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E-Commerce (University of Rajasthan)

## Lesson 1

### INTRODUCTION TO E-COMMERCE

#### 1.1 INTRODUCTION

In the past few years, enterprises across the globe have experienced significant changes in their business information system. Huge investments were made in enterprise resource planning system implementations but still they struggle to get timely information that is needed to make effective business decision and to ensure continuous growth of enterprises. Placing "e" in front of any process or function seemed to be the magic prescription for never ending story of success and rapid returns for enterprises. E-business, e-procurement, e-sales, e-payment, e-banking, e-CRM, e-CAD, e-delivery are just a few. Internet, for example is becoming one of the most popular medium in transmitting various data. Users can find any kind of information within a shorter time compared with conventional method that consumes more time.

The emergence of the Internet throughout the world has been contributing such a variety medium in doing business as well as people lifestyle. In fact, Internet is the essential prerequisite for the existence of E-commerce. Electronic commerce or e-commerce has been defined as the ability to perform transactions involving the exchange of goods or services between two or more parties using electronic tools and technique. The explosion of E-commerce has created new phenomena in our lifestyle especially in shopping activities. Consumers can easily buy products or services like magazines and airlines tickets via Internet.

#### 1.2 DEFINITION

The word commerce is the basic concept for electronic commerce, pertaining to buying and selling of goods while 'commercial' denotes business practice and activities intended to make profits. Electronic commerce, like any other business, deals with the exchange of money for soft or hard goods and services.

Kalakota and Whintons in 1997 defined the term E-commerce from different perspectives. These perspectives are:

- Communication
- Business Process
- Service
- Online

**Communication Perspective:** According to this perspective, E-commerce is the delivery of information, product/services or payments over telecommunication channels, computer networks or any other electronic mode of communication.

**Business Process Perspective:** This says that E-commerce is the application of technology towards the automation of business transactions and work flow.

**Service Perspective:** E-commerce is defined as a tool that addresses the desire of firms, consumers and management to cut service cost while improving the quality of goods/services and increasing the speed of service delivery.

**Online Perspective:** E-commerce provides the capability of buying and selling products and information on the internet and other online services.

The term commerce is treated as transaction between business partners. Therefore, the term e-commerce seems to fairly narrow to people. Thus some time we use the term e-business. It is a broader definition of e-commerce. There is confusion among the consultants and the academicians over the use of this term. Some think that e-commerce encompasses all world of electronically based organizational

activities that support a firm's market exchanges – including a firm's entire information system's infrastructure. On the other hand, some argue that e-business encompasses the entire world of internal and external electronically based activities including e-commerce.

“E-commerce has the potential to unleash enormous savings and business efficiencies, but the practicalities remain elusive. How will e-commerce change the global planning and purchasing of transport and logistics in the supply chain? Logistics has been described as the key enabler for e-business – but how can individual logistics and transport companies ensure that they benefit from, rather than perish in, the e-commerce revolution?”

Electronic Commerce (e-commerce) is electronic business. It's using the power of computers, the Internet and shared software to send and receive product specifications and drawings; bids, purchase orders and invoices; and any other type of data that needs to be communicated to customers, suppliers, employees or the public.

E-commerce is the new, profitable way to conduct business which goes beyond the simple movement of information and expands electronic transactions from point-of-sale requirements, determination and production scheduling, right through to invoicing, payment and receipt. E-commerce uses key standards and technologies including Electronic Data Interchange (EDI), Technical Data Interchange (TDI), Hypertext Mark-up Language (HTML), Extensible Mark-up Language (XML), and the Standard for Exchange of Product model data (STEP). E-commerce is made possible through the expanded technologies of the Internet, the World Wide Web, and Value-Added Networks.

The Internet is a worldwide collection of computer networks, co-operating with each other to exchange data using a common software standard. Through telephone wires and satellite links, Internet users can share information in a variety of forms. The size, scope and design of the Internet allows users to connect easily through ordinary personal computers and local phone numbers, exchange electronic mail (E-mail) with friends and colleagues with accounts on the Internet, post information for others to access, and update it frequently, access multimedia information that includes sound, photographic images and even video, and access diverse perspectives from around the world. An additional attribute of the Internet is that it lacks a central authority—in other words, there is no "Internet, Inc." that controls the Internet. Beyond the various governing boards that work to establish policies and standards, few rules and answers to no single organization bind the Internet.

Different people use different terminology such as 'electronic trading' 'electronic procurement' 'electronic purchasing' or 'electronic marketing'. From the above definition, we can conclude that electronic commerce is often used in a much broader sense, to mean essentially the same as 'electronic business'. In other words e-commerce includes purchases of goods, services and other financial transactions in which the interactive process is mediated by information or digital technology at both locationally separate, ends of the interchange. Here 'transactions' include both specification of goods and service required and commitment to buy. E-commerce transaction model can be in terms of business to business (B2B), business to customer (B2C) or customer to customer (C2C).

### **1.3 FEATURES OF E-COMMERCE TECHNOLOGY**

Electronic Commerce means better business communication and data interchange information is essential for any and every business. The quality and quantity of information which a business delivers to customers or use this information to make decisions can determine just how competitive the business is. A company already may be using a number of electronic based tools to help acquire and extend information and communication needs. These may include personal computers, word processors, courier, facsimile machines, telex services, cellular phones, pagers and more.

Unfortunately, many of today's communication tools are not really up to the speed of today's business needs, and can actually create barriers to achieving the goals set on the basis of strategies formulated by a company.

For instance, postal facilities can keep business waiting for information for days or even weeks. Overnight couriers may save time but can be an expensive proportion. Traditional telex and fax is quick but costly and communicating by telephone can become an endless game of tag. Now a business can avoid these problems by using e-commerce which is fast, cost efficient, time saving and easy to use -i.e., economic tangibility and good business generation.

Electronic business can result in better transactions, wide market coverage by offering the benefits of speed, convenience, being cost effective, timeliness, high profit margins, instant customer relations, no loss of customers, impact and control- all are a fraction of the past traditional business methods. A concern can do everything it can to run its business efficiently and profitably. Application of electronic operations to commercial activities means better business solutions. It greatly facilitates a firm to make better decisions, sale forecasts, prices and other valuable information can be sent and received instantaneously. A business will always have the information it needs faster, easier and more completely in the new system of communication than ever before. This enables firms to have an edge over competitors by informing, following up and requesting information faster and easier to customers. Another feature is that it helps to maintain greater control, at work, home or while traveling, communicate with any business partner or firm, anywhere instantly.

### ***Improve Responsiveness***

How does e-commerce help business? It helps by improving responsiveness to market conditions and customer preferences. Every business must know how important timing is to marketing and selling products. Timing is important to cater to the demands of customers.

If distributors, dealers and sales force do not get the right information at the right time, there will be a financial crisis as well as losing valuable customers.

E-commerce network enables a company to implement marketing programmes with greater precision such as:

- Pre-empt competitiveness with a change in marketing tactics before they can react.
- Improve responsiveness by revising price change and marketing programmes as and when required.

### ***Expedites and Streamlines Reporting***

It has been an experience in conventional commercial practices with factors like delays and ineffectiveness in reporting systems crippling effectiveness. Responsive, timely information flows from sound management systems. Electronic commerce improves delivery and distribution both within and outside organizations. The benefits are:

- Stored lists of key recipients facilitate distribution.
- Electronic delivery time.

### ***Coordinates Sales Efforts***

Some marketing studies reveal that most sales people spend nearly 75 per cent of their time on the roads, relying heavily on telephone calls for contact with their head officers and customers. Telephone tag makes an endless frustrating game out of tracking down leads and following up to authenticate sales calls. In addition, misplaced or undelivered information results in low sales records. Other benefits of electronic business are:

- Eliminating telephone tag.
- Sending and receiving message at convenience.

- Linking sales team numbers to gather, including international representatives, and
- Closing sales without delays.

### ***Effectiveness and Efficiency***

Electronic commerce can increase the efficiency and effectiveness of public relation programmes, broadcast press releases, financial updates and other corporate communications. Copy reviews and approvals are expedited by circulating instant messages to key internal and external contacts.

### ***Close Contact with Clients***

In any business where maintaining close contact with customers is a priority consideration, electronic business can increase responsiveness of the company' and ensure customer satisfaction. Appointment confirmations, requests for information, follow-up reports and electronic data interchange can be effected with greater efficiency using instant messages.

### ***Planning and Execution of Meetings***

The mechanism of electronic operations in business facilitates planning and execution of meetings. Executive management meetings, seminars, workshops, symposia and conventions take a great deal of time and effort to manage. Arrangements must be coordinated among a variety of diverse groups in different locations e.g., hotels, speakers, exhibitors, attendees, the media etc. Reports and surveys need to be distributed before and or after, the event. And there are always the headaches of late breaking events and last minute announcement. In an electronic business environment, video-conferences, document conference, computer-based conference, which offer companies the flexibility of both electronic and paper distribution, can make these jobs easier and more effective.

## **SEVEN UNIQUE FEATURES OF E-COMMERCE TECHNOLOGY**

<b>Dimension of E-commerce Technology</b>	<b>Significance in Business</b>
<b>Ubiquity</b> Internet/Web technology is available everywhere: at work, at home, and elsewhere via mobile devices, anytime.	The marketplace is extended beyond traditional boundaries and is removed from a temporal and geographic location. "Marketspace" is created; shopping can take place anywhere. Customer convenience is enhanced, and shopping costs are reduced.
<b>Global Reach</b> The technology reaches across national boundaries, around the earth.	Commerce is enabled across cultural and national boundaries seamlessly and without modification. "Marketspace" includes potentially billions of consumers and millions of businesses worldwide.
<b>Universal Standards</b> There is one set of technology standards, namely internet standards.	There is one set of technical media standards across the globe.
<b>Richness</b> Video, audio, and text messages are possible.	Video, audio, and text marketing messages are integrated into a single marketing message and consuming experience.
<b>Interactivity</b> The technology works through interaction with the users.	Consumers are engaged in a dialog that dynamically adjusts the experience to the individual, and makes the consumer a co-participant in the process of delivering goods to the market.
<b>Information Density</b> The technology reduces information costs and raises quality	Information processing, storage, and communication costs drop dramatically, while currency, accuracy, and timeliness improve greatly. Information becomes plentiful, cheap and accurate
<b>Personalization / Customization</b> The technology allows personalized messages to be delivered to individuals as well as groups.	Personalization of marketing messages and customization of products and services are based on individual characteristics.

## **NEED FOR E-COMMERCE**

The global business environment is moving faster than ever before. Increased competition at home and abroad means quality as well as profitability must be preserved by corporate houses. This pressure has led to a reappraisal of the accepted existing business practice in the search for greater efficiency.

Traditionally, the response in the face of competitive threat has been to reduce costs by rationalizing production, shedding labour and restructuring business, coupled with investments in technology to improve productivity and generate profit.

Whether business to business (B2B) or business to customer (B2C) there are benefits to all parties. A reduction in acquisition times and costs, lower prices for goods and services, an expanded number and quality of suppliers, an increase in buyer productivity. Better management information and better inventory control is possible. A Reduction time to market is also achievable giving improved operating efficiencies and improved product quality at reduced cost. The payment process can also be improved and finally and most importantly a greatly expanded customers base. B2B e-commerce was born out of an attempt to solve an administrative problem. It developed a new computer standard to handle these needs, which became known as EDI, Electronic Data Interchange. Today its descendant, XML, a lighter, simpler data interchange standard is used by B2B sites. Simple e-commerce sites first appeared in 1992. The early e-commerce sites were virtual catalogues, simply listing products for sale. Ordering was off-line, through e-mail, phone or fax. By 1996 the technology had advanced greatly to produce virtual stores with shopping carts, client accounts and, with the development of protocols such as Secure Socket Layer (SSL), enabled customers to order and pay for their purchase on-line directly by credit card. E-commerce quickly became popular with consumers and suppliers. For customers, it was fast, easy and efficient, allowing them to compare products, price and service before purchase. For suppliers, it allowed them to reach an unlimited international audience, 24 hours a day, 7 days a week at reduced costs. Today e-commerce is widely used and growing fast. B2B is the largest, fastest growing and most profitable market. According to IDC, this year, it is expected to account for two thirds of worldwide e-commerce. B2C is also expected to grow, boosted by Broadband (high-speed) Internet access to more on-line households. Future advances include digital money and e-wallets, and 'personal agents' that help users find what they are looking for. Sites can work with fulfilment centres providing customers with excellent service and suppliers with information, and can support the newest trend for human interaction in E-commerce customer service. The Internet is creating unprecedented and seeming infinite opportunities for both customers and businesses. Yet it one of its major problems is that it is changing so fast that both parties are overwhelmed by the speed of change and the sheer number of choices available to them. In addition web businesses win by following rules quite different than those which traditional businesses may follow.

E-commerce appears to be exempt from the kinds of constraints that have limited companies historically. An e-commerce environment handled in a proper manner, with the right customisation of products and services, in innovative ways, can lead to win-win situations. The customers can get the right product at the right time and for the right price, companies can set new standards in efficiency and profitability.

### **1.4 INTERDISCIPLINARY NATURE OF E-COMMERCE**

Electronic commerce, being a new field, is just developing its theoretical or scientific foundations. It is based on several disciplines. The major disciplines of E-Commerce with some samples of issues with which they are concerned follow:

### ***Marketing***

Many issues of marketing offline are relevant to online E-Commerce - for example, cost benefits of advertisements and advertisement strategies. Other issues are unique to E-Commerce, ranging from online marketing strategy to interactive kiosks.

### ***Computer sciences***

Many of the issues in the infrastructure of E-commerce, such as languages, multimedia, and networks, fall into the discipline of computer sciences. Intelligent agents play a major role in E-Commerce as well.

### ***Consumer behavior and Psychology***

Consumer behavior is the key to the success of B2C trade, but so is the behavior of the sellers. The relationship between cultures and consumer attitude in electronic market is an example of a research issue in the field.

### ***Finance***

The financial markets and banks are one of the major participants in E-Commerce. Also, financing arrangements are part of many online transactions. Issues such as using the Internet as a substitute for a stock exchange and fraud in online stock transactions are a sample of the many topics of the field.

### ***Economics***

Electronic commerce is influenced by economic forces and has a major impact on world and country economies. Also, theories of micro and macro-economics need to be considered in E-Commerce planning, as well as the economic impacts of E-Commerce on firms.

### ***Management Information Systems (MIS)***

The information systems department is usually responsible for the deployment of E-Commerce. This discipline covers issues ranging from systems analysis to system integration, not to mention planning, implementation, security, and payment systems, among others.

### ***Accounting and Auditing***

The back-office operations of electronic transactions are similar to other transactions in some respects, but different in others. For example, auditing electronic transactions presents a challenge for the accounting profession; so does the development of methodologies for .cost-benefit justification.

### ***Management***

Electronic commerce efforts need to be managed properly, and because of the interdisciplinary nature of E-Commerce, its management may require new approaches and theories.

### ***Business Law and Ethics***

Legal and ethical issues are extremely important in E-Commerce, especially in a global market. A large number of legislative bills are pending, and many ethical issues are interrelated with legal ones, such as privacy and intellectual property.

### ***Others***

Several other disciplines are involved in various aspects of E-Commerce to a lesser extent- for example, linguistics (translation in international trades), robotics and sensory systems, operations research / management science, statistics, and public policy and administration. Also, E-Commerce is of Interest to engineering, health care, communication, and entertainment publishing.

## **1.5 LEVELS OF E-COMMERCE**

Electronic commerce is the process of conducting commercial transactions electronically over the Internet. This process is carried out primarily in five levels, and the main aspect of e-commerce is a merchant selling products or service to the consumers.

There are five major segments under the broader category of e-business. However, the following are some popular e-commerce models used by companies engaged in e-commerce:-

- Business to business e-commerce (B2B)
- Business to consumers e-commerce (B2C)
- Consumers to consumers e-commerce (C2C)
- Business to employees e-commerce (B2E) and
- Consumer to business e-commerce (C2B)

### **Business to Business E-commerce (B2B)**

E-business is the process of conducting business on the Internet. Its scope includes not only buying and selling but also services, fulfilling the needs of customers and collaborating with business partners.

Business to business e-commerce is smart business. The opportunity for business to business e-commerce is even greater.

A wholesaler may sell products to the retailer. There are advanced e-commerce software which support multi-tier pricing. This helps to set up online stores to offer preferred pricing to some vendors and shared price to others.

This includes internet-enabled initiatives of an enterprise to form commercial linkages with another enterprise, dealer, warehouse or manufacturer. In this form of e-commerce, e paperwork and time-to-market get vastly reduced. Throughout the world, this e-commerce mode is the biggest.

In a B2B transaction, the interaction is between businesses. For example, a website that is catching for the steel industry might have facility for buyers and sellers to list their requirements and post their products. It helps them in quickly closing the transactions and the buyer can get quality, material and can choose from different suppliers.

B2B commerce is a growing business in the e-commerce arena- with the increasing use of the internet, more and more business are realizing the commercial advantage of giving business clients a streamlined and easy manner to order products or service online. It facilitates access to the ordering process to only those with whom a concern has a commercial relationship.

Business to Business e-commerce provides small and medium enterprises (SMES) with an excellent opportunity to access new markets, improve customer service and reduce costs. And while hurdles exist, they should be viewed more as speed breakers rather than road barriers. As a medium of information storage and dissemination, the internet has and is emerging a clear winner. Its rate of penetration has far outpaced the growth of other popular media such as newspaper, radio and television.

B2B transactions are however relatively high value in nature and organizations are slow to change their traditional systems for the supply chain management. The reasons for the growth in B2B e-commerce are many. In an increasing competitive scenario, e-commerce offers highly attractive cost saving options. The shift to this process is often driven by the needs of buyers.

Innovative methods of enhancing B2B and B2C levels of e-commerce include:

- CD-ROM catalogues that are linked to the user's online catalogue, enabling him to browse offline and order online.
- Kiosks placed at physical store locations or in shopping malls to introduce users to the easy online ordering options.
- Extranets to link businesses together that conduct regular business to .business transactions and
- Affiliate programmes to drive business to your commerce site from other content related sites.



B2B e-commerce is expected to be the largest mode of transacting e-business and is a global phenomenon. It involves taking internet enabled initiatives to form commercial links with other enterprises, dealers or manufacturers. In this form of e-commerce, a business firm places orders for supplies with another business firms directly over the Internet. Paperwork and time required for processing the order and delivery of the goods are thus reduced to a great extent.

