

Experiment-1

- (a) Give differences in Cat5e and Cat6 cables based on their costing.
- (b) State advantages and disadvantages in Cat5e and Cat6 cables.

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Subject Name: Computer Networks Lab

Subject Code: CSP-293

1. Aim/Overview of the practical:

Understand the working of the following.

1. IP Address
2. Cisco IOS
3. Straight Cable & Cross Cable, RJ45
4. Layer2 Switch
5. Routers

2. Task to be done:

- A. You will write the difference between the Cat5e and Cat6 cables based on their costing in points.
- B. You will mention the advantages and disadvantages of both cables in different scenarios.

3. Apparatus(For applied/experimental sciences/materials based labs):

- ⇒ *Cat5e Cable*
- ⇒ *Cat6 Cable*

4. Algorithm/Flowchart (For programming based labs):

n/a

5. Theme/Interests definition (For creative domains):

Cat5e => CAT5e is a network cable and It came in the end of 19s . CAT5e change the whole scenario and give the 10 times faster speed as compare with older version and it has ability to traverse distance without impacted by crosstalk CAT5e cables are usually 24-gauge twisted pair wires , It can support Giga networks at the distances up to 100m.

Cat6 => After CAT5e CAT6 got here it's far a derived model from Category 6 . CAT6 is a twisted pair cable for Ethernet this is backward well suited with CAT5/5e and CAT3 cable requirements Like CAT5e It is likewise supported Gigabit Ethernet segments as much as 100m however it's far extra more potent than CAT5e however it's far best use for confined distance At the start of this century, CAT5e normally ran to the workstations while CAT6 changed into used because the spine infrastructure from router to switches.

Comparison:

CAT5e v/s CAT6 Cost:

Multiple traits have a power at the fee of Ethernet cables, the principle factors being length, quality, copper content material and manufacturer. In general, you may locate that CAT6 cables are priced 10-20 ove CAT5e cables.

CAT5e v/s CAT6 Bandwidth:

CAT5e and CAT6 can manipulate the speeds of as much as 1 Gigabit consistent with second. Every person need this velocity and it's miles greater than enough for the rate of with the aid of using some distance the maximum net connections . There is a danger to obtain the rate as much as 500 mbps on net connection . The maximum vital distinction among CAT5e and CAT6 cable lies in the bandwidth , each the cable can aid for facts transfer. Generally CAT6 cables are designed for working frequencies as much as 250 MHz or much less then 250 MHz , and in different hand CAT5e working is one hundred

Mhz. This manner that a CAT6 cable can procedure greater facts on the identical time . Think of it because the distinction among a 2- and a 4-lane toll road. On each you may force the identical velocity, however a 4-lane toll road can deal with a great deal greater site visitors on the identical time. This imply CAT6 cable is a great deal higher then CAT5e.

CAT5e v/s CAT6 Speed :

Because CAT6 cables carry out as much as 250 MHz that is greater than two times that of CAT5e cables (one hundred Mhz), they provide hastens to 10GBASE-T or 10-Gigabit Ethernet, while CAT5e cables can aid as much as 1GBASE-T or 1-Gigabit Ethernet.

CAT5e v/s CAT6 Crosstalk :

CAT5e and CAT6 are each used identical twisted pair cables. Both use most effective copper wires, with usually four twisted pairs in keeping with cable. In the past, the 250 MHz overall performance supplied through CAT6 turned into frequently done through the usage of a nylon spline withinside the wiring, which remoted every of the 4 twisted pairs, making the cable rigid. Nowadays, CAT6 cables are greater flexible, the usage of different strategies to lessen noise .

CAT5e v/s CAT6 Maximum Length :

Both CAT5e and CAT6 are capable of lengths of as much as a hundred m in keeping with community segment . The most potential speeds will by no means be met past this length. This can display in a sluggish or failing connection , or maybe no connection at all . If it's miles required to cowl distances longer than a hundred m, the sign may be amplified with repeaters or switches.

⇒ **Advantages and drawbacks in Cat5e and Cat6 cables.**

Cat5e

Advantage:

Cost Using cat five cables we spent much less sum of money as evaluate to cat 6 cable it's far a huge benefit of the usage of cat five cable in networking Due to its affordability, it's also utilized in cross-over cable jobs as well . It is most inexpensive one

⇒ **Transfer Speeds Cat five :**

Cables deliver us better switch pace for community connections . in contrast to in advance or oldest cabling it's far five to 10 % better pace and Other talents consist of having the cappelential to switch 4 indicators at once.

