

## **Chapter 6 – Networks – Technologies for Electronic Commerce**

**Computer Network** – is a connection of two or more IT components (typically computers) that gives people the ability to share software, share information, share peripheral devices, communicate with each other, and share processing power.

**Telecommunications** – is the electronic movement of information from one location to another.

### **Client/Server as the emerging blueprint for organizational networks.**

As the emerging blueprint for organizational networks, client/server addresses the technology-independent working of your organization and five models for implementing the most appropriate network.

Client/Server network - is a network that contains one or more host computers (servers) that provide some type of service to the other computer (clients). As a business model, client/server requires that the processing be distributed to the exact place in the network where the processing needs to be performed. As such, client/server networks distinguish information, software, and processing power as either global or local.

**Peer-to-Peer network** – has the ability to communicate with other people in the network share peripheral devices

**Client/Server Network** – is a network that contains one or more host computer (servers) that provides some type of service to the other computers (called client's) in the network. The service that a server provides include (1) Maintaining information and software that people in a network can access and work with and (2) actually performing processed that a client workstation may need to do.

Network Operating Systems – The system software that determines how a network functions. The NOS is responsible for managing:

1. The communications within the network
2. The sharing of peripheral devices (printers)
3. The sharing of information
4. The sharing of software
5. Any coordinated processing that takes place between the server and the client.

Peer to peer only support the # 1 and 2. Client/Server NOS support all five.

**Client/Server as a business model** – requires that the processing be distributed to the exact place in the network where the processing needs to be performed. It is the foundation of decentralized computing. The client/server is composed of the following types of information, software and processing power:

### Information

- ⇒ Local information that is unique to a particular organizational function
- ⇒ Global information that spans the entire organization

### Software

- ⇒ Local processes that work with local information
- ⇒ Global processes that work with global information

### Processing Power

- ⇒ Local processing power that executes local software to work with local information
- ⇒ Global processing power that executes global software to work with global information.

## **5 Basic Client/Server Implementation - (p.226)**

*Presentation* deals with the formatting of information as it's displayed or printed and the editing of information as you enter it

*Logic* deals with the actual business rules that are implemented as software

*Data Management* deals with the retrieval and storage of information in a database.

1. **Model 1: Distributed Presentation** – Server handles all functions but presentation is shared between the client and the server.
2. **Model 2: Remote presentation** – Server handles all logic and data management functions, and the client handles all presentation functions.
3. **Model 3: Distributed logic** – Server handles DM, client handles presentation, and both share in processing the logic or business rules
4. **Model 4: Remote Data Management** – Server handles DM, client handles logic and presentation
5. **Model 5: Distributed Data Management** – Client handles all but DM is shared by both

## **Advantages of Client/Server**

- ⇒ **Distribution of processing mirrors organizational workings** – CS allows you to develop a technological structure that mirrors your organizational operations
- ⇒ **Distribution is transparent** – Knowledge workers do not need to concern themselves with the location of the information and software or on which computer the processing tasks take place
- ⇒ **Software reuse** – CS's ability to reuse software in many different locations. It reduces software development costs and increases programmer productivity
- ⇒ **Servers can control information use** – controls which people have access to what information
- ⇒ **Flexibility on a client side** – knowledge workers have complete flexibility and freedom at their workstations.
- ⇒ **Scalability** – As organization changes size, scope and information-processing requirements, you can change the scale of your CS implementation
- ⇒ **Support for Electronic commerce concepts**

### Disadvantages of Client/Server

- ⇒ **Existence of non-client/server-oriented software** – CS software is distributed according to presentation, logic and data management. Most non-client/server software has been developed without this in mind.
- ⇒ **Hidden Costs** - CS can be very costly (includes application development labor, knowledge worker support etc.)

### The Key to Client/Server

1. Knowing how your organization works
2. Choosing the appropriate implementation method
3. Implementing Client/Server with object-oriented techniques

### Network-Enabling Technologies and concepts that support e-commerce (5 categories)

1. **Types of networks** – According to functionality (client/server or peer-to-peer), geographic distance (local or wide area network), and physical structure or topology (bus, ring, star)

**Local Area Networks (LAN)** – covers a limited geographic distance, such as an office, office building or a group of buildings in close proximity

**Wide Area network (WAN)** – covers large geographic distance, such as a state, a country, or even the entire world. Wans are typically large networks that connect multiple, smaller networks.

**Network Topology** – the physical arrangement of computers in a network

**Bus Topology** – All computers are connected to a single communication medium over which all communications travels

**Ring Topology** - All computers are connected to a single communication medium and that communication medium is connected at both ends to form a closed loop.

**Star Topology** – Has a central computer from which all other computers radiate. Communication must pass through the central computer, which, in turn, interprets the address and sends the communication appropriately.