### **Business to Consumers E-commerce (B2C)**

It is for the customers to buy stores from the web. The problem to be recognized in this is to secure payment, using encryption, transaction integrity, quick response, time and reliability.

B2C e-commerce involves selling of goods and services to consumers or end users. It allows them to browse the product catalogue, select products or services and complete the order online.

In a B2C transaction, the interaction is between a consumer and the preferred business. For example, the most popular site is amazon.com, which is the first online bookseller which has proved a potential competitor to the traditional bricks and mortar booksellers such as Barrens and Noble.

In this category of e-commerce, businesses use the internet to offer to consumers sales and services around the world 24 hours a day, seven days a week and 365 days a year, The sites Amazon, Rediff and Uphar are among those belonging to this category. These websites are meant for selling goods directly to consumers through the internet. The two-way accessibility of the internet enables operating companies to directly ascertain customer preference and buying trends. Businesses are using these consumer insights to formulate marketing strategies and offer to the customers what they want and when they want. E-business in this mode significantly reduces the costs associated with intermediaries, service centres and mass marketing campaigns. Since e-commerce makes just in time delivery possible, the supplier does not have to store the goods. He can procure them from the suppliers as and when he gets the order from the buyer through the internet.

B2C is the most popular form of e-commerce, wherein the individuals are directly involved in B2C e-commerce, and businesses use the internet for offering their products or services 24 hours a day through global access. The sites Amazon.com and Rediff are among these. These websites spell goods directly to consumers over the Internet. The two way accessibility feature of the internet enables operating companies to ascertain consumer preferences and buying trends directly.

### **Consumer to Consumer E-commerce (C2C)**

Here interaction is between consumer to consumer. For example, in sites like e-Buy Bid or Buy.com, Baazi.com which are auction sites, one can virtually sell and buy any goods (either used or new ones). This form of e-commerce is nothing but the cyber version of the good old auction houses. If anyone wants to sell anything, all one has to do is post a message on the site, giving details of the product and the expected price and wait for an interested customer to turn up and buy it. The buyer gets in touch with the seller through the Internet and the deal is crossed once the amount is finalised. Online message boards and barbers are also examples of C2C e-commerce.

### **Consumer-to-Business E-commerce (C2B)**

E-commerce, by empowering the customer, has been strategically redefining business. An example of C2B model of e-commerce is the site Price line.Com, which allows prospective airline travellers, tourists in need of hotel reservations etc. to visit its websites and indicate their preferred price for travel between any two cities. If an airline is willing to issue a ticket on the customers offered price, the consumer can then travel to the mentioned destination at his terms.

### **Business to Employees E-commerce (B2E)**

This is concerned more with marketing a corporation's internal processes more efficiently. Customer care and support activities also hold ground. The requirement is that are all self-service with applications on the web that the employees can use themselves.

## 1.6 SWOT ANALYSIS

### Evaluating Business Unit Opportunities

Now that we have learned how to identify industry value chains and break each value chain down into strategic business units, we can learn one popular technique for analyzing and evaluating business opportunities. Most electronic commerce initiatives add value by the reducing transaction cost, creating some type of network effect, or a combination of both. In SWOT analysis (the acronym is short for Strengths, Weaknesses, Opportunities and Threats), the analyst first looks into the business unit to identify its strengths and weaknesses. The analyst then reviews the environment in which the business unit operates and identifies opportunities presented by that environment and the threats posed by that environment. As shown in the following figure which shows the questions that an analyst would ask in conducting a SWOT analysis.

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• What does the company do well?</li> <li>• Is the company strong in its market?</li> <li>• Does the company have a strong sense of purpose and the culture to support that purpose?</li> </ul>	<ul style="list-style-type: none"> <li>• What does the company do poorly?</li> <li>• What problems could be avoided?</li> <li>• Does the company have serious financial liabilities?</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Are industry trends moving upwards?</li> <li>• Do new markets exist for the company's products/services?</li> <li>• Are there new technologies that the company can exploit?</li> </ul>	<ul style="list-style-type: none"> <li>• What are competitors doing well?</li> <li>• What obstacles does the company face?</li> <li>• Are there troubling changes in the company's business environment (technologies, laws, and regulations)?</li> </ul>

By considering all of the issues that it faces in a systematic way, a business unit can formulate strategies that will take advantage of its opportunities by building on its strengths, avoiding any threats, and compensating for its weaknesses. In the mid- 1990s, Dell Computer used a SWOT analysis to create a strong business strategy that has helped it become a very strong competitor in its industry value chain. Dell identified its strengths in selling directly to customers and in designing its computers and other products to reduce manufacturing costs. It acknowledged the weakness of having no relationships with local computer dealers. Dell faced threats from competitors such as Compaq and IBM, both of which had much strong brand names and reputations for quality at that time. Dell identified an opportunity by noting that its customers were becoming more knowledgeable about computers and could specify exactly what they wanted without having Dell salespersons answer questions or develop configurations for them. It also saw the Internet as a potential marketing tool. The results of Dell's SWOT analysis appear in following figure:

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Sell directly to consumers.</li> <li>• Keep costs below competitors' costs.</li> </ul>	<ul style="list-style-type: none"> <li>• No strong relationships with computer retailers</li> </ul>

Opportunities	Threats
• Consumer desire for. one-stop shopping	Competitors have stronger brand names.
• Consumers know what they want to buy. • Internet could be a powerful marketing tool.	Competitors have strong relationships with computer retailers.

The strategy that Dell followed after doing the analysis took all four of the SWOT elements into consideration. Dell decided to offer customized computers built to order and sold over the phone, and eventually, over the Internet. Dell's strategy capitalized on its strengths and avoided relying on a dealer network. The brand and quality threats posed by Compaq and IBM were lessened by Dell's ability to deliver higher perceived quality because each computer was custom made for each buyer

## 1.7 THE BENEFITS OF E-COMMERCE

Few innovations in human history encompass as many potential benefits as E-Commerce does. The global nature of the technology, low cost, opportunity to reach hundreds of millions of people, interactive nature, variety of possibilities, and resourcefulness and growth of the supporting infrastructure (especially the web) result in many potential benefits to organizations, individuals, and society. These benefits are just starting to materialize, but they will increase significantly as E-Commerce expands. It is not surprising that some maintain that the E-Commerce revolution is just 'as pro- found as the change that came with the industrial revolution.

### *Benefits to Organizations*

The benefits to organizations are as follows:

- Electronic commerce expands the market place to national and international market with minimal capital outlay, a company can easily and quickly locate more customers, the best suppliers, and the most suitable business partners worldwide.
- Electronic commerce decreases the cost of creating, processing, distributing, storing, and retrieving paper-based information. For example, by introducing an electronic procurement system, companies can cut the purchasing administrative costs by as much as 85 percent.
- Ability for creating highly specialized businesses. For example, dog toys which can be purchased only in pet shops or department and discounts stores in the physical world are sold now in a specialized [www.dogtoys.com](http://www.dogtoys.com) (also see [www.cattoys.com](http://www.cattoys.com)).
- Electronic commerce allows reduced inventories and overhead by facilitating “pull” type supply chain management. In a pull-type system the process starts from customer orders and uses just-in-time manufacturing.
- The pull-type processing enables expensive customization of products and services which provides competitive advantage to its implementers.
- Electronic commerce reduces the time between the outlay of capital and the receipt of products and services.
- Electronic commerce initiates business processes reengineering projects By changing processes, productivity of salespeople, knowledge workers, and administrators can increase by 100 percent or more.

- Electronic commerce lowers telecommunication cost the internet is much cheaper than value added networks.
- Other benefits include improved image, improved customer service, new found business partners, simplified processes, compressed cycle and delivery time, increased productivity, eliminating paper, expediting access to information, reduced transportation costs, and increased flexibility.

### ***Benefits to Consumers***

The benefits of E-Commerce to consumers are as follows:

- Electronic commerce enables customers to shop or do other transactions 24 hours a day, all year round, from almost any location.
- Electronic commerce provides customer with more choices; they can select from many vendors and from many more products.
- Electronic commerce frequently provides customers with less expensive products and services by allowing them to shop in many places and conduct quick comparisons.
- In some cases, especially with digitized products, E-Commerce allows quick delivery.
- Customers can receive relevant and detailed information in seconds, rather than days or weeks.
- Electronic commerce makes it possible to participate in virtual auctions.
- Electronic commerce allow customers to interact with other customers in electronic communities and exchange ideas as well as compare experiences.
- E-commerce facilitates competition, which results in substantial discounts..

### ***Benefits to Society***

The benefits of E-Commerce to society are as follows:

- Electronic commerce enables more individuals to work at home and to do less traveling for shopping, resulting in less traffic on the roads and lower air pollution.
- Electronic commerce allows some merchandise to be sold at lowest prices, so less affluent people can buy more and increase their standard of living.
- Electronic commerce enables people in third world countries and rural areas to enjoy products and services that otherwise are not available to them.
- Electronic commerce facilitates delivery of public services, such as health care, education, and distribution of government social services at a reduced cost and/or improved quality. Health care services, e.g., can reach patients in rural areas.

## **1.8 THE LIMITATIONS OF E-COMMERCE**

The limitations of E-Commerce can be grouped into two categories which are:

- Technical limitations and
  - Non-technical limitations

### ***Technical Limitations of E-COMMERCE***

The technical limitations of E-Commerce are as follows:

- There is a lack of system security, reliability, standards and communication protocols.
- There is insufficient telecommunication bandwidth.
- The software development tools are still evolving and changing rapidly.
- It is difficult to integrate the Internet and E-Commerce software with some existing applications and databases.
- Vendors may need special Web servers and other infrastructures in addition to the network servers.

- Some E-Commerce software might not fit with some hardware or may be incompatible with some operating systems or other components.
- As time passes, these limitations will lessen or be overcome; appropriate planning can minimize their impact.

### ***Non-technical Limitations***

Of the many non-technical limitations that slow the spread of E-Commerce, the following are the major ones:

#### **Lack of Awareness**

The biggest challenge before successful e-commerce over the Net is that of changing the minds and attitudes of the merchants in tune with the emerging information technology. Further, optimism and strategic business projections are required. If e-commerce has to be an alternate means of doing business in India, a new awareness is needed, something that would cut through the hype and U.S. look alike.

Most of the business people do not understand the significance and implications of the electronic business medium or are unsure of the quality and delivery schedule, physical delivery of goods and mode of payment. Lack of awareness of the technology and its potential benefits are also equally responsible for the poor growth of e-commerce. Lack of interest and willingness to make a paradigm shift has become a crucial issue. Many companies are not willing to accept that their businesses need a revolutionary change to subsist in the potentially digital world. In short, information technology should not be looked upon as an end but as a means to achieve overall development. The IT sector is people intensive, ensuring vast employment opportunities.

The single most important challenge today pertains to increasing awareness of the benefits of e-commerce to potential customers, educate the market and the customers will themselves opt for these services. So, the e-commerce fraternity should accept the fact that the customers are extremely demanding and that they should be geared up towards this end and surpass the expectations of customers. .

#### **Lack of Infrastructure**

E-commerce infrastructure development is at its infancy stage in India. This unsatisfactory development is yet another major bottleneck for successful net business in India. The lack of infrastructure, if made available as required, will ensure that the investment in e-commerce starts flowing in because the business is happening and infrastructure will grow. To improve the country's wide infrastructure, major players must come forward to contribute their pie of technology. All the infrastructure framework needed for virtual e-commerce has not been there from the very beginning when it was started, there was a cry for the real shape of the virtual infrastructure for initiating successful e-commerce. This high cost of infrastructure development for e-business is also including the cost of leased lines.

#### **Lack of Confidence**

The people in India still show hesitancy in buying through the Net. Lack of quality products, timely delivery of products as some of them tend to go out of stock, lack of solutions security are the potential reasons for not developing e-commerce. People do not understand this new way of buying and selling products, i.e. the services in a digital environment which are available online.

#### **Skeptic Attitude**

Though the Internet is continuing to grow at a rapid rate, along with e-commerce transactions, the shoppers are still skeptical about safety and have not been quick to trust sending personal information

such as credit card numbers or address over the Net. Lack of adequate imagination and understanding of what web-based technologies can do to markets and competition only adds to the delay in economic development. The old business habits are demanding and controlling the business. The risk adverse attitude of the people is conspicuous and waiting for others to lead is also another attitude.

### **Credit Cards Frauds**

In India, distribution channels are just one part of the problem related to e-payments. The bigger problem is that of security. All credit cards related transactions are approved offline and given the high incidence of frauds, the banks are extremely wary of approving them. In-fact, there are some unconfirmed reports of a multi-national bank refusing to approve credit card transactions carried out by a large Indian portal.

Other drawbacks may include that the buyers are quite prepared to boot the real mail for e-mail. The e-tailers themselves are not yet ready to keep pace with the potential e-commerce and this brings us to another point. Although e-commerce has the ingredients of being successful, it may have come slightly ahead of its time. The e-commerce mechanism eliminates the need for intermediaries. Unfortunately, this also has negative effects. So, security needs to be extended to customers to gain their loyalty including substantial business.

### **Absence of Tax Laws**

E-commerce over the Net has effectively eliminated national borders. This has posed an important question as to tax on the transactions over the internet. Net business posed many peculiar technological and legal problems making it difficult to impose tax and formulate a sound taxation policy. The following are the various tax implications of e-commerce:

- There is no fixed physical location for the internet.
- It is difficult to monitor or prevent transmissions of information or electronic cash across the Net.
- Neither the users, administrators nor intermediaries have any control on the type of information, either transactions or cybercash and traveling through their networks.
- There is no emphasis on national boundaries, and messages travel across the boundaries of several countries globally. So, it means no difference, whether the information or electronic money sought to be transmitted are within one jurisdiction or between several.
- A person's location and identity is necessary for tax purposes. Since these two are difficult, the anonymity on the Net would pose a big problem for taxations.
- Electronic commerce eliminates intermediaries or middlemen. Though it is an advantageous feature, it also has negative effects because they could have served as leverage points for collection of tax also as information sources for transactions entered by the customers.
- In addition to technology problems, certain legal hurdles may also be encountered with reference to international taxation laws.
- The difficulties in defining service incomes as distinguished from sale of products, income or royalties cannot be ignored. So, it is desirable that the Net be turned as a potential free trade zone.

### **Cyber Laws**

Another important problem is lack of comprehensive cyber laws so as to ensure safety and protection. There should not be any legal regulations, or barriers to faster and increased development of e-commerce. The crying need of the hour is urgent action to be taken by the Government to enact cyber laws including electronic fund transfer, and amendments of official Secrets Act.

Cyber laws are not in place. In other countries, the business community is moving fast ahead, and stringent government regulations are there. The technology is changing the business paradigm so fast; government's ability to proactively change the law is a very difficult task.

In addition to them, the fear regarding the security aspects of online transactions without proper government directives and the existing policy machinery contribute to cyber criminality. Adding to them, separate cyber laws and amendments are also required to many existing laws like Companies Act, Evidence Act, Copyright Act, Bankers Book Evidence Act, Indian Penal Code, Contract Act etc. The country entered into a cyber space and documents through the computers should be made acceptable in a court of law. This is actually a big hurdle on the way which would solve one big hurdle for the business-to-business and business- to-customers e-commerce segment.

### **Stock Dilemma**

Many people are not too happy with e-commerce trends. Though online shopping may be growing but so is frustration with it. A key source of dissatisfaction is the out of stock dilemma. In most cases, advertised products or services are not available. The options of feedback and not receiving suggestions are also reasons for annoyance. Many online consumers want more detailed information on their purchases but are not available. The Net is becoming more main-stream and the expectations are also becoming more mainstream.

### **Lack of True Strength**

The presence on the web alone will not always ensure successful e-commerce. Having a website or dot com is no longer a novelty and merely setting up a website will not help companies in increasing the volume of business. They must accept the true strength of this new electronic medium of business and its potential for improving efficiency in extending services to the consumers.

There are many people who are connected to the internet but cannot browse the web and they are only availing the e-mail facility for communication.

### **Lack of Skills and Expertise**

Lack of skilled and trained personnel impedes the growth of implementation of IT related e-commerce. The use of the Net for trade requires a complex introduction of servers, browser software and knowledge of web design, hosting, promotion and many more skills. It requires understanding many new things. Many Indian businesses are not prepared to approach electronic commerce. For many business houses for which commerce over internet may not work, would take a lot of efforts for every little return.

### **Internet Outrage**

Failures in networks and the Net itself can play havoc. We read of frequent press reports of internet outrages. The IT industry is not yet attempting to improve network reliability to prevent these outrages. Reliability is a major issue in net business that needs to be attended.

Though worldwide, many business people looking at e-commerce as a blessing, many people also perceived the cyber space as a threat. There are also reported evidences of enforcing new censorship regimes to prevent cyber crimes.

### **Absence of Cyber Brand Image**

Another problem is that advertising on the Net tends to focus on e-commerce rather than on brands found in the real world. This would prove to be a deterrent in ensuring consumer loyalty.

The biggest thing going for it is a brand image and power. Though the already existing name is known and trusted, the issue is how to extend it into the new cyber reality. A concern should be to preserve

the old values of trust and dependability of the brand, and at the same time, keep it upon on the Net. At the same time, the whole business structure will have to undergo a change re-engineered.

### **Inadequate Government Role**

The government is not taking a serious view of e-commerce related information technology in terms of its promotion. Spreading awareness, imparting education, of the benefits of e-commerce, enacting new cyber laws, amendments to existing commercial laws, developing strong, communication infrastructure are the key domestic roles for the government to play. A very small portion of PC owners, non-owners who are aware of e-commerce perception and about the Internet is there which is being identified as the source of information, communication, learning and entertainment, but relatively few amongst them feel that it is a source of purchasing products or services. Government is not playing an active role by enacting different comprehensive cyber laws, bringing amendments to the existing business laws, not formulating a favourable IT policy and not making positive intervention when needed and ensuring adequate infrastructure. The existing negative business environment for development of new IT and telecom technologies cannot be ignored. Technology/solutions providers, special bodies and organisations are not taking suitable steps to educate Indian traditional business persons and customers in the area of e-commerce.

### **No Emphasis on Commercial Exploration**

E-commerce is not so popular and widespread in India rapidly because of several bottlenecks like content migration. Most of the PC users surf the Net for information rather than potential commercial transactions. This means that the market for this migrated content is very large. Many owners use the Net for learning, education, games and entertainment. To convince e-consumers, e-merchants will have to do a lot of education. Many business houses evidently do not come forward to leverage on some projects in the electronic commerce spectrum as it has already done at high speed overseas.