⇒ **Versatility:**

The maximum import thing in Cat five is its versatility. Two sorts of cable are used. One shape is referred to as a strong conductor, that is stiff and is used to enroll in collectively wall sockets with the significant panel in your own home or office. The strong conductor is the most inexpensive shape of Cat five to be had withinside the market. The different one, that is the same old conductor shape, is used to attach computer systems to the wall socket. This wiring is lots greater flexible.

Disadvantage:

⇒ **Data Transfer:**

As we are aware of it has many blessings however a number of risks as well .The foremost drawback of the usage of a Cat five cable is the quantity of records being despatched to and from the cable. The cable may be very restrained on its top-lead to phrases of records switch. While the cable is right for putting in a community at home, it is able to most effective manage up one hundred Mbps. That's why that cable most effective used for small region like in office .

⇒ **Interference :**

One greater drawback Cat five brings with it's far the difficulty of sensitivity to interference. When confronted with electrostatic disturbances from numerous hand held gadgets and different gadgets, the effectiveness of the cable is reduced. Objects that task inductive interference, which includes phones, microwaves, tv indicators, pc indicators, and different frequencies can motive plenty of interference with Cat five switch .

Cat6

⇒ **Advantage:**

Speed and Performance:

One of the wonderful matters on this cable is the extent of velocity that it provides. The Cat 6 can cope with velocity performances for as much as 250 MHz. This overall performance makes the tool feasible for use with a quicker Ethernet community, which incorporates Gigabit Ethernet connections or even 10 GB Ethernet too and It is utilized in big scale area.

Similar Structure with Cat 5 Cable:

This benefit may be blended with the flexibility of Cat 6 cables as well. In phrases of structure, each Cat five and the Cat 5e are the identical. The Cat 6, Cat five, and Cat 5e cables every have a mixture of eight wires twisted collectively to shape 4 pairs. The simplest primary distinction is that one pair of Cat 6 cable is stored farfar from any touch with others in order that it produces double the bandwidth of the Cat five and Cat 5e cable as well.

Backward Compatible :

The plug and port of the Cat 6 cable are similar to the Cat five and Cat 5e cable. This approach that it could be plugged into any precise port or connection that gives guide to each the cables. If, for example, you select to apply the Cat five port, it's going to now no longer offer the total velocity this is capable of cope with. It will perform on the identical velocity you will anticipate for a laptop community cable. However, velocity remains better.

Upgradable:

If you're seeking to replace your company's community, then the Cat 6 cable is protected as part of the upgrade. The Cat 6 cable will now no longer be operated at complete velocity if different devices withinside the community do now no longer guide gigabit speeds. We will quite advise small groups which might be seeking to enhance community overall performance to shift in the direction of putting in the Cat 6 cable considering that it's far turning into the enterprise standard.

Disadvantage:

Expensive:

Compared with the prices of the Cat 5e cable, Cat 6 is lots greater expensive. If the cable isn't always displaying sizable development for your community, it's far pleasant to now no longer set up it in your company. In maximum cases, the Cat 5e is a realistic preference considering that it's far greater affordable at the same time as nevertheless supplying exact overall performance. The Cat 5e cable additionally is available in a number of extraordinary colour .

Does Not Guarantee Full Speed :

It is an mistake of judgment to consider that shopping for a Cat 6 cable will provide them better speeds of the gigabit community. In reality, the Cat 6 cables simplest yield the total velocity if every of the additives withinside the community is working on the gigabit speeds. If even one of the additives isn't always rated gigabit, then your community goes to perform at the velocity of the slowest tool.

⇒ **IP Address :** IP Address is a community hardware cope with . It allows in connecting our pc to different gadgets on community and all around the world . An IP Address is made from numbers or characters .it required four octal .

An instance of an IP cope with might be: 178.198.16.1

It is type :

- Ipv4
- Ipv6

6. Steps for experiment/practical:

6.IP Address:-

"IP" stands for Internet Protocol, so an IP address is an Internet Protocol address. An Internet Protocol is a set of rules that govern Internet activity and facilitate completion of a variety of actions on the World Wide Web. An IP address consists of four numbers, each of which contains one to three digits, with a single dot (.) separating each number or set of digits. Each of the four numbers can range from 0 to 255.