2. **Communication Media** – the paths over which communication travels. Telecommunication implies that information must travel from one place to another, and the information must travel over some path. Communication media is either guided and transmit information over a closed path (twisted pair, coaxial, optical fiber) or unguided and transmit information through the air (microwave, satellite, broadcast radio, or infrared)

**Guided Communication media** – transmit information over a closed path (such as a wire)

- ⇒ **Twisted pair cable** – slowest and least reliable
- ⇒ **Coaxial cable** – faster and more reliable – central wires surrounded by thick insulation – less susceptible to outside interference and information damage
- ⇒ **Optical Fiber** – Fastest and most reliable – very thin glass or plastic fiber through which pulses of light travel

**Unguided Communication** – wireless communication media – Broadcast or radiate information in many directions rather than through an enclosed path.

- ⇒ **Microwaves** – high frequency band of radio broadcast transmission and dish-shaped antennae for sending and receiving information. “Line of sight” cannot bend around the surface of the earth

- ⇒ **Satellites** – Microwave transmission systems in space. It's an amplifier or repeater that receives information from one location, repeats the data, and sends it to one or more receiving locations on earth.
- ⇒ **Broadcast radio** – similar to microwaves and satellite, except that the receiving locations needn't be in the line-of-sight or have a dish shaped antennae to receive information transmissions. (Very susceptible to reflections from buildings or other physical structures)
- ⇒ **Infrared** - uses a red light to transmit information.

### Key Considerations for communications Media

- ⇒ Capacity – How much information & How fast
- ⇒ Reliability – Perfect service of your network
- ⇒ Cost – Greater capacity and reliability will cost more
- ⇒ Distance – knowing the distance your network must cover will help determine appropriate communications media
- ⇒ Mobility – Mobility of network users (telecommuters)

3. **Communication Processors** – the connections within the network. For computers and other devices to communicate in a network, they must be connected to the network in some way. Communication processors include modems, multiplexers, cluster controllers, and inter networking units (bridges, routers, and gateways)

**Communication processors** – hardware devices that unite that unite the various communications throughout the network

**Modem** – A device that converts the digital signals of your computer into an analog form that can be transmitted over a telephone line and then converts the analog signal back to digital signals at the other end of the transmission

**Multiplexers** – Aggregate several communications media and allow them to share a single communications medium that operates at a much higher capacity

**Cluster controllers** – manage a group of devices that share a single high speed communications medium connected to another location. They do not combine and separate communications. They merely handle the congestion and competition for a single high-speed communications medium the devices share.

**Front-end Processors** – special computers that handle the communication function for a host computer or server in a network

**Inter-networking units** – Special hardware devices that connect two or more networks. Three common types are bridges, routers, and gateways

- ⇒ Bridge – connects two networks of the same kind

- ⇒ Router – connect networks that are somewhat dissimilar
- ⇒ Gateway – connect networks that are completely dissimilar with respect to how they work and communicate internally.

4. **Communication methods, standards, and protocols** – the manner in which information is communicated. For network telecommunications to be possible, there must be predefined methods, standards, and protocols by which information will be communicated from one place to another. Some of these include Ethernet, token ring, fiber distributed data interface, asynchronous transfer mode, integrated services digital network, transmission control protocol/Internet protocol, and X.12

**Ethernet** – communication standards for connecting components in a LAN. Each network component constantly monitors the communications medium for traffic.

**Token Ring** – Another communication standard for LAN's. A single electronic token or “clipboard” is passed among the network components; with each component taking it's turn to use the token.

**Fiber distributed data interface (FDDI)** – Is a communication standard for connecting high speed LANs or links among geographically dispersed LANs.

**Synchronous transfer mode (ATM)** – Is a transmission method for sending information that divides a long transmission into smaller units called “packets”

**Integrated services digital network (ISDN)** – Is both the plan and the international communications standard for the transition of the worlds public telephone system from analog to digital for the purpose of transmitting all formats of information simultaneously over twisted pair telephone lines.

**Transmission control protocol/Internet protocol (TCP/IP)** – The standard by which the Internet works today.

**X.12** – Is the standard for transmitting common formatted information during electronic data interchange

5. **Communication service providers** – the issue of network ownership. Networks are expensive – sometimes too expensive for a single organization to completely build and maintain. In this instance, you can use the networks of other organization to build your own network. Networks according to ownership include private, public, value added, virtual private, Internet virtual private, and international virtual private.

**Communication service providers** – Is a network that covers great distances and require the use of the communications media.