### **No Encouragement from Business Community**

The business community is extremely an important sector to be targeted for the introduction of any technological innovations in business. It means it is the business community that sustains e-commerce and greatly influences the thinking and adoption process of various segments of the society to move forward in the field of information technology. It motivates the people who share the courage and conviction to move the new business paradigm.

### **Preferring Foreign Sites**

Online shoppers in India do not prefer Indian websites to a large extent and prefer US and other foreign websites. There are many reasons for this as they provide better selection, prices, stock, quality products, shipping, payment process security, customer service and wide variety of sites among other things.

### **Inactive Indian Software Houses**

Software houses particularly in India are not devoted to ensuring strong expertise in the supply chain and distribution management solutions. Efforts are lacking to ensure strategic working on development of systems which will provide a comprehensive open-e-business solutions environment, comprising of enterprise applications, internet applications and service and a special technology to enable companies to participate in the emerging online economy.

Technology is in abundance. The hardware and software makers are yet to work out strategies to ensure e-business privacy and security solutions to Net users in India. The technologists who are out of touch with the market, customers and competition need to work out options and set business strategies.



## **Cyber Competition**

It is becoming clearer that cyber structure is not enough to support cyber growth. Such a growth rate needs proper planning and world class global supply chain parameters. The profit strapped, not-struck cyber entrepreneurs have no vision and invest money on this.

One should not forget about low entry barriers, and as a result, cyber competition is perhaps more fierce. Cyber competition needs improvement in better contents, faster delivery of services and online support. It is a great task to pacifying angry live customers and then think how difficult it is to e-reassure a lost one. This means again more investment and more capitalization which is further from break-even.

## **Difficulty of Reengineering**

The web business structure will have to undergo a drastic change and be reengineered. It is not just about having a website or about sticking a web address on conventional advertising or transferring a few people to a new division and designation. It is about breaking free and creating new web services to satisfy the existing customers.

## **Internet for Small Business**

Another problem is that for major project, a large consumer product company needs profiling of customers who undertake transaction through e-commerce.

E-commerce is still being dominated by large corporations. Small and medium sized business houses have to take advantage of everything on the Net. Online shopping is clearly catching on with consumers and retailers need to keep pace with growing demands.

## **Blocking and Censorship**

People worldwide are under virtual slavery. It has been ISS reported in some media that many countries are blocking their citizens from accessing the Net, either partially or wholly. Censorship is enforced by some countries by stopping either a total ban on the Net or controlling the access traffic or installing filters blocking access to websites. Indian citizens enjoy unprecedented degree of freedom of speech and therefore may constitute a threat to the government. Development in any field may prove detrimental if it does not appreciate the code of ethics.

## **Infant Stages**

Electronic commerce is still in its infant stage. Indian commerce is establishing itself in the area of internet business. The concept of e-commerce is still in evolutionary stage, it is a job that still needs to be defined. The IT function has not grown beyond the marketing department and credit cards, merchant accounts, digital signatures and prompt payment and one has to realize that the e-commerce role is more about harnessing technological resources to deliver profits to the Net users. Only a few Indian big houses have gone online to explore the potentials of e-commerce.

E-commerce has yet to take off in India, because Indian consumers are wary of leaving their re credit card numbers on the Net. They eye the neighbourhood shopkeeper with suspicion and drive a hard bargain. So, e-commerce websites are losing thousands of customers.

## **1.9 KEYWORDS**

**E-Commerce:** Digitally enabled commercial transactions between and among organizations and individuals.

**EDI:** Electronic Data Interchange, means a way to exchange standard documents in intra or inter organizations.

**B2B:** Business to Business, means e-commerce transactions taking place between business to business organizations.

**B2C:** Business to Consumers, means e-commerce transactions taking place between business organizations and consumer directly.

**C2C:** Consumers to consumers e-commerce, means e-commerce transactions taking place between consumer to consumer.

**B2E:** Business to employees e-commerce, means e-commerce transactions taking place between business organizations to employees.

**C2B:** Consumer to business e-commerce, means e-commerce transactions taking place between consumers to business organizations.

**Cyber Law:** Cyber law is that law which is used to deal with all cyber crimes, i.e., crimes done on internet.

## **Lesson Two**

### **FRAMEWORK OF E-COMMERCE**

#### **2.1 INTRODUCTION**

Electronic commerce is the ability to perform transactions involving the exchange of goods or services between two or more parties using electronic tools and techniques. Long employed by large businesses and financial service organizations, several factors are now converging to bring electronic commerce to a new level of utility and viability for small businesses and individuals - thereby promising to make it part of everyday life.

These enabling factors include improved broader competitive access to networks, and the reduced cost and increased user-friendliness of both general-purpose computers and specialized devices. The rapid growth of primarily the Internet and other on-line services, convenient point-of-sale payment systems, and automated teller machines all set the stage for broad-scale electronic commerce. Further, with relentless pressures of competition at all levels of the economy, the efficiencies offered by electronic commerce are becoming hard to ignore.

#### **2.2 INFORMATION PROVIDERS**

Traditionally, in the physical world, we distinguish between three different types of information-driven companies: those that create content (e.g. TV production), those that define the form or format (e.g. recording studio) and finally those that provide the distribution medium (e.g. TV broadcasting station and cable operators). Companies that are targeting vertical markets need access in all three areas.

#### **2.3 E-COMMERCE FUNCTIONS**

The following ten functions must be provided in order to EC to occur; in essence, they are the enablers of EC:

- Standards setting body
- WAN service provider
- Hosting service (i.e. data center)
- Software developer
- Certification authority
- Publisher/Aggregator (presence provider)
- Copyright broker
- Metering authority
- Auditing authority
- Information consumer

The provision of the above ten E-Commerce functions does not necessitate the involvement of an equivalent number of parties; many of these will be carried out by the same provider. For example, the Hosting Service can be the same organization as the Publisher/Aggregator.

#### **2.4 ELECTRONIC COMMERCE: A GENERIC FRAMEWORK**

E-commerce is related to execution of business transactions through electronic messaging devices, there have been a lot of changes in the traditional business models to incorporate advantages offered by e-commerce. The old 'brick-and-mortar' businesses are finding ways to incorporate the activities to gain advantages from the avenues opened by e-commerce, while on the other hand there is a swarm of new entrepreneurs in race to establish themselves in the new digital marketplace. But like in real physical

markets only those will survive who have a strong fundamental framework based on sound business and market understanding. As e-commerce is rather evolving at a fast pace, the importance of developing business models on such sound frameworks is accentuated. Such a framework needs to encompass within itself the basic and supportive infrastructure and business applications as well as the basic issues that are needed to be kept in mind while developing the e-commerce business model. There are certain basic considerations that should be kept in mind while developing such a generic framework for e-commerce. These are as listed below.

### **1. Interoperability**

Electronic commerce must be based on a common set of services and standards that ensure interoperability. Preferably, service providers and application designers will be able to use these services and standards as building blocks that can be combined, enhanced, and customized.

### **2. Flexibility and Forward integration**

E-commerce as said above is constantly improving. And as it does so, new services and business application areas will emerge. It is thus very much logical that any generic framework developed for e-commerce shall be able to accommodate future enhancements and trends in the infrastructure, industry and applications.

### **3. Involving latest technological and applications**

As the technological and business logic develops in its natural flow, e-commerce framework should be able to incorporate those newer technologies and business logic. An example of such possible business logic will be the payment systems that shall be developed along the path of development of the field. The generic framework of e-commerce should be able to acknowledge and accept such advancements, especially in the field of electronic payment systems.

### **4. Backward Integration**

There will be many business enterprises that will shift from traditional commerce to electronic commerce. These traditional business enterprises are bound to be using their own "legacy systems." These include paper checks, mainframe-based settlement and payment systems, and EDI VANs. It is very much logical to expect that these legacy systems will not vanish overnight. A successful electronic commerce infrastructure must let the user transfer easily and transparently between these older systems and newer, all-electronic systems, applications, and processes.

### **5. Media Convergence**

Electronic commerce transactions involve all kinds of legacy and newly developed devices and media, and networks over which these are delivered. A generic framework developed for Electronic commerce must be able to take into its stride the ability to accommodate the plethora of technologies, devices and their convergence, needed to reach and sustain the mass market.

### **6. Information-intensive products**

These products are actually enabled by information technology, not just distributed more efficiently by it. Information products include electronic publications, catalogs, videos, and the like, as well as interactive video games, software programs, electronic tokens, customized design specifications, and even electronic keys to hotel rooms, cars, storage compartments, and airport boarding gates. Many of these products will not be simply "offered" by a vendor; they will be designed or tailored by a customer. Customers can, for example, choose their own selection of articles to be bound in an electronic book, or customize their own

clothing designs. This capability adds a customer-driven activity - a design phase - to the purchase cycle. It is likely that for these products, ordering, billing, payment, and distribution would be tightly integrated and happens virtually simultaneously.

## **7. New revenue collection methods**

Electronic commerce need to support advanced types of revenue collection in addition to traditional methods (e.g., payment upon receipt, payment in advance, etc.). For example, an information product service provider could distribute its product widely and charge on a usage basis; that is, charge the customer only when the information (be it a software program, digital document, or electronic key that opens and starts a rental car) is used. One innovative approach that permits usage accounting and payment is called meterware. It provides local hardware and/or software to record and bill customers continuously based on their product usage. Meterware, electronic cash and checks that don't need an online payment processor, and other advanced revenue collection ideas create opportunities for reaching new customers and for distributing products and services. These methods make a lot of sense in a low distribution cost environment supported by the electronic commerce infrastructure.

## **8. Legacy systems**

Many “legacy systems” exist in the electronic commerce domain. These include paper checks, mainframe-based settlement and payment systems, and EDI VANs. None of these legacy systems will go away overnight: A successful electronic commerce infrastructure must let the user transfer easily and transparently between these older systems and newer, all-electronic systems, applications, and processes.

## **9. Transaction devices**

Electronic commerce transactions involve all kinds of legacy and newly developed devices and media, and networks over which these are delivered. Electronic commerce must accommodate the technologies and devices needed to reach and sustain the mass market. A framework developed with all of these needs and considerations in mind form the strongest basis for a powerful and useful electronic commerce infrastructure. We next describe the specific activities and functions this infrastructure must support.

### **Activities and Functions**

- advertising and shopping,
- negotiating,
- ordering,
- billing,
- payment and settlement,
- distribution and receipt,
- accounting,
- customer service, and
- information and knowledge processing.

The specific functions associated with these activities in an electronic commerce setting are discussed below. Note that not all of these activities are performed in every transaction, nor are they necessarily performed in this order; indeed, they may be performed in parallel. Also, all activities are not necessarily conducted electronically. Finally, these activities can vary in complexity and importance depending on the transaction's size and scope.

### **Advertising and Shopping**

This activity can include

- searching and browsing electronic directories and catalogs on a network;

- enabling intelligent agents for various purposes on behalf of one or many buyers and/or sellers;
- buyers sending electronic requests for proposal (RFPs) and sellers responding with various offers;
- sellers advertising their products and services; and
- electronically navigating network-accessible services.

A major problem associated with the advertising and shopping activity is the cost and time expended in developing, maintaining, and finding relevant information, products, and services, given the plenitude of available information. Obviously, this problem will become increasingly complex as more data and services become available online and the choices and possibilities multiply exponentially. We need better ways to find and offer services and products.

### **Negotiating**

Buyers and sellers may elect to negotiate the terms of a transaction - that is, the terms of exchange and payment. These terms may cover delivery, refund policies, arranging for credit, installment payments, copyright or license agreements, usage rights, distribution rights, etc. These terms can be standardized for routine commodity use, or customized to suit more unique individual situations. Often, in the case of two parties with a well-established business relationship, the terms of exchange are pre-negotiated as standing contractual terms for all their future exchanges. This process will frequently also include authentication of the two parties.

### **Ordering**

The buyers eventually issue a contractual agreement of the terms of exchange and payment. This contractual agreement is generally issued as an order that sets forth the quantity, price, and other terms of the transaction. The order may be verbal, in writing, or electronic. It usually includes an acknowledgment of agreement by the various parties to help prevent any future repudiation. This agreement can be confirmed in a secure way, electronically safeguarded by cryptographic techniques such as digital signatures. In the case of some commodity purchases, the entire transaction may begin at this ordering stage, bypassing the advertising/shopping and negotiating activities. The ordering activity applies to all transactions, regardless of whether billing will be involved. Even requests for free public information should be issued as formal orders so that the service provider can record and account for information requests.

### **Billing**

Once a seller has delivered goods or services, a bill is sent to the buyer. This bill generally includes remittance information that should accompany the payment. Sometimes, a seller may require payment in advance. Sometimes, a supplier sends advance shipping notification, and the customer agrees to authorize payment upon confirmation of the arrival of the products. And in some cases, as with the free information example cited above, this activity is eliminated entirely.

### **Payment and Settlement**

The buyer, or some financial intermediary, eventually sends some form of electronic payment (this could be some form of contract or obligation, such as authenticated payment instructions or digital cash), usually along with some remittance information to the seller. This payment may be sent for a single item, on a usage basis, or for multiple items or usage. Settlement occurs when the payment and remittance information are analyzed by the seller or the seller's agent and accepted as valid.

### **Distribution and Receipt**

Either before, after, or concurrent with payment, the seller arranges for delivery of the purchased goods or services to the buyer; and the buyer provides the seller with proof of receipt of delivery. Policies regarding customer satisfaction and return should be negotiated prior to this activity and made part of the contract between buyer and seller. For larger, more complex orders, distribution may involve more than two parties

and entail complicated distribution coordination strategies. An ancillary distribution service involves acting as a fiduciary and holding goods, certificates, bonds, stocks, etc., in trust.

### **Accounting**

This activity is particularly important to corporate customers and suppliers. Both buyer and seller must reconcile all electronic transactions in the accounts receivable and accounts payable, inventory information, and accounting systems. Account and management information system records must also be updated. This activity can involve third parties if the transacting businesses outsource their accounting services.

### **Customer Service**

- Customer service entails:
- providing the buyer with timely information as to the progress of the transaction;
- handling customer requirements when transactions go awry - i.e., resolving any mistakes, disputes, or complaints concerning product quality, delivery, or payment (this includes managing returns and refunds, further exchanges, and/or repairs); and
- providing expert advice and assistance in the use of the products and services.

Customer service concerns may also include providing general cash management advice, including addressing foreign exchange imbalances and risk exposures; collecting delinquent payments and late fees; and repossessing products for which payment is long. A framework developed with all of these needs and considerations in mind will form the strongest basis for a powerful and useful electronic commerce infrastructure.

### **Figure 2.1: Framework of E-Commerce**

#### ***Insert Figure***

A generic e-commerce framework can be explained in two basic parts;

1. The E-Commerce core consisting of basic infrastructure which will enable the e-commerce activities, and
2. A five-corner web of basic issues that will ultimately shape all e-commerce efforts.

### **THE E-COMMERCE CORE**

Following a bottom-up approach, e-commerce core can be described as a three-layer hierarchical architecture where each subsequent layer is based upon the lower layers. The three layers, starting from the lowest layer are:

#### **Content Development Deployment and Distribution Infrastructure**

This layer will include all hardware and network infrastructure that will act as physical infrastructure to enable e-commerce transactions. This will include:

##### **Content Development Infrastructure**

- Multimedia Publishing Infrastructure (to create multimedia contents for business applications)
- Multimedia Storage Infrastructure (to provide for efficient and organized storage facilities for efficient and quick retrieval and deployment of multimedia contents)
- Multimedia Deployment Infrastructure (to search and retrieve multimedia contents from their storage locations)

##### **Distribution Infrastructure**

- Network Access Device Infrastructure (independent and internally controlled by merchants and consumers)

- Infrastructure installed by Network Service Providers (includes Local-on-ramp service providers, National Data and Information Carriers, Third-party Value Added Networks and other Network Service Providers)
- Global Information Delivery Networks (includes sub-marine cables, Intercontinental optic fiber networks, satellite networks and other such networks forming backbone of global communication networks)

### **Services Enabling Infrastructure**

This layer include all vendors and other parties engaged in the business activities which facilitate e-commerce transactions in any fashion. The list of such business activities may include following:

1. Securing Business Transactions by providing hardware and software solutions to counter both physical and logical security threats (this includes development of encryption technology and standards, development of standards and technology for restricting physical access to the e-commerce equipments).
2. Development of secure Electronic Payments Fund Transfer systems
3. Third-party verification and authentication services
4. Developing standards and formats for content creation, distribution and deployment (this includes development of multimedia formats, conversion software, software development kits, development of standards and protocols for data transmission, and other such infrastructure)
5. Development and deployment of technologies enabling convergence of different media (this includes convergence of content, transmission technologies and information access devices.
6. Offline Support Services provided by traditional 'brick-and-mortar' support service providers (this includes services like distribution and logistics etc

### **2.5 ELECTRONIC COMMERCE BUILDING BLOCKS: OBJECTS AND OBJECT CLASSES**

The activities and functions of electronic commerce need certain basic building blocks, namely,

- unstructured information (reports and freeform text, voice, and video);
- structured information (EDI messages, electronic forms, contracts and contact rules, design specifications);
- accounts, account databases, and accounting rules;
- transactions;
- records;
- agents and brokers (information filters, translators, trusted third parties);
- objects for sale (movies/videos, software objects, contracts, information, documents); and
- decision support models and simulations.