Example:- 78.125.0.209. This innocuous-looking group of four numbers is the key that empowers you and me to send and retrieve data over our Internet connections, ensuring that our messages, as well as our requests for data and the data we have requested, will reach their correct Internet destinations. . Without this numeric protocol, sending and receiving data over the World Wide Web would be impossible.

IP addresses can be either **static** or **dynamic**.

Static IP addresses never change. They serve as a permanent Internet address and provide a simple and reliable way for remote computers to contact you. Static IP addresses reveal such information as the continent, country, region, and city in which a computer is located.

Dynamic IP addresses are temporary and are assigned each time a computer accesses the Internet. They are, in effect, borrowed from a pool of IP addresses that are shared among various computers.

6. **Cisco IOS:-** IOS : Internetwork Operating System. IOS configuration is usually done through a text-based command line interface (CLI).

Cisco's Internetwork Operating System (IOS) is a complex operating system optimized for interconnection. Is a software architecture that is separate from the hardware, with the continuous development of network technology, can be dynamically upgraded to adapt to changing technology (software).

For cisco, there are three IOS version: Lan Base, IP Base and IP Service.

Lan Base is supporting Layer 2 switching function, IP Base is supporting Layer 2 switching function and partial 3 Layer, and IP Service is supporting Layer 2 switching function and partial routing function.

example, **WS-C2960X-48TS-L**, -L means it's Lan Base IOS versions, -S for IP Base, and -E for IP Services.

Straight Cable & Cross Cable, RJ45:-

***Straight Cable:-** Use for connecting different devices

Example- PC-Switch, PC-Router, Switch-Router etc.

***Cross Cable:-** Use for connecting same devices

Example:- PC-PC, Switch-Switch, Router-Router etc.

***RJ45:-** RJ45. Short for *Registered Jack-45*, RJ-45 connectors look similar to the ubiquitous RJ-11 connectors used for connecting telephone equipment, but they are somewhat wider. An 8-pin/8-position plug or jack is commonly used to connect computers onto Ethernet-based local area networks (LAN).

Layer2 Switch:- This is a type of network switch which works on data layer. It

determines the path by using MAC Address.

Routers:- This is also one of the networking devices which forwards data package between computers through the internet.

Give differences in Cat5e and Cat6 cables based on their costing:-

| Cat5e | Cat6 |
|--|---|
| Cat5e cables are made for operating frequencies nearly upto 100mhz | Cat6 are made for operating frequencies upto 250mhz |
| provides higher interface | provides lower interface compared to the c |
| less flexible | more flexible |
| cat5e cables are thinner | cat6 cables are thicker than cat5e |
| process less data at a time | process more data at a time |

State advantages and disadvantages in Cat5e and Cat6 cables:-

Cat5e advantages And Disadvantages:-

| Advantages | Disadvantages |
|--|---|
| It is one of the cheapest networking cables. | This cable is limited in terms of data transfer. |
| This cable is good at carrying nearly 1 gigabyte per second. | Effectiveness of the cable decreases gradually by handling several devices. |
| improved signal carrying capacity. | This cable can only handle upto 100 mbps so it is not useful for setting networks in corporative offices. |
| | |
| | |

Cat6 Advantages And Disadvantages:-

| Advantages | Disadvantages |
|---|---|
| This cable can handle the speed nearly upto 250mhz. | In this cable components are not in gigabyte than the speed will decrease |
| It provides great bandwidth. | The cost of this cable is high. |
| Reduced near end cross talk. | |
| | |
| | |

7. Observations/Discussions(For applied/experimental sciences/materials based labs): N/A

8. Percentage error (if any or applicable): N/A

9. Calculations/ Chemical Reactions / Theorems /Formulas used etc : N/A



10.

