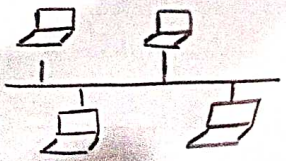
Task1 To Study about Different types of network cables and network topology

Hardware Components :- Computers (PC's, Laptop)
Routers
Switches
Hubs
Network Cables
WANS
NICS

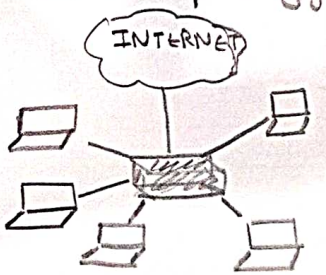
Software Components :- CiscoPacket Tracer
Operating System
Network Configuration Tools

Types of Topologies

1, Bus Topology



2, Star Topology



Expt. No. _____ Date _____

Page No. _____

Task 1 To study about different types of network cables and network topologies

Theory

Types of Network Topologies

1, Bus Topology
- All devices are connected to a single central cable known as bus
- Easy to install and require less cables.
- Disadvantage :- If the main cable fails, the entire network goes down.

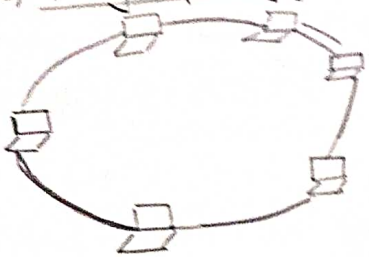
2, Star Topology.
- All devices are connected to a central hub or Switch
- Easy to manage and trouble shoot, failure of one device doesn't affect the others
- If the central hub fails, the entire network is affected

3 Ring Topology
- Devices are connected in a circular fashion, with each device having exactly two neighbors
- Data packets travel at high speeds, no collision
- A failure in any cable or device can disrupt the entire network.

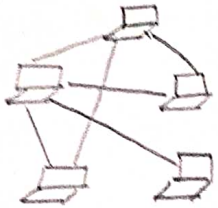
4. Mesh topology
- Every device is connected to every other device
- High redundancy and ~~reb~~ realiability

Teacher's Signature : _____

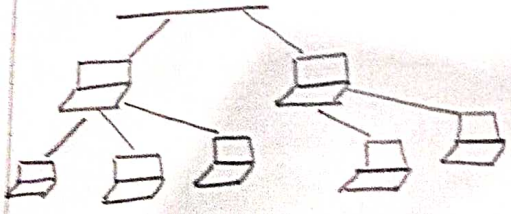
3) Ring Topology



4) Mesh Topology



5) Tree Topology

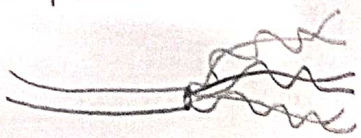


TYPES OF NETWORK CABLES

1) Coaxial Cable

2) TWISTED Cables

1) UTP (Unshielded)



3) fiber optic

2) STP (Shielded)

Expt. No. Date

Page No.

- Expensive and complex to install (high maintenance)

5) Tree Topology
- A combination of star and bus topologies, with groups of star configured networks connected to a linear bus backbone
- Scalable and easy to manage

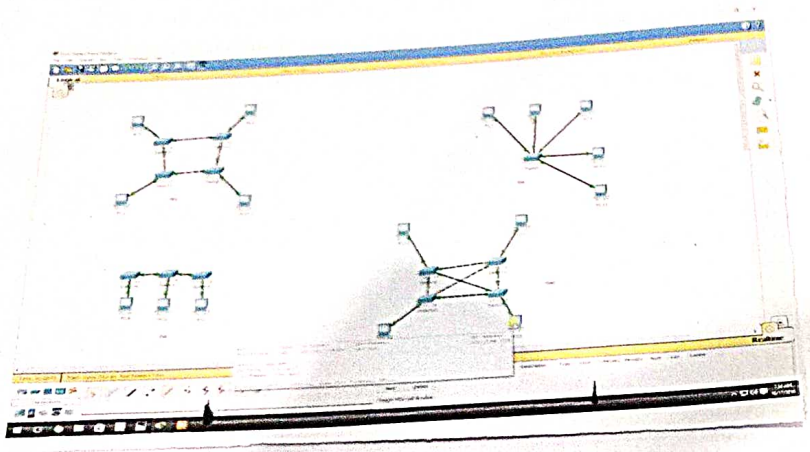
6) Hybrid Topology
- A combination of two or more different types of topologies.
- Flexible and Scalable
- Complex to design and manage

