

Structure

- 1.0 Introduction
- 1.1 Objectives
- 1.2 E-Commerce: Definition
 - 1.2.1 Commerce and Internet
- 1.3 Advantages and Limitations
 - 1.3.1 Advantages of E-Commerce
 - 1.3.2 Limitations and Constraints of E-Commerce
- 1.4 E-Commerce Business Operations
 - 1.4.1 Consumer Oriented E-Commerce Applications
- 1.5 Benefits from Various Points of View
- 1.6 Types of E-Commerce Storage of Information
- 1.7 Systems of Payments
 - 1.7.1 Methods of Implementing Systems of Payments over the Web
- 1.8 Security Issues
 - 1.8.1 Digital Signatures and Certificates
 - 1.8.2 Secure Socket Layer (SSL)
 - 1.8.3 PCI, SET, Firewalls and Kerberos
 - 1.8.4 Transactions
- 1.9 ATM and Online Banking
 - 1.9.1 Online Banking
 - 1.9.2 Online Banking Safety Checks
- 1.10 Online Purchase of Railway Tickets
- 1.11 Summary
- 1.12 Solutions / Answers
- 1.13 Further Readings

1.0 INTRODUCTION

Commerce has a long tradition of profiting from innovative systems and tools. As technologies emerge, successful businesses are quick to identify developing opportunities and expand their commercial capabilities. Conducting commerce electronically is no different.

For many businesses, new technologies that digitally exchange text and monetary information are effective tools to serve traditional business goals of streamlining services, developing new markets, and creating innovative business opportunities. In addition, they offer the potential to develop types of services that are so innovative and distinct from tradition that they define a new type of commerce. Appropriately named, electronic commerce (E-Commerce) is the synthesis of traditional business practices with computer, information and communication technologies.

<http://store.templatemonster.com/?aff=orlandoweb> E-Commerce is not an entirely new type of commerce. It first emerged in the 1960's on private networks, as typically large organizations developed **electronic data interchange** (EDI) installations and banks implemented **electronic funds transfer** (EFT). Today, however, E-Commerce is no longer the exclusive domain of large organizations or private networks.

The open network Internet and particularly the World Wide Web not only present new commercial potential for large organizations, but also provide a viable entry point for small and medium-sized enterprises (SMEs) into E-Commerce opportunities.

Even though E-Commerce has existed for past several years, it has just recently sustained significant growth. In the past 5 years, the Internet has transformed from an auxiliary communication medium for academics and large organizations into an entrenched communication medium that spans across nearly all parts of mainstream society. E-Commerce growth is tied directly to these socio-technological changes. The more entrenched the medium becomes; the more users are drawn to it. An increase in users increases markets. As markets expand, more businesses are attracted, which in turn drives the development of better, more stable and secure technology to facilitate E-Commerce. A stable, secure environment for exchanging mission-critical and monetary information only draws more businesses and consumers to the Internet and ensures the growth pattern continues. All these related factors contribute to a burgeoning E-Commerce marketplace that should continue to grow well into the new millennium.

Only now it is becoming apparent how large the potential for E-Commerce will be in the next few years. With E-Commerce prospects continuing to improve, most large corporations have already developed preliminary E-Commerce strategies. Although many SMEs are not following this trend of large corporations, others have found that a modest investment in a simple website can develop into a commitment to E-Commerce as a major component of the business plan. At this stage of development, E-Commerce is not an essential operation for every type of SME, but in the near future it may become standard for many.

In this Unit, we will study about the concept of E-Commerce, how it will be done, advantages, benefits, limitations, types of E-Commerce, electronic payment systems and security issues.

1.1 OBJECTIVES

After going through this unit, you should be able to:

- understand the concept of E-Commerce;
- list the advantages and disadvantages of E-Commerce;
- differentiate between traditional commerce and E-Commerce;
- describe the types of E-Commerce;
- discuss the various electronic payment modes; and
- describe the security issues pertaining to the online transactions.

1.2 E-COMMERCE: DEFINITION

Electronic commerce or E-Commerce is a term for any type of business, or commercial transaction that involves the transfer of information across the Internet. It covers a range of different types of businesses, from consumer based retail sites, through auction or music sites, to business exchanges trading goods and services between corporations. It is currently one of the most important aspects of the Internet to emerge.

E-Commerce allows consumers to electronically exchange goods and services with no barriers of time or distance. Electronic commerce has expanded rapidly over the past five years and is predicted to continue at this rate, or even accelerate. In the near future, the boundaries between “conventional” and “electronic” commerce will become increasingly blurred as more and more businesses move sections of their operations onto the Internet.

There are a number of ways in which companies can make money from the internet. Probably the best known way of making money is by selling some commodity; this could be a non-IT commodity such as a CD or item of clothing or it could be some piece of application software, a font, a browser plug-in or an operating system.

Other forms of revenue rising are:

- **Auction sites** which auction items on the Internet and make profits by taking some commission from the sales.
- **Affiliate sites** which contain a link to a normal retailing site and are paid when a visitor from the affiliate site makes a visit to the retail site to make a purchase. The affiliate site will usually attract visitors by offering some information such as providing links to resources and tutorials on some specific topic or technology such as Java.
- **Banner adverts.** These advertisements will contain links to the company doing the advertising; they will be displayed on a site and will result in some revenue being earned by the site owner when the banner advert is clicked.
- **Bulk-buying sites** where a site collects a number of users together all of whom want to buy some item; the site negotiates a discount with the supplier and takes a commission.
- **Shopping malls** where a number of e-commerce sellers congregate together on the same website; often these sellers will be related to each other, for example they may all sell luxury goods. The mall owner takes a percentage of their profit.
- **Portals** which contain massive amounts of material on a particular topic, for example a portal devoted to fishing. Such sites will contain thousands of resource links, tutorials and indexes. They will also contain links to merchants who sell goods associated with the portal topic. There may be a number of ways that the portal owner would make money, for example they could be paid by a merchant for each visit from the portal or the merchant may pay a flat fee for being included in the portal.
- **Digital publishing sites** which are effectively magazines on the web. They make profits in a number of ways including advertising and charging vendors for references to their website.
- **Licensing sites** which make some software available to other sites, for example search engines which allow a visitor to the site to search for material more easily.
- **Community sites:** These are like portals but involve the visitors more, for example a community site devoted to nurses might include a number of chat rooms which allow nurses to talk together in real time and swap advice. Money is made from such sites in the same way as with portals.
- **Name-your-price sites** are websites where the buyer haggles with the retailer and names what price they will pay for a particular product. Such sites make profits in the same way as normal retail sites.