Result/Output/Writing

Summary: Connection using

Cross Cable:-



PC0

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 172.198.16.1

Subnet Mask: 255.255.0.0

Default Gateway: 0.0.0.0

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::208:BEFF:FE19:E6C3

IPv6 Gateway:

IPv6 DNS Server:

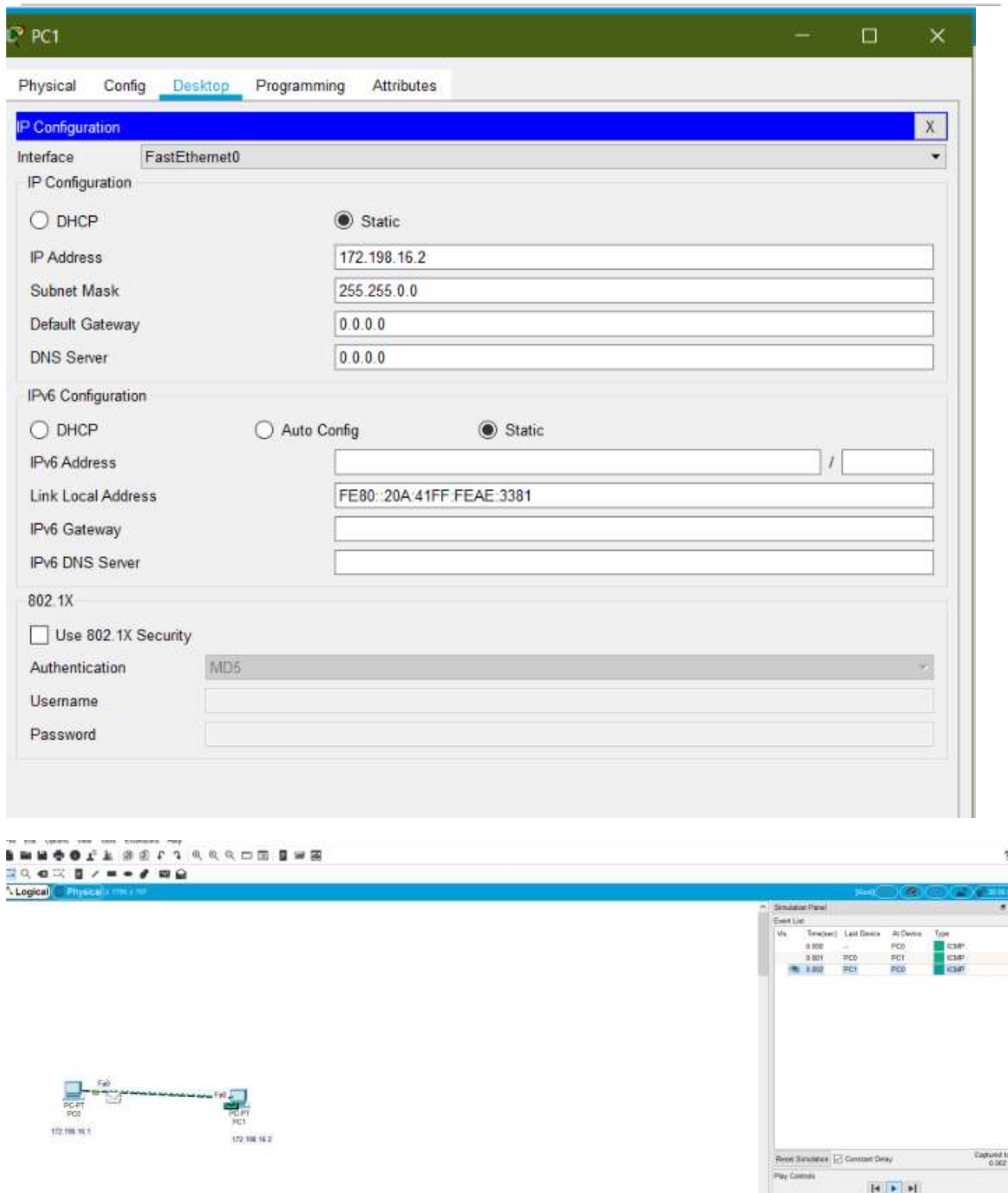
802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

PC-PT
PC1
172.198.16.2



The screenshot displays a network simulation environment. The main window is titled 'PC1' and has tabs for 'Physical', 'Config', 'Desktop', 'Programming', and 'Attributes'. The 'Config' tab is active, showing the 'IP Configuration' for the 'FastEthernet0' interface. The configuration is set to 'Static' with the following values:

- IP Address: 172.198.16.2
- Subnet Mask: 255.255.0.0
- Default Gateway: 0.0.0.0
- DNS Server: 0.0.0.0

Below the IP configuration, there is an 'IPv6 Configuration' section with options for DHCP, Auto Config, and Static. The 'Static' option is selected. The IPv6 Address field is empty, and the Link Local Address is set to FE80::20A:41FF:FEAE:3381. There are also fields for IPv6 Gateway and IPv6 DNS Server.