Types of Network Cables

1) Coaxial Cable
- Consist of a central conductor, an insulating layer, a metallic shield, and an outer insulating layer
- Commonly used for cable television and early Ethernet networks.
- Good shielding against electromagnetic interference

2. Twisted Pair Cables.
- Consist of pairs of insulated copper wires twisted together
- Types
- UTP (Unshielded Twisted Pair)
- STP (Shielded Twisted Pair)

Teacher's Signature :



Expt. No. ..... Date .....
Page No. .....

3) fiber optic cable
- Used light to transmit data through strands of glasses or plastic fibers
Types
- SMF (Single Mode Fiber)
- Multi Mode Fiber (MMF)

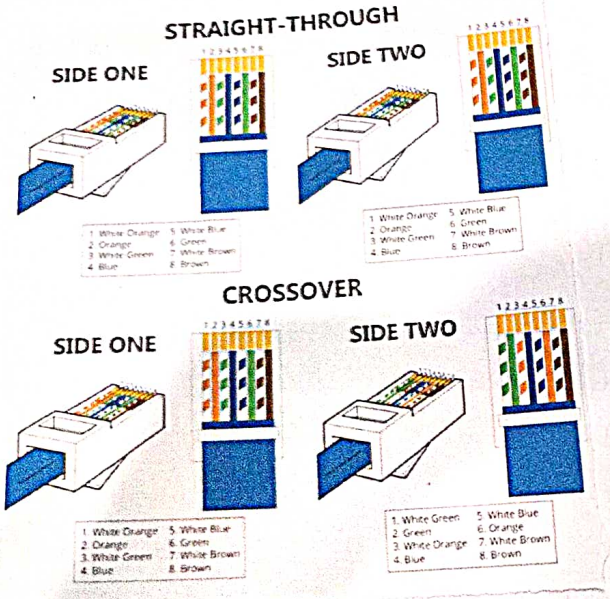
Procedure:

General Steps for Creating Network Topologies

1) Open cisco packet
2) Add Device to the workspace : From the device selection box at the bottom, drag and ~~drop~~ drop the required devices (eg routers, Switches, PCs) onto the work space
3) Connect Devices :- Select cable type (eg. copper, straight copper crossover, fiber) & click on the devices you want to connect.
4) Configure Device properties. Set up IP address, subnet masks and other necessary configuration
5) Simulate and Test :- Send packets b/w devices to ensure proper communication

Teacher's Signature : .....

Task 2 / Practically implement and test the cross wired cable and straight through cable using clamping tool and network lab cable tester



Expt. No. ..... Page No. .....

Task 2) Practically implement and test the cross wired cable and straight through cable using clamping tool and network lab cable tester.

Material Required :- Pair
Twisted Cable
RJ-45 connectors
Clamping Tool
Cable Stripper
Network Cable Tester

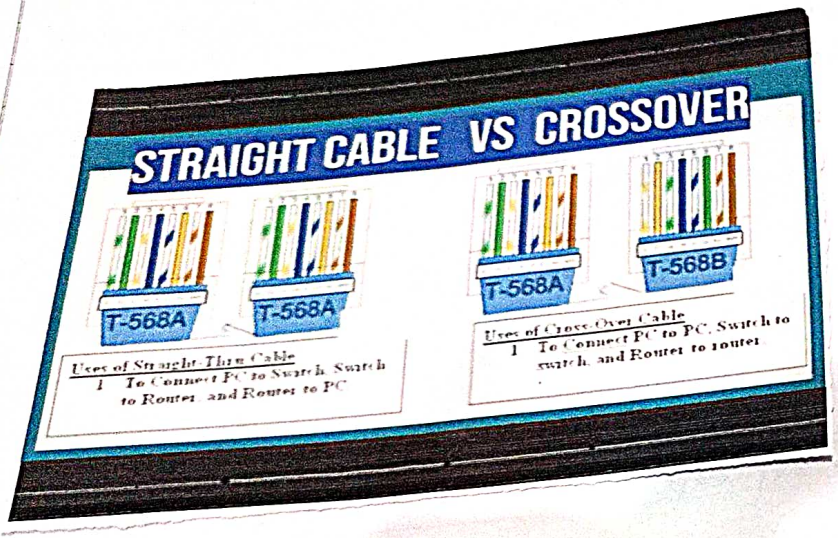
Steps to create a straight through cable.

