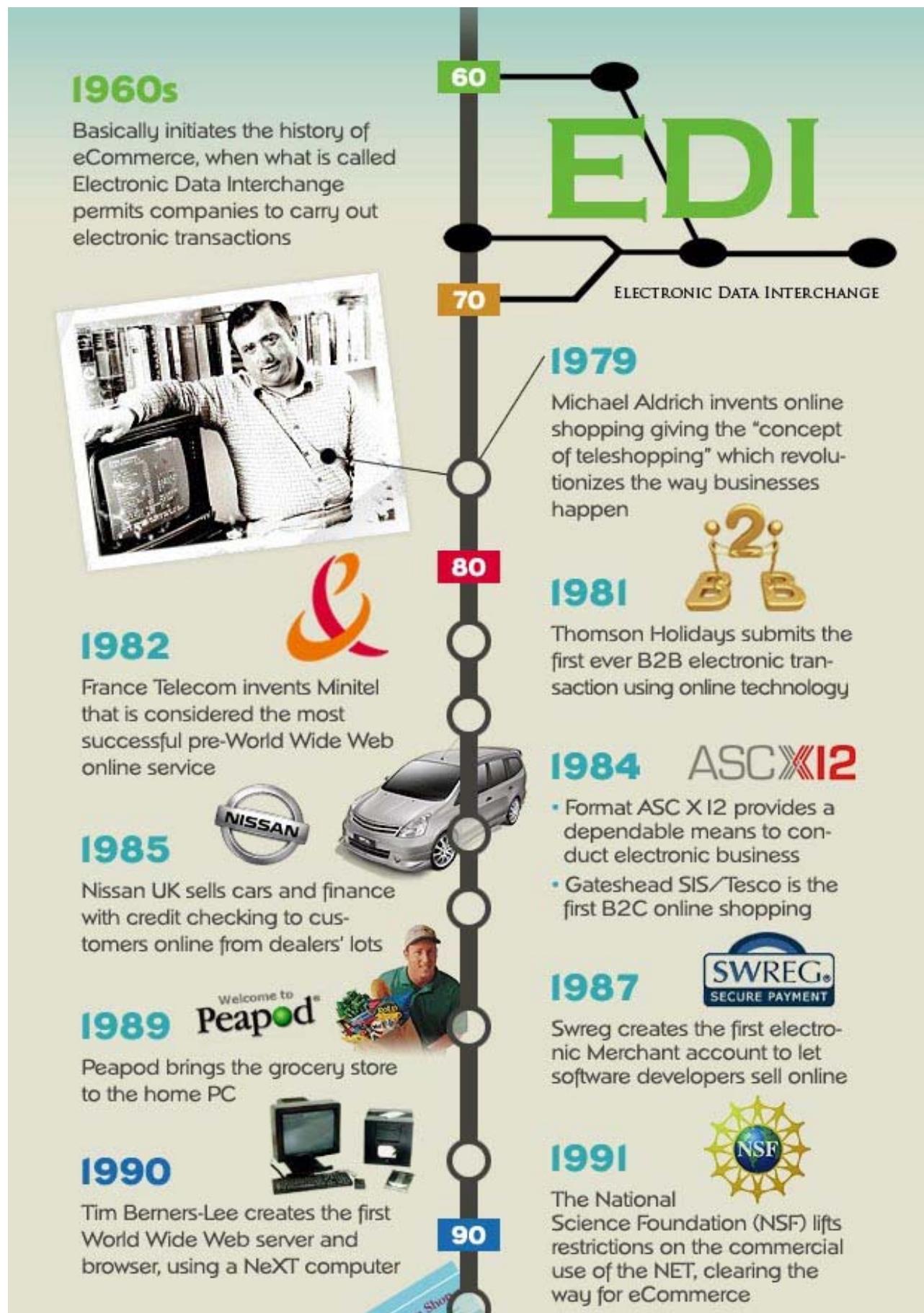
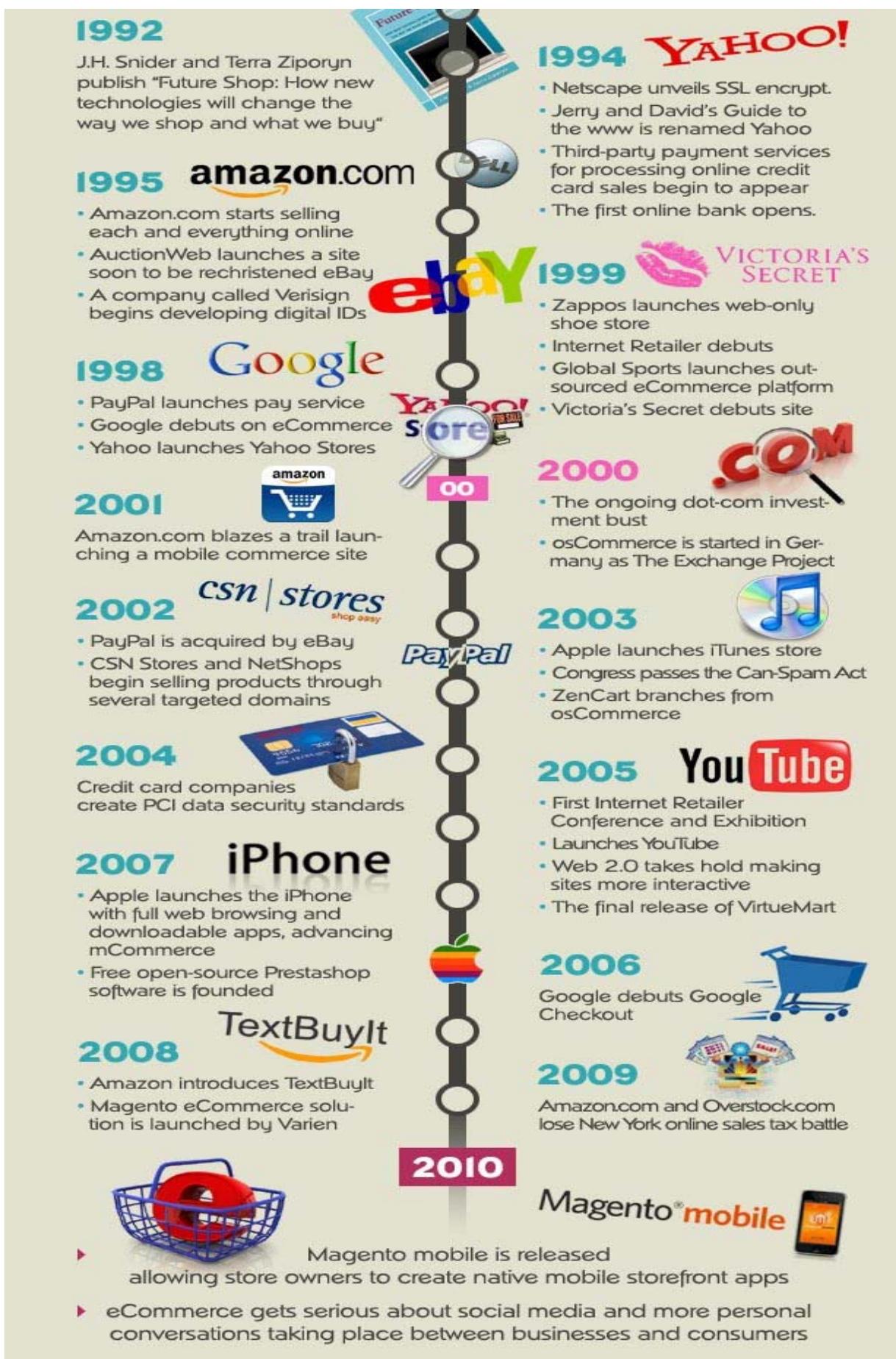


Prelude

- ❖ is a modern business methodology that addresses the needs of organizations, suppliers and consumers to cut costs while improving the quality of goods and services and increasing the speed of service delivery.
- ❖ applies to the use of computer networks to search and retrieve information in support of human and corporate decision making.
- ❖ is the buying and selling of products and services by businesses and consumers over the internet.
- ❖ incorporates spurred and drawing on innovations in electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems.
- ❖ A large percentage of electronic commerce is conducted entirely electronically for virtual items such as access to premium content on a website, but most electronic commerce involves the transportation of physical items in some way
- ❖ E-commerce can be divided into:
 - E-tailing or "virtual storefronts" on Web sites with online catalogs, sometimes gathered into a "virtual mall"
 - Electronic Data Interchange (EDI), the business-to-business exchange of data
 - E-mail and fax and their use as media for reaching prospects and established customers (for example, with newsletters)
- ❖ Electronic commerce that is conducted between businesses is referred to as business-to-business or B2B. B2B can be open to all interested parties (e.g. commodity exchange) or limited to specific, pre-qualified participants (private electronic market).
- ❖ Electronic commerce that is conducted between businesses and consumers, on the other hand, is referred to as business-to-consumer or B2C. This is the type of electronic commerce conducted by companies such as Amazon.com. Online shopping is a form of electronic commerce where the buyer is directly online to the seller's computer usually via the internet. There is no intermediary service. The sale and purchase transaction is completed electronically and interactively in real-time such as Amazon.com for new books. If an intermediary is present, then the sale and purchase transaction is called electronic commerce such as eBay.com.





Electronic Commerce Framework

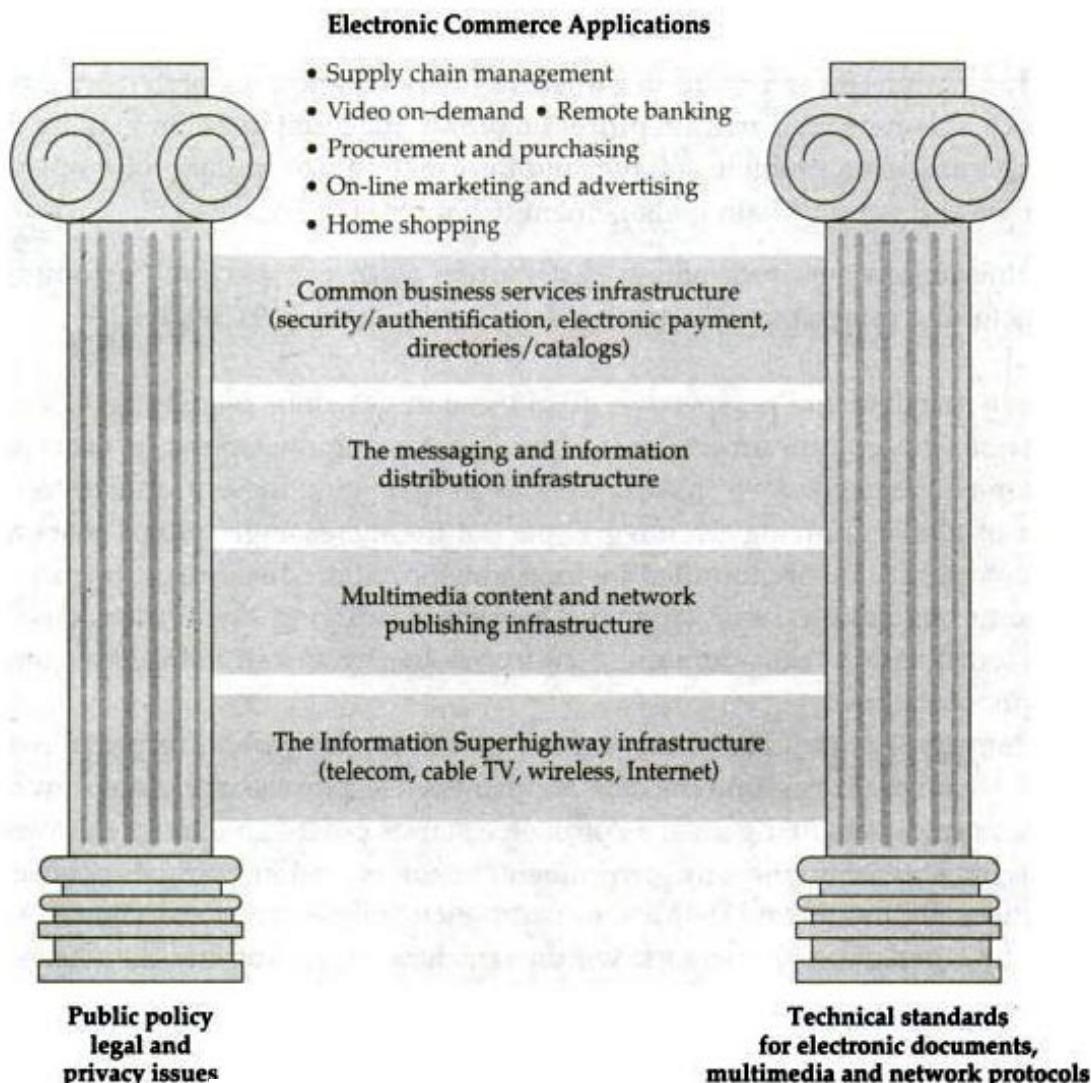


Figure 1. Generic framework for electronic commerce

- ❖ **Public Policy** – to govern issues such as universal access, privacy and information pricing.
- ❖ **Technical Standards** – to dictate the nature of information publishing, user interface and transport in the interest of compatibility across the entire network
- ❖ E-Commerce application will be built on the existing technology infrastructure
 - A myriad (numerous) of computers
 - Communication networks
 - Communication software
- ❖ Common business services for facilitating the buying and selling process
- ❖ Messaging & information distribution as a means of sending and retrieving information
- ❖ Multimedia content & network publishing, for creating a product & a means to communicate about it

Chapter 1: Introduction To Electronic Commerce

- ❖ The information superhighway- the very foundation-for providing the highway system along which all e-commerce must travel
- ❖ The two pillars supporting all e-commerce applications & infrastructure
- ❖ Any successful e-commerce will require the I-way infrastructure in the same way that regular commerce needs
- ❖ I-way will be a mesh of interconnected data highways of many forms
 - Telephone,wires,cable TV wire
 - Radio-based wireless-cellular & satellite
- ❖ Movies=video + audio
- ❖ Digital games=music + video + software
- ❖ Electronic books=text + data + graphics + music + photographs + video
- ❖ In the electronic ‘highway system’ multimedia content is stored in the form of electronic documents
- ❖ These are often digitized
- ❖ On the I-way messaging software fulfills the role, in any no. of forms: e-mail, EDI, or point-to-point file transfers
- ❖ Encryption & authentication methods to ensure security
- ❖ Electronic payment schemes developed to handle complex transactions
- ❖ These logistics issues are difficult in long-established transportation

Electronic Commerce And Media Convergence

- ❖ E-commerce has been repeatedly linked with the idea of convergence (junction) of industries centered on information that until today has been isolated – content, storage, network, business applications and consumer devices.
- ❖ Multimedia convergence applies to the conversion of text, voice, data, image, graphics and motion video into interactive digital content whereas cross media convergence refers to the integration of various industries – entertainment, publication, and communication media base on multimedia content.

Convergence: A Case Study

While watching a World Cup Match between Nepal and Brazil, one may develop an urge to know more about Nigeria. Instead of running to the local bookstore and purchasing a book, one can link to an online database and search the required information without missing any part of the match. The information in the online database is not limited to text but contains interactive multimedia elements.

Thus convergence requires removing the barriers between the telecommunications, broadcasting, computing, movie, electronic games and publishing industries to facilitate interoperability.

Convergence may incorporate the following technological advances:

1. **Convergence of content:** Translates all types of information content including books, business documents, videos, movies, music into digital information. Once converted into digital format, the processing, searching, sorting, conversion, compression, encryption, transmission of information can be easily matched with today’s information processing systems.

2. **Convergence of transmission:** Compresses and stores digitalized information so it can travel through the existing guided transmission media. Hence the information including voice, data, image and video can be transmitted without rewiring our home.
3. **Convergence of information access devices:** Have the sophistication to function as both computers and televisions. Other examples are the ubiquitous telephone, with internal fax machine, modem and video monitor.

Market Conditions Affecting Convergence:

1. widespread availability of increasingly low-cost, high performance technologies including storage, display, communication systems and operating systems
2. entrepreneurs who are feeding on anticipated end-user demand for new applications – both products and services – they rely on the aforementioned enabling technologies
3. aggressive regulatory actions that are introducing competition in monopoly markets

The Anatomy of E-Commerce Applications

E-Commerce applications are:

1. Multimedia Content for E-Commerce Applications
2. Multimedia Storage Servers & E-Commerce Applications
 - i. Client-Server Architecture in Electronic Commerce
 - ii. Internal Processes of Multimedia Servers
 - iii. Video Servers & E-Commerce
3. Information Delivery/Transport & E-Commerce Applications
4. Consumer Access Devices

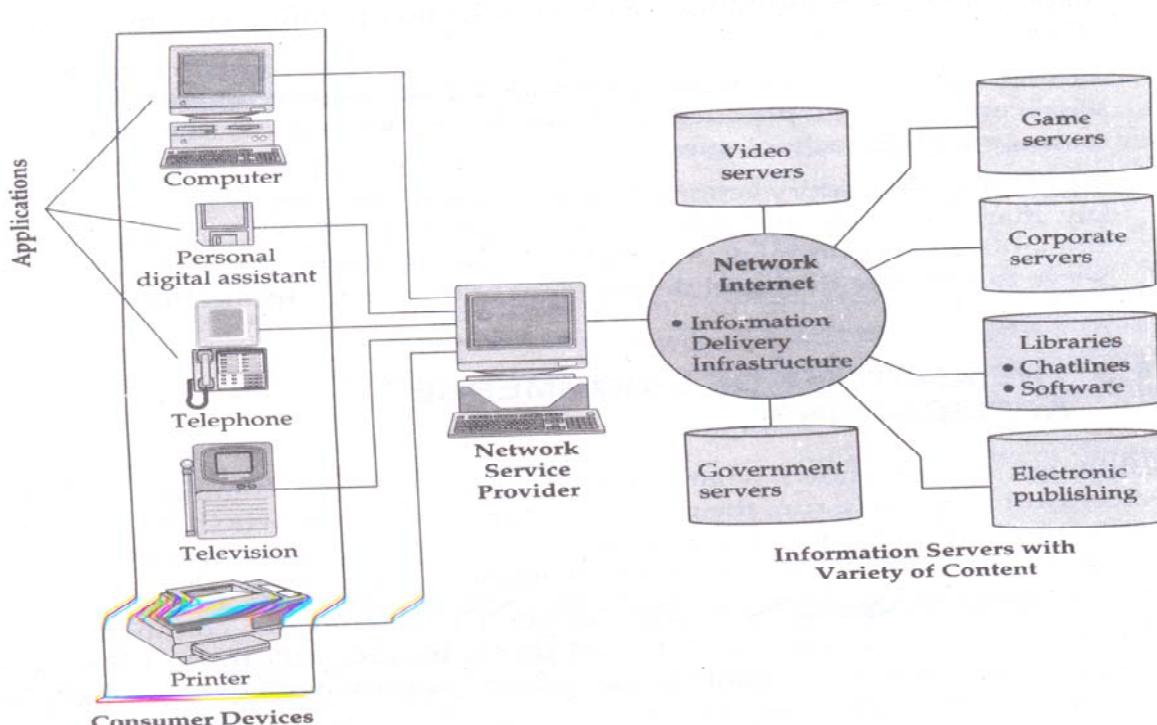


Figure 1.2 Elements of electronic commerce applications

1. Multimedia Content for E-Commerce Applications

- ❖ Multimedia content can be considered both fuel and traffic for electronic commerce applications.
- ❖ The technical definition of multimedia is the use of digital data in more than one format, such as the combination of text, audio, video, images, graphics, numerical data, holograms, and animations in a computer file/document.
- ❖ Most business systems support only a fraction of the information and communication found in the workplace and the goal of multimedia is to increase the utility of all information through the processing and distribution of new forms such as images, audio and video.
- ❖ The key question is "What does the consumer want?"
- ❖ Consumer acceptance will be positive if the technology is an e-commerce "killer" application that meets some suppressed need, as did the Lotus 123 spreadsheet for IBM and Nintendo's Super Mario for video games. These applications rapidly filled a need that the consumer never knew existed.
- ❖ No one has yet developed the "killer" application for e-commerce and it is unlikely that an uncontested winner will emerge until the technical infrastructure is in place, clearly defined or at least articulated.

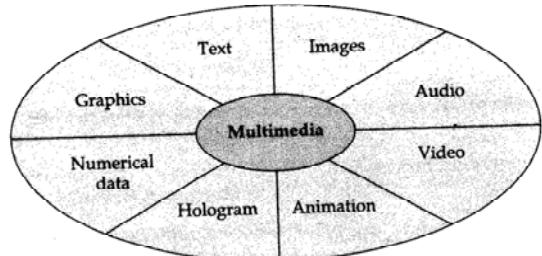


Figure 1.3 Possible components of multimedia

2. Multimedia Storage Servers & E-Commerce Applications

- ❖ E-Commerce requires robust servers to store and distribute large amounts of digital content to consumers.
- ❖ These Multimedia storage servers are large information warehouses capable of handling various content, ranging from books, newspapers, advertisement catalogs, movies, games, & X-ray images.
- ❖ These servers, deriving their name because they serve information upon request, must handle large-scale distribution, guarantee security, & complete reliability

i. Client-Server Architecture in Electronic Commerce

- All e-commerce applications follow the client-server model
- Clients are devices plus software that request information from servers or interact known as message passing
- The client server model, allows client to interact with server through request-reply sequence governed by a paradigm known as message passing.
- The server manages application tasks, storage, security & provides scalability-ability to add more clients and client devices like Personal digital assistants to PCs.

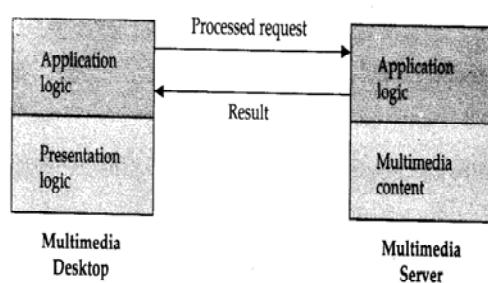


Figure 1.4 Distribution of processing in multimedia client-server world

ii. Internal Processes of Multimedia Servers

- The internal processes involved in the storage, retrieval & management of multimedia data objects are integral to e-commerce applications.
- A multimedia server is a hardware & software combination that converts raw data into usable information & then disseminates it out as per the user requirement.
- It captures, processes, manages, & delivers text, images, audio & video.
- A multimedia server must be able to
 - handle thousands of simultaneous users.
 - manage the transaction of these users (purchase, information request, billing)
 - deliver information streams to consumers at an affordable cost
- Include high-end symmetric multiprocessors, clustered architecture, and massive parallel systems.
- E.g. requirements of Video On Demand Service..

iii. Video Servers & E-Commerce

The electronic commerce applications related to digital video will include

1. Telecommunicating and video conferencing
 2. Geographical information systems that require storage & navigation over maps
 3. Corporate multimedia servers
 4. Postproduction studios
 5. Shopping kiosks.
- Consumer applications will include video-on-demand.
 - The figure which is of video-on demand consist video servers, is an link between the content providers (media) & transport providers (cable operators)

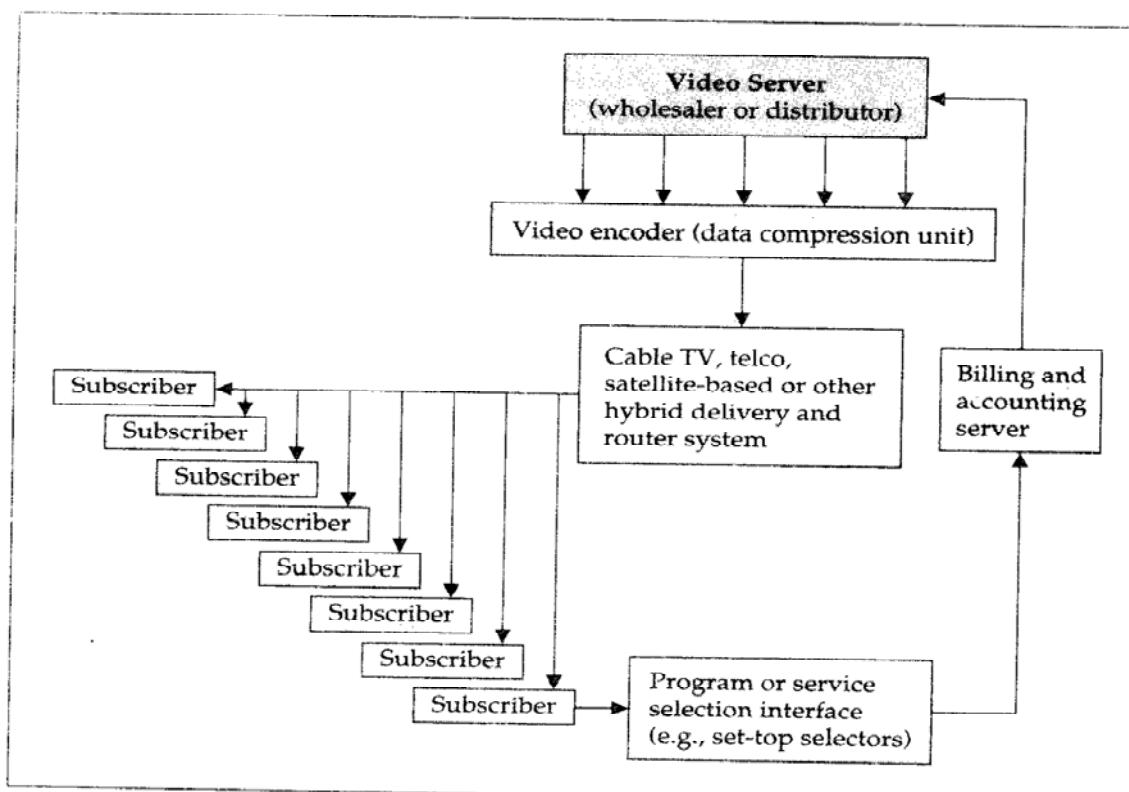


Figure 1.5 Block diagram of a generic video on-demand system

3. Information Delivery/Transport & E-Commerce Applications

- ❖ Transport providers are principally telecommunications, cable, & wireless industries.
- ❖ May include commercial networks like America Online or public network like the Internet.

Transport Routes

Information Transport Providers

- Telecommunication companies
- Cable television companies
- Computer-based on-line servers
- Wireless communications

Information Delivery Methods

- long-distance telephone lines; local telephone lines
- Cable TV coaxial, fiber optic & satellite lines
- Internet; commercial on-line service providers
- Cellular & radio networks; paging systems

4. Consumer Access Devices

Information Consumers

- Computers with audio & video capabilities
- Telephonic devices
- Consumer electronics
- Personal digital assistants (PDAs)

Access Devices

- Personal/desktop computing, Mobile computing
- Videophone
- Television + set-top box, Gaming Systems
- Pen-based computing, voice-driven computing

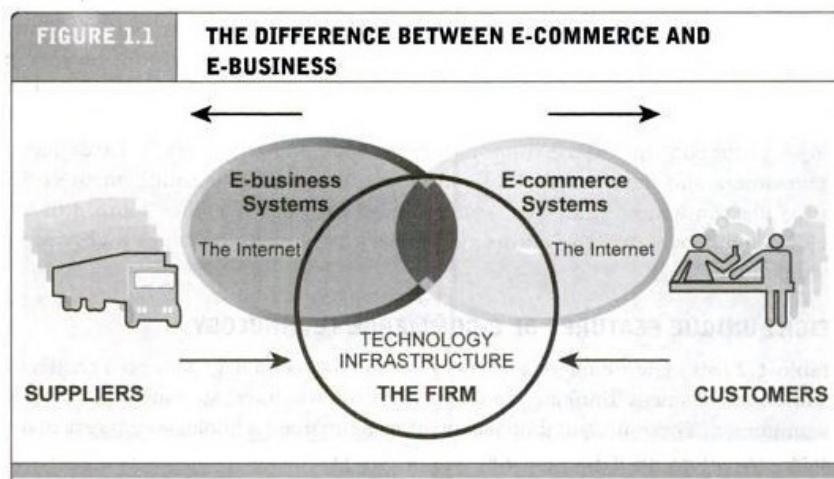
E-COMMERCE VS. E-BUSINESS

- Commonly referred to as "eBusiness" or "e-business", may be defined as the application of information and communication technologies in support of all the activities of business. Commerce constitutes the exchange of products and services between businesses, groups and individuals and can be seen as one of the essential activities of any business.
- Electronic business methods enable companies to link their internal and external data processing systems more efficiently and flexibly, to work more closely with suppliers and partners, and to better satisfy the needs and expectations of their customers.
- In practice, e-business is more than just e-commerce. While e-business refers to more strategic focus with an emphasis on the functions that occur using electronic capabilities, e-commerce is a subset of an overall e-business strategy. E-commerce seeks to add revenue streams using the World Wide Web or the Internet to build and enhance relationships with clients and partners and to improve efficiency.
- eBusiness is digitally enabled transactions and processes for the distribution of information, providing customer support, and intra-business tasks. It is frequently used interchangeably with EC.
- For example, a company's online inventory control mechanisms are a component of e-business and online selling of company product is e-commerce.
- Some people use the term e-business to refer to all the categories of e-commerce. E.g. IBM defines e-business as: The transformation of key business processes through the use of Internet technologies

THE DIFFERENCE BETWEEN E-COMMERCE AND E-BUSINESS

There is a debate among consultants and academics about the meaning and limitations of both e-commerce and e-business. Some argue that e-commerce encompasses the entire world of electronically based organizational activities that support a firm's market exchanges—including a firm's entire information system's infrastructure (Rayport and Jaworski, 2003). Others argue, on the other hand, that e-business encompasses the entire world of internal and external electronically based activities, including e-commerce (Kalakota and Robinson, 2003).