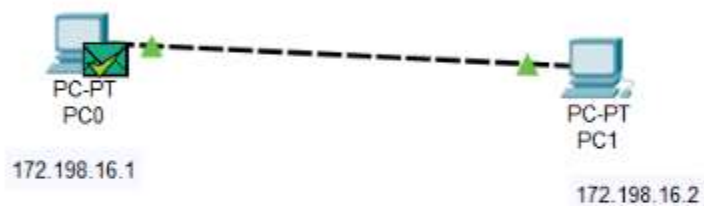
The '802.1X' section is also visible, with a checkbox for 'Use 802.1X Security' and a dropdown menu for 'Authentication' set to 'MD5'. There are fields for 'Username' and 'Password'.

At the bottom of the window, there is a network diagram showing two PCs connected by a cable. The left PC is labeled 'PC0' and the right PC is labeled 'PC1'. The IP addresses 172.198.16.1 and 172.198.16.2 are shown below the PCs.

On the right side of the window, there is a 'Simulation Panel' with an 'Event List' table. The table has columns for 'Time(sec)', 'Last Device', 'At Device', and 'Type'. The events listed are:

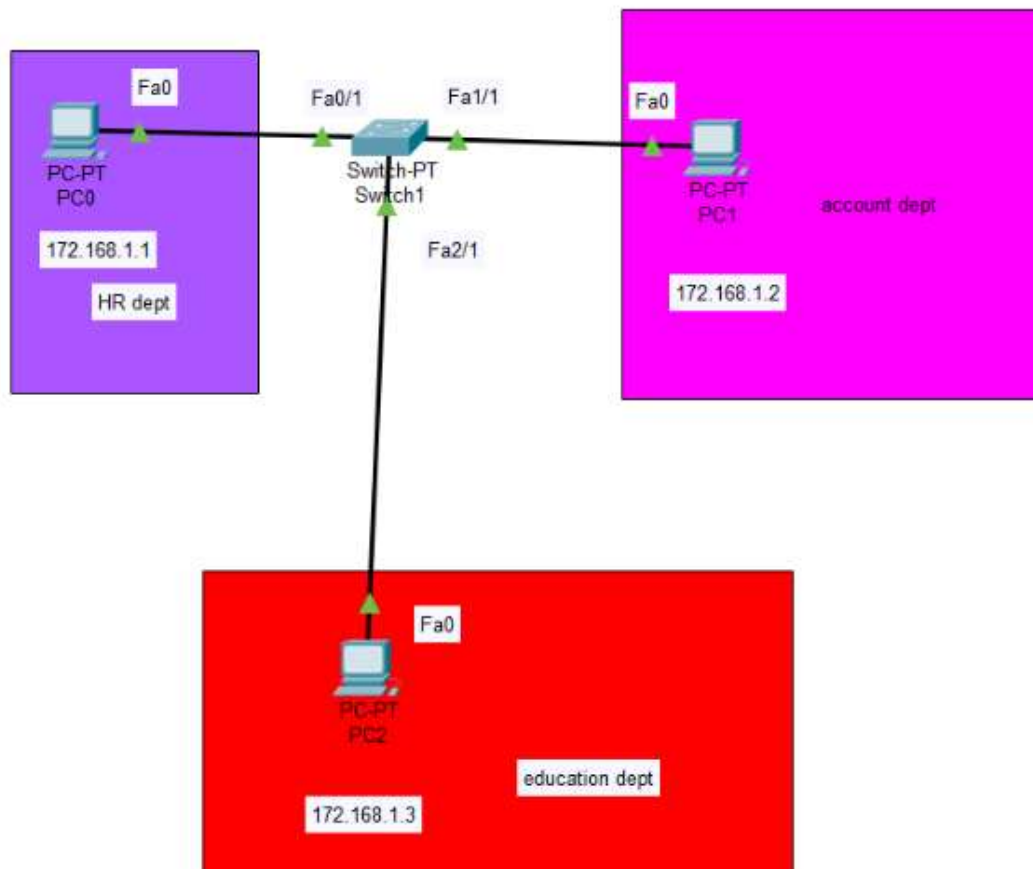
| Time(sec) | Last Device | At Device | Type |
|-----------|-------------|-----------|------|
| 0.000 | - | PC0 | ICMP |
| 0.001 | PC0 | PC1 | ICMP |
| 0.002 | PC1 | PC0 | ICMP |

