**American International University- Bangladesh**

**Department of Computer Engineering**

COE 3201: Data Communication Laboratory

**Title: Study of PC-to-PC, Star and Bus Topology using LAN TRAINER ACT-14**

**Abstract:**

This experiment is designed to-

1. Study the file transfer of LAN using Trainer board and software.

2.To develop the understanding of different LAN topologies.

**Introduction:**

A local area network (LAN) is a computer network that interconnects computers within a limited area such as a residence, school, laboratory, university campus or office building. By contrast, a wide area network (WAN) not only covers a larger geographic distance, but also generally involves leased telecommunication circuits. Ethernet and Wi-Fi are the two most common technologies in use for local area networks.

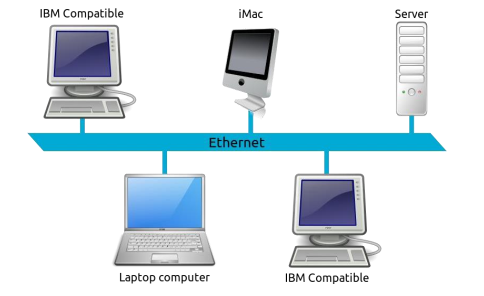


Figure 1: Conceptual Diagram of Local Area Network

Network topology describes the layout of interconnections between devices and network segments. At the data link layer and physical layer, a wide variety of LAN topologies have

been used, including ring, bus, mesh and star. At the higher layers, NetBEUI, IPX/SPX, AppleTalk and others were once common, but the Internet Protocol Suite (TCP/IP) has prevailed as a standard of choice. Simple LANs generally consist of cabling and one or more switches. A switch can be connected to a router, cable modem, or ADSL modem for Internet access. A LAN can include a wide variety of other network devices such as firewalls, load balancers, and network intrusion detection. Advanced LANs are characterized by their use of redundant links with switches using the spanning tree protocol to prevent loops, their ability to manage differing traffic types via quality of service (QoS),and their ability to segregate traffic with VLANs. LANs can maintain connections with other LANs via leased lines, leased services, or across the Internet using virtual private network technologies. Depending on how the connections are established and secured, and the distance involved, such linked LANs may also be classified as a metropolitan area network (MAN) or a wide area network (WAN).

**STAR TOPOLOGY:**

A star topology is a topology for a Local Area Network (LAN) in which all nodes are individually connected to a central connection point, like a hub or a switch. A star takes more cable than e.g. a bus, but the benefit is that if a cable fails, only one node will be brought down.

Diagram

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Figure 2: Star Topology

All traffic emanates from the hub of the star. The central site is in control of all the nodes attached to it. The central hub is usually a fast, self contained computer and is responsible for routing all traffic to other nodes. The main advantage of a star network is that one malfunctioning node does not affect the rest of the network. However this type of network can be prone to bottleneck and failure problems at the central site. A star network is often combined with a bus topology. The central hub is then connected to the backbone of the bus. This combination is called a tree.

**BUS TOPOLOGY:**

A bus topology is a topology for a Local Area Network (LAN) in which all the nodes are connectedto a single cable. The cable to which the nodes connect is called a "backbone". If the backbone is broken, the entire segment fails. Bus topologies are relatively easy to install and don't require much cabling compared to the alternatives.

Diagram

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Fig-3. Bus Topology

**Hardware Description:**

LAN TRAINER ACT-14 is divided into different BLOCKS for the benefit of user. The different blocks are as explained below.

Diagram

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Figure 4: Block Diagram of the trainer board

**PC TO PC COMMUNICATION:**

The LAN Trainer has on board facility for PC to PC Communication. This trainer has 2 nos. of RJ-45 connecting slots to connect 2 computers for the access of PC to PC communication. One fault switch FSW-3 is provided on board to create the fault in PC to PC communication. Test points for both the PC connectors are brought out on board.

**BUS TOPOLGY:**

The LAN Trainer has on board facility for Bus Topology. This trainer has on board 4 nos. of RJ-45 connecting slots (Node-1 to Node-4) to connect 4 computers for the access of communication in Bustopology manner. It has two BNC connectors. One fault switch FSW-2 is provided on board to createthe fault.

**STAR TOPOLGY:**

The LAN Trainer has on board facility for Star Topology. This trainer has on board 4 nos. of RJ-45 connecting slots (Node-1 to Node-4). Node -1 is WAN port to connect Internet & Node 2-4 are LAN ports to connect 3 computers for the access of communication in Star topology manner. One fault switch FSW-1 is provided on board to create the fault.

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**Procedure:**

### **PC to PC Connection**

**1.** Connect one RJ45 Cable between PC-1 on kit and COMPUTER-1.

**2.** Similarly connect another RJ45 Cable between PC-2 on kit and COMPUTER-2.

**3.** Switch ON the power supply.

**Graphical user interface, text

Description automatically generated4.** In both the computers right click on the icon “SB” and select “Run as administrator”

**5.** Click on “Yes” on the pop up screen and the following window will appear on the screen

Diagram

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**6.** Click on **“Network”** on both the computers simultaneously, following window will appear

Graphical user interface, application

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**7.** IP Address of the Computer can be monitored as marked in the circle.

Graphical user interface, application

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#### **For computer-1 (act as a transmitter):**

**8.** Now select the transmitter mode and enter the receiver’s IP address on **Devices** which is shown at the top of the receiver computer.

**For computer-2 (act as a Receiver):**

Graphical user interface, text, application, email

Description automatically generated**9.** Now select receiver mode and select protocol **“Go back N”** as given below

#### Note: Same protocol must be selected on both the computers (Transmitter & Receiver)

**10.** Click in “Connect” from Computer-1 marked arrow

Graphical user interface, application

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**11.** At receiver end you can see status ‘connected’ (If any message comes asking for connection click on Yes)

**12**. Click on “Browse” from computer-1 and select max of 10 KB file for transmission.

**13**. Click on “Start file Transmission” marked arrow and this selected file contains number of packets marked by box.

Graphical user interface, application

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**14.** Transmission is shown on the computer-1, and reception is shown on the computer-2.

### **Bus Topology:**

1. Connect one RJ45 Cable between NODE-1 on kit and COMPUTER-1.

2. Similarly connect another RJ45 Cable between NODE-2 on kit and COMPUTER-2.

3. Switch ON the power supply.

4. Follow step-4 to step-14 in the procedure given for PC-to-PC Communication.

5. Repeat step-1 to 4 for NODE-3 & NODE-4

Note:

* User can interchange the transmitter with receiver and repeat the above procedure from step-1to step-4 by using any protocol.
* User can insert errors like “Discard”, “ACK Lost” & “Discard/Lost” in the receiving computer.

1. **STAR Topology:**

1. Connect one RJ45 Cable between NODE-3 on kit and COMPUTER-1.

2. Similarly connect another RJ45 Cable between NODE-4 on kit and COMPUTER-2.

3. Switch ON the power supply.

4. Follow step-4 to step-14 in the procedure given for PC to PC Communication.

5. Repeat step-1 to 4 for NODE-2 (NODE-1 is given for WAN Connection)

Note:

* User can interchange the transmitter with receiver and repeat the above procedure from step-1to step-4 by using any protocol.
* User can insert errors like “Discard”, “ACK Lost” & “Discard/Lost” in the receiving computer.