COMPUTER NETWORKS LAB MANUAL

SUBJECT CODE: CSA07

NAME:
REGISTRATION NUMBER:

Saveetha Institute of Medical and Technical Science

Saveetha School of Engineering

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EXPERIMENT-1

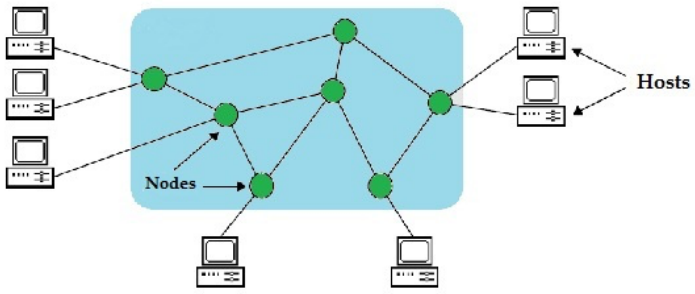
STUDY OF NETWORK COMPONENTS

Aim: To Study the following Network Devices in Detail

- PC
- Server
- Repeater
- Hub
- Switch
- Bridge
- Router
- Gate Way
- Transmission medium

Apparatus (Software): No software or hardware needed.

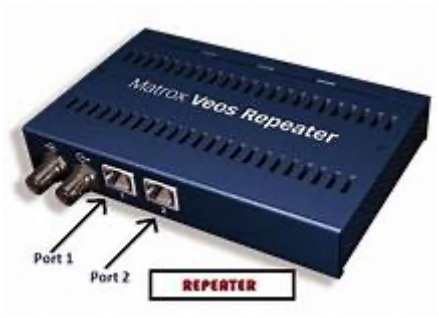
1. Node: In a communications **network**, a **network node** is a connection point that can receive, create, store or send data along distributed **network** routes.

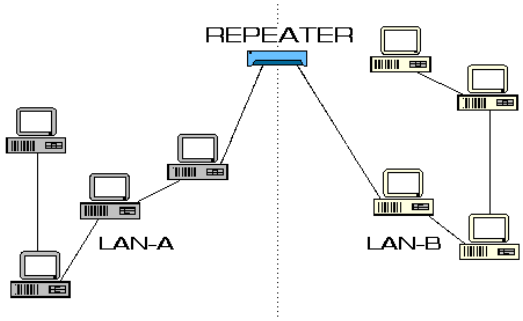


Computer Network

2. **Repeater:** FunctioningatPhysicalLayer.

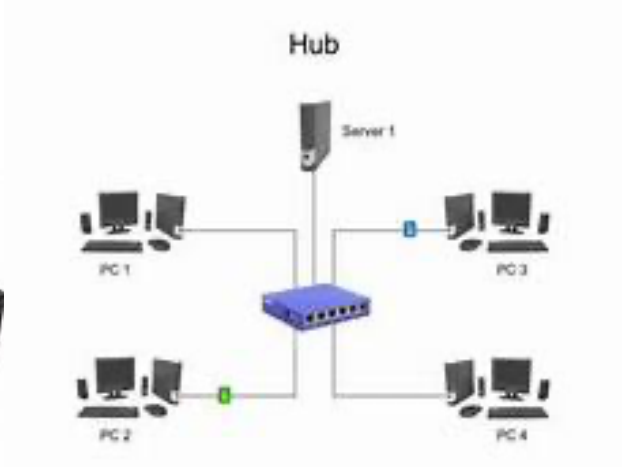
A**repeater**isanelectronicdevicethatreceivesa signal and retransmits it at a higher level and/or higher power, or onto the other side of an obstruction,sothatthesignalcancoverlongerdistances.