These building blocks are likely to become the standard digital objects of commerce; over time, they will probably become increasingly comprehensive and refined

### **BUSINESS APPLICATIONS**

This layer corresponds to the real business transactions that take place using the digital messaging technologies. A few of the common business applications that can be offered online can be listed as below:

- Online Education and Learning (Education-on-Demand, Distance e-Learning, Virtual Classrooms)
- Online Marketing Communication and Promotion
- Online Shopping
- E-procurement and e-purchasing
- Online Gaming
- Online news and bulletin boards.
- Online Customer Feedback and Satisfaction Surveys



- Online Research
- Online Retailing and Sales
- Online After Sales and Complaint Redresses
- E-Auctions
- Online Stock Trading and Brokering
- Online Entertainment
- Digital Video and Animation
- Online Banking Services (including ATM networks)
- E-Publishing
- Supply Chain Management
- Online Catalogues and Directories
- Remote Inventory Management
- Online knowledge and information processing

## **ISSUES INVOLVED IN E-COMMERCE**

### **Financial Issues**

- Customs and Taxation
- Electronic Payments and Fund Transfers

### **Legal and Regulatory Issues**

- Uniform Commercial Code
- Intellectual Property Protection
- Privacy
- Security, Confidentiality and Integrity
- Protection of Consumer Rights and Interests
- Content Liability
- Dispute Resolution and Jurisdiction

### **Market Related Issues**

- Market Development Stage
- Competition
- Customer Orientation
- Trust and Reliability

### **Network Protocols and Technical Standards**

- Transmission Protocols and Standards
- Multimedia Formats
- Hardware Standards
- Interoperability
- Backward and Forward Integration of Hardware and Software
- Documentation Specifications
- Compatibility
- Acceptability of Standards

### **Socio-cultural Issues**

- Perceived Economic Appeal
- Attitude towards e-commerce
- Usability (will define the default navigation patterns)
- Lifestyle
- Demographics of Target Market

- Purchase potential
- Social and Religious Dynamics

## **2.6 E-COMPATIBLE LEGAL AND FINANCIAL FRAMEWORK**

All over the world, globalization and the new information and communication technologies that are restructuring the commercial distribution circuits are reinforcing the linkages between internal and external trade. Even developing countries like Kenya, therefore, can no more treat the internal and external sectors in isolation. The legal and financial framework for one sector directly affects the other sector. While the regulations and rules which govern commercial operations remain mostly local or national in scope, the growth of e-commerce will increasingly call into question the ability of public authorities to impose their prerogatives on national markets and international trade by their companies and citizens.

### **Legal framework**

Legal issues encompass two basic areas—those of regulation, and those of making legal systems compatible to and for e-commerce. The latter, though perceived as being facilitator in content, requires the former for it to be effectual. There are in fact many things that governments might reasonably want to regulate on the Internet. These include not just serious affronts to human values such as child pornography and incitement to tribal or racial hatred, but also consumer protection, the defense of intellectual property rights, and taxation. These are all issues on which countries legislate already. The existing rules and laws would and should apply to the Internet and e-commerce. The problem is not whether the Internet should be regulated, but how. This entirely new sort of communication poses several entirely new sorts of problem for regulators. A legal framework for e-commerce has been provided by the Information communication Technology Act.

The ICT Act essentially seeks to address three areas or perceived requirements for the digital era:

- a. to make possible e-commerce transactions—both business to business and business to consumer
- b. to make possible e-governance transactions—both government to citizen and citizen to government
- c. to curb cyber crime and regulate the Internet.

### **E-Governance**

E-governance implies action and commitment of the state and its agencies at two levels:

- a. It involves the promotion of the information and communication technologies and, especially, e-commerce, on the one hand, and
- b. The adopting of these technologies and all they involve in the matter of a completely new type of commitment, open systems and use of the medium of the Internet for government business, citizen interaction, and most important, for development.

Fortunately today several e-governance projects are underway in several states of Kenya. The introduction of e-governance could turn out to be one of the most far-reaching and progressive steps in Kenya. Not only does it signal a commitment of government to the use and introduction of IT for efficiencies in government services and citizen interface but it could also be the most potent weapon against the emerging and growing digital divide.

### **Some of the challenges in this regard are:**

- Handling the feudal mindset—information is seen as power and those having it do not wish to give it up.
- Implementation requires change management and re-engineering of government agencies, and not so much of technology.
- Transparency, i.e. the issue of making government dealings (including procurement) transparent and thereby reducing corruption.

- Labour and Union problems in government (as these are perceived to be a threat to established procedures and vested interests).

Implementation of e-governance is quite obviously not going to be very easy or smooth. There is still a great deal of confusion among implementing agencies at various levels as to what exactly e-commerce and e-governance are and how to go about it. Part of the problem is that some of these organizations have inadequate internal computer personnel who have their own limitations in understanding and implementing e-governance schemes or in serving as a bridge between the organization and professional external organizations. There is also the need for integration and convergence of services offered by different departments so that a truly single point service can evolve. Extensive coverage of rural areas is also going to take time.

Despite these constraints, the initiatives here are crucial. By using the Internet as a tool for 'electronic governance', the environment for e-commerce development itself would be furthered and strengthened. The premise here is that in promoting business on-line, governments will facilitate the delivery of information, goods, and services. This will then deliver more traffic across data networks, which, in turn, will serve to provide the revenues and investment rationale needed to encourage further infrastructure development.

### **Financial framework**

One of the main concerns of developing countries are the perceived dangers foreign exchange outflow on account of e-commerce, i.e. through the purchase of goods abroad. In order, therefore, to encourage e-commerce development, banking procedures within developing countries need to be aligned and made compatible with digital trade transactions, so that consumers and buyers can easily make purchases locally through the Internet.

Many businesses and consumers are still wary of conducting extensive business over the Internet because of the lack of a predictable legal environment governing transactions. This is particularly true for international commercial activity where concerns about enforcement of contracts, liability, intellectual property protection, privacy, security and other matters have caused businesses and consumers to be cautious.

As use of the internet expands, many companies and internet users are concerned that some governments will impose extensive regulations on the internet and electronic commerce. Potential areas of problematic regulation include taxes and duties, restrictions on the type of information transmitted, control over standards development, licensing requirements and rate regulation of service providers. Indeed, signs of these types of commerce-inhibiting actions already are appearing in many nations.

## **2.8 KEYWORDS**

**Interoperable:** It means the system can work on different hardware and software platforms

**WAN:** Wide area network, a type of network spread through the world

**VAN:** Value added network, a privately owned network providing various value added services

**Protocol:** Set of rules and regulations for communication and transfer of data between two computers in network.

**Meterware:** It is software which permits usage accounting and payment is called meterware.

**Legacy System:** These type of systems include paper checks, mainframe-based settlement and payment systems, and electronic data interchange in e-commerce

## **Lesson 3**

### **INTERNET SERVICE PROVIDER**

#### **3.1 INTRODUCTION**

The Internet has revolutionized the computer and communications world like nothing before. The invention of the telegraph, telephone, radio, and computer set the stage for this unprecedented integration of capabilities. The Internet is at once a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals through computers irrespective of geographic locations.

#### **3.2 DEFINITION OF INTERNET**

The Internet is a global network of computers that allows people to send email, view web sites, download files such as mp3 and images, chat, post messages on newsgroups and forums and much more. The Internet was created by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1960's and was first known as the ARPANet. At this stage the Internet's first computers were at academic and government institutions and were mainly used for accessing files and to send emails. From 1983 onwards the Internet as we know it today started to form with the introduction of the communication protocol TCP/IP to ARPANet. Since 1983 the Internet has accommodated a lot of changes and continues to keep developing. The last two decades has seen the Internet accommodate such things as network LANs and ATM and frame switched services. The Internet continues to evolve with it becoming available on mobile phones and pagers and possibly televisions.

The actual term "Internet" was finally defined in 1995 by FNC (The Federal Networking Council). According to Federal Networking Council (FNC) Internet refers to the global information system that,

- is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons.
- is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols.
- provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure.

#### **3.3 BASIC CONCEPT OF INTERNET**

##### **Who Runs The Internet?**

Who controls this web, this cloud, this network of networks? Well, no one, really. The Internet seems to be both institutional and anti-institutional at the same time, massive and intimate, organized and chaotic. In a sense the Internet is an international cooperative endeavor, with its member networks kicking in money, hardware, maintenance, and technical expertise.

The U.S. government has had a big influence on the federally funded parts of the Internet. The National Science Foundation (NSF) initiated the NSFNET in the mid 1980s, a nationwide backbone in the United States that connected many mid-level networks, which in turn connected universities and other organizations.

##### **Names and Addresses**

If you've ever traveled in a country where you couldn't read the street signs or figure out how they numbered the houses, you'll understand the wisdom of learning the Internet's name and address system. Most computers on the Internet can be identified in two ways. Each computer, or **host**, has a name and a numerical address (both unique), just as most of us can be located by our names or

numerically by our phone numbers. It's easier to remember a name than a phone number, and it's the same on the Internet. An Internet computer name is usually several words separated by periods, such as yahoo.com. An Internet address-technically an **IP address**-is four numbers also separated by periods, for example, 161.44.128.70. When you're saying these names and addresses out loud, you should substitute "dot" for "period" to sound as though you belong.

The idea is for people to use the computers' names when accessing resources and to let the computers and routers work with the IP addresses. Each Internet-connected organization keeps a database of the names and addresses of all the computers connected to its own networks. Because there are so many computers on the Internet and there is no real central authority, name assignment is best left to the local networks.

**Domain Name System:** There's actually a method to these names and addresses-a naming system known as the Domain Name System, or DNS. The DNS is also the worldwide system of distributed databases of names and addresses. These databases provide the "translation" from names to numbers and vice versa, a sort of international *Who's Who* of computers. DNS names are constructed in a hierarchical naming fashion, which you can think of as a worldwide organization chart. At the top of this chart are top-level specifications, such as EDU (educational), COM (commercial), GOV (government), MIL (military), ORG (organizations), and NET (networks), and also two-letter country codes, such as US for the United States and KE for Kenya.

An organization can register for a **domain name**, selecting one of the top-level specifications mentioned above that describes it best, and then preceding it with a recognizable version of its name. For example, the ABC Software Systems company will have a domain name like *abc.com*. From there, it can divide itself into sub-domains, extending the organization chart to department levels, or it can just give all of its computers names in the *abc.com* domain.

Once you understand how this naming system works, you can remember names more easily, and you can also tell things about a computer, such as to what organization it belongs. The names do not, however, always indicate geographical location.

Many U.S. organizations and companies use the three-letter designations mentioned above (for example, EDU, COM, and ORG). However, most countries have stipulated that organizations use their two-letter country codes for top-level domains. For example, an actual computer name, *quake.think.com*, refers to a commercial (COM) enterprise: the computer's name is *quake* and it belongs to Thinking Machines Corporation (*think*), a supercomputer manufacturer in the United States. Another example is *fujitsu.co.jp*, a computer at the Fujitsu Company in Japan (*jp* is the two-letter country code for Japan).

### **Advantages of internet**

There many advantages to using the internet such as:

**E-mail:** Email is now an essential communication tool in business. It is also excellent for keeping in touch with family and friends. The advantage to email is that it is free ( no charge per use) when compared to telephone, fax and postal services.

**Information:** There is a huge amount of information available on the internet for just about every subject known to man, ranging from government law and services, trade fairs and conferences, market information, new ideas and technical support.

**Services:** Many services are now provided on the internet such as online banking, job seeking and applications, and hotel reservations. Often these services are not available off-line or cost more.

**Buy or sell products.** The internet is a very effective way to buy and sell products all over the world.

**Communities:** Communities of all types have sprung up on the internet. It's a great way to meet up with people of similar interest and discuss common issues.

**A Leading-Edge Image:** Presenting your company or organization as leading-edge shows your customers and prospective customers that you are financially strong, technologically savvy, and ready for the 21st century. And that you care enough about your customers to take advantage of new technologies for their benefit. And finally that you have the resources to support your clients in the most beneficial manner possible. More and more advertisers on television, radio, magazines, and newspapers are including a Web address. Now is the time to avoid playing catch-up later.

**Improved Customer Service:** The companies are available to their customers 24 hours a day, 7 days a week. The Internet never sleeps. Whenever customer needs information about any company, products or services, they can access the company's Web Page.

**Market Expansion:** The Internet is a global system. Latest estimates are that there are about 40 million people with access to the Internet, and this number is growing every day. By simply posting a Web Page you are also addressing International markets.

**Low Cost Marketing:** Imagine developing a full color brochure without having to incur the costs of proofs, printers, wasted paper, long lead times between revisions, and more. Then imagine a full color product or services brochure that is interactive and which incorporates text, graphics, audio, and/or video. One that can be immediately updated without incurring the usual costs of product material updates. For a minimal initial investment your company or organization is presented to millions of Internet users worldwide. It's like a virtual brochure in everyone's hand without the associated costs.

**Low Cost Selling:** Without the cost of direct selling potential customers can get detailed information about your products or services at any time. And they can easily order your products over the Internet, or request additional information be sent to them via a request form on your Web page.

**Lower Communication Costs:** Your time, and your employees' time, is valuable. Most businesses and organizations spend time answering the same questions over and over again. With a Web page you can make the answers available to everyone immediately. You can also update your Web page with new information quickly and easily.

**Value Added Marketing:** You can use your Web page to provide useful information about your particular industry, product or uses. Any type of information that you believe will be valuable to your customer base can be included in your web page to encourage visitors to your site. You can also provide easy links to other sites with information that would be of value to your customers.

### 3.4 REQUIREMENTS FOR INTERNET

The basic requirements for connecting the computer system to the internet can be classified into two categories:

- Hardware Requirement
- Software Requirement

#### **Hardware Requirements**

Users can use any of the PC models coming today e.g. Intel Celeron, Intel P-I, Intel P-II, Intel P-III, Intel P-IV, AMD K6, CYRIX MII, etc. The CPU of 350 MHz and above gives a good performance.

Your computer should have at least of 16 MB RAM to have good navigation on the net. The AGP card should have at least 4 MB RAM. This helps in watching the graphics/movies on the Internet effectively.

One should have a telephone line or ISDN (Integrated Services Digital Network) connection. ISDN connection has more bandwidth as compared to a single telephone line. A modem is also required. Modem stands for modulator/demodulator. The computer operates on digital signals, whereas the telephone lines operate on analog signals. So an additional piece of hardware, i.e., modem is connected between the computer and the telephone line. Modem converts the digital signals to analog and vice versa. Modems are inbuilt or they can be connected externally. The good modems available in the market are from the companies US ROBOTICS, D-Link etc. A modem can be an ordinary modem or a fax/voice modem. The fax/voice modem in addition to data, can also carry, voice on the net.

### ***Software Requirements***

We should have connecting software and web browser software. Internet can be called upon from any operating system e.g. Windows 98, Windows NT, Linux, Unix, etc. The two most widely used web browsers are Internet explorer and Netscape communicator.

After having the basic requirements the additional requirements that are required for smooth and quality service of internet, the following software are required:

- Anti-Virus
- Anti-Worm
- Firewall
- System Utilities
- Download Accelerator or Get right like software
- Compression and Uncompressing utilities
- Adobe Acrobat Reader
- Macromedia Flash
- E-mail configuring software like MS Outlook
- Web Messenger etc.

## **3.5 INTERNET SERVICE PROVIDER**

An ISP (Internet Service Provider) is a company which provides internet access to other companies or individuals. An ISP maintains connections to other networks and ISPs, acting as a router for internet traffic between a customer's computer and any other machine also connected to the internet anywhere else in the world.

## **3.6 TYPES OF INTERNET SERVICE PROVIDER**

Internet Service Provider is a company that you dial up to get on the Internet. There are basically four different kinds:

- National Companies That Offer Services throughout the country.
  - Pros:
    - o If you travel or move, most likely you will be able to access the Internet at your new location.
    - o The extra services like chat rooms can be an added bonus.
  - Cons:

- o Technical support may be hard to reach or long distance.
- o Sometimes you get busy signals when trying to access them.
- o If you don't use the services, if there is an additional charge, it is a waste of money.
- o Although you buy an unlimited account, some will send you notices if you have been online too much.
- **Specialized Companies That Offer A Service Like Filtering**
  - Providers:
    - o Safaricom
    - o Airtel
    - o Orange
  - Pros:
    - o You don't have to install additional software to get pornography out of your computer.
    - o You will not have to update your filtering software.
  - Cons:
    - o In some cases roaming facility of account is not available.
    - o Technical support may be limited.
- **Local ISPs (Small companies that offer Internet service to a small area)**
  - Providers:
    - o Check in your telephone directory or yellow pages under Internet Services.
  - Pros:
    - o Less error prone
    - o Less disconnections
    - o Offers a local dial up number if you are in a rural area that doesn't have local dial up numbers for the major providers.
  - Cons:
    - They may be limited in their equipment to offer a good, fast internet speed.
    - They may be limited in offering any web guidance.
- **Free ISPs**
  - Pros:
    - o Free and no commitment
  - Cons:
    - o Technical support may be limited, long distance, or not available.
    - o May not offer reliable service.
    - o Advertising banner can take up a lot of space on your screen.
    - o Some charge very high set up fees (stay away from these)

### 3.7 TYPES OF INTERNET SERVICE PROVIDER ACCOUNTS

There are many types of connections USER can get on the internet depending on the type of use and the amount of resources (money) available. The different types of connections, their advantages and limitations are discussed below:



No matter what type of connection you go in for, it should be reliable, fast, easily available, and economical. There is no such thing as a free connection to the Internet. Someone somewhere has to pay for the equipment, software, telephone lines, and electricity.

Basically there are four types of connections to the Internet:

1. Dial-up Connection
2. ISDN Connection
3. Leased Line Connection
4. Cable Modem
5. DSL
6. Broadband
7. V-SAT

The most popular type of connection for an individual is the broadband connection as it is easily available and economical.

### **1. Dial-Up Connection**

As the name suggests, dial-up link means you have to dial into a modem over a telephone line before you can get connected to the internet. A modem (modulator demodulator) is a device which converts digital signals emitting from the computer into analog signals so that the data is easily transmitted over analog telephone lines. At the receiving end, there is another modem which converts these transmitted analog signals back to the digital form which are received by the target computer.

For this type of connection you require:

A computer whose configuration could be 80486 but the best is Pentium-IV or above. A modem (optimal speed is 36.6 Kbps). These days we use modems of speeds up to 56 Kbps. Software like a browser, e-mail programme, FTP software, Newsgroup reader, Outlook Express, etc. Outlook Express is one of the software which helps to read news and mail offline once they have been collected online. There are 3 major ways by which you can get linked to the Internet using a dial-up connection, namely;

- A. Host terminal connection
- B. Individual computer
- C. Dial-Up or on demand through the LAN.

#### **A. Host Terminal Connection (Terminal Emulation)**

In case of host terminal connection, a PC is connected to some Internet host via modem and a terminal emulation programme is run. Your terminal now acts like a vt-100 terminal. In other words, you are connected to a large computer which is connected to the Internet. Thus if want to download a file, the file is downloaded to the host and not your computer. To download a file from their host to your computer you need to have some specific software. In this type of connection you can download only text but not graphics. Hence, a host terminal connection is also referred to as a shell account. This account is best suitable for:

1. Students whose budget is low and their requirement is limited to text.
2. Users who connect via Telnet programmes.
3. Users whose frequency to use the Internet is low.
4. Users who want to use the Internet to access the network of their workplace from their home place (personal account). Such users could connect via Telnet.

