

# **MAR GREGORIOS COLLEGE OF ARTS & SCIENCE**

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## **DEPARTMENT OF COMPUTER APPLICATION**

**SUBJECT NAME: E-COMMERCE TECHNOLOGIES**

**SEMESTER: IV**

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## **E-COMMERCE TECHNOLOGIES**

### **UNIT – I**

History of E-commerce and Indian Business Context: E-Commerce –Emergence of the Internet –Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India – The Internet and India – E-transition Challenges for Indian Corporate. Business Models for E-commerce: Business Model – E-business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types.

### **UNIT – II**

Enabling Technologies of the World Wide Web: World Wide Web – Internet Client-Server Applications –Networks and Internets – Software Agents – Internet Standards and Specifications – ISP. e-Marketing :Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – E-branding.

### **UNIT – III**

E-Security: Information system Security – Security on the Internet – E-business Risk Management Issues –Information Security Environment in India. Legal and Ethical Issues : Cybers talking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.

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### **UNIT – V**

Information systems for Mobile Commerce: What is Mobile Commerce? – Wireless Applications –Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies –Different Generations in Wireless Communication – Security Issues Pertaining to Cellular Technology. Portals for E Business: Portals – Human Resource Management – Various HRIS Modules.

### **TEXT BOOK:**

1. P.T.Joseph, S.J., “E-Commerce - An Indian Perspective”, PHI 2012, 4th Edition.

### **REFERENCE BOOKS:**

1. David Whiteley , “E-Commerce Strategy, Technologies and Applications”, Tata McGraw Hill, 2001.
2. Ravi Kalakota, Andrew B Whinston, “Frontiers of Electronic Commerce”, Pearson 2006, 12th Impression.

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- <https://magnetoitsolutions.com/blog/advantages-and-disadvantages-of-ecommerce>
- [https://www.researchgate.net/publication/320547139ECommerce\\_Merits\\_and\\_Demerits\\_A\\_Review\\_Paper](https://www.researchgate.net/publication/320547139ECommerce_Merits_and_Demerits_A_Review_Paper)

## **History of E-commerce and Indian Business Context**

E-business is the conduct of business on the internet not only buying and selling of goods but Also serving the customer and also collaborating with business partner aimed at improving And/or transforming business process and efficiency.

**Definition:** E-business (electronic business) is the conduct of business processes on the Internet. These electronic business processes include buying and selling products, supplies and services; servicing customers; processing payments etc.

**E- Commerce:** E- Commerce is where business on the transaction takes place by our telecommunication network especially through internet it means doing business electronically.

### **History of E-Commerce**

1 1960-1982 - Paving the way for electric commerce was the development of the Electronic Data Interchange (EDI). EDI replaced traditional mailing and faxing of documents.

2 Michael Aldrich, an English inventor, innovator and entrepreneur is credited with developing the predecessor to online shopping.

3 In 1982, France launched the precursor to the Internet called, Minitel.

4 In 1990 Tim Berners Lee, along with his friend Robert Cailliau, published a proposal to build a "Hypertext project" called, "Worldwide Web."

5 In September 1995, the NSF began charging a fee for registering domain names.

6 The Secure Socket Layers (SSL) – encryption certificate by Netscape in 1994 provided a safe means to transmit data over the Internet.

7 The largest online retailer in the world Amazon, launched in 1995 as an online bookstore.

8 EBay, an online auction site that debuted in 1995.

9 Also in 1995, was the inception of Yahoo followed by Google in 1998, two leading search engines in the US.

10 Global ecommerce company, PayPal, began its services in 1998 and currently operates in 190 markets.

11 As more and more people began doing business online, a need for secure communication and transactions became apparent. In 2004, the Payment Card Industry Security Standards Council (PCI) was formed.

### **Features of E- Commerce Technology**

1. Improved sales: E- Commerce is fast, cost efficient, time saving and easy to use were it can result in better transaction, wide market coverage by offering the benefits of speed, convince, being cost effective, impact and control over the market.
2. Improved responsiveness: It helps by improving responsiveness to market conditions and customer preferences. Improve responsiveness by revising price change and marketing programs as and when required.
3. Efficient Inventory Management: Using E- Commerce, inventory management of products becomes automated. Product management inventory becomes very efficient and easy to maintain. It enables reduced inventories and overheads by enabling "pull" – type supply chain management by collecting the customer order and then delivering through JIT (just In Time).

4. **Effectiveness and Efficiency:** Electronic commerce can increase the efficiency and effectiveness of public relation programs, broadcast press releases, financial updates and other corporate communications.
5. **Planning and Execution of meetings:** The mechanism of electronic operations in business facilitates planning and execution of meetings. Executive management meetings, seminars, workshops take a great deal of time and effort to manage.
6. **Ubiquity:** It is available just about everywhere and at all times. Consumer can connect it to the Internet at any time, including at their homes, their offices, on their video game systems with an Internet connection and mobile phone devices.
7. **Global reach:** The potential market size is roughly equal to the size of the online population of the world. E- Commerce Technology seamlessly stretches across traditional cultural and national boundaries and enables worldwide access to the client.
8. **Personalization/Customization:** E-commerce technologies enable merchants to target their marketing messages to a person's name, interests and past purchases. They allow a merchant to change the product or service to suit the purchasing behaviour and preferences of a consumer..
9. **Information Density:** The total amount and quality of information available to all market participants is vastly increased and is cheaper to deliver. Most business owners use the shopping cart and do the order of product and purchasing online.
10. **Interactivity and support:** Consumer/user can interact with the content.. Engaging consumer/user is a powerful feature.

### **Emergence of the Internet**

The role of the Internet in the evolution of e-commerce has been so crucial that the history of e-commerce will remain incomplete without the inclusion of the history of the Internet. Using the Internet, you can communicate with other people throughout the world by means of e-mail, read online versions of newspapers, magazines, academic journals, and books, join discussion groups on almost any conceivable topic, participate in games and simulations, and obtain free computer software. In recent years, the Internet has allowed commercial enterprises to connect with one another and with customers. Today, all kinds of businesses provide information about their products and services on the Internet. Many of these businesses use the Internet to market and sell their products and services. The part of the Internet known as the World Wide Web, or, more simply, the Web, is a subset of the computers on the Internet that are connected to each other in a specific way that makes those computers and their contents easily accessible to each other. The most important thing about the Web is that it includes an easy-to-use standard interface. This interface makes it possible for people who are not computer experts to use the World Wide Web to access a variety of Internet resources.

### **Commercial Use of the Internet**

As personal computers became more powerful, affordable, and available during the 1980s, companies increasingly used them to construct their own internal networks. Although these networks included e-mail software that enabled the employees to send messages, businesses wanted their employees to be able to communicate with people outside their corporate networks for promoting business. The Defense Department network and most of the other academic networks that had teamed up with it were receiving funding from the National Science Foundation (NSF). The NSF prohibited commercial network traffic on its networks

and so businesses turned to commercial e-mail service providers to handle their e-mail needs. Larger firms built their own networks that used leased telephone lines to connect field offices to corporate headquarters.

### **Growth of the Internet**

In 1991, the NSF further eased its restrictions on Internet commercial activity and began implementing plans to privatize the Internet. The privatization of the Internet was substantially completed in 1995, when the NSF turned over the operation of the main Internet connections to a group of privately owned companies. The new structure of the Internet was based on four Network Access Points (NAPs), each operated by a separate company. These companies, which are known as network-access providers, sell Internet access rights directly to larger customers and indirectly to smaller firms through other companies, called Internet Service Providers (ISPs).

The Internet was a phenomenon that truly sneaked into an unsuspecting world. The researchers who had been so involved in the creation and growth of the Internet just accepted it as a part of their working environment. People outside the research community were largely unaware of the potential offered by a large interconnected set of computer networks.

### **Emergence of the World Wide Web**

The web is more a way of thinking about and organizing information storage and retrieval than a technology. As such, its history goes back to many years. Two important innovations played key roles in making the Internet easier to use and more accessible to people who were not research scientists. These two innovations were Hypertext and Graphical User Interfaces (GUIs)

The **World Wide Web** abbreviated as WWW and commonly known as the web. The WWW was initiated by CERN (European laboratory for Nuclear Research) in 1989.

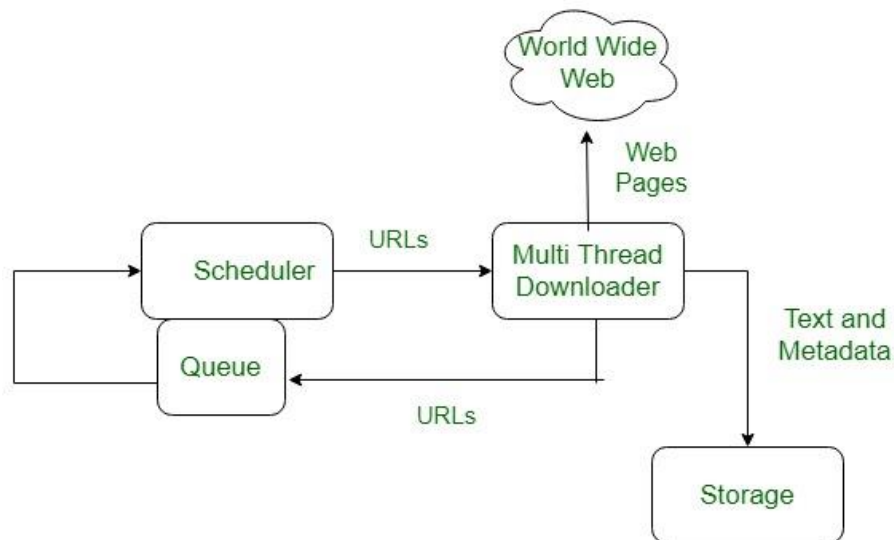
#### **History:**

It is a project created, by Timothy Berner's Lee in 1989, for researchers to work together effectively at CERN. is an organization, named World Wide Web Consortium (W3C), which was developed for further development in the web. This organization is directed by Tim Berner's Lee, aka the father of the web.

#### **System Architecture:**

From the user's point of view, the web consists of a vast, worldwide connection of documents or web pages. Each page may contain links to other pages anywhere in the world. The pages can be retrieved and viewed by using browsers of which internet explorer, Netscape Navigator, Google, Chrome, etc are the popular ones. The browser fetches the page requested interprets the text and formatting commands on it, and displays the page, properly formatted, on the screen.

The basic model of how the web works are shown in the figure below. Here the browser is displaying a web page on the client machine. When the user clicks on a line of text that is linked to a page on the abd.com server, the browser follows the hyperlink by sending a message to the abd.com server asking it for the page.



Here the browser displaying a web page on the client machine when the user clicks on a line of text that is linked to a page on abd.com, the browser follows the hyperlink by sending a message to abd.com server asking for the page.

### Working of WWW:

The World Wide Web is based on several different technologies: Web browsers, Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP).

A Web browser is used to access webpages. Web browsers can be defined as programs which display text, data, pictures, animation and video on the Internet. Hyperlinked resources on the World Wide Web can be accessed using software interface provided by Web browsers. Initially Web browsers were used only for surfing the Web but now they have become more universal. Web browsers can be used for several tasks including conducting searches, mailing, transferring files, and much more. Some of the commonly used browsers are Internet Explorer, Opera Mini, Google Chrome.

### Features of WWW:

- HyperText Information System
- Cross-Platform
- Distributed
- Open Standards and Open Source
- Uses Web Browsers to provide a single interface for many services
- Dynamic, Interactive and Evolving.
- “Web2.0”

### Components of Web:

There are 3 components of web:

1. **Uniform Resource Locator (URL):** serves as system for resources on web.
2. **HyperText Transfer Protocol (HTTP):** specifies communication of browser and server.
3. **Hyper Text Markup Language (HTML):** defines structure, organisation and content of webpage

### E-Commerce advantages can be broadly classified in three major categories

- Advantages to Organizations
- Advantages to Consumers
- Advantages to Society

## **Advantages to Organizations**

- Using e-commerce, organizations can expand their market to national and international markets with minimum capital investment. An organization can easily locate more customers, best suppliers, and suitable business partners across the globe.
- E-commerce helps organizations to reduce the cost to create process, distribute, retrieve and manage the paper based information by digitizing the information.
- E-commerce improves the brand image of the company.
- E-commerce helps organization to provide better customer services.
- E-commerce helps to simplify the business processes and makes them faster and efficient.
- E-commerce reduces the paper work.
- E-commerce increases the productivity of organizations. It supports "pull" type supply management. In "pull" type supply management, a business process starts when a request comes from a customer and it uses just-in-time manufacturing way.

## ***Advantages to Customers***

- It provides 24x7 support. Customers can enquire about a product or service and place orders anytime, anywhere from any location.
- E-commerce application provides users with more options and quicker delivery of products.
- E-commerce application provides users with more options to compare and select the cheaper and better options.
- A customer can put review comments about a product and can see what others are buying, or see the review comments of other customers before making a final purchase.
- E-commerce provides options of virtual auctions.
- It provides readily available information. A customer can see the relevant detailed information within seconds, rather than waiting for days or weeks.
- E-Commerce increases the competition among organizations and as a result, organizations provides substantial discounts to customers.

## ***Advantages to Society***

- Customers need not travel to shop a product, thus less traffic on road and low air pollution.
- E-commerce helps in reducing the cost of products, so less affluent people can also afford the products.
- E-commerce has enabled rural areas to access services and products, which are otherwise not available to them.
- E-commerce helps the government to deliver public services such as healthcare, education, social services at a reduced cost and in an improved manner.

## **Advantages of E-commerce:**

- E-commerce enables fast and secure shopping.
- It is making digitalized world.
- E-commerce also enables to choose different goods and services according to your choice.
- It is a simple way of selling and buying products and services.

- E-commerce replaced the paper work as all transactions are through internet today.
- It provides better management system, as it has a centralized database.
- E-commerce via internet covers a large number of customers worldwide.

#### **Disadvantages of E-commerce:**

- E-commerce has no universal standard for quality and reliability.
- E-commerce works through internet, it is possible that navigation on internet itself may be slow.
- Strong security is required in e-commerce as all transactions are through internet.
- There is high risk of buying unsatisfactory products through e-commerce.
- It uses public key infrastructure which is not safe.
- Customers also trap in banking fraud which is quite frequent.
- Hackers also try to get access of data or to destroy data in e-commerce.

#### **Transition to E-commerce in India**

The potential for e-commerce is enormous in India, owing to the rapid growth of the number of Internet users. The enormous savings in time and money achieved by both buyers and sellers is the principal advantage.

#### **Indian Readiness for E-commerce**

A pertinent question arises here about the readiness of Indian buyers for e-commerce. The proliferation of the Net at a rapid pace and the granting of private ISP (Internet Service Provider) licences has put the market en route to a new phase. Even small and medium enterprises (SMEs) have been increasingly realizing the potential of the net. The technological advancements happening in all spheres of life in India will be the driving factors for the spread of e-commerce in this country, as has happened elsewhere in the world. NASSCOM (National Association of Software and Service Companies), has recently released the findings of its survey to evaluate the e-commerce scenario in India. E-commerce is dependent to a great extent, on the number of internet users in India. The following tables give the rate of growth of internet users in India

#### **The Internet and India**

The Internet has undergone a steady evolution from being a source of instant communication in the early 90s to a rich source of infotainment and education. This evolution has been driven by the growing customer expectations with the content of Internet. Thus newer segments of Internet usage have emerged and there lie potential user segments that are still unexplored and may emerge in the future.

Fifteen years ago there was limited Internet access but only in a few major cities, all in the hands of the government. VSNL, the agency responsible for Internet activities, and the DOT (Department of Telecommunications) provided an agonizingly erratic connectivity, with miserly bandwidth and far too few phone lines. Connection rates ran as low as 5% and users were frequently cut off. And the rates for this pathetic level of service were among the highest in the world. By the end of 1998, after three years of government monopoly, there were barely 150,000 Internet connections in India.

According to the NASSCOM survey, considering the interest the Government is taking in the growth of the market, e-commerce in India will witness a significant jump over the next three years. Based on these preliminary findings, experts have concluded that the penetration of the Internet and e-commerce transactions in India will increase by leaps and bounds. The survey findings also point to the fact that India's active Internet population would spend close to 3.2 per cent of its total regular household spending through Internet purchase.



## **E-commerce Opportunities for Industries**

Following are some of the areas where e-commerce is witnessing rapid growth in the global markets. Indian software and services companies need to tap into some of these vertical segments to gain the maximum advantage in the e-commerce solution sector.

1. Financial services. A large number of users use the Internet for some form of financial guidance.
2. Stock trading. Online stock trading is nowadays one of the most demanding e-commerce utilities. The ability to offer market access at a competitive price is a key advantage of online stock broking companies and this is slowly happening in India too.
3. Banking. Internet banking is now growing. Many banks like ICICI and HDFC are making inroads into this area.
4. Legal and professional services. Opportunities also exist for Indian companies in legal and other professional services. There are significant legal and regulatory implications of implementing an Internet business or of migrating from a traditional off-line business. In terms of opportunities for Indian legal service providers, the requirement for professional, legal and regulatory advice is expected to increase as the number of e-commerce users increases.
5. Tour and travel. The travel industry has readily adapted to e-commerce. There has been a growing emphasis on the search for alternative distribution channels within the sector, particularly with the railways and the airlines, as they seek to reduce costs. These sectors have adapted well because of their online reservation systems.
6. Healthcare. Healthcare represents one of the biggest expenditures of governments worldwide. The Internet has the potential to enhance communications, streamline processes and create new business opportunities, by providing high-quality administrative services and integrating information systems.

## **E-transition Challenges for Indian Corporates**

Some issues that Indian corporates face while e-transforming themselves are worth delving into, in the following manner.

### **Internal Resisting Issues**

**Bureaucratic wrangles.** With organizations e-transforming themselves, the old ways of doing things are being replaced by new ways which destabilize the existing power equations. The fear of this among the staff is a significant barrier to the organizational transformation.

**Cultural changes.** The e-biz team spearheading the e-com initiatives in an organization, mostly consists of young, externally recruited, tech savvy populace who maintain a 'skunkwork' like culture. This open culture may be in direct conflict with the already established culture in the organization and may force the old-timers to oppose any change.