We think that it is important to make a working distinction between e-commerce and e-business because we believe they refer to different phenomena. E-commerce is not "anything digital" that a firm does. For purposes of this text, we will use the term **e-business** to refer primarily to the digital enabling of transactions and processes *within* a firm, involving information systems under the control of the firm. For the most part, in our view, e-business does not include commercial transactions involving an exchange of value across organizational boundaries. For example, a company's online inventory control mechanisms are a component of e-business, but such internal processes do not directly generate revenue for the firm from outside businesses or consumers, as e-commerce, by definition, does. It is true, however, that a firm's e-business infrastructure provides support for online e-commerce exchanges; the same infrastructure and skill sets are involved in both e-business and e-commerce. E-commerce and e-business systems blur together at the business firm boundary, at the point where internal business systems link up with suppliers or customers, for instance (see **Figure 1.1**). E-business applications turn into e-commerce precisely when an exchange of value occurs (see Mesenbourg, U.S. Department of Commerce, 2001, for a similar view). We will examine this intersection further in Chapter 12.



E-commerce primarily involves transactions that cross firm boundaries. E-business primarily involves the application of digital technologies to business processes within the firm.

ELECTRONIC MARKET

- Is a place where shoppers and sellers meet electronically.
- In electronic markets, sellers and buyers negotiate, submit bids, agree on an order, and finish the execution on- or off- line.
- A *market* is a network of interactions and relationships where information, products, services, and payments are exchanged.
 - ✓ It handles all the necessary transactions
 - ✓ It is a place where shoppers and sellers meet electronically
 - ✓ Sellers and buyers negotiate, submit bids, agree on an order, and finish the execution on- or off- line

M-COMMERCE

- Mobile Commerce is any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobile access to computer-mediated networks with the help of an electronic device.
- M-commerce (mobile commerce) is the buying and selling of goods and services through wireless handheld devices such as cellular telephone and personal digital assistants (PDAs). Known as next-generation e-commerce, m-commerce enables users to access the Internet without needing to find a place to plug in.
- "Mobile Business", signifies an "anytime and anywhere access" to business processes managed by computer-mediated networks.
- As content delivery over wireless devices becomes faster, more secure, and scalable, there is wide speculation that m-commerce will surpass wireline e-commerce as the method of choice for digital commerce transactions. The industries affected by m-commerce include:
 - ✓ Financial services, which includes mobile banking (when customers use their handheld devices to access their accounts and pay their bills) as well as brokerage services, in which stock quotes can be displayed and trading conducted from the same handheld device
 - ✓ Telecommunications, in which service changes, bill payment and account reviews can all be conducted from the same handheld device
 - ✓ Service/retail, as consumers are given the ability to place and pay for orders on-the-fly
 - ✓ Information services, which include the delivery of financial news, sports figures and traffic updates to a single mobile device
- Mobile commerce was born in 1997 when the first two mobile phone enabled Coca Cola vending machines were installed in the Helsinki area in Finland. They used SMS text messages to send the payment to the vending machines.
- In 1997 also the first mobile phone based banking service was launched by Merita bank of Finland also using SMS.

Attributes of M-Commerce and Its Economic Advantages

- **Mobility:** -users carry cell phones or other mobile devices
- **Broad reach:**-people can be reached at any time
- **Ubiquity:**-easier information access in real-time
- **Convenience:**-devices that store data and have Internet, intranet, extranet connections
- **Instant connectivity:**-easy and quick connection to Internet, intranets, other mobile devices, databases
- **Personalization:**-preparation of information for individual consumers
- **Localization of products and services:**-knowing where the user is located at any given time and match service to them

Unit 1.1: Introduction To Electronic Commerce

Limitations of M-Commerce

- Usability Problem
 - ❖ small size of mobile devices (screens, keyboards, etc)
 - ❖ limited storage capacity of devices
 - ❖ hard to browse sites
- Technical Limitations
 - ❖ insufficient bandwidth
 - ❖ transmission and power consumption limitations
 - poor reception in tunnels and certain buildings
 - weather, and terrain problems and distance-limited connections
- WAP Limitations
 - ❖ Speed
 - ❖ Cost
 - ❖ Accessibility

M-COMMERCE TO U-COMMERCE



- U-commerce extends traditional commerce to a world of ubiquitous networks and universal devices, a world in which users can access networks at any time from any place, using a range of devices to invoke unique and personalized services. Specifically, four constructs are discussed that form the fundamental dimensions of u-commerce: ubiquity, uniqueness, universality, and unison. It is proposed that future developments of information systems will be framed by these constructs.
- Ubiquity = Ultimate form of (Reachability + Accessibility + Portability)
- Uniqueness = Ultimate form of (Localization + Identification + Portability)
- Universality = Ultimate merge of (Mobile Networks + Mobile Devices)
- Unison = Ultimate merge of (Mobile Applications + Data Synchronization)

UNIQUE FEATURES OF ECOMMERCE TECHNOLOGY

The features the set eCommerce Technology apart from others used in traditional commerce are:

1. **Ubiquity** – internet/web technology is available everywhere: at work, home and elsewhere via mobile devices.
 - ✓ Marketplace extended beyond traditional boundaries
 - ✓ “Marketspace” is created, available 24/7/365
 - ✓ Customer convenience increased, costs reduced.
2. **Global Reach** – the technology reaches across national boundaries, around the earth. Commerce enabled across cultural and national boundaries seamlessly.
 - ✓ Potential customer reach extended.
 - ✓ Reduces barriers to markets.
3. **Universal standards** – there is one set of technology standards, namely internet standards.
 - ✓ Promotes technology adoption
 - ✓ Reduces costs of adoption
4. **Richness** – Video, Audio, graphical and text messages are possible.
 - ✓ Integration to a more powerful marketing message and customer experience

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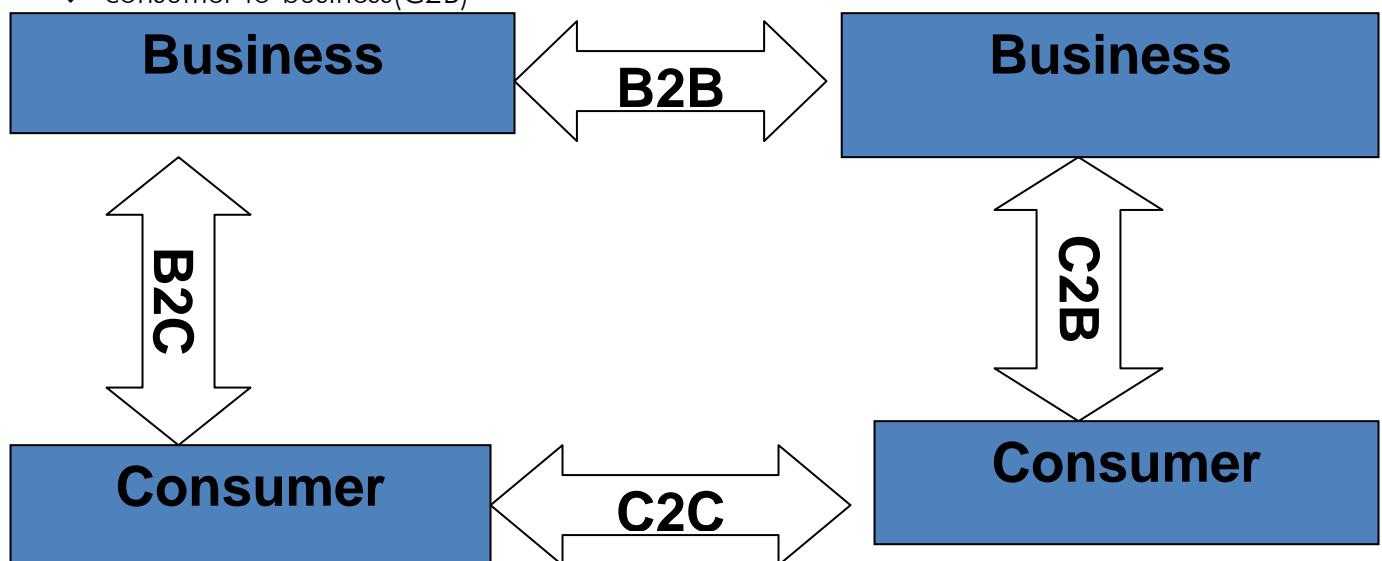
5. **Interactivity** – the technology allows active user involvement.
 - ✓ Consumers engage in dynamic dialog
 - ✓ Experience adjusted to the individual based on responses / reviews.
 - ✓ Customer becomes co-participant in the process of delivering goods to the market.
6. **Information Density** - the technology reduces information costs and increase quantity and quality.
 - ✓ Information processing, storage and communication costs drop dramatically.
 - ✓ Accuracy and timeliness improve greatly.
 - ✓ Information becomes plentiful, cheap and accurate.
7. **Personalization/Customization** – the technology reaches allows personalized messages to be delivered to individuals as well as groups.
Commerce enabled across cultural and national boundaries seamlessly.
 - ✓ Potential customer reach extended.
 - ✓ Reduces barriers to markets.

TYPES OF E-COMMERCE

- Although there are many different ways to categorize e-business models, they can be broadly categorized as:
 - ✓ E-business model based on the relationship of transaction parties and
 - ✓ E-business model based on the relationship of transaction types.

E-COMMERCE BASED ON TRANSACTION PARTIES

- ❖ business-to-consumer(B2C)
- ❖ business-to-business(B2B)
- ❖ consumer-to-consumer(C2C)
- ❖ consumer-to-business(C2B)



BUSINESS-TO-CONSUMER (B2C)

- Sells products or services directly to consumers.
- Application
 - ✓ retail sales
 - ✓ online airline ticket purchasing

Unit 1.1: Introduction To Electronic Commerce

- ✓ online share purchasing
- ✓ online hotel rooms booking
- Examples: amazon.com, eDiets.com

How does B2C work?

- Customer identifies a need
- Searches for the product or services to satisfy the need
- Selects a vendor
- Customer registers
- Customer negotiates a price and buys products
- Merchant processes the order
 - ✓ Credit card processing
 - ✓ Shipment and delivery
- Customer receives the product or service
- Gets after sales service and warranty claims

CONSUMER-TO-CONSUMER (C2C)

- It facilitates the online transaction of goods or services between two peoples.
- Consumers sell directly to other consumers.
- It includes Selling of personal services or expertise.
- Example: ebay.com, InfoRocket.com

How does C2C work?

- Purchasing anything online from another person via an ad posting on an electronic board or an online auction, instead of a business makes you a participant of consumer to consumer E-Commerce. By far, the most popular form of consumer-to-consumer E-Commerce is in the form of online auctions, through the mammoth eBay auction site, where anyone can put goods online for sale to the highest bidder.

CONSUMER-TO-BUSINESS (C2B)

- Consumers fix price on their own, which businesses accept or decline
- This mechanism is also known as demand collection system
- Example: Priceline.com

How does C2B work?

- It enables buyers to name their own price, often binding, for a specific good or services generating their demand.
- A consumer posts his project with a set of budget online, and often within hours companies review the customers' requirements and bid for the project.
- Then the customer will review the bids and selects the company that will complete the project.

BUSINESS-TO-BUSINESS (B2B)

- Sells products or services to other businesses or bring multiple buyers and sellers together in a central marketplace.
- Example: SHOP2gether.com, MetalSite.com, dell.com

Varieties of B2B

- a. B2B Storefronts: Provide businesses with purchase, order fulfillment, and other value-added services. e.g. Office Depot
- b. B2B Vertical Markets: Provide a trading community for a specific industry. e.g. Hotel Resource
- c. B2B Aggregators: Provide a single market space for business purchasing from multiple suppliers. e.g. Metal Site

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- d. B2B Trading Hubs: Provide a market space for multiple vertical markets. e.g. Vertical Net
- e. B2B Post and Browse Markets: Provide a market space where participants post buy and sell opportunities on an e-bulletin board. Interested parties meet through the postings and negotiate transaction for themselves. e.g. CATEX
- f. B2B Auction Markets: Provide a market space for buyers and sellers to enter competitive bids on contracts. e.g. e-STEEL

E-COMMERCE BASED ON TRANSACTION TYPES

- ❖ Brokerage
- ❖ Aggregator
- ❖ Info-mediary
- ❖ Community

BROKERAGE MODEL

- They bring buyers and sellers together and facilitate transactions.
- Brokers are market-makers: they bring buyers and sellers together and **facilitate transactions**. Brokers play a frequent role in business-to-business (B2B), business-to-consumer (B2C), or consumer-to-consumer (C2C) markets. Usually a broker charges a **fee or commission** for each transaction it enables.
- The price-discovery mechanism is its key-principle
- Auction and exchange are the mode of transaction
- It consists of Global network of buyers and sellers.

Brokerage Model Types

- **Transaction Broker** -- provides a third-party payment mechanism for buyers and sellers to settle a transaction. [[PayPal](#), [Escrow.com](#)]
- **Distributor** -- is a catalog operation that connects a large number of product manufacturers with volume and retail buyers. Broker facilitates business transactions between franchised distributors and their trading partners. [Necx]
- **Search Agent** -- a software agent or "robot" used to search-out the price and availability for a good or service specified by the buyer, or to locate hard to find information. [[MySimon](#), Monster]
- **Virtual Marketplace** -- or virtual mall, a hosting service for online merchants that charges setup, monthly listing, and/or transaction fees. May also provide automated transaction and relationship marketing services. [zShops and Merchant Services at [Amazon.com](#)]

AGGREGATOR MODEL

- Based on the e-market place, the aggregator model bypasses distributors so that the buyers and sellers come together.
- They are involved in the overall process of selection, organization, matching the buyer's requirement with that of the available goods, fulfillments of orders and enable the customer to create a value about the sellers.

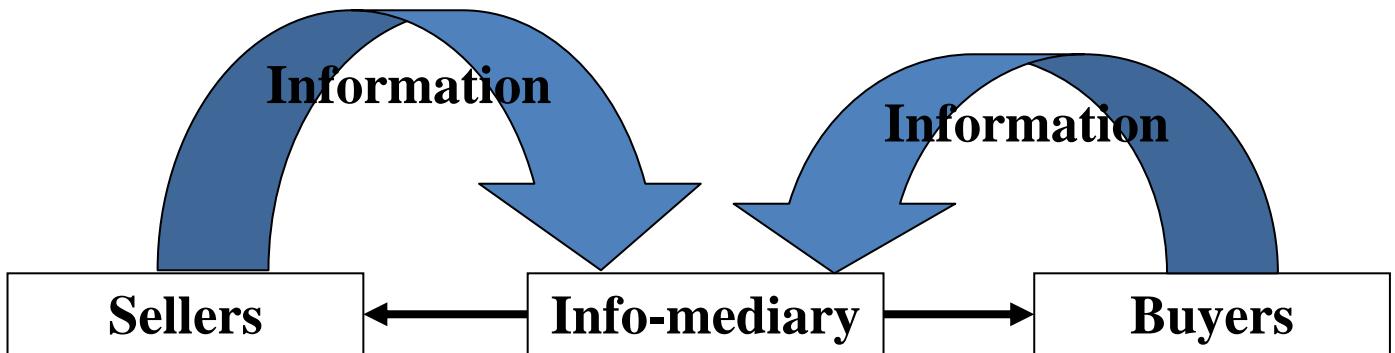
INFO MEDIARY MODEL

- They helps to collect, manage ,and maximize the value of information about consumers and Business.
- Examples: [NYTimes.com](#) , [Gomez](#)
- Data about consumers and their consumption habits are valuable, especially when that information is carefully analyzed and used to target marketing campaigns. Independently collected data about

Unit 1.1: Introduction To Electronic Commerce

producers and their products are useful to consumers when considering a purchase. Some firms function as infomediaries (information intermediaries) assisting buyers and/or sellers understand a given market.

- It functions as infomediaries by collecting and selling information about consumers and their buying habits.



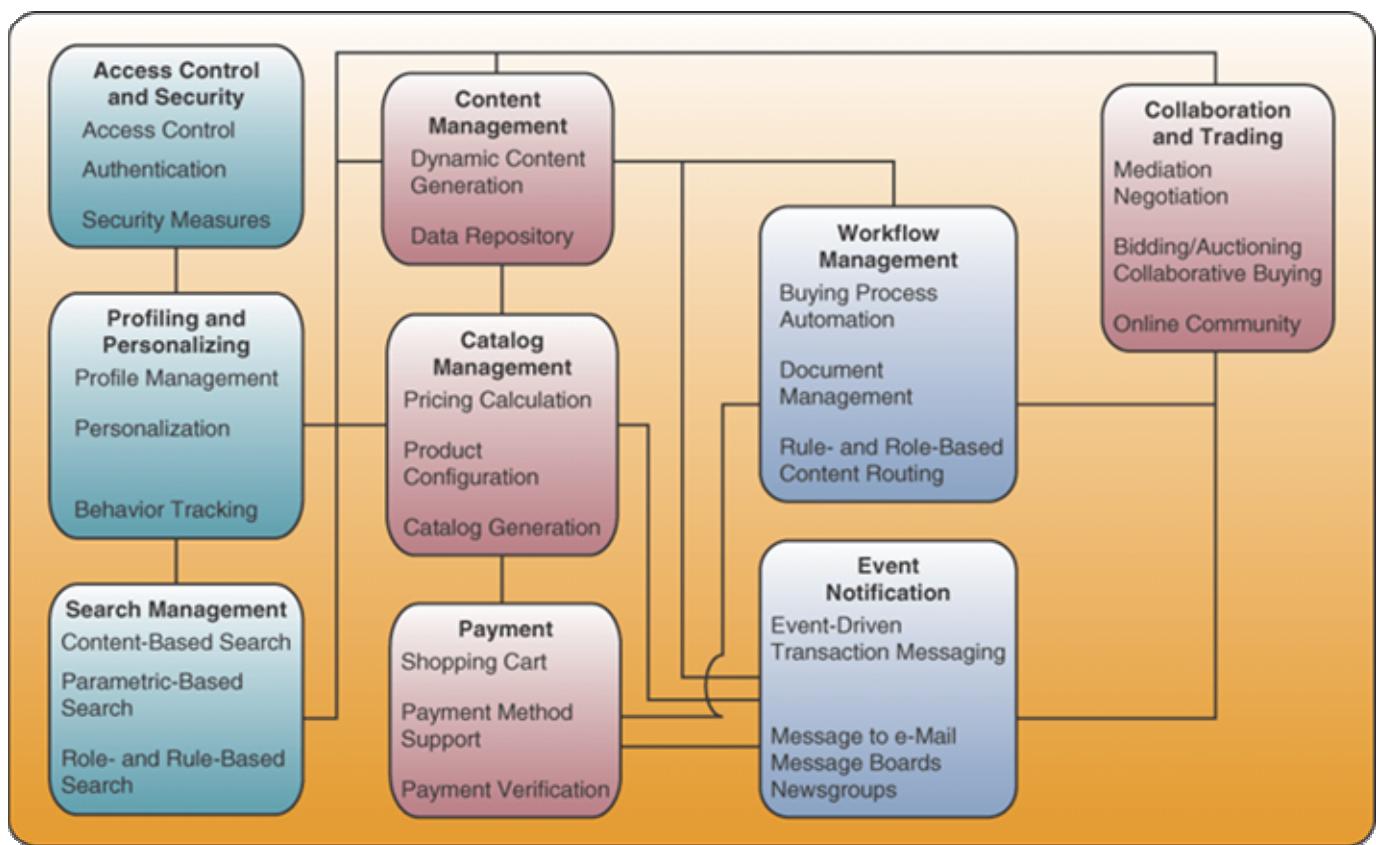
COMMUNITY MODEL

- Make group of people come on-line to serve their common interest and needs, exchange information, share interest, trade goods and service, entertain and seek help.
- The viability of the community model is based on user loyalty. Users have a high investment in both time and emotion. Revenue can be based on the sale of ancillary products and services or voluntary contributions; or revenue may be tied to contextual advertising and subscriptions for premium services. The Internet is inherently suited to community business models and today this is one of the more fertile areas of development, as seen in rise of social networking.
- Different structures are:
 - Newsletters
 - Discussion Lists
 - Bulletin Boards
 - Chat Rooms

PURE VS. PARTIAL COMMERCE

- Traditional Commerce also known as Brick-and-mortar where selling physical products by means of physical agents
- Partial E-Commerce also known as Click-and-mortar where organizations conduct e-commerce activities, but do their primary business in the physical world.
- Pure E-Commerce where organizations sell products or services only online
- Electronic commerce can take several forms depending on the degree of digitization (*the transformation from physical to digital*) involved. The degree of digitization can relate to:
 - the product (service) sold,
 - the process,
 - the delivery agent (or intermediary).
- A product can be physical or digital, the process can be physical or digital, and the delivery agent can be physical or digital. In traditional commerce all three dimensions are physical, and in *pure EC* all dimensions are digital. All other combinations include a mix of digital and physical dimensions. If there is at least one digital dimension, we consider the situation electronic commerce but only *partial EC*. For example, buying a shirt at Wal-Mart Online, or a book from Amazon.com is partial EC, because the merchandise is physically delivered by FedEx. However, buying an e-book from Amazon.com or a software product from Buy.com is *pure EC*, because the product, its delivery, payment, and transfer agent are all done online.

ESSENTIAL E-COMMERCE PROCESS ARCHITECTURE



Access Control and Security

- E-commerce processes must establish mutual trust and secure access between the parties in an e-commerce transaction
- By authenticating users, authorizing access, and enforcing security features

Profiling and Personalizing

- Gather data on you and your website behavior and choices
- Build electronic profiles of your characteristics and preferences
- Profiles are used to recognize you and provide you with a personalized view of the contents of the site with product recommendations and personalized advertising
- One-to-one marketing strategy

Search Management

- Search processes that helps customers find the specific product or service they want to evaluate or buy

Content and Catalog Management

- Content Management – software that helps e-commerce companies develop, generate, deliver, update, and archive text data and multimedia information at e-commerce websites
- Catalog Management – software that helps generate and manage catalog content
- May support customer self-service and mass-customization of products, e.g., Dell Computer configuration management

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Workflow Management

- Software that helps employees electronically collaborate to accomplish structured work tasks within knowledge-based business processes
- Ensure proper transactions, decisions, and work activities are performed and the correct data and documents are delivered to the right employee, customer, or supplier

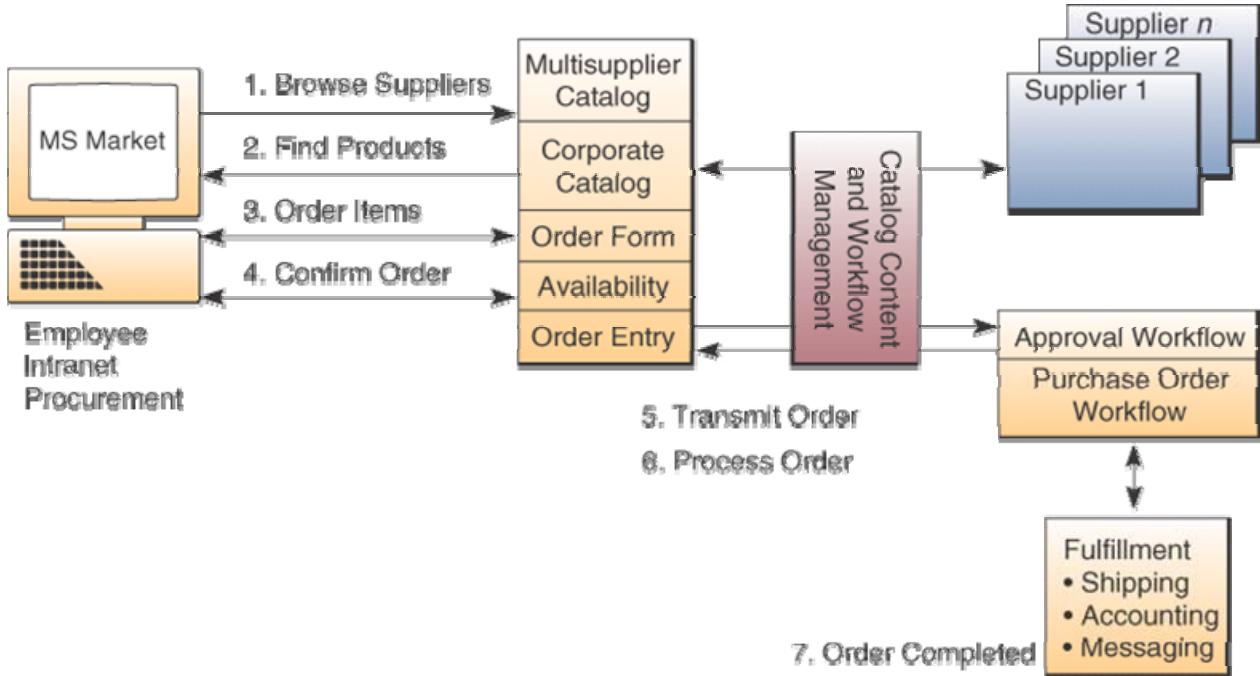


Fig: Catalog/content management and workflow example

Event Notification

- Most e-commerce applications are event-driven
- Respond to events such as customer's first website access, payment, delivery
- Event notification software monitors e-commerce processes
- Records all relevant events including problem situations
- Notifies all involved stakeholders

Collaboration and Trading

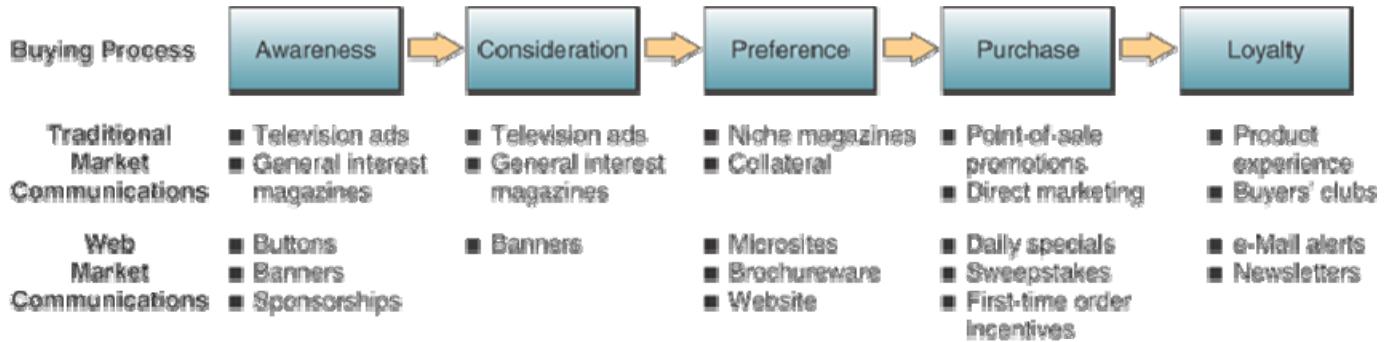
- Processes that support the vital collaboration arrangements and trading services
- Needed by customers, suppliers, and other stakeholders
- Online communities of interest
 - ✓ E-mail, chat, and discussion groups
 - ✓ Enhance customer service and build customer loyalty

E-COMMERCE SUCCESS FACTORS

- Selection and Value
 - ✓ Attractive product selections, competitive prices, satisfaction guarantees, and customer support after the sale
- Performance and Service
 - ✓ Fast, easy navigation, shopping, and purchasing, and prompt shipping and delivery
- Look and Feel

