

Assignment 1

Aim - To set up a wired LAN using Layer 2 switch and IP switch of minimum 4 computers.

Problem Statement:

A. Setup a wired LAN using Layer 2 Switch and then IP switch of minimum four computers. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility and demonstrate the PING packets captured traces using Wireshark Packet Analyzer Tool.

B. Extend the same Assignment for Wireless using Access Point.

Prerequisites:

Knowledge of components such Ethernet card, Cable type, Connections, topologies.

Objectives:

1. To understand the structure and working of various networks including the interconnecting devices used in them.
2. To get hands on experience of preparing and testing cables.

Concept related theory:

Types of LAN:

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 and has its network equipment and interconnects locally managed.

Ethernet and Wi-Fi are the two most common transmission technologies in use for local area networks.

Ethernet LAN:

Ethernet is the most popular physical layer LAN technology in use today. It defines the number of conductors that are required for a connection, A standard Ethernet

network can transmit data at a rate up to 10 Megabits per second (10 Mbps). Other LAN types include Token Ring, Fast Ethernet, Gigabit Ethernet, 10 Gigabit Ethernet, Fiber Distributed Data Interface (FDDI),

Fast Ethernet:

The Fast Ethernet standard (IEEE 802.3u) has been established for Ethernet networks that need higher transmission speeds. This standard raises the Ethernet speed limit from 10 Mbps to 100 Mbps with only minimal changes to the existing cable structure. Fast Ethernet provides faster throughput for video, multimedia, graphics, Internet surfing and stronger error detection and correction.

Gigabit Ethernet:

Gigabit Ethernet was developed to meet the need for faster communication networks with applications such as multimedia and Voice over IP (VoIP). It is defined in the IEEE 802.3 standard and is currently used as an enterprise backbone. Existing Ethernet LANs with 10 and 100 Mbps cards can feed into a Gigabit Ethernet backbone to interconnect high performance switches, routers and servers.

10 Gigabit Ethernet:

10 Gigabit Ethernet is the fastest and most recent of the Ethernet standards. IEEE 802.3ae defines a version of Ethernet with a nominal rate of 10Gbits/s that makes it 10 times faster than Gigabit Ethernet. 10 Gigabit Ethernet is based entirely on the use of optical fiber connections.

IP Switching

Internet protocol switching, more commonly referred to as IP switching is a routing technique which routes packets faster than traditional routing by layer-3 switches. IP Switching is performed by implementing Layer-3 switches which employ Application Specific Integrated Circuit (ASIC) hardware and transferring via Asynchronous Transfer Mode (ATM) switches.

~~Cable~~ Cable Testing:

Cable test instruments are designed with a variety of focused features for particular field tasks. They vary in price, performance, and application. Depending on the task the field test instrument performs, it can be classified into one of the three hierarchical groups: certification, qualification, or verification.

Wireshark Packet Analyser Tool:

Wireshark, a network analysis tool formerly known as Ethereal, captures packets in real time and display them in human-readable format. Wireshark includes filters, color-coding and other features that let you dig deep into network traffic and inspect individual packets.

Color Coding:

You'll probably see packets highlighted in green, blue, and black. Wireshark uses colours to help you identify the types of traffic at a glance. By default, green is TCP traffic, dark blue is DNS traffic, light blue is UDP traffic, and black identifies TCP packets with problems – for example, they could have been delivered out-of-order.

Steps for setting up LAN:

1. Installation of Ethernet card in machine.
2. Crimping of Ethernet cable
3. Make Straight cable in order to form Star topology network to connect 2 different types of components, like, PC to switch or PC to router
4. Make Cross cable in order to form Star topology network to connect 2 similar types of components, like, PC to PC or router to router
5. Connect the cables to switch and from switch to machines to form a star topology.
6. Assign I.P. address and ping from one machine and message is displayed.

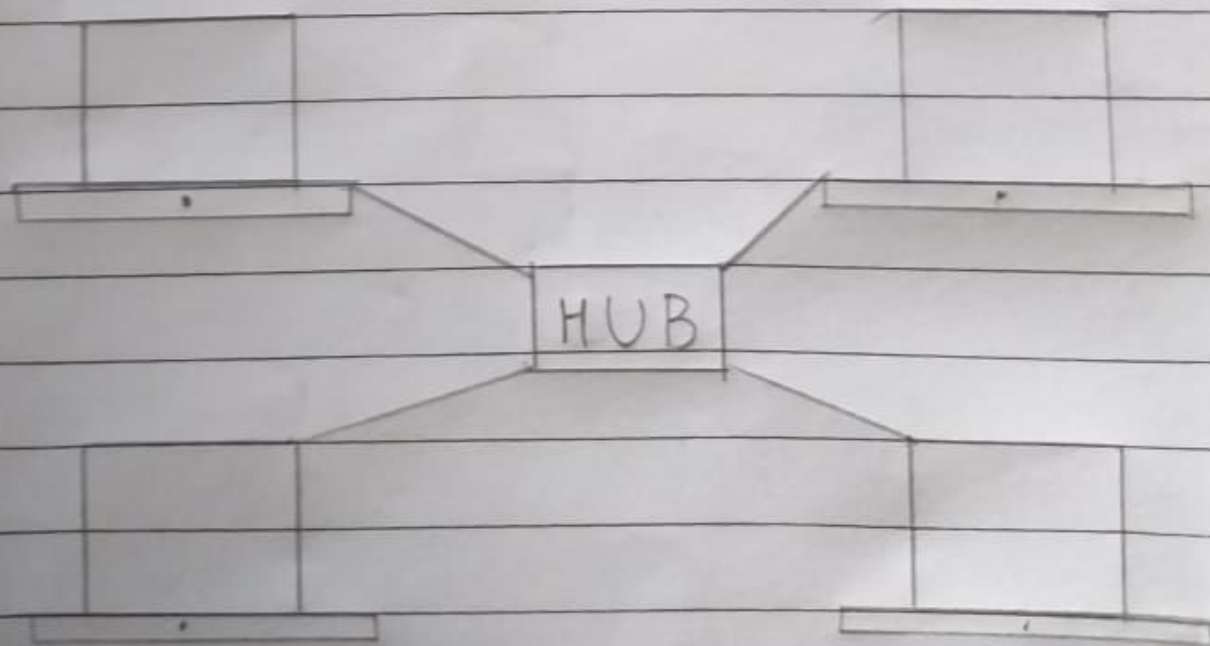


Straight Through



Cross-Over

Star Topology LAN model



~~Op~~ Conclusion:

Thus, we implemented a wired LAN using layer 2 switch. We also understood the structure and working of various networks including interconnecting devices used.