Such applications have changed the face of retailing, for example the fast communication of the Internet has made bulk buying sites feasible and popular and has given rise to a number of novel commercial models. The most popular model is one which involves a pyramid of services, ranging from those that are free, to those which are charged at a premium rate. For example, a site which sells a piece of software might give the basic software away for free and then offer increasingly more sophisticated versions of the software to buyers. This form of partially free charging has percolated down from the internet to conventional software sales; for example, the company Qualcomm that markets the *Eudora* email reader makes a version of the program available for no cost, but will charge for fully featured versions.

1.3 ADVANTAGES AND LIMITATIONS

E-commerce provides many new ways for businesses and consumers to communicate and conduct business. There are a number of advantages and disadvantages of conducting business in this manner.

1.3.1 Advantages of E-Commerce

Some advantages that can be achieved from e-commerce include:

- **Being able to conduct business 24 x 7 x 365.:** E-commerce systems can operate all day every day. Your physical storefront does not need to be open in order for customers and suppliers to be doing business with you electronically.
- **Access the global marketplace:** The Internet spans the world, and it is possible to do business with any business or person who is connected to the Internet. Simple local businesses such as specialist record stores are able to market and sell their offerings internationally using e-commerce. This global opportunity is assisted by the fact that, unlike traditional communications methods, users are not charged according to the distance over which they are communicating.
- **Speed:** Electronic communications allow messages to traverse the world almost instantaneously. There is no need to wait weeks for a catalogue to arrive by post: that communications delay is not a part of the Internet / e-commerce world.
- **Marketspace:** The market in which web-based businesses operate is the global market. It may not be evident to them, but many businesses are already facing international competition from web-enabled businesses.
- **Opportunity to reduce costs:** The Internet makes it very easy to 'shop around' for products and services that may be cheaper or more effective than we might otherwise settle for. It is sometimes possible to, through some online research, identify original manufacturers for some goods - thereby bypassing wholesalers and achieving a cheaper price.
- **Computer platform-independent:** Many, if not most, computers have the ability to communicate via the Internet independent of operating systems and hardware. Customers are not limited by existing hardware systems.
- **Efficient applications development environment:** In many respects, applications can be more efficiently developed and distributed because they can be built without regard to the customer's or the business partner's technology platform. Application updates do not have to be manually installed on computers. Rather, Internet-related technologies provide this capability inherently through automatic deployment of software updates.
- **Allowing customer self service and 'customer outsourcing':** People can interact with businesses at any hour of the day that it is convenient to them, and because these interactions are initiated by customers, the customers also provide a lot of the data for the transaction that may otherwise need to be entered by business staff. This means that some of the work and costs are effectively shifted to customers; this is referred to as 'customer outsourcing'.
- **Stepping beyond borders to a global view.** Using aspects of e-commerce technology can mean your business can source and use products and services provided by other businesses in other countries..
- **A new marketing channel:** The Internet provides an important new channel to sell to consumers.

1.3.2 Limitations and Constraints of E-Commerce

Some disadvantages and constraints of e-commerce include the following.

- **Time for delivery of physical products:** It is possible to visit a local music store and walk out with a compact disc or a bookstore and leave with a book. E-commerce is often used to buy goods that are not available locally from businesses all over the world, meaning that physical goods need to be delivered, which takes time and costs money. In some cases there are ways around this, for example, with electronic files of the music or books being accessed across the Internet, but then these are not physical goods.
- **Physical product, supplier and delivery uncertainty:** When you walk out of a shop with an item, it's yours. You have it; you know what it is, where it is and how it looks. In some respects e-commerce purchases are made on trust. This is because, firstly, not having had physical access to the product, a purchase is made on an expectation of what that product is and its condition. Secondly, because supplying businesses can be conducted across the world, it can be uncertain whether or not they are legitimate businesses and are not just going to take your money. It's pretty hard to knock on their door to complain or seek legal recourse! Thirdly, even if the item is sent, it is easy to start wondering whether or not it will ever arrive.
- **Perishable goods:** Forget about ordering a single gelato ice cream from a shop in Rome! Though specialized or refrigerated transport can be used, goods bought and sold via the Internet tend to be durable and non-perishable: they need to survive the trip from the supplier to the purchasing business or consumer. This shifts the bias for perishable and/or non-durable goods back towards traditional supply chain arrangements, or towards relatively more local e-commerce-based purchases, sales and distribution. In contrast, durable goods can be traded from almost anyone to almost anyone else, sparking competition for lower prices. In some cases this leads to *disintermediation* in which intermediary people and businesses are bypassed by consumers and by other businesses that are seeking to purchase more directly from manufacturers.
- **Limited and selected sensory information:** The Internet is an effective conduit for visual and auditory information: seeing pictures, hearing sounds and reading text. However it does not allow full scope for our senses: we can see pictures of the flowers, but not smell their fragrance; we can see pictures of a hammer, but not feel its weight or balance. Further, when we pick up and inspect something, we choose what we look at and how we look at it. This is not the case on the Internet. If we were looking at buying a car on the Internet, we would see the pictures the seller had chosen for us to see but not the things we might look for if we were able to see it in person. And, taking into account our other senses, we can't test the car to hear the sound of the engine as it changes gears or sense the smell and feel of the leather seats. There are many ways in which the Internet does not convey the richness of experiences of the world. This lack of sensory information means that people are often much more comfortable buying via the Internet generic goods - things that they have seen or experienced before and about which there is little ambiguity, rather than unique or complex things.
- **Returning goods:** Returning goods online can be an area of difficulty. The uncertainties surrounding the initial payment and delivery of goods can be exacerbated in this process. Will the goods get back to their source? Who pays for the return postage? Will the refund be paid? Will I be left with nothing? How long will it take? Contrast this with the offline experience of returning goods to a shop.