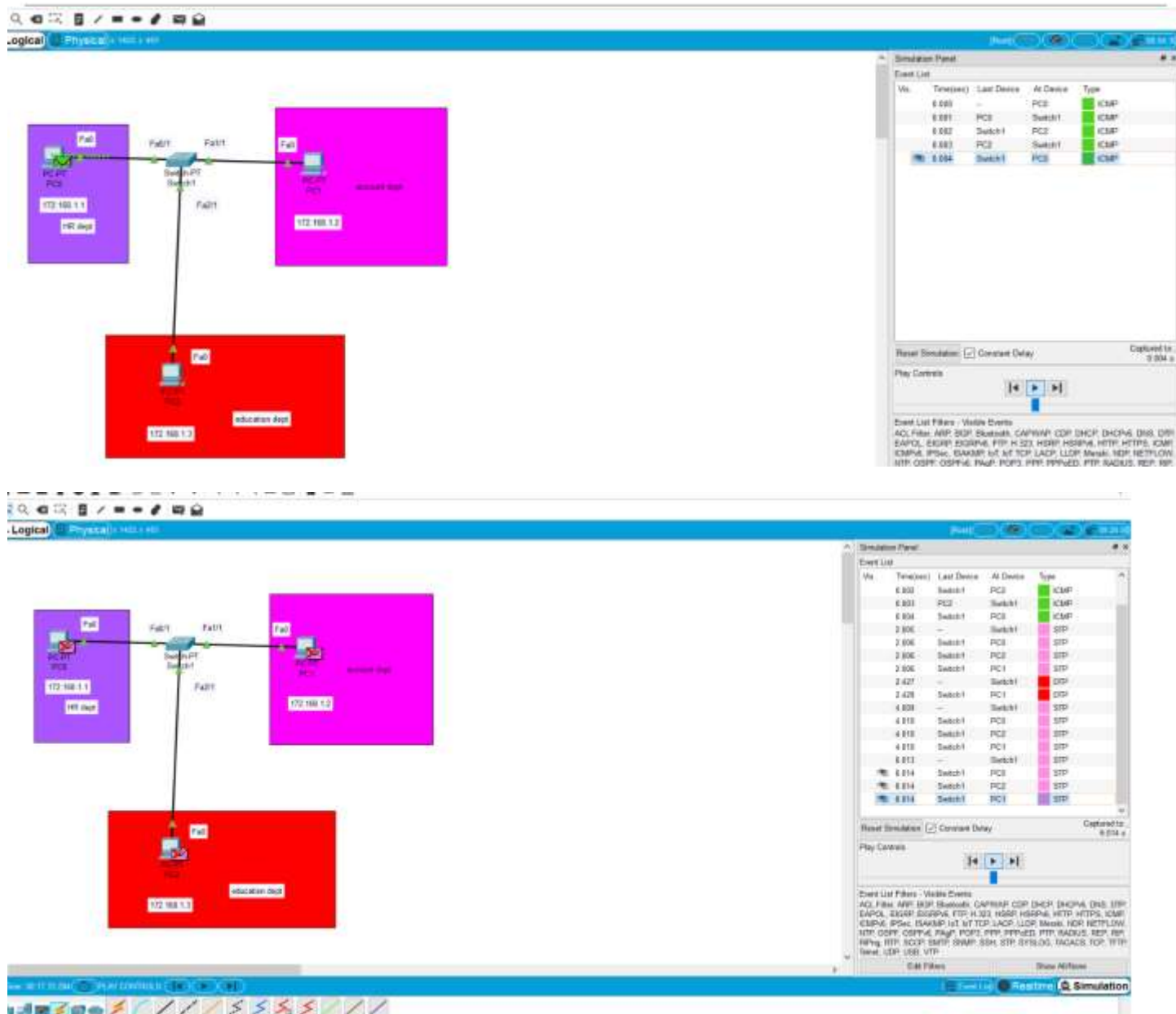
At the bottom right of the simulation panel, there are controls for 'Reset Simulation', 'Constant Delay', and 'Play Controls'.