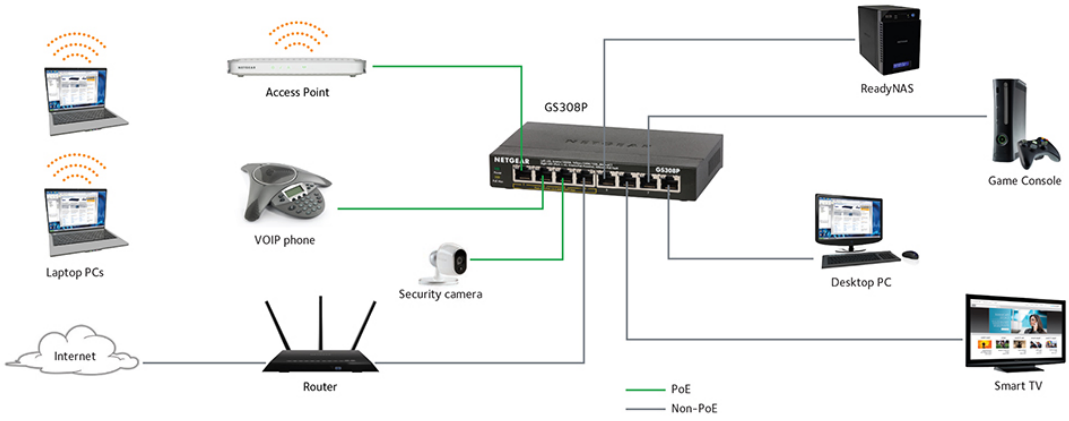


3. Hub: An**Ethernethub**,**activehub**,**networkhub**,**repeaterhub**

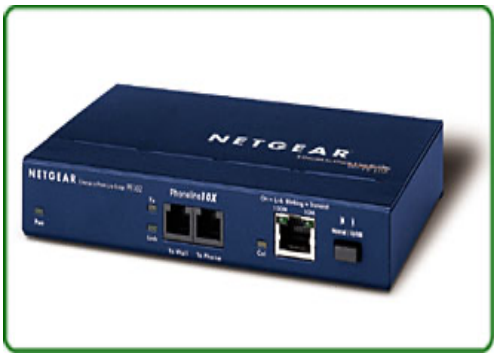
Huborconcentrator is a device for connecting multiple twisted pair or fiber optic Ethernet devices together and makingthemactasasinglenetworksegment.Hubsworkatthephysicallayer(layer1)ofthe OSI model. The device is a form of multiport repeater. Repeater hubs also participate in collisiondetection,forwardingajamsignaltoallportsifitdetectsacollision.

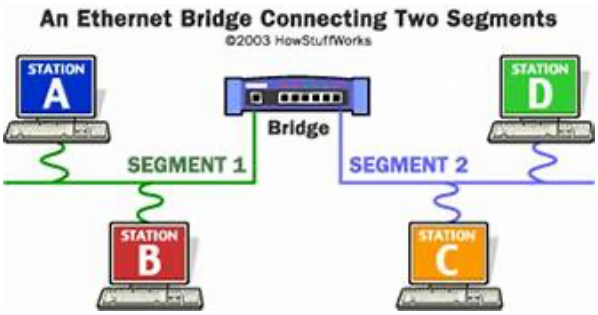


4.**Switch:** A **network switch** or **switching hub** is a computer networking device that connects network segments. The term commonly refers to a network bridge that processes and routes data at the data link layer (layer 2) of the OSI model. Switches that additionally processed at the network layer(layer3and above)areoftenreferredtoasLayer3switches or multilayer switches.