- **Privacy, security, payment, identity, and contract:** Many issues arise - privacy of information, security of that information and payment details, whether or not payment details (eg credit card details) will be misused, identity theft, contract, and, whether we have one or not, what laws and legal jurisdiction apply.
- **Defined services and the unexpected:** E-commerce is an effective means for managing the transaction of known and established services, that is, things that are everyday. It is not suitable for dealing with the new or unexpected. For example, a transport company used to dealing with simple packages being asked if it can transport a hippopotamus, or a customer asking for a book order to be wrapped in blue and white polka dot paper with a bow. Such requests need human intervention to investigate and resolve.
- **Personal service:** Although some human interaction can be facilitated via the web, e-commerce can not provide the richness of interaction provided by personal service. For most businesses, e-commerce methods provide the equivalent of an information-rich counter attendant rather than a salesperson. This also means that feedback about how people react to product and service offerings also tends to be more granular or perhaps lost using e-commerce approaches. If your only feedback is that people are (or are not) buying your products or services online, this is inadequate for evaluating how to change or improve your e-commerce strategies and/or product and service offerings. Successful business use of e-commerce typically involves strategies for gaining and applying customer feedback. This helps businesses to understand, anticipate and meet changing online customer needs and preferences, which is critical because of the comparatively rapid rate of ongoing Internet-based change.
- **Size and number of transactions:** E-commerce is most often conducted using credit card facilities for payments, and as a result very small and very large transactions tend not to be conducted online. The size of transactions is also impacted by the economics of transporting physical goods. For example, any benefits or conveniences of buying a box of pens online from a US-based business tend to be eclipsed by the cost of having to pay for them to be delivered to you in Australia. The delivery costs also mean that buying individual items from a range of different overseas businesses is significantly more expensive than buying all of the goods from one overseas business because the goods can be packaged and shipped together.

1.4 E-COMMERCE BUSINESS OPERATIONS

By virtue of its similarities, the scope of operations for E-Commerce is nearly as broad as traditional commerce. E-Commerce includes both traditional activities (e.g. providing product information) and new activities (e.g. conducting online retail in virtual malls, publishing digital information). Some of the common operations that define E-Commerce are specific business-to-business and business-to-customer interactions, such as:

- <http://store.templatemonster.com/?aff=orlandoweb> Information exchange
- Goods or services trading
- Sales promotion and advertising
- Online digital content delivery
- Electronic funds transfers and transaction processing
- Electronic share trading
- Electronic bills of lading processing
- Collaborative work interaction

- Manufacturing management
- Accounts settlement
- Online sourcing
- Public procurement
- Direct consumer marketing
- Inventory management
- Post-sales service
- Commercial auctions.

Although every E-Commerce implementation will differ, most SMEs focus operations on:

- Product promotion via online catalogues
- Transaction processing (exchanging digitized monetary information)
- Customer Support.

E-Commerce conducted over the Internet differs from typical commercial activity in that it is influenced by the unique characteristics of the medium itself. In contrast to print media, E-Commerce is dynamic, allowing users to interact with the commercial site, send comments, and even define the scope of a document. Unlike person-to-person commerce, E-Commerce allows for a controlled interaction between vendor and potential purchaser, where the vendor may strategically direct the customer through a series of options and processes. E-Commerce also differs from traditional commerce by its boundless relation to time and space. Interaction is not restricted to normal working hours or geopolitical borders. There is potential to conduct business with other merchants and consumers around the world in different time zones, 7 days a week, 24 hours a day.

1.4.1 Consumer Oriented E-Commerce Applications

The wide range of applications for the consumer marketplace can be broadly classified into:

- **Entertainment:** Movies on demand, video cataloging, interactive ads, multi-user games, on-line discussions.
- **Financial services and information:** Home banking, financial services, and financial news.
- **Essential services:** Home shopping, electronic catalogs, tele-medicine, remote diagnostics.
- **Educational and training:** Interactive education, video conferencing, online databases.

1.5 BENEFITS FROM VARIOUS POINTS OF VIEW

In the short-term, entry into E-Commerce may offer a competitive advantage over slower to act competitors. The market for E-Commerce is growing; as more consumers and businesses gain Internet access and transaction processing technologies improve security.

Companies that establish an operation today, still in the early stages of Internet based E-Commerce, will have a fuller understanding of the issues and be better prepared to capitalize on emerging technologies when E-Commerce markets open up in the next few years.

The benefits of E-Commerce have various views which include:

From business point of view

- Extend the range of sales territory
- Streamline communication to suppliers and clients
- Expand reach to new clients
- Improve service to existing clients
- Reduce paperwork and time spent on correspondence
- Track customer satisfaction
- Expedite billing
- Improve collaboration on work projects
- Expand markets beyond geographical, national boundaries
- Leverage legacy data
- Improve inventory control, order processing
- Establish position in emerging E-Commerce marketplace
- Lower costs of overhead
- Realize economies of scale by increasing sales volume to new markets
- Monitor competition and industry trends
- Improve or expand product lines - locate new suppliers, products that could be included in catalogue.

For marketing point of view

- Improved market analysis, product analysis and customer analysis.
- Low-cost advertising
- Easy to create and maintain customer or client database

From customer point of view

- Wide-scale information dissemination
- Wide selection of good products and goods at the low price
- Rapid inter-personal communications and information accesses
- Wider access to assistance and to advice from experts and peers.
- Save shopping time and money
- Fast services and delivery.

1.6 TYPES OF E-COMMERCE

There are a number of different types of e-commerce:

- 1) ***Business to Consumer (B2C):*** It is the direct trade between companies and end consumers. This is the direct selling via the Internet. For example: selling goods direct to customer and anyone can buy any products from the supplier's website. In this mode is intended to benefit the consumer and can say business to consumer (B2C) E-Commerce works as retail store over internet.
- 2) ***Business to Business (B2B):*** Business to business E-Commerce existed in marketing from the very beginning. It is the trade that takes place between companies. Terms like off-shoring and outsourcing are generally associated with B2B E-Commerce. For example: If I give my company's payroll work to another accounting firm, it would be deemed as outsourcing. The term off-shoring decides the outsourcing term further. If the work is outsourced to a company, which is outside the geographical boundary of the country in which the outsourcing company resides, it is termed as off-shoring.
- 3) ***Consumer to Business (C2B):*** In today's E-Commerce arena, it is growing trend wherein consumers demand specific products or services from

respective businesses. For example: I contact a tour and travel operator via their website for purchasing a holiday package.

