CLIENT SERVER COMPUTING

COMMUNICATION INTERFACE TECHNOLOGY

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- For the data communication to be taking place on a network, four basic elements are
- involved there:
- *Sender: the device that creates and transmits the data.*
- *Message: the data to be sent. It could be a spreadsheet, database, or document, converted*
- to digital form.
- *Medium: the physical material that connects the devices and carries the data from the*
- sender to the receiver. The medium may consist of an electrical wire or airwaves.
- *Receiver: the destination device for the data.*
- To communicate with other devices, a sending device must know and follow the rules
- for sending data to receiving devices on the network. These rules for communication
- between devices are called *protocols. Numerous standards have been developed to provide*
- common foundations for data transmission. The International Standards Organization (ISO)
- has divided the required communication functions into seven levels to form the Open
- Systems Interconnections (OSI) model.

- To communicate on a network the following components are
- required:
- • A network interface card (NIC) or network adapter.
- • Software driver.
- • Communication protocol stack.

Network Interface Card

- The physical connection from the computer to the network is made by putting a network interface card (NIC) inside the computer and connecting it to the shared cable.
  A network interface card is a device that physically connects each computer to a network. This card
  controls the flow of information between the network and the computer. The circuit board needed to provide network access to a computer or other device, such as a printer. Network interface cards, or NICs, mediate between the computer and the physical media, such as cabling, over which transmissions travel. NIC is an adapter card that is installed in the controller that allows it to connect to a network (for example, Ethernet and Token Ring etc. The card contains both the hardware to accommodate the cables and the software to use the network's protocols. The NIC is also called a network adapter card.

LAN Cabling

- LAN is data communication network, which connects many computers or client workstations and permits exchange of data and information among them within a localized area (2 to 5 Km). Where all connected devices share transmission media (cable) and also each connection device can work either stand alone or in the network. Each device connected in the network can communicate with any other device with a very high data transmission rate that is of 1Mbps to 100Mbps. Due to rapid change in technology, design and commercial applications for the LANs the number of approaches has emerged like High speed wireless LAN fast Ethernet. At the result, in many applications the volume of data handled over the LAN has been increased. For example in case of centralized server farms there is need for higher speed LAN. There is a need for client system to be able to draw huge amount of data from multiple centralized servers.

WAN

- WAN (Wide area network) is a data communications network that covers a large geographical

  area such as cities, states or countries. WAN technologies generally function at the lower three layers of the OSI reference model, the physical layer, the data-link layer, and the network layer. WAN consists of a number of interconnected switching nodes via telephone line, satellite or microwaves links. A transmission form any one device is routed through internal nodes to the specific destination device. In WAN two computing device are not connected directly, a network of ‘switching nodes’ provides a transfer path and the process of transferring data block from one node to another is called data switching.

ATM

Asynchronous Transfer Mode (ATM) is a connection-oriented technology, in which a logical connection is established between the two end points before the actual data exchange begins. ATM has proved very successful in the WAN scenario and numerous telecommunication providers have implemented ATM in their wide-area network cores ATM is a cell relay, packet switching network and data link layer protocol which encodes data traffic into small (53 bytes; 48 bytes of data and 5 bytes of header information) fixed sized cells. ATM provides data link layer services that run over Layer 1 links. This differs from other technologies based on packet-switched networks (such as the Internet Protocol or Ethernet), in which variable sized *packets (known as frames when referencing layer 2)* are used. The motivation for the use of small data *cells was the reduction of jitter (delay* variance, in this case) in the multiplexing of data streams; reduction of this (and also end to-end round-trip delays) is particularly important when carrying voice traffic.

ATM services are

categorised into mainly two categories one is Real-Time Services and other one is Nonreal-Time Services which are used by an end system to identify the type of service required. RTS concerns the delay and the variability of delay, referred to as jitter, that the application can tolerate. Real time applications typically involve a flow of information to a user that is intended to reduce that flow at a source. Constant Bit Rate services are the simplest real time services. CBR are used by the applications that requires a fixed data rate that is continuously available during the connections lifetime and a relatively tight upper bound on transfer delay. CBR applications are used mostly in video conferencing, interaction audio and audio/video retrieval and distribution.