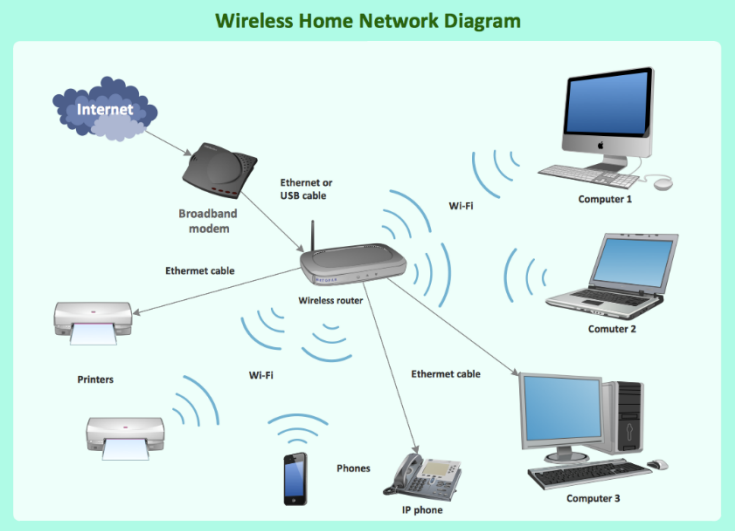


5. **Bridge:** A **network bridge** connects multiple network segments at the data link layer (Layer 2) of the OSI model. In Ethernet networks, the term *bridge* formally means a device that behaves according to the IEEE 802.1D standard. A bridge and switch are very much alike; a switch being a bridge with numerous ports. *Switch* or *Layer 2 switch* is often used interchangeably with *bridge*.Bridges can analyze incoming data packets to determine if the bridgeisabletosendthegivenpackettoanothersegmentofthenetwork.





6. **Router:** A **router** is an electronic device that interconnects two or more computer networks, and selectively interchanges packets of data between them. Each data packet contains address information that a router can use to determine if the source and destination are on the same network, or if the data packet must be transferred from one network to another where multiple routers are used in a large collection of interconnected networks, the routers exchange information about target system addresses,sothateachroutercanbuildup atableshowingthepreferredpathsbetweenanytwosystemsontheinterconnectednetworks.



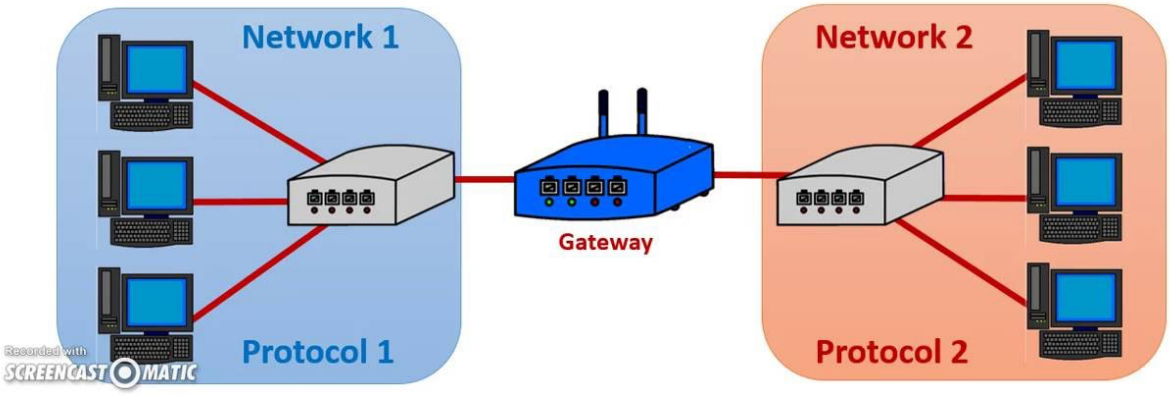
7. **GateWay:**Inacommunicationsnetwork,anetworknodeequippedforinterfacingwith another network that uses different protocols.A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between bothnetworks.

- A protocol translation/mapping gateway interconnects networks with different networkprotocoltechnologiesbyperformingtherequiredprotocolconversions.

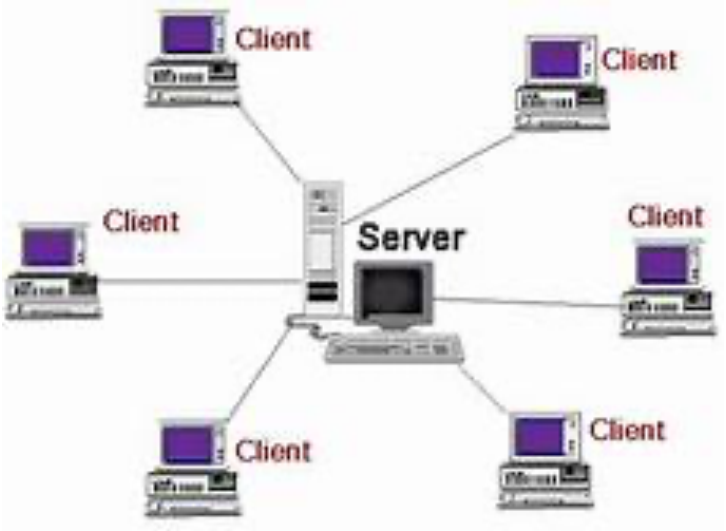
Hardware Components used in Communication Systems