Consumer to business E-Commerce is growing at a rapid pace and the trend is set to continue in the future.

- 4) **Consumer to Consumer (C2C):** Usually, this type of E-Commerce works as Consumer to Business to Consumer (C2B2C). It essentially means that a consumer would contact a business in search for a suitable customer. Most of the auction websites (like eBay) and matrimonial websites are working on this methodology.
- 5) **Business to Employee (B2E):** Business to Employee e-commerce is growing in use. This form of e-commerce is more commonly known as an 'Intranet'. An intranet is a web site developed to provide employees of an organization with information. The intranet is usually accessed through the organization's network, though it can and is often extended to an entrant who uses the Internet but restricts uses by sign-on and password.

Apart from the types of E-Commerce mentioned above, there are various other hybrid forms of E-Commerce being practiced in today's globalized world. Choosing the appropriate model is crucial and vital for the business firm.

G2G (Government-to-Government), G2E (Government-to-Employee), G2B (Government-to-Business), B2G (Business-to-Government), G2C (Government-to-Citizen), C2G (Citizen-to-Government) are other forms of E-Commerce that involve transactions with the government - from procurement to filing taxes to business registrations to renewing licenses.

1.7 SYSTEMS OF PAYMENTS

Majorly, there are four business payment methods which include:

- 1) Processes that use existing credit/debit card Models.
- 2) Funds Transfer request to the Banks through existing ECS, EFT, SWIFT etc..
OR On-line debit /credit to respective accounts.
- 3) Electronic Funds Transfer using Digital Check
- 4) Electronic monetary alternatives (Digital "Cash")
 - Electronic Wallets
 - Stored-Value (Smart) Card

Let us see the details of them:

- **Credit card-based:** if consumer want to purchase a product or service, they simply send their credit card details to the service provider involved and the credit card organization will handle this payment like any other.
- **Smart card:** these are credit and debit cards and other card products enhanced with microprocessors capable of holding more information than the traditional magnetic stripe. The chip can store significantly greater amounts of data, estimated to be 80 times more than a magnetic stripe. Smart card are basically of two types:
 - **Relationship based smart credit cards:** this is an enhancement of existing card service and/or the addition of new service that a financial institution delivers to its customers via chip-based card or other service. These new services may include access to multiple financial accounts, value-added marketing programmes, or their information cardholders may want to store on their card.

- **Electronic Purses:** these are wallet-sized smart cards embedded with programmable microchips that store sums of money for people to use instead of cash for everything from buying food to paying subway fares.
- **Digital and electronic cash:** Also called e-cash, these terms refer to any of several schemes that allow a person to pay for goods or services by transmitting a number from one computer to another. The number, just like those on a dollar bill, is issued by a bank and represents specified sums of real money. One of the key features of digital cash is that it's anonymous and reusable, just like real cash. This is a key difference between e-cash and credit card transactions over the Internet.
- **Electronic checks:** currently being tested by **Cybercash**, electronic checking system such as **Paynow** take money from users' checking accounts to pay utility and phone bills.
- **Electronic wallet:** this is a payment scheme, such as a Cybercash's Internet Wallet, that stores your credit card number on your hard drive in an encrypted form. You can then make purchases at web sites that support that particular electronic wallet. When you go to a participating online store, you click a Pay button to initiate a credit card payment via a secure transaction enabled by the electronic wallet company's server. The major browser vendors have struck deals to include electronic wallet technology in their products.
- **Micropayments:** Transaction in amount between 25 cents and \$10, typically made in order to download or access graphics, games and information are known as micropayments. Pay-as-you-go micropayment was supposed to revolutionize the world of e-commerce.

1.7.1 Methods of Implementing Systems of Payments over the Web

There are many possibilities for conducting transactions over the web, from simple and cheap to complicated and expensive. Let us see some of them:

PayPal

The cheapest/easiest is PayPal - this is an inexpensive way to start taking payments quickly, especially if you don't have a merchant account. With PayPal, your visitors can pay you with a credit card or by sending a payment from their checking account (**check**). PayPal provides a shopping cart and many other free services that are helpful to sites that are starting out. They charge 2.9% +\$.30 per transaction and have no start-up fees.

PayPal is inexpensive both because there are no merchant account or payment gateway fees, but also because PayPal provides a very easy way to integrate their shopping cart into your site, which reduces development time. To implement it, just sign up with PayPal, click on Merchant Tools, and then on Make Shopping Cart Buttons. You will input your options for each product and it will produce a snippet of HTML code which you put in your page where you want the "Add to Cart" button to be.

Non-profit Payment Solutions

A similar solution just for non-profits is Network for Good, which allows you to accept credit card donations on your site. They charge 3% of each transaction.

Mal's E-commerce Cart

This is also an inexpensive option and is a free solution. **Mal's** is a shopping cart system that is remotely hosted. With the free version, you can accept PayPal, offline payments like checks, and credit cards if you have your own way to charge them already. It will store the numbers securely for you to run offline. For \$6 a month you can upgrade your cart so it can integrate with a number of popular payment gateways like Authorize.net. In this case you would also be responsible for merchant account and payment gateway fees.

Fully featured shopping carts

Finally, there is the option of creating a full e-commerce solution. This involves several different components - a merchant account from a bank, a payment gateway service that allows you to accept payments into your merchant account from your website (this is sometimes bundled with the merchant account as a complete package), a shopping cart or payment script that integrates with your payment gateway, and certain elements of the server environment like having an SSL certificate and a static IP. There are some shopping carts that are available as pre-packaged scripts such as ClearCart that can be customized for your situation, or a custom payment script can be developed that exactly matches your needs. Full e-commerce is much more expensive and time-consuming to develop than PayPal or Mal's, but it can be integrated into your site for a truly seamless payment experience. It can also save you money in the long run if you are doing a high volume of sales.