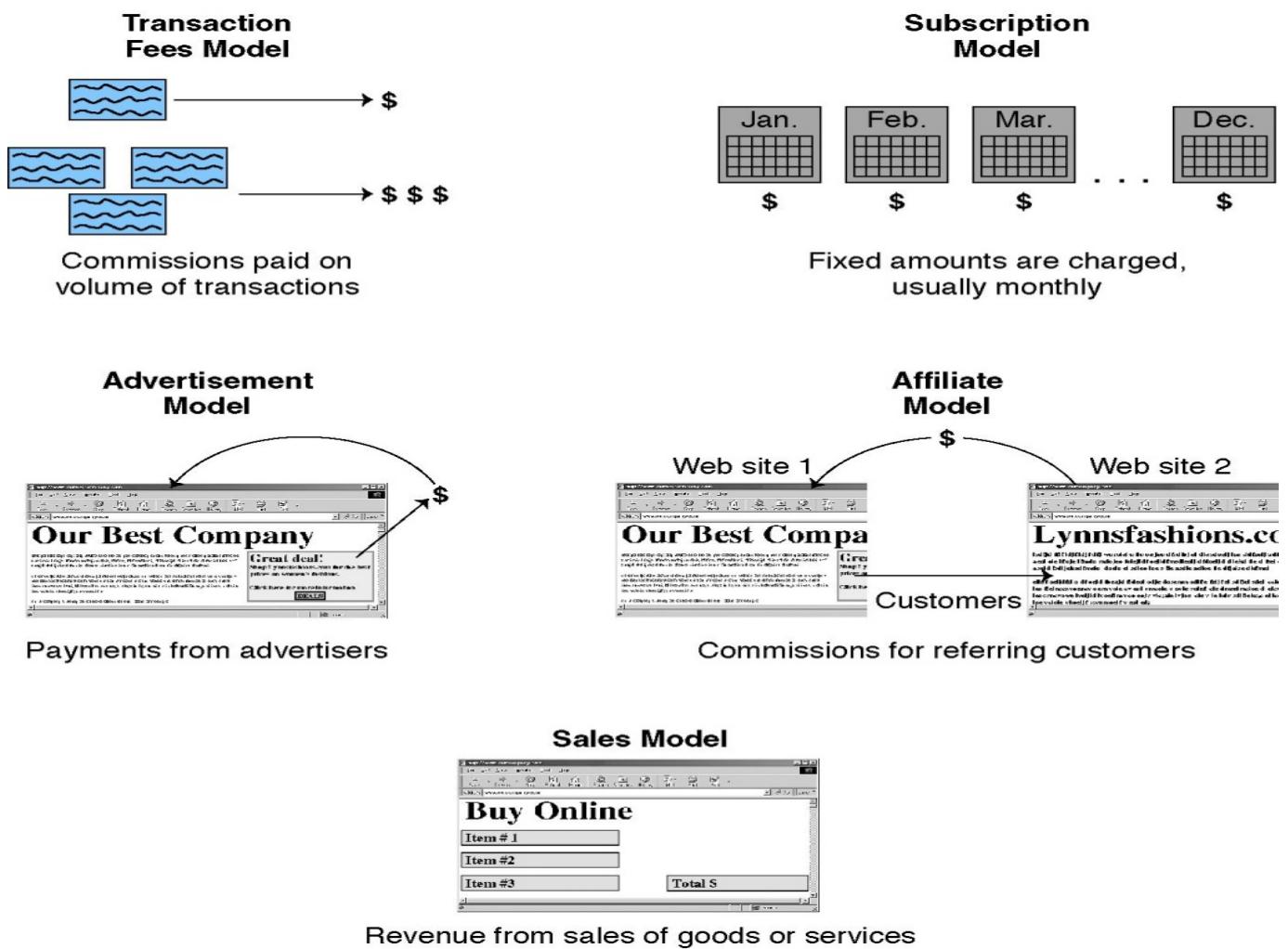
Unit 1.1: Introduction To Electronic Commerce

- ✓ Attractive web storefront, website shipping areas, multimedia product catalog pages, and shopping features
- Advertising and Incentives
 - ✓ Targeted web page advertising and e-mail promotions, discounts and special offers, including advertising at affiliate sites



- Personal Attention
 - ✓ Personal web pages, personalized product recommendations, Web advertising and e-mail notices, and interactive support for all customers
- Community Relationships
 - ✓ Virtual communities of customers, suppliers, company representatives, and others via newsgroups, chat rooms, and links to related sites
- Security and Reliability
 - ✓ Security of customer information and website transactions, trustworthy product information, and reliable order fulfillment

E-COMMERCE BUSINESS MODELS



2. PRELUDE

- To become a reality, electronic commerce needs a network infrastructure to transport the content.
- I-way, also known as the electronic, interactive, or multimedia superhighway has become the leading buzzword that has no precise definition.
- I-way can be portrayed as the high bandwidth, interactive pipeline capable of simultaneously supporting a large number of electronic commerce applications
- Principal Shortcoming of the existing communication infrastructure
 - Inability to provide integrated voice, data, and video services
 - Voice — circuit switching and Data — packet switching networks
 - Hence electronic commerce requires a network infrastructure capable of supporting multiple types of information
- Multinational companies have started mergers and investments in technology to construct the new infrastructure. (AT & T, Sony, Time Warner, Microsoft, Viacom)
- Projections indicate that anywhere from \$100 to \$200 billion will be spent on constructing the I-way infrastructure over the next 10 to 15 years
- Companies upgrading their network infrastructure (telephone cables being replaced by optical fiber links)
- Initial euphoria being tempered ---- reason ---- collapse of Bell Atlantic/TCI \$30 billion merger in 1994, which would have combined telephone and cable networks in the Northeast to create a large segment of the I-way.
- BARRY DILLER (CEO, QVC- fought with Viacom in a takeover battle for Paramount Studios) quoted --- Initially the thesis was "the development of the I-way is the next industrial revolution" and then the dismissive antithesis " The I-way is off track, it is delayed and it is not meeting anyone's expectations"
- For a predominance of the general public the I-way remains masked in mystery.
 - 66% of Americans say they have not seen, read or heard about the I-way (Folio Magazine)
 - Survey amidst 1255 adults—only 34% aware of I-way and believe that the technology has a very little to do with their daily lives.
 - 78% Germans and 57% Britons didn't know I-way and 73% French only a basic understanding (Wall Street Journal, April 10, 1995)
- Most business don't understand how the I-way will change the way they advertise, market, or sell their products and services, how it will change their relationship with their customers, what sort of new arrangements will be possible with suppliers and collaborators, how will it affect information sharing between various parts of the organization, and how it will impact individual productivity and efficiency.

2.1 MARKET FORCES INFLUENCING THE I-WAY

2.1.1 Demands and Requirements of Market Participants

- The success or failure of any innovation, product or service is a factor of Market forces
- The user/firm role
 - Users who become information publishers by setting up on line servers
 - Consumers, end users or business consuming and paying for information products/services
 - Information service providers who are commercial, government or private providers or publishers of information goods and services

Unit 1.2: The Network Infrastructure for Electronic Commerce

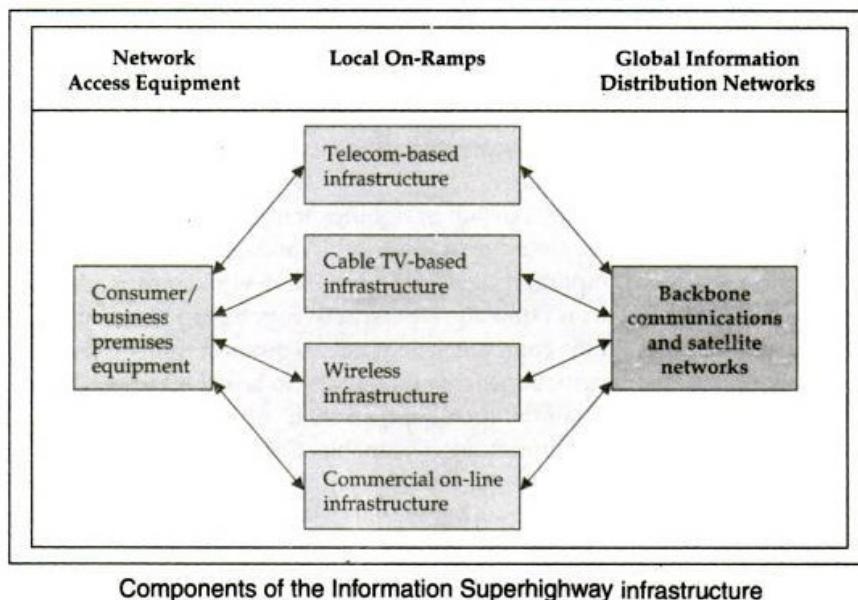
- Value added information providers, including third party brokers and other intermediaries, as well as originators or services who add value by packaging or building on services provided by others
- From the list above, we may see that users and firms play multiples roles as consumers and producers of information. These roles are not fixed and can be a major reason for why many companies are merging or realigning themselves.
- The companies which once focused on one type of user role (communication, entertainment or information) now seek to broaden their markets and serve as many users as possible.
- The Telcos want to see an I-way that can support a variety of applications: on-demand publishing, real time video conferencing, and tele-everything— telemedicine, telemarketing, and telecommuting – where individuals work fro home through the extensive used of telephone hookups.
- The cable industry wants to expand services from TV programming or pay per view services such that the consumer can pay bills, shop, reference encyclopedias, or check stock prices – all staying at home. Most cable companies tend to see the I-way as a 500 channel one way distribution vehicle.
- The online services (Prodigy, CompuServe, America Online) and computer companies want to see an I-way that involves a lot of two-way interaction such as electronic mail, information search and retrieval, and more forums, chat lines and BBS.
- The demand and requirements various participants place on the network infrastructure are bound to be very different. To support as many roles as possible, an increasing number of alliances are developing between telecommunication, cable television and entertainment companies. These partnerships provide synergy to spur consumer demand for advanced information, entertainment services and the equipment and devices necessary to provide them

2.1.2 Strategic Alliance and the I-Way Infrastructure

- To ensure construction of a broadly useful I-way, strategic planning shold take into account the needs of the communication, entertainment and information sectors
- The resource requirements of building these three segments of the I-way are driving companies to make maximum use of existing facilities through alliances to control costs and create test markets.
- Alliances, particularly among large firms are dominant as they reduce risks, spread costs and allow firms to acquire costly expertise in different areas instantly
- Two aspects of these alliances:
 - They cut across industry lines a diversity suggesting that member companies will perform different roles within the alliances. E.g studio provide the content, telephone or cable companies deliver the information and computer hardware and software firms provide the access hardware and application to use the data.
 - Many alliances are international, signaling that the I-way will be global from the start
- A majority of the alliances are between Telcos and cable companies just because today the cable companies posses the bandwidth to the home that the Telcos lack but they don't have the Telcos sophisticated switching equipment and operational support systems to provide interactive point to point communications.
- These mergers are expected to result in significant long term opportunities to achieve economies of scale by providing cable and telephony access to more customers. Moreover, it would give the new alliance increased control, from both cost and timeliness perspective in the purchase of content or programming.

2.2 COMPONENTS OF THE I-WAY

- Three major components make up the I-way as shown in the figure below.



CONSUMER ACCESS EQUIPMENT

- Consumer access equipment is often ignored in discussions of the I-way but represents a critical category, the absence or slow progress of which is holding up other segment of the I-way.
- For instance, interactive TV is uncommon, not because of a lack of wiring but because of a lack of affordable equipment on the customer's side for access and on the provider's side for distribution
- This segment includes hardware and software vendors who provide physical devices such as routers and switches and access device such as computer, set top box and software platforms such as browsers and OS

LOCAL or ACCESS ROADS, or ON-RAMPS

- Simplifies linkage between businesses, schools and homes to the communication backbone.
- Often called the "last mile" in telecommunication industry.
- The providers of access ramps can be divided into 4 categories
 - Telecom based
 - Cable TV based
 - Wireless based
 - Computer based Online Information Services
- These providers link users and E-commerce application providers where users research which service best suit their need and decide which service they want to access.
- A careful consideration should be made to the applications deployed or accessed, objectives and costs, and security as well as privacy.

GLOBAL INFORMATION DISTRIBUTION

- Represent the infrastructure criss-crossing countries and continents
- Most of the infrastructure for the I-way already exists in the vast network of fiber optic strands, coaxial cables, radio waves, satellites and copper wires spanning the globe.
- This backbone, put in place over the last three decades by the telephone and cable companies, includes such networks as long distance telephone lines, satellite networks and the internet.

2.3 NETWORK ACCESS EQUIPMENT

- The network access equipment of the I-way includes the CPE (Customer Premises Equipment) which are the privately owned communications equipment that is attached to the network.

2.3.1 SET-TOP BOXES

- A key hardware for I-way access will be cable converter boxes known as set top boxes (converter boxes or descramblers).
- They will be the gateway for information services, commercial transactions and 500 digitally compressed channels.
- These boxes will have greater intelligence and more intelligence than the existing converter boxes such as enabling users to make phone calls, surf the internet and even plan their viewing, schedule for the week.
- The simplest set-top box would include on screen text menus enabling features like parental controls, favorite channel grazing and time delay programming for unattended VCR recording.
- At the high end, it might have menu system based on icons for navigating through various activities to shop, access a bank account, play video games, watch a pay-per-view movie or examine an on screen TV schedule.
- They may also have slots for add on cards that can be used to change or add application, provide security or expand the memory. They may also have a serial data port for a printer.

SET-TOP VS. PC

The Display – traditional low resolution display vs. high definition text enabled high resolution which can easily display text, video and graphics crisply to a viewer a foot and half way.

The Controls – hand held remote control (possibly a joystick or trackball) vs. the full functional keyboard with a mouse assisting for clicking, selecting and highlighting plus a variety of devices are supported by a PC.

The Pipeline – existing cable systems that can deliver a huge amount of information rapidly one way (must be modified to allow a significant return flow) vs. the dominant system with high capacity modems and networks for video on demand services.

The Brains – the set-top box is really a special purpose computer with powerful graphics and communication features but limited versatility whereas PCs are interactive, versatile and not central server dependent.

The Accessibility – nearly every household has a television and is familiar and comfortable with it. PCs are rapidly gaining acceptance but people who don't tend to take a technology leap resist use of PCs and remain uncomfortable with PCs.

2.3.2 COMPUTER BASED TELEPHONY

- The largest CPE (Customer Premises Equipment) product are the PBXs, telephones, facsimile, modems, voice processing and communication equipments.
- Because of the technology leap shipment of telephones and answering machines are declining whereas modems, voice processing and video communication equipment are inclining.
- These devices feature multimedia facilities and enable user to send and receive information over bounded as well unbounded communication media.
- The CPE products have been popular as they improve business productivity by reducing communication and travel expenses.

2.3.3 Digital Switches, Routers and Hub

- The digital switches industry has a major impact on the I-way.

Six Generations of Switching Technology	
1880s to 1920s	Manual operator controlled
1920s to 1940s	Step-by-step electromechanical switches (called Strowger design); developed at the turn of the century; placed in common use beginning in the 1920s
1940s to 1960s	Crossbar electromechanical; developed in the 1930s; in heavy use in the 1950s and into the 1960s to replace step-by-step
1960s to 1970s	Semielectronic switching stored-program-control computers, analog and digital
1970s to 1990s	Totally electronic solid state digital, increasingly software driven
1990s	Fiber optic-based integrated switching and transmission systems enabling distributed architecture, multimedia systems

- All digital bits are essentially alike whether they represent a movie, a phone call, a newspaper or an opera.
- In a network data move from a source to their intended destination with a **header**.
- Like any other data, the digital data packets pass the switches that route them to their intended destination using the fast packet switching.
- Cable companies are testing different switching techniques, including asynchronous transfer mode which is quickly gaining international acceptance.

2.4 GLOBAL INFORMATION DISTRIBUTION NETWORKS

- Two major technologies underpins the global information network distribution

2.4.1 Long Distance Networks – Fiber Optics

- Long distance connectivity is available via cable (coax or fiber) owned by long distance or inter-exchange carriers (IXCs)
- Experience suggests that fiber optics for international transmission is likely to grow as they provide impressive economic advantage for selected routes where the growth in demand for communications capacity is high.
- The current large scale capacity of fiber optic connections between the US and Europe is enhanced to operate at gigabit rate.
- The IXCs also play a significant role in the local access market by teaming with firms in the wireless and cable TV business. They are exploring alternative arrangements that would lower their costs of using the local network, an expense that exceeded \$30 billion in 1993 or even allow them to provide such access themselves through business partnerships or acquisitions.
- The IXCs have advanced switched networks nationwide that can serve as a backbone for alternative local access networks and they have the financial and human resources that can help the small competitive access firms grow.
- The major long distance carriers have focused their attention on wireless technologies and made plans to work with or acquire companies in the wireless market. This would enable them to provide long-distance services to cellular users and possibly to develop a more economical local access network to reach their own subscribers

2.4.1 Satellite Networks

- The role of satellites in the communications industry has changed substantially during the past two decades.
- Initially satellites were used to transport long distance telecommunications and one way video broadcasts.
- The advent of fiber optics in the early 80s changed the role of satellites in the global communication industry.
- Fiber optics has emerged as the technology of choice, not only because it is capable of providing higher bandwidth than satellites but also because it is immune to EMI. Hence, it is being deployed for long distance communication and even underseas to carry international traffic.
- Satellite networks do have accessibility from any spot on the globe, can provide digital broadband service including voice, data and video without the cost of acquiring wire installation.
- Today about 150 communication satellites in geosynchronous orbit (GEO) are providing a wide range of services, including broadcast video and overseas telephone links.
- GEO satellites are placed in a high circular orbit 22,300 miles above the equator. Because they rotate with the earth, they appear to be stationary
- In 1980s, a new class of satellites using a narrow beam to focus the transmitted energy on a small geographical area known as VSAT.

2.5 PUBLIC POLICY ISSUES SHAPING THE I-WAY

- Seven major issues
 - **Cost:**
 - The primary concern is cost; who will pay for constructing the I-way?
 - **Subsidies:**
 - Developers might hope for subsidies, tax breaks, government business, or other form of encouragement.
 - **Allocation of scarce resource:**
 - Investments in all aspects of the I-way may be wasted because there is no strong evidence that markets exist for the services it would offer or it may create markets due to developing technologies.
 - **Regulation:**
 - Regulation to provide public access, privacy. What are the rules? Who writes them? Who enforces them?
 - **Universal Access:**
 - Who gets access to the I-way. Networks are inherently collectivist: a broader reach benefits everyone.
 - **Information Privacy Issues:**
 - **Social and Religious Barriers:**
- Public policy and global connectivity: Achieving global connectivity has policy implications:
 - Access to Local Infrastructure
 - Global Subsidies
 - Cost and pricing of “Universal Access” Transmission Capacity
 - Adoption of Technology Standards

PRELUDE

- The Internet is the most well known component of the Information Superhighway network infrastructure.
- Today, the Internet is an information distribution system spanning continents and is a unique combination of postal services, telephone systems, research library, supermarket as well as a talk show center that enables people to share and purchase information.
- The interchange takes place rapidly in fractions of seconds using a fairly inexpensive and commonly available technology.
- Emerged around 1965 --- U.S. defense department linked a handful of universities and military research laboratories.
- Until 1991, most of these networks were used primarily for research by academics, government agencies and research laboratories to communicate and share information.
- 1992-93 the spotlight on the I-way propelled the Internet from a virtual unknown to an elegant media cliché (formula). Many who heard about this gimmick attempted to get on to the Internet and see what all the excitement was about.
- So, Internet soon became the cover story and headlines of every other newspaper and magazines
- Estimates by the ISOC indicate doubling Internet subscribers annually.

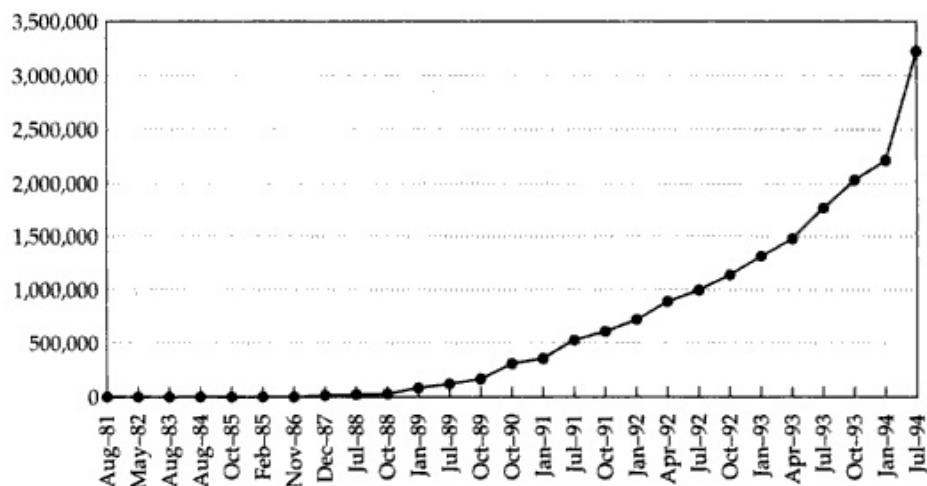


Figure Internet host growth

THE INTERNET TERMINOLOGY

- Today, the Internet is a mesh of LANs, MANs and WANs that envelops thousands of interconnected networks linking approximately 4 million computers worldwide and is composed of universities, government institutions, large private companies as well as small entrepreneurial start ups.
- LAN –
 - characterized by small geographical location which allows resource sharing and work group interaction with a single building
 - Total management control residing with the local manager with limited number of users (50 – 1000 users)
- MAN –
 - sometimes used to describe campus networks or Big LANs (1000 – 10000 users)
 - are usually segregated hierarchically into smaller LANs that are interconnected using devices called bridge

Unit 1.3: The Internet as a Network Infrastructure

- WAN –
 - Links several dispersed MANs and extends the principles of information resource sharing to several locations.
 - Characterized by multi-organizational control i.e. a company may own the LAN host, but carriers (telcos) own communication subnetworks on which the WAN operates.
- Classified into two broad categories
 - Academic Internet
 - Also known as core internet is based over the TCP/IP
 - Consist of various government, regional, campus and some international network
 - Include the NSFNET (US group of IP network), EBONE (the European group of IP network), PSINet, UUNET(Private IP networks)
 - Business Internet
 - Can use and understand a variety of protocols other than TCP/IP including ISO/OSI X.25, SNA based BITNET and many others for networks run by such commercial providers as CompuServe, Prodigy, America Online, FidoNet, AppleLink and MiniTel networks
 - Consist of online services, value added networks and other email only services
- The Academic and Business can communicate with each other through language translators called the gateways stationed at network border.
- The Academic internet has proven to be a milestone because of its massive size, high performance, open connectivity, valuable information and rich set of applications.
- Most recently many of the Business Internet providers have begun to adopt the TCP/IP as the standard protocol on their own networks to allow smooth linkage with the Academic Internet.
- The activity of Academic Internet has take two forms
 - Research and development of new distributed network technologies and software applications
 - Collaboration among innumerable user populations employing the Internet and its technologies as tools to enhance their specific professional activity or other interests significantly

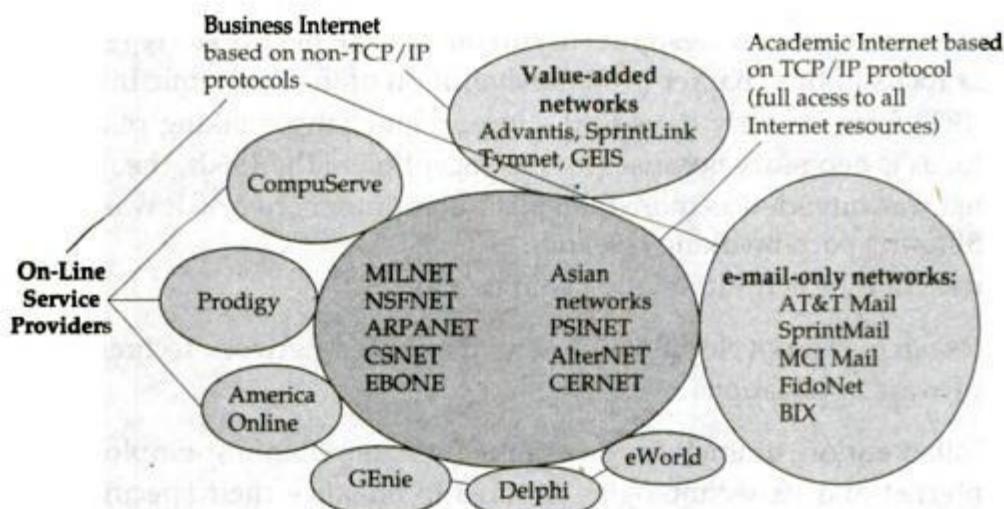


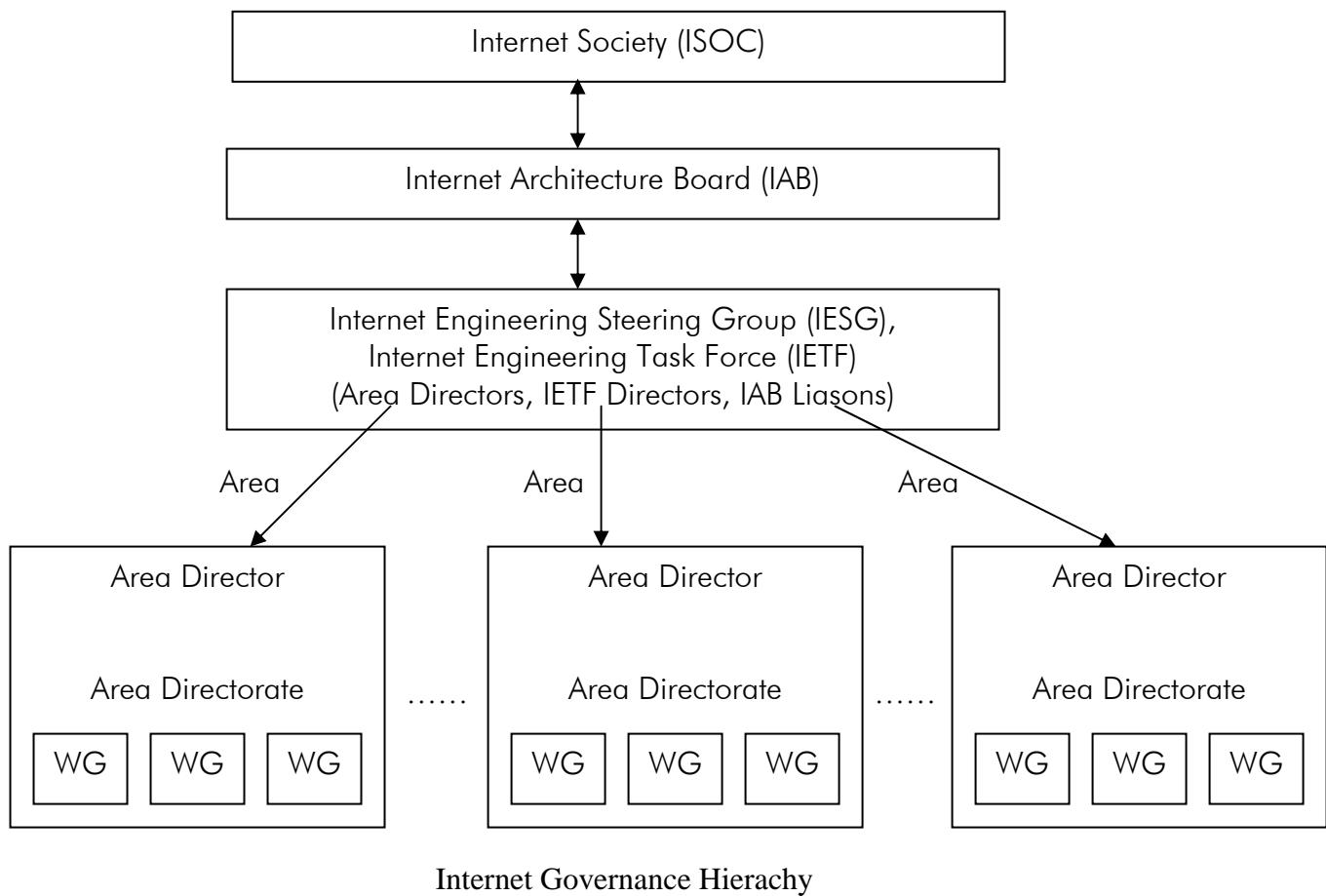
Figure : Networks making up the Internet

NSFNET: ARCHITECTURE AND COMPONENTS

INTERNET GOVERNANCE: THE INTERNET SOCIETY

Governance Hierarchy

- Because the internet is not a single network, it is not surprising that no one body controls it.
- Although standards exist, no Internet police is present to enforce them. In case any organization breaches the collective standards, it loses the benefit of global connectivity.
- Groups like InterNIC do exist which carry central management functions, registers companies that are connected to the Internet and the Internet Society (ISOC).
- The ultimate authority for the technical direction of the Internet rests with the ISOC which is concerned with the growth and evolution of the worldwide Internet, with the way in which the Internet is used and with the social, political and technical issues.
- The major goal of ISOC is to promote global information exchange has various engineering committees that help make technical recommendations for the future development of Internet but no one has the authority to force to a particular direction.