5. Jobs where multi-tasking is not required. This connection permits only one task at a time, e.g., the user cannot read the news as well as download a file.

This type of a connection offers three different types of accounts depending on your distance from the ISP and the nature of work for which you want the connection.

1. Local dial.
  2. Use of public data networks.
  3. Restricted access.
1. Local Dial: Local dial is the cheapest type and is only possible if the host is at a local telephone call distance away.
  2. Public Data Network: If the host is not in the vicinity, then long distance calls have to be made over public data networks. If the speed of such networks is slow then data transmission speed will also be slow and so the connection will prove to be more expensive.
  3. Restricted Access Account: Suppose you want to access only E-mail or newsgroups. In such situations, restricted access account is best for you. There are certain sites which provide inexpensive E-mail accounts, local bulletin board services, etc. you just have to registered pay only for the services you want to use.

## **B. Individual Computer**

Here your computer can work as an Internet Host, i.e., direct downloading of files and mails can be done when connected to the internet. This kind of link is a little more costly than the host terminal connection as you have to pay monthly fees to the service provider or sometimes even a flat charge for a fixed period of time. Here you can have one or both the following account;

1. Serial Line Internet Protocol (SLIP)
  2. Point to Point Protocol (PPP)
1. Serial Line Internet Protocol (SLIP). In case of SLIP data is sent in packets under speeds of 9600 bps on telephone lines using data compression protocols.
  2. Point-to-Point Protocol (PPP). In case of PPP data is sent over telephone lines via modem. Double checking is done at the destination to see if data packets have arrived intact. This is better than SLIP as it allows authentication of users. These days PPP connections are more common. Again, speed of data transfer in PPP is faster than in SLIP.

This type of connection is good for people who:

1. Use Graphics.
2. Download files often.
3. Use direct e-mail or any other online service.
4. Use Internet regularly though for limited hours.

The limitations are few, such as, people may not be able to access the Internet easily if the disk space is limited or if the line is slow (i.e., speeds below 28.8 Kbps will not be accessible by other people).

## **C. Dial-Up or On-Demand through the LAN**

In this case there is a dial up link from the LAN to which you are connected to. This type of connection is favorable for small business houses and educational institutes. Here the server, on demand, dials up for a connection and once the connection is established everybody logged on to the LAN can access the Internet. In such a situation if there is any file downloaded from the Internet then like any other file, this file will be accessible to all LAN clients. The only problem here is that the more the number of users logged onto the LAN and working on the Internet, the slower will be the

Internet connection. However, this is successful if you have very fast server software along with a very fast line. Again extra software like proxy servers are also required to serve the needs of various individual LAN users with one Internet connection.

## **2. Integrated Services Digital Network Connection (ISDN)**

This is a very high speed connection to the Internet over normal telephone line. It combines both voice and digital information in a single medium, making it possible to provide the customers with digital as well as voice connections. In ISDN connection, the information which is sent from your computer to the Internet is digital. Here we do not use a normal modem. As no conversion from analog to digital or vice versa is required, so we use an ISDN modem which is merely a terminal adapter. Another difference lies in the fact that the ISDN lines, in order to work, require power from outside. When there is a power shutdown, ISDN lines will not work. ISDN service has many variations but we follow Basic Rate Interface (BRI) Service. Here the ISDN line is divided into three logical channels, namely:

1. Two 64 Kbps B (bearer) channels.
2. One 16 Kbps D (Data) channel.

Thus ISDN is commonly referred to as 2B+D.

Over bearer channels you can send data. If only data is sent then it could be sent at a speed of  $64+64=128$  Kbps but if both data and voice is to travel then one B channel is dedicated to voice and the other to data. The data or D channel is used to send signaling information for routing data which is being sent over B channels. Those telephone companies which do not have the ability to use D channels remove 8 Kbps from each B channel. Therefore, only 56 Kbps of data can go over each of these B channels.

Apart from voice, many value added services are also being offered like:

1. Telephones will soon have the facility to display name, address, and telephone number of the caller while the telephone rings.
2. When the telephone gets connected to the computer, the caller's database record is displayed on the computer.
3. Call forwarding facility
4. Remote electricity meter reading services.
5. Smoke alarms that automatically call up the hospital, fire station or police station.

### **Advantages of using ISDN:**

1. Allows high speed access, i.e., 128 Kbps.
2. No special laying down of wires. The existing copper telephone cables work fine.
3. Can be used for voice, data, graphics, and full motion video as data transfer speed is high.

The only disadvantage of using ISDN is that it proves to be an expensive affair as special equipment is required for it and the tariff is also high.

## **3. Leased Line Connection (Dedicated Connection)**

As the name suggests, a leased line connection is a permanent connection laid down between you and a modem. As it is permanently lined, you have a 24 hour access to the Internet, seven days in a week. A leased line connection is very useful especially when frequent information has to be accessed from the Internet and also when the volume of data transfer is high. It is also useful if the Internet is to be used for more than 12 hours a day.

This type of connection is the most reliable and has high speed. The only issue behind this connection is its cost. The cost includes:

1. One time installation (laying down of physical line upto your site).
2. Yearly/periodically maintenance charge.
3. Annual tariff.
4. The necessary one time hardware, software and set up charges.

#### **4. Cable Modem**

In case of cable modem the Internet can be accessed through the normal coaxial television cables with the help of cable modems. Speed of cable modems is 10 to 100 times faster than normal dial-up connection modems. The only catch is that the local cable operator should have the capability to access the Internet over cable TV wires and that cable modems are slightly more expensive than normal modems. One advantage of cable modem connection is that you need not have a telephone line if you want this type of connection to the Internet.

#### **5. DSL**

DSL or Digital Subscriber Line service is provided through the existing telephone line, but it works differently than regular analog modem dial-up access. DSL operates over normal telephone lines and it can be used simultaneously with the telephone. DSL can increase the connection speed by as much as ten-fold from a standard dial-up modem.

#### **6. Broadband**

This type of access is good for remote locations, where ISDN, cable or DSL are not available. It gives a decent download speed, but to upload the data, the user still needs a regular analog modem to dial in, via a telephone line. Satellite connection can be either a two way service or a one way service. In case of two-way satellite service, the data is transmitted via satellite to a dish antenna at the user's house. In one-way system, the user needs a conventional modem and a telephone link to an ISP. Satellite connection is expensive but sometimes is the only fast option for the people who are beyond the service area of cable and DSL providers.

#### **7. Very Small Aperture Terminals (VSATs)**

The two ground stations that communicate with one another via the satellite need not be the same size or transmit data with the same amount of power. Many satellite networks use a large number of small dishes, called VSATs (very small aperture terminals), for the outlying nodes and one central hub with a big dish that can transmit very powerful signals and is very sensitive to incoming ones. This system minimizes the cost of the majority of the ground stations at the expense of maintaining one big one, which can be shared by several users. However, this approach can cause additional delays, because the VSATs aren't powerful enough to talk to one another directly through the satellite; messages must pass through the hub and make two trips into space before reaching their final destination, incurring a double delay.

VSATs are typically used by organizations, such as oil companies, that require data or voice communications between sites distributed over a wide geographical area. Terrestrial links are economical over short distances; their cost climbs quickly as the distance between locations increases. In addition, terrestrial data and voice links, while readily available in cities, are often difficult, if not impossible, to obtain in smaller urban and remote local areas using these links.

### **3.8 HOW TO SELECT INTERNET SERVICE PROVIDER**

Before choosing an ISP, it is important to assess your company's business and marketing goals. In other words, you should determine what your organization will be using the Internet for. Once you've determined this, you can contact ISPs that serve your geographic area and ask them about their

services. Here are some questions that user may wish to ask when choosing an ISP for Internet connection:

### **General**

- What types of connections are available in your geographic area? (Dial-up, ADSL, cable, etc...)
- What equipment (hardware) is necessary to establish a connection? (Dial-up modem, cable modem, etc...)
- Does the ISP provide installation software?
- What kind of technical support can you expect?
- What additional perks are offered with each package? (Web space, additional e-mail accounts, etc.)

### **Connection**

- Is the dial-up number billed as a local call?
- Does the ISP provide alternate local dial-up numbers? How many?
- Is remote service available? (Regional, national, international)
- What type of connection speed can you expect?
- How often can you expect busy signals?
- What is the service's expected uptime?

### **Cost**

- What payment options are available?
- Is there an initial connection fee?
- Can the type of connection be changed without penalty?
- How will your connection time be charged?
  - metered
  - flat rate
  - bandwidth use
  - combination of the above
- Are annual subscriptions offered at discounted prices? (as opposed to monthly charges)
- Are there any other possible charges?

Many of these questions can only be answered while trying for the services. You may want to request a trial period from an ISP so that you can evaluate its performance before signing on with them.

### **Web Hosting**

Most companies that offer Web hosting services will offer basic packages which can be modified to accommodate your specific needs. Requesting and comparing this information is a good place to start when looking for Web hosting services. The following list outlines some important questions that should be answered before you make a decision:

## **General**

- How much bandwidth is available for upload and download? (Data transfer)
- How much storage space is available? Can additional space be added at a later date? (Data storage)
- Does the ISP allow for commercial Web sites?
- What is the site's expected uptime? What is the company's policy with regards to this?
- Which operating systems do they support? (Microsoft, Unix, Linux...)

## **Services**

- Does the ISP provide shopping cart and other e-commerce technologies and services?
- Are Web-based tools available for site maintenance and configuration?
- Which Web technologies are supported? (databases, programming environments, etc...)
- What kind of technical support can you expect?
- How many e-mail addresses (aliases) are provided per account?
- Are mailing list services available?

## **Costs**

- What is the cost for domain name registration?
- What will be the total monthly cost of your company's desired Web hosting solution?
- Is there a service fee for adding or removing features?
- What is the cost of each additional feature? (Databases, additional e-mail addresses, etc...)

Be wary of relatively low advertised prices when choosing a company to host your Web site. These low prices are usually offset by additional costs for basic services, or are indicative of poor performance. You may also want to visit some sites that are hosted by the company to see how they perform.

## **Lesson 4**

### **INTERNET AND WORLD WIDE WEB**

#### **4.1 INTRODUCTION**

The Internet is a rapidly growing network of thousands of business, educational and research networks connecting millions of computers and their users in over 100 countries. Internet is very popular in the today, though it took birth in the late 1960's. The US Government started the process when they laid the framework for the Internet. The Department of Defence (DOD) decided to fund a network of computers that would all talk the same language. The intention was to connect researchers, government workers and defence contractors who were providing systems and data to government agencies. Most brands of computers at that time applied different rules for communication (protocols). DOD decided to develop a vendor-independent suite of protocols. The new network was named ARPANET (after the Advanced Research Projects Agency) within DOD that provided the funding.

ARPANET protocol was replaced in 1970's by TCP/IP protocol suite. The features in these protocols permitted transmission of data in an efficient way from any computer connected to the ARPANET to any other on the net. It is thus the foundation for the Internet as we know today. The chronological events that took place are as under:

- 1969 First ARPANET installed at UCLA in Sept. 1969: ARPANET used special purpose computers IMPs (Interface Message Processors); created Network Communication Protocol (NCP)
  - 1972 E-mail was invented by accident for sending messages by two programmers. Ray Tomlinson of BBN is credited for sending the world's first e-mail message in 1973.
  - 1973/74 In mid 1970s, Transport Control Protocol/Internet Protocol (TCP/IP) was developed by vintcerf to link different packet networks; These were capable of connecting multiple independent networks through routers/gateways.
  - 1978 US government preferred TCP/IP;
  - 1980 DARPA funded the development of Berkley UNIX TCP/IP was made part of the operating system.
  - 1980/86 National Science Foundation (NSF) supported the development of CSNET, a computer I science research network. CSNET became popular (with 170 universities, other organizations and networks in other countries).
  - 1986 NSF initiated a new program of networking and computer support for super computing centers for research. IT launched the NSFNET network backbone program.
  - 1987 CSNET merged with BITNET, the backbone was upgraded from 56 Kbps to TI service (1.5:1 .Mbps); TI was operational in 1988.
  - 1991 CSNET service discontinued. Internet connectivity had become essential tool for the conduct of scientific research; NSFNET program had outgrown its initial vision (of 1985). Successor program established by High performance computing act of 1991.
- The three parallel activities of this are :
- Commercialization of the Internet (as found even today)
  - High performance computing and communications (HPCC Program)
  - (As found even today)
  - National Information infrastructure (Information Superhighway)

(As found even today).

US government requirement was to ensure that the system was secure and would allow continued cooperation between these sites and computers in the case of nuclear attack.

The internet evolved from a military focus towards non-military use with many simultaneous developments like:

- E-mail
- Office productivity applications
- Personal computer
- Software products
- Workgroup computing
- Local area network

## 4.2 ADVANCED CONCEPT OF INTERNET

### Uniform Resource Locator

A URL (or uniform resource locator) is the address of an Internet page on a Web site. Usually it consists of four parts: protocol, server (or domain), path, and filename. Often, when you go to the very first page of a Web site, called the home page, there's no path or filename. Here's an example:

**<http://www.microsoft.com/windows/default.asp>**

- http is the protocol
- www.microsoft.com is the server
- windows/ is the path
- default.asp is the filename of the page on the site

### Communication Protocol

Protocol is a set of rules created for the process of communication with another computer or with an operating system. The first element in the URL is the protocol. This is the service that provides the resource, followed by a colon. The default taken is http: if you don't specify other service. The protocol specifies the computer language used to transfer information. Specifically, a protocol tells the browser where the information is located (for example, on a web server, an FTP (file transfer protocol) server, a local hard drive, and so on). The protocol tells the browser what to expect from the document retrieval process.

Table : Common Protocols	
Protocol	Use
http://	For HTML documents and associated files on the web
ftp://	For documents on the FTP server
Gopher://	For documents on the Gopher server
telnet://	To open a telnet connect to a specific host.



**Host Name:** host name is the server that contains the resource, preceded by two slashes (either. in the form of a domain name or an IP address). In other words the hostname is the name of the server that holds HTML documents and related files.

**Folder name:** folder names give document on the servers file system. Folders perform the same function on a web server that they perform on your PC (i.e. they organize documents). There's virtually no limit to how deep you can nest folders, and there's no limit as to what files the folders can contain.

**File name:** file names are the names of specific documents. It identifies the file (an HTML document, an image, a text file, and so on) to be displayed. In the above example, the file index.html is displayed. This file is kept in the folder virtual.

### **Transmission Control Protocol / Internet Protocol (TCP/IP)**

Transmission Control Protocol and Internet Protocol ( TCP/IP ) are most commonly used protocol in the Internet. They mainly deal with slicing the data into small sized packets and routing them along the communication channel. These packets are routed to their destination and passed through from node to node and are assembled in order to form the data at the destination computer.

TCP/IP is a very popular protocol used in conjunction with internet. To establish a link between two computers on the internet, it is required to frame certain rules and regulations so that the data communication between the computers may take place. A protocol means a set of rules which is accepted globally. TCP/IP is the protocol which defines the rules and algorithm for data communication between different computers.

To establish a link between two or more computers, it is required to define the address of the computer. This address must be unique. Rules and regulations for secure transmission of data over the communication channel are also required. TCP/IP is divided into two set of protocols one is called TCP or Transmission Control Protocol and other is called IP or Internet Protocol.

### **Transmission Control Protocol**

This deals with packets over networks. The packets are small pieces of data meant for effective and safe communication over the network. To send a block of data over a communication channel, the data is divided into various pieces and these pieces of data are communicated as packets. These packets' have to follow a long path, traversing from one computer or node to another computer. This process is called routing. The size of packets is decided on the basis of network capability. The TCP also ensures the safe delivery at the destination and the assembling of all the packets to get the complete lot of data at the destination computers.

### **Internet Protocol**

This mainly deals with the addresses of computers. The Internet Protocol decides the address of computer to be labelled on the packet. This allows various computers or intermediate nodes to read the address of the destination computer and route the packet to the destination node.

### **Hyper Text Transfer Protocol (HTTP)**

A web page is transferred to a user's computer via the hypertext transfer protocol (HTTP). HTTP is the method through which hypertext files such as web pages, are transferred over the internet. HTTP is a client/server based internet protocol.

Web pages generally reside on HTTP servers. A user requests a web page from an HTTP server through his or her web browser client software. Either by clicking on a hypertext link or designating a particular URL (uniform resource locator). The server then sends the requested information to the

user's computer. The browser software interprets the HTML codes and presents the information contained in the web page in a readable format on the user's computer.

### **File Transfer Protocol (FTP)**

FTP is part of the TCP /IP protocol suite. It is a protocol or set of rules, which enables files to be transferred between computers. Ftp works on the client/ server principle. A client programme enables the user to interact with a server in order to access information and services on the server computer. Files that can be transferred are stored on computers called FTP servers. To access these files, an FTP client programme is used. This is an interface that allows the user to locate the file(s) to be transferred and initiate the transfer process.

Anonymous ftp allows a user to access a wealth of publicly available information. No special account or password is needed. There are a wide variety of files that are publicly available through anonymous ftp. They are:

*Shareware*: software that you can use free for a trial period but then pay a fee for the licensed version.

*Freeware*: completely free software, for example fonts, clipart and games.

*Upgrades and Patches*: upgrades to amend software and fixes for software- problems available either free or against charges.

*Documents*: examples include research papers, articles and Internet documentation.

Files on FTP servers are often compressed. Compression decreases file size and this enables more files to be stored on the server and makes file transfer times shorter. In order to use a compressed file the user needs to decompress it using appropriate software. It is a good idea to have current virus checking software on the computer before files are transferred on it.

Ws-FTP32 LE is a top rated and very popular FTP programme from John Junod. It is given away free to certain non-commercial users.

### **Simple Mail Transfer Protocol (SMTP)**

This protocol is used for the delivery of E Mail. When an E mail is to be sent, then the Mail Transfer Program contacts the remote machine and forms a TCP connection over which to e-mail is transferred. Once the connection is established, then Simple Mail Transfer Protocol (SMTP) identifies the sender itself, specifies the recipient of mail and then transfers the E mail message. Other features included in the SMTP are that it allows the sender to ask whether the mailbox to which the mail is directed, does exist on the remote computer or not. It also enables the sender to keep a copy of the mail until it removed or deleted.

### **Post Office Protocol**

If you're accessing the Internet using a PC or Macintosh, there are several different ways you can read and send email. One of the more popular applications uses the Post Office Protocol (POP). In a nutshell, the POP system allows your personal workstation to get its email from a big computer that serves as a post office, delivering the mail when you (or your computer) ask for it. This eliminates the need for your computer to be on all the time, constantly available to receive email. In order to use a POP-based email application, you need Internet access (via dial-up or full-time connectivity) and a POP mail account on a post office computer (ask your Internet provider). All of these applications provide intuitive editors.