**Not many are prepared.** A survey by the GIIC found out that only 20 per cent of the organizations covered under the CIO segment are trying to use e-commerce at least to some extent. Eighty per cent of the industry is in the process of gearing up for the show, such as banks and sectors like IT, courier, travel and transport.

**Lack of skill and training.** Lack of skill and training within a company (28 per cent) and lack of funds (24 per cent) are other factors impeding the implementation of IT in companies. Most of these companies are from traditional businesses like manufacturing, travel, transport and education



The eCommerce industry in India is growing at a remarkable pace due to high penetration of internet and sophisticated electronic devices. However, the recent growth rate of **eCommerce in India** is far lagging behind than other developed countries. There are many big problems and challenges faced by an e-commerce industry. Factors like safety and security of online money transaction being the biggest problem along with others, have curb the smooth expansion of the online industry in the country.

Although, major portion of e-business sectors have affected by the below mentioned challenges but still there are few online giants like [Makemytrip.com](http://Makemytrip.com), [flipkart.com](http://flipkart.com), [Snapdeal.com](http://Snapdeal.com) who have overcome the challenges and represents the perfect growth trends of eCommerce in India.

- **Poor Knowledge and Awareness:** When it comes to ratio of internet consumers, scenario is not so admirable one. Majority of Indian rural population are unaware of internet and it uses. Surprisingly, most of internet savvies or urban population are also suffering from poor knowledge on online business and its functionalities. Very few are aware of the online corruption and fraud and thus darkness still exists. A reliable survey reveals that 50% of Indian online users are unaware of the solution of online security.
- **Online Transaction:** Most of Indian customers do not possess plastic money, credit card, debit card and net banking system, which is one of the prime reasons to curtail the growth of **eCommerce**. Nevertheless, in recent years, some of the nationalized banks have started to issue debit cards to all its account holders. This is undoubtedly a positive sign for Indian online entrepreneurs.
- **Cash On Delivery:** Cash on Delivery (COD) has evolved out of less penetration of credit card in India. Most of Indian E-commerce companies are offering COD as one of mode of payment for the buyers. 30%-50% of buyers are also taking advantage of this mode of payment while making purchase of any product and service over internet. COD has been introduced to counter the payment security issues of online transaction, but this mode has been proving to be loss and expensive to the companies. It is seen that majority of the customers denied to make the payment at the time of delivery of the product. Hence, companies tend to lose the sale along with product transit fees. In order to curb the problem of COD, online companies should take some judicial steps; otherwise basic logic behind the **eCommerce business** will be at risk.
- **Online Security :** In case of start up and small business, Business owners are ignoring the importance of authentic software due to budget constraints. They are even failing to take the initial steps to secure and protect their online business through installation of authentic protection services like antivirus and firewall protection, which indeed a crucial step for successful online business players. In India, maximum number of business entrepreneurs used unauthorized software in their server, which usually does not come with upgraded online security. Such pirated software leaves room for virus, malwares and Trojan attacks and it is highly risky task to make online transactions in the systems,

which may disclose or leak sensitive details of credit cards and online banking of the users. These kinds of droopiness should be banned in Indian eCommerce sectors. Affiliation to SSL certificate should be imposed as a mandatory action for every owner.

- **Logistics and Shipment Services:** In India, logistics and courier services required lots of improvement. While, perfect and strong logistics service is one of the key reasons behind the success of any online company, India is lagging far behind in this sector as most of the town and small villages are still not covered under serviceable area of many of the courier and logistic companies. eCommerce is hampered in a big way owing to the limited services offered by the courier service companies.
- **Tax Structure:** Tax rate system of Indian market is another factor for lesser growth rate of eCommerce in India in comparison to other developed countries like USA and UK. In those countries, tax rate is uniform for all sectors whereas tax structure of India varies from sector to sector. This factor creates accounting problems for the Indian online business companies.
- **Fear factor:** Fear of making online payment is a universal psychological factor of Indian customers. With the spread of knowledge on online transactions and its reliability, some percentages of customers have overlooked this fear and they are fearlessly engaging themselves in online shopping. But still, majority of customers are not aware of online transactions and its security. They often reluctant to disclose their credit card and bank details and preferred to stay away from online world of shopping.
- **Touch and Feel' factors:** Indian customers are more comfortable in buying products physically. They tend to choose the product by touching the product directly. Thereby, Indian buyers are more inclined to do ticketing and booking online in Travel sectors, books and electronics. Companies dealing with products like apparel, handicrafts, jewelry have to face challenges to sell their products as the buyers want to see and touch before they buy these stuffs.

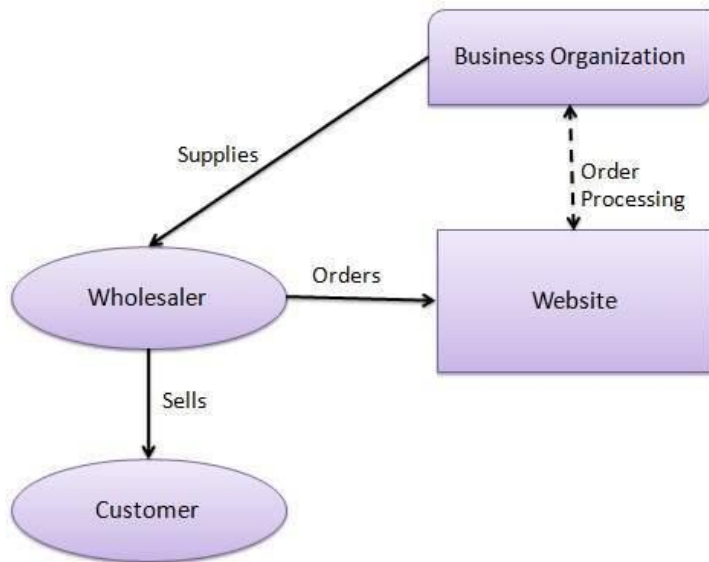
### **E- Commerce Business models**

E-commerce business models can generally be categorized into the following categories.

- Business - to - Business (B2B)
- Business - to - Consumer (B2C)
- Consumer - to - Consumer (C2C)
- Consumer - to - Business (C2B)
- Business - to - Government (B2G)
- Government - to - Business (G2B)
- Government - to - Citizen (G2C)

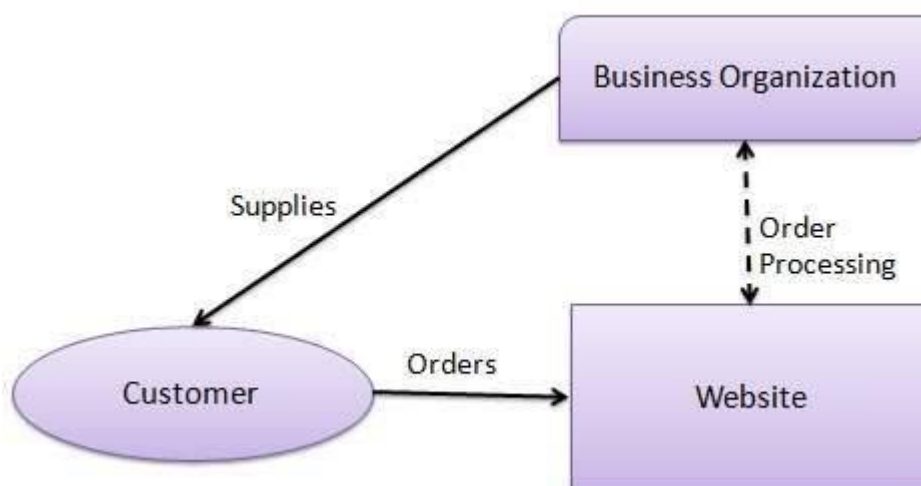
### **Business - to - Business**

A website following the B2B business model sells its products to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the end product to the final customer who comes to buy the product at one of its retail outlets.



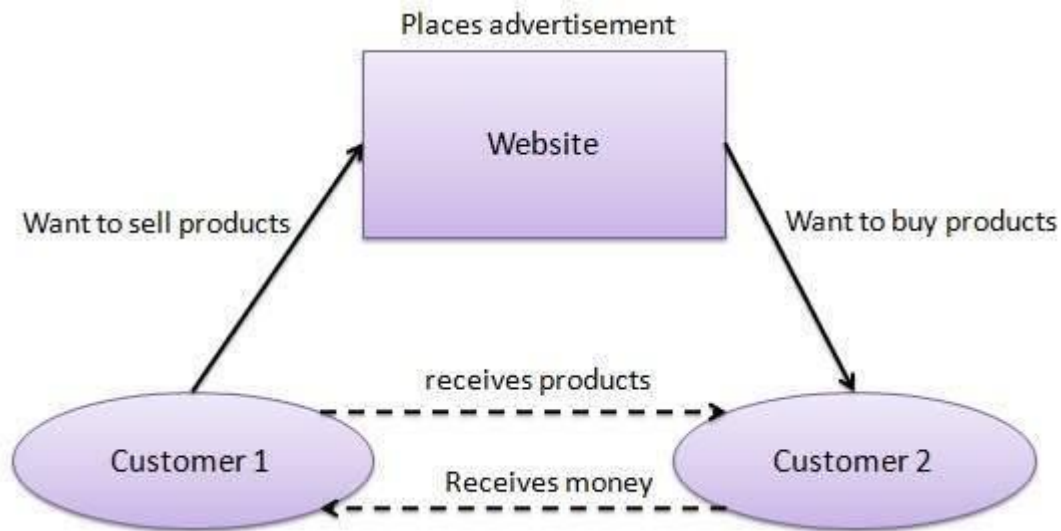
### Business - to - Consumer

A website following the B2C business model sells its products directly to a customer. A customer can view the products shown on the website. The customer can choose a product and order the same. The website will then send a notification to the business organization via email and the organization will dispatch the product/goods to the customer.



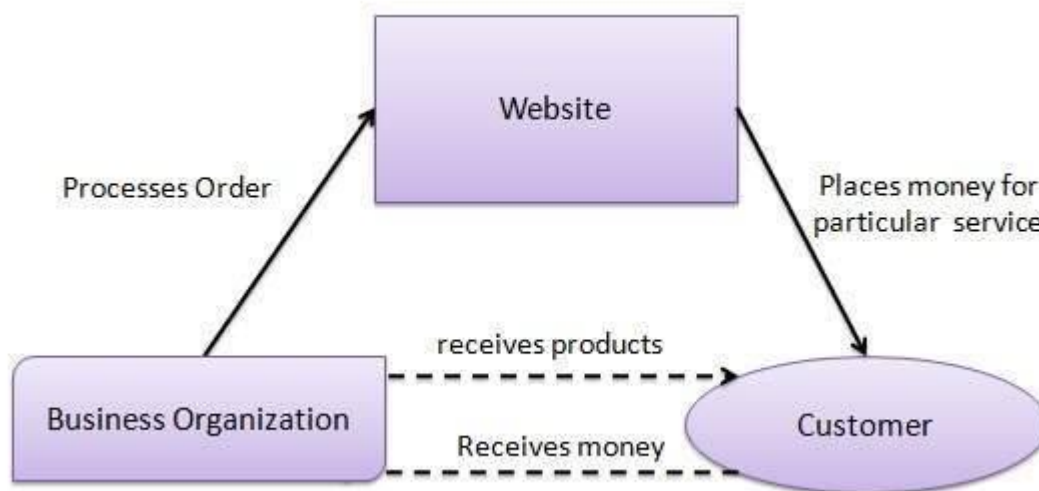
### Consumer - to - Consumer

A website following the C2C business model helps consumers to sell their assets like residential property, cars, motorcycles, etc., or rent a room by publishing their information on the website. Website may or may not charge the consumer for its services. Another consumer may opt to buy the product of the first customer by viewing the post/advertisement on the website.



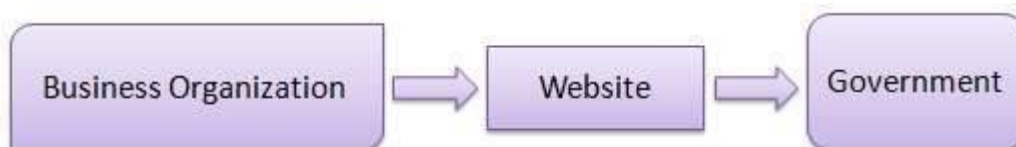
**Consumer - to - Business**

In this model, a consumer approaches a website showing multiple business organizations for a particular service. The consumer places an estimate of amount he/she wants to spend for a particular service. For example, the comparison of interest rates of personal loan/car loan provided by various banks via websites. A business organization who fulfills the consumer's requirement within the specified budget, approaches the customer and provides its services.



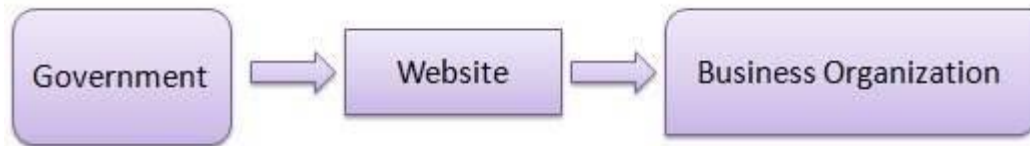
**Business - to - Government**

B2G model is a variant of B2B model. Such websites are used by governments to trade and exchange information with various business organizations. Such websites are accredited by the government and provide a medium to businesses to submit application forms to the government.



## Government - to - Business

Governments use B2G model websites to approach business organizations. Such websites support auctions, tenders, and application submission functionalities.



## Government - to - Citizen

Governments use G2C model websites to approach citizen in general. Such websites support auctions of vehicles, machinery, or any other material. Such website also provides services like registration for birth, marriage or death certificates. The main objective of G2C websites is to reduce the average time for fulfilling citizen's requests for various government services.



E-business Models Based on the Relationship of Transaction Parties

## E-business Models Based on Transaction Types

The e-business transactions take place between different parties, using different means. One way of looking e-business models is based on parties taking part in e-business transactions and the means of the transactions.

### 1. B2B E-business Model

Over the last few years, the internet has brought the companies to a virtual marketplace and built what is known as "Digital economy". Digital economy offers various opportunities for the companies to step into new markets, improve efficiency, benchmark with global companies, increase customer satisfaction, collaboration with new partners and above all to reduce cost. The use of internet in the Business-to-Business transaction is one such area where all these opportunities can be grabbed. It refers to electronic transactions of information among companies and their supply chain partners.

Business to business is the most common type of business transactions. Close to 75% to 80% of transactions are of this type. Providers, distributors, players and manufacturers and other ancillary organizations perform various business transactions among themselves. These all transactions are referred to as B2B.

### 2. B2C E-business Model

B2C (Business-to-Consumer) e-business model is actually a concept of on-line distribution or on-line selling of services, products or information from companies to actual consumers. B2C model is ensemble of electronic technologies and business transactions used for the transactions between companies and consumers. This is second most popular e-business model after B2B. This includes different transactions between companies and consumers.

In B2C business environment, there is no need to maintain any physical store / warehouse to maintain product inventory or WIP. And as such no need of retailers to distribute the product.

Customers can directly search through the product catalog on the company website, place the order and the product are delivered to the customer directly. Amazon.com is a perfect example of this kind of B2C business. The main things which are browsed and sell in B2C e-business include computer hardware and software (e.g. Dell), consumer electronics (e.g. digital cameras, printers, mobile phones etc.), sports goods, office supplies, books, music, toys, health and beauty, entertainment, apparel, cars, services etc.

### **3. C2C E-business Model**

The introduction of e-business has helped to create a very individualistic and independent society. Consumers no more want to rely on corporations for business and looking for their own business transactions on the internet.

Consumer to Consumer e-business model refers to business transaction made by consumer with other group of consumer. E.g. the individuals interacting through some well-known portal or the auction site (e.g. eBay) or the individuals advertise their product through some site using classifieds or advertisement. The most well known example of Consumer to Consumer e-business is eBay.com. It's the most famous and successful website for auctioning nearly all kinds of items. It allows customers to auction their owned items privately among other customers. The other examples of successful Consumer to Consumer e-businesses can be Monster.com, uBid.com etc. These websites provides valuable services to those consumers looking for jobs and auctioning of items respectively. Consumer to Consumer applications are growing in size every day and making more and more people involved in e-businesses

### **4. B2G E-business Model**

Internet has great potential to bring together people, businesses and facilitate the flow of information among them. Government organizations are also coming ahead to utilize this power of internet. Business to Government e-business model explores the switching of products / services / information from a business organization to a government agency and vice versa. B2G business model allows the businesses to bid on government request proposals or tenders. A website offering B2G business model can provide their customers a single place where they can easily locate tax forms for various levels of the government such as city, state or country. It can also provide the facility to send the filled forms along with relevant payments. It can also make a platform available where their customers can ask questions regarding government processes and get correct, quick answers. B2G can also include applications and databases designed to help functioning of government agencies. Thus it includes different transactions made between business organizations, citizens and government agencies.

#### ***IT Infrastructure Requirements of E-business Models***

Information technology infrastructure is the foundation to start any e-business. An e-business initiative needs to connect various suppliers, customers and other business partners. Investing in IT infrastructure is as critical as it was in place, plant, machineries and equipment's in earlier traditional businesses. The new market leader will be companies those who can successfully move from traditional enterprise model to the virtual enterprise model where business partners are integrated to get e-business advantage. An initiate to integrate various business partners, information technology infrastructure investment etc. are the major factors which affect the successful transition to e-business.

Business integration brings all business partners together and remove the barriers in the supply chain, barriers to customer relationship, barriers to stakeholders and barriers in partners intercommunication. Examples of these kinds of business integration can be seen in the organizations such as Cisco, Ford etc. It makes the competitors very difficult to tumble and at

the same time, make the integrated partners together far stronger than individual organizations finding / leading its place in the digital economy.

## E-business Models Based on the Relationship of Transaction Types

**This business model is essentially ruled by the following two parameters:**

On the basis of value addition. Value addition is the addition of value to a product or service because of the opportunities that it offers on the Web.

On the basis of control. At the high end of control there is hierarchical control and at the low end there is no control, so that it is self-organizing. Normally, the control is done through the policies of the website.