Internet Architecture Board (IAB)

- ISOC appoints a council – IAB – that has the responsibility for the technical management and direction of the Internet.
- Is responsible for the overall architectural consideration in the Internet, technical direction, establishing standards and settlement of conflicts in the standard process.
- IAB meets regularly to discuss Internet Standards. It decides when a standard is necessary, considers the problem, adopts a standard and announces it via a network.

Unit 1.3: The Internet as a Network Infrastructure

- It also keeps track of various network addresses (IP) and develops rules for assigning IP addresses.
- It even works out for the current problem of shortage of IP (IPV4) and addresses it using IP next generation (IPng) or IPV6.
- IAB is supported by IETF — the protocol engineering and development arm of internet.
- IETF is a large international community of network designers, operators, vendors and researchers concerned with the evolution of the Internet Architecture and the smooth operation of the Internet.
- It is open to any interested individual and meets regularly to discuss operational and technical problems of the Internet.
- IESG is formed along with the IETF which handles the operational management of the Internet standards process under the auspices of ISOC.

IETF Working Groups

- The IETF is currently divided into eighth functional areas :
 - Applications
 - Internet
 - Network management
 - Operational requirements
 - Routing
 - Security
 - Transport
 - User services
- The actual technical work of IETF is done in its working groups, which are organized by topic into several areas. Most working group have a finite lifetime and area dispersed after the initial goal is achieved.
- The BOF (birds of a feather) have the similar goals as working groups and provide an informal forum for discussing the latest trends in the market place that may necessitate a working group for more detailed inquiry.

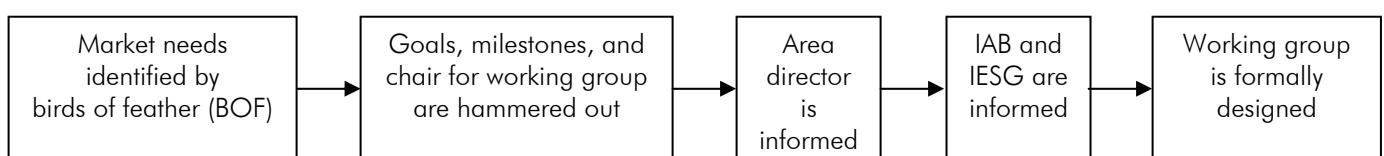


Fig: Process of working group creation that culminates in an Internet standard document



Fig: Process of request for comments (RFC) publication

PRELUDE

- Complex issues of security, privacy, authentication and anonymity have been thrust into the forefront as confidential information increasingly traverse modern networks
- A security threat is defined as a circumstance, condition or event with the potential to cause economic hardship to data or network resources in the form of destruction, disclosure, modification of data, denial of service and/or fraud, waste and abuse.
- The discussion of security concerns in E-Commerce can be divided into two broad types:
 - **Client server security:**
 - Uses various authorization methods to make sure that only valid users and programs have access to information resources
 - Access control mechanism must be set up to ensure that properly authenticated users are allowed access only to those resources that they are entitled to use.
 - **Data and transaction security:**
 - Ensures the privacy and confidentiality in electronic message and data packets, including the authentication of remote users in network transactions for activities such as on line payments.
 - The goal is to defeat any attempt to assume another identity while involved with electronic mail or other forms of data communication
 - Uses various data encryption technologies and cryptographic methods

CLIENT SERVER NETWORK SECURITY

- Is one of the biggest headaches system administrators face as they balance the opposing goals of user maneuverability, easy access, site security and confidentiality of local information.

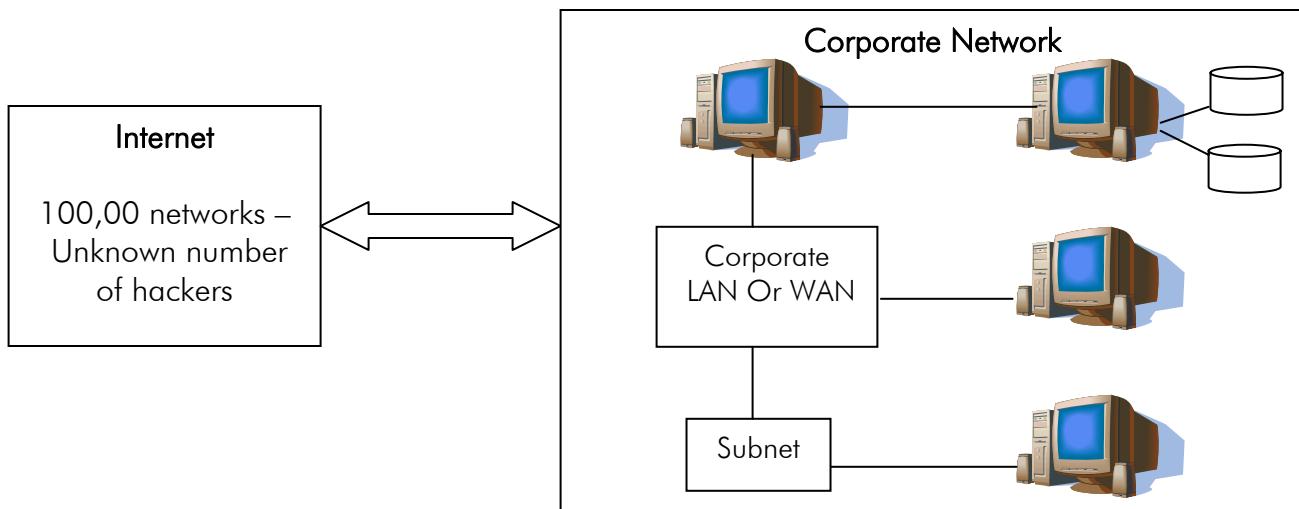


Fig: Unprotected Internet Connection

- Client server network security problems manifest themselves in three ways:
 - **Physical security holes:**
 - Result when individuals gain unauthorized physical access to a computer.
 - E.g. a public workstation room, where it would be easy for a wandering hacker to reboot a system into a single-user mode and tamper with the files, if precautions not taken
 - It is a common problem in any network where hackers intrude into system by simply guessing the passwords of different users.

Unit 2.1: Network Security and Firewalls

- **Software security holes:**
 - Result when badly written program or software is compromised into doing things they should not do.
 - Is the highest level of access possible and could be used to delete the entire file system, or create a new account or password file resulting in incalculable damage.
- **Inconsistent usage holes:**
 - Results when a system administrator assembles a combination of hardware and software such that the system is seriously flawed from a security point of view
 - The incompatibility of attempting two unconnected but useful things creates the security hole.
 - Problems like this are difficult to isolate once a system is set up and running so it is better to carefully build the system with them in mind.
 - This type of problem is becoming common as software become more complex.

To reduce these security threats, various **protection methods** are used.

Trust Based Security

- Simply means to trust everyone assuming that all users are trustworthy and competent in their use of the shared network and do nothing extra for protection
- This approach assumes that no one ever makes an expensive breach such as getting root access and deleting files.
- It worked when there were limited threats but today this is no longer the case.

Security Through Obscurity (STO)

- Practiced by most organization where the network can be secure as long as nobody outside its management group is allowed to find out any thing about its operational details and users are provided information on a need to know basis.
- Hiding account passwords in binary files or scripts with the presumption that nobody will ever find them is a prime case (similar to hiding key under the dormant)
- STO provides a false sense of security in computing systems by hiding information.
- Quite successful with stand alone systems but minimal use in UNIX world where users are free to move around the file systems and have a great understanding of programming technique.
- As the users tend to have advanced knowledge of how their operating system works in and through experience can guess at the bits of knowledge considered confidential, the whole basis of STO is bypassed and makes this security method useless

Password Schemes

- Straightforward security solution that erects a first level barrier to accidental intrusion.
- Do a very little about deliberate attack, especially when common words or proper names are selected as password.
- The simplest password cracking mechanism is the dictionary comparison – comparing a list of encrypted user passwords against a dictionary of encrypted common words
- To beat the dictionary words experts recommend a minimum of 8 characters mixed cased password containing at least once non-alphanumeric character and changing password every 60 to 90 days.
- Passwords in a remote log-in session usually pass over the network in unencrypted form; any eavesdropper on the network can simply record the password any time it is used.

Unit 2.1: Network Security and Firewalls

- To counter these threats, various approaches have been suggested for creating one-time passwords, including smart cards, randomized token, and challenge response schemes
- Various cryptographic functions and algorithms can be used to generate a strong password

Biometric Systems

- Is the most secure level of authorization which involves some unique aspect of a person's body
- Older biometric systems were based on comparisons of fingerprints, palm prints, retinal patterns, signature verification or voice recognition
- Expensive systems with radical enhancements such as systems that recognize key-board typing patterns or read infrared facial patterns from passerby using a video camera.

EMERGING CLIENT-SERVER SECURITY THREATS

- Emerging threat in the e-commerce world is **mobile code** which in many ways resembles a more traditional virus threat.
- Is an executable program that has the ability to move from machine to machine and also to invoke itself without external influence
- To circumvent this threat, organizations install firewalls that filter the incoming data packets.
- Can be divided into two major categories
 - Threats to local computing environment from mobile software
 - Access control and threats to servers that include impersonation, eavesdropping, denial of service, packet relay and packet modification

Software agent and malicious code threat

- Internet tends to be the major security threat for running client software as client program interprets data downloaded from arbitrary servers on the internet.
- In absence of checks on imported data, the potential exists for this data to disrupt programs running on the systems.
- Most of the client threats arise from malicious data or code (viruses, worms, Trojan Horse, logic bombs)
- These codes mistakenly intrude into standalone PCs and have the ability to attack systems on network where the maintenance cost tends to be significant.

Examples of Malicious Code

Virus. A code segment that replicates by attaching copies of itself to existing executables (.EXE files). The new copy of the virus is executed when a user executes the host program. The virus may include additional "payload" that triggers when specific conditions are met. For example, some viruses display a text string or delete all files on the hard disk on a particular date. Many types of viruses fall into categories known as variants, overwriting, resident, stealth, and polymorphic.

Trojan Horse. A program that performs a desired task but also includes unexpected (and undesirable) functions. Consider as an example an editing program for a multiuser system. This program could be modified to randomly delete one of the users' files each time they perform a useful function (editing); these deletions are unexpected and definitely undesired.

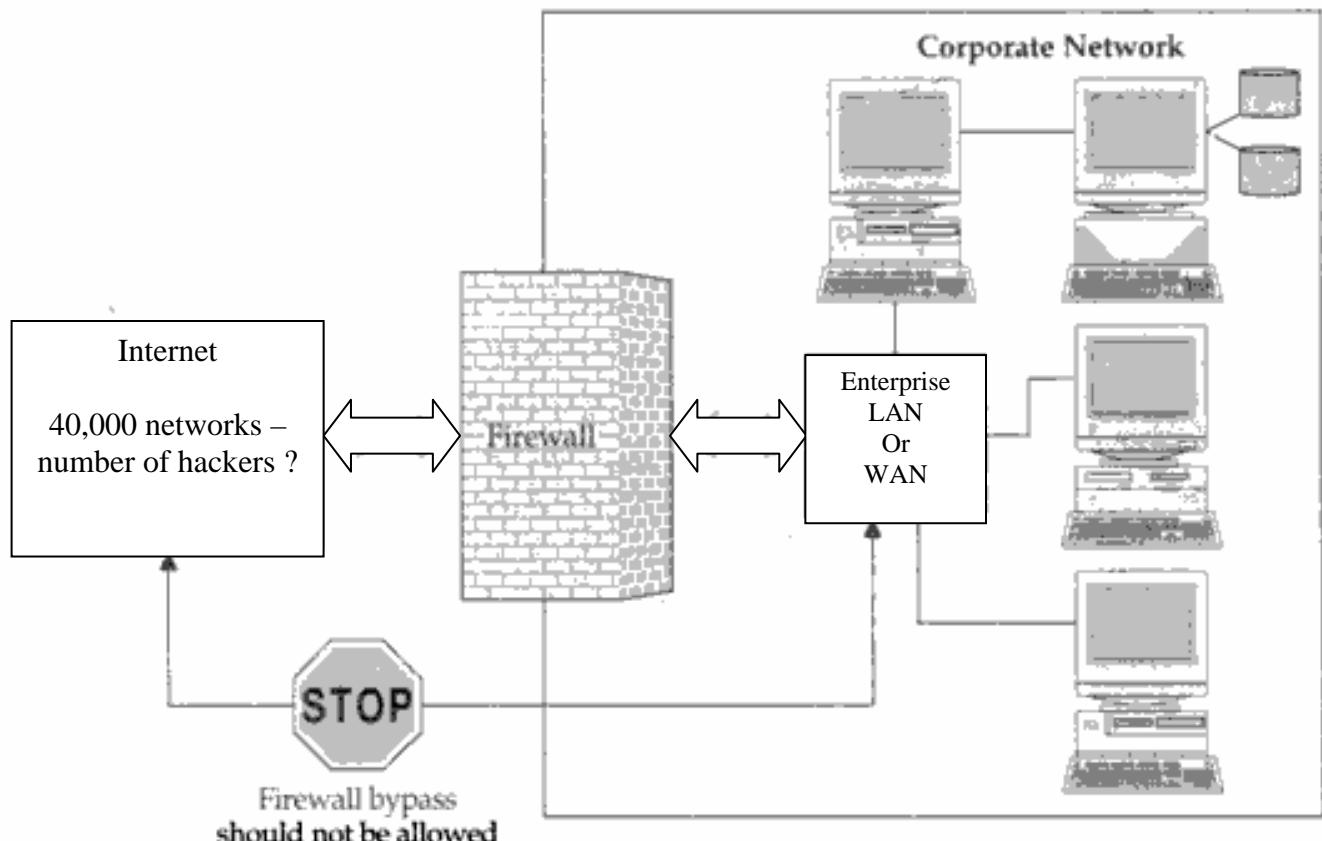
Worm. A self-replicating program that is self-contained and does not require a host program. The program creates a copy of itself and causes it to execute; no user intervention is required. Worms commonly utilize network services to propagate to other host systems.

Threats to Servers

- Threats to servers consist of unauthorized modification of server data, eavesdropping, modification of data packets and compromise of a server system by exploiting bugs in the server software.
 - Are much more susceptible to attacks where legitimate users are impersonated
- Hackers have potential access to a large number of systems. As a result, computers that are not properly configured and running programs with security holes are particularly vulnerable.
 - Hackers can use popular UNIX programs like Finger, rsh or ruser to discover account names and then try to guess simple passwords using a dictionary
 - Hackers can spoof or configure a system to masquerade as another system thus gaining unauthorized access to resources or information on systems that trust the system being mimicked.
- Hackers can eavesdrop using software that monitors packet sent over the network. Information sent over Telnet or FTP is often sent unencrypted which allows a hacker to make a complete transcript of network activity and obtain sensitive information.
 - Servers can also be attacked with threats such as **denial of service**, where a user can render the system unusable from legitimate users by "hogging" a resource or by damaging resources so that they cannot be used. The two most common forms of DOS attacks are:
 - **Service overloading:** This may happen to servers for instance, if anyone writes a small loop that sends continuous requests for a particular file. The server tries to respond in good faith. It may also happen due to accidental infinite loops.
 - **Message flooding:** This occurs when someone sends a very large file to a message box every few minutes. This message box rapidly grows in size and begins to occupy all the space on the disk and increases the number of receiving processes on the recipient's machine, trying it up even more and often causing a disk crash. The best way to avoid message overloading is to provide separate areas for different programs and to make provisions for graceful failure.
 - Other sophisticated threats like **packet replay** and modification are harder to guard against.
 - Packet replay refers to the recording and retransmission of message packets in the network. This is a significant threat for programs that require authentication sequences because a hacker could replay legitimate authentication sequence messages to gain access to a secure system.
 - It is frequently undetectable but can be prevented by using methods like packet time-stamping and sequence counting.
 - Packet modification is an integrity threat involving one computer intercepting and modifying a message packet destined for another system. In many cases, packet information may not only be modified but its contents may be destroyed before the legitimate users can see them.

FIREWALL AND NETWORK SECURITY

- Is the most common accepted network protection barrier between the corporate network and the outside world.
- The basic idea is placing a network device (computer or router) between the network and the Internet to control and monitor all traffic between the outside world and the local area.
- These devices allow insiders to have full access to services on the outside world while granting access from the outside only selectively based on log on information, password or IP address.



Firewall-secured Internet connection

- In context of Internet, a firewall is a system – a router, a PC, a host or a collection of hosts – set up specifically to shield a site or subnet from protocol and services that can be abused from hosts on the outside of the subnet.
- Is usually located at the gateway point but may be located at internal gateways to provide protection for smaller collection of hosts
- General firewalls operate by screening packets and applications that pass through them, provide controllable filtering of network traffic, allow restricted access to certain applications and block access to everything else.
- In short, the general reasoning behind firewall usage is that, without a firewall installed, network security is a function of each host on the network and all hosts must cooperate to achieve a uniformly high level of security. The larger the subnet, the less manageable it is to maintain all hosts at the same level of security. As mistakes and lapses in security become more common, break-ins can occur not as the result of complex attacks but because of simple errors in the configuration and inadequate passwords.

FIREWALLS IN PRACTICE

Firewalls range from simple traffic logging systems that record all network traffic flowing through the firewall in a database to complex methods such as IP packet screening routers, hardened firewall hosts and proxy application gateways.

IP Packet Screening Router

- Is a static traffic routing service placed between the network service provider's router and the internal network.
- May be implemented at an IP level via screening rules in a router or at an application level via proxy gateways and services.
- The firewall router filters incoming packets to permit or deny IP packets based on several screening rules.
- **Disadvantage**
 - Screening rules are difficult to specify, given the vastly diverse needs of users.
 - Screening routers are fairly inflexible and do not easily extend to deal with functionality different from preprogrammed by the vendors.
 - If the screening router is circumvented by a hacker, the rest of the network is open.

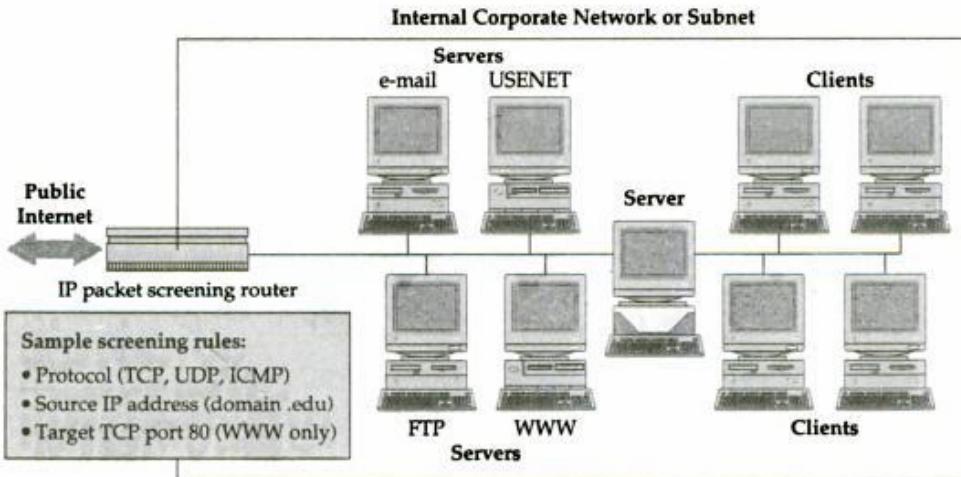


Figure Secure firewall with IP packet screening router

Proxy Application Gateways

- is a special server that typically runs on a firewall machine which is used to access the application such as WWW from within a secure perimeter.
- Instead of talking directly to external WWW servers, each request from the client would be routed to a proxy on the firewall that is defined by the user and the proxy knows how to get through the firewall.
- An application level proxy makes a firewall safely permeable for users within the organization without creating a potential security hole through which hackers can get into corporate networks.
- The proxy waits for a request from inside the firewall, forwards the request to the remote server outside the firewall, reads the response and then returns it to the client.
- In the usual case, all clients within a given subnet use the same proxy which makes it possible for the proxy to execute efficient caching of documents that are requested by a number of clients.
- Proxy mediation helps mitigate security concerns by
 - Limiting dangerous subsets of the HTTP protocol (a site's security policy may prohibit the use of some of HTTP's methods)
 - Enforcing client and/or server access to designated hosts
 - Implementing access control for network services that is lost when the proxy is installed
 - Checking various protocols for well formed commands

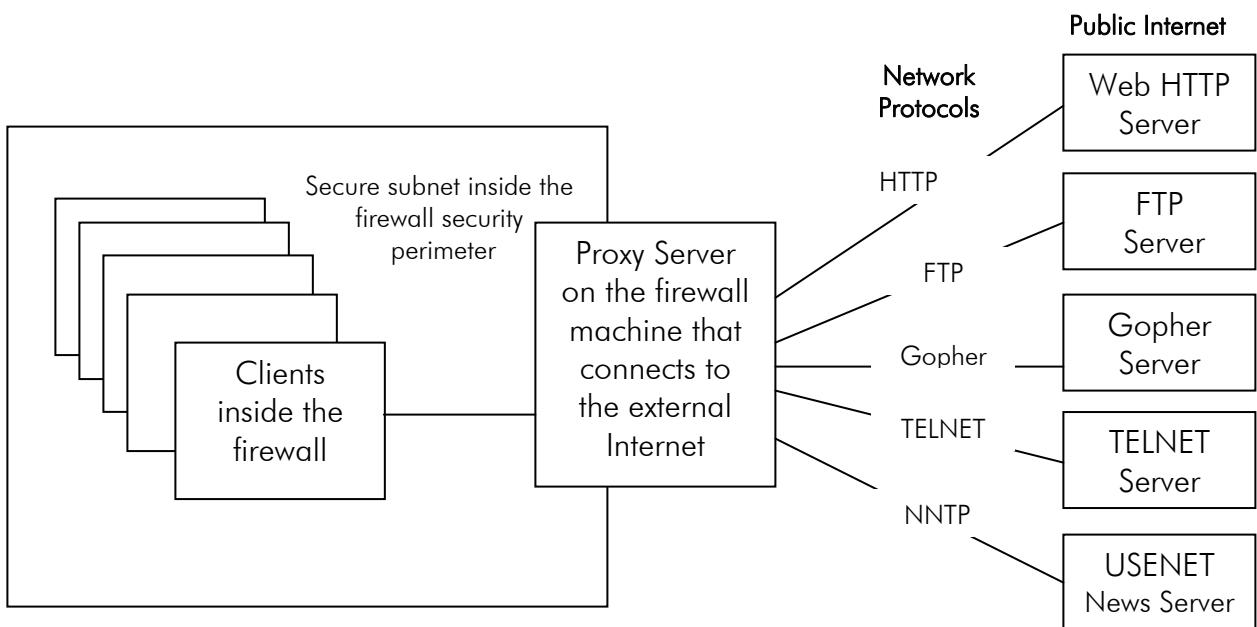


Fig: Proxy Servers on the WWW

Hardened Firewall Hosts

- It is a stripped-down machine that is configured for increased security which requires inside and outside users to connect to the trusted applications on the firewall machine before connecting further.
- They are configured to protect against unauthenticated interactive log-ins from external world which prevents unauthorized logging into machines on network.
- **Steps for creating a hardened host**
 - Removing all user accounts except those necessary for operation of the firewall, the logic being that, if users cannot log into the firewall host, they cannot challenge the security measures.
 - Removing non crucial files and executable, especially network server programs and client programs like FTP and TELNET
 - Extending traffic logging and monitoring to check remote access
 - Disabling IP forwarding to prevent the firewall from forwarding unauthorized packets between the Internet and the enterprise network
- **Advantages**
 - **Concentration of Security:** All modified software and logging is located on the firewall systems as opposed to being distributed on many hosts.
 - **Information hiding:** A firewall can hide names of internal systems or email address, thereby revealing less information to outside hosts.
 - **Centralized and simplified network services management:** Services such as FTP, email, Gopher and other similar services are located on the firewall systems as opposed to being maintained on many systems.
- **Weakness**
 - There are some design problems—certain types of network access may be blocked for some hosts including Telent, FTP and X Windows
 - Firewall concentrates security in one spot as opposed to distributing it among systems, thus a compromise of the firewall could be disastrous to other less protected systems on the subnet.

Security Policy and Firewall Management

- **The First Issue : Security policy of the organization**
 - Is the firewall in place explicitly to deny all services except those integral to the mission of connecting to the Internet or is the firewall in place to provide a metered and audited method of regulating access in a non-threatening manner?
 - Many corporations and data centers have computing security policies and practices that dictate how data must be protected and a firewall is embodiment of this security policy
- **The Second Issue: The level of monitoring, redundancy and control**
 - Having established the acceptable risk level by resolving the first issue, a checklist is made of what should be monitored, permitted and denied.
 - E.g. the firewall system can control access based on time of day, organizations might allow employee to run email only from 1 pm to 2 pm.
- **The Third Issue: Technical design dictated by financial concerns**
 - How much will it cost either to buy or to implement?
 - It's important to evaluate firewalls not only in terms of what they cost now but in terms of continuing maintenance costs such as support and upgrades
- **The Final Issue: Realistic firewall policies**
 - The firewall policies must be a realistic reflection of the level of security in the entire network.
 - In general, firewall cannot protect against data-driven attacks – attacks in which something is mailed or copied to an internal host and then executed.

DATA AND MESSAGE SECURITY

- The lack of data and message security on the Internet has become a high profile problem due to increasing number of merchants trying to spur commerce on the global network.
 - E.g. credit card numbers in their plain text form create a risk when transmitted across the Internet where the possibility of the number failing in to the wrong hands is relatively high
- A growing threat on today's public and private networks is the theft of passwords and other information that passes over them. Today's hacker has an array of tools to reach and manipulate information from remote sites as well to engage in unauthorized eavesdropping.

Data Security

- is of paramount importance today as people are considering banking and other financial transactions by PCs.
- Major threat to data security -- **Packet Sniffing (unauthorized network monitoring)**
- Sniffer attack begins when a computer is compromised and the cracker installs a packet sniffing program that monitors the network to which the machine is attached.
- The sniffer program watches for certain kinds of network traffic, typically for the first part (user name and password) of any TELNET, FTP or remote login session that legitimate the users to gain access to another systems.
- The problem has been magnified because this knowledge is no longer limited to a small set of responsible people but to a much larger set of potentially malicious folks.
- Users whose accounts and passwords are collected will not be aware that their sessions are being monitored and subsequent intrusions will happen via legitimate accounts on the machines involved.

Message Security

- **Message Confidentiality**
 - Important for users involving sensitive data such as credit card numbers.
 - Information such as employee records, government files, social security numbers are confidential enough and access to release of such information to unauthorized users is precluded (stopped).
 - After successful delivery to their destination gateways, messages must be removed from the public environment.
 - All that remains is the accounting record of entry and delivery, including message length, authentication data.
 - Provision must be made for the irrecoverable emergency destruction of stored, undelivered messages where necessary.
- **Message and System Integrity**
 - Business transactions require that their contents remain unmodified during transport i.e. information received must have same content and organization as information sent.
 - Unauthorized combining of message either by intermixing or concatenating during submission, validation, processing or delivery should not be allowed.
 - Data integrity mechanism must prevent active attacks involving the modification of data.
 - Error detection codes, checksums, sequence numbers and encryption techniques are methods to enhance information integrity.
 - Error detection codes operate on the entire message or selected fields within a message
 - Sequence number prevents reordering loss or replaying of message by an attacker.
 - Encryption technique such as digital signatures can detect modification of a message.
- **Message Sender Authentication/Identification**
 - For e-commerce, it is important that clients authenticate themselves to servers and vice versa.
 - Authentication is a mechanism whereby the receiver of a transaction or message can be confident of the identity of the sender and the integrity of the message.
 - It verifies the identity of an entity using certain encrypted information transferred from the sender to the receiver.
 - Authentication in e-commerce requires the user to prove his identity for each requested service.
 - Authentication method must be easy to use, secure, reliable and scalable.

MECHANISMS FOR DATA AND MESSAGE SECURITY: CRYPTOGRAPHIC APPROACH

- The word **cryptography** comes from two Greek words meaning “secret writing” and is the art and science of information hiding. This field is very much associated with mathematics and computer science with application in many fields like computer security, electronic commerce, and telecommunication.
- Mostly referred to as **encryption** and **decryption** in the past but now considers the study and practices of authentication, digital signatures, integrity checking, and key management.

Encryption and Decryption

- **Encryption** is the process of encoding a message so that its meaning is not obvious i.e. converting information from one form to some other unreadable form using some algorithm called **cipher** with the help of secret message called **key**.
- The converting text is called **plaintext** and the converted text is called **ciphertext**.

Unit 2.1: Network Security and Firewalls

- **Decryption** is the reverse process, transforming an encrypted message back into its normal, original form. In decryption process also the use of key is important.

