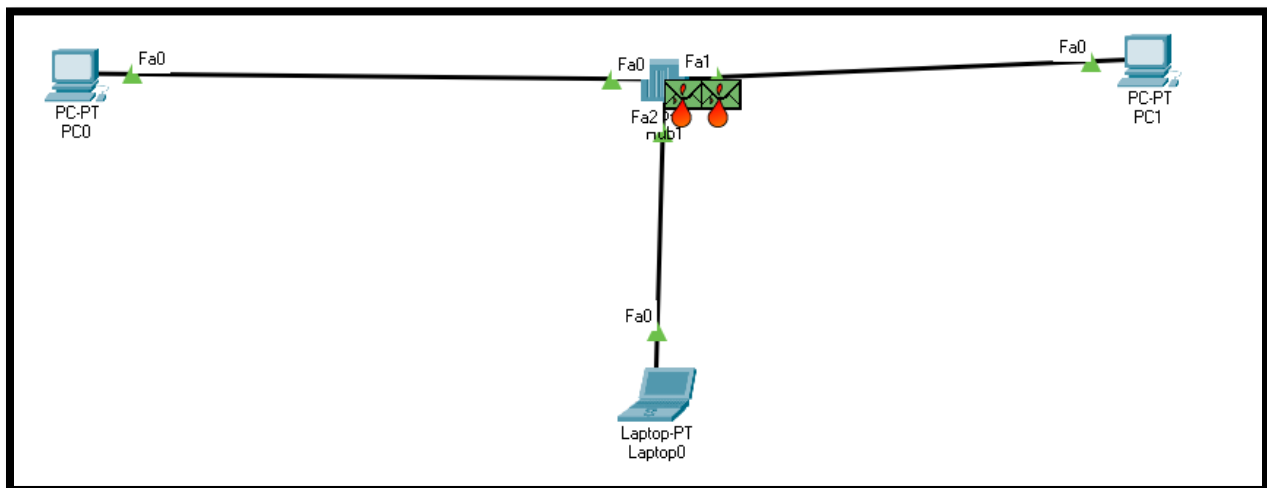
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- When two devices use medium at the same time on half duplex environment so then collision occurs.



See we have collision now as we use hub. As Hub is half duplex.

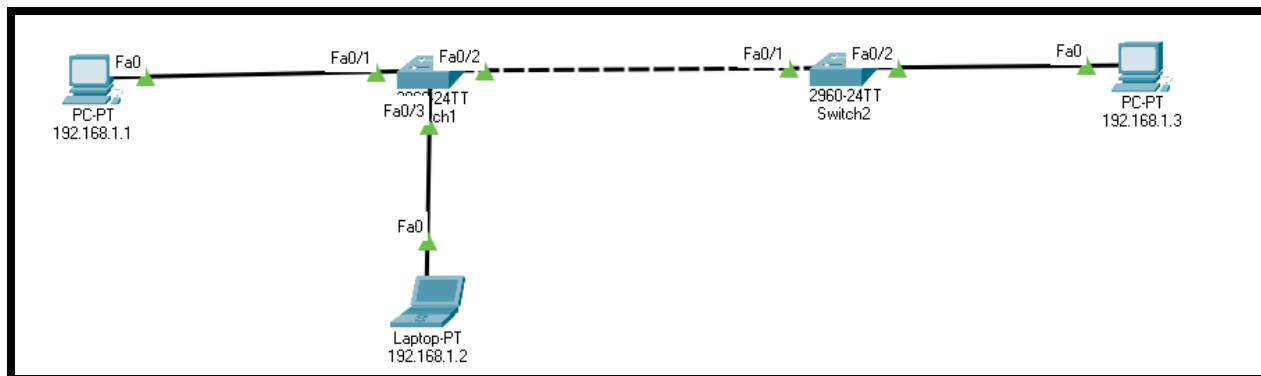
Possible Errors:

- Duplex Mismatch
- Loopback Error
- Link Flapping (up/down)
- Port Security Violation
- Unicast Flooding
- Broadcast Storms

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Lab to Check Some Error:



```
Switch#sh int status
Port      Name      Status      Vlan      Duplex  Speed  Type
Fa0/1     Fa0/1     connected   1         auto    auto   10/100BaseTX
Fa0/2     Fa0/2     connected   1         auto    auto   10/100BaseTX
Fa0/3     Fa0/3     connected   1         auto    auto   10/100BaseTX
Fa0/4     Fa0/4     notconnect  1         auto    auto   10/100BaseTX
```

```
Switch#sh int status
Port      Name      Status      Vlan      Duplex  Speed  Type
Fa0/1     Fa0/1     notconnect  1         a-full  a-10   10/100BaseTX
Fa0/2     Fa0/2     connected   1         auto    auto   10/100BaseTX
```

| SW1 Configuration | SW2 Configuration |
|---|--|
| En Config t Hostname SW1 Int f0/1 duplex full speed 10 | En Config t Hostname SW1 Int f0/1 duplex half speed 100 |

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