Based on these, nine types of transactions can be identified as listed below:

- Brokerage
- Aggregator
- Info-mediary
- Community
- Value chain
- Subscription
- Manufacturer
- Advertising
- Affiliate

### **Brokerage Model**

The characteristics of the brokerage model are as follows:

- The price-discovery mechanism is its key-principle.
- It is a meeting point for sellers and buyers.
- Auctions and exchanges are the modes of transactions.
- It is a 'Free Market'.
- It consists of Global Network of Buyers and Sellers.
- It is a Virtual Marketplace enabled by the Internet.
- It encompasses all types of organizations now

### **Advantages of the Brokerage Model**

Following are the advantages of the brokerage model:

#### **C2C trading**

- a) allows buyers and sellers to trade directly bypassing intermediaries, and
- (b) reduces cost for both the parties.



### **Global reach**

Trading convenience, which (a) allows trading at all hours, and (b) provides continually updated information

Sense of community through direct buyer and seller communication

### **Brokerage—Price Discovery Mechanisms**

There are three kinds of price discovery mechanisms, which form the basis for the brokerage model. They are:

1. Auction
2. Reverse Auction
3. Market Exchange

- **Auction broker.** Many different auction formats have emerged since the first auction occurred in Babylon in about 500 B.C. Today, different auction formats are aggregated on certain common attributes. There are open and sealed-bid auctions. There are auctions where the auction price ascends as the auction proceeds and there are auctions where the price descends at regular intervals. There are single auctions and double auctions
- **English auction.** The English auction is one of the most common auction formats. It is also known as the open-outcry auction or the ascending-price auction. It is frequently used for selling art, wine, and other physical goods, which do not have a limited lifetime.
- **Dutch auction.** The Dutch auction was developed in the Netherlands to auction flowers and other products with a limited life. It is also known as the descending-price auction. In a Dutch auction, the opening price is set extremely high.

### **Economic Rationality Behind Auctions**

From a market microstructure perspective, auctions are basically trading processes which bring buyers and sellers together. Auctions may be used when other trading procedures fail to work or when a price discovery process is needed. Two main motives for auctions are identified from an economical point of view:

**Critical factors.** There are four main factors that characterize electronic auctions. At least one of these factors will be present where an electronic auction appears. The four factors are:

- Perishability
- Scarcity
- Goods that may be moved electronically
  - Goods that are geographically constrained.

**Electronic auction seller-buyer perspective.** From a seller-buyer perspective, there are three different pairs of buyers and sellers that appear in electronic auctions. These different pairs are:

- Consumer-to-Consumer (C2C)
- Business-to-Consumer (B2C)
  - Business-to-Business (B2B)

### **Aggregator Model**

Classic wholesalers and retailers of goods and services are increasingly referred to as “e-tailers”. Sales can be made based on list prices or through auctions. In some cases, the goods and services are unique to the Web and do not have a traditional “brick-and-mortar” Store front (see Figure 2.11).

**Following are some of the aggregator models:**

1. **Virtual merchant.** This is a business that operates only from the Web and offers either traditional or Web-specific goods and services. The method of selling may be by list price or auction. An example of a service merchant is *Facetime*, which calls itself an “application service provider”. It offers live customer support for e-commerce websites (e.g. Amazon, eToys,

Eyewire and OnSale).

**2. Catalogue merchant.** Catalogue merchant is the migration of mail order to a Web based order business (e.g. Levenger).

**3. Surf-and-turf.** This is a traditional brick-and-mortar establishment with Web storefront. The model has the potential for channel conflict.

**4. Bit vendor.** This is a merchant that deals strictly in digital products and services and, in its purest form, conducts both sales and distribution over the Web.

**5. Subscription model.** In this, the users pay for access to the site. High value-added content is essential (e.g. *WallSt. Journal*, *ConsumerReports*). Generic news content, viable on the newsstand, has proven less successful as a subscription model on the Web [e.g. *Slate*].

## UNIT II

### E-Commerce Enabling Technologies

#### Introduction

Electronic commerce allows businesses and consumers to purchase goods and services, and exchange information on business transactions online. The growth of the Internet as a viable business vehicle for conducting these transactions is one of the phenomena of modern information technology and has already had a significant impact on the business community, providing new methods of conducting business on a global basis (Jutla, Bodorik, Hajnal & Davis 1999).

Several technologies must be in place for electronic commerce to exist. The most obvious one is the Internet, which is revolutionizing the way commerce is performed. Beyond that system of interconnected networks, many other sophisticated software and hardware components are needed to provide the support structure: operating systems, distributed computing environments, middleware, user-interface technologies, server-side facilities and services, languages, software development methodologies, and of course the World Wide Web.

In general, requirements imposed on these basic technologies are numerous and result from the unique nature of electronic commerce, which is characterised by distributed, autonomous, and heterogeneous information sources, vast amounts of hypermedia data, a wide range of users' specialities and abilities, and the need to support a range of business transactions (Adam & Yesha 1998).

The rate of change is rapid for all elements that support electronic commerce. They evolve and change daily. The purpose of this paper is to briefly examine these various technologies and their inter-relationship, examine a conceptual model of e-commerce architecture and identify major technology research areas that will affect the growth or nongrowth of electronic commerce in the immediate future. Major research areas of interest are wireless technology, and autonomous agents.

#### Overview of Internet Technologies

In its simplest form the Internet exists to facilitate the reading of ordinary documents that are physically located on other people's computers. With the emergence of electronic commerce, the Internet has evolved into an infrastructure capable of supporting major commerce enabled applications. To understand this transition it is necessary to review the basic mechanics of the Internet and its major application, the World Wide Web (WWW).

## Static Web Content

The set of protocols that underlie the basic operation of the Internet are the Transmission Control Protocol (TCP) and the Internet Protocol (IP). The common acronym TCP/IP refers to the two protocols. The Hypertext Transfer Protocol (HTTP) is the Internet protocol responsible for transferring and displaying Web pages. HTTP runs in the application layer of the TCP/IP model and employs a client/server architecture in which the user's web browser (the client) opens an HTTP session and sends a request for a web page to a web server (see figure 1). The format of the web page is controlled by the Hypertext Markup Language (HTML), a document production language that includes a set of tags that define the appearance and style of a document. This combination of technologies provides the fundamental mechanism for the retrieval and display of information on the Web (Schneider & Perry 2000).

Web Browser requests a web page

Internet TCP/IP

Web Server transfers a web page

Figure 1: Static Web Content

## Dynamic Web Content

The preceding description is concerned with static content, which is permanently stored on a web server. Static content does not have the ability to personalise the end-user's web experience. This experience is provided by server side applications which produce dynamically generated web content.

The primary technology that enabled the development of dynamic pages was the creation of HTML forms. These forms facilitate user input through a simple graphical user interface that web browsers render and process, based on specifications contained in the web pages. Forms themselves are not dynamic, but their ability to call and pass parameters to automated scripts or programs on the server make them an integral part of the solution for providing dynamic web pages (Micro Modelling Associates 1999). Typical web application architecture with dynamic content is shown in figure 2.

Web Browser requests a web page

Internet TCP/IP

Web Server transfers a web page

Figure 2: Web application architecture with dynamic content

The significant limitation with HTML is that it determines how a page will be displayed without specifying content and structure. The Extensible Markup Language (XML) represents an industry-wide effort to define which data are displayed on a web page (Roy & Ramanujan 2000). A non-proprietary specification, XML is a project of the World Wide Web Consortium (W3C). XML adds context and gives meaning to data and allows the creation of customised tags, called elements, for describing the documents structure. This facilitates the electronic transfer of structured business data from point to point (business to business), independent of the programming platform. It is possible using XML to integrate knowledge management systems into a myriad of e-business solutions (Usidin & Graham 1998; Ritter 1999; Shim, Pendyala, Sundaram & Gao 2000; Tiwana & Ramesh 2001).

## Web Client/Server Architecture

The division of labour between web clients and web servers is quite distinct and is an example of a client/server architecture. This type of architecture allows the distribution of computing tasks between two or more computing resources. Essentially the client requests a service that is provided by the server. These clients can be browsers running on personal computers, network devices, personal digital assistants, cell phones, and other pervasive computing devices. The static web content system (see figure 1) is a basic two-tier system with all communications (using HTTP) occurring between the client and the web server.

In the case of dynamic web content (see figure 2), a three-tiered client/server architecture is used (see figure 3), consisting of a thin client layer (often, but not always a web browser), an application server layer and a data layer which holds the databases and data stores for the application. Interactions between the client and the server operate the same way as they do in a two-tier system. The third tier provides comprehensive data services, including database operations, enterprise resource planning software services, and any other services needed to support a robust electronic commerce server (Schneider & Perry 2000). This type of architecture holds many advantages over simple client/server architecture, including the easy deployment and maintenance of the thin client layer and the inherent scalability of the middle and data layers.

The application servers in the mid-tier are responsible for:

- **Process management**

Running different application modules in different processes, passing data between them and distributing them across physical processors and machines. Good process management is key to a high performance, high throughput application.

- **Access and security**

Authenticating users (or connecting processes) and customising the interface to application services according to the user's profile.

- **Transaction management**

Grouping data updates in transactions and ensuring that they are properly committed to the data layer.

- **Session management**

Web browsers and servers are essentially stateless, but if for example you want the user's shopping trolley to keep filling up as they select items to buy, then the state of the user session has to be maintained between mouse clicks in the browser.

- **Application Logic**

The processing and logic that makes up the core of the application is executed in the mid-tier, isolated from the thin client and the data access layers.

## Catalog Database

Figure 3: Three-tiered architecture.

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The three-tiered model is being replaced with a multi-tiered model, where the third tier is modified to consist of an integration server and any number of specific back-end applications (see figure 4). This change results in a business web site with improved scalability and robustness. The impetus behind multi-tiered architectures is the same one that popularised client-server development in the first place: the need to put specialized processing and applications within an appropriate computing and network environment. The major disadvantage associated with this type of system is the higher level of complexity, which requires a well-

disciplined development and testing environment for effective implementation.

A multi-tiered, as opposed to a three-tiered architecture, splits the application layer into any number of separate tiers, which may be just a logical separation or may reflect a physical separation between processors or machines. Multi-tiered architectures are important for web-based applications generally, but even more so for applications involving XML. In XML applications, the XML processing can take place in the application server layers, rather than in the desktop browser.

Figure 4: Multi-tiered architecture.

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#### Conceptual Model of Electronic Commerce Technology Architecture

Electronic commerce architectures use web technologies to implement mission-critical e-business applications. These architectures use small-footprint clients to access services provided by resource managers that can be accessed across a strong and reliable network. The e-business architecture is more than just a collection of technologies and products. It consists of several architectural models and will adapt to changing business and technology requirements.

Koushik and Joodi (2000) identify the following key elements that influence e-business architecture:

- The organisation's overall business strategies;
- A range of business drivers;
- IT environment;
- IT vision, objectives and strategies;
- Organisational constraints; and
- New and emerging technologies.

The process of developing an effective strategy for implementing an operational system requires a clear understanding of both the systems requirements and constraints, and must be based on a conceptual model that provides a layout of the basic architectural components that deliver the services required to support e-business applications. The EC Technology Architecture, a five layered application model, developed by Techknowledge Australia provides such a basis (see figure 5).

USER INTERFACE

COMPONENT TOOLKIT

APPLICATION - SPECIFIC LOGIC  
COMPONENT TOOLKIT

MIDDLEWARE

APPLICATION SERVER

ERP

LEGACY

NETWORK

DATABASE

OPERATING SYSTEMS

Figure 5: EC Technology Architecture™

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### Layer 0 – Foundation Layer

This forms the basic platform on which the e-business operational system is built. The foundation layer includes all of the infrastructure hardware and its associated hardware management equipment. Infrastructure hardware consists of, at least, the payments systems hardware (eg credit card reader), security hardware (eg proxy servers) and networking hardware (eg routers).

A range of software is also associated with this layer including the infrastructure software for the payment system and security system, operating systems software and any associated database management software.

### Layer 1 – Internal Applications Layer

Provides an access interface to the various applications systems (eg data warehousing system, legacy systems requiring data translation) required to provide functionality to the e-business system. These interfaces often play the role of proxy for individual transactions within back-end legacy systems and shield other components from the proprietary technologies used by these systems.

Included in this level is the enterprise resource planning (ERP) applications used to provide management of the operational business processes (eg product planning, purchasing, inventory management).

### Layer 2 – Middleware Layer

Middleware is a framework for building (typically distributed) application systems. Middleware frameworks provide common services, such as network communication primitives (eg RPC and distributed objects) naming and locating services and security support. Middleware is meant to abstract away the underlying environment from applications and present a homogeneous interface to application programmers and users (Milojicic 1999). Examples of middleware frameworks include OSF DCE, Microsoft DCOM, Java RMI, and OMG CORBA.

### Layer 3 – EC Application Layer

Based at this level is the online e-business application. Software is required for two distinct purposes, the commerce server and the web server. The web server provides online access to the commerce server. The commerce server will require a range of software to implement and manage the actual storefront.

### Layer 4 – Relationship Layer

The presentation mechanism such as a browser based front end to accept and process user input data. This layer interacts with visual components to handle presentation related tasks and with non-visual components to handle the interface with back-end applications.

### Future Trends in Electronic Commerce Technology

Electronic commerce applications are by definition dynamic and must be prepared to react and incorporate (if appropriate) new and emerging technologies. Mobile electronic commerce and the use of agent software are two such technologies.

### Mobile Electronic Commerce

According to the Gartner Group, by 2004 at least 40% of business-to-consumer electronic

commerce will come from smart phones using the wireless application protocol (WAP) (Haskin 1999). WAP focuses on applications tailored to the capabilities of cell phones and the needs of the user. WAP uses the Wireless Markup Language (WML) to display text and icons on the telephones screen (Goodman 2000). WAP thus creates an information web for cellular phones, distinct from the PC-centric web. WAP functions well in the low-data-rate low-power environment of the present cellular systems.

The major obstacle for the future development of WAP is its operating environment, which is under the full commercial control of the various cellular operating companies, and as such application development is limited. Varshney, Vetter and Kalakota (2000) identified four groups of potential mobile applications:

- Mobile inventory management that tracks the location of goods, services and possibly even people;
- Product location which allows consumers to find an item with certain specifications in a particular area;
- Proactive service management which collects information on user needs then signal vendors to provide services; and
- Mobile auctions, entertainment and other services.

Mobile computing is now seeing the development of mobile devices with sufficient memory, an appropriate display and communication functionalities. Several devices are now available including the PalmPilot, a personal digital assistant (PDA) with a wireless modem and the Nokia Communicator, a mobile phone with computing functions.

Electronic commerce applications make use of mobile middleware as an enabling layer of software (see figure 6) to connect with different mobile networks and operating systems without introducing mobility awareness (Varshney, Vetter & Kalakota 2000). ExpressQ from Nettech ([www.nettechRf.com](http://www.nettechRf.com)) is a mobile messaging middleware product.

Figure 6: Mobile middleware for application and content adaption

Recent evidence from both Japan and Scandinavia would indicate that the general public are taking advantage of digitally networked portable devices (Feldman 2000).

### **Agents**

Griss and Pour (2001) describe an agent as “a proactive software component that interacts with its environment and other agents as a surrogate for its user, and reacts to significant changes in the environment”. A software component (program) is considered to be an agent if it exhibits a combination or several of the following characteristics: autonomous, adaptable, knowledgeable, mobile, collaborative and persistent.

Examples of agents currently in use include:

- shopbots and pricebots, which monitor product availability and price, then negotiate and complete sales of goods and stocks to optimise business-to-business and business- to-consumer interactions (Huhns 2000);
- personal agents which interact directly with a user, presenting some personality or character, monitoring and adapting to the users ‘s activities (eg Microsoft Office Assistant) (Griss & Pour 2001); and
- mobile agents sent to visit remote sites and collect information (eg network management agents, Internet spiders) (Griss & Pour 2001).

### **Internet Service Provider (ISP)**

The US Government’s 1991 decision to end subsidizing the NSFNET backbone beginning in 1995, sparked a massive restructuring aimed at shaping the Internet into a faster and a more productive tool for the business. The InterNIC compilation of public access dial-up providers

listed 80 vendors in December 1993. A year later, the list cited more than 1500 providers. Figure 3.12 illustrates how the providers work.

Commercialization of the Internet has taken place in two spheres: commercialization of users and commercialization of ISPs. At first, companies that accessed the Internet through the existing non-profit mid-level networks were offered a lower level of membership than the academic members. As restrictions were dismantled, commercial use of the Internet became more common. As soon as the commercialization was announced, ISPs came into existence to provide paid access to the various Internet applications and resources for both companies and individuals. Established telecommunications, cable and commercial online companies began to offer this service.

## **e-Marketing**

### Traditional Marketing

Marketing is a method of attracting potential customers to buy your products and services. The process of conventional marketing consists of various processes such as planning, researching, promoting, and selling products. Traditionally, marketing has been part of the business since ages and every year the expenditure of companies on marketing has been increasing by leap and bounds.

Increasing competition in the market has increased the importance of marketing as ever before. Companies opt for various methods of marketing to promote their products to get an edge over their competitors. These methods can broadly be categorized into two main categories such as digital marketing and traditional marketing.

The term digital marketing is referred to all the methods of marketing which make the use of digital platforms to promote products and traditional marketing term is referred to all marketing methods which are used to promote products using traditional platforms. [Click here to learn about the difference between digital marketing and traditional marketing.](#)

In this article, you will learn about what is traditional marketing, why it is called traditional marketing, different traditional platforms used for promoting products, advantages, and disadvantages of traditional marketing.

### Why marketer use traditional marketing?

There are several reasons why marketers use traditional media marketing. let us learn about them one by one.

#### 1) The ability to reach a wide audience

Digital marketing and social marketing is a suitable choice for promoting products to millennials or the people who use technology frequently. But traditional marketing has the ability to reach people who live in rural areas and does not use digital media frequently.

For example, elder people are not tech-savvy and they still rely on television, radio, and newspapers to learn about the happenings in the world. Therefore, these platforms are the best marketing medium to make such people aware of your products.

#### 2) Large eyeballs share

The second reason for using traditional media marketing is these platforms are placed in public places and people view advertisement unintentionally. For example, you will see television installed in all waiting rooms whether it is a waiting room at a railway station or it is a waiting room in a hospital.

In addition to this, companies advertise their products on life-size billboards on the sides of roads, so that products can be promoted to people even when they are traveling or driving home.



### 3) Caters to people with special needs

Traditional marketing is a good style for promoting products to people with special needs. For example, you can promote a product to blind people by promoting promotional ads on radio and in addition to this, such people can be targeted by meeting them face to face and making them aware of the benefits of the products that you want to sell to them.