1) Strip a cable :-
Use a cable stripper to remove about 2 inches of the outer jacket from both ends of the twisted pair cable.

2) Untwist and arrange wires
Untwist the pairs and arrange the wires
- Orange/white
- Orange
- Green/white
- Blue
- Blue/white
- Green
- Brown/white
- Brown

3) Trim wires :-
Trim the wires to make them even, leaving about 1/2 inch of exposed wire.

Teacher's Signature : .....



Date

Expt. No. Page No.

4) Insert wires into RJ 45 Connector
3) Crimp the connector
Place the connector into the crimping tool and crimp it firmly to secure the wires
6) Repeat for the other end

Steps to create a Cross wired (Cross over) Cable

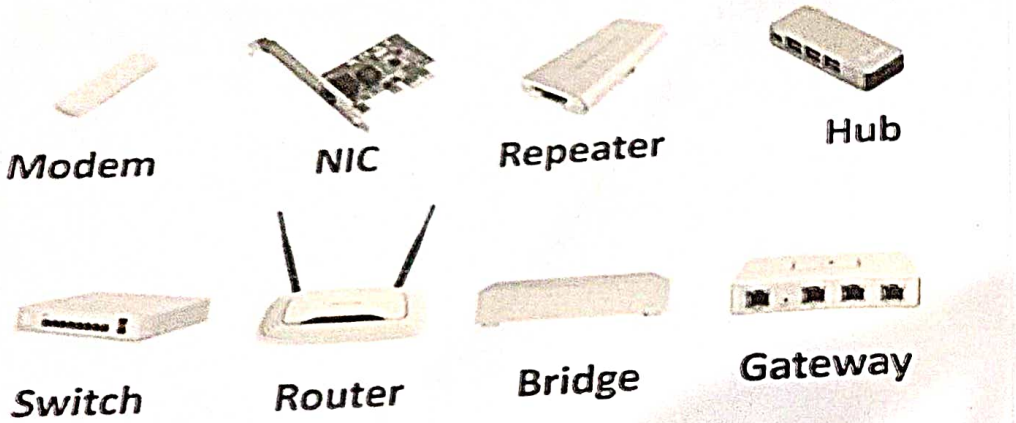
1) Strip the cable.
2) Untwist and arrange wires
3) Trim wires ~~and~~ to make them even, leaving about 1/2 inch of exposed wire
4) Insert wires into RJ 45 Connector
5) Crimp the connector.
6) Repeat for other end.

Testing the Cables.

1. Connect the cables to the tester
2) Run the test :> Turn on the tester and run the test. The tester will check for continuity, correct wiring and any faults.
3) Interpret the test :. The tester will indicate if the cable is correctly wired & functional. If not, check the wiring and crimpings.

Teacher's Signature :

Study & familiarization with various Network devices



Types of Network Devices

Expt. No. Date

Page No.

Task 3, Study and familiarization with various network devices.

Components :→ Router, Switch, Hub, Modem, Access point, Firewall, NIC, Network Interface Card, Bridges, Gateway, Repeater.

Theory :→ 1, Router

It routes the data packets between different networks, typically a local network and the internet. Home and Office network to connect to the network (use case).

(Key feature) It can perform NAT (Network Address Translation) and provide firewall protection.

2, Switch

It connect multiple devices within same netwo and uses MAC address to forward data to the correct destination.

LAN (Use case), (Key feature) Operates at the Data link layer of the OSI model.

3 Hub

Connect multiple Ethernet devices, making the act as a single network segment.

4, Modem.

It modulates and demodulates signal data transmission over telephone lines Cable system or satellites links

Teacher's Signature :

Expt. No. Date

Page No.

5) Gateway
It acts as a bridge between different network protocols. It can perform protocol conversion. It connect different types of network, such as (local network) to the internet.

6) Repeater
It amplifies and retransmits signal to extend the range of a network. It operates at the physical layer (layer 1) of the OSI model.

7) Bridge
It connect and filters traffic between two network segment. It operates at the data link layer of the OSI model.

8) NIC (Network Interface card)
It allows a computer or device to connect to a network. It can be wired (Ethernet) or wireless.