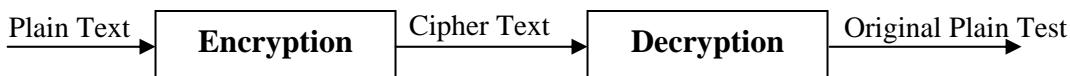


Fig: Encryption-Decryption

Cipher

- A **cipher** is an algorithm for performing encryption and decryption.
- The operation of cipher depends upon the special information called key. Without knowledge of the key, it should be difficult, if not nearly impossible, to decrypt the resulting cipher into readable plaintext.
- There are many types of encryption techniques that have advanced from history, however the distinction of encryption technique can be broadly categorized in terms of number of key used and way of converting plaintext to the cipher text.

Types Of Ciphers:

Historical Ciphers

- Also called classical ciphers used processes like substitution and transposition or combination of both called product ciphers.
- These historic ciphers use the single key for both encryption and decryption (symmetric cipher).
- To reduce the cipher attacks, in substitution instead of monoalphabetic - a letter for letter, polyalphabetic- one or more letters for single letter substitution can be used.

Modern Ciphers:

- Modern encryption methods can be divided by two criteria: by type of input data, and by type of key used.
 - **Based upon input data**

Stream Ciphers: In this kind of ciphers the plaintext is converted into ciphertext stream by stream. So it encrypts continuous streams of data. Like, character by character conversion.

Block Ciphers: Here the plaintext is converted into ciphertext block by block. So it encrypts of data of fixed size

- **Based upon type of key:** By type of key used ciphers are divided into;

Symmetric Key Algorithms (Private Key Cryptography): These techniques use single key for encryption as well as decryption.

Asymmetric Key Algorithms (Public Key Cryptography): These techniques use two keys, namely private and public keys. One key is used for encryption and the other is used for decryption.

In a symmetric key algorithm (e.g., DES and AES), the sender and receiver must have a shared key set up in advance and kept secret from all other parties; the sender uses this key for encryption, and the receiver uses the same key for decryption. In an asymmetric key algorithm (e.g., RSA), there are two separate keys: a *public* key is published and enables any sender to perform encryption, while a *private* key is kept secret by the receiver and enables only him to perform correct decryption.

ENCRYPTED DOCUMENTS AND ELECTRONIC MAILS

Privacy Enhanced Mail Standard (PEM)

- PEM is the Internet Privacy Enhanced Mail Standard, designed, proposed but not yet officially adopted by the Internet Activities Board to provide secure electronic mail over the Internet.
- PEM includes encryption, authentication and key management and allows use of both public key and secret key cryptosystems.
- Explicitly supports only a few cryptographic algorithms; others may be added later.
- Uses DES algorithm for encryption and RSA for sender authentication and key management.
- Also supports for non-repudiation which allows third party recipient of a forwarded message to verify the identity of the message originator and to verify whether any of the original text has been altered.

Pretty Good Privacy (PGP)

- PGP is an implementation of public key cryptography based on RSA.
- It is a free software package developed by Philip Zimmerman that encrypts e-mail. It is freely available for DOS, Mac, UNIX, Atari and OS/2
- The latest version is available from MIT via <FTP://net-dist.mit.edu> in the pub/PGP directory.
- Provides secure encryption of documents and data files which tend to be a tough task even for the supercomputers to crack.
- For authentication, PGP employs the RSA public key encryption scheme and the MD5 (a one-way hash function to form a digital signature that assures the receiver that an incoming message is authentic.

DIGITAL SIGNATURES

In the case of business transactions, authentication refers to the use of digital signatures, which play a function for digital documents similar to that played by handwritten signatures for printed documents: The signature is an unforgeable piece of data asserting that a named person wrote or otherwise agreed to the document to which the signature is attached.

Unlike encryption, digital signatures are a recent development, the need for which has arisen with the proliferation of electronic commerce. The recipient, as well as a third party, can verify that the document did indeed originate from the person whose signature is attached and that the document has not been altered since it was signed.

A secure digital signature system thus consists of two parts: a method of signing a document such that forgery is infeasible, and a method of verifying that a signature was actually generated by whomever it represents. Furthermore, secure digital signatures cannot be repudiated; that is, the signer of a document cannot later disown it by claiming it was forged.

AUTHENTICATION SYSTEM

PRELUDER

- E-Commerce applications are quite varied which is currently used to denote the paperless exchange of business information using EDI, Email, electronic bulletin boards, EFT and other technologies.
- Despite the changes taking place, businesses have three goals: stay competitive, improve productivity and deliver quality service.
- To best portray the full potential of electronic commerce, an integrated architecture is emerging in the form of the WWW.

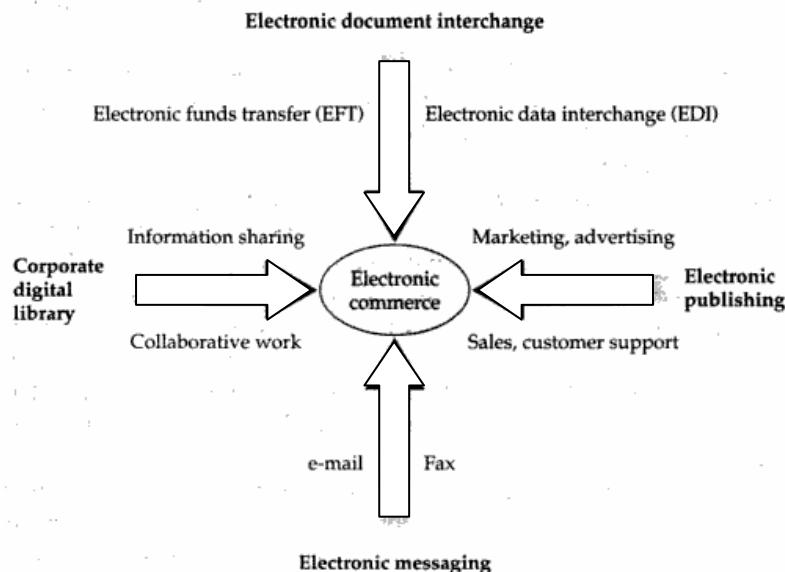


Figure Convergence of previously disparate functions around electronic commerce

ARCHITECTURAL FRAMEWORK FOR ELECTRONIC COMMERCE

- The framework is intended to define and create tools that integrate the information found in today's closed systems and allows development of e-commerce applications. It is important to understand the architectural framework itself is not to build new DBMS, data repository, computer languages, software agent-based transaction monitors. Rather, the architecture should focus on synthesizing the diverse resources already in place in corporations to facilitate the integration of data and software for better applications.
- The E-commerce application architecture consists of six layers of functions and services
- These layers cooperate to provide a seamless transition between today's computing resources and those of tomorrow by transparently integrating information access and exchange within the context of the chosen application.

Application services	Customer-to-business Business-to-business Intra-organizational
Brokerage and data management	Order processing—mail-order houses Payment schemes—electronic cash Clearinghouse or virtual mall
Interface layer	Interactive catalogs Directory support functions Software agents
Secure messaging	Secure hypertext transfer protocol Encrypted e-mail, EDI Remote programming (RPC)
Middleware services	Structured documents (SGML, HTML) Compound documents (OLE, OpenDoc)
Network infrastructure	Wireless—cellular, radio, PCS Wireline—POTS, coaxial, fiber optic

Figure Electronic commerce: a conceptual framework

Unit 2.2: Electronic Commerce And World Wide Web

1. Application Service

- Three distinct classes
 - Consumer to business
 - Business to business
 - Intra-organization

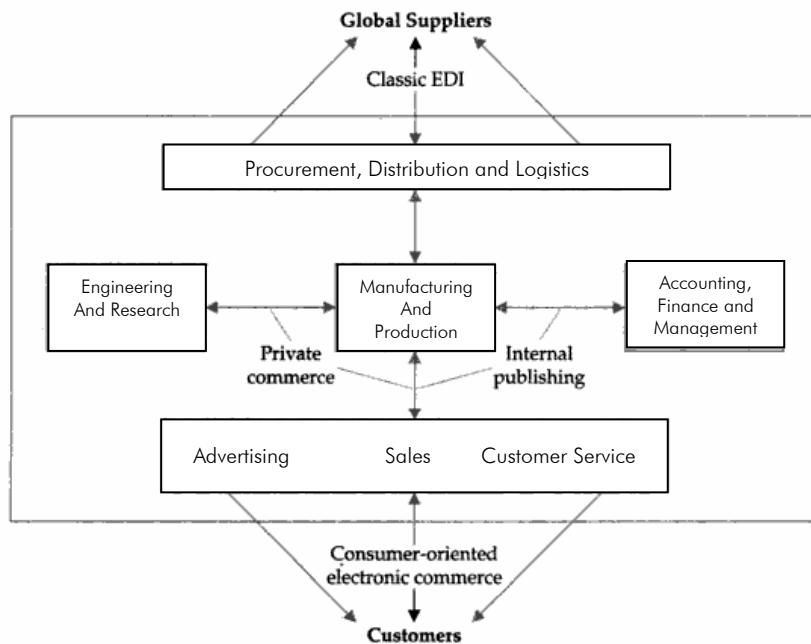


Figure Different types of electronic commerce applications

1.1 Consumer-to-Business Transactions

- Also called marketplace transaction where customers learn about products differently through electronic publishing, buy them differently using electronic cash and secure payment systems and have them delivered differently.
- In this environment, brand equity can rapidly evaporate forcing firms to develop new ways of doing business.

1.2 Business-to-Business Transactions

- Also called market-link transaction where businesses, governments and other organizations depend on computer to computer communication as a fast, economical and a dependable way to conduct business transaction
- Adopt the use of EDI and email for purchasing goods and services, buying information and consulting services, submitting requests for proposals and receiving proposals.

1.3 Intra-organizational Transactions

- Also called market-driven transaction where a company becomes market driven by dispersing throughout the firm information about its customers and competitors; by spreading strategic and tactical decision making so that all units can participate
- Continuously monitoring their customer commitment to meet the ongoing objective of by making improved customer satisfaction.
- Develops a comprehensive understanding of its customer's business and how customers in the immediate and downstream markets perceive value.
- Three major components
 - Customer orientation through product and service customization
 - Cross-functional coordination through enterprise integration
 - Advertising, marketing and customer service.

2. Information Brokerage and Management

- This layer provides service integration through the notion of information brokerage, the development of which is necessitated by the increasing information resource fragmentation

Unit 2.2: Electronic Commerce And World Wide Web

- Provides service integration between customers and information providers, given some constraint such as a low price, fast service or profit maximization for a client.
- With the complexity associated with large voluminous on-line database and service bureau, it's impossible to expect humans to do the searching. It will have to be software programs, information brokers or software agents that act the searcher's behalf.
- Other than searching issues, it addresses the issue of adding value to the information that is retrieved.
- Brokerages may provide tools to accomplish more sophisticated, time delayed updates or future compensator, the distributed transaction generator, and the declarative resource constraint base – which describes a business's rule and the environment information.

3. Interface and Support Service

- This layer provides interfaces for e-commerce applications such as interactive catalogs and will support directory services- functions necessary for information search and access.
- Interactive catalogs are the customized interface to consumer applications such as home shopping which is an extension of paper-based catalog while directories attempt to organize the enormous amount of information and transaction generated to facilitate e-commerce (telephone directory)

4. Secure Messaging and Structured Document Interchange Services

- Is the software that sits between the network infrastructure and the clients or electronic commerce applicants, masking the peculiarities of the environment.
- Is a framework for the total implementation of portable application, divorcing from the architectural primitives of the system.
- Messaging services offer solutions for communicating non-formatted (unstructured) data – letters, memos, reports – as well as formatted (structured) data such as purchase order, shipping notices and invoices.
- Messaging supports both immediate (synchronous) and delayed (asynchronous) message delivery and processing and above all it is not associated with any particular communication protocol.

5. Middleware Services

- Is a new concept that emerged recently to solve the issues of interface, translation, transformation and interpretation problems that were driving application developers crazy.
- Is the ultimate mediator between diverse software programs that enables them talk to one another
- Another reason for middleware – computing shift from application centric to data centric.
- To achieve data centric computing, middleware services focus on three elements:
 - Transparency
 - Transaction security and management
 - Distributed object management and services
- **Transparency** implies that users should be unaware that they are accessing multiple systems. Transparency is accomplished using middleware that facilitates a distributed computing environment. This gives users and applications transparent access to data, computation, and other resources across collections of multiple vendors, heterogeneous systems.
- **Transaction Security & Management** Security and management are essential to all layers in the electronic commerce model. At the transaction security level, two broad general categories of security services exist; authentication and authorization. For ecommerce, middleware provides the qualities expected in a standard transaction processing system: the so-called ACID (Atomicity, Consistency, Isolation, Durability) properties
- **Distributed Object management and services:** A natural instance of an object in ecommerce is a document. A document carries data and often carries instruction about the actions to be performed on the data. Today the term object is used interchangeably with document. Here the trend is to move away from single data-type documents such as text, pictures, or video toward integrated documents known as compound document architectures.

Unit 2.2: Electronic Commerce And World Wide Web

6. Network Infrastrucrures

- Consists of :
 - Information superhighway (I-way)
 - Components of I-way
 - Internet as network infrastructure
 - Wireless (cell phones, radio)
 - Wireline (POTS, optical Fibers, Coax)

NB: We have already covered these topics in UNIT 1.2

WWW AS THE ARCHITECTURE

- We can realize www as human analogy; think of network as the skeleton and the web as the flesh, veins, and skin that shape the human body. And the functions carried by the human body would be the ecommerce applications. In short, the web provides the functionality necessary for ecommerce.
- The web architecture is made up of three primary entities: **client browser**, **web server**, and **third party services**. The client browser usually interacts with the WWW server, which acts as an intermediary in the interaction with third-party services
- **The client browser** resides on the user's PC or workstation and provides an interface to the various types of content.
- **Web server** functions can be categorized into information retrieval, data and transaction management, and security.
- **Third party services** could be other web servers that make up the digital library, information processing tools, and electronic payment systems.

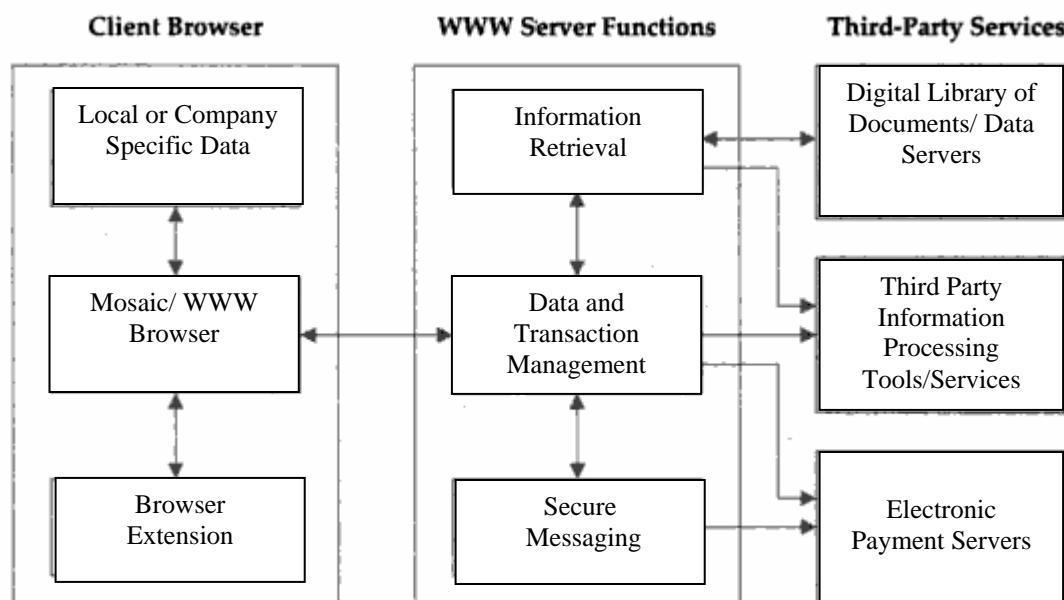


Fig: Block Diagram Depicting WWW Architecture

WHAT DOES WEB ENCOMPASS?

- The web has become an umbrella for a wide range of concepts and technologies that differ markedly in purpose and scope. These include
 - The global hypertext publishing concept,
 - The universal reader concept, and
 - The client-server concept

Unit 2.2: Electronic Commerce And World Wide Web

- The **global hypertext publishing concept** promotes the idea of a seamless information world in which all online information can be accessed and retrieved in a consistent and simple way. To access information in this seamless world, we will need the ability to address many types of data- text files, images, sound files, animation sequences.
- The **universal readership concept** promotes the idea that, unlike the segmented applications of the past we can use one application- a universal/common user interface- to read a variety of documents. This concept implies that once information is published it is accessible from any type of computer, in any country, and that any (authorized) person just needs to use one single program to access it. This is accomplished in web by using a core browser or application that is augmented by supporting applications.

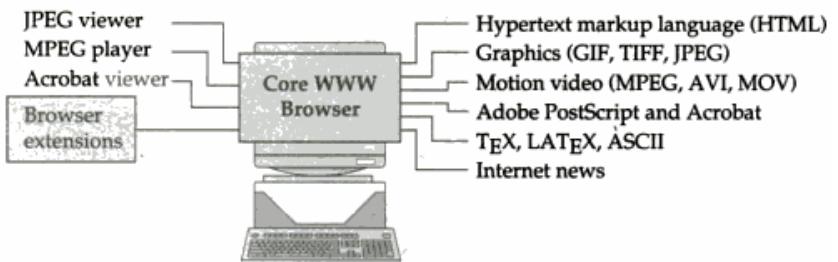


Figure Universal readership supported by core WWW browser

This is accomplished in web by using a core browser or application that is augmented by supporting applications.

- The **client-server concept** allows the web to grow easily without any centralized control. Anyone can publish information; anyone (authorized) can read and download it. Publishing information requires a server program, and reading data requires a client browser. All clients and all the servers are connected to one another by the internet. The various standard protocols allow all the clients to communicate with all servers.
- In practice the web hands on number of essential concepts, including;
 - The addressing scheme known as **uniform resource locator (url)** makes the world possible despite many different protocols.
 - A network protocol known as **hypertext transfer protocol (http)** used by the client browsers and servers offer performance and features not otherwise available.
 - A **mark-up language (HTML)**, which every web client is required to understand, is used for representation of hypertext documents containing text, graphical information, etc across the net.

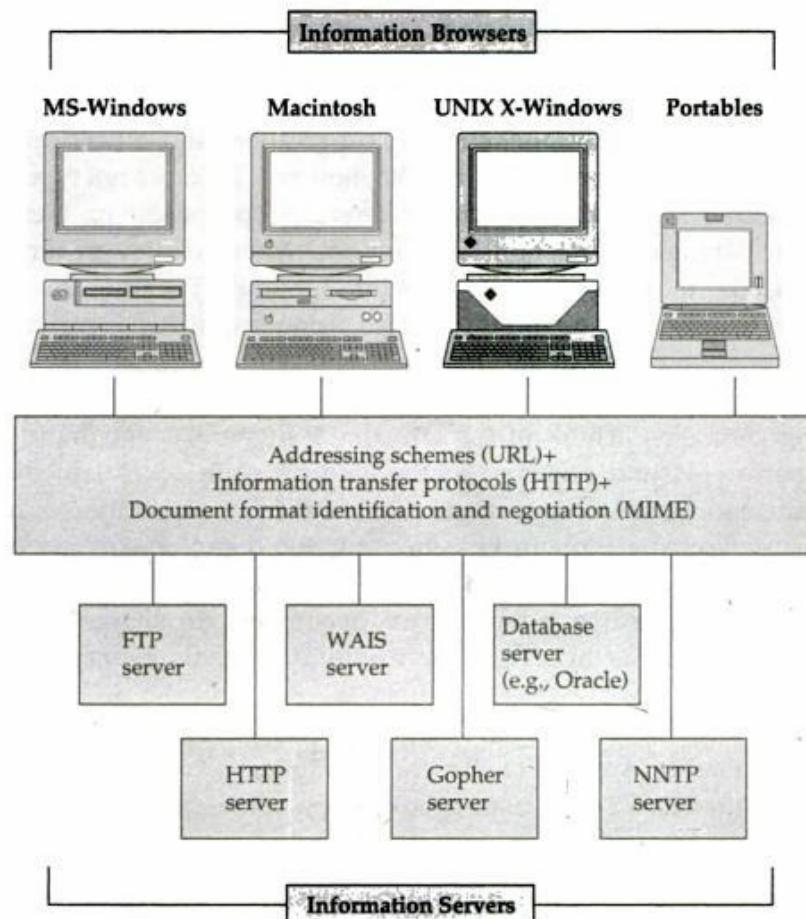


Figure Client-server structure of the Web

WEB BACKGROUND: HYPERTEXT PUBLISHING

Hypertext versus Hypermedia

- Hypertext is an approach to information management in which data are stored in a network of documents connected by links. These links represent relationships between nodes. A hypermedia system is made of nodes (documents) and links (pointers). A node usually represents a single concept or idea. Nodes can contain text, graphics, animation, audio, video, images, or programs. The nodes, and in some systems the network itself, are meant to be viewed through an interactive browser and manipulated through a structure editor.
- Nodes are connected to other nodes by links. The node from which a link originates is called the reference or anchor, and the node at which a link ends is called the referent. The movement between the nodes is made possible by activating the links.
- In summary, hypertext is a very simple concept based on the association of nodes through links. The promise of hypertext lies in its ability to produce large, complex, richly connected, and cross referenced bodies of information.
- The term hypermedia and hypertext are used interchangeably, causing confusion. The hypermedia contains links not only to other pieces of text but also to other forms of media- sounds, images, and movies. In short, hypermedia combines qualities of hypertext and multimedia.

Benefits of Hypermedia Documents

- Hypermedia documents are much more flexible than conventional documents.
- Hypermedia documents are also convenient. Hypermedia documents offer sound, video sequences, animation, and so forth.
- The hypermedia is dynamic. The links and nodes can change dynamically. Information nodes can be updated, new nodes can be linked into the overall hypermedia structure, and new links can be added to show new relationships.
- Thus, hypermedia systems provide innovative ways of accessing and retrieving network documents.

TECHNOLOGY BEHIND THE WEB

Uniform Resource Locators

- URLs are strings as addresses of objects (documents, images) on the web. URL marks the unique location on the internet where a file or service can be found.
- The URLs follow a fairly consistent pattern. The first part describes the type of resource; the second part gives the name of the server housing the resource; and the third part gives the full file name of the resource.
 - Eg: FTP://server.address/complete.file.name
 telnet://server.address:port
 http://server.address:port/index.html
- The different protocols use different syntaxes, but they do have a small amount in common. For eg., the common URL syntax reserves the solidus (/) as a way of representing hierarchical space, the pound label (#) as a way of pointing inside the document.

Hyper Text Transfer Protocol (HTTP)

- is a simple request/response protocol that is currently run over TCP and is the basis of the world Wide Web. In short, HTTP is a protocol for transferring information efficiently between the requesting client and server. The data transferred may be plain text, hypertext, images, or anything else. HTTP is used for retrieving documents in an unbounded and extensible set of formats. To achieve this, the client sends a list of the formats it can handle, and the server replies with data in any of those formats that it can produce.

SECURITY AND THE WEB

- The lack of data security on the Internet has become a high profile problem due to the increasing number of applications oriented towards commerce. Many commercial applications require that the client and server be able to authenticate each other and exchange data confidentially. This exchange has three basic properties :
 - Clients are confident about servers they are communicating with (server authentication).
 - Clients' conversations cannot be tampered or interfered with (data integrity).
 - Client conversation with the server is private (privacy using encryption).

Internet Data Categories

- **Public Data:** They have no security restrictions and can be read by anyone. Such data should be protected from unauthorized tampering or modification, however, because a reader may perform damaging actions on its content
- **Copyright Data:** They have content that is copyrighted but not secret. The owner of the data is willing to provide it but wishes to ensure that the user has paid for it. The objective is to maximize revenue and security.
- **Confidential Data:** They contain materials that is secret but whose existence is not a secret. Such data include bank account statements, personal files etc. Such materials may be referenced by public or copyright data.
- **Secret Data:** They are the data whose existence is secret. Such data might include algorithms and it is necessary to monitor and log all access to such data

SSL (Secure Socket Layer)

- Proposed by Netscape communications for providing data security layered between high level application protocols and TCP/IP.
- Provides data encryption, server authentication, message integrity and optional client authentication for a TCP/IP connection.
- Is layered beneath application protocols such as HTTP, SMTP, TELNET, FTP and NNTP and above the Internet connection protocol TCP/IP.
- Provides a security "handshake" to initiate the TCP/IP connection which results in the client and server agreeing on the level of security they will use and fulfill any authentication requirements for the connection.
- Only role is to encrypt and decrypt the message stream.

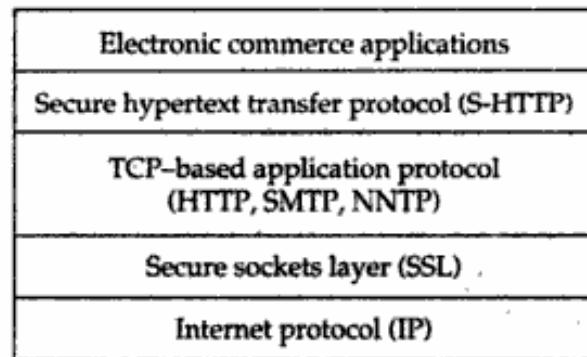


Figure Web security layers

Secure HTTP (S-HTTP)

- Assumes that the Web and the HTTP protocol are central to electronic commerce due to their installed base and ease of use.
- Supports a variety of security mechanisms necessary for commerce, HTTP clients and servers, providing the security service options appropriate to the wide range of potential end uses possible on the Web.
- To ensure a secure conversation between a Web client and server, S-HTTP works by negotiating the type of encryption scheme used between client and server.
- S-HTTP supports end to end secure transactions which minimized multiple encryption/decryption at every intermediate point.

SSL versus S-HTTP

- Both are not mutually exclusive and S-HTTP can be layered on top of SSL.
- S-HTTP provides capabilities SSL does not and vice versa
- SSL layers security beneath application protocols such as HTTP, FTP and TELNET whereas S-HTTP adds message or transaction based security to HTTP by drawing on the approaches and philosophies of the message encryption standard such as PEM or PGP.
- SSL simply encrypts data in a given file such as a customer information form with a credit card number and decrypts it at the other end of the transaction.
- S-HTTP is a more comprehensive security package that includes authentication of the client's identity by the server through digital signature verification and other features

PRELUDE

- Consumer oriented E-commerce is still in its early stage and the basic question that arises is how fast and how widely will it spread.
- Consumer applications such as on line stores and electronic shopping malls are burgeoning but access is still cumbersome and basic issues need to be resolved.
- The early systems lack integration which puts the burden of spending time and money for searching stores and online information on the consumer.
- Ideally, consumers should be able to execute a transaction by clicking on the BUY button to authorize payment, and the online store's bank account would then automatically receive it from the customer's preferred payment mode.
- Basic Issues to be addressed:
 - Establishment of standard business process for buying and selling products and services in electronic markets
 - Development of widespread and easy to use implementations of mercantile protocols for order taking, on line payment and service delivery similar to those found in retail/credit card based transaction.
 - Development of transport and privacy methods that till allow parties that have no reason to trust one another to carry on secure commercial exchanges.

CONSUMER ORIENTED APPLICATIONS

Consumer Life-Style Needs	Complementary Multimedia Services
Entertainment	Movies on Demand, Video Cataloging, Interactive Ads, Multi-user Games, On-line Discussions
Financial Services and Information	Home Banking, Financial Services, Financial News
Essential Services	Home Shopping, Electronic Catalogs, Telemedicine, Remote Diagnostics
Education and Training	Interactive Education, Multi-user Games, Video Conferencing, Online Database

1. Personal Finance and Home Banking Management

- a. Basic Services
- b. Intermediate Services
- c. Advanced services

2. Home Shopping

- a. Television-Based Shopping
- b. Catalog-Based Shopping

3. Home Entertainment

- a. Size of the Home Entertainment Market
- b. Impact of the Home Entertainment on Traditional Industries

1. Personal Finance and Home Banking Management

- The newest technologies are direct deposit of payroll, on-line bill payment and telephone transfers
- The technology for paying bills, whether by computer or telephone, is infinitely more sophisticated than anything on the market a few years ago
- In 1980s were the days of "stone age" technology because of technology choices for accessing services were limited
- For home banking, greater demands on consumers and expanding need for information, its services are often categorized as basic, intermediate and advanced

Unit 2.3: Consumer Oriented Electronic Commerce

a. Basic Services

- o These are related to personal finance
- o The evolution of ATM machines from live tellers and now to home banking
- o The ATM network has with banks and their associations being the routers and the ATM machines being the heterogeneous computers on the network.
- o This interoperable network of ATMs has created an interface between customer and bank that changed the competitive dynamics of the industry.
- o Increased ATM usage and decrease in teller transactions
- o The future of home banking lies with PC's.

