

NETWORKS

There are many types of networks: LAN (local area network), WAN (wide area network) and MAN (metropolitan area network). A LAN is usually made of nodes located in the same building while a WAN connect smaller networks over a very wide area; a MAN is a combination of the two. The goal of a network is to transmit data. Almost every pc has a network interface card (NIC) or an RJ-45 connector (ethernet). The communication signal use twisted pairs of wires, fibre optic wires and radio waves to arrive in a certain destination. The bandwidth is the combination of connector, circuitry and wiring. In a client/server network one computer is the file server that contains programs and data that can be reached by other computers. Servers are often faster and powerful cause they run the NOS (network operative system) which manages the movements of files and the security of the network. Personal computers are also clients. There are 3 types of clients: Fat clients (runs most of the programs on their own and use a small part of a network service), Thin clients (runs programs with their own microprocessor but depend on a to access programs and store data) and Dumb terminals (use server's microprocessor to perform all functions). In a peer-to-peer network there is no central server but every node act as a server to every other node.

A network can have different topologies:

BUS: Every node is connected to another through the same cable (or backbone). This topology is inexpensive and easy to set up but if the main cable gets damaged all the network is compromised.

RING: Every node is connected to another node in a ring shape. To communicate, a node, needs a token that gives him the priority to transmit. The trasmission is fast but if one cable breaks all the network collapse.

STAR: Several nodes are linked to the centre of the star (there could be a hub, a router or a switch). A hub recives a message and send it to all nodes but only the destination-one is going to accept the message. A switch send the message only to the pc that has to recive it. Router are similar to switches but they don't accept broadcast packets. Even if a cable breaks, the network keeps working but it's very expensive.

TREE: Node are connected to a hub that is connected to a bus. It supports the expansion of the network and it's easy to find a problem but new hardwares and the lot of cables make it very expensive.

Protocols are the formal rules and procedures that needs to be followed to allow data to be transmitted. In 1984 the ISO developed a standard to determines how data is sent and recived called OSI. A message or a file has to pass through seven layers designed to secure the perfection of the data. The first layer is the APPLICATION which is the only part of the OSI that is directly connected with the user. The layer converts data in bits and attaches a header identifying the sending and reciving computers. The PRESENTATION layer translates the message into a language the computers can understand and encrypt the data. The SESSION layer opens communications and establishes wheter the message will be send half duplex or full duplex. The TRANSPORT layer protects the data and divides it in segments checking for errors (checksum). The NETWORK layer selects the route for the message, forms segments into packets and adds to the header the order of the packets. The DATA LINK layer transport the packets and keeps a copy of every packet until it recives the conformation that the packet is arrived to destination. The PHYSICAL layer carry the packets through the cables to destination.

Three of the most common physical links used to create networks are: twisted pair (two wires twisted together to make them less susceptible to radio frequencies), coaxial cable (two wires, one is twisted on the other and it is filled with a nonconducting material) and the fibre optic cable (hundreds of clear glass which reflects light and it's very fast).