9) Access point
It provides wireless connectivity to device within a network. (Use case): extending wireless coverage in homes and offices and public spaces.

10) Firewall
It Monitors and controls incoming and outgoing Networks traffic based on predetermined security rules. It can be of hardware base or software based.

Teacher's Signature :

Expt. No. _____ Date _____

Page No. _____

5) Gateway
It acts as a bridge between different network protocols. It can perform protocol conversion. It connect different types of network, such as LAN (local area network) to the internet.

6) Repeater
It amplifies and retransmits signal to extend the range of a network. It operates at the physical layer (layer 1) of the OSI model.

7) Bridge
It connect and filters traffic between two network segment. It operates at the data link layer of the OSI model.

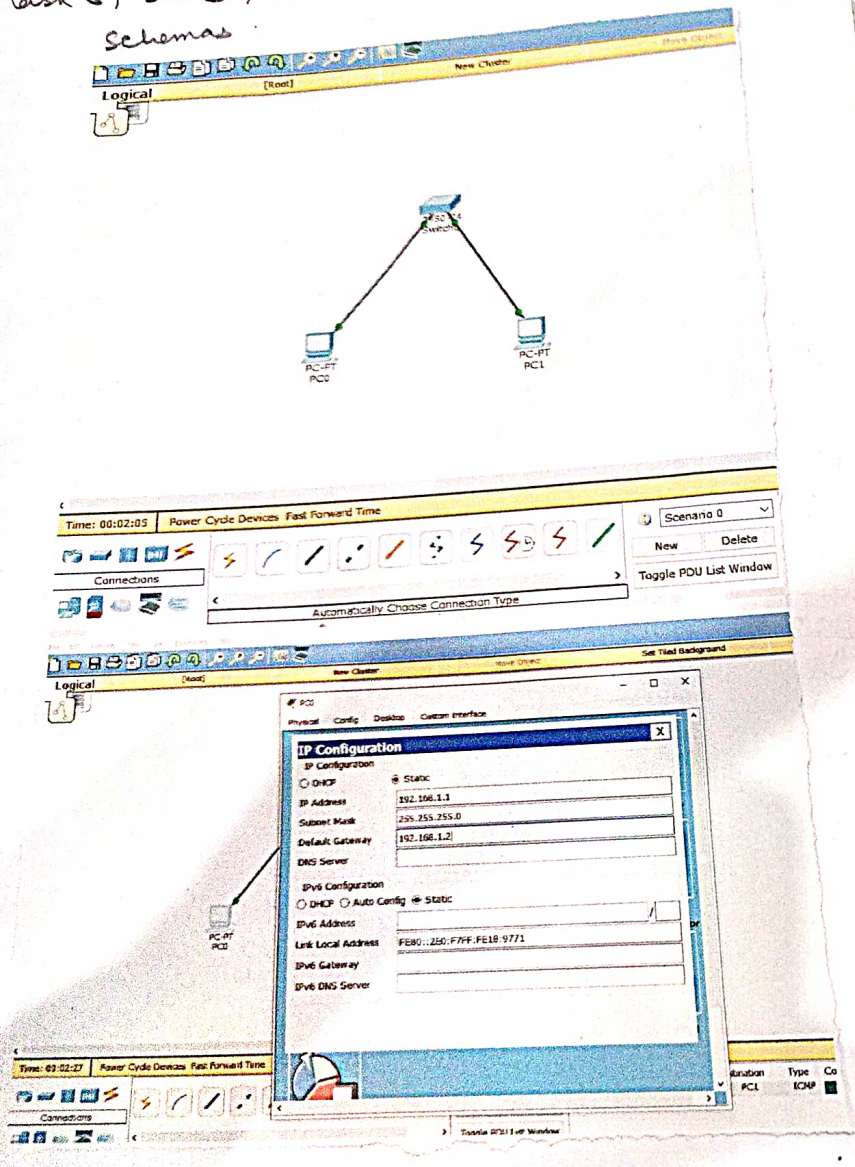
8) NIC (Network Interface card)
It allows a computer or device to connect to a network. It can be wired (Ethernet) or wireless.

9) Access point.
It provides wireless connectivity to device within a network. (Use case) : extending wireless coverage in homes and offices and public spaces.

10) Firewall
It Monitors and controls incoming and outgoing Networks traffic based on predetermined security rules. It can be hardware base or software based.