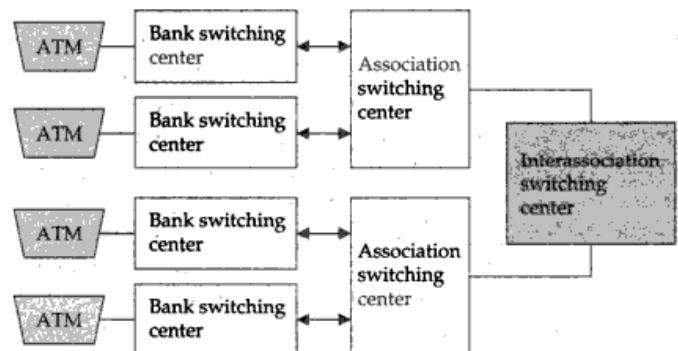
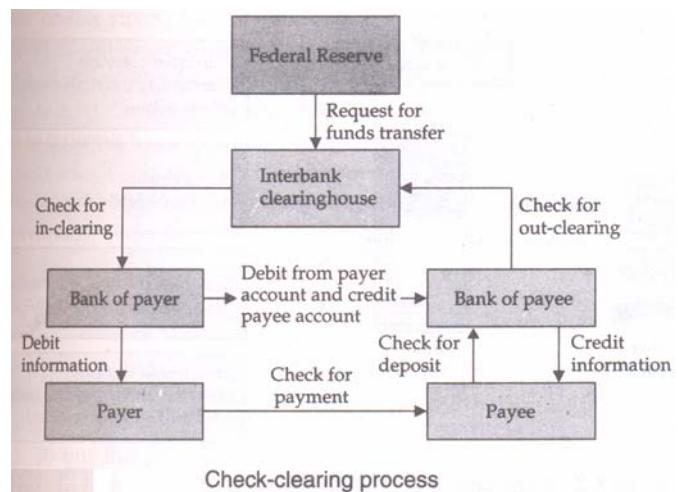


Figure Structure of ATM network

b. Intermediate Services

- o The problem with home banking in 1980 is, it is expensive service that requires a PC, a modem and special software.
- o As the equipment becomes less expensive and as bank offers broader services, home banking develop into a comprehensive package that could even include as insurance entertainment
- o Consider the computerized on-line bill-payment system
- o It never forgets to record a payment and keeps track of user account number, name, amount and the date and we used to instruct with payment instructions.



c. Advanced Services

- o The goal of advanced series is to offer their on-line customers a complete portfolio of life, home, and auto insurance along with mutual funds, pension plans, home financing, and other financial products
- o The Figure explains the range of services that may well be offered by banks in future
- o The services range from on-line shopping to real-time financial information from anywhere in the world
- o In short, home banking allows consumers to avoid long lines and gives flexibility

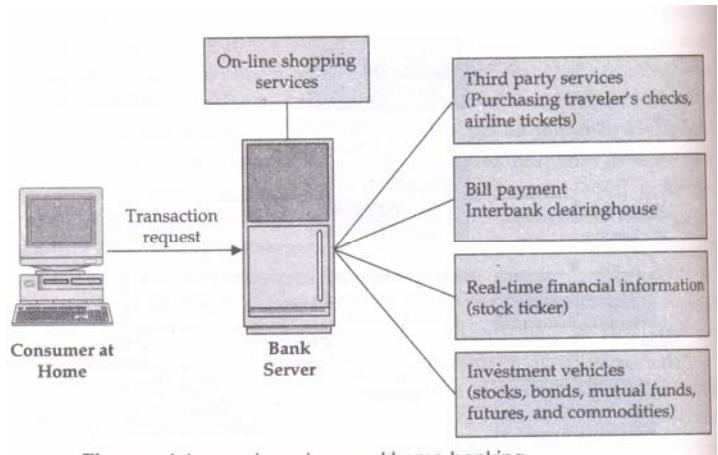


Figure Advanced services and home banking

Unit 2.3: Consumer Oriented Electronic Commerce

2. Home Shopping

a. Television-Based Shopping

- o It is already in wide use and has generated substantial revenues for many companies racing to developing online malls.
- o This enables a customer to do online shopping.
- o It is launched in 1977 by the Home Shopping Network (HSN).
- o It provides a variety of goods ranging from collectibles, clothing, small electronics, housewares, jewelry, and computers.
- o When HSN started in Florida in 1977, it mainly sold factory overruns and discontinued items
- o It works as, the customer uses her remote control at shop different channels with touch of button. At this time, cable shopping channels are not truly interactive
- o At present, cable shopping channels are not truly interactive because they use phone lines to take orders.
- o But the latest innovations would enable to scan your picture into the TV and see how the latest outfit looks on your body before making a decision

b. Catalog-Based Shopping

- o In this the customer identifies the various catalogs that fit certain parameters such as safety, price, and quality
- o The on-line catalog business consists of brochures , CD-ROM catalogs, and on-line interactive catalogs
- o Currently, we are using the electronic brochures

3. Home Entertainment

- It is another application for e-commerce
- Customer can watch movie, play games, on-screen catalogs, such as TV guide.
- In Home entertainment area, customer is the control over programming
- In Table tells the, What will be required in terms of Television-based technology for this telemart to become a reality

THE TELE MART: PRESENT AND FUTURE FUNCTIONS

Compressing and decoding a digital signal(images are compress to reduce quantity of information)	The transition to digital satellite and cable network head broad casting involves linking the TV to decoder to reconvert into an analog signal
Decoding a scrambled signal	The broadcasting of pay channel requires the encryption of the signal on emission and unscrambled
Rapid loading of program on memory	An increase in the no. of individual interactive services is possible only if n/w overloading is kept minimum
Electronic money or card payment terminal	Once separated from the telephone, tele-mart will need a keyboard up to the TV set in order to ensure interactivity. The keyboard will have a payment connection to simplify the billing process

Table Industry Estimates of Consumer Expenditures

	1980 (\$4.7 bln)	1990 (\$31.0 bln)		1993 (\$37.8 bln)	
Theaters	49.0%	\$ 2.3	14.5%	\$ 4.5	13.2% \$ 5.0
Basic cable	35.0%	\$ 1.6	34.5%	\$10.7	36.9% \$13.9
Premium cable	16.0%	\$ 0.8	16.5%	\$ 5.1	14.0% \$ 5.3
Home video	—	—	33.8%	\$10.5	34.8% \$13.2
Pay per view	—	—	0.7%	\$ 0.2	1.1% \$ 0.4

a. Size of the Home Entertainment Market

- o Entertainment services are play a major role in e-commerce
- o This prediction is underscored by the changing trends in consumer behavior.

b. Impact of the Home Entertainment on Traditional Industries

- o This will have devastating effects on theater business
- o Economic issues might allow theaters to maintain an important role in the movie industry
- o Today average cable bill is approximately \$30 a month

Desirable Characteristics Of An Electronic Market Place

- **Critical mass of Buyers and sellers:** To get critical mass, use electronic mechanisms
- **Opportunity for independent evaluations and for customer dialogue and discussion:** Users not only buy and sell products, they compare notes on who has the best products and whose prices are outrageous
- **Negotiation and bargaining:** Buyers and sellers need to able to haggle over conditions of mutual satisfaction, money, terms & conditions, delivery dates & evaluation criteria
- **New products and services:** Electronic marketplace is only support full information about new services
- **Seamless Interface:** The trading is having pieces work together so that information can flow seamlessly
- **Resource for unhappy buyers:** It provide for resolving disagreements by returning the product.

MERCANTILE PROCESS MODELS

- Mercantile processes define interaction models between consumers and merchants for on-line commerce

MERCANTILE MODELS FROM THE CONSUMER'S PERSPECTIVE

- i. **Pre purchase preparation** -- includes search and discovery for a set of products to meet customer requirements
 - a. The consumer information search process.
 - b. The Organizational search process.
 - c. Consumer search experiences.
 - d. Information brokers & brokerages.
- ii. **Purchase consummation** -- includes mercantile protocols
 - a. Mercantile process using digital cash.
 - b. Mercantile transaction using credit cards.
 - c. Costs of electronic purchasing.
- iii. **Post purchase interaction** --includes customer service & support

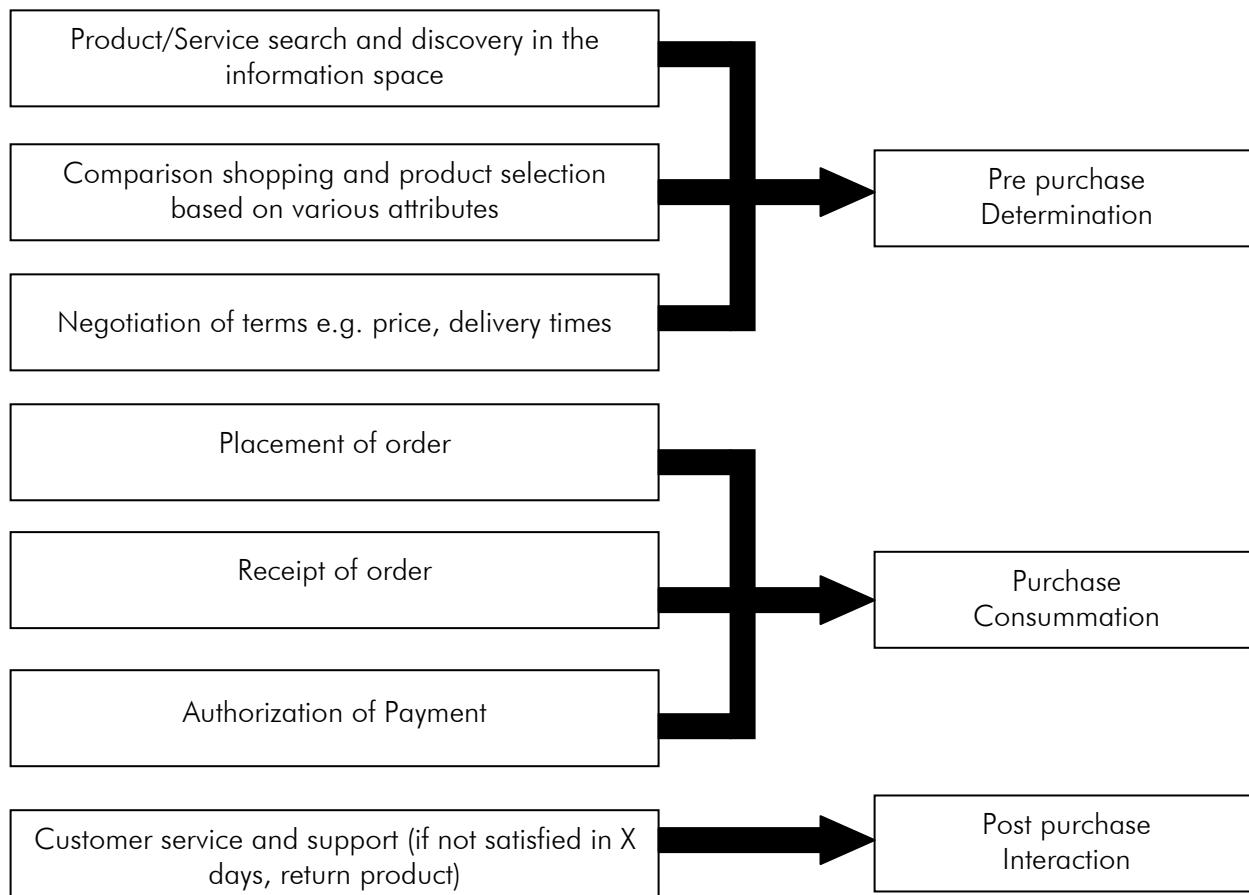


Fig: Steps taken by customers in product/service purchasing

Unit 2.3: Consumer Oriented Electronic Commerce

i. Pre purchase Preparation

- The purchase is done by the buyers, so consumers can be categorized into 3 types
- Impulsive buyers, who purchase products quickly
- Patient buyers, purchase products after making some comparisons
- Analytical buyers, who do substantial research before making decision to purchase products.

Marketing researches have several types of purchasing:

- ❖ Specifically planned purchases
- ❖ Generally planned purchases
- ❖ Reminder purchase
- ❖ Entirely unplanned purchases

a. The consumer information search process

- ❖ Information search is defined as the degree of care, perception, & effort directed toward obtaining data or information related to the decision problem

b. The Organizational search process

- ❖ Organizational search can be viewed as a process through which an organization adapts to such changes in its external environment as new suppliers, products, & services.

c. Consumer Search Experiences

- ❖ The distinction between carrying out a shopping activity "to achieve a goal" (utilitarian) as opposed to doing it because "u love it" (hedonic).

d. Information Brokers and Brokerages

- ❖ To facilitate better consumer and organizational search, intermediaries called information brokers or brokerages
- ❖ Information brokerages are needed for 3 reasons: Comparison shopping, reduced search costs, and integration

ii. Purchase Consummation

Simple Mercantile protocol Flow

- Buyer contacts vendor to purchase
- Vendor states price
- Buyer and Vendor may or may not engage in negotiation
- If satisfied, buyer ask the payment to the vendor
- Vendor contacts billing service
- Billing service decrypts authorization and check buyers account balance
- Billing service gives to the vendor to deliver product
- Vendor delivers the goods to buyer
- On receiving the goods, the buyer signs and delivers receipt
- At the end of the billing cycle, buyer receives a list of transactions

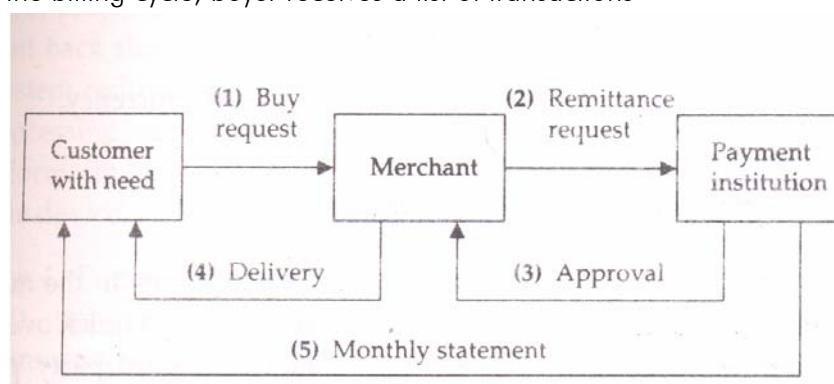


Fig: Simplified on-line mercantile model

Unit 2.3: Consumer Oriented Electronic Commerce

Mercantile process using Digital Cash

- Buyer obtains e-cash from issuing bank
- Buyer contacts seller to purchase product
- Seller states price
- Buyer sends e-cash to seller
- Seller contacts his bank or billing service to verify the validity of the cash
- Bank gives okay signal
- Seller delivers the product to buyer
- Seller then tells bank to mark the e-cash as "used" currency

Mercantile Transactions Using Credit Cards

- Two major components compromise credit card transactions in this process: electronic authorization and settlement
- In retail transaction, a third-party processor (TPP) captures information at the point of sale, transmits the information to the credit card issuer for authorization, communicates a response to the merchant and electronically stores the information for settlement and reporting.
- The benefits of electronic processing include the reduction in credit losses, lower merchant transaction costs, & faster consumer checkout & merchant-to-bank settlement

A step-by-step account of retail transaction follows:

- Step1: A customer presents a credit card for payment at a retail location
- Step2: The point-of-sale software directs the transaction information to the local network
- Step3: System verifies the source of the transaction and routes it.
- Step4: In this, transaction count and financial totals are confirmed between the terminal and the network
- Step5: In this, the system gathers all completed batches and processes the data in preparation for settlement

Merchant clients take one of two forms:

- Merchants are charged a flat fee per transaction for authorization and data capture services
- The other form of billing allows merchants to pay a "bundled" price for authorization, data capture, & settlement

Cost of Electronic Purchasing:

- ❖ Cash seems to be preferable to electronic payments, such as, on-line debit, credit, and electronic check authorization
- ❖ Consumers appear to spend more when using cards than when spending cash

Post purchase Interaction

- ❖ Returns and claims are an important part of the purchasing process
- ❖ Other complex customer service challenges arise in customized retailing are:
 - Inventory issues: To serve the customer properly, a company should inform a customer right away and if the item is in stock, a company must be able to assign that piece to customer
 - Database access and compatibility issues: Customers should get kind of services by easy issues like calling an 800 number
 - Customer service issues: To clear the doubts of customer about product

MERCANTILE MODELS FROM THE MERCHANT'S PERSPECTIVE

- For better understanding, it is necessary to examine the order management cycle (OMC).
- The OMC includes eight distinct activities.
- The actual details of OMC vary from industry to industry and also for individual products and services
- OMC has generic steps
 - a. Order planning & Order generation.
 - b. Cost estimation & pricing.
 - c. Order receipt & entry.
 - d. Order selection & prioritization.
 - e. Order Scheduling

Unit 2.3: Consumer Oriented Electronic Commerce

- f. Order fulfillment & delivery.
- g. Order billing & account/payment management.
- h. Post sales service.

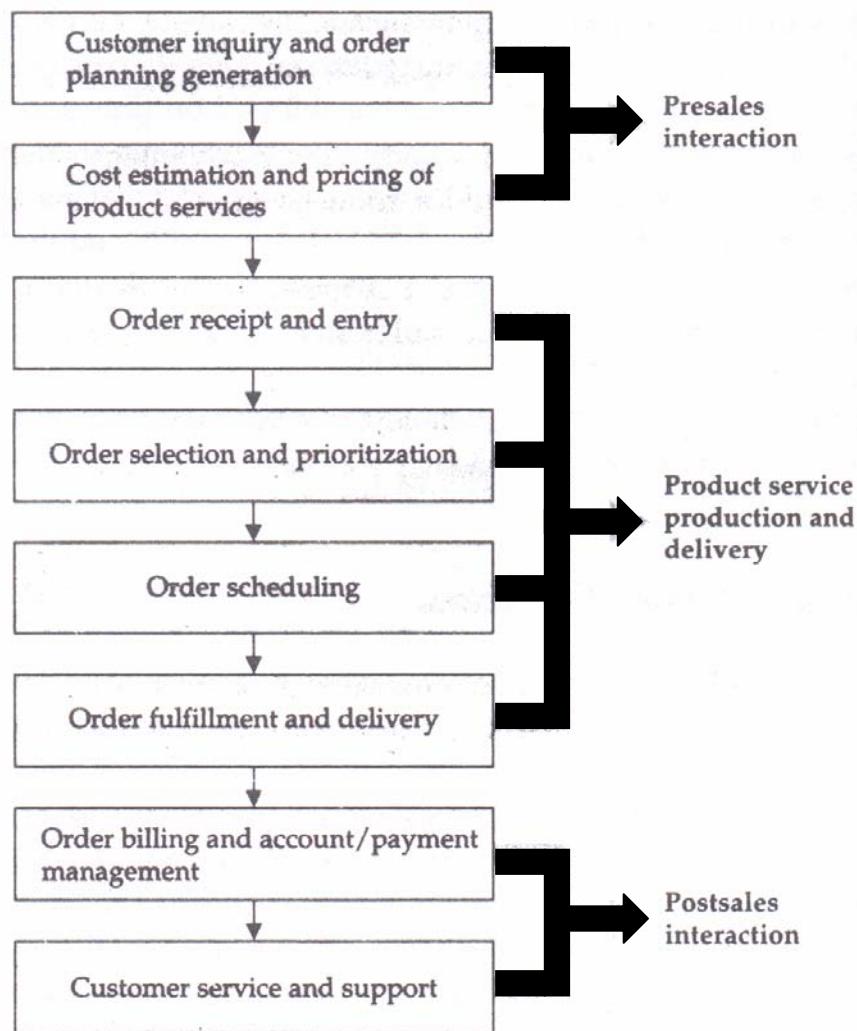


Figure Order management cycle in e-commerce

Order planning & order Generation

- Order planning leads to order generation.
- Orders are generated in a no. of ways in the e-commerce environment.
- The sales force broadcasts ads (direct marketing), sends personalized e-mail to customers (cold calls), or creates a WWW page

Cost Estimation & pricing

- Pricing is the bridge between customer needs & company capabilities.
- Pricing at the individual order level depends on understanding the value to the customer that is generated by each order, evaluating the cost of filling each order; & instituting a system that enables the company to price each order based on its value & cost

Order Receipt & Entry

- After an acceptable price Quote, the customer enters the order receipt & entry phase of OMC.
- This was under the purview of departments variously titled customer service, order entry, the inside sales desk, or customer liaison.

Unit 2.3: Consumer Oriented Electronic Commerce

Order Selection & Prioritization

- Customer service representatives are also often responsible for choosing which orders to accept and which to decline.
- Not, all customers orders are created equal; some are better for the business.

Order Scheduling

- In this phase the prioritized orders get slotted into an actual production or operational sequence.
- This task is difficult because the different functional departments- sales, marketing,, customer service, operations, or production- may have conflicting goals, compensation systems, & organizational imperatives:
- Production people seek to minimize equipment changeovers, while marketing & customer service reps argue for special service for special customers.

Order Fulfillment & Delivery

- In this actual provision of the product or service is made.
- It involves multiple functions and locations.

Order Billing & Account/Payment Management

- After the order has been fulfilled & delivered, billing is given by finance staff.
- The billing function is designed to serve the needs and interests of the company, not the customer.

Post sales Service

- This phase plays an increasingly important role in all elements of a company's profit equation: customer, price, & cost.
- It can include such elements as physical installation of a product, repair & maintenance, customer training, equipment upgrading & disposal.

Unit 2.4 Electronic Payment Systems

PRELUDE

- Payment is an integral part of the mercantile process and prompt payment is crucial.
- If the claims and debits of the various participants are not balanced because of payment delay or even worse default, then the entire business chain is disrupted.
- Hence an important aspect of e-commerce is prompt and secure payment, clearing and settlement of credit or debit claims.
- Big Question:: How will buyers pay for goods and services online? What currency will serve as the medium of exchange in this new marketplace?

WHY ELECTRONIC PAYMENT SYSTEMS?

- Electronic tokens are designed as electronic analogs of various forms of payment backed by a bank or financial institution to transfer money over the Internet.
- Methods of traditional payment
 - ❖ Check, credit card, or cash
- Methods of electronic payment
 - ❖ Electronic cash, software wallets, smart cards, and credit/debit cards

REQUIREMENTS FOR E-PAYMENTS

- Atomicity
 - ❖ Money is not lost or created during a transfer
- Good atomicity
 - ❖ Money and good are exchanged atomically
- Non-repudiation
 - ❖ No party can deny its role in the transaction
 - ❖ Digital signatures

Period	Innovation
700 BC	Earliest coins produced in western Turkey to pay tax.
1400	First banks open, in Italy, honoring checks against cash reserves.
1694	The Bank of England opens.
1887	The phrase credit card is coined in Looking Backward, a novel by Edward Bellamy
1947	Flatbush National Bank issues first general-purpose credit card, for use in select New York shops.
1958	BankAmerica, in Fresno, California, executes the first mass mailing of credit cards
1967	Westminster Bank installs first ATM at Victoria, London, branch
1970	The New York Clearing House launches CHIPS-the Clearing House Interbank Payments System-which provides US dollar funds-transfer and transaction settlements on-line and in real time
Late 1970s	Chemical Bank launches its Pronto system providing 3000 computer terminals to customer's homes linked to its central computers by telephone. It offers a range of facilities: balance inquiries, money transfers between Chemical Bank accounts and bill payment to selected local stores
1985	EDI extensively used in bank-to-bank payment systems
1994	Digital cash trials by DigiCash of Holland conducted on-line
1995	Mondex electronic currency trials begin in Swindon, England

TYPES OF ELECTRONIC PAYMENT SYSTEMS

- Electronic payment systems are proliferating in banking, retail, health care, on-line markets, and even government—in fact, anywhere money needs to change hands.
- Organizations are motivated by the need to deliver products and services more cost effectively and to provide a higher quality of service to customers.
- The emerging electronic payment technology labeled electronic funds transfer (EFT).
- EFT is defined as “any transfer of funds initiated through an electronic terminal, telephonic instrument, or computer or magnetic tape so as to order, instruct, or authorize a financial institution
- EFT can be segmented into three broad categories:
 - ❖ Banking and financial payments
 - ✓ Large-scale or wholesale payments (e.g., bank-to-bank transfer)
 - ✓ Small-scale or retail payments (e.g., automated teller machines)
 - ✓ Home banking (e.g., bill payment)
 - ❖ Retailing payments
 - ✓ Credit Cards (e.g., VISA or MasterCard)
 - ✓ Private label credit/debit cards (e.g., J.C. Penney Card)
 - ✓ Charge Cards (e.g., American Express)
 - ❖ On-line electronic commerce payments
 - ✓ Token-based payment systems
 - Electronic cash (e.g., DigiCash)
 - Electronic checks (e.g., NetCheque)
 - Smart cards or debit cards (e.g., Mondex Electronic Currency Card)
 - ✓ Credit card-based payment systems
 - Encrypted Credit Cards (e.g., World Wide Web form-based encryption)
 - Third-party authorization numbers (e.g., First Virtual)

DIGITAL TOKEN-BASED ELECTRONIC PAYMENT SYSTEMS

- Electronic tokens are designed as electronic analogs of various forms of payment backed by a bank or financial institution. They are equivalent to cash that is backed by a bank.
- Electronic tokens are three types:

1. Cash or Real-time

- Transactions are settled with exchange of electronic currency.
- Ex: on-line currency exchange is electronic cash (e-cash).

2. Debit or Prepaid

- Users pay in advance for the privilege of getting information.
- Ex: prepaid payment mechanisms are stored in smart cards and electronic purses that store electronic money.

3. Credit or Postpaid

- The server authenticates the customers and verifies with the bank that funds are adequate before purchase.
- Ex: postpaid mechanisms are credit/debit cards and electronic checks.

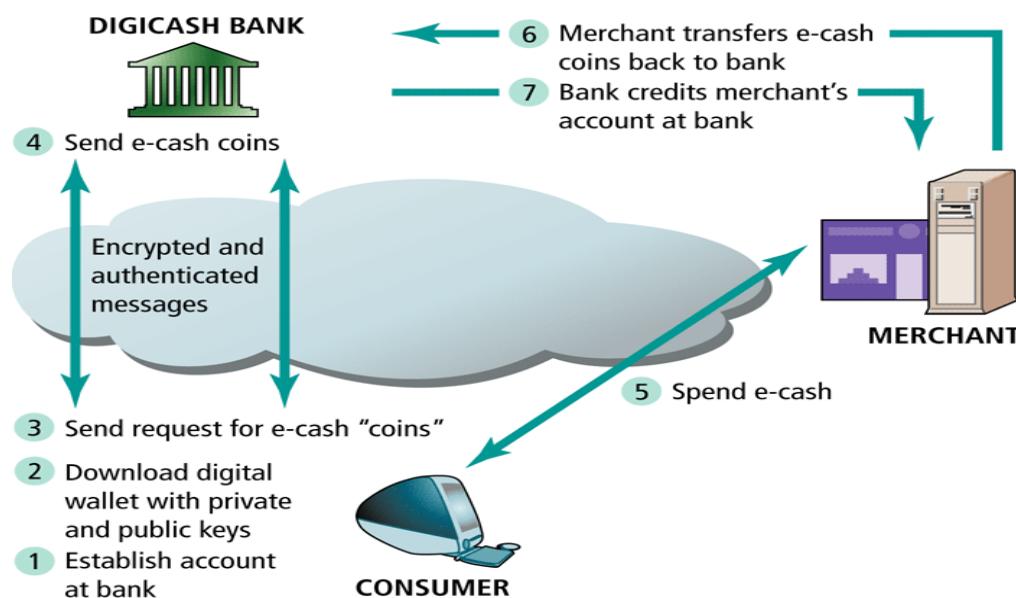
ELECTRONIC CASH (E-Cash/Digital Cash)

- is the new concept in on-line payment systems because it combines computerized convenience with security and privacy that improve on paper cash.
- E-cash focuses on replacing cash as the principal payment vehicle.
- Primary advantage is with purchase of items less than \$10
 - ❖ Credit card transaction fees make small purchases unprofitable
 - ❖ Micro-payments
 - ✓ Payments for items costing less than \$1
- Even after 30 years of continuous development of electronic payment systems, cash is still the dominant consumer payment instrument for three reasons
 - ❖ Lack of trust in banking system
 - ❖ Inefficient clearing and settlement of non cash transaction
 - ❖ Negative real interest rates paid on bank deposits

Properties of Electronic Cash:

- Specifically, e-cash must have the following four properties:
 - ❖ **Monetary value**
 - ✓ It must be backed by either cash, bank authorized credit or bank-certified cashier's check.
 - ✓ When e-cash created by one bank is accepted by others, settlement must occur without any problem.
 - ❖ **Interoperable**
 - ✓ Exchangeable as payment for other e-cash, paper cash, goods or services, deposits in bank.
 - ✓ Multiple banks are required with an international clearing house that handles the exchange ability issues because all customers are going to be using the same bank or even be in the same country.
 - ❖ **Storable and Retrievable**
 - ✓ Cash should be stored and retrievable to and from remotely or on standard device.
 - ✓ It might be easy to create counterfeit cash that is stored in a computer, it might be preferable to store cash on a dedicated device that cannot be altered.
 - ✓ The device should have a suitable interface to facilitate personal authentication using passwords or other means and a display so that the user can view the card's contents.
 - ❖ **Security**
 - ✓ Should not be easy to copy or tamper with while being exchanged.