Merchant Accounts

There are many merchant accounts to choose from, often including your local bank. E-onlinedata is the merchant account provider. It is the company that had the best balance of low fees, solid customer service, and experience serving online merchants.

1.8 SECURITY ISSUES

Most E-Commerce merchants leave the mechanics to their hosting company or IT staff, but it helps to understand the basic principles. Any system has to meet four requirements:

- **Privacy:** information must be kept from unauthorized parties.
- **Integrity:** message must not be altered or tampered with.
- **Authentication:** sender and recipient must prove their identities to each other.
- **Non-repudiation:** proof is needed that the message was indeed received.

Privacy is handled by encryption. In PKI (public key infrastructure) a message is encrypted by a public key, and decrypted by a private key. The public key is widely distributed, but only the recipient has the private key. For authentication (proving the identity of the sender, since only the sender has the particular key) the encrypted message is encrypted again, but this time with a private key. Such procedures form the basis of RSA (used by banks and governments) and PGP (Pretty Good Privacy, used to encrypt emails).

Unfortunately, PKI is not an efficient way of sending large amounts of information, and is often used only as a first step — to allow two parties to agree upon a key for symmetric secret key encryption. Here sender and recipient use keys that are generated for the particular message by a third body: a key distribution center. The keys are not identical, but each is shared with the key distribution center, which allows the message to be read. Then the symmetric keys are encrypted in the RSA

manner, and rules set under various protocols. Naturally, the private keys have to be kept secret, and most security lapses indeed arise here.

1.8.1 Digital Signatures and Certificates

Digital signatures meet the need for authentication and integrity. To vastly simplify matters, a plain text message is run through a hash function and so given a value: the message digest. This digest, the hash function and the plain text encrypted with the recipient's public key is sent to the recipient. The recipient decodes the message with their private key, and runs the message through the supplied hash function to that the message digest value remains unchanged (message has not been tampered with). Very often, the message is also time stamped by a third party agency, which provides non-repudiation.

What about authentication? How does a customer know that the website receiving sensitive information is not set up by some other party posing as the E-Merchant? They check the digital certificate. This is a digital document issued by the CA (certification authority: Verisign, Thawte, etc.) that uniquely identifies the merchant. Digital certificates are sold for emails, e-merchants and web-servers.

1.8.2 Secure Socket Layer (SSL)

Information sent over the Internet commonly uses the set of rules called TCP/IP (Transmission Control Protocol / Internet Protocol). The information is broken into packets, numbered sequentially, and an error control attached. Individual packets are sent by different routes. TCP/IP reassembles them in order and resubmits any packet showing errors.

SSL uses PKI and digital certificates to ensure privacy and authentication. The procedure is something like this: the client sends a message to the server, which replies with a digital certificate. Using PKI, server and client negotiate to create session keys, which are symmetrical secret keys specially created for that particular transmission. Once the session keys are agreed, communication continues with these session keys and the digital certificates.

1.8.3 PCI, SET, Firewalls and Kerberos

Credit card details can be safely sent with SSL, but once stored on the server they are vulnerable to outsiders hacking into the server and accompanying network. A PCI (peripheral component interconnect: hardware) card is often added for protection, therefore, or another approach altogether is adopted: SET (Secure Electronic Transaction). Developed by Visa and MasterCard, SET uses PKI for privacy, and digital certificates to authenticate the three parties: merchant, customer and bank. More importantly, sensitive information is not seen by the merchant, and is not kept on the merchant's server.

Firewalls (software or hardware) protect a server, a network and an individual PC from attack by viruses and hackers. Equally important is protection from malice or carelessness within the system, and many companies use the Kerberos protocol, which uses symmetric secret key cryptography to restrict access to authorized employees.

1.8.4 Transactions

Sensitive information has to be protected through at least three transactions:

- Credit card details supplied by the customer, either to the merchant or payment gateway. Handled by the server's SSL and the merchant/server's digital certificates.
- Credit card details passed to the bank for processing. Handled by the complex security measures of the payment gateway.

- Order and customer details supplied to the merchant, either directly or from the payment gateway/credit card processing company. Handled by SSL, server security, digital certificates (and payment gateway sometimes).

Let us see the following Table 1.1 for better understanding:

Table 1.1: Security Issues, Solutions and Implementers

THREAT	SOLUTION	IMPLEMENTOR
Site Security	Firewalls	Consumer
	Physical Measures	Merchant
	Operating Procedures	Acquirer
Message Security	Encryption	Software
	SSL-HTTP	
	SET-Card Payment	
Message Authentication	Digital Signatures	Software
	Public Key Certificates	Certification Authority
Message Integrity	Message Hashes	Software
	Digital Signatures	Certification Authority
	Public Key Certificates	

Let us discuss another application namely ATM and online banking in the next section.

1.9 ATM AND ONLINE BANKING

ATM sometime known as all time money and any time money but the exact meaning of ATM is 'Automated Teller Machine'. In other words it is a machine, which automatically works on telecommunication electronic principals. It is a computer like machine, which don't want any full time operator on it. Who ever are using it will become the operator of it and this machine it self will tell what to do next after completing a step. This machine will enable people to withdraw and deposit money without the help of any bank clerk. Any person who is the customer of a particular bank and have an ATM card with him can use the ATM of that particular bank only. For example if I am the customer of Punjab National Bank and I also have the ATM card of that bank, then I can use any ATM of Punjab National Bank or any other banks associated with it. It means ATM is bank specific. If an ATM is supporting more than one bank then the customers of those banks can use the same ATM.

ATM card always embedded with a magnetic strip, which contain either a unique number or some security information or both. Along with this card customer is provided with a PIN (Personal identification number) to make it sure that right man is using the right card.

Thief can steal card but until or unless he/she is not having its associated PIN one cannot use it as PIN confirms the ownership of the card in the machine. Firstly man need to insert the card inside the ATM machine (or need to swap the card from magnetic side at mentioned place) so that machine could read the unique number or also may check the other security information encrypted in the card. After that person needs to fill his/her PIN in the machine manually to verify the usages. Through this PIN, ATM provides security to its user.