### Identifying Web Presence Goals

When a business creates a physical space in which to conduct its activities, its managers focus on very specific objectives. Few of these objectives are image-driven. An ambitious businessman must find a location that will be convenient for customers to access, with sufficient floor space features to allow the selling activity to occur, and they must take into consideration, the room space to store inventory and provide working space for employees. An added feature is the interior decoration which could enhance the business ambience, and at the same time attract customers. The success of a business relies on fulfilling these objectives in a tangible, physical location. On the Web, businesses and other organizations have the advantage of creating a space of their own choice, design and other embellishments, good enough to make a distinctive presence. A website can have images, and can activate them by animation, thus making the customers feel and enjoy its presence. It can serve as a sales brochure, a product showroom, a financial report, an employment ad, or a customer contact point. Each entity that establishes a Web presence should decide which tasks the website must accomplish, and which tasks are most important and need to be included for promoting their business.

### Achieving Web Presence Goals

An effective site is the one that creates an attractive presence that meets the objectives of the business or the organization. These objectives include: 1. Attracting visitors to the website 2. Making the site interesting enough so that visitors stay and explore 3. Convincing visitors to follow the site's links to obtain information 4. Creating an impression consistent with the organization's desired image 5. Building a trusting relationship with visitors 6. Reinforcing positive images that the visitor might already have about the organization 7. Encouraging visitors to return to the site.

### The Uniqueness of the Web

When firms first started creating websites in the mid 1990s, they often built simple sites that conveyed basic information about their businesses. Few firms conducted any market research to see what kinds of things potential visitors might want to obtain from these websites, and even fewer considered what business infrastructure improvement would be needed to keep the site alive. For example, few firms had e-mail address links on their sites. Those firms that did include an e-mail link, often understaffed the department responsible for answering visitors' e-mail messages. Thus, many of the visitors' e-mails remained unanswered. The failure to understand how the Web is different from other presence-building media is one reason why so many businesses fail to achieve their Web objectives. The scenario has changed for the better in the recent times with the prominence of Internet technologies over others

### Online Marketing

#### What Does Online Marketing Mean?

Online marketing is a set of tools and methodologies used for promoting products and services through the internet. Online marketing includes a wider range of marketing elements than traditional business marketing due to the extra channels and marketing mechanisms available on

the internet.

Online marketing can deliver benefits such as:

- Growth in potential
- Reduced expenses
- Elegant communications
- Better control
- Improved customer service
- Competitive advantage

Online marketing is also known as internet marketing, web marketing, or digital marketing. It includes several branches such as social media marketing (SMM), search engine optimization (SEO), pay-per-click advertising (PPC), and search engine marketing (SEM).

Online marketing combines the internet's creative and technical tools, including design, development, sales and advertising, while focusing on the following primary business models:

- E-commerce.
- Lead-based websites.
- Affiliate marketing.
- Local search.
- Social media.

Online marketing has several advantages, including:

#### Low costs

Large audiences are reachable at a fraction of traditional advertising budgets, allowing businesses to create appealing consumer ads. Many advertising platforms also allow for scalable ads with different levels of reach that are proportioned to the advertising budget. Rather than committing a large amount of money to advertising, smaller companies can spend a small amount and still increase their reach.

#### Flexibility and convenience

Consumers may research and purchase products and services at their leisure. Business blogs can be used to let consumers and prospects conduct their own research on the business's products as well as provide their feedback and reviews

#### Analytics

Efficient statistical results are facilitated without extra costs. Many advertising tools include their own analytics platforms where all data can be neatly organized and observed. This facilitates business intelligence efforts and data-driven decision making.

#### Multiple options

Advertising tools include pay-per-click advertising, email marketing, interstitial ads and banners, social media advertising, and local search integration (like Google Maps). Digital marketing companies usually offer their services across various online advertising channels by tuning their offer to the individual client's needs.

#### Demographic targeting

Consumers can be demographically targeted much more effectively in an online rather than an offline process. Coupled with the increased analytics potential explained above, organizations can improve their targeting over time, have a clearer understanding of their customer base, and create specific offers that are shown only to certain demographics.

The main limitation of online marketing is the lack of tangibility, which means that consumers

are unable to try out, or try on items they might wish to purchase. Generous return policies are the main way to circumvent such buyer apprehension.

Online marketing has outsold traditional advertising in recent years and continues to be a high-growth industry.

E-advertising

E-advertising

Advertising is a \$500 billion worldwide industry that, until now, has been mainly a one-way street, with consumers passively absorbing advertising messages. Advertisers hoped that potential buyers would remember their slogan or jingle long enough to make a trip to the store and purchase the product.

This has changed with the advent of interactivity. The new concept of 'interactivity' has overpowered the traditional concept of advertising, by putting the buyer in the driver's seat. Interactivity allows consumers to increase their control over the buying process. We are all deluged with an overflow of data. We long for a sense of mastery over the information that washes over us. Given the opportunity, we will be more selective about the kind of information we choose to receive. Interactivity gives us that option. Thus, the audience is not captive any more, and the marketers would have to work harder than before to entice them. The marketing efforts will have to be information-rich and user-friendly.

Web-based advertising has become an important part of a company's media mix. Numerous companies are committing large advertising budgets to the Internet.

Following are the reasons for the growing importance of e-advertisements:

1. People increasingly prefer to surf the Internet rather than watch TV.
2. The target audience goes to the advertisement, rather than the other way around.
3. Development of business search engines by companies such as C2B Technologies, which aim to link buyers with online bargain sites for over a million products for comparison-shopping purposes.
4. Yahoo! has a business unit which offers contests and prizes to online participants, which drive players to the websites of different clients. To play, participants must provide certain data, including their preference of advertisements and tastes, which presents a valuable database as to customer preferences.
5. The growth of e-business. Dell Computers, for example, estimates that by 2005, 85 per cent of its sales will be through the Internet.
6. The Internet is not geographically restricted. Amazon.com sells 20 per cent of its books to foreign destinations, whereas a physical book store serves an area of only a few square miles.

Various Means of Advertising

E-mail

The advantages of e-mail are its low cost and its ability to reach a wide variety of targeted audiences. Most companies develop a customer database, to whom they send e-mails. E-mail is emerging as a marketing channel that affords cost-effective implementation and better, quicker response rates than other advertising channels. Marketers should be racing to embrace the medium. Sometimes, it may also happen that when every marketer starts inundating prospects and customers with e-mail, the consumers may react negatively.

Banners

They make up 50 per cent of online ad revenues, but their effectiveness may be waning. When IBM kicked off banner ads in 1994 on tech site Hotwire, 30 per cent of the people who saw the ads clicked on them. Now the overall click-through rate for banner ads has dropped to a measly

0.3 per cent. But it is the most commonly used form of advertising on the Internet. As you surf your way through the information superhighway, banners are everywhere. The smaller the file size, the quicker it gets loaded. Typically, a banner contains a short text or a graphical message to promote a product. A major advantage of using banners is the ability to customize them to the target audience. One can decide which market segment to focus on.

Where does the use of Electronic advertising fit into the process of establishing e-commerce marketing?

There are three primary steps that fit into the process of establishing e-commerce marketing;

- 1) Complete the digital content
- 2) Place the Electronic Advertising
- 3) Monitor your results

How does the use of Electronic advertising impact on e-commerce marketing?

One precaution that should be taken regarding Electronic Advertising is that if it is done poorly it can severely damage the image of the company. Once something is published on the Internet it is near impossible to remove it therefore extra care must be taken to ensure that the advertisements are consistently monitored and controlled.

What specific terms are used when using Electronic advertising?

Cookie: A cookie is a file on someone's computer that records specific information from their search history to help promote relevant ad rotation.

Web banner: A type of advertising that is intended to attract potential customers by promoting the company's website by an ad-server. It typically rolls across the screen or flashes.

Pop ups: A type of ad that 'pops up' usually in a small box on the user's screen that promotes a company's business.

## E-Branding

In today's net-savvy world, e-branding is an essential requirement for survival amongst the competition. Your brand is what your product is and what it stands for including your core values, competencies, attitudes, vision, mission, personality and appearance. Companies, as well as individuals, understand the importance of e-Branding, and the untapped potential of social networks which are quite essential for growth.

Impeccable Advertising Asset :- As our entire society is transferred to digital bits, your eBrand becomes a digital asset and an avatar for being a part of a great advertising new world

Acknowledgment: – E-Branding provides you a tag of Knowledgeable and technologically savvy company which marches ahead with the demand of the hour.

Renounce and Reputation:-E-Branding is growing exponentially, and both individuals and corporations who underestimate the power of their online reputation will suffer from arriving late to a venue that is already crowded with established brands. Thus, if you capture the golden opportunity of E-branding you will not only gain you renounce in the market and reputation amongst the customers.

Familiarity and Loyalty: – The Internet is transforming customer buying behavior, with major consequences for how the new breed of consumer develops familiarity with, and ultimately loyalty to, brand.

Successful Marketing Strategy :-E-branding is just recomposing marketeering traffic, build brand equity and capture customer loyalty in the Internet age with one of the most economical and specific audience-targeted way .

Expand Customer Relationship: – e brand will not only advertise or popularize your product or service but it will also expand your customer relationship. With the advantage of

communicating to your customers you can also build a strong relationship and bond between them which would surely lure and attract them to your products and services.

Deepen Market Penetration: – your own e brand will bring you a deeper market penetration that is you would get much inside the roots of the marketing and advertising your product and ultimately achieving your goals of an established market standing.

Lead Generation :- In this 21st century it's the need of the hour for your company to be in the virtual field that is to have a e brand so that you are also the part of the grand global internet community where you can easily and feasibly showcase your product and can capture the tech savvy generation .

E-branding is one of the most integral parts of a marketing campaign for any organization. A well designed informative website is the only medium through which an organization can reach out to the world in a short span of time and give the potential customers a glimpse of the business an organization is into.

### UNIT III

#### E-Security

Security is an essential part of any transaction that takes place over the internet. Customers will lose his/her faith in e-business if its security is compromised. Following are the essential requirements for safe e-payments/transactions –

- Confidentiality – Information should not be accessible to an unauthorized person. It should not be intercepted during the transmission.
- Integrity – Information should not be altered during its transmission over the network.
- Availability – Information should be available wherever and whenever required within a time limit specified.
- Authenticity – There should be a mechanism to authenticate a user before giving him/her an access to the required information.
- Non-Repudiability – It is the protection against the denial of order or denial of payment. Once a sender sends a message, the sender should not be able to deny sending the message. Similarly, the recipient of message should not be able to deny the receipt.
- Encryption – Information should be encrypted and decrypted only by an authorized user.
- Auditability – Data should be recorded in such a way that it can be audited for integrity requirements.

#### Measures to ensure Security

Major security measures are following –

- Encryption – It is a very effective and practical way to safeguard the data being transmitted over the network. Sender of the information encrypts the data using a secret code and only the specified receiver can decrypt the data using the same or a different secret code.
- Digital Signature – Digital signature ensures the authenticity of the information. A digital signature is an e-signature authenticated through encryption and password.
- Security Certificates – Security certificate is a unique digital id used to verify the identity of an individual website or user.

#### Security Protocols in Internet

We will discuss here some of the popular protocols used over the internet to ensure secured online transactions.

#### Secure Socket Layer (SSL)

It is the most commonly used protocol and is widely used across the industry. It meets following security requirements –

- Authentication
- Encryption

- Integrity
- Non-reputability

"https://" is to be used for HTTP urls with SSL, where as "http://" is to be used for HTTP urls without SSL.

### Secure Hypertext Transfer Protocol (SHTTP)

SHTTP extends the HTTP internet protocol with public key encryption, authentication, and digital signature over the internet. Secure HTTP supports multiple security mechanism, providing security to the end-users. SHTTP works by negotiating encryption scheme types used between the client and the server.

### Secure Electronic Transaction

It is a secure protocol developed by MasterCard and Visa in collaboration. Theoretically, it is the best security protocol. It has the following components –

- Card Holder's Digital Wallet Software – Digital Wallet allows the card holder to make secure purchases online via point and click interface.
- Merchant Software – This software helps merchants to communicate with potential customers and financial institutions in a secure manner.
- Payment Gateway Server Software – Payment gateway provides automatic and standard payment process. It supports the process for merchant's certificate request.
- Certificate Authority Software – This software is used by financial institutions to issue digital certificates to card holders and merchants, and to enable them to register their account agreements for secure electronic commerce.

### E-mail Hacking

Email hacking can be done in any of the following ways:

- Spam
- Virus
- Phishing

### Spam

E-mail spamming is an act of sending Unsolicited Bulk E-mails (UBE) which one has not asked for. Email spams are the junk mails sent by commercial companies as an advertisement of their products and services.

### Virus

Some emails may incorporate with files containing malicious script which when run on your computer may lead to destroy your important data.

### Phishing

Email phishing is an activity of sending emails to a user claiming to be a legitimate enterprise. Its main purpose is to steal sensitive information such as usernames, passwords, and credit card details.

Such emails contains link to websites that are infected with malware and direct the user to enter details at a fake website whose look and feels are same to legitimate one.

### E-mail Spamming and Junk Mails

Email spamming is an act of sending Unsolicited Bulk E-mails (UBE) which one has not asked for. Email spams are the junk mails sent by commercial companies as an advertisement of their products and services.

Spams may cause the following problems:

- It floods your e-mail account with unwanted e-mails, which may result in loss of important e-mails if inbox is full.
- Time and energy is wasted in reviewing and deleting junk emails or spams.
- It consumes the bandwidth that slows the speed with which mails are delivered.
- Some unsolicited email may contain virus that can cause harm to your computer.

### Blocking Spams

Following ways will help you to reduce spams:

- While posting letters to newsgroups or mailing list, use a separate e-mail address than the one you used for your personal e-mails.
- Don't give your email address on the websites as it can easily be spammed.
- Avoid replying to emails which you have received from unknown persons.
- Never buy anything in response to a spam that advertises a product.

#### E-mail Cleanup and Archiving

In order to have light weighted Inbox, it's good to archive your inbox from time to time. Here I will discuss the steps to clean up and archive your Outlook inbox.

- Select File tab on the mail pane.
- Select Cleanup Tools button on account information screen.
- Select Archive from cleanup tools drop down menu.
- Select Archive this folder and all subfolders option and then click on the folder that you want to archive. Select the date from the Archive items older than: list. Click Browse to create new .pst file name and location. Click OK.

## LEGAL AND ETHICAL ISSUES

### Cyberstalking

Cyberstalking is a prime example of the use of computers and the Internet to facilitate a traditional, offline crime. Cyberstalking generally refers to the use of the Internet, e-mail, or other electronic communications devices to "stalk" another person—where "stalking" in the traditional sense means to engage in repeated harassing or threatening behaviour (such as following a person, appearing at a person's home or workplace, making harassing telephone calls, or leaving written messages or objects) that places the victim in reasonable fear of death or bodily injury. The Internet provides new avenues for would-be stalkers to pursue their victims.

**EXAMPLE 1:** In April 1999, a 50 year old former security guard pleaded guilty (under California law) to one count of stalking and three counts of solicitation of sexual assault for using the Internet to solicit the rape of a woman who rejected his romantic advances. The defendant impersonated the victim in various Internet chat rooms and online bulletin boards, where he posted, along with her telephone number and address, messages that she fantasized about being raped. On at least six occasions, sometimes in the middle of the night, men knocked on the victim's door saying they wanted to rape her. The defendant faces up to six years in prison.

**EXAMPLE 2:** A person was arrested by the New Delhi Police in India's first case of cyberstalking. He was stalking a lady by illegally chatting on the Web site MIRC using her name. He used obscene and obnoxious language, and distributed her residence telephone number, inviting people to chat with her on the phone. As a result of which, she kept getting obscene calls from everywhere, and people promptly talked dirty with her. In a state of shock, she called the Delhi police and reported the matter. For once, the police department did not waste time swinging into action, and a case has been registered under Section 509 of the Indian Penal Code for outraging the modesty of that lady.

**EXAMPLE 3:** A 23 year old Telecom engineer from Mumbai who posed as the famous hacker Dr Neuker and made several attempts to hack the Mumbai police Cyber Cell website.

**EXAMPLE 4:** A case which was registered under Section 65 of the IT Act, related to theft of computer source code. An engineer was sent by his employer to America to develop a software program for the company. He instead of working for the company, allegedly sold the source code of the programme to an American client of his employer person to which his employer suffered loss.

According to the U.S. federal law, known as the Anti-Cybersquatting Consumer Protection Act, cybersquatting is registering, trafficking in, or using a domain name with bad

faith—intent to profit from the goodwill of a trademark belonging to someone else. The terms derive from *squatting*, the practice of inhabiting someone else's property without their permission.

### **Privacy is at Risk in the Internet Age**

Privacy is not just about hiding things; it is about self-possession, autonomy, and integrity. But this right of privacy does not mean that it is the right of people to close their doors and pull down their window shades, perhaps because they want to engage in some sort of illicit or illegal activity. It is the right of people to control what details about their lives stay inside their own houses and what leaks to the outside.

To understand privacy, we need to rethink what privacy really means today:

- It is not about the man who wants to watch pornography in complete anonymity over the Internet. It is about the NGO who is afraid to use the Internet to organize their community against a proposed toxic dump—afraid because the dump's investors are sure to dig through their past if they becomes too much of a nuisance.
- It is not about people speeding on the nation's highways who get automatically generated tickets mailed to them thanks to a computerized speed trap. It is about lovers who will take less joy in walking around city streets or visiting stores because they know they are being photographed by surveillance cameras everywhere they step.
- It is not about the searches, metal detectors, and inquisitions that have become a routine part of our daily lives at airports. It is about a society that views law-abiding citizens as potential terrorists, yet does little to effectively protect its citizens from the real threats to their safety.

Today, more than ever before, we are witnessing the daily erosion of personal privacy and freedom. We are victims of a war on privacy that is being waged by government eavesdroppers, business marketers, and nosy neighbours.

Today's war on privacy is intimately related to the dramatic advances in technology that we've seen in recent years. Video cameras observe personal moments. Computers store personal facts. Communications networks make personal information widely available throughout the world. Although some special technology may be used to protect personal information and autonomy, the overwhelming tendency of advanced technology is to do the reverse.