### **Point to Point Protocol (PPP)**

This is used when the Internet is accessed using a telephone line. Normally, in India, the server of the Internet Service provider (ISP) is accessed from the home or office through the telephone line. PPP is

the set of rules which specify how the data will be communicated over telephone line from your computer when the connection with your ISP has been established. This protocol is used in conjunction with Serial Line Internet Protocol (SLIP).

This protocol is used when the communication is done over a serial transmission line like the telephone line. The protocol allows the user to use GUI based web browsers like Netscape and MS Internet Explorer. Internet Service providers use the PPP and SLIP account to enable users to view graphics on the Internet. These accounts assign an IP address to your computer when a connection is established.

### **Telnet**

Telnet is a protocol, or set of rules, that enables one computer to connect to another computer. This process is also referred to as remote login. The user's computer, which initiates the connect icon, is referred to as the local computer and the machine being connected to, which accepts the connection, is referred to as the remote or host computer.

Once connected, the user computer emulates the remote computer. When the user types in commands, they are executed on the remote computer. The user monitor displays what is taking place on the remote computer during the telnet session.

### **Gopher**

Gopher is a protocol designed to search, retrieve and display documents from remote sites on the Internet. It accomplishes this using the client / server model of users running client software on their local machines that provide an interface that interacts with remote servers or computers that have information of their interest. In addition to document display and document retrieval, it is possible to initiate on-line connections with other systems via gopher. Information accessible via gopher is stored on many computers all over the Internet. These computers are called gopher servers.

Users interact with gopher via a hierarchy of menus and can use full-text searching capabilities of gopher to identify desired documents. Once an appropriate item is selected, gopher retrieves it from wherever on the network it resides and (if it is text) displays it. The users may feel as if all the information available to gopher resides on their local computer, when in fact, gopher is interacting with a large number of independently owned and operated computers around the world. Gopher client software exists for most computer platforms.

### **Archie**

These are thousands of anonymous ftp servers around the world offering more files than you can imagine. The role of Archie is to make the whole system manageable by helping you find what you need. There are a number of Archie servers around the net, each of which consist a database of most of the files that are publicly available via anonymous ftp.

Suppose you want a particular file -for instance, a programme but you don't know which anonymous ftp server has the file. You use an Archie client to connect to an Archie server. You can have your client ask the server to search for files that have the same name as the programme you want.

After a short wait, the server will send back a list of addresses of some of the Internet sites that have files with that name. Once you know where to look, it is a simple matter to use ftp to download the file. The term Archie was chosen to express the idea of an archive server.

### **Veronica and Jughead**

Like the web, Gopherspace is large and full of menu items than you could ever find on your own. To help you find things in Gopherspace you can use veronica: a tool that keeps track of an enormous number of gopher menu items from all over the net. You can use Veronica to perform a search and

look for all the menu items in gopherspace containing certain keywords. A related tool, Jughead does the same thing for a specific group of gopher menus, say, and all the menus at a particular university. After Veronica or Jughead finishes searching, you will be presented with a new menu containing the names of whatever items were found. To access one of these items, all you need to do select it, and your gopher client will connect you to the appropriate gopher server automatically. The results of a typical Veronica search will be items from around the net, but you won't need to know any of the details: your client will take care of everything for you.

### **Wide Area Information Service (WAIS)**

WAIS is an Internet search tool that is based on a certain protocol. It works on the client / server principle. A WAIS client programme enables the user computer to contact a WAIS server, submit a search query and receive a response to that query.

WAIS has the capability of simultaneously searching more than one database. After the search phrase has been typed into the client interface, the user can then choose which databases should be used to complete the search. Depending on the WAIS client software being used, this may be a matter of using a mouse to select database names displayed on a screen, or of typing in the database names using the keyboard. It is very important to know that WAIS indirectly searches the database. The database itself is not being searched for the requested search phrase. Rather, an index for the database is searched. The index is created by people, and can contain all, or a number of words in all of the items contained in the database. Once the search has been executed, all items containing the words appearing in the search phrase will be returned to the user, provided that the words in the search phrase appear in the indexes of the selected databases.

## **4.3 INTERNET TOOLS**

### **E-mail**

The conventional mailing by post can take several days to travel across the country and weeks to go around the world. That is why nowadays it is referred to as 'snail mail'. In recent times, e-mail or electronic mails being used to send and receive messages. It saves time and money, is fast, easy to use and less expensive than the post. You can send e-mail practically to anyone with an e-mail address, anywhere in the world. So what is e-mail? Its simplest form, e-mail is an electronic message sent from one computer to another. You can send or receive personal and business-related messages with attachments like pictures or other documents.

Just as a letter or document stops at the different postal stations along its way, e-mail is passed from one computer to another as it travels along the network. Each computer reads the e-mail address and routes it to another computer until it eventually reaches its destination. It's then stored in an electronic mailbox. With the internet this whole process usually takes just a few minutes, allowing you to communicate quickly and easily with millions of people around the world anytime of the day or night, for the cost of a local phone call.

Until recently, e-mail on the internet was good only for short notes. You couldn't send attachments like formatted documents or graphics. With the advent of MIME (Multipurpose Internet Mail Extension) and other types of encoding schemes, like UUencode, not only can you send messages electronically, but you can also send formatted documents, photos, sound files, and video files as attachments.

### **Search Engine**

Search engines are Web sites that help you search the Internet for other Web sites based on keywords you provide. Databases of web sites that use spiders or robots to search the web and catalog web pages and make it convenient for you to search. Popular search engines include:

Google  
Yahoo  
Hotmail, etc

Special www sites that offer a facility by which you can search the web or Usenet for information. Alta Vista (<http://www.altavista.co.uk/>), for example, provides a keyword search that scans every word of every page on the web. Yahoo permits you to search by following ever-decreasing menus. Your browser will take you to a site featuring a number of web search engines.

### **Newsgroups**

Discussion groups on the Internet (not on the Web, which is only one area of the Internet). Newsgroups are classified by subject matter and do not necessarily deal with journalism or “news.” Health, hobbies, celebrities, and cultural events are the subjects of many newsgroups. Participants in a newsgroup conduct discussions by posting messages for others to read, and responding to the messages posted by others.

Newsgroups, also referred to as forums, have been around almost since the dawn of the Internet. They enabled scientists to post questions (and answers) to each other. Today, newsgroups resemble virtual coffee houses, where people get together to discuss subjects of mutual interest. Except with newsgroups, the communication is written, not verbal. Newsgroups revolve around specific topics, such as wireless technology or organic gardening. You can read what others have written and post your own comments.

There are literally thousands of newsgroups covering every topic imaginable--from computers, social issues, literature and science, to recreation, entertainment, hobbies and current affairs. In newsgroups you can find job postings, business and health care advice, announcements about events, referrals, political and religious discussions--even photos you can download.

### **Internet Relay Chat (IRC)**

IRC works because a series of IRC servers band together in a network to share channels of communication, like communicating with someone or a group on a single radio frequency. If you connect to one server in such a network, you have access to all the channels and all the users connected to any of the servers on that network

There have been chatting on the internet since Unix users were able to page each other using the talk username @ address command. Unlike e-mail, chatting takes place live and is called as real time, meaning both people participating at the same time. Chat is synchronous (happening for all participants at the same time), and e-mail is asynchronous (taking place at different times).

Chat protocol permitted many people to converse with each at once. Finally IRC (.Internet relay chat) provide for multiple channels where completely separate conversations, all potentially many-to-many become available to anyone on the Internet. The IRC protocol remains the underlying basic for other forms of real- time communication (such as voice or video conferencing). The standard chat interface, with a big dialogue window, a narrow list of participants and a command line at the bottom for typing your responses, continues to be used in many real-time collaboration tools.

## **Video Conferencing**

It's the technological age, there's no doubt about it. You look around and you see people speaking on cell phones everywhere; people working on their laptop computers or PDA's; People taking pictures with their digital cameras, or listening to music on their digital mp3 players. The technology is evolving so quickly that it can barely keep up with itself. One area in which we are seeing rapid technological developments as of late is within the video conferencing industry.

Although the technology that makes video conferencing possible has been around for a several years now, it is hasn't received too much attention until recently, now becoming more and more popular every day. What is video conferencing? Basically, video conferencing can be easily described as a telephone conversation that allows you to be face-to-face with one another. This technology will never replace the person-to-person meeting completely, but it does offer an incredible tool for better telecommunication & can save companies hundreds of thousands of dollars in travel costs; and these applications are just scratching the surface:

### **Internet video conferencing**

High quality Internet video conferencing offers an internet based software product that allows users who log on the ability to partake in video conferences. After some form of software and its accessories are installed and the hardware components are set up, users have the ability to engage in face-to-face meetings with family/friends/business associates across the globe through the Internet. The quality of the transmission/reception depends entirely upon the amount of bandwidth and the quality of the software employed. If you have a great deal of bandwidth and superior software complete with top-of-the-line codes, your compression/decompression rates will be higher and so too will the level of quality.

## **4.4 DEFINITION OF WORLD WIDE WEB (WEB, WWW OR W3)**

World Wide Web (www) is a repository of information spread all over the world and linked together. WWW uses the concept of hypertext. In this environment, information is stored in a set of documents. Concept of pointers is used to link the documents together. An item could be associated with another document using the pointers. A reader who browses through a document can move to other documents by clicking the items that are linked to other documents. A hypertext on the web is known as a page and the main page for an organization / an individual is called as a home page. After establishing a web hosting arrangement with ISP it will allocate storage space on its server that will be accessed each time a request comes in. We are now ready to create our first web page or home page or index page and load it into this storage space. Web pages are created, using one of the many web design software packages like 'Quicksite' or Microsoft's 'Front page' or by utilizing the services of a web designer. Web pages utilize the main software language of the Internet HTML although many now use other languages and software in addition to HTML, such as Java by Sun Microsystems. Information on any subject can be:

- Undistributed -whole information may consist of one or more web pages on the same server.
- Distributed -Information made up of many pages distributed on different servers.

It is another information retrieval tool. The web is attractively easy to use, and lends itself to publishing or providing information to anyone interested. Its popularity has increased dramatically, because of easy usage, colorful and rich in content. Web is a series of interconnected documents stored on computer sites. If you use your computer and a software program (browser) to visit a site on the

web, the screen displays a document called a home page. Home page gives the name of the organization or individual sponsoring the website and displays a list of highlighted words, buttons or pictures. It is the text and graphical screen display that welcomes the user and explains the organization that has established the page. This will lead to other pages, with all the pages of company being known as a website. For a corporation to establish a presence on the web, therefore, it must set up a website of its one or more pages. The web is a network of billions of interlinked documents. These links called hyperlinks or links are the highlighted words, buttons, icons or pictures. Each link contains the address of another document on the same computer or another computer anywhere in the world; from this one can jump to the linked pages by clicking on one of these links. Clicking them plays videos, music, 3D animations or takes one through a virtual reality experience.

It is a set of standards for storing, retrieving, formatting and displaying information using a client / server architecture, graphical user interfaces (GUI) and a hyper text language that enable dynamic links to other documents. It is one of the most exciting Internet services. Worldwide Web (www) has a vast canvas of web servers that provide an idea almost similar to that of a hypertext. A page in hypertext may contain links that point to other documents or to other segments in the same document. When users click on a link, they jump to other documents/other segments in the same document. Users can navigate the web easily, pushing their interests.

One of the main functions of the Internet is easy to use offerings of information and products. This function is provided by the World Wide Web which is at the heart of the recent explosion in the business use of the Net. This is based on an hypertext language called Hypertext Markup Language (HTML) that formats documents and incorporates dynamic links to other documents and pictures stored in the same or remote computers.

World Wide Web and Internet are not the same though people think they are the same. The Internet is the network itself and many activities other than the World Wide Web will be done on it. The services like E-mail, Gopher, Usenet news groups are available separately, and access to them has been integrated into the World Wide Web. While the other methods of locating information on the Net are mainly text based, the web pages have made an impact by combining text, hypermedia, graphics and sound. Through the use of web, commercial enterprises are providing information on demand (say customer support, marketing and sales). The specific hypermedia technology used in the web is known as hyperlink, navigating (or surfing) the web requires a graphics computer linked to the Internet and web browser. The user must also have a special software tool to navigate the web known as a web browser. A popular web browser is Mosaic, developed by the National Centre for Super Computing Applications. There is another web browser known as Travel Web, a website that gives complete details of electronic information on 16 resort hotels in the USA and the Caribbean and similar information on 87 non-resort hotels in North America. Prospective travelers can use Travel Web any time to find out information on hotel details, sightseeing attractions related to USA and Caribbean. The World Wide Web needs:

- A functional architecture.
- A structural Architecture and
- A navigational architecture

## **4.5 WWW TECHNOLOGIES**

### **Web Page**

A web page is a single unit of information, often called a document that is available via the World Wide Web (www). A web page can be longer than one computer screen and can use more than one piece of paper when it is printed out.

A web page is created using HTML. It consists of standardized codes or “tags” that are used to define the structure of information on a web page. These codes enable web pages to have many features including bold text, italic text, headings, paragraph break and numbered or bulleted lists.

### **Web Browser**

Web browsers are applications that retrieve content in the form of HTML from web servers. Browsers keep track of the users input actions, for example; clicking buttons or selecting links-and executing those actions.

By 1992, the basic idea of hypertext-data containing links to other data had been explored and was widely accessible on the net. However, the number of people using the web was still small. This was because the principal web client programmes ran under text-based Unix systems and were awkward to use.

This all changed in 1993, when Mark Andersen; then a student at the University of Illinois, released a new programme called Mosaic. Mosaic was the original graphical web browser. Mosaic used the original text web browser, Linux as a model. After the release of Mosaic, the popularity of the World Wide Web exploded. Mark Andersen formed a new company Netscape and released Netscape navigator.

After the release of navigator 2, Microsoft woke up to the Internet and realized the vast potential of this entirely new market. In short time the company released Internet explorer, which in its original version wasn't very compelling.

Other web browsers were spry Mosaic, Lynx, HotJava etc. Spry Mosaic is a licensed descendent of NCSA Mosaic. Spry has licensed it for use as the CompuServe web browser. Lynx is the original text only web browser developed at CERN to support only pure HTML. HotJava is a web browser that Sun wrote entirely in Java as a demonstration of the programming power of the Java language.

Netscape communicator (initially called as Netscape navigator) and Internet explorer are the two browsers that are most popular. Regardless of which browser you use, web browsers may support some or all of these features:

- Bookmarks for favorite web sites
- Multiple browsing windows
- Frames or multiple views within a window
- Secure data transmission
- Java and other languages support
- Web interface to FTP and Gopher Internet sites.

### **Hypertext Markup language (HTML)**

HTML defines several aspects of a web page including heading levels, bold, italics, images, paragraph breaks and hypertext links to other resources. HTML can be compared to word processing. The text in a word processed file can be formatted in various ways. For example, a heading can be bold and in larger font size than the rest of the document. Also, specific words can be italicized for emphasis.

Thus, HTML is a way to define the formats of text in a web page. However, it goes further by also being able to define placement of graphics and hypertext links. HTML is a sub-language of SGML, or Standard Generalized Markup Language. SGML is a system that defines and standardizes the structure



of documents. Both SGML and HTML utilize descriptive markup to define the structure of an area of text. In general terms, descriptive markup does not specify a particular font or point size for an area of text. Therefore, in HTML, text is marked as a heading, subheading, numbered list, bold, italic, etc.

HTML is standardized and portable. A document that has been prepared using HTML markup “tag” can be viewed using a variety of web browsers, such as Internet Explorer, Netscape and Lynx. A browser interprets the tags in an HTML file and presents the file as a formatted, readable web page. In addition, HTML documents can be viewed on all types of systems, such as Macintosh, PC’s and UNIX machines.

### **HTML Tags**

HTML tags are used to define areas of a document as having certain characteristics. The tags used in HTML usually consist of a code in between two “wickets”. These codes are called container tags because the formatting described by the tag affects only the text contained between the tags. For example, <B> and </B> are the starting and ending tags used to indicate an area as bold. HTML tags are used to define heading levels, such as <H1> and </H1>. Heading levels can go to <H6>, with each successive number indicating a smaller heading size.

Some other basic HTML tags are:

- <i> and </i> to indicate italics
- <img src=“name-of-picture”> to place an image in a document file
- <p> to create a paragraph break

In HTML, some codes require end tag and some do not require end tags. In the previous example, the <p> tag indicates a paragraph break. This type of tag is called an empty tag because no end tag is required.

Web pages can contain text, images, sound files, video files and hyperlinks to other internet resources. All these features are indicated by using HTML codes.

## Lesson 5

### ELECTRONIC PAYMENT SYSTEMS

#### 5.1 INTRODUCTION

Electronic payment systems are central to on-line business process as companies look for ways to serve customers faster and at lower cost. Emerging innovations in the payment for goods and services in electronic commerce promise to offer a wide range of new business opportunities.

Electronic payment systems and e-commerce are highly linked given that on-line consumers must pay for products and services. Clearly, payment is an integral part of the mercantile process and prompt payment is crucial. If the claims and debits of the various participants (consumers, companies and banks) are not balanced because of payment delay, 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.

The current state of on-line electronic payments is in many ways reminiscent of the medieval ages. The merchants of Asia and Europe faced a similar problem while trying to unlock the commercial potential of the expanding marketplace. Those ancient traders faced a number of obstacles (e.g., conflicting local laws and customs regarding commercial practices and incompatible and nonconvertible currencies) that restricted trade. To circumvent some of these problems, traders invented various forms of payment instruments. The merchants also developed commercial law surrounding the use of these instruments that proved to be one of the turning points in the history of trade and commerce. We are on the verge of a similar sort of development today, but one that is unlikely to take anywhere near the centuries it took for the traditional payment system to evolve.

Everyone agrees that the payment and settlement process is a potential bottleneck in the fast-moving electronic commerce environment if we rely on conventional payment methods such as cash, checks, bank drafts, or bills of exchange. Electronic replicas of these conventional instruments are not well suited for the speed required in e-commerce purchase processing. For instance, payments of small denominations (micropayments) must be made and accepted by vendors in real time for snippets of information. Conventional instruments are too slow for micropayments and the high transaction costs involved in processing them add greatly to the overhead. Therefore new methods of payment are needed to meet the emerging demands of e-commerce. These neo-payment instruments must be secure, have a low processing cost, and be accepted widely as global currency tender.