ATM machine (see the *Figure 1.1*) is just like a computer, which is attached with the server for accessing the database. In this case each and every ATM is attached with its concerned bank server for accessing the customer detail. The connection can be established through modem or leased line; the choice depends on the desirable speed. Modem is rather slower than the leased line connection. An ATM therefore requires:

- 1) **CPU:** to control the transaction and computer-user interface.
- 2) **Vault:** restricted access machinery storage area.
- 3) **ATM card:** to identify the customer.
- 4) **PAD:** pad will include calculator like structure, to insert manual instruction/data.
- 5) **Crypto processor:** to convert the human readable language (English) into secret code and vice-versa.
- 6) **Function keys / Touch screen:** to carry on the process (where the process options are mentioned and user need to select the option)
- 7) **Printer:** to provide hard record of the transaction.
- 8) **Dispensing Machine:** to provide cash out of the machine.



Figure 1.1: An ATM Machine

After getting a little idea of hardware requirement of the ATM, let's talk about the software. ATM generally stores off-the-shelf software inside itself. It is commercial software. Generally ATM prefer the Microsoft Operating system because they are more user friendly in comparison to JAVA, UNIX and LINUX etc. and the most important protocol is 'Transaction protocol' in the ATM.

The process of the ATM starts with physical security that's why, now-a-days in spite of swapping the card inside the machine one need to swap it at the gate to take permission to enter into the ATM room. After entry one need to swap/insert the card in the machine also to start the process of the machine. On demand the PIN is to be entered manually to restrict unauthorized access. After that the ATM will work as per your instructions. It maintains the records of the transaction and also the security of the currency stored in it.

1.9.1 Online Banking

Online banking, also known as Internet banking allows customers to conduct financial transactions on a secure website operated by their retail or virtual bank. The system allowed on-line viewing/checking of statements, bank transfers and bill payments.

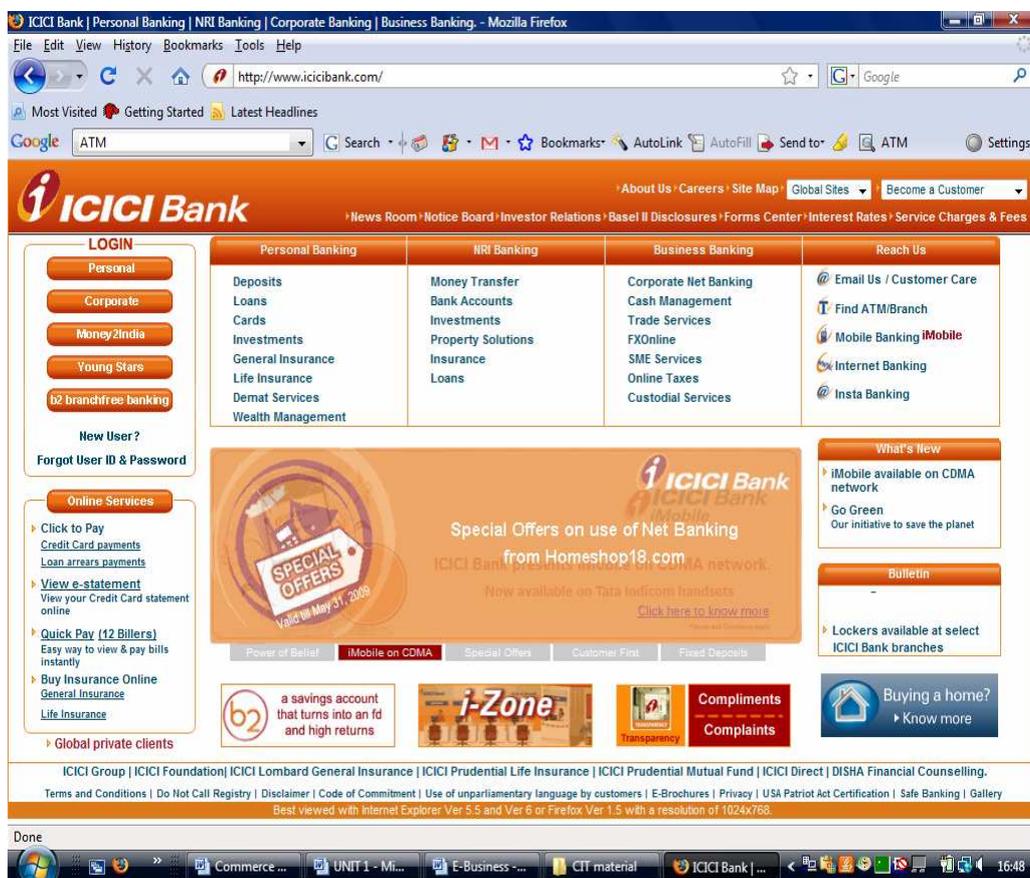


Figure1.2: Sample Online banking website
Source website: ICICI Bank

Security is provided through *userid* and *password*. Every customer is provided distinct single password to use the online service. This password is in encrypted form which makes it next to impossible for a third party to obtain or modify information after it is sent.

Advantages of online banking are:

- 1) Convenience
- 2) Safety
- 3) Secure
- 4) Time saving

In general if a bank has its website (for example, see the *figure 1.2*) it provides the facility of operating her/his account online in a secure mode (by paying some nominal fees or may be free). This is called as online banking. Online banking provides some of the following services to its customer:

- 1) **Account summary:** A customer can check or view its account summary online just by logging on the internet or by entering the account number. It help in make it sure that your money is where it's supposed to be is getting simpler all the time with online banking. One can safely monitor his money

movement without standing in the queue. Online banking provides privacy, accuracy and convenience.