Privacy is fundamentally about the power of the individual. In many ways, the story of technology's attack on privacy is really the story of how institutions and the people who run them use technology to gain control over the human spirit, for good and ill. That is because technology by itself does not violate our privacy or anything else, it is the people using this technology and the policies they carry out that create violations.

Many people today say that in order to enjoy the benefits of modern society, we must necessarily relinquish some degree of privacy. If we want the convenience of paying for a meal by credit card, then we must accept the routine collection of our purchases in a large database over which we have no control.

Privacy-invasive technology does not exist in a vacuum. That is because technology itself exists at a junction between science, the market, and society. People create technology to fill specific needs, real or otherwise. And technology is regulated, as people and society deem fit.

Few engineers set out to build systems designed to crush privacy and autonomy, and few businesses or consumers would willingly use or purchase these systems if they understood the consequences. What happens more often is that the privacy implications of a new technology go unnoticed. Or if the privacy implications are considered, they are misunderstood. Or if they are understood correctly, errors are made in implementation. In practice, just a few mistakes can turn a system designed to protect personal information into one that destroys our secrets.



## **Phishing**

Computer criminals used a relatively new method—phishing, which is becoming more and more popular amongst hackers. Recently many banks all over the world encountered a variety of frauds and scams committed by hackers, swindlers, and inside bank officials. But the most widespread crime against banks and especially accounts' owners is a so-called 'phishing scam'. This scam is always entailed by usual spam. Swindlers try to trick consumers into giving up credit card information by posing as mail from *regulations.gov*, the government website where citizens comment on federal rule-making.

The phishing e-mails typically have subject headings of 'Official information' or 'Urgent information to all credit card holders!' and claim that recent changes in the law require that Internet users identify themselves to the federal government to create a secure and safer Internet community.' Like other phishing scams, the e-mail includes a link to a bogus website, which in this case closely resembles *regulations.gov*. Once there, users are asked to enter private and personal financial information, including credit card numbers.

Phishing expeditions can be a financial windfall for attackers, since some analysts' estimates put the success rate of such bogus e-mails at about 1 in every 20 recipients. The most recent major outbreak of phishing attacks was between the summer of 2003 and January 2004, when Mmail and a host of copycats tried to trick users into giving up credit card information by masquerading as messages from PayPal, eBay, and other major companies and banks.

## **Application Fraud**

Application fraud is one specific version of what is broadly referred to as "identity theft." As the name implies, it essentially involves a criminal using someone else's name and credentials to fill out a credit card application without their permission. Often, the thief sets the stage for application fraud by stealing supporting documents from the victim, such as utility bills or bank statements, which are then used to substantiate the thief's fraudulent credit card application. If and when they are approved for a card in the victim's name, thieves face few restraints in the damage they are capable of inflicting. FICO scores and payment histories can be ruined in a heartbeat by determined thieves in possession of a fraudulently granted credit card.

## **Skimming**

An electronic method of capturing a victim's personal information used by identity thieves. The skimmer is a small device that scans a credit card and stores the information contained in the magnetic strip. Skimming can take place during a legitimate transaction at a business. Skimming can occur easily in a restaurant because your card is taken away when the bill is being settled. If your server is a skimming identity thief, he or she will, before giving the card back to you, scan the credit card with a hand-held electronic device, which takes only seconds. The electronically captured information is then used by the thief or sold to other criminals.

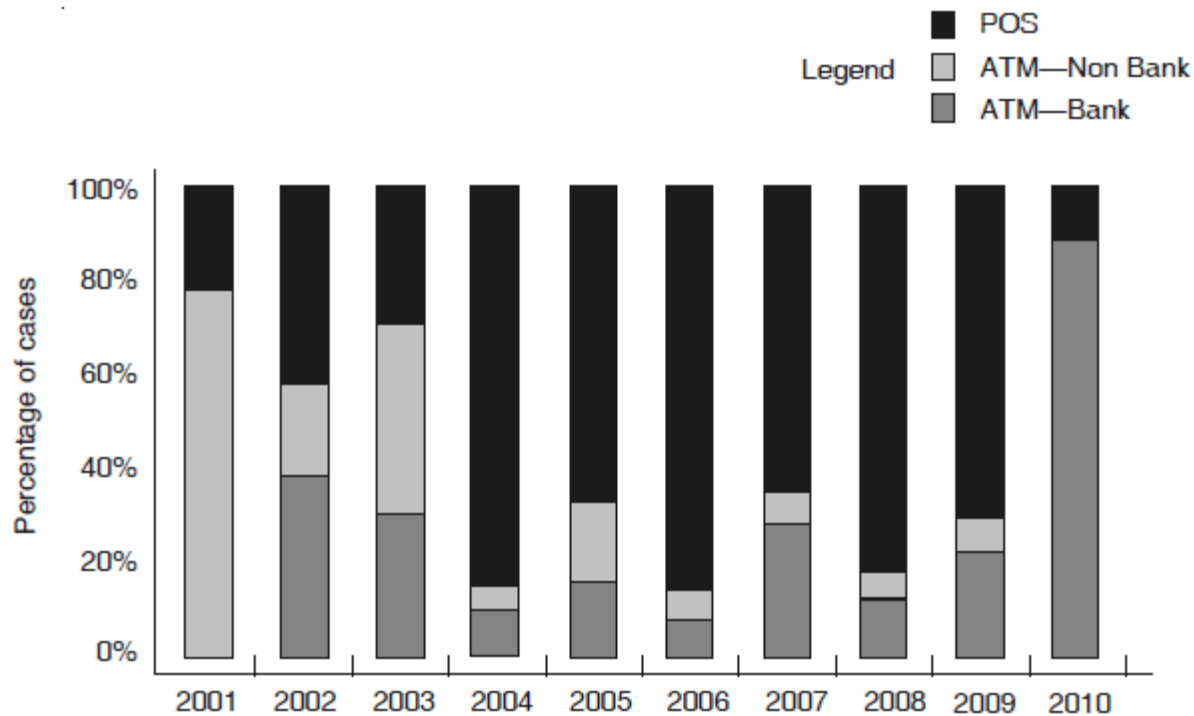


Figure Pin points of compromise 2001 through Q2 2010 FICO card alert services statistics.

ATM skimming is the practice of adding concealed technology to ATMs to capture bank account numbers, usernames and passwords. The point is to hijack bank accounts and clean them out before the customer is even aware of a problem.

ATM skimming has existed for years on a small scale. Skimmers attack both retail points-of-sale (POS) and ATMs, both bank-owned and non-bank. As the graphic below shows, the focus of these criminals has shifted recently. Notice that in the beginning in 2004, these criminals were working hard on POS fraud. Late in 2009, however, their focus began to shift to ATM machines and specifically bank-owned ATMs. According to Wall Street Journal, 80% of the credit card fraud during the first half of 2010 occurred on bank-owned ATMs.

### Copyright

In general terms, copyright provides an author with a tool to protect a work from being taken, used, and exploited by others without permission. The owner of a copyrighted work has the exclusive right to reproduce it, prepare derivative works based upon it, distribute copies by sale or other transfer of ownership, to perform and display it publicly, and to authorize others to do so.

For a company that depends upon intellectual property for its livelihood, such as a software company or an Internet-based publisher, copyright law provides a framework that ensures that the company can compete in the marketplace. The importance of copyright is illustrated by comparing what happens to an appliance company when a refrigerator is stolen with what happens to a software company when its source code is stolen. The refrigerator company will simply have one less item of merchandise to sell and a loss reflected by the refrigerator's price. The software company, however, will suddenly be faced with the prospect of a market flooded with exact copies of its product—sold or given away by another. Without the ability to prevent unauthorized copying, sale, and distribution of its product, the software company will not be able to survive.

Copyright law protects “original works of authorship”. Sheer hard work alone will not suffice—a modicum of creativity is required. The work does not have to be the first of its kind, or novel—it just has to be the independent product of the author, not copied from another source. Copyright, in fact, does not protect against independent creation of similar or identical works.

Certain items are excluded from copyright protection. Registering a work with the Copyright Office is a critical step to be taken in protecting a work under copyright law. While time and money costs are involved, significant benefits are gained by completing the registration process in a timely manner. To protect a work from the date of first publication, it must be registered within three months of that time. The work may be registered by the owner or an exclusive licensee. There is a “mandatory” deposit requirement, but it is not a condition of copyright protection.

A copyright is infringed when one of the exclusive rights of the copyright holder is violated. These include the right to reproduce a copyrighted work, prepare derivative works based upon it, distribute copies by sale or other transfer of ownership, to perform and display it publicly, and to authorize others to do so.

### **Internet Gambling**

The Internet and other emerging technologies, such as interactive television, have made possible certain types of gambling that were not feasible a few years ago. For example, an Indian citizen can now, from his home at any hour of the day or night, participate in an interactive Internet poker game operated by a computer located in the Caribbean. Indeed, a tech-savvy gambler can route his bets through computers located in other countries throughout the world, thereby obscuring the fact that he is placing his bet from India.

Online gambling also makes it far more difficult to prevent minors from gambling. Gambling websites cannot look at their customers to assess their age and request photo identification as is possible in traditional physical casinos and off-track-betting parlours. Currently, Internet gambling businesses have no reliable way of confirming that the gamblers are not minors who have gained access to a credit card and are gambling on their website.

Although some companies are developing software to try to detect whether a player is old enough to gamble or whether that player is from a legal jurisdiction, such software has not been perfected and would, of course, be subject to the same types of flaws and vulnerabilities that could be exploited by hackers. Unlike on-site gambling, online gambling is readily available to all at all hours, and it permits the user to gamble, in many cases, anonymously. This presents a greater danger for compulsive gambling and can cause severe financial consequences for an unsuccessful player. Internet gambling, unlike many other forms of gambling activity, is a solitary activity, which makes it even more dangerous; people can gamble uninterrupted and undetected for unlimited periods of time. Indeed, the problems associated with pathological and problem gamblers, a frighteningly large percentage of which are young people, are well-established and can be measured in the ruined lives of both the gamblers themselves and their families.

### **Threats to Children**

With the growing number of classrooms connected to the Internet and the rising number of personal computers used in the home, more and more children are now able to access the Internet. One of the greatest benefits of the Internet is that it provides children with access to such things as educational materials, subject matter experts, online friendships, and penpals.

Nevertheless, like many other pursuits that children engage in without adequate parental supervision, the Internet should also be approached with careful consideration of risks and benefits. One concern of course is that the Internet may allow children unrestricted access to inappropriate materials. Such materials may contain sexually explicit images or descriptions, advocate hate or bigotry, contain graphic violence, or promote drug use or other illegal activities. In the worst instances, children have become victims of physical molestation and harassment by providing personal information about themselves over the Internet and making contact with strangers.

To protect children from such risks, parents and teachers therefore need to empower themselves with the tools, knowledge, and resources to supervise and guide children's online experience and to teach children how to use the Internet responsibly.

## UNIT-IV

### E-PAYMENT SYSTEMS

E-PAYMENT SYSTEMS also known as **net-banking** or **online banking**, is an electronic payment system that enables the customer of a bank or a financial institution to make financial or non-financial transactions online via the internet. This service gives online access to almost every banking service, traditionally available through a local branch including fund transfers, deposits, and online bill payments to the customers.

E-PAYMENT SYSTEMS can be accessed by any individual who has registered for online banking at the bank, having an active bank account or any financial institution. After registering for online banking facilities, a customer need not visit the bank every time he/she wants to avail a banking service. It is not just convenient but also a secure method of banking. Net banking portals are secured by unique User/Customer IDs and passwords.

### MAIN CONCERNS IN INTERNET BANKING

In a survey conducted by the Online Banking Association, member institutions rated security as the most important issue of online banking. There is a dual requirement to protect customers' privacy and protect against fraud. Banking Securely: Online Banking via the World Wide Web provides an overview of Internet commerce and how one company handles secure banking for its financial institution clients and their customers. Some basic information on the transmission of confidential data is presented in Security and Encryption on the Web. A multi-layered security architecture comprising firewalls, filtering routers, encryption and digital certification ensures that your account information is protected from unauthorized access.

➤ Firewalls and filtering routers ensure that only the legitimate Internet users are allowed to access the system.

➤ Encryption techniques used by the bank (including the sophisticated public key encryption) would ensure that privacy of data flowing between the browser and the Infinity system is protected.

➤ Digital certification procedures provide the assurance that the data you receive is from the Infinity system.

The growth of e-commerce is dependent, among other factors, on the existence of secure, user-friendly and cost-effective payment systems. Handling payments is a costly process that has been a central part of bank business for the past century. However, it is now being transformed by technological developments, and in particular, the Internet. The importance of the payment function lies in the fact that it could encourage convergence between sectors with disparate objectives, since payment systems are the common denominator of all e-commerce transactions. Conceptually, the alternative means of payment available for e-commerce may be classified as either electronic money (e-money), or electronic access products. The difference between them is that whereas electronic access products basically provide Internet access to traditional products (credit card payments, bank transfers, and the like), e-money is a new concept, and in particular is considered to be "private money not depending on central bank reserves."

Consolidated methods of payment used for distance selling mostly at national level, such as cheque, cash-on-delivery and credit-transfer mechanisms, have proven easy to adapt to

electronic transactions. The credit card system has to date been the usual payments instrument for goods ordered over the Internet. This is despite security concerns and relatively higher transaction cost. Nevertheless, the lack of a widely accepted e-payment system is not considered to be a major barrier for the gearing up of e-commerce. The most important factors are undoubtedly user trust and user confidence.

E-payment systems are becoming central to e-commerce 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. The current state of online 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, such as 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, such as promissory notes, bills of exchange, gold coins, and barter. 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 with regard to e-payment systems.

## **DIGITAL PAYMENT REQUIREMENTS:**

### **About Digital Payments**

The Government of India has been taking several measures to promote and encourage digital payments in the country. As part of the 'Digital India' campaign, the government aims to create a 'digitally empowered' economy that is 'Faceless, Paperless, Cashless'. There are various types and modes of digital payments. Some of these include the use of debit/credit cards, internet banking, mobile wallets, digital payment apps, Unified Payments Interface (UPI) service, Unstructured Supplementary Service Data (USSD), Bank prepaid cards, mobile banking, etc.

Digital payment methods are often easy to make, more convenient and provide customers the flexibility to make payments from anywhere and at anytime. These are a good alternative to traditional methods of payment and speeden up transaction cycles. Post demonetization, people slowly started embracing digital payments and even small time merchants and shop owners started accepting payments through the digital mode.

### **Digital Payment:**

A digital payment occurs when goods or services are purchased through the use of various electronic mediums. There is no use of cash or cheques in this type of payment method.

### **Cashless Economy**

In a cashless economy, all transactions are carried out using different types of payment methods and this does not involve the physical use of money for the purchase of various goods and services.

## **10 Types of Digital Payment Methods**

1. Banking cards
2. USSD
3. Aadhaar Enabled Payment System (AEPS)
4. UPI
5. Mobile Wallets

6. Bank pre-paid cards
7. Point of Sale (PoS)
8. Internet Banking
9. Mobile Banking
10. Bharat Interface for Money (BHIM) app

### **1. Banking cards:**

Cards are among the most widely used payment methods and come with various features and benefits such as security of payments, convenience, etc. The main advantage of debit/credit or prepaid banking cards is that they can be used to make other types of digital payments. For example, customers can store card information in digital payment apps or mobile wallets to make a cashless payment. Some of the most reputed and well-known card payment systems are Visa, Rupay and MasterCard, among others. Banking cards can be used for online purchases, in digital payment apps, PoS machines, online transactions, etc.

### **2. USSD:**

Another type of digital payment method, \*99#, can be used to carry out mobile transactions without downloading any app. These types of payments can also be made with no mobile data facility. This facility is backed by the USSD along with the National Payments Corporation of India (NPCI). The main aim of this type of digital payment service is to create an environment of inclusion among the underserved sections of society and integrate them into mainstream banking. This service can be used to initiate fund transfers, get a look at bank statements and make balance queries. Another advantage of this type of payment system is that it is also available in Hindi.

### **3. AEPS:**

Expanded as Aadhaar Enabled Payment System, AEPS, can be used for all banking transactions such as balance enquiry, cash withdrawal, cash deposit, payment transactions, Aadhaar to Aadhaar fund transfers, etc. All transactions are carried out through a banking correspondent based on Aadhaar verification. There is no need to physically visit a branch, provide debit or credit cards, or even make a signature on a document. This service can only be availed if your Aadhaar number is registered with the bank where you hold an account. This is another initiative taken by the NPCI to promote digital payments in the country.

### **4. UPI:**

UPI is a type of interoperable payment system through which any customer holding any bank account can send and receive money through a UPI-based app. The service allows a user to link more than one bank account on a UPI app on their smartphone to seamlessly initiate fund transfers and make collect requests on a 24/7 basis and on all 365 days a year. The main advantage of UPI is that it enables users to transfer money without a bank account or IFSC code. All you need is a Virtual Payment Address (VPA). There are many UPI apps in the market and it is available on both Android and iOS platforms. To use the service one should have a valid bank account and a registered mobile number, which is linked to the same bank account. There are no transaction charges for using UPI. Through this, a customer can send and receive money and make balance enquiries.

### **5. Mobile Wallets:**

A mobile wallet is a type of virtual wallet service that can be used by downloading an app. The digital or mobile wallet stores bank account or debit/credit card information or bank account information in an encoded format to allow secure payments. One can also add money to a mobile wallet and use the same to make payments and purchase goods and services. This eliminated the need to use credit/debit cards or remember the CVV or 4-digit pin. Many banks in the country have launched e-wallet services and apart from banks, there are also many private

players. Some of the mobile wallet apps in the market are Paytm, Mobikwik, Freecharge, etc. The various services offered by mobile wallets include sending and receiving money, making payments to merchants, online purchases, etc.

#### **6. PoS terminals:**

Traditionally, PoS terminals referred to those that were installed at all stores where purchases were made by customers using credit/debit cards. It is usually a hand held device that reads banking cards. However, with digitization the scope of PoS is expanding and this service is also available on mobile platforms and through internet browsers. There are different types of PoS terminals such as Physical PoS, Mobile PoS and Virtual PoS. Physical PoS terminals are the ones that are kept at shops and stores. On the other hand, mobile PoS terminals work through a tablet or smartphone. This is advantageous for small time business owners as they do not have to invest in expensive electronic registers. Virtual PoS systems use web-based applications to process payments.