Ethernet

Ethernet is a family of frame-based computer networking technologies for Local Area Networks (LANs) that is also based on the idea of computers communicating over a shared coaxial cable acting as a broadcast transmission medium. The name comes from the physical concept of the ether. It defines a number of wiring and signaling standards for the physical layer, through means of network access. The communication methods used shows some similarities to radio systems, although there are fundamental differences, such as the fact that it is much easier to detect collisions in a cable broadcast system than a radio broadcast. Eathernet is most widely used LAN technology to get connected PCs and workstations more than 84% world wide due to its protocol that has following characteristics:

- Is easy to understand, implement, manage, and maintain.
- Allows low-cost network implementations.
- Provides extensive topological flexibility for network installation.
- Guarantees successful interconnection and operation of standards.
- Compliant products, regardless of manufacturer.

Ethernet LANs consist of network nodes and interconnecting media. The network nodes fall into two major classes:

- Data Terminal Equipment (DTE)—Devices that are either the source or the destination of data frames. DTEs are typically devices such as PCs, workstations, file servers, or print servers that, as a group, are all often referred to as end stations.
- Data Communication Equipment (DCE)—Intermediate network devices that receive and forward frames across the network. DCEs may be either stand alone devices such as repeaters, network switches, and routers, or communications interface units such as interface cards and modems.

Token Ring

Token-Ring was developed and promoted by IBM in the early 1980s and standardized as IEEE 802.5. Physically, a token ring network is wired as a star, with 'hubs' and arms out to each station and the loop going out-and-back through each. Stations on a token ring LAN are logically organized in a ring topology with data being transmitted sequentially from one ring station to the next with a control token circulating around the ring controlling access. Token ring is a local area network protocol which resides at the Data Link Layer (DLL) of the OSI model. It uses a special three-byte frame called a token that travels around the ring. Token ring frames travel completely around the loop.

Token-passing networks move a small frame, called a token, around the network. Possession of the token grants the right to transmit. If a node receiving the token has no information to send, it passes the token to the next end station. Each station can hold the token for a maximum period of time. If a station possessing the token does have information to transmit, it seizes the token, alters 1 bit of the token (which turns the token into a start of-frame sequence), appends the information that it wants to transmit, and sends this information to the next station on the ring. While the information frame is circling the ring, no token is on the network (unless the ring supports early token release), which means that other stations wanting to transmit must wait. Therefore, collisions cannot occur in Token Ring networks. Token ring networks had significantly superior performance and reliability compared to early shared-media implementations of Ethernet (IEEE 802.3), and were widely adopted as a higher-performance alternative to the shared-media Ethernet.

FDDI

FDDI (Fiber Distributed Data Interface), as a product of American National Standards Institute X3T9.5 (now X3T12), conforms to the Open Systems Interconnection (OSI) model of functional layering of LANs using other protocols.
FDDI provides a standard for data transmission in a local area network that can extend in range up to 200 kilometers. In addition to covering large geographical areas, FDDI local area networks can support thousands of users. As a standard underlying medium, it uses optical fiber (though it can use copper cable, in which case one can refer to CDDI). A FDDI network contains two token rings (dual-ring architecture) with traffic on each ring flowing in opposite directions (called counter-rotating). The dual rings consist of a primary and a secondary ring. During normal operation, the primary ring is used for data transmission, and the secondary ring remains idle. Secondary ring also provides possible backup in case the primary ring fails. The primary ring offers up to 100 Mbit/s capacity. When a network has no requirement for the secondary ring to do backup, it can also carry data, extending capacity to 200 Mbit/s. The single ring can extend the maximum distance; a dual ring can extend 100 km. FDDI has a larger maximum-frame size than standard 100 Mbit/s ethernet, allowing better throughput. The primary purpose of the dual rings is to provide superior reliability and robustness.