Gateway

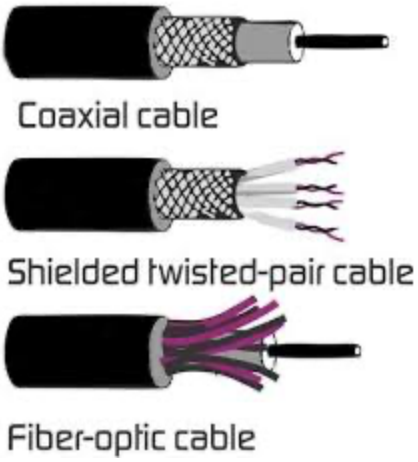
A gateway is required to connect a network with other types of networks that are running different protocols.

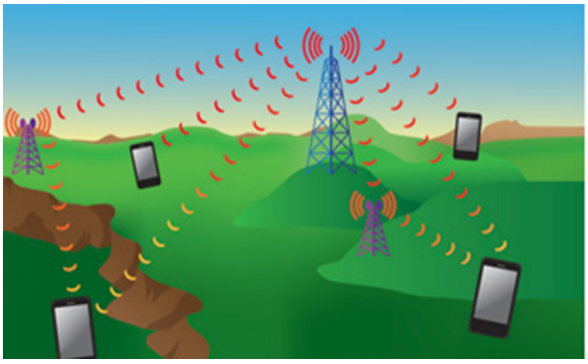


8. Server: A server is a type of computer or device on a network that manages network resources. Servers are often dedicated, meaning that they perform no other tasks besides their server tasks. On multiprocessing operating systems, however, a single compute can execute several programs at once. A server in this case could refer to the program that is managing resources rather than the entire computer.



9. **Transmission media**: The medium through which the signals travel from one device to another. These are classified as guided and unguided. Guided media are those that provide a conduit from one device to another. Egs Twisted pair, coaxial cable etc. Unguided media transport signals with out using physical cables. Eg.Air.





Result: Thus the network components are studied in detail.

Date:

EXPERIMENT-2

IMPLEMENTATION OF STAR TOPOLOGY USING PACKET TRACER

Aim: To Implement a star topology using packet tracer and hence to transmit data between the devices connected using star topology.

Software/Apparatus required: Packet Tracer/End devices, bridge, connectors.

Steps for building topology:

Step 1: Start Packet Tracer

Step 2: Choosing Devices and Connections

Step 3: Building the Topology – Adding Hosts

Single click on the **End Devices**.

Single click on the **Generic** host.

Move the cursor into topology area.

Single click in the topology area and it copies the device.

Step 4: Building the Topology – Connecting the Hosts to Switches

Select a switch, by clicking once on **Switches** and once on a **2950-24** switch.

Add the switch by moving the plus sign "+"

Step 5: Connect PCs to switch by first choosing Connections

Click once on the **Copper Straight-through** cable

Click once on **PC2**

Choose **FastEthernet**

Drag the cursor to **Switch0**

Click once on **Switch0**

Notice the green link lights on **PC** Ethernet NIC and amber light **Switch port**. The switch port is temporarily not forwarding frames, while it goes through the stages for the Spanning Tree Protocol (STP) process. After about 30 seconds the amber light will change to green indicating that the port has entered the forwarding stage. Frames can now forwarded out the switch port.

Step 6: Configuring IP Addresses and Subnet Masks on the Hosts

To start communication between the hosts IP Addresses and Subnet Masks had to be Configured on the devices. Click once on PC0. Choose the Config tab and click on FastEthernet0. Type the IP address in its field. Click on the subnet mask it will be generated automatically.

Step 7: To confirm Data transfer between the devices

Click on the node. Select desktop option and then command prompt. Once the window pops up ,ping the IP address of the device to which node0 is connected. Ping statistics Will be displayed.

