WEEK-3

Point-to-Point

Point-to-point networks contains exactly two hosts such as computer, switches or routers, servers connected back to back using a single piece of cable. Often, the receiving end of one host is connected to sending end of the other and vice-versa.

Bus Topology

In case of Bus topology, all devices share single communication line or cable.Bus topology may have problem while multiple hosts sending data at the same time. Therefore, Bus topology either uses CSMA/CD technology or recognizes one host as Bus Master to solve the issue. It is one of the simple forms of networking where a failure of a device does not affect the other devices. But failure of the shared communication line can make all other devices stop functioning.

Star Topology

All hosts in Star topology are connected to a central device, known as hub device, using a point-to-point connection. That is, there exists a point to point connection between hosts and hub. The hub device can be any of the following:

- Layer-1 device such as hub or repeater
- Layer-2 device such as switch or bridge
- Layer-3 device such as router or gateway

As in Bus topology, hub acts as single point of failure. If hub fails, connectivity of all hosts to all other hosts fails. Every communication between hosts, takes place through only the hub.Star topology is not expensive as to connect one more host, only one cable is required and configuration is simple.

Ring Topology

In ring topology, each host machine connects to exactly two other machines, creating a circular network structure. When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all intermediate hosts. To connect one more host in the existing structure, the administrator may need only one more extra cable..

Mesh Topology

In this type of topology, a host is connected to one or multiple hosts.This topology has hosts in point-to-point connection with every other host or may also have hosts which are in point-to-point connection to few hosts only.

Week1

1. Installation of Simulation Tools (packet tracer and NS2).

❖ INSTALLATION OF PACKET TRACER

- Downloading Cisco Packet Tracer
  - Go to your web browser and search “download packet tracer” . Click on any of the links provided.
  - You can see many packet tracer versions. Choose the latest version that is compatible with your computer.
  - Go to the file where the cisco packet tracer is downloaded on your computer and double click on setup to begin the setup.
  - Click on “I accept the agreement” and click on “Next”.
  - Choose the directory folder where you want to install the packet tracer by clicking on “Browse” and then click on “Next”.
  - You can create a desktop shortcut icon by selecting the checkbox when prompted and click “Finish”.
  - Now cisco packet tracer is installed successfully.
- Opening Cisco Packet Tracer
  - Double click on the cisco packet tracer shortcut icon to open.
  - You can login by providing email address and password or simply login as guest.
  - After a successful login, the cisco packet interface appears as shown in the below image.

❖ INSTALLATION OF NS2

Step 1:

Please go to below given link and download the three .rar files after that place these files into in a single folder.

Step 2:

- Now Extract the NS 2.35.part1 only. It will extract the part2 an part3 automatically.
- Extract after the download is complete.
- Part 2 and Part 3 will automatically be extracted.

Step 3:

- After extraction you’ll get a folder named NS 2.35
- Inside this folder you get cygwin setup, .bashrc etc..
- Now install the setup. Choose install from local directory

- Press Next
- Don’t change the default Root Directory
- In Local Package Repository field browse to: NS 2.35/nslocal/release
- Click Next
- Click on the Circle
- After clicking the circle, the default turns to install
- After this press Next it will install the necessary packages for NS2
- Check create a desktop shortcut and start menu shortcut
- Then installation finished.
- Now you are halfway done!

Step 4:

- Now create a folder Named Noureddine inside the C:\cygwin\home
- Now copy the ns-allinone-2.35-RC7avecxgraph.rar and Extract there. You’ll get ns-allinone-2.35-RC7 folder.
- Now copy the .bashrc file from the downloaded Extract folder
- Now go to the “C:\cygwin\home\user” folder and replace (i.e., paste) the .bashrc file that you copied.
- Now open the Cygwin command window which is on your desktop and type source .bashrc
- Now type ns then the symbol “$” change to “%”
- Now type ns-version it will show like:
- Now press exit.
- Now type startxwin you’ll get a new window.
- Now type name you will get a screen.
- Now go to file and quit the name window.
- Now hold the main tab and drag your mouse to quit from Cygwin window (the white window)
- And exit from ‘cygwin command’ window (type exit).

WEEK-3

BUS TOPOLOGY

ALGORITHM:

1. Create a simulator object
2. Define different colors for different data flows
3. Open a nam trace file and define finish procedure then close the trace file, and execute nam on trace file.
4. Create five nodes that forms a network numbered from 0 to 4
5. Create duplex links between the nodes and add Orientation to the nodes for setting a LAN topology
6. Setup TCP Connection between n(1) and n(3)
7. Apply CBR Traffic over TCP.
8. Schedule events and run the program.

RING ALGORITHM

ALGORITHM:

1. Create a simulator object
2. Define different colors for different data flows
3. Open a nam trace file and define finish procedure then close the trace file, and execute nam on trace file.
4. Create five nodes that forms a network numbered from 0 to 4
5. Create duplex links between the nodes to form a Ring Topology.
6. Setup TCP Connection between n(1) and n(3)
7. Apply CBR Traffic over TCP
8. Schedule events and run the program.