How E-Cash Works



Unit 2.4 Electronic Payment Systems

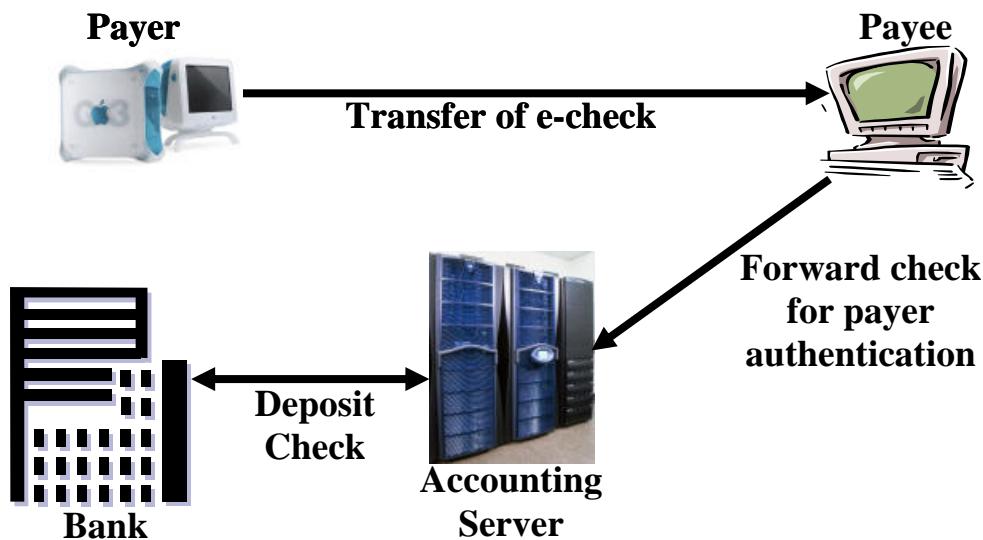
- Every person using e-cash account at digital bank on the Internet.
- When an e-cash withdrawal is made, the PC of the e-cash user calculates how many digital coins of what denominations are needed to withdraw the requested amount.
- Next random serial numbers for those coins will be generated and the blinding factor will be included.
- The result of these calculations will be sent to the digital bank.
- The bank will encode the blinded numbers with its secret key and at the same time debit the account of the client for the same amount.
- The authenticated coins are sent back to the user
- User take out the blinding factor introduced earlier.
- The serial numbers plus their signatures are now digital coins, their value is guaranteed by the bank.

Merits and Demerits

- **Advantages**
 - ✓ More efficient, eventually meaning lower prices
 - ✓ Lower transaction costs
 - ✓ Anybody can use it, unlike credit cards, and does not require special authorization
- **Disadvantages**
 - ✓ Tax trail non-existent, like regular cash
 - ✓ Money laundering
 - ✓ Susceptible to forgery

ELECTRONIC CHECKS

- It is another form of electronic tokens which are designed to accommodate the many individuals and entities that might prefer to pay on credit or through some mechanism other than cash. .



How E-Check Works?

- To be able to issue e-cheque payer must register with accounting server.
- Once register, a buyer can sends a check to the seller for the certain amount.
- On receiving the check, the seller presents it to the accounting server for verification and payment.
- The accounting server verifies the digital signature and upon authentication authorizes the transfer of account balance from the account against which the check was drawn to the account to which the check was deposited.

Unit 2.4 Electronic Payment Systems

Advantages:

- Unlike e-cash process is simple and similar to traditional check.
- Use of digital signature make it secure and are suited for clearing micro-payments
- Flourish new business of third-party accounting server.
- Financial risk is assumed by the accounting server & may result in easier acceptance

SMART CARDS & ELECTRONIC PAYMENT SYSTEMS

- Smart cards have been in existence since the early 1980s and hold promise for secure transactions using existing infrastructure.
- Smart cards are credit and debit cards and other card products enhanced with microprocessors capable of holding more information than the traditional magnetic stripe.
- The smart card technology is widely used in countries such as France, Germany, Japan, and Singapore to pay for public phone calls, transportation, and shopper loyalty programs.

Smart cards are basically two types:

- Relationship-Based Smart Credit Cards
- Electronic Purses, which replace money, are also known as debit cards and electronic money.

Relationship-Based Smart Credit Cards

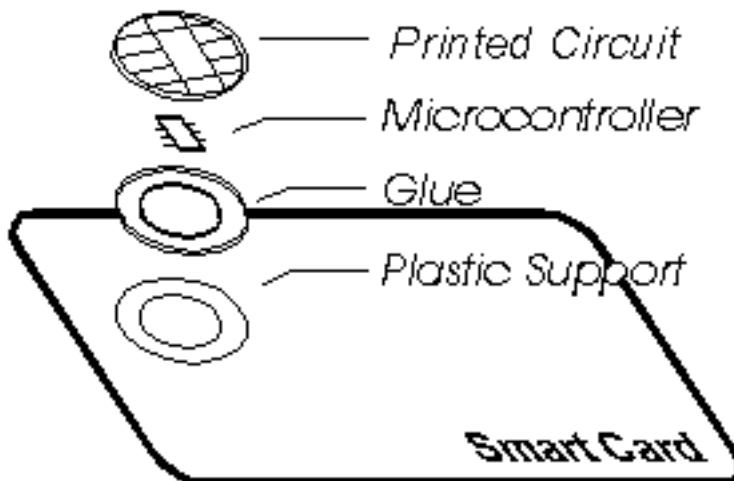
- It is an enhancement of existing cards services &/ or the addition of new services that a financial institution delivers to its customers via a chip-based card or other device
- These services include access to multiple financial accounts, value-added marketing programs, or other information card holders may want to store on their card
- It includes access to multiple accounts, such as debit, credit, cash access, bill payment & multiple access options at multiple locations

Electronic Purses

- To replace cash and place a financial instrument are racing to introduce “electronic purses”, wallet-sized smart cards embedded with programmable microchips that store sums of money for people to use instead of cash for everything
- The electronic purse works in the following manner:
 - ✓ After purse is loaded with money at an ATM, it can be used to pay for candy in a vending machine with a card reader.
 - ✓ It verifies card is authentic & it has enough money, the value is deducted from balance on the card & added to an e-cash & remaining balance is displayed by the vending machine.

SMART CREDIT CARD SYSTEM

- The smart card, an intelligent token, is a credit card sized plastic card embedded with an integrated circuit (IC).
- It provides not only memory capacity, but computational capability as well.
- Smart cards are often used in different applications which require strong security protection and authentication.
- It can be used to carry a lot of sensitive and critical data.



Unit 2.4 Electronic Payment Systems

Some Applications

- As an identification card, to prove the identity of the card holder
- As medical card, which stores the medical history of the person
- As a debit/credit card, which allows off-line transaction.
- As secure initiation of calls and identification of caller on any Global System for Mobile (GSM) phone

Physical Structure

- Generally it is made up of three elements
 - ✓ Plastic card with dimension 85.60mm X 53.98mm X 0.80mm
 - ✓ A printed circuit and
 - ✓ An integrated circuit chip embedded on the card
- IC chip consists of a microprocessor, ROM, non static RAM and nonvolatile EEPROM
- Data transfer rate between chip and card acceptor device is limited to 9600 bits per second.
- The smart card's COS (Chip Operating System) is a sequence of instructions, permanently embedded in the ROM of the smart card.
- Some functions of the COS are:
 - ✓ Management of interchanges between the card and the outside world
 - ✓ Management of the files and data held in memory
 - ✓ Management of card security and the cryptographic algorithm procedures.

Key features and Characteristics (Advantages)

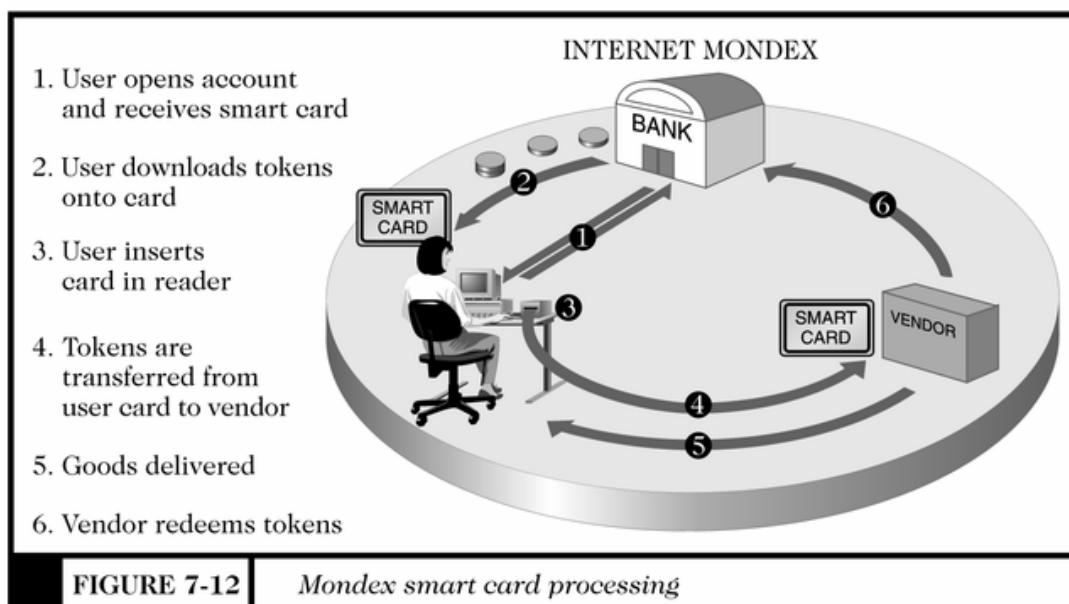
- **Cost**
 - ✓ Card cost is cheap. Per card cost increased with chips providing high capacity and more complex capabilities; per card cost decreased as higher volume of cards produced.
- **Reliability**
 - ✓ Card claiming to meet ISO specification achieve set test results covering drop, flexing, concentrated load, temperature, humidity, electricity, chemical attack, UV ray, X-ray.
- **Error Correction**
 - ✓ COS perform their own error checking
- **Storage capacity**
 - ✓ EEPROM 8K-128K bit (1K=1000bits)
- **Ease of use**
 - ✓ User friendly with easy interface
- **Security**
 - ✓ Smart cards are highly secure. Information stored on the chip is difficult to duplicate or disturb. Chip microprocessor and co-processor support DES, RSA standards for encryption, authentication and digital signature for non-repudiation.
- **Processing Power**
 - ✓ Up to 25 to 32 MHz with 32-bit RISC processor
- **Power Source**
 - ✓ Mostly 5volt DC power current
- **Support Equipment Required**
 - ✓ For most, only a simple card acceptance device with an asynchronous clock, a serial interface, and a 5volt power source is required.

Disadvantages

- Economically not feasible.
- Need extra infrastructure such as vending machine, ATM telephones
- Lack of standards to ensure interoperability among varying smart card program
- Unresolved security and legal issue
- Single physical point of failure (the card)
- Not (yet) widely used

SMART-CARD READERS AND PHONES

- Smart card is recognized by smart card reader.
- They can communicate with the chip on the smart card.
- Smart-card readers can range from 2 lines 16 character display to readers with function keys to perform frequently used operation
- Card reader can be also in the form of a screen phones
- Screen phones features four line screen with reader and keypad
- Screen-based phones are more convenient to use than PC-based home banking application, which requires users to boot up their systems and establish a modem connection before conducting transaction
- Other features of screen phones include advanced telephone function such as two-way speaker, dialing directory and a phone log for tracking calls.
- Smart card reader can be customized for specific environment by programming.



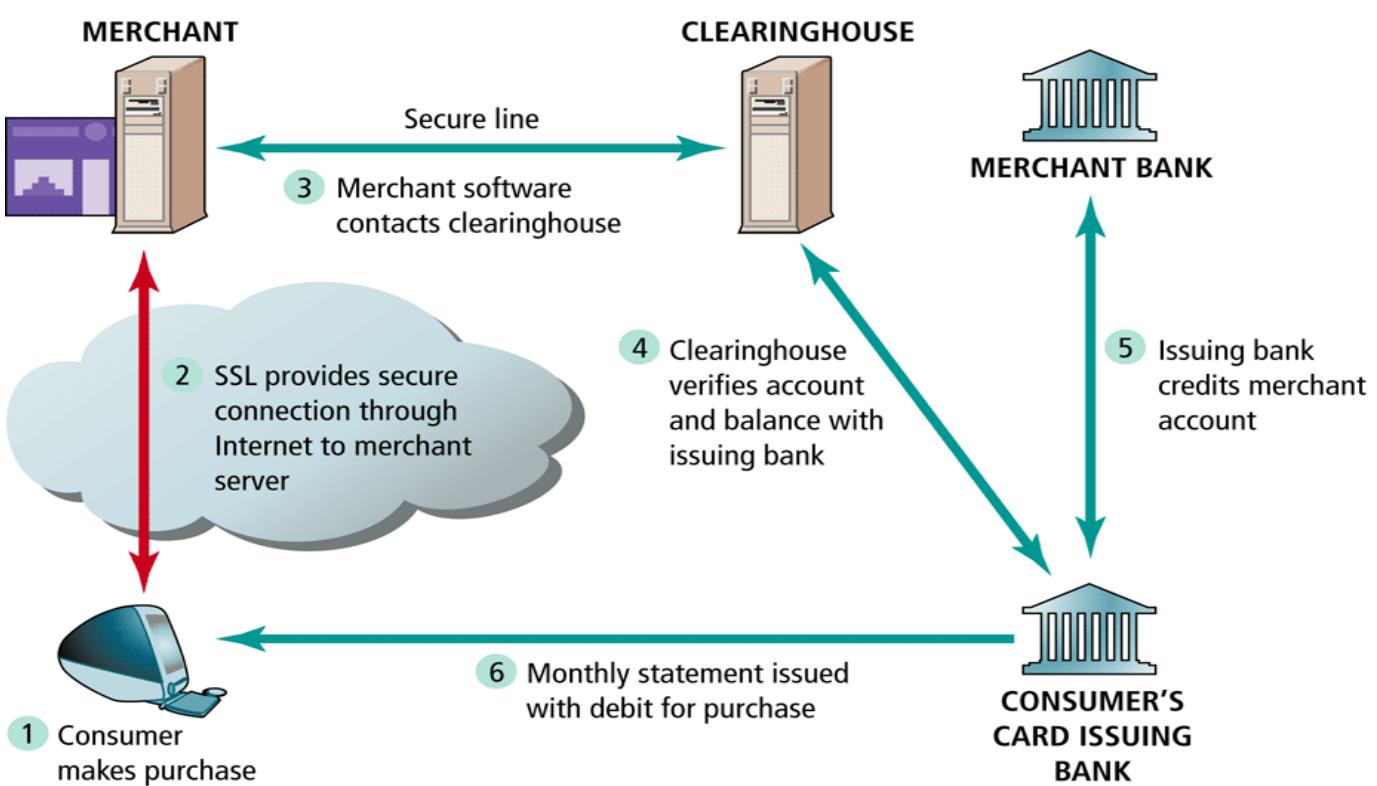
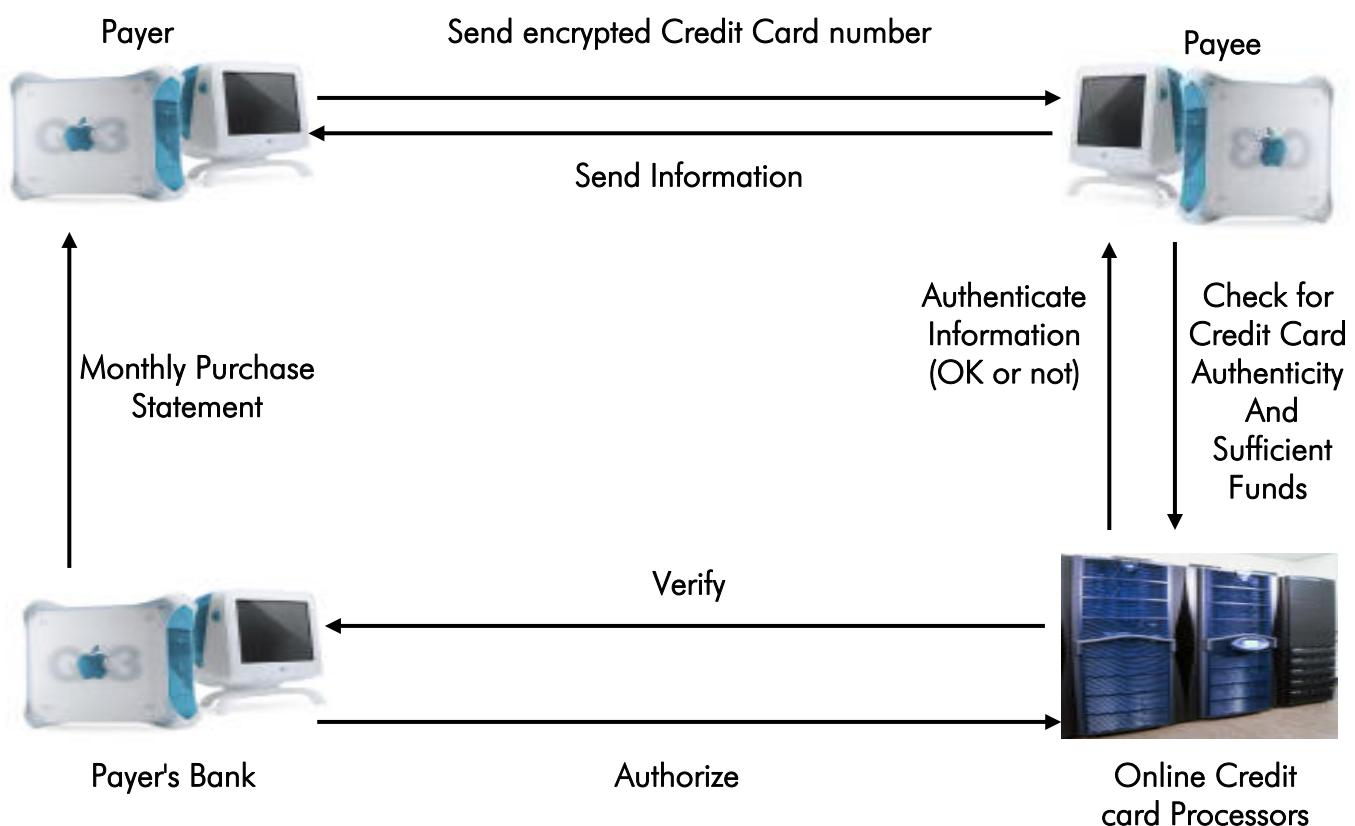
CREDIT CARDS

- Most popular means of payment used and initiated via the Internet for consumer transaction.
- Popular because
 - ✓ familiar to user and was widely used before the advent of e-commerce
 - ✓ transaction costs are hidden from users
 - ✓ payment is simple anywhere and in any currency
 - ✓ the credit-issuing company shares the transaction risk.

Credit Card Payment Categories

- Payment using plain credit card details
 - ✓ Easiest method of payment using unencrypted credit cards over a public network such as telephone lines or Internet.
 - ✓ Low level of security in the design of Internet makes this method problematic
- Payment using encrypted credit card details
 - ✓ Uses an encrypted credit card details while making any transaction.
 - ✓ Cost of the credit card transaction increases which would prohibit low-value payments by adding costs to the transactions.
- Payments using third party verification
 - ✓ Method of introducing a third party that collects and approves payments from one client to another.
 - ✓ After a certain period of time, one credit card transaction for the total accumulated amount is completed.

ENCRYPTION AND CREDIT CARDS



Unit 2.4 Electronic Payment Systems

How it works?

- A customer sends encrypted credit card information and signed order with time stamp securely to the merchant.
- The merchant validate the customer's identity as the owner of the credit card account.
- The merchant relays the credit card charge information and signature to its bank or on-line credit card processors.
- The bank or processing party relays the information to the customer's bank for authorized approval.
- The customer's bank returns the credit card data, charge authentication, and authorization to the merchant.

Can anyone cheat?

- To buy something from vendor X, the consumer sends vendor X the message, "It is now time T. I am paying Y dollars to V for item Z", then the consumer sign the message.
- The vendor will then sign the message with his key and send it to the credit card company, which will bill the consumer for Y dollars and give the same amount to X.

Nobody can cheat

- ✓ The consumer can't claim that he didn't agree to the transaction, because he signed it.
- ✓ The vendor can't invent fake charges, because he doesn't have access to the consumer's key and he can't submit the same charge twice, because the consumer included the precise time in the message.

OTTP STEPS FOR ONLINE TRANSACTION

1. The consumer acquires an OTTP account number by filling out a registration form. This will give the OTTP a customer information profile that is backed by a traditional financial investment such as a credit card.

2. To purchase an article, software or other information on line, the consumer requests the item from the merchant by quoting the OTTP account number. The purchase can take place in one of the two ways. The consumer can automatically authorize the merchant via browser settings to

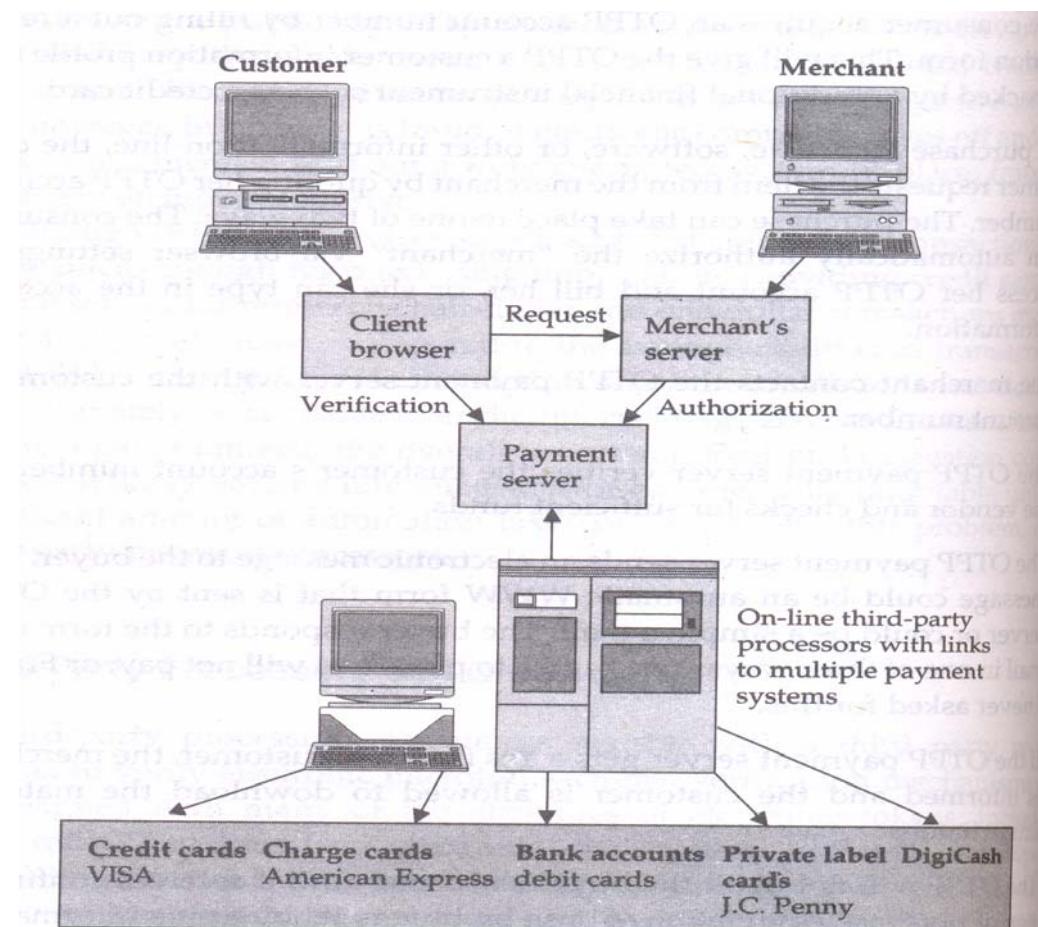


Figure 8.4 On-line payment process using a third-party processor

Unit 2.4 Electronic Payment Systems

- access his OTTP account and bill him or he can type in the account information.
3. The merchant contacts the OTTP payment server with the customer's account number.
 4. The OTTP payment server verifies the customer's account number for the vendor and checks for sufficient fund.
 5. The OTTP payment server sends an electronic message to the buyer. This message could be an automatic WWW form that is sent by the OTTP server or could be a simple e-mail. The buyer responds to the form or email in one of the three ways. Yes, I agree to pay; No, I will not pay; or Fraud, I never asked for this.
 6. If the OTTP payment server gets a Yes from the customer, the merchant is informed and the customer is allowed to download the material immediately.
 7. The OTTP will not debit the consumer's account until it receives confirmation of purchase completion. Abuse by consumer who receive information or a product and decline to pay can result in account suspension.

DIGITAL WALLETS

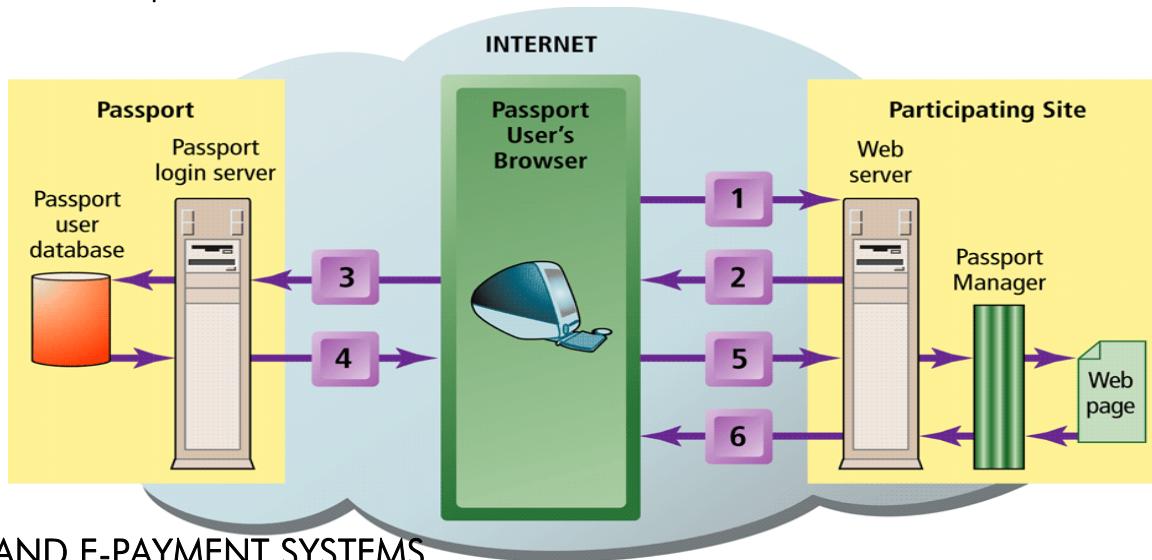
- Seeks to emulate the functionality of an analog wallet.
- Client-based digital wallets are software applications that consumers install on their computer, and that offer consumer convenience by automatically filling out forms at online stores
- Server-based digital wallets are software-based authentication and payment services and products sold to financial institutions that market the systems to merchants either directly or as a part of their financial service package
- Functions:
 - ✓ Authenticate the consumer through the use of digital certificates
 - ✓ Store and transfer value.
 - ✓ Secure the payment process from the customer to merchant through encryption methods.

ELECTRONIC WALLETS

- Stores credit card, electronic cash, owner identification and address
 - ✓ Makes shopping easier and more efficient
 - Eliminates need to repeatedly enter identifying information into forms to purchase
 - Works in many different stores to speed checkout
 - ✓ Amazon.com one of the first online merchants to eliminate repeat form-filling for purchases
- Agile Wallet
 - ✓ Developed by CyberCash
 - ✓ Allows customers to enter credit card and identifying information once, stored on a central server
 - ✓ Information pops up in supported merchants' payment pages, allowing one-click payment
 - ✓ Does not support smart cards or CyberCash, but company expects to soon
- eWallet
 - ✓ Developed by Launchpad Technologies
 - ✓ Free wallet software that stores credit card and personal information on users' computer, not on a central server; info is dragged into payment form from eWallet
 - ✓ Information is encrypted and password protected
 - ✓ Works with Netscape and Internet Explorer
- Microsoft Wallet
 - ✓ Comes pre-installed in Internet Explorer 4.0, but not in Netscape
 - ✓ All information is encrypted and password protected
 - ✓ Microsoft Wallet Merchant directory shows merchants setup to accept Microsoft Wallet

Unit 2.4 Electronic Payment Systems

How Microsoft Passport Wallet Works?