#### ***Electronic Payment Systems***

Electronic payment systems are becoming central to on-line business transactions nowadays as companies look for various methods to serve customers faster and more cost effectively. Electronic commerce brings a wide range of new worldwide business opportunities. There is no doubt that electronic payment systems are becoming more and more common and will play an important role in the business world. Electronic payment always involves a payer and a payee who exchange money for goods or services. At least one financial institution like a bank will act as the issuer (used by the payer) and the acquirer (used by the payee).

#### ***Awareness of risks Electronic Payment Systems***

Security, legal certainty and trust are important elements, influencing the acceptance of commerce by both individuals and businesses. Furthermore, sociological and cost factors play a significant role. Several reports on awareness of risks are related to the non-transparent legal background for both companies and consumers. In this context, e-commerce reluctance appears to be more pronounced in

firms than in customers. The main reason for firms to be reluctant may be insecurity caused by the lack of legal rules determining when a transaction is legally binding. For customers, in addition to this, the security of on-line payment methods may be decisive. An important issue is credit card acceptance by retailers in Europe. The credit cards were offered to merchants originally on the grounds, that authorized transactions would be honoured. Now the system is established, banks in some countries charge traders for fraudulent transactions, which cause tensions. Some large retailers still refuse to take credit cards because of the terms of business. The result has been a move towards debit cards - which use the same infrastructure but have different contractual terms.

In general, there seems to be no consensus on whether companies and customers clearly distinguish between secured and unsecured methods of payment and whether they would not accept the latter because of the risks involved. Some parties believe that companies and customers clearly distinguish between secured and unsecured methods. However, others maintain that only companies clearly distinguish between secured and unsecured methods. Customers' awareness of risks on the other hand is most probably based on perception rather than on facts, and is therefore less analytical. If both partners in ecommerce (banks and merchants) are reliable and offer convenient payment schemes, customers will make use of them.

The general public remains unaware of the risk issue. The main concern of the average consumer seems to be confidentiality about credit card numbers exchanged on the Internet. Some experts share the view that the perceived lack of security in on-line electronic payments is largely exaggerated and not justified at all by the actual threat. The average consumer does not yet realize that the risk of compromising his card number is far greater in conventional face-to-face transactions than on the Internet. This is partly the result of ignorance and unfamiliarity, as well as a mistaken belief in the security of traditional payment systems. In this respect, the difficulty of generalizing about the security aspects of all systems should be stressed. There is a wide variety of payment systems with different security features and thus with varying security level.

Many other issues affect the security of electronic payments perhaps even more importantly: e.g. the physical, procedural and personnel security procedures operated at the ends of any telecommunications link (whether via a PC, smart card or mobile phone). It is also fairly well known that most security failures are caused by "insider" threats rather than by external hackers (or crackers). Confidence in the reliable operation of the terminal equipment(s) is essential.

## **5.2 TYPES OF ELECTRONIC PAYMENT SYSTEMS**

### ***Conventional Payment Process***

A conventional process of payment and settlement involves a buyer-to-seller transfer of cash or payment information (e.g. credit card or check). The actual settlement of payment takes place in the financial processing network. A cash payment requires a buyer's withdrawal from his bank account, a transfer of cash to the seller, and the seller's deposit of the payment to his/her account. Non-cash payment mechanisms are settled by adjusting, i.e. crediting and debiting, the appropriate accounts between the banks based on payment information conveyed via check or credit card. Figure 5.1 is a simplified diagram for both cash and non-cash transactions. Cash moves from the buyer's bank to the seller's bank through face-to-face exchanges in the market. If a buyer uses a non-cash method of payment, payment information instead of cash flows from the buyer to the seller, and ultimately payments are settled between affected banks who notably adjust accounts based on the payment information. In real markets, this clearing process involves some type of intermediaries such as credit

card services or check clearing companies. Schematically then most payment systems are based on similar processes. The 'information' conveyed to settle payments can be one of the following: information about the identities of the seller and the buyer and some instruction to settle payments without revealing financial information [payment clearing systems financial information such as credit card or bank accounts numbers (including checks and debit cards) actual values represented by digital currency

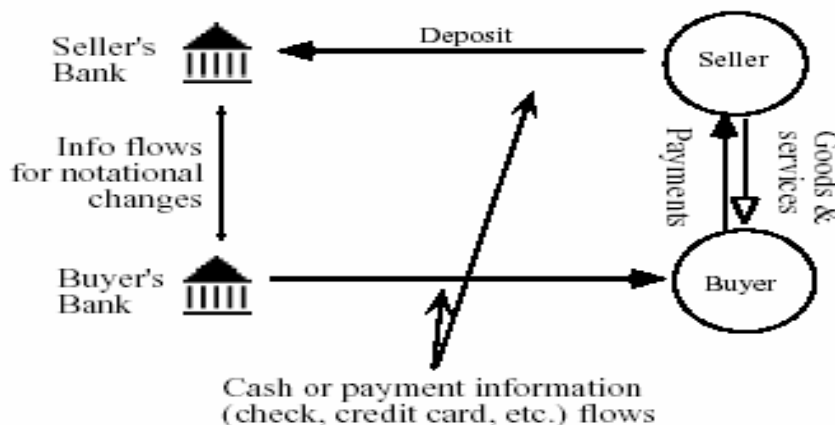


Figure 5.1: A Cheque simplified model of transaction

### Type 1: Payment Through an Intermediary - Payment Clearing Services

When face-to-face purchase is replaced with on-line commerce, many aspects of a transaction occur instantly, under which various processes of a normal business interaction are subsumed. For example, a typical purchase involves stages of locating a seller, selecting a product, asking a price quote, making an offer, agreeing over payment means, checking the identity and validity of the payment mechanism, transferring of goods and receipts. In order to be used as a substitute for face-to-face payments, online payment systems must incorporate all or some of these stages within their payment functions. The lack of face-to-face interaction also leads to more secure methods of payment being developed for electronic commerce, to deal with the security problems for sensitive information and uncertainty about identity. Consequently, electronic commerce transactions require intermediaries to provide security, identification, and authentication as well as payment support.

Figure 5.2 shows a stylized transaction for online commerce using an intermediary. In this model, the intermediary not only settles payments, it also takes care of such needs as confirming seller and buyer identities, authenticating and verifying ordering and payment information and other transactional requirements lacking in virtual interactions. In the figure, two boxes delineate online purchasing and secure or off-line payment clearing processes. Payment settlement in this figure follows the example of the traditional electronic funds transfer model which uses secured private value networks. The intermediary contributes to market efficiency by resolving uncertainties about security and identity and relieving vendors of the need to set up duplicative hardware and software to handle the online payment clearing process. The payment information transmitted by the buyer may be one of three types. First, it may contain only customer order information such as the identity of the buyer and seller, name of the product, amount of payment, and other sale conditions but no payment information such as credit card numbers or checking account numbers. In this case, the intermediary acts as a centralized commerce enabler maintaining membership and payment information for both sellers and buyers. A buyer need only send the seller his identification number assigned by the intermediary.

Upon receiving the purchase order, the intermediary verifies it with both the buyer and seller and handles all sensitive payment information on behalf of both.

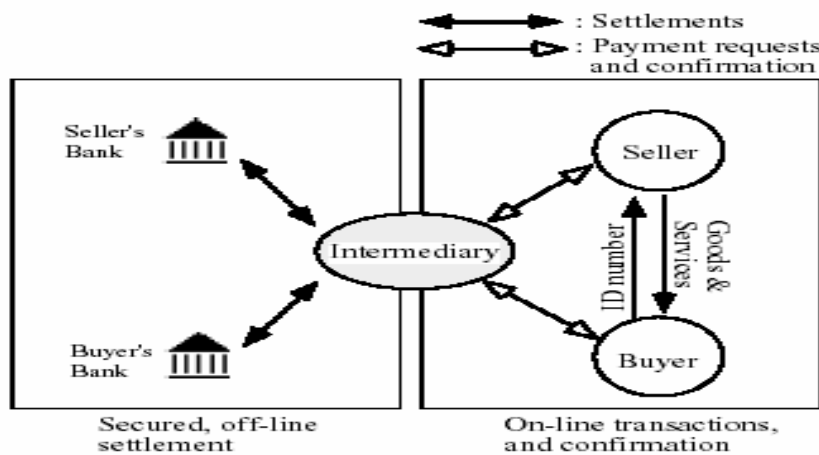


Figure 5.2: Transactions with an intermediary

The key benefit of this payment clearing system is that it separates sensitive and non-sensitive information and only non-sensitive information is exchanged online. This alleviates the concern with security that is often seen as a serious barrier to online commerce. In fact, First Virtual does not even rely on encryption for messages between buyers and sellers. A critical requisite for this system to work is the users' trust in the intermediaries.

#### **Type 2: Payment Based on EFT - Electronic Funds Transfer**

The second type of payment systems does not depend on a central processing intermediary. Instead, sensitive payment information (such as credit card or bank account number) is transmitted along with orders, which is in effect an open Internet implementation of financial electronic data interchange (EDI) (see Figure 5.3). An electronic funds transfer (EFT) is a financial application of EDI, which sends credit card numbers or electronic checks via secured private networks between banks and major corporations. To use EFTs to clear payments and settle accounts, an online payment service will need to add capabilities to process orders, accounts and receipts. In its simplest form, payment systems may use digital checks —simply an image of a check— and rely on existing payment clearing networks. The Secure Electronic Transaction (SET) protocol - a credit card based system supported by Visa and MasterCard - uses digital certificates, which are digital credit cards. We call this type of payment system as notational funds transfer system since it resembles traditional electronic fund transfers and wire transfers which settle notational accounts of buyers and sellers.

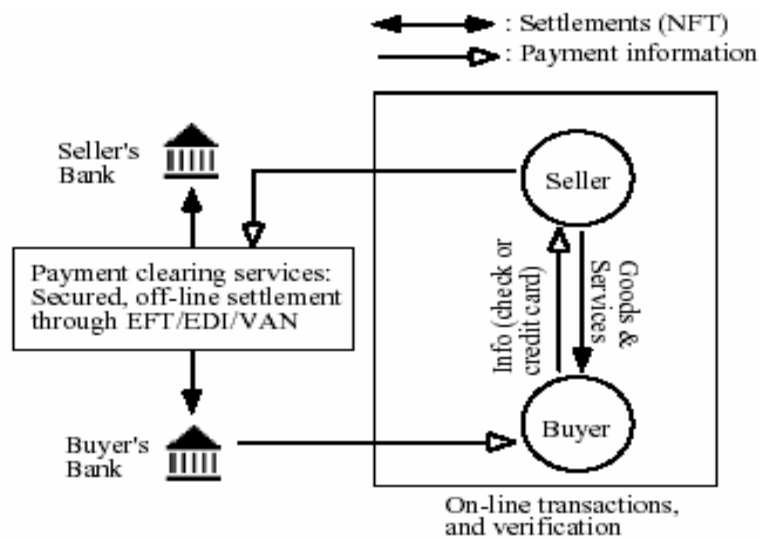


Figure 5.3: Notational funds transfer system

Electronic funds transfer systems differ from payment clearing services in that the 'payment information' transferred online contains sensitive financial information. Thus, if it is intercepted by a third party, it may be abused like stolen credit cards or debit cards. A majority of proposed electronic payment systems fall into this second type of payment systems. The objective of these systems is to extend the benefit and convenience of EFT to consumers and small businesses. However, unlike EFTs, the Internet is open and not as secure as private value added networks (VANs). The challenge to these systems is how to secure the integrity of the payment messages being transmitted and to ensure the interoperability between different sets of payment protocols.

### Type 3: Payment Based on Electronic Currency

The third type of payment systems transmits not payment information but a digital product representing values: electronic currency. The nature of digital currency mirrors that of paper money as a means of payment. As such, digital currency payment systems have the same advantages as paper currency payment, namely anonymity and convenience. As in other electronic payment systems, here too security during transmission and storage is a concern, although from a different perspective, for digital currency systems doubling, counterfeiting, and storage become critical issues whereas eavesdropping and the issue of liability (when charges are made without authorization) are important for notational funds transfers. Figure 5.4 shows a digital currency payment scheme.

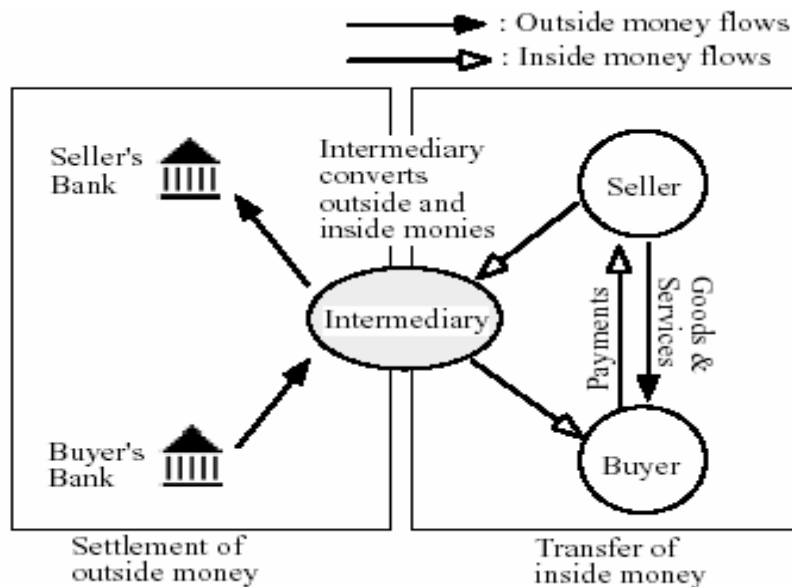


Figure 5.4: Digital Currency Payment Scheme

The only difference from Figure is that the intermediary in Figure 5.4 acts as an electronic bank which converts outside money, into inside money (e.g. tokens or e-cash) which is circulated within online markets. However, as a private monetary system, digital currency will have wide ranging impact on money and monetary system with implications extending far beyond mere transactional efficiency. Already digital currency has spawned many types of new businesses: software vendors for currency server systems; hardware vendors for smart card readers and other interface devices; technology firms for security, encryption and authentication; and new banking services interfacing accounts in digital currency and conventional currency.

### 5.3 DIMENSIONS OF ELECTRONIC PAYMENT SYSTEM

Electronic payment systems can be considered to be merely the next - albeit significant - step in a long line of changes in payment clearing systems. The electronic settling of accounts, for example, has long been an integral part of payment systems using credit cards, debit cards, automatic teller machines, and prepaid cards. What enables any payment mechanism to be processed electronically is the fact that unlike currency, bills, or coins which carry monetary values, non-cash mechanisms are promises or contracts of payments. Based on the information transmitted or characteristics following a transaction, the appropriate accounts representing notational money are adjusted between banks and financial institutions. The difference between the various types of Electronic payments systems discussed in section 5.2 can be shown by the table 5.1

**Table 5.1: DIMENSIONS OF ELECTRONIC PAYMENT SYSTEM**

Dimension	Cash	Personal Check	Credit Card	Stored Value (Debit Card)	Accumulating Balance
Instantly convertible without intermediation	Yes	No	No	No	No
Low transaction cost for small transactions	Yes	No	No	No	Yes
Low transaction cost for large transactions	No	Yes	Yes	Yes	Yes
Low fixed costs for merchant	Yes	Yes	No	No	No
Refutable (able to be repudiated)	No	Yes	Yes	No (usually)	Yes

Financial risk for consumer	Yes	No	Yes	Limited	No
Financial risk for merchant	No	Yes	Yes	No	Yes
Anonymous for consumer	Yes	No	No	No	No
Anonymous for merchant	Yes	No	No	No	No
Immediately respendable	Yes	No	No	No	No
Security against unauthorized use	No	Some	Some	Some	Some
Tamper-resistant	Yes	No	Yes	Yes	Yes
Requires authentication	No	Yes	Yes	Yes	Yes
Special hardware required	No	No	Yes – by merchant	Yes – by merchant	Yes – by merchant
Buyers keeps float	No	Yes	Yes	No	Yes
Account required	No	Yes	Yes	Yes	Yes
Has immediate monetary value	Yes	No	No	Yes	No

## 5.4 TRADITIONAL PAYMENT SYSTEMS VS ELECTRONIC PAYMENT SYSTEMS

- **Offline versus Online** Offline payments involve no contact with a third party during payment: The transaction involves only the payer and payee. The obvious problem with offline payments is that it is difficult to prevent payers from spending more money than they actually possess. In a purely digital world, a dishonest payer can easily reset the local state of his system to a prior state after each payment. Online payments involve an authorization server (usually as part of the issuer or acquirer) in each payment. Online systems obviously require more communication. In general, they are considered more secure than offline systems. Most proposed Internet payment systems are online. Both systems offer payers an electronic wallet, preventing fake-terminal attacks on the payer's PIN. The payee is known to the payer in advance, and the payment is already authorized during withdrawal, in a way similar to a certified bank check.
- **Trusted hardware** Offline payment systems that seek to prevent (not merely detect) double spending require tamper-resistant hardware at the payer end. The smart card is an example. Tamper-resistant hardware may also be used at the payee end. An example is the security modules of point-of-sale (POS) terminals. This is mandatory in the case of shared-key systems and in cases where the payee does not forward individual transactions but the total volume of transactions. In a certain sense, tamper-resistant hardware is a “pocket branch” of a bank and must be trusted by the issuer. Independent of the issuer's security considerations, it is in the payer's interest to have a secure device that can be trusted to protect his secret keys and to perform the necessary operations. Initially, this could be simply a smart card. But in the long run, it should become a smart device of a different form factor with secure access to a minimal keyboard and display. This is often called an electronic wallet. Without such a secure device, the payers' secrets and hence their money are vulnerable to anybody who can access his computer. This is obviously a problem in multiuser environments. It is also a problem even on single-user computers that may be accessed directly or indirectly by others. A virus, for example, installed on a computer could steal PINs and passwords as they are entered. Even when a smart card is available to store keys, a virus program may directly ask the smart card to



make a payment to an attacker's account. Thus for true security, trusted input/output channels between the user and the smart card must exist.