Result: Thus the Star topology is implemented with Packet Tracer simulation Tool.

Date:

EXPERIMENT-3

Implementation of Tree Topology Using Packet Tracer

Aim: To Implement a tree topology using packet tracer and hence to transmit data between the devices connected using tree topology.

Software/Apparatus required: Packet Tracer/End devices, Hubs, connectors.

Steps for building topology:

Step 1: Start Packet Tracer

Step 2: Choosing Devices and Connections

Step 3: Building the Topology – Adding Hosts

Single click on the **End Devices**.

Single click on the **Generic** host.

Move the cursor into topology area.

Single click in the topology area and it copies the device.

Step 4: Building the Star Topology – Connecting the Hosts to Hubs

Select a Hub, by clicking once on **Hub** and once on a **generic Hub**

Add the Hub by moving the plus sign "+"

Step 5: Connect PCs to Hub by first choosing Connections

Click once on the **Automatic cable selector**

Click once on **PC2**

Choose **FastEthernet**

Drag the cursor to **Hub0**

Click once on **Hub0**

Proceeding in this way create three star topologies

Step 6 : Building the Tree Topology – Connecting the Hubs to Active Hub

Connect the hubs of star topologies to active hub to create tree topology.

Step 7: Configuring IP Addresses and Subnet Masks on the Hosts

To start communication between the hosts IP Addresses and Subnet Masks had to be configured on the devices. Click once on PC0. Choose the Config tab and click on FastEthernet0. Type the IP address in its field. Click on the subnet mask. It will be Generated automatically

Step 8: Verifying Connectivity in Realtime Mode

Be sure you are in **Realtime** mode.

Select the **Add Simple PDU** tool used to ping devices.

Click once on PC0, then once on PC3.

The PDU **Last Status** should show as **Successful**.

Step 9:**Verifying Connectivity in Simulation Mode**

Be sure you are in **Simulation** mode.

Deselect all filters (All/None) and select only **ICMP**.

Select the **Add Simple PDU** tool used to ping devices

Click once on PC0, then once on PC3.

Continue clicking **Capture/Forward** button until the ICMP ping is completed. You should see the ICMP messages move between the hosts, hub and switch. The PDU **Last Status** should show as **Successful**.

Result: Thus the Tree topology is implemented with Packet Tracer simulation Tool.

Date:

EXPERIMENT-4

Implementation of Hybrid Topology (Bus and Ring Topology) Using Packet Tracer

Aim: To Implement a hybrid topology using packet tracer and hence to transmit data between the devices connected using tree topology.

Software/Apparatus required: Packet Tracer/End devices, Hubs, connectors.

Steps for building topology:

Step 1: Start Packet Tracer

Step 2: Choosing Devices and Connections

Step 3: Building the Topology – Adding Hosts

Single click on the **End Devices**.

Single click on the **Generic** host.

Move the cursor into topology area.

Single click in the topology area and it copies the device.

Step 4: Building the Bus Topology – Connecting the Hosts to Hubs

Select a Hub, by clicking once on **Hub** and once on a **generic Hub**

Add the Hub by moving the plus sign "+"

Step 5: Building the Ring Topology – Connecting the Hosts to Hubs

Select a Hub, by clicking once on **Hub** and once on a **generic Hub**

Add the Hub by moving the plus sign "+"

Step 5: Connect PCs to Hub by first choosing Connections

Click once on the **Automatic cable selector**

Click once on **PC2**

Choose **FastEthernet**

Drag the cursor to **Hub0**

Click once on **Hub0**

Proceeding in this way create three Bus topologies

Step 6 : Building the Tree Topology – Connecting the Hubs to Active Hub

Connect the hubs of star topologies to active hub to create tree topology.

Step 7: Configuring IP Addresses and Subnet Masks on the Hosts

To start communication between the hosts IP Addresses and Subnet Masks had to be configured on the devices. Click once on PC0. Choose the Config tab and click on FastEthernet0. Type the IP address in its field. Click on the subnet mask. It will be Generated automatically

Step 8: Verifying Connectivity in Realtime Mode

Be sure you are in **Realtime** mode.