#### **7. Internet Banking:**

Internet banking refers to the process of carrying out banking transactions online. These may include many services such as transferring funds, opening a new fixed or recurring deposit, closing an account, etc. Internet banking is also referred to as e-banking or virtual banking. Internet banking is usually used to make online fund transfers via NEFT, RTGS or IMPS. Banks offer customers all types of banking services through their website and a customer can log into his/her account by using a username and password. Unlike visiting a physical bank, there are no time restrictions for internet banking services and they can be availed at any time and on all 365 days in a year. There is a wide scope for internet banking services.

#### **8. Mobile Banking:**

Mobile banking is referred to the process of carrying out financial transactions/banking transactions through a smartphone. The scope of mobile banking is only expanding with the introduction of many mobile wallets, digital payment apps and other services like the UPI. Many banks have their own apps and customers can download the same to carry out banking transactions at the click of a button. Mobile banking is a wide term used for the extensive range or umbrella of services that can be availed under this.

#### **9. Bharat Interface for Money (BHIM) app:**

The BHIM app allows users to make payments using the UPI application. This also works in collaboration with UPI and transactions can be carried out using a VPA. One can link his/her bank account with the BHIM interface easily. It is also possible to link multiple bank accounts. The BHIM app can be used by anyone who has a mobile number, debit card and a valid bank account. Money can be sent to different bank accounts, virtual addresses or to an Aadhaar number. There are also many banks that have collaborated with the NPCI and BHIM to allow customers to use this interface.

### **Digital Token-Based Electronic Payment Systems**

Electronic tokens are three types:

**1. Cash or Real-time** • Transactions are settled with exchange of electronic currency.

• Ex: on-line currency exchange is electronic cash (e-cash).

**2. Debit or Prepaid** • Users pay in advance for the privilege of getting information. • Ex: prepaid payment mechanisms are stored in smart cards and electronic purses that store electronic money.

**3. Credit or Postpaid**

• The server authenticates the customers and verifies with the bank that funds are adequate before purchase.

- Ex: postpaid mechanisms are credit/debit cards and electronic checks.
- Removes the amount of the charge from the cardholder's account and transfers it to the seller's bank. – Charge cards
- Such as one from American Express, carries no preset spending limit.

**Advantages:** – Payment cards provide fraud protection. – They have worldwide acceptance (nearly!). – They are good for online transactions.

**Disadvantages:** – Payment card service companies charge merchants per-transaction fees and monthly processing fees.

### Classification of new payment system:

NPCI & RBI must be greatly appreciated for creating a robust and resilient payment systems backbone for making India, a true “Digital Economy” state. A decade earlier, the predominant mode of payments for individual/business, small/large value payments used to cash, card, cheque, ECS, NEFT & RTGS. However, in the recent years, introduction of IMPS, AEPS, UPI (BHIM & USSD), NETC, phasing out ECS with NACH, BBPS have spiked up geometrically the number of digital transactions, and more importantly more options to its customers.

The way RBI/NPCI classifies our payment systems/options is (a) Paper (b) Electronic (c) Card Based Payments.

**(a) Fast Payments & Retail:** These payment options are typically used by individuals to perform P2P payments (or payments-to-merchants) and most importantly low-ticket transactions. The settlement of these transactions happens instantaneously.

**(b) Clearing & Large value Payments:** These options are used by individuals or businesses to perform large value payments, and usually the money transfer across in a delayed fashion. Delayed here implies, that the settlement between the accounts/banks happen in at defined settlement timings. ACH & Cheque are a classic example of delayed settlements.

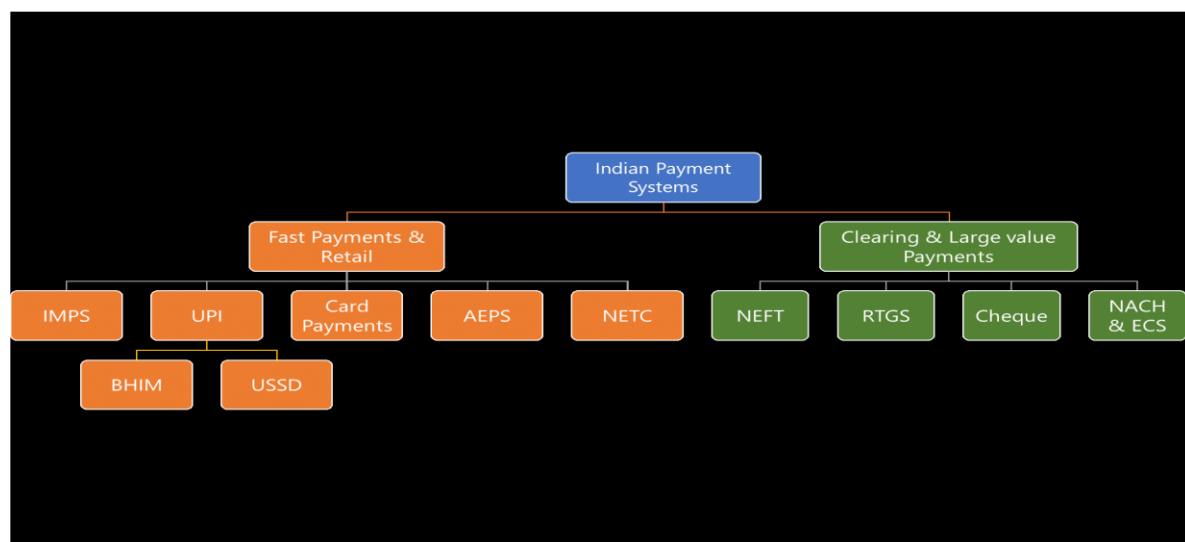


Figure payment system

### Properties of Electronic Cash:

- There are many ways that exist for implementing an e-cash system, all must incorporate a few common features.
- Specifically, e-cash must have the following four properties:
  1. Monetary value



2. Interoperability
3. Retrievability
4. Security

#### **Electronic Cash in Action :**

- Electronic Cash is based on cryptographic systems called —digital signatures||.
- This method involves a pair of numeric keys: one for locking (encoding) and the other for unlocking (decoding). (Through public key and private key).

#### **Purchasing E-cash from Currency Servers:**

The purchase of e-cash from an on-line currency server (or bank) involves two steps: • Establishment of an account and Maintaining enough money in the account to bank the purchase. Some customers might prefer to purchase e-cash with paper currency, either to maintain anonymity or because they don't have a bank account. Using the Digital Currency

- Once the tokens are purchased, the e-cash software on the customer's PC stores digital money undersigned by a bank.
- The users can spend the digital money at any shop accepting e-cash, without having to open an account there or having to transmit credit card numbers.
- As soon as the customer wants to make a payment, the software collects the necessary amount from the stored tokens.

#### **Cheque Payment Systems on the Internet**

- It is another form of electronic tokens.
- In the given model shown in fig, buyers must register with third-party account server before they are able to write electronic cheques
- The account server acts as a billing service.
- **The advantages are:**
  1. They work in the same way as traditional cheques.
  2. These are suited for clearing micropayments
  3. They create float & availability of float is an important for commerce
  4. Financial risk is assumed by the accounting server & may result in easier acceptance.

#### **Credit Card-Based Electronic Payment Systems**

Payment cards are all types of plastic cards that consumers use to make purchases: – Credit cards

- Such as a Visa or a MasterCard, has a preset spending limit based on the user's credit limit. – Debit cards

#### **Risks and E-payment Systems:**

##### **Risks in Electronic Payment systems**

- Customer's risks
  - Stolen credentials or password
  - Dishonest merchant
  - Disputes over transaction

- Inappropriate use of transaction details
- Merchant's risk
- Forged or copied instruments
- Disputed charges
- Insufficient funds in customer's account
- Unauthorized redistribution of purchased items

### **Electronic payments Issues**

- Secure transfer across internet
- High reliability: no single failure point
- Atomic transactions
- Anonymity of buyer
- Economic and computational efficiency: allow micropayments
- Flexibility: across different methods

### **Designing e-Payment Systems**

Despite cost and efficiency gains, many hurdles need to be overcome for the spread of e-payment systems. These include several factors, mostly non-technical in nature that must be addressed before any new payment method is made successful.

They are as follows:

- 1. Privacy.** A user expects trustworthiness of a secure system; just as the telephone is a safe and a private medium, free of wiretaps and hackers, electronic communication must merit equal trust.
- 2. Security.** A secure system verifies the identity of two-party transactions through “user authentication”, and reserves flexibility to restrict information/services through access control. Tomorrow's bank robbers will need no getaway cars—just a computer terminal, the price of a telephone call, and a little ingenuity. Millions of dollars have been embezzled by computer fraud. No systems are yet foolproof, although designers are concentrating closely on security.
- 3. Intuitive interfaces.** The payment interface must be as easy to use as a telephone. Generally speaking, users value convenience more than anything.
- 4. Database integration.** With home banking, for example, a customer wants to play with all his accounts. Separate accounts are stored on separate databases. The challenge before banks is to tie these databases together and allow customers access to any of them while keeping the data up-to-date and error-free.
- 5. Brokers.** A “network banker”—someone to broker goods and services, settle conflicts, and facilitate financial transactions electronically—must be in place.

**6. Pricing.** One fundamental issue is how to price payment system services. For example, should subsidies be used to encourage users to shift from one form of payment to another from cash to bank payments, from papers based to e-cash? The problem with subsidies is the potential waste of resources, as money may be invested in systems that will not be used. Thus, investment in systems not only might not be recovered, but also substantial ongoing operational subsidies will be necessary. On the other hand, it must be recorded that, without subsidies, it is difficult to fix up an affordable price to all services.

**7. Standards.** Without standards, the welding of different payment users into different networks and different systems is impossible. Standards enable interoperability, giving users the ability to buy and receive information, regardless of which bank is managing their money.

None of the above hurdles are insurmountable. Most of these will be overcome within the next few years. These technical problems, experts hope, will be solved as technology is improved and experience is gained.

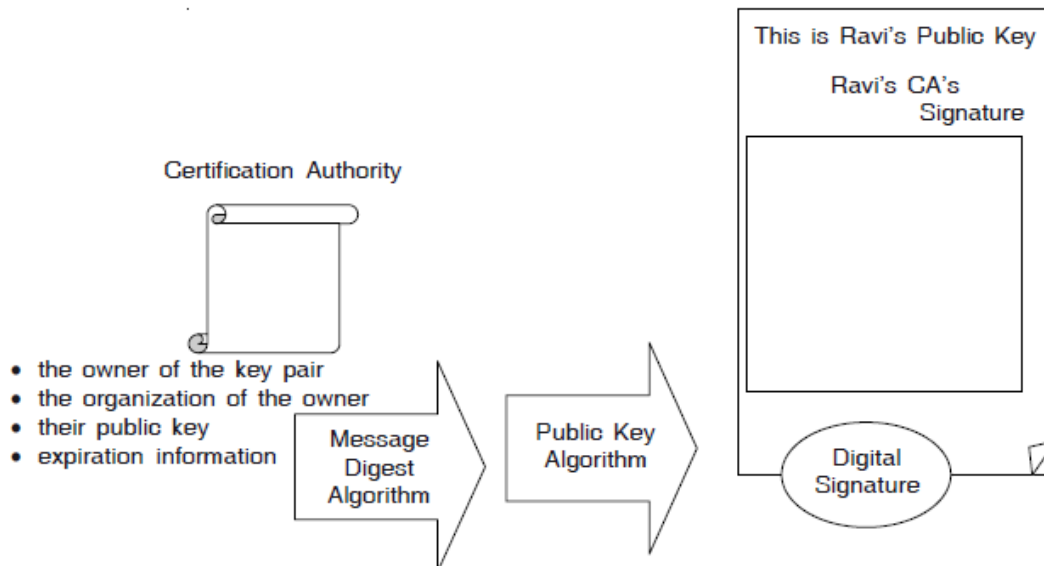
## **Digital Signatures**

Digital signatures provide information regarding the sender of an electronic document. The technology has assumed huge importance recently, with the realization that it may be the remedy to one of the major barriers to growth of electronic commerce: *fear of lack of security*.

Digital signatures provide data integrity, thereby allowing the data to remain in the same state in which it was transmitted. The identity of the sender can also be authenticated by third parties.

The most widely used type of cryptography is public key cryptography, where the sender is assigned two keys—one public, one private. The original message is encrypted using the public key while the recipient of the message requires the private key to decrypt the message. The recipient can then determine whether the data has been altered. However, although this system guarantees the integrity of the message, it does not guarantee the identity of the sender (public key owner). In order to remedy this, a Certificate Authority is required.

In Figure, Ravi (the sender) uses his private key to compute the digital signature. In order to compute the digital signature, a one-way hashing algorithm may be used to first calculate a message digest, as is done by RSA. The message digest is an efficient way to represent the message, as well as being a unique number that can only be calculated from the contents of the message. The sender's private key is used at this point to encrypt the message digest. The encrypted message digest is what is commonly called a digital signature.



A certification authority (CA) performs the task of managing key pairs, while the verification of the person or entity bound to that key pair is initially ascertained at the time of application by the registration authority. A certificate is issued by a CA and links an individual or entity to its public key, and in some cases to its private key. Certification authorities can offer different grades of certificates, depending upon the type of initial identification provided by the individual. From an information security viewpoint, these simple “electronic signatures” are distinct from the “digital signatures” and in the technical literature, although “digital signature” is sometimes used to mean any form of computer-based signature. These guidelines use “digital signature” only as it is used in information security terminology, as to mean the result of applying the technical processes.

Following is the list of certifying authorities in India

- SafeScript (A Sify-Verisign venture) was the first CA in India.
- National Informatics Centre.
- Tata Consultancy Services.
- Institute of Development and Research in Banking Technology, Hyderabad (IDRBT), the technology arm of the Reserve Bank of India.
- Mahanagar Telephone Nigam Ltd (MTNL).
- ICICI Infotech, which has the contract for the supply and installation of the National Root Certification Authority, with an aim to bring uniformity amongst the different Certifying authorities in India.

Web-based banks figured their pitch was irresistible—by eliminating physical branches, tellers, and bankers’ hours, they could slash costs and offer customers higher interest rates and more convenience. But in reality, customers want human contact, or at least an ATM. The multi channel strategy is what is important to people. They want to be able to use the Web. Online bank shave also learned that convenience means more than just twenty-four-hour banking. In fact, some aspects of the virtual banking model are flat-out inconvenient. For example, online banks require that deposits be made by cheque or money order, eliminating the cash option available at traditional banks. Adding physical infrastructure, though, adds to an on line bank’s operating costs and may force it to lower interest rates paid on savings.

Online banks maintain that they still run more efficiently than traditional banks because of practices such as online account managers, loan officers, and so on. That allows them to manage a branch with a smaller staff than a traditional bank. Although a multichannel approach

may appeal to customers, the strategy undermines the very premise of online—only institutions, and makes them less distinguishable from traditional banks that also offer Web-banking services. It is a lot easier and cheaper for an existing bank to roll out Internet services than it is for an Internet bank to buy enough ATMs or branches to compete on a national level.

### **Online financial services in India**

Online banking is also known as cyber banking, home banking, virtual banking, and includes various banking activities that can be conducted from anywhere instead of at a physical bank location. Consumers can use e-banking to pay bills online or to secure a loan electronically. Electronic banking saves a lot of time and money for users. For banks, it offers an inexpensive alternative to branch banking and a chance to enlist remote users. Many physical banks offer home banking services, and EC is used as a major competitive strategy. Online banking is growing in India.

### ***Features of e-Banking in India***

1. Can access current account balances at any time.
2. Can obtain charge and credit card statements.
3. Can pay bills online.
4. Can download account transactions.
5. Can transfer money between accounts.
6. Can keep a track of accounts online.
7. Can send e-mails to the bank.
8. Customers have a flexible schedule.
9. Can also use additional services like free phone banking, ATM withdrawals, bill paying.

International banking and the ability to handle trades in multiple currencies are critical for international trade. Although some international retail purchasing can be done with a credit card number, other transactions require international banking support. Many banks offer such services online.

### **Personal Finance Online**

Often electronic banking and portfolio management are combined with personal finance. However, specialized personal finance vendors offer more diversified services, with features like:

1. Bill tracking
2. Tracking of bank accounts, expenditures, and credit cards
3. Portfolio management, including reports and capital gain (losses) computations
4. Investment tracking and monitoring of securities
5. Stock quotes
6. Personal budget organization
7. Record keeping of cash flow, and profit and loss computations
8. Tax computations and preparations
9. Retirement goals, planning, and budgeting.

## **Online Billing and Bill Paying**

People prefer to pay monthly bills like telephone, utility, electricity etc., online. More so, the recipients of such payments are even more eager to receive money online, as the processing costs are lower! In India, banks like ICICI and SBI make it easier with a facility of paying bills from online accounts. ICICI provides this feature absolutely free of cost and offers customer to view the bill, status checks, and queries. For certain billers, one can see the bill online and pay immediately or schedule the payment of bills. Now there is no more hunting around for the right amount to be paid. Paying these Bills online will ensure that one does not miss any due dates. It acts as a reminder. SBI on the other hand also provides a feature called Autopay. One can set up AutoPay instructions with an upper limit to ensure that bills are paid automatically whenever they are due. The upper limit ensures that only bills within the specified limit are paid automatically, thereby providing the customer complete control over these payments.

## **Auxiliary Services**

ICICI offers a few auxiliary services online as part of their online services, apart from bill payment and e-banking.

**Online shopping:** using the Internet banking ID and transaction password, one can visit affiliated shopping sites online and make online transactions.

**Online Trading:** one of the most popular features of ICICI is their online trading feature. Their products and services offer the following features:

1. Trading in shares
2. Trade in derivatives
3. Investing in mutual funds
4. IPOs and bonds online
5. Personal finance and portfolio, risk management
6. Customer servicing

Some banks like SBI also offer other features like telephone and SMS alerts.

## **Mutual Funds Online**

Mutual funds online are very useful in providing financial assistance and predictions, offering services like the below.

1. Funds fact sheet
2. New launches of Public Offerings
3. Portfolio Trackers and Fund Monitors

These services are available online and provide useful advice on fund management and investments. While online services are useful and easy to handle, they are definitely not risk free.

There are repeated cases of fraud, carding cash, and liquidity risks, etc.