RISK AND E-PAYMENT SYSTEMS

Electronic payments: Issues

- Secure transfer across internet
- High reliability: no single failure point
- Atomic transactions
- Anonymity of buyer
- Economic and computational efficiency: allow micropayments
- Flexibility: across different methods
- Scalability in number of servers and users
- Customer's risks
 - ✓ Stolen credentials or password
 - ✓ Dishonest merchant
 - ✓ Disputes over transaction
 - ✓ Inappropriate use of transaction details
- Merchant's risk
 - ✓ Forged or copied instruments
 - ✓ Disputed charges
 - ✓ Insufficient funds in customer's account
 - ✓ Unauthorized redistribution of purchased items

DESIGNING ELECTRONIC PAYMENT SYSTEMS

It includes several factors

- **Privacy:** A user expects to trust in a secure system; just as a telephone is a safe
- **Security:** A secure system verifies the identity of two-party transactions through "user authentication" & reserves flexibility to restrict information/services through access control
- **Intuitive interfaces:** The payment interface must be as easy to use as a telephone.
- **Database integration:** With home banking, for ex, a customer wants to play with all his accounts.
- **Brokers:** A "network banker"-someone to broker goods & services, settle conflicts, & facilitate financial transactions electronically-must be in place

Unit 2.4 Electronic Payment Systems

- **Pricing:** One fundamental issue is how to price payment system services. For e.g., from cash to bank payments, from paper-based to e-cash. The problem is potential waste of resources.
- **Standards:** Without standards, the welding of different payment users into different networks & different systems is impossible.

PRELUDE

- Electronic Data Interchange (EDI) - interposes communication of business information in standardized electronic form
- Prior to EDI, business depended on postal and phone systems that restricted communication to those few hours of the workday that overlap between time zones.
- EDI is the interchange of standard formatted data between computer application systems of trading partners with minimal manual intervention.
- EDI is a structured document interchange which enables data in the form of document content to be exchanged between software applications that are working together to process business transactions.
- EDI only specifies a format for business information and the actual transmission of the information is tackled by other underlying transport mechanisms such as email or point to point connections

Why EDI

- Reduction in transaction costs
- Foster closer relationships between trading partners

EDI & Electronic Commerce

- Electronic commerce includes EDI & much more
- EDI forges boundary less relationships by improving interchange of information between trading partners, suppliers, & customers

EDI LAYERED ARCHITECTURE

EDI Semantic Layer

- describes the business application that is driving EDI.
- For a procurement application, this translates into requests for quotes, price quotes, purchase orders, acknowledgements and invoices.
- This layer is specific to a company and the software it uses
- Includes user interface and content visible on the screen

EDI semantic layer	Application level services	
EDI standard layer	EDIFACT business form standards	
	ANSI X12 business form standards	
EDI transport layer	Electronic mail	X.435, MIME
	Point to point	FTP, TELNET
	World Wide Web	HTTP
Physical layer	Dial-up lines, Internet, I-way	

EDI Standard Layer

- Specifies business form structure so that information can be exchanged
- Two competing standards
 - ✓ American National Standards Institute(ANSI)X12
 - ✓ EDIFACT developed by UN/ECE, Working Party for the Facilitation of International Trade Procedures
 - ✓ E.g. A purchase order name field in an X12 standard might be specified to hold a maximum of 50 characters. An application using 75 characters field lengths will produce name truncation during the translation from the application layer to the standard layer.

EDI Transport Layer

- Deals with how the business form is sent. e.g. via postal mail, UPS, registered mail, fax
- Increasingly, e-mail is the carrier
- Differentiating EDI from e-mail
 - ✓ Emphasis on automation
 - ✓ EDI has certain legal status

Physical Network Infrastructure Layer

- Dial-up lines, Internet, value-added network, etc

Benefits Of EDI

- Cost & time savings, Speed, Accuracy, Security, System Integration, Just-In-Time Support.
- Reduced paper-based systems, i.e. record maintenance, space, paper, postage costs
- Improved problem resolution & customer service
- Expanded customer/supplier base or suppliers with no EDI program lose business

EDI APPLICATIONS IN BUSINESS

1. International or cross-border trade

- EDI has always been very closely linked with international trade.
- Trade efficiency, which allows faster, simpler, broader & less costly transactions is a necessity today as trade has no longer any restrictions and EDI is the primary tool to achieve such efficiency.

Role of EDI in International Trade

- ✓ EDI facilitates the smooth flow of information.
- ✓ It reduces paper work.
- ✓ EDI benefits for international trade are
 1. Reduced transaction expenditures
 2. Quicker movement of imported & exported goods
 3. Improved customer service through "track & trace" programs
 4. Faster customs clearance & reduced opportunities for corruption, a huge problem in trade

2. Financial EDI

- Comprises the electronic transmission of payments and remittance information between a payer, payee and their respective banks.
- Examines the ways business-to-business payments are made today and describes the various methods for making financial EDI payments.
- Allows replacing the labor-intensive activities associated with issuing, mailing and collecting cheques through the banking system with automated initiation, transmission and processing of payment instructions.
- Removes delays inherent in cheque processing.

Type of Financial EDI

a. Bank Cheques

- ✓ are the instruments for debit transfers where payees collect funds from payers.
- ✓ Funds made available by banks to depositors of cheques are provisional and may be reversed if the payee does not have sufficient funds in its account to pay the cheque when it is received by the payer's bank.
- ✓ Business use cheques for two main reasons
 - i. Familiar and readily accepted mode of payment despite some uncertainties about receiving final payment.
 - ii. Business benefit from the float created by the delay in the cheque collection process

b. Interbank Electronic Fund Transfer (EFT)

- ✓ EFT are credit transfers between banks where funds flow directly from the payer's bank to the payee's bank.
- ✓ Are same day almost instantaneous payments.
- ✓ The two biggest funds transfer services in the United States are the Federal Reserve's system, Fedwire, & the Clearing House Interbank Payments System (CHIPS) of the New York clearing house

EDI: LEGAL, SECURITY AND PRIVACY ISSUES

Legal Status of EDI Messages

- There has been a considerable debate concerning the legal status of EDI messages.
- Although a lot of work is being done on legal framework, nothing concrete has come out of these efforts. No rules exist that indicate how electronic messages may be considered binding in business or other related transactions.
- To understand the legal framework, let's take a look on three modes of communication types: Instantaneous communication, delayed communication via the U.S. Postal Service (USPS), & delayed communication via non-USPS couriers;
 1. **Instantaneous:** If the parties are face to face or use an instantaneous communication medium such as the telephone
 2. **Delayed (USPS):** The "mailbox rule" provides that an acceptance communicated via USPS mail is effectively when dispatched
 3. **Delayed (non-USPS):** Acceptances transmitted via telegram, mailgram, & electronic messages, are communicated & operable upon receipt.
- Messaging systems combine features of both instantaneous and delayed communications. A message's delay is a function of the specific application, message routing, network(s) traversed, system configuration and other technical factors typically unknown to the user.

Digital Signatures & EDI

- Digital signatures might be time-stamped or digitally notarized to establish dates & times
- If digital signatures are to replace handwritten signatures, they must have the same legal statuses as handwritten signatures.
- It provides a means for a third party to verify that notarized object is authentic.
- Digital signatures should have greater legal authority than handwritten signatures. For instance, if a ten page contract is signed by hand on the tenth page, one cannot be sure that the first nine pages have not been altered. Of the contract was digitally signed, however, a third party can verify that not one byte of the contract has been altered.

EDI AND ELECTRONIC COMMERCE

- New types of EDI are traditional EDI & open EDI

Traditional EDI

- It replaces the paper forms with almost strict one-to-one mappings between parts of a paper form to fields of electronic forms called transaction sets.
- It covers two basic business areas:
 1. Trade data Interchange (TDI) encompasses transactions such as purchase orders, invoice & acknowledgements.
 2. Electronic Funds Transfer (EFT) is the automatic transfer of funds among banks & other organizations
- It is divided into 2 camps: old EDI & new EDI.
- Old EDI is a term created by those working on the next generation of EDI standards in order to differentiate between the present & the future.

Old EDI

- Automating the exchange of information pertinent to business activity
- It is referred as the current EDI-standardization process where it allows every company to choose its own, unique, proprietary version

New EDI

- It is refocus of the standardization process.
- In this, the structure of the interchanges is determined by the programmer who writes a program.

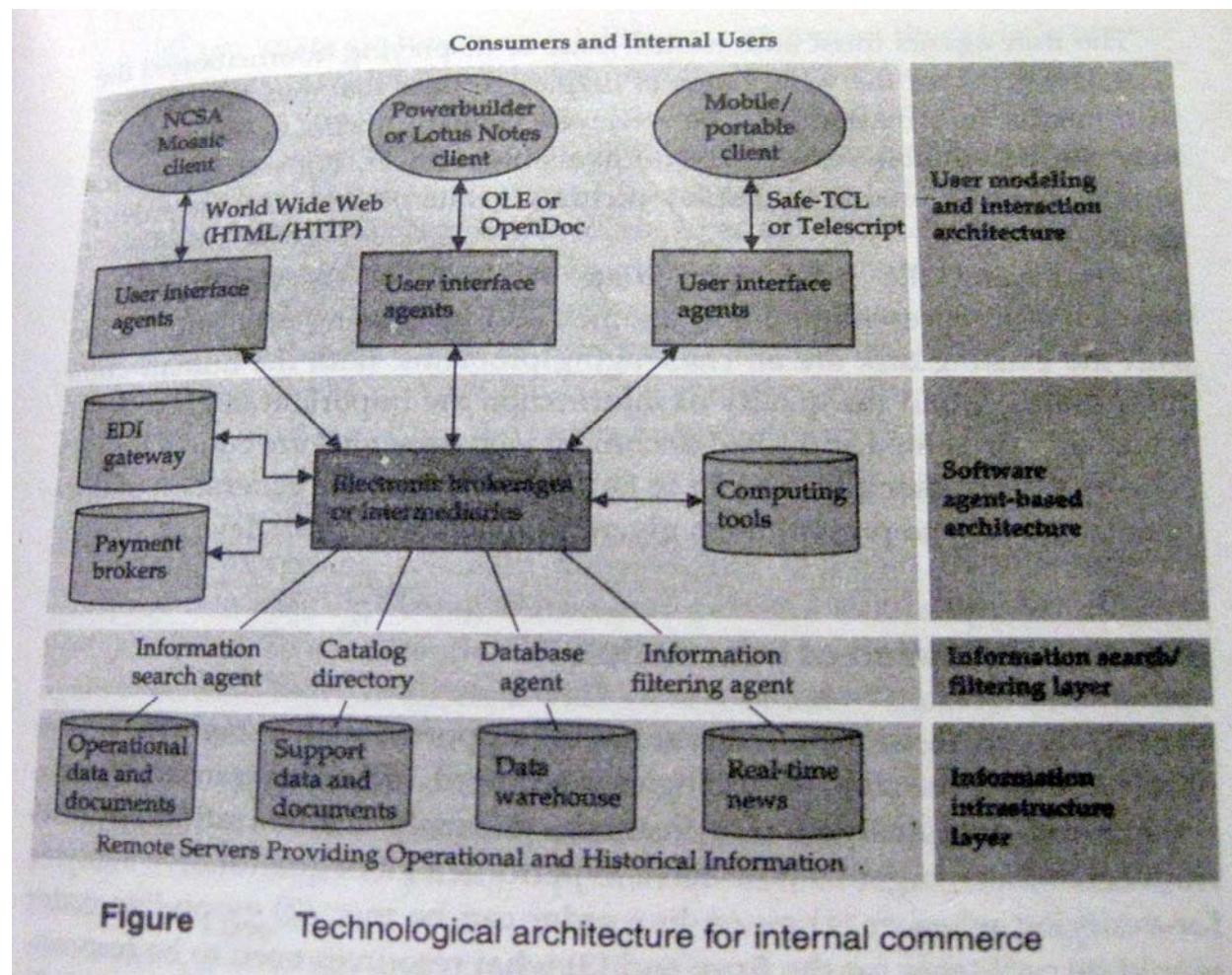
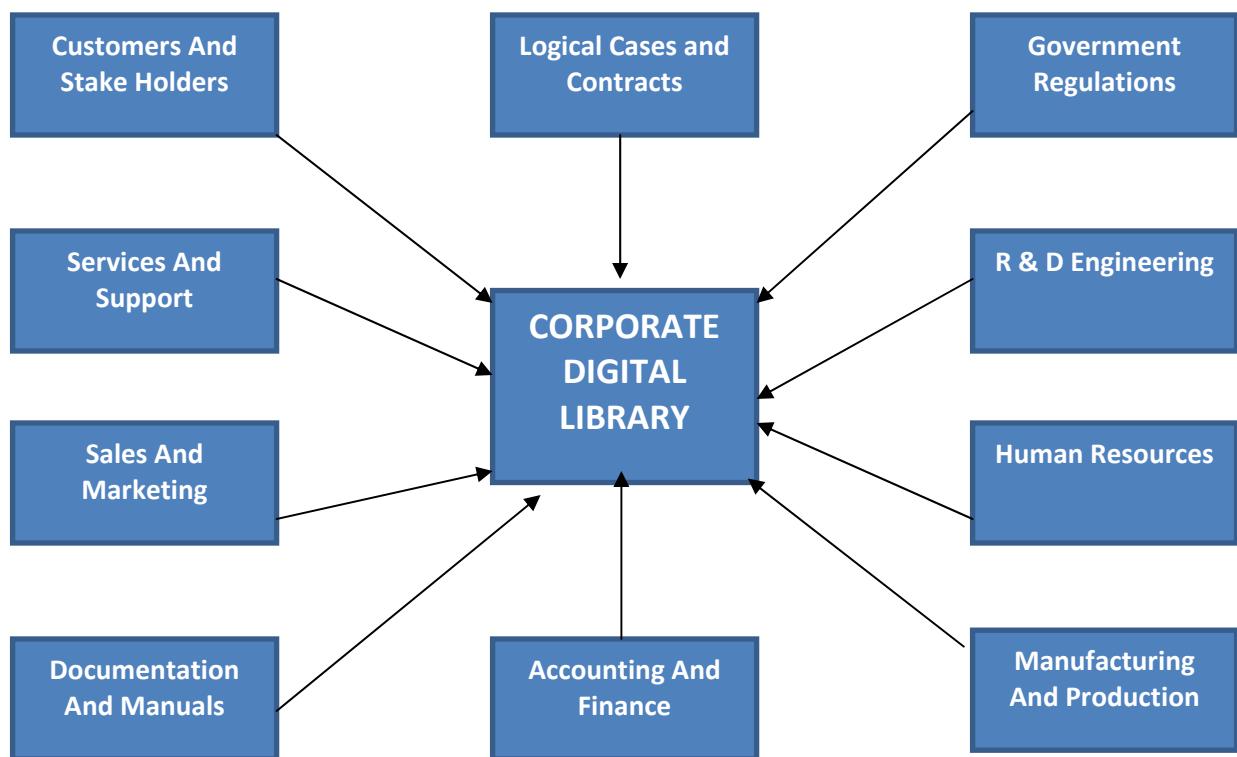
Unit 3.1 Inter-organizational Commerce and EDI

- It removes long standardization process.

Open EDI

- It is a business procedure that enables e-commerce to occur between organizations where the interaction is of short duration.
- It is process of doing EDI without the upfront trading partner agreement that is currently signed by the trading partners.
- The goal is to sustain ad hoc business or short-term trading relationships using simpler legal codes.
- It is a law of contract within the context of e-commerce where transactions are not repeated over long period of time.

PRELUDE



TYPES OF DIGITAL DOCUMENTS

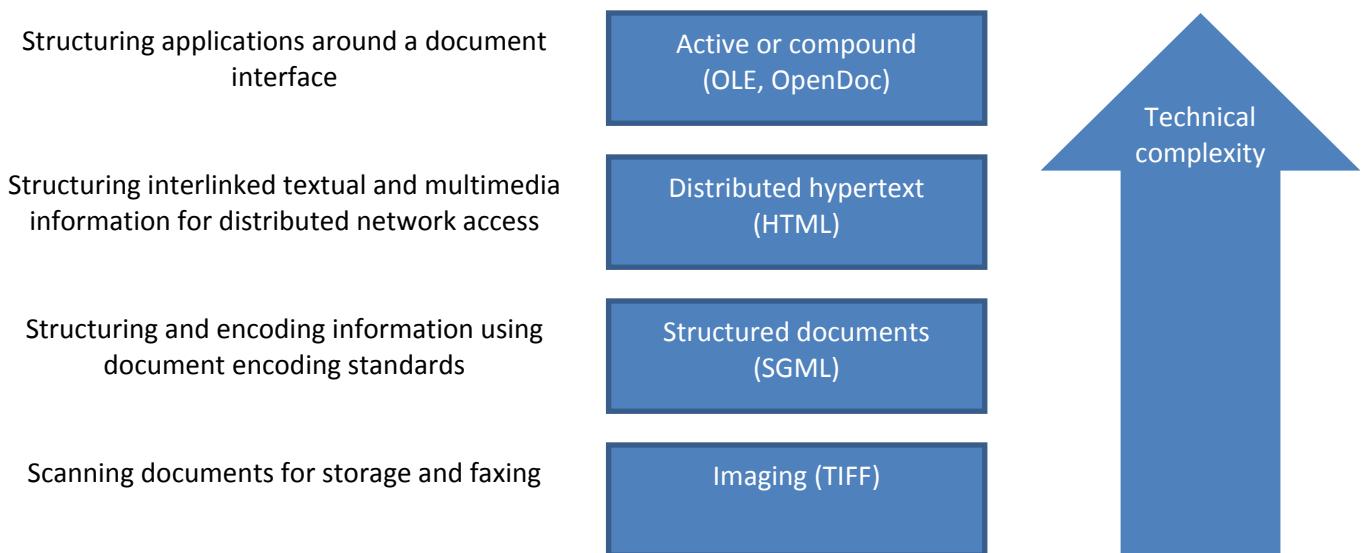


Fig. Four Types of Digital Documents

1. Document Imaging

- Document imaging emulates microfiche and microfilm.
- An imaging system passes a document through a scanner that renders it digital and then stores the digital data as a bit-mapped image of the document.
- The problem with the imaging approach is that the output contains only images not text.

The following imaging standards are prominently used:

- TIFF(tag image file format): format for interchange of bit-mapped images.
- ITU-TSS(international telecommunication union-telecommunication standardization sector) Group IV T.6 facsimile: this standard is used for compression and exchange of bit-mapped files.

2. Structured Documents

- Structured documents provide clear description of document content.
- Structured documents apply data-base structuring capabilities to individual documents and document collections.

Capabilities of Structured Documents

- Document formatting, rendering and presentation (interactive CDs of customer catalog, manuals)
- Dynamic documents, user interaction and manipulation such as the ability to create bookmarks, highlight text and write notes.
- Easier search and query

Standard for structured documents are:

SGML (Standard Generalization Markup Language):

- It is an ISO standard for interchange & multi-formatting description of text document in terms of logical structure.

ODA (Office Document Architecture):

- It is an ANSI & ISO standard for interchange of compound office documents. ODA specifies both content & format.

Unit 3.2 The Corporate Digital Library

CDA (Compound Document Architecture):

- It defines set of rules for content and format .It defines services for compound documents.

RTF (Rich –Text Format):

- It is developed by Microsoft for interchanging of desk top documents.

3. Hyper Text Documents

- Hyper text is a way of making document-based information more mobile.

Reasons for mobility of information are:

- Information in enterprises is seldom located on server but is distributed throughout the organization.
- Accessing & retrieving large monolithic document is time consuming.
- Reuse of document for composing new documents is difficult task.
- In this relationships between documents can be represented through hypermedia links i.e. hyperlinks.

Standards of Hypertext Documents

- HyTime: It adds time based relationships like synchronization, t is extension of SGML.
- HTML: Developed by WWW to support distributed hypermedia.
- MHEG: (Multimedia /Hypermedia Encoding/Experts Group):standard for presenting objects in multimedia

4. Active Documents

- Active document represents what is known as document oriented computing.
- Active document provide an interactive interface between documents.
- Active documents are especially powerful because they combine composition of information with the distributed nature of information.
- Ex: spreadsheet, word-processing

ISSUES BEHIND DOCUMENT INFRASTRUCTURE

- Creating a digital library poses many hurdles and challenges. What stands out as a conceptually simple exercise can quickly turn in to a cluster of incompatible platforms, software applications, databases and document formats.
- Special challenges include: variance in end users' needs and sophistication, diversity in hardware performance, information resources that are physically distributed, heterogeneous types of information resources and multimedia data types created by a variety of departments.

Document infrastructure must address the following questions:

- What is the proper architecture for the corporate digital library?
- What are appropriate model?
- What protocols required?
- What are the best human interfaces?
- How does one represent and manipulate the information processing activities occurred in the digital library?

Document Constituencies

- The emerging document processing & management strategies must address three constituencies.
 - ✓ End Users
 - End users want to do more with the information in their documents than merely store them to disk or occasionally print them.
 - They need systems to access distributed repositories and to manipulate them in a number of ways.

Unit 3.2 The Corporate Digital Library

- ✓ Developers
 - Developers need a framework to prevent ad hoc system design and assure the longevity and flexibility of documents and the information they include in the face of new technological advancements.
 - Methodologies are required that can guide to develop and deploy documents in organization.
- ✓ Document librarians
 - Librarians manage the dissemination and maintenance of information in document.
 - This new role alters the process by which workers create, find and use information they need in the networked environment.

Document-oriented processes

Components:

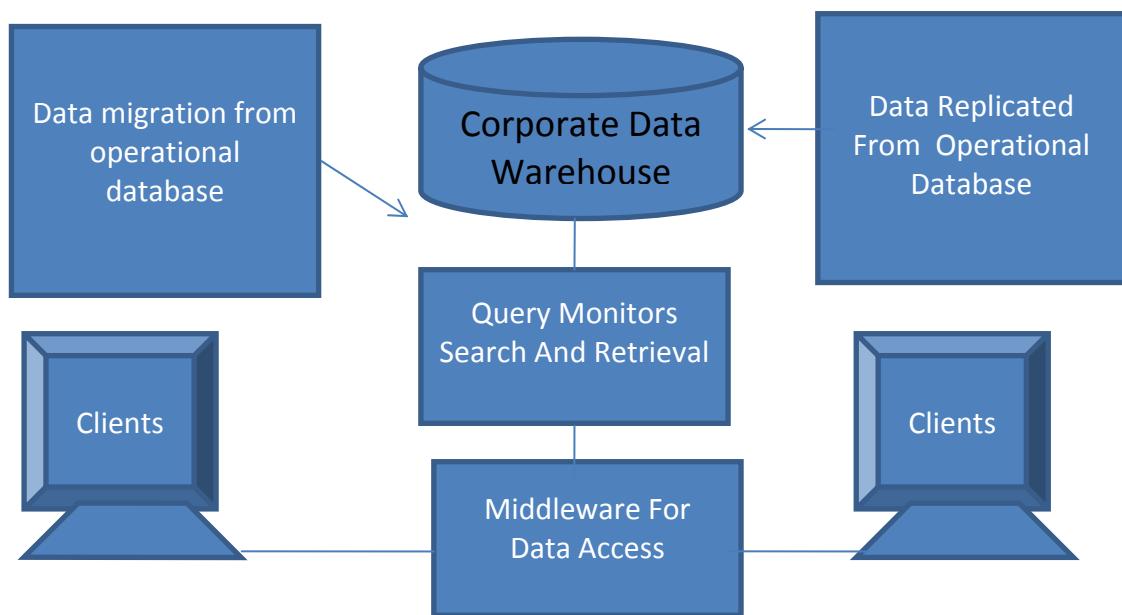
- ✓ Document creation
 - End Users want to be able to create mission critical documents cooperatively on disparate systems and applications. So links between these systems needs to be seamless.
- ✓ Document media conversion
 - End users are looking for systems that accept multiple forms of input – hard copy, image, text, numeric data, video and sound – from either paper originals, networks or magnetic media.
- ✓ Document production and distribution
 - End users need interfaces between document creation, document production and document distribution systems.
 - They want to
 - ❖ Direct document output via networks to print on demand systems
 - ❖ Exploit Just-in-time document production using page description languages, image retrieval and network storage technologies
 - ❖ Simplify document production by integrating finishing into high speed production processes
- ✓ Document storage and retrieval
 - End Users seek integrated archival storage and retrieval support with easy access to whole documents as well as documents elements such as text passages and illustrations.
 - They need document inventory techniques that can generate substantial savings in document storage costs and near elimination of document obsolescence while assuring easy document access.

Document-Based Work Flows:

- Is the process how documents move in and out of the digital library.
- four activities make up the document-based framework flow

- ✓ Document modeling
 - Defines the structure and processes of operation systems, both internal and external to the enterprise
- ✓ Transformation
 - Creates modules for capturing, validating, transforming, and applying key operational concepts.
- ✓ Synthesizing
 - Create value-added informational objects from the combination of two or more documents.
- ✓ Business modeling
 - Defines the structure and processes of the business environment, both internal and external to the enterprise.

CORPORATE DATA WAREHOUSES



- Data warehouse is used store information of the organization, leverage existing business and generate new growth opportunities.
- Data warehouse is needed to handle increasing data in volume and complexity.
- Data warehouse is a repository of an organization's electronically stored data and are designed to facilitate reporting, analysis, extraction and transformation to manage a data dictionary.
- In contrast to data, warehouses are operational systems that perform day-to-day transaction processing.
- It provides a tool to satisfy the information needs of the employee's at all organizational levels-not just for complex data queries but as a general facility for getting quick, accurate and often insightful information.
- One of the principal reasons for developing a Data Warehouse is to integrate operational data from various sources into a single and consistent architecture that supports analysis and decision making with the enterprise.

Organizational Needs of data warehouse (Why data warehouse?)

- An information-based approach to decision making.
- Involvement in highly competitive & rapidly changing markets with a large, diverse customer base for a variety of products.
- Data stored in many systems and represented differently.
- Data stored in complex, technical, difficult to decipher formats, making conversion for analysis difficult

Functions of Data warehouse

- Allow existing transactions and legacy systems to continue in operation.
- Consolidates data from various transaction systems into a coherent set.
- Allows analysis of virtual information about current operations of decision support.

Unit 3.2 The Corporate Digital Library

Types of data warehouse

- **Physical data warehouse**
 - It is the actual physical database into which all the corporate data for the data warehouse are gathered along with the schemas and the processing logics.
- **Logical data warehouse:**
 - It contains all the metadata, business rules and processing logics required to scrub, organize, package and preprocess the data.
 - It also contains information required to find and access the actual data, wherever it actually resides
- **Data library:**
 - This is sub set of the enterprise wide data warehouse and performs the role of a departmental, regional or functional data warehouse.
 - As part of the data warehouse process, the organization builds a series of data libraries over time and eventually links them via an enterprise wide logical data warehouse.
- **Decision Support System (DSS):**
 - These systems are not data warehouses but are the applications but make use of data warehouse.
 - Also called Executive Information Systems (EIS)

Advantages of data warehouse:

- **More cost effective decision making:** A data warehouse allows reduction of staff and computer resources required to support queries and reports against operational and production database. This typically offers significant savings.
- **Better enterprise intelligence:** Increased quality and flexibility of enterprise analysis arises from the multi-level data structure which guarantees data accuracy and reliability ensuring that a Data Warehouse contains only "trusted" data.
- **Enhanced customer service:** An enterprise can maintain better customer relationships by correlating all customer data via a single Data Warehouse Architecture.
- **Business reengineering:** Allowing unlimited analysis of enterprise information often provides insights to enterprise processes that may yield breakthrough ideas for engineering those processes. Knowing what information is important to an enterprise will provide direction and priority for reengineering efforts.
- A data warehouse provides a common data model for all data of interest regardless of the data's source. This makes it easier to report and analyze information than it would be if multiple data models were used to retrieve information such as sales invoices, order receipts, general ledger charges, etc.
- Prior to loading data into the data warehouse, inconsistencies are identified and resolved. This greatly simplifies reporting and analysis.
- Information in the data warehouse is under the control of data warehouse users so that, even if the source system data is purged (washed out) over time, the information in the warehouse can be stored safely for extended periods of time.
- Because they are separate from operational systems, data warehouses provide retrieval of data without slowing down operational systems.
- Data warehouses can work in conjunction with and, hence, enhance the value of operational business applications, notably customer relationship management (CRM) systems.
- Data warehouses facilitate decision support system applications such as trend reports (e.g., the items with the most sales in a particular area within the last two years), exception reports, and reports that show actual performance versus goals.