- 2) **Fund transfer:** in order to make bank-to-bank transfer one can do this online. Fund can be transfer online on Internet. A written instruction needs to be sent to bank online. On the basis of instruction bank transfer the fund from one bank to another, one account to another and many more transfers.
- 3) **Bill Payment:** Now a day peoples have les time to stand in queue for payment of bills like electricity, water, and telephone etc. Online banking provides such facility also. On the request of customer bank pay your bill on your behalf. After payment of bill a written feedback if sent by bank to the customer to verify the transaction. Some time bank sent the SMS also on the mobile to verify the transaction.
- 4) **Investment purchase or sale:** Through bank investment can be purchased or sale out online. Bank provide the facility of DEMAT Account which allow his customer to purchase investment like shares, mutual fund etc. online.
- 5) **Loan applications:** one either the customer or non-customer client can apply for loan online. One can have all the instruction regarding applying, terms and condition etc. online. Loan form is available online.
- 6) **Opening a new account:** account open forms are also available online. One can apply for new account online.

1.8.2 Online Banking Safety Checks

With the rapid increase in use of technology by the companies / individuals, for banking as well as nonbanking activities, it is imperative that each user is aware of prudent use of computers and gadgets. Enjoy the convenience of Online Banking with just a few simple safety checks as given below:

PC Security

- It is essential to update antivirus software regularly with a personal firewall and spyware programme.
- It is also important to ascertain that firewall is ON, if the computer is used in cyber cafes or is not self owned.

Precautions while logging in

- Always access a bank's Internet banking website only by typing the correct URL (website address) into the browser.
- Never click a link sent in an e-mail that is supposed to link to the bank's website
- A spurious link could be a fraudster's phishing attack designed to collect personal information
 - This information is then used for accessing accounts and making unauthorized transfer of funds
 - In case of doubt, immediately contact the bank.

Confirm that the website is secure

When you use the Internet for banking, check that the session is secure by:

- Checking presence of digital certificate, a padlock or key at the bottom right hand corner. Double click on this icon to view information about the organization with which you have entered into a secure session.
- Verify the name of the website displayed in the top bar to avoid entering a spoof (false) website.

Ensure to log out

Always log off completely when you have finished your internet banking activity.

Special caution for e-mails from unknown sources

- Never reply to any email that is received from unknown people asking about confidential information or payment of fees etc., for surprise gifts.
Example: You have won lottery – \$100,000
- Be careful with such email; do not fill up any form given in such emails, most likely it is for phishing (fishing out information from you).
- Be very suspicious of any person who ask for your log-in-ID, password, account details, card details, or similar sensitive information
- Be especially careful about opening an e-mail with an attachment.

Check your transactions regularly

- It is very important to check your bank statements regularly to identify any erroneous or unauthorized transaction.
- You can also register for SMS alert services for your banking transactions and electronic statements provided by most banks (for example, from ATM).

Keep your Banking documents safe

- Destroy expired debit / credit cards and other old statements that are not required and may contain sensitive personal information.

1.10 ONLINE PURCHASE OF RAILWAY TICKETS

After reading the heading you might have wondered whether we can buy tickets online. The method of buying ticket online is called E-Ticketing. This method is quite a new method. Let's compare the traditional method with the online method of buying a railway ticket:

Table 1.2: Traditional Method Vs Online Method of Buying Railway Ticket

Traditional Method	Online Method
Should go to a specific ticket counter to purchase ticket.	No need to go physically to any place. Just you have to login online to the website.
Take the help of ticker seller.	Read the instructions available online on the user interface to purchase the ticket.
May be self or some other person is purchases ticket on your behalf.	You yourself are purchasing the ticket.
Tell the ticket seller source and destination station or fill in a specific reservation form.	Fill in the source and destination stations.
Ticket seller will tell you the trains availability, time, waiting etc.	A list of all the available train will appear in front of you to choose from
Make the payment and purchase the ticket	You enter your credit and debit card detail for payment. If approved your reservation details will appear on the screen.
You take the ticket immediately and come back to home	You will simply receive an email with an attachment. The attachment can be opened and the tickets will become available for print.
You have only one copy of the ticket. In case of theft / lost you will be in trouble	e-tickets can be printed an infinite of times

Hence, e-ticket is the Hassle free, convenient and economic way of purchasing ticket and getting reservation. Hassle free and convenient is very much clear from above comparison. But how it is economic? If we are purchasing ticket through Internet it means we are not taking the help of any clerk and also we are not physically going to any of the ticket reservation counters. This is saving the economic resources. Below given is the screenshot (see the *Figure: 1.3*) of the Indian Railways reservation interface.