## **Online Stock Trading**

Buying and selling shares online with speeds comparable and at times better than NSE's NEAT Terminal. This speed and reliability comes only with perseverance of a pioneer backed by huge investment in technology! Intra-day price alerts that you can set, customize market watch screen, intra-day tick-by-tick time and price data with chart, for any number of scripts. Technical experts make live calls, the news desk supplying you with the fastest information updates. Even if you load CNX 500 with 500 scripts, it will appear with all live prices in a fraction of a second.

## ***Features Offered While Trading in Stocks Online***

Several features offered while trading in stocks are enumerated below:

### ***1. View positions online.***

The customer can view the status of all his orders online. Every information as to whether the order has been executed or are waiting in the queue to be executed—can be viewed for their status.

### ***2. View transaction history online.***

Transactions details for all the trades done are available online. The customer can also check his Account statements online. This account would be updated regularly on a quarterly basis.

### ***3. Online quotes, streaming quotes and ticker.***

The customer gets free online quotes for all his favorite stocks. Quotes are real-time to make sure he receives the best quote for his trades. He can also access the Streaming Quotes, which would give him a feel of the online update of stock prices of his choice. A real-time ticker would run-on the screen for him to keep a watch on the stocks of his choice.

### ***4. Online news analysis.***

This gets the latest news affecting the markets. ICICI direct research team will analyze the news and explain its impact on the market and stocks.

### ***5. Follow the market.***

This gets the latest stock trends by accessing its market centre. Its research team will ensure that you are kept abreast of the latest market happenings. All news and events affecting markets and companies are analyzed and presented in a form which you can understand easily. It gets the complete picture behind the movement of the stocks.

### ***6. IPO centre.***

It tells about all the latest IPOs (Initial Public Offerings) which are about to hit the market and our analysis on these. IPO Calendars, recent IPO listings, Prospectus/Offer Documents, and IPO analysis are few of the features which help the customer keep on top of the IPO markets.

The major online brokers have been getting better and better with improved services and programs. Most online brokers charge the average client, but most will give services and access free to traders who trade actively and maintain above minimum account balances.

There are non-brokerage services that can be purchased or accessed for free on the Internet. Many provide information or tools that you cannot get from your broker.<sup>13</sup>

Some of the **major Indian players** in the Online Stock Trading business are:

- \_ ICICIDirect.com
- \_ IndiaInfoline.com
- \_ Fivepaise.com
- \_ HDFCBank.com
- \_ MyIris.com
- \_ Sharekhan.com
- \_ Indiabulls.com

## UNIT 5

**Information system** can be defined as set of people, procedure and resources that collects, transforms & disseminates information in an organization. It is a system that accepts data resources as input & processes them into information products as outputs this supports an organization's business strategies, business processes & organizational structures & culture to increase the business value of the enterprise in a dynamic business environment.

Mobile Commerce, also known as m-commerce, is defined as the process of performing business transactions using handheld mobile devices which are connected through wireless networks. The business transactions may range from buying and selling goods, making mobile payments, downloading audio/video contents, playing online games, using numerous software applications or getting mobile tickets. The mobile devices include cellular phones, handheld computers such as palmtops or laptops, pagers, smartphones and Personal Digital Assistants (PDA). The mobile users can access internet through these devices without any wired connection or a computer. Powered with the emerging technology based on Wireless Application Protocol (WAP), mcommerce employs webready micro browsers in these mobile devices to surf through the internet anytime, anywhere on earth.

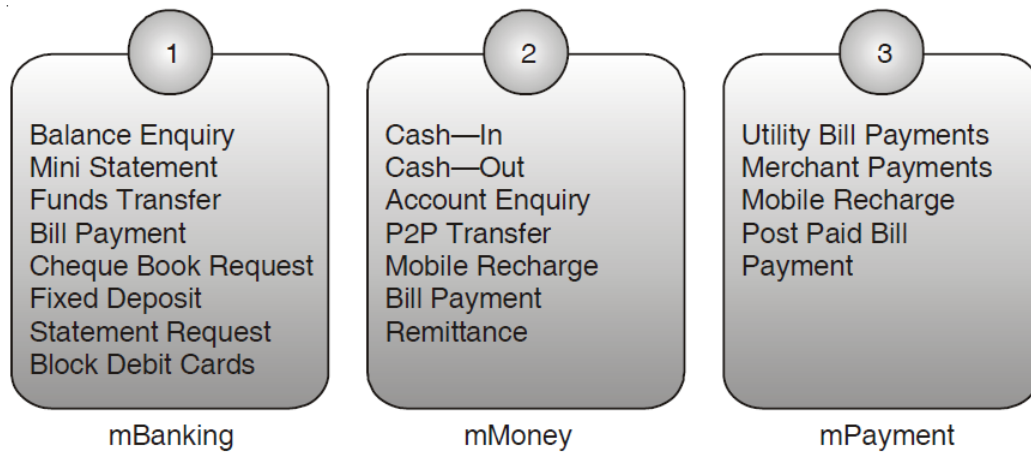
Mobile commerce provides instant connectivity between mobile users irrespective of their geographical location and time of the day. With enormous growth of wireless and mobile technology and rapid penetration of mobile phones in developing countries worldwide, the scope of m-commerce has increased manifold. With the advent of super-fast 3G access technology that ensures high speed data transfer rates of the order of 20 Mbps, m-commerce is opening up new vistas of digital media applications. 3G technology, equipped with WiMax and UMTS standards for high speed mobile broadband internet connectivity, supports mobile multimedia application delivery at far greater bandwidths. So, it is now possible for mobile users to watch their favourite TV programmes or download and view famous movies in their mobile devices while travelling.

The scope of mobile commerce is all pervasive, and is gradually engulfing all aspects of lives of modern day citizens. Ranging from mobile banking, mobile browsing and mobile ticketing up to mobile marketing, mobile advertising and mobile computing, mobile commerce is gradually becoming an integral part of both corporate world and common people. With the prices of mobile phone decreasing exponentially and the number of different mobile applications increasing enormously, more and more people will indulge in m-commerce applications and soon it will become the preferred choice of the digital business world.

Mobile commerce (M-commerce) can be broadly divided into three categories. They are as follows

- 1. Mobile banking:** It is the state-of-the-art process that has been introduced in the banks to make sure that the customers are better equipped with all the systems and process. This helps to carry out the transaction quickly and the account holders can check their account balance and the newly available schemes from the mobile website. Mobile banking can be accessed through mobile and people can use it for their benefit and they do not have to be physically present at the banks for checking the account balance. Mobile banking has made life a lot easier and this is a programme that is being used by the younger generation a lot more, but if you are a middle-aged or senior person, you can certainly avail it because it is genuinely user friendly.
- 2. M-payment (mobile payment):** It is a point-of-sale payment made through a mobile device, such as a cellular telephone, a smartphone, or a personal digital assistant (PDA). Using m-payment, a person with a wireless device could pay for items in a store or settle a restaurant bill without interacting with any staff member.
- 3. Mobile money** A facility that allows people to use their cell phones and otherhand-held devices to handle financial transactions.





**Figure Components of M-commerce.**

## WIRELESS COMMUNICATION TECHNOLOGY

Mobile commerce is based on wireless communication technology. The wireless communication technology has emerged as the new choice of modern corporate world. The wireless networking has some distinct advantages over traditional wired networking that employs co-axial, twisted pair or fiber optic cables for physical connection between two or more computing devices. In wireless networking, the data transfer between computers is facilitated by microwaves, radio waves or infrared waves. It eliminates the cumbersome cabling process involving bulky cables with a significant reduction in labor and material cost as well as development time.

The wireless networking technology together with wireless application protocol provides the backbone of mobile commerce applications. In various vertical markets, such as retail, healthcare, manufacturing and warehousing, mobile commerce gained acceptance and provided increased productivity through the usage of mobile devices. The mobile handheld devices are used to transmit data in real time to centralized hosts through wireless networks. The mobile commerce that employs wireless technology, offers some extra advantage over the internet based e-commerce. In e-commerce, the internet provides information anytime of the day, while in m-commerce, the information is available anytime, anywhere. In e-commerce, the information is available as long as the user is connected with the internet, i.e. connected with the wired network. If the user is involved with some other activities, i.e. travelling or doing some offline job, which forces him/her to become disconnected from the internet, the information becomes unavailable. M-commerce removes such uncertainties. Wireless networking allows the user to be connected with the wireless internet even if he/she is on the move. Thus, in mcommerce, it is possible to stay online anywhere on earth and anytime of the day. The user can access information instantly even if he/she is engaged in some other activities, such as travelling or shopping, with the help of the mobile device and the wireless network or internet. This helps the employees to make spot decisions, the customers to ask questions spontaneously and business owners to perform transactions anytime regardless of their geographical positions.

### Cellular Network

A cellular network is a radio network made up of a number of **radio cells** (or just **cells**) each served by a fixed transmitter, known as a cell site or base station. These cells are used to cover different areas in order to provide radio coverage over a wider area than the area of one cell. Cellular networks are inherently asymmetric with a set of fixed main transceivers each serving a cell and a set of distributed (generally, but not always, mobile) transceivers which provide services to the network's users.

Cellular networks offer a number of advantages over alternative solutions:

- increased capacity
- reduced power usage
- better coverage

The primary requirement for a network to be successful as a cellular network is for it to have developed a standardized method for each distributed station to distinguish the signal emanating from its own transmitter from the signals received from other transmitters. Presently, there are two standardized solutions to this issue: frequency division multiple access (FDMA) and; code division multiple access (CDMA).

FDMA works by using varying frequencies for each neighboring cell. By tuning to the frequency of a chosen cell the distributed stations can avoid the signal from other cells. The principle of CDMA is more complex, but achieves the same result; the distributed transceivers can select one cell and listen to it. Other available methods of multiplexing such as polarization division multiple access (PDMA) and time division multiple access (TDMA) cannot be used to separate signals from one cell to the next since the effects of both vary with position and this would make signal separation practically impossible. Time division multiple access, however, is used in combination with either FDMA or CDMA in a number of systems to give multiple channels within the coverage area of a single cell.

### ***Broadcast Messages and Paging***

Practically every cellular system has some kind of broadcast mechanism. This can be used directly for distributing information to multiple mobiles, commonly, for example in mobile telephony systems, the most important use of broadcast information are to set up channels for one to one communication between the mobile transceiver and the base station. This is called **paging**.

The details of the process of paging vary somewhat from network to network, but normally we know a limited number of cells where the phone is located (this group of cells is called a Location Area in the GSM or UMTS system, or Routing Area if a data packet session is involved). Paging takes place by sending the broadcast message to all of those cells. Paging messages can be used for information transfer. This happens in pagers, in

CDMA systems for sending SMS messages, and in the UMTS system where it allows for low downlink latency in packet-based connections.

### ***Frequency Reuse***

The increased capacity in a cellular network, compared with a network with a single transmitter, comes from the fact that the same radio frequency can be reused in a different area for a completely different transmission. If there is a single plain transmitter, only one transmission

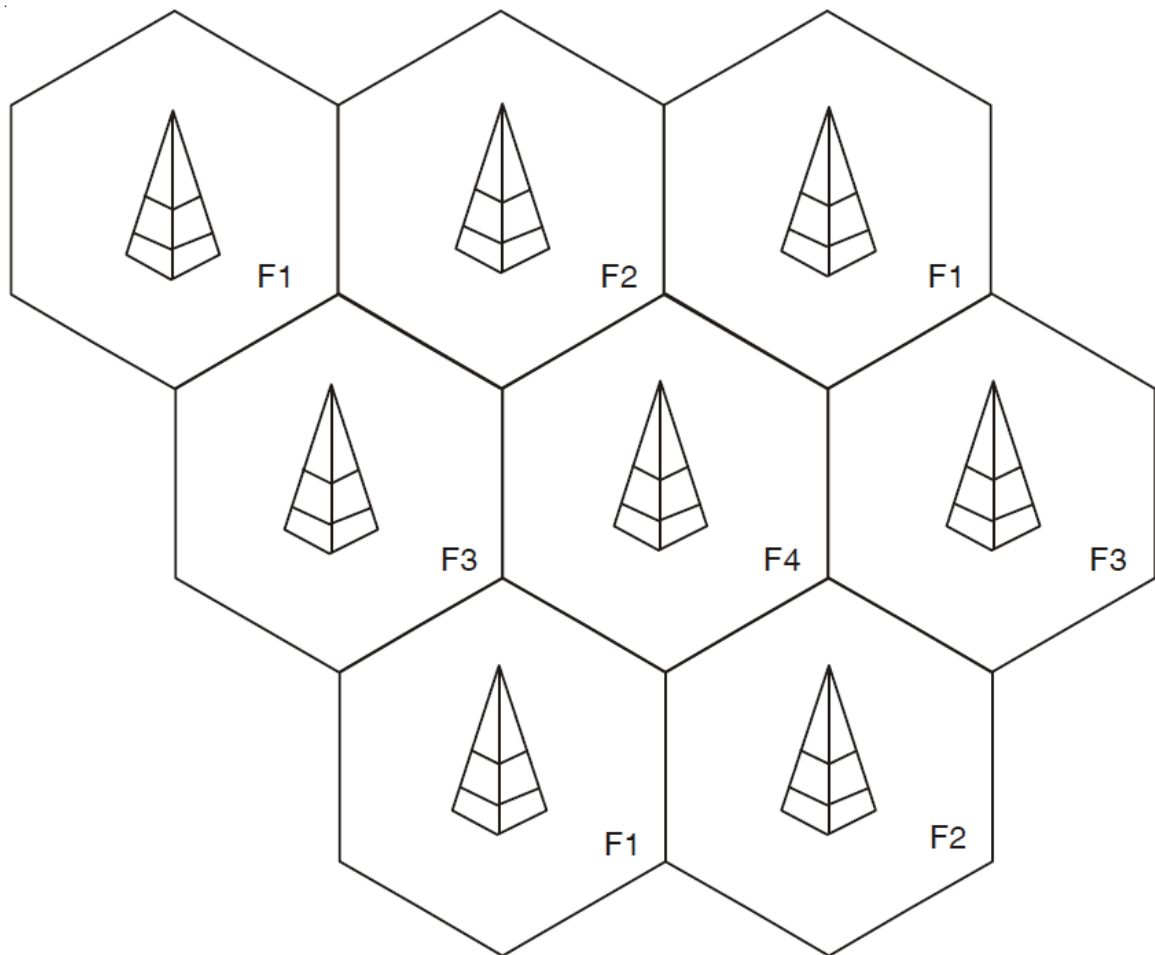


Figure Example of frequency reuse factor or pattern 1/4.

Can be used on any given frequency. Unfortunately, there is inevitably some level of interference from the signal from the other cells which use the same frequency. This means that, in a standard FDMA system, there must be at least a one cell gap between cells which reuse the same frequency. The frequency reuse factor is the rate at which the same frequency can be used in the network. It is  $1/K$  where  $K$  is the number of cells which cannot use the same frequencies for transmission. Common values for the frequency reuse factor are  $1/3$ ,  $1/4$ ,  $1/7$ ,  $1/9$  and  $1/12$ . In case of  $N$  sector antennas on the same base station site, each with different direction, The base station site can serve  $N$  different cells.  $N$  is typically 3.

A **reuse pattern** of  $N/K$  denotes  $N$  sector antennas per site. Common reuse patterns are  $3/3$ ,  $3/9$  and  $3/12$ . If the total available bandwidth is  $B$ , each cell can only utilize a number of frequency channels corresponding to a bandwidth of  $B/K$ , and each base station site can use a bandwidth of  $BN/K$ .

Code division multiple access-based systems use a wider frequency band to achieve the same rate of transmission as FDMA, but this is compensated for by the ability to use a frequency reuse factor of 1. In other words, every cell uses the same frequency and the different systems are separated by codes rather than frequencies.

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### ***Movement from Cell to Cell and Handover***

The use of multiple cells means that, if the distributed transceivers are mobile and moving from place to place, they also have to change from cell to cell. The mechanism for this differs depending on the type of network and the circumstances of the change. For example, if there is an ongoing continuous communication and we don't want to interrupt it, then great care must be taken to avoid interruption. In this case there must be clear coordination between the base station and the mobile station. Typically such systems use some kind of multiple access independently in each cell, so an early stage of such a handover (handoff) is to reserve a new channel for the mobile station on the new base station which will serve it. The mobile then move from the channel on its current base station to the new channel and from that point on communication takes place. The exact details of the mobile system's move from one base station to the other vary considerably from system to system. For example, in all GSM handovers and W-CDMA inter-frequency handovers the mobile station will measure the channel it is meant to start using before moving over. Once the channel is confirmed okay, the network will command the mobile station to move to the new channel and at the sometime start bi-directional communication there, meaning there is no break in communication.

In CDMA 2000 and W-CDMA same-frequency handovers, both channels will actually be in use at the same time (this is called a soft handover or soft handoff). In IS-95 inter-frequency handovers and older analog systems such as NMT it will typically be impossible to measure the target channel directly whilst communicating. In this case other techniques have to be used such as pilot beacons in IS-95. This means that there is almost always a brief break in the communication whilst searching for the new channel followed by the risk of an unexpected return to the old channel.

If there is no ongoing communication or the communication can be interrupted, it is possible for the mobile station to spontaneously move from one cell to another and then notify the network if needed.

The effect of frequency on cell coverage means that different frequencies serve better for different uses. Low frequencies, such as 450 MHz NMT, serve very well for countryside coverage. GSM 900 (900 MHz) is a suitable solution for light urban coverage. GSM 1800 (1.8 GHz) starts to be limited by structural walls. This is a disadvantage when it comes to coverage, but it is a decided advantage when it comes to capacity. Pico cells, covering, e.g. one floor of a building, become possible, and the same frequency can be used for cells which are practically neighbors. UMTS, at 2.1 GHz is quite similar in coverage to GSM1800. At 5 GHz, 802.11a Wireless LANs already have very limited ability to penetrate walls and may be limited to a single room in some buildings. At the same time, 5 GHz can easily penetrate windows and goes through thin walls so corporate WLAN systems often give coverage to areas well beyond that which is intended. Moving beyond these ranges, network capacity generally increases (more bandwidth is available) but the coverage becomes limited to line of sight. Infra-red links have been considered for cellular network usage, but as of 2004 they remain restricted to limited point-to-point applications.