Teacher's Signature : _____

Task 5, Study & Implementation of IP addressing Schemas.



Expt. No. Date

Page No.

Task 5, Study and Implementation of IP addressing schemas.

Material required :- Twisted pair cable, RJ-45 connectors, Crimping tool, Cable stripper, Network cable Tester, Network devices (Switches, Routers, PC & laptops)

Software Components :- Cisco Packet Tracer, Operating System.

Theory

IP addressing :- It is a unique ~~address~~ identifier for a device on a network.
Consist of four octets (eg 192.168.1.1) in IPv4

Subnet Mask :- Defines the network and host portions of an IP address.
Common subnet mask include 255.255.255.0 for class C network.

Default gateway :- The IP address of the router that connects the local network to other networks.

Procedure :- 1) Open Cisco Packet Tracer
2) Create a new project
3) Drag and Drop switches, PC's onto the workspace.

Teacher's Signature : _____

```
:\Users\sethi>ipconfig
indows IP Configuration

hernet adapter Ethernet:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

ess LAN adapter Local Area Connection* 1:
dia State . . . . . : Media disconnected
nection-specific DNS Suffix . :

ss LAN adapter Local Area Connection* 2:
a State . . . . . : Media disconnected
ection-specific DNS Suffix . :

LAN adapter Wi-Fi:
tion-Specific DNS Suffix . :
ocal IPv6 Address . . . . . : fe80::7cb6:46b:56d7:75d4%18
ddress. . . . . : 192.168.1.7
Mask . . . . . : 255.255.255.0
Gateway . . . . . : fe80::204:95ff:fee2:e800%18
                    192.168.1.1
```

Expt. No.

4) Use the connection tool to connect devices with appropriate Cables.
5) Click on the PC, go to Desktop tab, select IP Configuration
6) Enter IP address, Subnet masks and default gateway.

Testing the Network
1) Ping test
Use the ping command from the PCs to test connectivity to other devices.

PC> ping 192.168.1.1
PC> ping 192.168.2.1
screen

2) Simulation Mode
Switch to simulation mode in packet Tracer to visualize the data packets & troubleshoots any issue

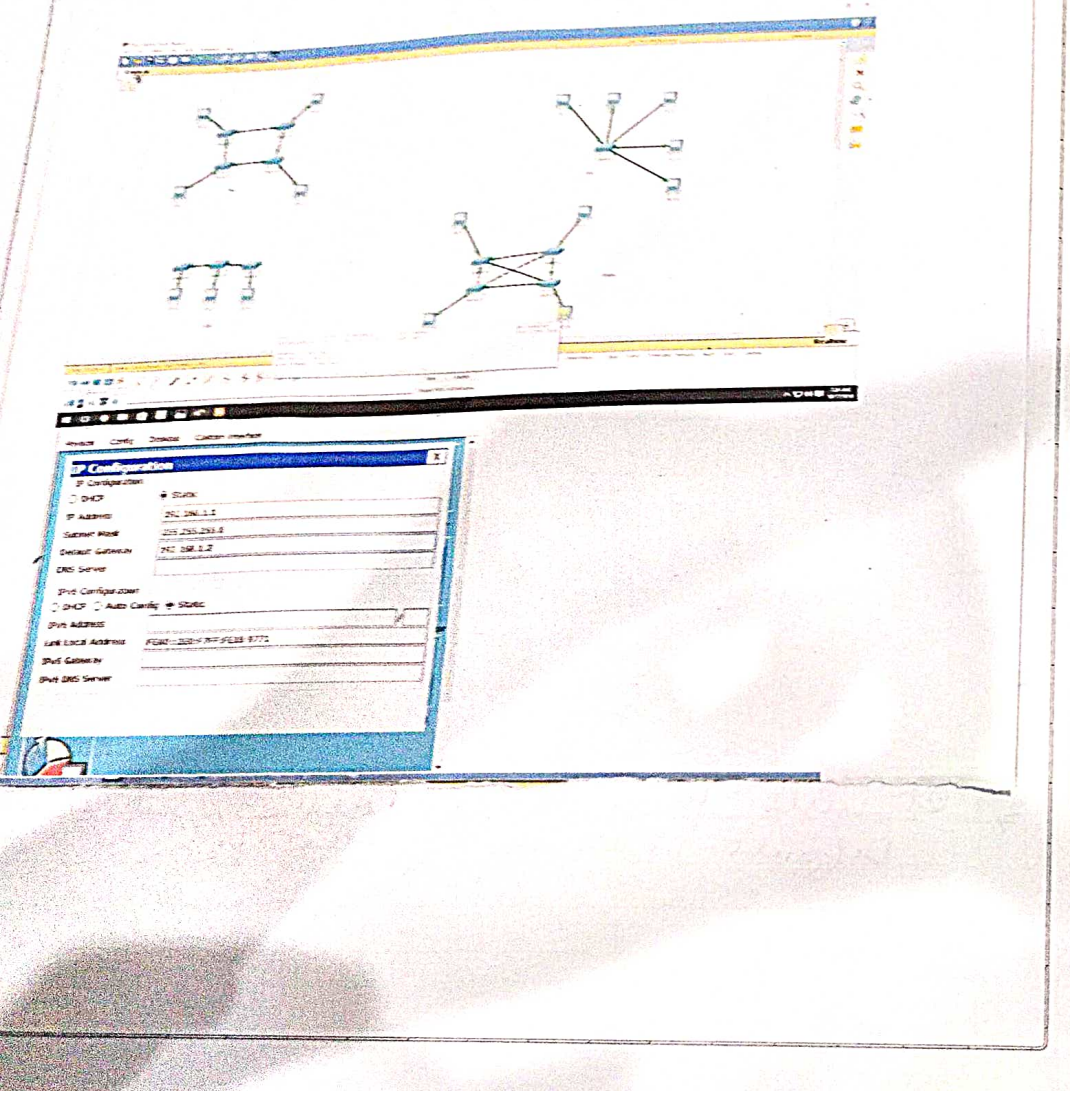
Implementation
1) Open command Prompt
2) In terminal write IP config command