Select the **Add Simple PDU** tool used to ping devices.

Click once on PC0, then once on PC3.

The PDU **Last Status** should show as **Successful**.

Step 9:**Verifying Connectivity in Simulation Mode**

Be sure you are in **Simulation** mode.

Deselect all filters (All/None) and select only **ICMP**.

Select the **Add Simple PDU** tool used to ping devices

Click once on PC0, then once on PC3.

Continue clicking **Capture/Forward** button until the ICMP ping is completed. You should see the ICMP messages move between the hosts, hub and switch. The PDU **Last Status** should show as **Successful**.

Result: Thus the Hybrid topology is implemented with Packet Tracer simulation Tool.

OUTPUT FOR HYBRID TOPOLOGY:

Date:

EXPERIMENT-5

CAPTURING OF PACKETS

AIM:

To analyze capturing of packets using wire shark network analyzer

SOFTWARE USED:

Wire shark network analyzer

PROCEDURE:

1. Open wire shark
2. Click on the list the available capture interface
3. Choose the LAN interface
4. Click on the start button
5. Active packets will be displayed
6. Stop the capturing &click on capture options
7. Remove the capture packets in promiscuous mode
8. Click start
9. Click restart the tunneling device icon
10. Then packets will be captured
11. Click on stop the running device icon

RESULT: Hence, the capturing of packets using wire shark network analyzer was analyzed.

Date:

EXPERIMENT- 6

TRANSMISSION OF DATA THROUGH GUIDED MEDIUM

Aim: To Transmit a signal through a guided media – Coaxial Cable.

Components Required: Function Generator(FG), coaxial Cable, CRO.

Procedure

1.Adjust the amplitude knob in Function Generator to fix a value (ex:2V).

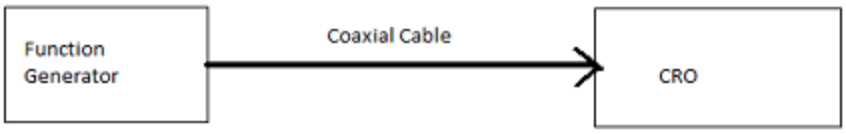
2.Adjust the Frequency knob in FG to fix a value (ex:1KHZ).

3.Connect the Coaxial Cable one end to the FG and other end to CRO.

4.Adjust the Amplitude and time period knobs simultaneously to bring the required output in CRO.

5. Repeat the experiment for different signals of different amplitude and frequency

Diagram



Observation

Sl.No	Signal Type	Amplitude	Time Period (t)	Frequency (f=1/t)
1	Sinusoidal			
2	Square			
3	Triangular			

Result: Thus the transmission of signal through a guided medium is performed and graphs are drawn.

DATE :

EXPERIMENT 7

FILTERING OF PACKETS USING SOURCE ADDRESS

AIM:

To Perform the filtering of packets using source address using wire shark network analyzer

SOFTWARE USED:

Wire shark network analyzer

PROCEDURE:

1. Open wire shark
2. Click on list the available capture interface
3. Choose the LAN interface
4. Click on start button
5. Active packets will be displayed
6. Capture the packets & select any IP address from the source
7. Click on the expression and select IPV4 →IP addrsource address in the field name.
8. Select the double equals(==) from the selection and enter the selected IP source address in the
9. Protocol value protocol.
10. click on apply button
11. All the packets will be filtered using source address

RESULT:

Hence, the filtering of packets using source address with wire shark Network analyzer is performed

DATE :

EXPERIMENT 8

FILTERING OF PACKETS USING DESTINATIONADDRESS

AIM:

To analyze the filtering of packets using destination address using wire shark network analyzer

SOFTWARE USED: Wire shark network analyzer

PROCEDURE:

1. Open wire shark
2. Click on list the available capture interface
3. Choose the LAN interface
4. Click on start button
5. Active packets will be displayed
6. Capture the packets & select any IP address from the source
7. Click on the expression and select IPV4-IP address destination address in the field name.
8. Select the double equals (= =) from the selection and enter the selected IP source address in the value field.
9. click on apply button
10. All the packets will be filtered using destination address

RESULT:

Hence, the filtering of packets using destination address with wire shark network analyzer is performed.