logical Physical x: 1021, y: 515





7. Observations/Discussions(For applied/experimental sciences/materials based labs):

n/a

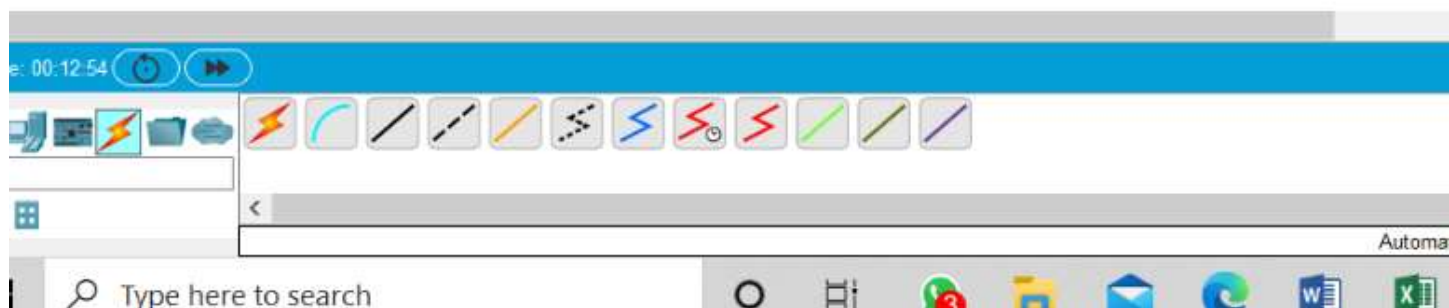
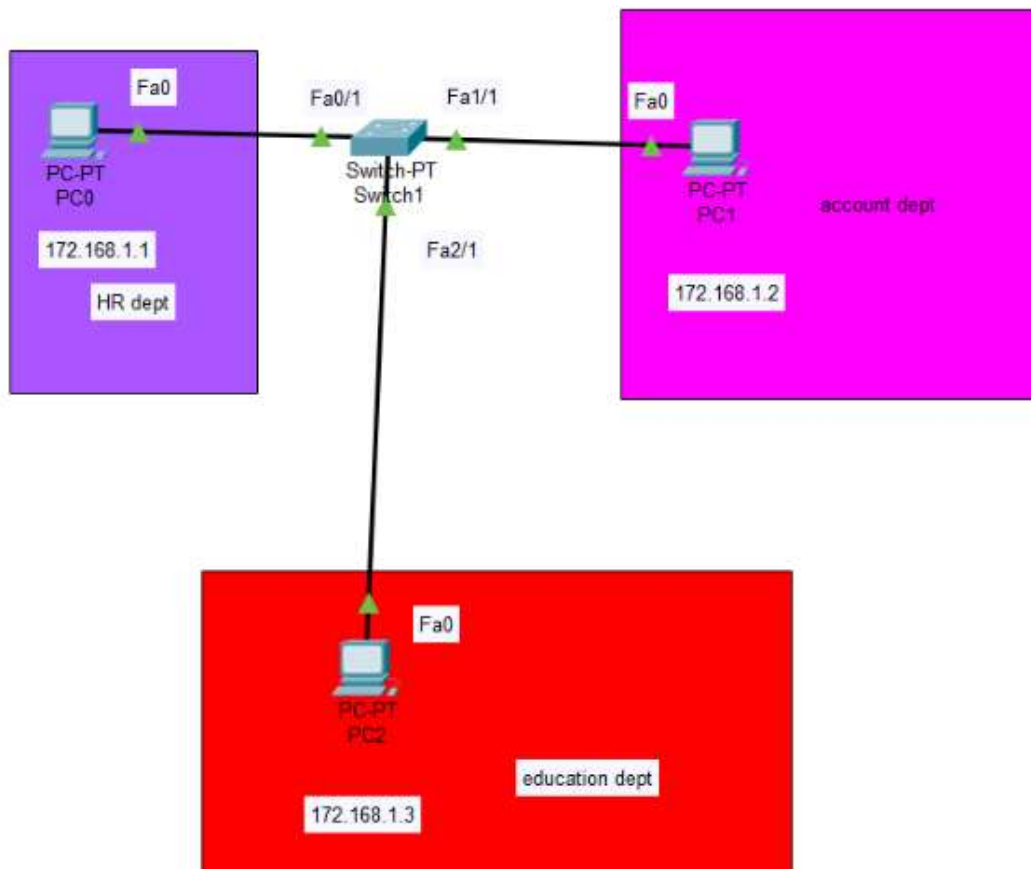
8. Percentage error (if any or applicable):n/a