- **Cryptography** A wide variety of cryptographic techniques have been developed for user authentication, secret communication, and non-repudiation. They are essential tools in building secure payment systems over open networks that have little or no physical security. There are also excellent reference works on cryptography.
- **"Cryptofree" systems** Using no cryptography at all means relying on out-band security: Goods ordered electronically are not delivered until a fax arrives from the payer confirming the order. First Virtual is a cryptofree system. A user has an account and receives a password in exchange for a credit card number, but the password is not protected as it traverses the Internet. Such a system is vulnerable to eavesdropping. First Virtual achieves some protection by asking the payer for an acknowledgment of each payment via email, but the actual security of the system is based on the payer's ability to revoke each payment within a certain period. In other words, there is no definite authorization during payment. Until the end of this period, the payee assumes the entire risk.
- **Generic payment switch** A payment switch is an online payment system that implements both the prepaid and pay-later models, as exemplified by the Open Market payment switch. Open Market's architecture supports several authentication methods, depending on the payment method chosen. The methods range from simple, unprotected PIN-based authentication to challenge-response-based systems, in which the response is computed, typically by a smart card. Actually, Open Market uses passwords and optionally two types of devices for response generation: Secure Net Key and Secure ID. User authentication therefore is based on shared-key cryptography. However, authorization is based on public-key cryptography: the Open Market payment switch digitally signs an authorization message, which is forwarded to the payee. The payment switch is completely trusted by users who use shared-key cryptography.
- **Shared-key cryptography** Authentication based on shared-key cryptography requires that the prover (the payer) and a verifier (the issuer) both have a shared secret. A password and PIN are other examples. Because both sides have exactly the same secret information, shared-key cryptography does not provide non-repudiation. If payer and issuer disagree about a payment, there is no way to decide if the payment was initiated by the payer or by an employee of the issuer. Authenticating a transfer order on the basis of shared keys is therefore not appropriate if the payer bears the risk of forged payments. If authentication is to be done offline, each payer payee pair needs a shared secret. In practice this means that some sort of master key is present at each payee end, to enable the payee to derive the payer's key. Tamper-resistant security modules in point-of-sale terminals protect the master key. Most offline systems use a shared secret between payer and issuer for authentication.
- **Public-key digital signatures** Authentication based on public-key cryptography requires that the prover have a secret signing key and a certificate for its corresponding public signature verification key. The certificate is issued by a well-known authority. Most systems now use encryption, but there are several alternatives. Digital signatures can provide non-repudiation disputes between sender and receiver can be resolved. Digital signatures should be mandatory if the payer bears the risk of forged payments. A rather general security scheme that uses public key signatures is Secure Socket Layer. SSL is a socket layer communication interface

that allows two parties to communicate securely over the Internet. It is not a payment technology per se, but has been proposed as a means to secure payment messages.

- **Payer anonymity** Payers prefer to keep their everyday payment activities private. Certainly they do not want unrelated third parties to observe and track their payments. Often, they prefer the payees (shops, publishers, and the like) and in some cases even banks to be incapable of observing and tracking their payments. Some payment systems provide payer anonymity and un-traceability. Both are considered useful for cash-like payments since cash is also anonymous and untraceable. Whereas anonymity simply means that the payer's identity is not used in payments, un-traceability means that, in addition, two different payments by the same payer cannot be linked. By encrypting all flows between payer and payee, all payment systems could be made untraceable by outsiders. Payer anonymity with respect to the payee can be achieved by using pseudonyms instead of real identities. Some electronic payment systems are designed to provide anonymity or even un-traceability with respect to the payee. A blind signature on some message is made in such a way that the signer does not know the exact content of the message.

## 5.5 ELECTRONIC PAYMENTS AND PROTOCOLS

There are many protocols that are currently employed to allow money to change hands in cyberspace.

But the most important open protocols used for payments on the Web are SSL, SET, and IOTP.

### SSL

The Secure Sockets Layer (SSL) protocol was designed by Netscape as a method for secure client-server communications over the Internet. Using public key cryptography and certificates, SSL offers a mechanism so that clients and servers can authenticate each other and then engage in secure communication. During an initial handshaking phase, the client and server select a secret key crypto scheme to use and then the client sends the secret key to the server using the server's public key from the server's certificate. From that point on, the information exchanged between the client and server is encrypted.

At its heart, SSL is not a payment protocol at all. SSL's goal is to provide a secure connection between two parties and its application for electronic commerce is to provide a secure communications channel over which a customer and business can exchange private information. In fact, the processing of payments - such as the seller obtaining credit card approval - continues to use the same mechanisms that are employed today by businesses, such as the use of a private business-to-bank network or use of card swipe machines at the business.

### SET

Despite SSL's popularity, MasterCard, Visa, and several other companies developed the Secure Electronic Transaction (SET) protocol specifically to handle electronic payments. SET version 1.0 was released in May 1997. Today, interoperability testing is in full swing-many products, such as Cyber cash's popular merchant software, are already SET compliant. Fraud prevention is a primary motivator behind SET. Visa and Mastercard claim that online credit card frauds closely track offline rates, which they estimate to be less than one-tenth of one percent. That would seem to indicate that the current model of using SSL to protect transactions is adequate. However, some recent studies have suggested that merchants are experiencing fraud rates as high as 40% in certain segments of the electronic marketplace-items such as airline tickets, computers, and downloadable software carry the greatest

risk. SET has the potential to reduce the chance of fraud by providing rigorous authentication measures in addition to encrypting transactions.



**FIGURE 5. 5: SET Purchase Request.**

The order details and the account information are unequivocally associated through a “dual signature” mechanism. The SET client software first combines a hash of the order information with a hash of the payment instructions. The result is then hashed, thus linking the order and payment together such that nobody can deny the bond. This second hash value is signed by encrypting it with the customer’s secret key, tying the customer to the purchase.

### **IOTP**

Whereas SSL is a secure communications protocol that can be used by a consumer to forward payment information and SET is a protocol specifically designed for credit card transactions, the Internet Open Trading Protocol (IOTP) provides an interoperable framework for consumer-to-business Internet-based electronic commerce. As a commerce framework specification, IOTP is designed to replicate the "real" world of transactions where consumers choose their product, choose their vendor, choose their form of payment (in conjunction with their vendor), arrange delivery, and, periodically, even return products. The designers of IOTP intend that this protocol will be the lingua franca of Internet commerce just as EDI has become the standard document language for "real" commerce; any two parties conducting Internet-based e-commerce in a way that conforms to the IOTP specifications will be able to complete their transactions securely.

Clearly, cryptography is an important part of the security associated with IOTP. Although IOTP does not call out for specific algorithms, it does provide the flexibility that any given transaction may employ symmetric (secret key), asymmetric (public key), or both types of crypto schemes. Furthermore, depending upon transaction type, digital certificates may or may not be employed. Again, the overhead and cost of the security must be balanced with the needs of the buyer and the seller on a per-transaction basis. Use of XML (eXtensible Markup Language) as the data

representation language provides flexibility and extensibility, and facilitates the development of a broad range of IOTP-aware applications.

## **5.6 SECURITY REQUIREMENTS IN ELECTRONIC PAYMENT SYSTEMS**

The concrete security requirements of electronic payment systems vary, depending both on their features and the trust assumptions placed on their operation. In general, however, electronic payment systems must exhibit integrity, authorization, confidentiality, availability, and reliability.

### ***Integrity and authorization***

A payment system with integrity allows no money to be taken from a user without explicit authorization by that user. It may also disallow the receipt of payment without explicit consent, to prevent occurrences of things like unsolicited bribery. Authorization constitutes the most important relationship in a payment system. Payment can be authorized in three ways: via out-band authorization, passwords, and signature.

### ***Out-band authorization***

In this approach, the verifying party (typically a bank) notifies the authorizing party (the payer) of a transaction. The authorizing party is required to approve or deny the payment using a secure, out-band channel (such as via surface mail or the phone). This is the current approach for credit cards involving mail orders and telephone orders: Anyone who knows a user's credit card data can initiate transactions, and the legitimate user must check the statement and actively complain about unauthorized transactions. If the user does not complain within a certain time (usually 90 days), the transaction is considered "approved" by default.

### ***Password authorization***

A transaction protected by a password requires that every message from the authorizing party include a cryptographic check value. The check value is computed using a secret known only to the authorizing and verifying parties. This secret can be a personal identification number, a password, or any form of shared secret. In addition, shared secrets that are short - like a six-digit PIN - are inherently susceptible to various kinds of attacks. They cannot by themselves provide a high degree of security. They should only be used to control access to a physical token like a smart card (or a wallet) that performs the actual authorization using secure cryptographic mechanisms, such as digital signatures.

### ***Signature authorization***

In this type of transaction, the verifying party requires a digital signature of the authorizing party. Digital signatures provide non-repudiation of origin: Only the owner of the secret signing key can "sign" messages (whereas everybody who knows the corresponding public verification key can verify the authenticity of signatures.)

### ***Confidentiality***

Some parties involved may wish confidentiality of transactions. Confidentiality in this context means the restriction of the knowledge about various pieces of information related to a transaction: the identity of payer/payee, purchase content, amount, and so on. Confidentiality requirement dictates that this information be restricted only to the participants involved. Where anonymity or un-traceability is desired, the requirement may be to limit this knowledge to certain subsets of the participants only.

### ***Availability and reliability***

All parties require the ability to make or receive payments whenever necessary. Payment transactions must be atomic: They occur entirely or not at all, but they never hang in an unknown or inconsistent

state. No payer would accept a loss of money (not a significant amount, in any case) due to a network or system crash. Availability and reliability presume that the underlying networking services and all software and hardware components are sufficiently dependable. Recovery from crash failures requires some sort of stable storage at all parties and specific resynchronization protocols. These fault tolerance issues are not discussed here, because most payment systems do not address them explicitly.

## 5.7 ELECTRONIC PAYMENTS AND CONSUMER EMPOWERMENT

Electronic payments empower the consumer in several fundamental ways that cash and cheques cannot. One of the clearest ways is the security that dispute resolution provides, offering consumers a form of insurance against purchases of faulty goods or services that are not delivered or lower in quality than expected. Insurance against lost, stolen or otherwise unauthorized use allows consumers to quickly shield themselves from liability, at zero cost in some markets, unlike lost cash or cheques. Electronic payments also provide the ability to control payment for goods and services over time by allowing buyers to pay now, pay later, or prepay. Credit cards provide liquidity through pre-approved credit availability, something that transaction-specific loans cannot do. This works favorably for consumers, merchants, and banks because the process facilitates current period sales while minimizing the cost of obtaining credit. Debit cards offer convenient and immediate access to funds on deposit. Globally branded electronic payments have the ubiquitous and interoperable features that lend themselves to immediate acceptability by consumers and businesses. Despite the value that consumers place on electronic payments, and the benefits that extend to economies from the underlying system, concerns are sometimes raised about abuse of credit and erosion of consumer wealth. Often these concerns are raised in the context of new regulations that would raise barriers to consumer access to credit and are based on an implicit assertion that expanded credit availability and use produces widespread harm to consumers. However, with the application of an objective analysis quite a different picture emerges. An in-depth study of consumer behavior in Australia provides some insights into the level and sophistication of payment usage and clearly shows that consumers have a high level of understanding of payments and responsibly manage revolving credit.

## 5.8 DESIRABLE PROPERTIES OF DIGITAL CURRENCY

Developers of digital currency have a wide range of options to implement strong safety requirements of transmitting values over the network. For example, a secure digital currency can be implemented by using strong encryption algorithms, by employing tamper-resistant hardware, or by securing the network communication. Although physical specifications of digital coins and tokens may vary, the following properties are fundamental to any digital currency payment system.

- **Monetary Value** To be used as a monetary unit, digital currency must have value that can be exchanged for other goods and services, be used to pay fiduciary obligations, or be transferred to another person. Since digital currency is essentially a file, it does not have an intrinsic value, but must be linked to other system of value. The most common implementation is to base the value of digital currency on bank deposits, credits, or prepayments using outside money. Once a digital currency is convertible to dollars, the next step is for it to be accepted in the market as a monetary token. Once accepted and trusted, a digital currency can establish related properties such as exchangeability and transferability.
- **Convenience** Convenience has been the biggest factor in the growth of notational currencies such as checks, which are scalable and easy to transport. Similarly, digital currencies must be

convenient to use, store, access, and transport. As a digital file, it may allow remote access to money via telephone, modem, or Internet connection. Electronic storage and transfer devices or network capabilities will be needed. To gain wide acceptance, digital cash also must be convenient in terms of scalability and interoperability so that users need not carry multiple denominations or multiple versions for each operating system.

- **Security** To secure physical money and coins, one needs to store them in wallets, safes or other private places. If digital currencies are stored in hard drives connected to an open network, theoretically anybody can snoop and tamper with the money. Encryption is used to protect digital currency against tampering. At the same time, digital currencies must be resistant to accidents by owners.
- **Authentication** Authentication of money is done by visually inspecting bills and coins. Although further tests could involve weighing, chemical analysis, and contacting the authorities, authentication is usually a simple matter for physical currency. Digital currency, however, cannot be visually inspected, and it is difficult to distinguish the original and a counterfeit. Because of this, inspection of digital currency depends on authenticating secondary information that accompanies the bills or coins such as the digital signatures of banks or payers attached to the currency (serial number). A more rigid system will require contacting a third party each time a transaction is made. Although this system is more secure, the transaction costs may be too high for small-value purchases
- **Non-refutability** Acknowledging payment and receipt is a basic property required of a payment system. In cash transactions, simple receipt is enough to establish non-refutability. A similar exchange of digital receipts can be used for digital transactions. An alternative is to append all transaction records into the digital currency itself. In this system, digital coins accumulate information about all parties involved in past transactions. These are called identified tokens compared to anonymous tokens, which do not reveal information about users.
- **Accessibility and Reliability** One advantage of digital currency over cash is its capability to be transported over the network. Therefore, users can store digital money at home but access it remotely via telephone or modem, the same network used to clear payments. Because of this crucial role, digital payment systems must provide continuous, fast, and reliable connections.
- **Anonymity** Unlike checks and cards, cash transactions are anonymous. An anonymous payment system is needed to protect against revealing purchase patterns and other consumer information, although untraceable transactions are opposed by the government in view of possible criminal uses. Nevertheless, the need will persist, and anonymity is perhaps the single most important property of cash transactions. Digital currency can be equipped with varying degree of anonymity masking the user identity to the bank, the payee, or both. Strong anonymity guarantees un-traceability while a weaker version allows the user's identity to be traced when the need arises. While the issue of anonymity invokes debates about tax evasion, money laundering and other criminal uses of digital currency, the economic rationale for simple, anonymous digital coins is that they reduce transaction costs by eliminating third parties and protect consumer information that could be used to price-discriminate among consumers.

## 5.9 PROSPECTS OF ELECTRONIC PAYMENT SYSTEMS

As the volume of Electronic Commerce becomes larger, the role of secure and economical online payments on the Internet will, accordingly, become more important. At the moment, the credit card payment for B2C trades with SSL protocol is the most widely adopted. However, SET protocol tailored to credit card payment may become one of the next generation standards. For micro payment, smart-card-based e-cash will become popular and will be recharged through the Internet from the cyber-banks, which will revitalize the benefit of cyber-banks.

As B2B occupies the major portion of Electronic Commerce, more economical payment methods like Internet-based funds transfer equipped with the benefit of check systems will become the major medium for large-amount payments. The credit card fee seems too high to transfer large amounts among credible corporations. This prospective trend should envision opportunities to payment businesses and corporate finance managers.

## 5.10 MANAGERIAL ISSUES IN ELECTRONIC PAYMENT SYSTEMS

Managerial issues for electronic payment systems vary depending upon the business position.

- **Security solution providers** can cultivate the opportunity of providing solutions for secure electronic payment systems. Typical ones include authentication, encryption, integrity, and non-repudiation.
- **Electronic payment systems solution providers** can offer various types of electronic payment systems to e-stores and banks. The SET solution of having the certificate on the smart card is an emerging issue to be resolved.
- **Electronic stores** should select an appropriate set of electronic payment systems. Until electronic payment methods become popular among customers, it is necessary to offer traditional payment methods as well.
- **Banks** need to develop cyber-banks compatible with the various electronic payment systems (credit card, debit card, stored-value card, and e-check) that will be used by customers at e-stores. Watch for the development of consistent standards in certificates and stored-value-card protocols.
- **Credit card brand companies** need to develop standards like SET and watch 'the acceptance by customers. It is necessary to balance security with efficiency. Careful attention is needed to determine when the SSL-based solution will be replaced by the SET -based solution and whether to combine the credit card with the open or closed stored-value card.
- **Smart card brands** should develop a business model in cooperation with application sectors (like transportation and pay phones) and banks. Having standards is the key to expand interoperable applications. In designing business models, it is important to consider the adequate number of smart cards from the customer's point of view.
- **Certificate authorities** need to identify all types of certificates to be provided. Banks and credit card companies need to consider whether they should become a clearing agent.

## 5.11 FUTURE OF ELECTRONIC PAYMENTS SYSTEMS

The critical reasons in acceptance of electronic payment instruments and their niche in the payments environment are:

1. The cost savings are substantial, and businesses and consumers will not be able to ignore that fact once other issues are resolved.

2. The exponential growth of electronic commerce, online financial services, electronic bill presentment and payment products, and new financial communication networks will demand greater velocity in the movement of value which are efficient and instantaneous.
3. The proliferation of business-to-business ("B2B") electronic commerce will force payments systems to adapt to even greater speeds and standards of efficiency.
4. The adults of the future will not be wed to bricks and mortar, checkbooks or passbooks or even ATM cards.

But we should not be fooled into thinking that 21st century electronic payments products will totally replace checks, credit and debit cards, or cash. They will simply find their niche in the financial products landscape like every other product did in the 20th century.

### ***Legal Considerations***

There are a variety of policies, operational and legal considerations confronting any entrepreneur who attempts to tackle the challenge of creating a new form of value or a new way to transmit it. Because most current banking and payments systems laws and regulations have been constructed to deal with more traditional payment mechanisms, they often do not provide a clear picture of whether and how they apply to new payment vehicles or systems. That creates a sense of uncertainty that is not helpful to developing markets. If the government does anything in the near future, it should foster legal predictability in this area.

### ***Jurisdictional Considerations***

Money and payments systems are by their very nature, multi-jurisdictional products. If there is one thing that is meant to be in commerce, it is money. Thus the creation of new global electronic payment instruments and systems raises a threshold issue.

### ***State Banking Laws***

The creation of a new electronic payment product raises the possibility that it may unknowingly conflict with banking laws in the states. To the extent that a non-bank creates a payment product that is linked to an "account," that entity may be engaging in the business of banking without a license under state law. It may also have established an illegal deposit relationship with its customers that subject it to criminal penalties under law.