STAR TOPOLOGY

ALGORITHM:

1. Create a simulator object
2. Define different colors for different data flows
3. Open a nam trace file and define finish procedure then close the trace file, and execute nam on trace file.
4. Create six nodes that forms a network numbered from 0 to 5
5. Create duplex links between the nodes to form a STAR Topology
6. Setup TCP Connection between n(1) and n(3)
7. Apply CBR Traffic over TCP
8. Schedule events and run the program.

WEEK-5

THEORY:

Ethernet is a LAN (Local area Network) protocol operating at the MAC (Medium Access Control) layer. Ethernet has been standardized as per IEEE 802.3. The underlying protocol in Ethernet is known as the CSMA / CD – Carrier Sense Multiple Access / Collision Detection. The working of the Ethernet protocol is as explained below, A node which has data to transmit senses the channel. If the channel is idle then, the data is transmitted. If the channel is busy then, the station defers transmission until the channel is sensed to be idle and then immediately transmitted. If more than one node starts data transmission at the same time, the data collides. This collision is heard by the transmitting nodes which enter into contention phase. The contending nodes resolve contention using an algorithm called Truncated binary exponential back off.

ALGORITHM:

1. Create a simulator object
2. Define different colors for different data flows
3. Open a nam trace file and define finish procedure then close the trace file, and execute nam on trace file.
4. Create six nodes that forms a network numbered from 0 to 5
5. Create duplex links between the nodes and add Orientation to the nodes for setting a LAN topology
6. Setup TCP Connection between n(0) and n(4)
7. Apply FTP Traffic over TCP
8. Setup UDP Connection between n(1) and n(5)
9. Apply CBR Traffic over UDP.
10. Apply CSMA/CA and CSMA/CD mechanisms and study their performance
11. Schedule events and run the program.

WEEK-6

THEORY:

Stop and Wait is a reliable transmission flow control protocol. This protocol works only in Connection Oriented (Point to Point) Transmission. The Source node has window size of ONE. After transmission of a frame the transmitting (Source) node waits for an Acknowledgement from the destination node. If the transmitted frame reaches the destination without error, the destination transmits a positive acknowledgement. If the transmitted frame reaches the Destination with error, the receiver destination does not transmit an acknowledgement. If the transmitter receives a positive acknowledgement it transmits the next frame if any. Else if its acknowledgement receive timer expires, it retransmits the same frame.

1. Start with the window size of 1 from the transmitting (Source) node
2. After transmission of a frame the transmitting (Source) node waits for a reply (Acknowledgement) from the receiving (Destination) node.
3. If the transmitted frame reaches the receiver (Destination) without error, the receiver (Destination) transmits a Positive Acknowledgement.
4. If the transmitted frame reaches the receiver (Destination) with error, the receiver (Destination) do not transmit acknowledgement.
5. If the transmitter receives a positive acknowledgement it transmits the next frame if any. Else if the transmission timer expires, it retransmits the same frame again.
6. If the transmitted acknowledgment reaches the Transmitter (Destination) without error, the Transmitter (Destination) transmits the next frame if any.
7. If the transmitted frame reaches the Transmitter (Destination) with error, the Transmitter (Destination) transmits the same frame.
8. This concept of the Transmitting (Source) node waiting after transmission for a reply from the receiver is known as STOP and WAIT.

WEEK-4

Cyclic Redundancy Check (CRC)

A cyclic code is a linear (n, k) block code with the property that every cyclic shift of a codeword results in another code word. Here k indicates the length of the message at transmitter (the number of information bits). n is the total length of the message after adding check bits. (actual data and the check bits). n, k is the number of check bits.
The codes used for cyclic redundancy check there by error detection are known as CRC codes (Cyclic redundancy check codes).Cyclic redundancy-check codes are shortened cyclic codes. These types of codes are used for error detection and encoding. They are easily implemented using shift-registers with feedback connections. That is why they are widely used for error detection on digital communication. CRC codes will provide effective and high level of protection.

Hamming Code

This error detecting and correcting code technique is developed by R.W.Hamming . This code not only identifies the error bit, in the whole data sequence and it also corrects it. This code uses a number of parity bits located at certain positions in the codeword. The number of parity bits depends upon the number of information bits. The hamming code uses the relation between redundancy bits and the data bits and this code can be applied to any number of data bits.

Week-2

Overview of TCP/IP reference model

TCP/IP that is Transmission Control Protocol and Internet Protocol was developed by Department of **Defence's Project Research Agency** (ARPA, later DARPA) as a part of a research project of network interconnection to connect remote machines.

The features that stood out during the research, which led to making the TCP/IP reference model were:

- Support for a flexible architecture. Adding more machines to a network was easy.
- The network was robust, and connections remained intact untill the source and destination machines were functioning.

The overall idea was to allow one application on one computer to talk to(send data packets) another application running on different computer.

A local area network (LAN) is a collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.

Regardless of size, a LAN's single defining characteristic is that it connects devices that are in a single, limited area. In contrast, a wide area network (WAN) or metropolitan area network (MAN) covers larger geographic areas. Some WANs and MANs connect many LANs together.