**Public Network** – Is a network on which your organization competes for time and use with other people and organizations (telephone system). In public networks, your organization typically operates on a pay-as-you go basis, competes for time and use, communicates information only from one place to another, communication is slower then private networks and there is no guaranteed privacy

**Private Network** – Is a network that your organization either owns or exclusively leases the right to use the communications media to connect network components. When leasing a private network, your organization pays a flat fee per month, is guaranteed time and use, can request additional communication services, communicates info at a higher speed, and has a higher guarantee of privacy

**Value Added Network (VAN)** – Is a semipublic network that provides additional services beyond the simple communication of information from one place to another. It is owned and operated by a communication service provider. Pay as you go, no competition for use, VAN owner provides additional services, faster than public network, and better security than public network.

**Virtual Private Network (VPN)** – Is a public network that guarantees availability to your organization, but does not provide you with a dedicated line or with communication media. Offers data encryption to provide a guarantee of privacy. Flat fee, guarantee availability, data encryption service, higher speed compared to public networks, and a guarantee of privacy.

**Internet Virtual Private Network (Internet VPN)** – provides your organization with a way of establishing a virtual Internet network that consists of only you, your customers, and suppliers

**International Virtual Private Networks (International VPN)** – Virtual private networks that combine the capabilities of telephone service providers around the world. They are usually offered by alliances of several organizations.

**Electronic Commerce** is a modern methodology that addresses the use of information technology as an enabler of business. Electronic commerce supports both internal and external business functions

**External electronic commerce** – how a business interacts with the marketplace

**Internal electronic commerce** – Use of internal technology to support internal processes, functions, and operations

Key aspects of electronic commerce that offer your organization a real competitive advantage, include the following:

#### External

**Electronic data interchange** – Ordering products and services electronically. EDI is the direct computer-to-computer transfer of transaction information contained in standard business documents, such as invoices and purchase orders, in a standard format. EDI is becoming the standard for interorganizational transactions. It links suppliers, customers, retailers and distributors. It supports many of the strategies for achieving a competitive advantage

**Electronic fund transfer** – Moving money without handling it. Also called financial EDI refers to the electronic passing of funds (money) between businesses and banks and their customers. **Automated clear housing (ACH)** handles the electronic movement of money between banks.

**Individualized electronic advertising** – Reaching the exact customer. Individualized electronic advertising using technology to determine who gets what advertisements and electronically sending those advertisements to only those people. Privacy issue must be carefully considered. IEA is a two-step process:

- ⇒ Analyze your databases – containing customer, sales, and product information – to determine individual customers and their exact buying habits
- ⇒ Set up your system to electronically distribute individualized advertisements to those people through the internet

**Knowing more than your competitors** – Gathering competitive intelligence. Knowing whom your customers are, what they want, knowing what your products cost to make, and knowing what your competitors are doing. **Competitive Intelligence** is simply information about the internal workings of your organization as well as the external market surrounding your organization. Internet Cruisers = gathering competitive intelligence

#### Internal

**Intranets** – An intranet is an internal organizational Internet that is guarded against outside access by special security software called a firewall. Extranet is when your organization provides outside access to an intranet. It's a special application that allows other organizations and people access to information published on an intranet. Internet is so popular because it's completely platform independent and intranets are so effective because they work on intranet based technologies.

**Telecommuting** – Empowering employees to work regardless of location. Telecommuters can be grouped into two groups. People required to work outside the office (salespeople) and those who can work away from the home office (telecommuters in insurance claims)

#### Network technologies that support telecommuting

**Network range** – the variety of information and transactions that must occur across the network. Simple communication (email and other forms of communication software), Information access, Independent processing, and cooperative processing (telecommuters computer at home and a computer server at the home office which may require dedicated lines, value added network providers, and communications media and standards).

#### How electronic commerce will affect the business world

- ⇒ EDI will become a requirement
- ⇒ Disintermediation will displace many organizations – Eliminating intermediary organizations in the chain of providing goods and services is called **disintermediation**.
- ⇒ EFT may mean the end of cash and checks as we know them
- ⇒ Individual electronic Advertising will require more focused Market Information
- ⇒ Telecommuting will allow everyone to stay at home more

### **Network Perfect Service**

**Network Perfect Service** simply occurs at the customer's moment of value – where they want it (location), how the customer wants it (form), and when the customer wants it (time). For networks, perfect service is the delivery of network capabilities where (network reach), how (network range) and when they are wanted (network responsiveness)

**Network reach** – addresses the people, organizations, and business processes that your network should include.

**Network Range** – Addressing the information and transactions that must travel across your network

**Network Responsiveness** – Addresses the level of service – speed, reliability, and security – your network must provide.

The extent to which your organization can meet the where, how, and when characteristics of the network and the extent to which your organization can guarantee those characteristics determine your level of **Network Perfect Delivery**