DATE:

EXPERIMENT-9

Configuration of a simple static routing in packet tracer using a simple topology with two routers

Aim: To Configure a router using packet tracer software and hence to transmit data between the devices in real time mode and simulation mode.

Software/Apparatus required: Packet Tracer/End devices, Hubs, connectors.

Steps for building topology:

Step 1: Start Packet Tracer

Step 2: Choosing Devices and Connections

Step 3: Single click on the **End Devices**.

Single click on the **Generic** Host.

Place PC0, PC1 on topology area.

Connect PCs to Switch 1.

Similarly Place PC2, PC3 on topology area for receiver side

Connect these PCs with switch 1 and 2 respectively through connecting wires.

Select Router and place the router between two switches.

Connect these switches into router through connecting wires.

Step 3:Configuring IP Addresses, Gate Way and Subnet Masks on the Hosts

To start communication between the hosts IP Addresses, subnet Masks and Gate way had to be configured on the devices. Click once on PCs. Choose the Config tab and click on FastEthernet0. Type the IP address in its field. Based on router create gate way click on the subnet mask. It will be generated automatically.

Step 4: Verifying Connectivity in Realtime Mode

Be sure you are in **Realtime** mode.

Select the **Add Simple PDU** tool used to ping devices.

Click once on PC0, then once on PC3.

The PDU **Last Status** should show as **Successful**.

Step 5: **Verifying Connectivity in Simulation Mode**

Be sure you are in **Simulation** mode.

Deselect all filters (All/None) and select only **ICMP**.

Select the **Add Simple PDU** tool used to ping devices

Click once on PC0, then once on PC3.

Continue clicking **Capture/Forward** button until the ICMP ping is completed. You should see the ICMP messages move between the hosts, hub and switch. The PDU **Last Status** should show as **Successful**.

Result: Thus Configuration of a simple static routing in packet tracer using a simple topology with two routers was done successfully.

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OUTPUT FOR STATIC ROUTER CONFIGURATION:

Date :

EXPERIMENT-10

Configuration of Dynamic Routing – RIP in Packet Tracer

Aim: To Configure a network using distance vector routing (Routing information protocol) using packet tracer software and hence to transmit data between the devices in real time mode as well as simulation mode.

Software/Apparatus required: Packet Tracer/End devices, Hubs, connectors.

Steps for building topology:

Step 1: Start Packet Tracer

Step 2: Choosing Devices and Connections

Step 3: Single click on the **End Devices**.

Single click on the **Generic** Host.

Place PC0, PC1 on topology area.

Connect PCs to Switch 1.

Similarly Place PC2, PC3 on topology area for receiver side.

Connect these PCs with switch 1 and 2 respectively through connecting wires.

Select Router1 and Router 2 and place the router 1, 2 between two switches.

Connect these switches into router through connecting wires.

Step 3:Configuring IP Addresses, Gate Way and Subnet Masks on the Hosts

To start communication between the hosts IP Addresses, subnet Masks and Gate way had to be configured on the devices. Click once on PCs. Choose the Config tab and click on FastEthernet0. Type the IP address in its field. Based on router create gate way click on the subnet mask. It will be generated automatically.

Step 8: Verifying Connectivity in Realtime Mode

Be sure you are in **Realtime** mode.

Select the **Add Simple PDU** tool used to ping devices.

Click once on PC0, then once on PC3.

The PDU **Last Status** should show as **Successful**.

Step 9:**Verifying Connectivity in Simulation Mode**

Be sure you are in **Simulation** mode.

Deselect all filters (All/None) and select only **ICMP**.

Select the **Add Simple PDU** tool used to ping devices

Click once on PC0, then once on PC3.

Continue clicking **Capture/Forward** button until the ICMP ping is completed. You should see the ICMP messages move between the hosts, hub and switch. The PDU **Last Status** should show as **Successful**.