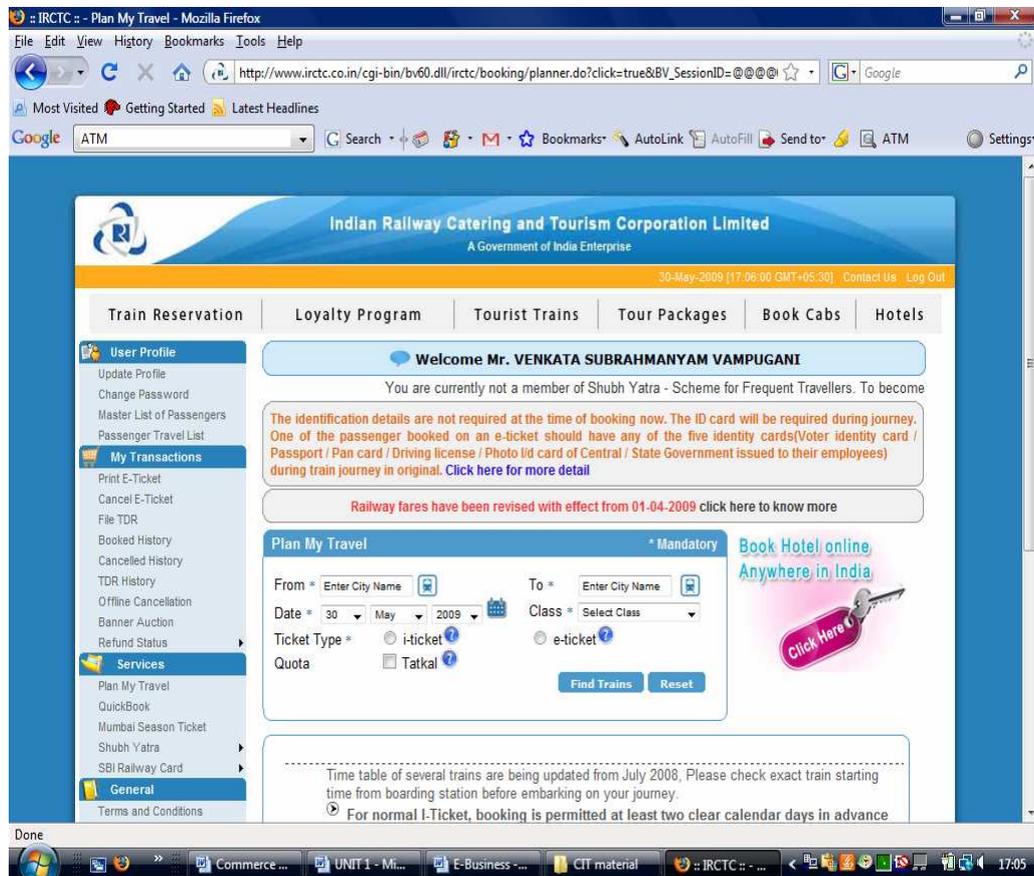


Figure 1.3 Indian Railways Online Reservation Interface
 Source: www.irctc.co.in

When we are purchasing the ticket on line the reservation option is also available. No need to put any special effort to get the reservation. The reservation depends upon the availability of free seats. Let’s understand the process of e-ticketing from the diagram:

- 1) Request Entered: The customer needs to mention the source and destination stations either by their name by mentioning their code (through available list) and the date of journey.
- 2) Option List: A list of all the available options will come. Like the list of trains those are available from Delhi to Bombay on a specific date. It will give you the entire information relating to that particular journey like train number, train name, time, availability, time etc.
- 3) Choice: Out of the available options the customer can choose.
- 4) Purchase/Reservation: After selecting the train, it prompts to enter the details of the passengers. Press the buy the ticket key. After this it prompts to enter the credit or debit card information for purchase/reservation. The user has to give the photo identity card details of any one of the passengers, while booking the ticket. This will require entering the identity particulars of one of the passengers, who will have to carry same ID card in original while

traveling. You can take the print out of the e-ticket and travel with the help of it along with your identity proof.

- 5) Other information: some other but important information are available online. It may include history, terms and conditions, acceptable identity proof etc.
- 6) Other options: it will include the information regarding cancellation and change of ticket and also the possible options in case of lost and theft.

Likewise, you can book the flight tickets of various flights, movie tickets; order your meals, various items etc online. Just log on to Internet and try some of them.

Check Your Progress 1

- 1) What is E-Commerce?
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- 2) What steps one needs to take to utilize E-Commerce?
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- 3) What is Online Payment Processing?
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- 4) What is a Merchant Account?
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- 5) What are the benefits of Commerce w.r.t the Seller and Customer?
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1.11 SUMMARY

E-Commerce is new way of conducting, managing and executing business transactions using computer and telecommunications networks. As awareness of the

Internet throughout the commercial world and general public increases, more and more business activities using internet based technology. The real key to making electronic commerce over the Internet a normal, every day business activity is the convergence of the telecommunications, content/media and software industries. E-commerce is expected to improve the productivity and competitiveness of participating businesses by unprecedented access to an online global market place with million of customers and thousands of products and services.

In this unit, we have studied about the concept of E-Commerce, advantages, benefits, limitations, types of E-Commerce, electronic payment systems, security issues, online banking and online railway reservation.

1.12 SOLUTIONS / ANSWERS

Check Your Progress 1

- 1) Electronic Commerce is a convenient and affordable way to sell products or services online.

E-Commerce software and service such as PayPal, MalseCom, and others enables individuals to maintain an online business while performing transactions right from the Web.
- 2) The following are the steps one needs to take to utilize E-Commerce:
 - First, determine your immediate and long term needs.
 - How many items will you be selling?
 - Will purchased items need to be shipped or can they be downloaded from a secure area of your site.
 - If your product needs to be shipped, will you want shipping included with your service or will your business handle it separately?
 - How often does your inventory change?
 - Will you need the ability to update products and pricing from you own computers?
- 3) When a customer purchases products from your site with a credit card, you or your site software will request approval that the card is valid and that sufficient funds are available in the customers account for the purchase. On approval, the bank will reply with an authorization number and the order will be officially “captured”. In the next step, the merchandise or service is sent to the customer and the Merchant informs the bank where the Merchant Account is held. The bank then deposits funds into the Merchant Account as the customers account is debited the cost of the products. The bank of your Merchant Account will remove the necessary service fees and complete the transaction.

Offline processing entails some labor on the part of the Merchant, but is easiest to adapt an existing business. In this case, a businesses current credit card processor will suffice.

Real-time processing requires little or no intervention by the Merchant, and is ideal for businesses in need of processing hundreds of orders per month. Credit Card numbers are received through the Internet and cleared by CyberCash online processing.

- 4) All merchants of all sizes and types of business must open a Merchant Account in order to receive credit card orders and clear the transactions. The Merchant Account acts as the deposit location for the customer's money. The bank that you choose to house your Merchant Account will take a small percentage of the sale as a service fee. This fee is extracted at the point of each sale.
- 5) **Seller benefits:**
- Overhead cost of an E-Commerce website is generally much less than the cost of a physical storefront.
 - You have the ability to reach customers all over the world rather than being limited to a certain geographical location.

Customer benefits:

- Order your products without leaving their home
- Security knowing every transaction is secure.
- Purchases will be delivered directly to their door.
- Search and find what they are looking for instantly.
- Viewing any or all of your product specifications and photographs.
- Choosing from a variety of options such as size and color.
- Checking how much they have "spent" before committing to a purchase.
- Contact you for customer service.

1.13 FURTHER READINGS

- 1) *E-Commerce – Cutting Edge of Business*, Kamlesh K Bajaj, Debjani Nag, Tata McGraw Hill, 1/e, 2003.
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- 4) *E-Commerce Concepts, Models, Strategies*, C S V Moorthy, Himalaya Publications.
- 5) *Electronic Commerce*, Gari P Schneider, Thomson Course Technology, 4/e, 2004.