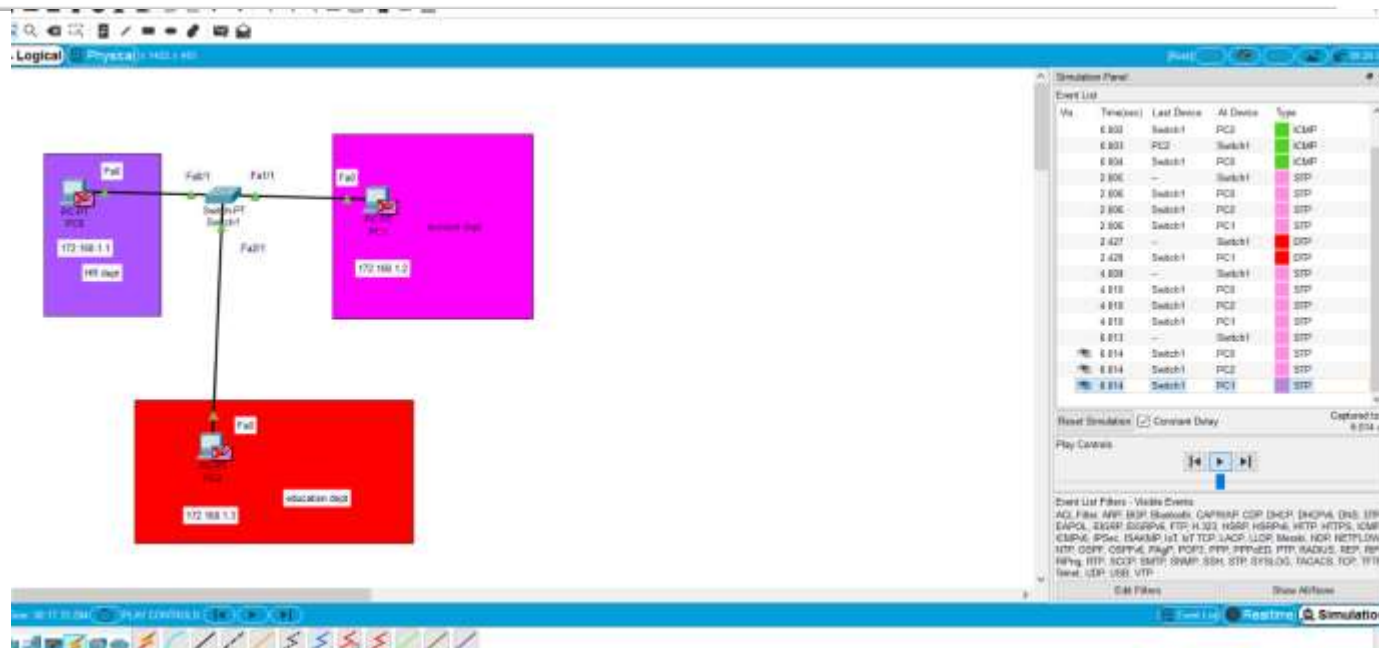
9. Calculations/ Chemical Reactions / Theorems /Formulas used etc :n/a

10. Result/Output/Writing Summary:



logical Physical x: 1021, y: 515





11. Graphs (If Any): Image /Soft copy of graph paper to be attached here

n/A

Learning outcomes (What I have learnt):

1. I have learnt about the differences of cat5e and cat6.
2. I have learnt about differences of cross cable and straight cable.
3. I have learnt about ip address, cisco ios, routers.
4. I have learnt about the advantages and disadvantages of cat5e and cat6.
5. I have learnt about RJ45.

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

| Sr. No. | Parameters | Marks Obtained | Maximum Marks |
|---------|------------|----------------|---------------|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| | | | |