C:\Users\sethi>ipconfig

3) It will provide IP address, Subnet mask Default Gateway of that PC.

Teacher's Signature :

Task 6, Creation of Simple Networking topologies using hubs and switches



Expt. No. _____ Date _____

Page No. _____

Task 6 Creation of Simple Networking topologies using hubs and switches.

Material Required: Cisco Packet Tracer, PCs, Switches, hubs, Wires, IP/MAC addresses.

Procedure: Open Cisco Packet Tracer

2. Drag and drop a hub and several PCs (eg 4 PCs) on to work space.
3. Use the connection tool to connect each PC to the Hub using Straight through Cables.
4. Click on each PC, go to Desktop tab and select IP Configuration.
5. Assign IP addressing to each PC within the same subnet.
6. Use the ping command from the command prompt of each PC to test connectivity with other PCs.

Practical Differences B/w Hub and Switches

1. Hub
   - Operates at the physical layer (Layer 1) of the OSI model.
   - Broadcasts data to all devices in the network, leading to potential collisions.
   - Suitable for small, simple networks.
2. Switches
   - Operates at the data link layer (Layer 2) of the OSI model. Uses MAC addresses to forward data

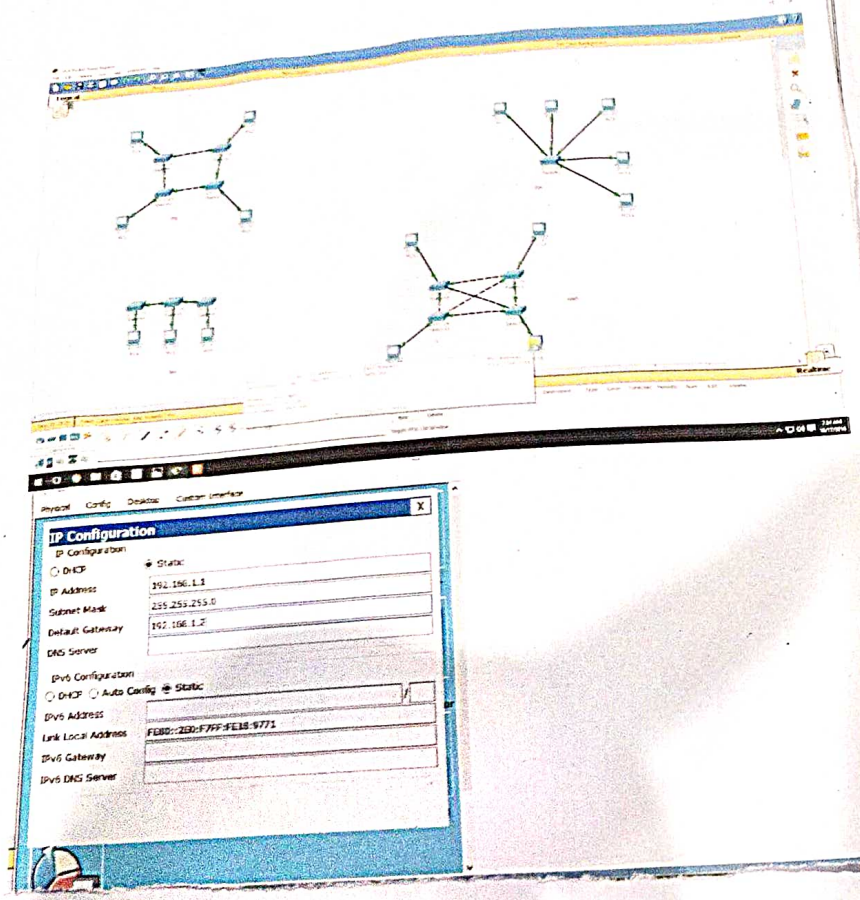
Teacher's Signature : _____

Expt. No.

Page No.

- Correct Destination / reducing collision