Result: Thus the Configuration of Dynamic Routing – RIP in Packet Tracer

OUTPUT FOR RIP CONFIGURATION:

EXPERIMENT-11

Configuration of OSPF using Packet tracer

Aim: To Configure a network using link state routing (OSPF) using packet tracer software and hence to transmit data between the devices in real time mode and simulation mode.

Software/Apparatus required: Packet Tracer/End devices, Hubs, connectors.

Steps for building topology:

Step 1: Start Packet Tracer

Step 2: Choosing Devices and Connections

Step 3: Single click on the **End Devices**.

Single click on the **Generic** Host.

Place PC0, PC1 on topology area.

Connect PCs to Switch 1.

Similarly Place PC2, PC3 on topology area for receiver side.

Connect these PCs with switch 1 and 2 respectively through connecting wires.

Select Router1 and Router 2 and place the router 1, 2 between two switches.

Connect these switches into router through connecting wires.

Step 3:Configuring IP Addresses, Gate Way and Subnet Masks on the Hosts

To start communication between the hosts IP Addresses, subnet Masks and Gate way had to be configured on the devices. Click once on PCs. Choose the Config tab and click on FastEthernet0. Type the IP address in its field. Based on router create gate way click on the subnet mask. It will be generated automatically.

Step 9:**Verifying Connectivity in Simulation Mode**

Be sure you are in **Simulation** mode.

Deselect all filters (All/None) and select only **ICMP**.

Select the **Add Simple PDU** tool used to ping devices

Click once on PC0, then once on PC3.

Continue clicking **Capture/Forward** button until the ICMP ping is completed. You should see the ICMP messages move between the hosts, hub and switch. The PDU **Last Status** should show as **Successful**.

Result: Thus the Configuration of OSPF using Packet tracer successfully.

OUTPUT FOR OSPF :

Date:

EXPERIMENT-12

FILTERING OF PACKETS USING TCP PROTOCOL

AIM:

To analyze filtering of packets using TCP protocol using wire shark network analyzer

SOFTWARE USED:

Wire shark network analyzer

PROCEDURE:

1. Open wire shark
2. Click on the list the available capture interface
3. Choose the LAN interface
4. Click on the start button
5. Active packets will be displayed
6. Stop the capturing &click on capture options
7. Click on the expression IPV4_ip protocol.
8. Click on the reaction "==".
9. Select the type required protocol system in the box TCP, Click ok.
10. Click on apply button.
11. All packets will be filter by using TCP protocol and all retransmission TCP packets will be obtained.

RESULT: Hence, the filtering of packets using TCP protocol in wire shark network analyzer was analyzed.

Date:

EXPERIMENT-13

FILTERING OF PACKETS USING UDP PROTOCOL

AIM:

To analyze capturing of packets using UDP protocol using wire shark network analyzer

SOFTWARE USED:

Wire shark network analyzer

PROCEDURE:

1. Open wire shark
2. Click on the list the available capture interface
3. Choose the LAN interface
4. Click on the start button
5. Active packets will be displayed
6. Stop the capturing &click on capture options
7. Click on the expression IPV4_ip protocol.
8. Click on the reaction "==".
9. Select the type required protocol system in the box UDP, Click ok.
10. Click on apply button.
11. All packets will be filter by using UDP protocol and all retransmission UDP packets will be obtained.

RESULT: Hence, the filtering of packets using UDP protocol in wire shark network analyzer was analyzed.

EXPERIMENT-14

FILTERING OF PACKETS USING DNS PROTOCOL

AIM:

To analyze capturing of packets using DNS protocol using wire shark network analyzer

SOFTWARE USED:

Wire shark network analyzer

PROCEDURE:

1. Open wire shark
2. Click on the list the available capture interface
3. Choose the LAN interface
4. Click on the start button
5. Active packets will be displayed
6. Stop the capturing &click on capture options
7. Click on the expression IPV4_ip protocol.
8. Click on the reaction "==".
9. Select the type required protocol system in the box DNS, Click ok.
10. Click on apply button.
11. All packets will be filter by using DNS protocol and all retransmission DNS packets will be obtained.

RESULT: Hence, the filtering of packets using DNS protocol in wire shark network analyzer was analyzed.