- More efficient and scalable for large network

Simulation of web traffic in Packet Tracer



Expt. No. Date

Page No.

Task 7) Simulation of Web Traffic in Packet Tracer.

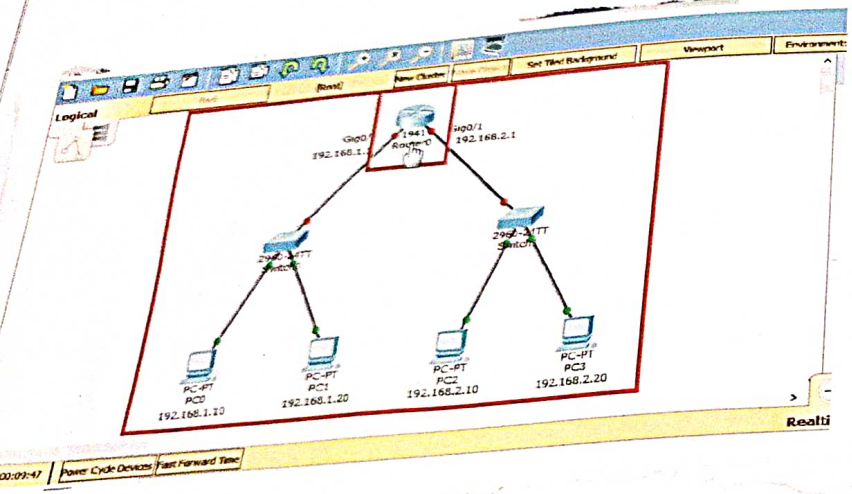
Material required : Cisco Packet Tracer, Router, Switches, Server, PCs, Cable, IP Addresses.

Procedure

1) Open Cisco packet Tracer
2) Drag and Drop the following devices onto the workspace : 1 Router, 1 Switch, 1 Server, 2 PCs
3) Connect Devices
   Use straight-through cables to connect the devices as follows:
   Connect the Router to the Switch
   Connect the Server to the Switch
   Connect each PC to the Switch.
4) Configure IP address.
   Assign IP addresses to each device for example.
   - Router:
     Interface connect to the switch 192.168.1.1
   - Server.
     IP Addresses : 192.168.1.2
     Subnet Mask : 255.255.255.0
     Default Gateway: 192.168.1.1
3) PC 1
   IP address : 192.168.1.4
   Subnet Mask : 255.255.255.0.

Teacher's Signature : _____

S.NO	Device	IPv4 Address	Default Gateway
1	PC0	192.168.1.2	192.168.1.1
2	PC1	192.168.1.3	192.168.1.1
3	PC2	192.168.1.4	192.168.1.1
4	PC3	192.168.1.5	192.168.1.1



Expt. No. Page No.

Task 01 Study and implementation of various router configuration commands.

Material required :- Cisco Packet Tracer, PCs, routers, cables, wires, IP Addresses.

Procedure :- Open Cisco Packet Tracer and Drag and Drop PCs, Switches, Router onto workspace

2) Click on the router and go to the CLI tab
3) Enter Privileged EXEC Mode
Router > enable
4) Enter Global configuration mode.
Router # configure terminal

5) Set a Hostname

6) Configure interfaces:
- Assign IP address to fast Ethernet 0/0
- Assign IP address to fast Ethernet 0/1

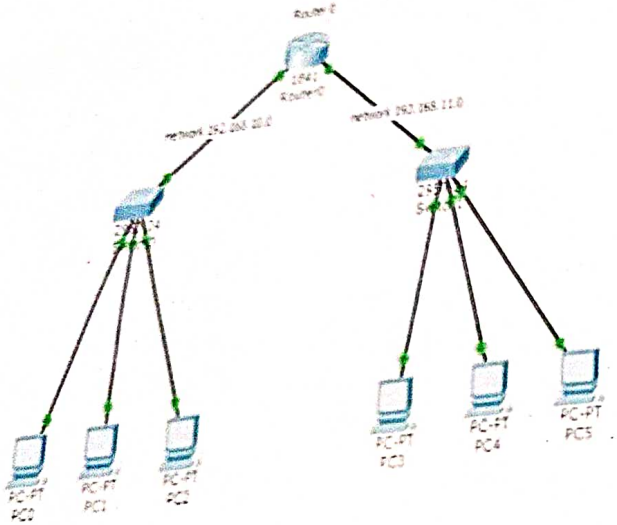
7) Configure routing

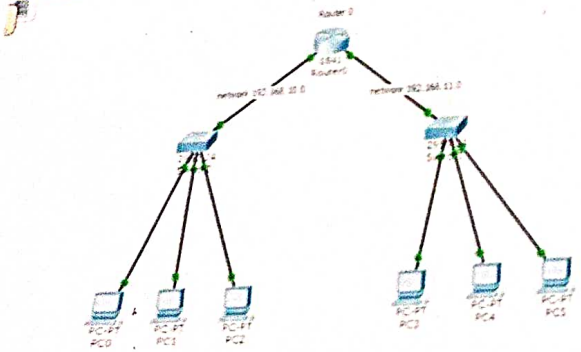
8) Save configuration

Conclusion :-> 1) Accessing the Router CLI
2) Setting up basic configuration
3) Configuration routing
4) Saving the configuration

Teacher's Signature :

Task 9 :- Creation of Networks using routers





Expt. No. Page No.

Task 9 Creation of Networks using routers

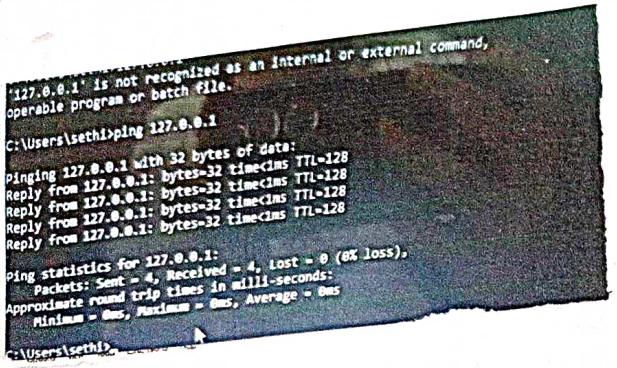
Material required :- Cisco Packet tracer, Computers, routers, Switches, Computers, Connecting wires, IP addresses, Packets

Procedure

1) Open Cisco Packet Tracer
2) Start a new project
3) Drag and Drop the following devices onto the workspace :- 2 routers, 2 Switches, 4 PCs
4) Connect Device.
   - Use straight through cables to connect PCs to switches.
   - Use crossover cables to connect switches to routers
   - Use a serial cable to connect the two routers.
5) Configure IP Addresses.
   - Router 1
   - Router 2.
6) Test Connectivity :- Use the ping command from each PC to test connectivity with PCs on the other network segment

Teacher's Signature :

TROUBLESHOOT



Expt. No. Page No.

Trouble shoot is the case unable to connect a printer that wired to one PC, so that other PC can use it too
Here all same steps to troubleshoot the issue

1. Check the printer settings.
On the PC to which printer is connected go to control panel > Device & Printers

Right click on the printer and select Printer properties and select Printer Properties

2. Verify Network Setting
Ensure all PCs are on same network

3. Ping Test

ping [IP address of the PC with that printer]

Teacher's Signature : _____