Cell service area may also vary due to interference from transmitting systems, both within and around that cell. This is true especially in CDMA based systems. The receiver requires a certain signal-to-noise ratio. As the receiver moves away from the transmitter, the power transmitted is reduced. As the interference (noise) rises above the received power from the transmitter, and the power of the transmitter cannot be increased any more, the signal becomes corrupted and eventually unusable. In CDMA-based systems, the effect of interference from other mobile transmitters in the same cell on coverage area is very marked and has a special name, *cell breathing*.

## *Cellular Telephony*

The most common example of a cellular network is a mobile phone (cell phone) network. A mobile phone is a portable telephone which receives or makes calls through a cell site (base station), or transmitting tower. Radio waves are used to transfer signals to and from the cell phone. Large geographic areas (representing the coverage range of a service provider) are split up into smaller cells to deal with line-of-sight signal loss and the large number of active phones in an area. In cities, each cell site has a range of up to approximately 1/2 mile, while in rural areas; the range is approximately 5 miles. Many times in clear open areas, a user may receive signal from a cell 25 miles away. Each cell overlaps other cell sites. All of the cell sites are connected to cellular telephone exchanges “switches”, which in turn connect to the public telephone network or another switch of the cellular company.



Figure Cell site.

As the phone user moves from one cell area to another, the switch automatically commands the handset and a cell site with a stronger signal (reported by the handset) to go to a new radio channel (frequency). When the handset responds through the new cell site, the exchange switches the connection to the new cell site.

With CDMA, multiple CDMA handsets share a specific radio channel; the signals are separated by using a pseudo noise code (PN code) specific to each phone. As the user moves from one cell to another, the handset sets up radio links with multiple cell sites (or sectors of the same site) simultaneously. This is known as “soft handoff” because, unlike with traditional cellular technology, there is no one defined point where the phone switches to the new cell.

Modern mobile phones use cells because radio frequencies are a limited, shared resource. Cell sites and handsets change frequency under computer control and use low power transmitters so that a limited number of radio frequencies can be reused by many callers with less interference. CDMA handsets, in particular, must have strict power controls to avoid interference with each other. An incidental benefit is that the batteries in the handsets need less power.

Since almost all mobile phones use cellular technology, including GSM, CDMA, and AMPS (analog), the term “cell phone” is used interchangeably with “mobile phone”; however, an exception of mobile phones not using cellular technology is satellite phones. Old systems predating the cellular principle may still be in use in places. The most notable real hold-out is

used by many amateur radio operators who maintain phone patches in their clubs' VHF repeaters.

## **Wireless Spectrum**

The electromagnetic spectrum, or simply spectrum, is the entire range of energy waves over which communicating devices transmit. The electromagnetic spectrum is assigned common groupings of energy waves, commonly called *airwaves*, that make bands of the spectrum. Over the airwaves, TV, radio, cell phones, or any wireless Internet devices communicate with a transceiver. Each kind of transceiver uses dedicated frequency ranges that are measured in Hertz (Hz); 1 Hz is one cycle per second.

An interesting property of the spectrum is that higher frequencies travel shorter distances. They take more power to transmit. With enough power, they can be life-threatening. Higher frequencies can be modulated to carry more bits per second than longer waves, but they are subject to atmospheric interference. Broadcasters generally prefer owning a lower frequency because it costs less to transmit a signal, it carries farther, and it is generally "safer". The US Federal Communications Commission (FCC) and similar agencies around the world break up the spectrum and assign bands for specific purposes. Bands are ranges of frequency with common names. Worldwide bodies such as the International Telecommunications Union (ITU) also make frequency agreements, so that devices will operate clearly worldwide. Regulating radio interference is necessary so that wireless devices do not interfere with one another. To prohibit interference from a neighboring transmitter, the FCC restricts bands of coverage.

### **GSM-900 and GSM-1800**

GSM-900 and GSM-1800 are used in most parts of the world: Europe, Middle East, and Africa and most of Asia. GSM-900 uses 890–915 MHz to send information from the Mobile Station to the Base Transceiver Station (uplink) and 935–960 MHz for the other direction (downlink), providing 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz.

Most of the GSM operators in India use the 900 MHz band. Operators like, Airtel, Idea, and some others, use 900 MHz in rural areas as well as in urban areas whereas Hutch uses 1800 MHz everywhere except in its BPL network.

### **GSM-850**

GSM-850 and GSM-1900 are used in the United States, Canada, and many other countries

in the Americas. GSM-850 is also sometimes erroneously called GSM-800. In Australia, GSM-850 is the frequency allocated to Telstra's NextG Network which was switched on in October 2006. The NextG Network is a step up from the 3G Network and is available at faster speeds Australia wide compared to the 3G Network which is limited to only major population centres. GSM-850 uses 824–849 MHz to send information from the Mobile Station to the Base Transceiver Station (uplink) and 869–894 MHz for the other direction (downlink). Channel numbers 128 to 251.

### ***Multi-band and Multi-mode Phones***

Today, most telephones support multiple frequencies used in different countries. These are

typically referred to as multi-band phones. Dual-band phones can cover GSM networks in pairs such as 900 and 1800 MHz frequencies (Europe, Asia, Australia and Brazil) or 850 and 1900 (North America). European tri-band phones typically cover the 900, 1800 and 1900 bands giving good coverage in Europe and allowing limited use in North America, while North American tri-band phones utilize 850, 1800 and 1900 for widespread North American service but limited worldwide use. A new addition has been the quad band phone, supporting all four major GSM frequency groups, allowing for widespread usage globally, including in North America.

There are also multi-mode phones which can operate on GSM systems as well as on mobile-phone systems using other technical standards. Often these phones use multiple frequency bands as well. For example, one version of the Nokia 6340i GAIT phone sold in North America can operate on GSM-1900, GSM-850 and legacy TDMA-1900, TDMA-800, and AMPS-800, making it both multi-mode and multi-band.

### **Technologies for Mobile Commerce**

**Wireless Spectrum:** The electromagnetic spectrum, or simply spectrum, is the entire range over which communicating devices transmit energy waves. The electromagnetic spectrum is assigned common groupings of energy waves, commonly called airwaves, that make bands of the spectrum. Over the airwaves, TV, radio, cell phones, or any wireless Internet devices communicate with a transceiver. Each kind of transceiver uses dedicated frequency ranges that are measured in hertz (Hz); 1 Hz is one cycle per second. An interesting property of the spectrum is that higher frequencies travel shorter distances. They take more power to transmit. With enough power, they can be life-threatening. Higher frequencies can be modulated to carry more bits per second than longer waves, but they are subject to atmospheric interference. Broadcasters generally prefer owning a lower frequency because it costs less to transmit a signal, it carries farther, and it is generally “safer”. The US Federal Communications Commission (FCC) and similar agencies around the world break up the spectrum and assign bands for specific purposes. Bands are ranges of frequency with common names. Worldwide bodies, such as the International Telecommunications Union (ITU), also make frequency agreements, so that devices will operate clearly worldwide. Regulating radio interference is necessary so that wireless devices do not interfere with one another. To prohibit interference from a neighboring transmitter, the FCC restricts bands of coverage. The owner of popular mobile cellular bands must obtain an FCC license, which guarantees the owner, exclusive use in a territory. Other parts of the spectrum go unlicensed, such as the Instrument Medical Scientific (ISM) at 2.4 GHz and Unlicensed National Information.

**Wireless Application Protocol (WAP):** Wireless Application Protocol (WAP) was invented and is driven by the WAP Forum—a group originally formed by Nokia, Ericsson, Motorola and Phone.com in 1997. WAP is an open specification that offers a standard method to access Internet-based content and services from wireless devices such as mobile phones and PDAs (Personal Digital Assistants). The WAP model is very similar to the traditional desktop Internet. The mobile device has an embedded browser, and the operator’s network that optimizes the transmission of the content software that connects to a WAP Gateway (software infrastructure residing in for the wireless network) and makes requests for information from Web servers in the normal form of a URL. The content for wireless devices can be stored on any Web server on the Internet. Content must be formatted suitably for the mobile phone’s small screen and low bandwidth/high latency connection. Content is written in a markup language called Wireless Markup Language (WML). WML script enables client side intelligence. The main benefits of WAP include: 1. Non-proprietary method to access Internet-based content and services 2. It is network independent 3. It has been adopted by 95 per cent of handset manufacturers and is being implemented by the majority of carriers 4. WAP browsers can be built on top of any operating system, including PalmOS, EPOC, Windows CE, FLEXOS, OS/9, JavaOS, etc. Origins of WAP While all the four companies that founded the WAP Forum had a hand in the currently available WAP technology set, its basis was a gift from Phone.com. The company incorporated in 1994 as Libris Inc., changed its name twice: first to Unwired Planet and then to Phone.com. By November 1995 the company hosted the first public demonstrations of its UP. Browser, a micro-web browser for cellular phones.

**WAP Step-by-Step:** Through a typical WAP transaction, so as to understand the steps involved in retrieving information from the Web server: A user requests a URL by entering it into a WAP device. (Alternately, an already running WAP program requests a URL on behalf of the user.) For the sake of argument, let us say the request is for [www.wmlserver.com/myweather.wml](http://www.wmlserver.com/myweather.wml). The WAP device encodes the request into an encrypted, compact binary format suitable for

transmission over a wireless link, and sends it to the WAP gateway. The gateway examines the message, converts it into a valid HTTP-based URL request, and forwards it to www.wmlserver.com. When wmlserver.com receives the request, it fulfils it by returning the requested document back to the gate.

**WAP Architecture:** Figure shows the Wireless Application Protocol in a series of layers. This layered format mimics the International Standards Organization (ISO) Open Systems Interconnection (OSI) network model. The OSI Model defines a layered framework for generically describing and designing protocols. The OSI Model has seven layers. WAP uses six, but the approach is similar.

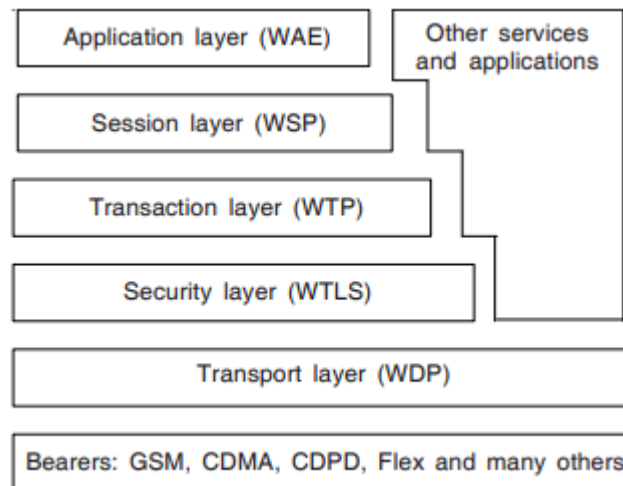


Figure The WAP architecture

The WAP stack can be configured in four different ways to provide four different types of services. Following are the four types of services offered by WAP:

1. Connectionless service: The WAP protocol stack used for this service consists of only WSP layer operating directly over WDP layer.

2. Connectionless service with security: This configuration is similar to connectionless service but provides security by having WTLS layer between WSP and WDP layers.

3. Connection oriented service: The configuration of protocol stack used for this service consists of WSP, WTP and WDP layers with ordering of the layers same as that shown in Figure 10.8. WTP and WDP layers together provide a connection oriented transport service in this configuration.

4. Connection oriented service with security: This configuration consists of all the layers of WAP stack as shown in the above figure. WAP protocols have been designed to operate transparently over data capable wireless networks supporting different data transport mechanisms (bearers), which include packet data networks, short message services and circuit-switched data networks.

Some of the bearers, which are currently supported by WAP, are GSM SMS, GSM USSD, CSD, IPv4, IPv6 and CDMA.

**WAP Application Environment (WAE):** The Wireless Application Environment layer is the one you are most likely concerned with if you are considering deploying WAP applications. It encompasses the devices, the content development languages you use (WML and WMLScript), the telephony APIs (WTA) for accessing telephony functionality from within WAE programs, and some well-defined content formats for phone book records, calendar information, and graphics.

**Wireless Session Protocol (WSP):** WSP layer provides a consistent interface to WAE for two types of session services: a connection mode, and a connectionless service. Without getting bogged down into the details, it is important to note the services this layer enables, such



as the following: Creating and releasing a connection between the client and server. Exchanging data between the client and server using a coding scheme that is much more compact than traditional HTML text. Suspending and releasing sessions between the client and server.

**Wireless Transaction Protocol (WTP):** Now we are getting a bit more technical. WTP provides transaction services to WAP. It handles acknowledgements so that you can tell if a transaction succeeded. It also provides retransmission of transactions in case they are not successfully received, and removes duplicate transactions.

WTP manages different classes of transactions for WAP devices: unreliable one-way requests, reliable one-way requests, and reliable two-way requests. A reliable request means that acknowledgements are sent from the receiving device. An unreliable request from a WAP device means that no precautions are taken to guarantee that the request for information makes it to the server. You might think that this is a ludicrous transaction type. Why would anyone request something, but not care if it was actually fulfilled? One-way paging networks work in this fashion. If you page someone and the pager is off or out of range, that person does not receive the message.

**Wireless Transport Layer Security (WTLS):** WTLS provides services to protect your data, and includes data integrity, privacy, authentication, and denial-of-service protection. Data integrity guarantees that the data sent is the same as that received. WAP privacy services guarantee that all transactions between the WAP device and the gateway are encrypted. Authentication guarantees the authenticity of the client and the application server. Finally, denial-of-service protection detects and rejects data that come in the form of unverified requests.

**Wireless Datagram Protocol (WDP):** WDP provides a consistent interface to the higher layers of the WAP architecture so that they need not concern themselves with the exact type of wireless network the application is running on. Among other capabilities, WDP provides data error correction. WDP uses port numbers to address higher layer entities as in transport layer of the Internet protocol stack. WDP can be extended to support optional error reporting mechanism by adding Wireless Control Message Protocol (WCMP) functionality, which is similar to Internet Control Message Protocol (ICMP).

**Wireless Communications Networks (Bearers):** The bearers, or wireless communications networks, are at WAP's lowest level. WAP is designed to run on a variety of networks, including Short Message Services (SMS), circuit switched connections, and packet-switched networks. Each type of network has pros and cons in terms of performance, delay, and errors.

## **Wireless Technologies**

### ***AMPS and European Analog Cellular***

Advanced Mobile Phone Service or AMPS, is the analog cellular transport used throughout North America and in other parts of the world, notably Central and South America, New Zealand, and Australia. It has the best coverage of all North American systems.

AMPS operate at 800 MHz. It is a voice-only analog transport. You can also use it with a cellular modem for circuit-switched data communications. AMPS is slowly being replaced with various competing digital networks. For the foreseeable future however, it will be the most readily available cellular network in North America.

At the same time AMPS systems were being built in the United States, a variety of incompatible analog systems were when being promoted in Europe and the rest of the world.

Although they all operated in the 900 MHz frequency range, the European systems did not work well with each other. These 900 MHz European analog systems, which we do not identify individually, are rapidly being phased out in favour of all-digital systems.

## ***TDMA***

Time Division Multiple Access (TDMA) is a digital transport that divides the frequency range allotted to it into a series of channels. Each channel is then divided into time slots. Each conversation within that channel gets a time slot; hence the term “division” in the name. TDMA has been in use for quite some time in Europe as the basis for the GSM (Global System for Mobile Communications). More recently, it is being adopted in North America, in some PCS systems. It is possible to overlay TDMA on top of an AMPS transport, converting an analog network to a hybrid analog/digital network. Some AMPS carriers in North America have been doing this to add security, capacity, and data capabilities to their older voice systems. This type of network has several names, such as Digital AMPS (D-AMPS) and North American TDMA (NA-TDMA).

## ***CDMA***

Code Division Multiple Access (CDMA) is a digital transport that has been in use by the US military since the 1940s. However, as a commercial wireless transport, it is the new kid on the block compared to TDMA and AMPS. Pioneered by US-based QUALCOMM, a CDMA transmitter assigns a unique code to each wireless connection and then broadcasts its data out on the channel simultaneously with all other connections. The receiver is able to decode each conversation by knowing the unique code assigned to each connection. CDMA is often described as a party in a room where everyone speaks a different language. If everyone speaks at approximately the same volume, you should be able to hear all the conversations. If you know the unique code (language) used by each speaker, you can hear and understand all the conversations. CDMA advocates the claim that it has some definite advantages over TDMA. First and foremost, CDMA enables simultaneous usage: approximately 10–20 times AMPS, and three times TDMA. It uses less power, giving you much better phone battery life. It is also more secure, because it hops from one frequency to another during a conversation, making it less prone to eavesdropping and phone fraud. Other benefits include fewer dropped calls and better voice quality. CDMA is being widely deployed in North America in new PCS systems, but less widely throughout the world. Like TDMA, it can also be overlaid on top of AMPS systems to create hybrid analog/digital networks.

## ***GSM***

In the late 1980s, noting the wide disparity of analog cellular systems in Europe, various European political, trade, and academic interests started collaborating on an all-digital cellular communications network. Eventually called GSM, it has gone on to be the most widely deployed digital network in the world to date. It is used by millions of people in more than 200 countries.

Using an all-digital, TDMA-based network, every GSM phone has access to a variety of data functions at speeds limited to 9600 bps (the effective throughput is typically about half that speed). These services include direct-connect Internet access (both circuit-switched and packet data) without requiring a modem, mobile fax capabilities, and short message service.

GSM started operating in the 900 MHz frequency range in all European countries. Additional networks are being deployed in the 1800 MHz frequency range. An alternate name for GSM is PCN (Personal Communication Network), the European equivalent of PCS (Personal Communication Services).

## **Different Generations in Wireless Communication**

### ***The First Generation (1G)***

The first generation of cellular phones can be traced to the early eighties, and is marked by the use of **Analog** technology. The bandwidths used then were confined to a maximum of 30 kHz. The most widely used analog cellphone standard in this generation was the **Advanced Mobile Phone System (AMPS)**. In 1983, AMPS was approved by the FCC and first used in

Chicago. AMPS is the analog cellular transport used throughout North America and other parts of the world, notably Central and South America, New Zealand, and Australia. The AMPS system uses 832 full-duplex channels, each consisting of a pair of simplex channels. AMPS uses a range of frequencies between 824 MHz and 894 MHz. Each simplex channel is 30 kHz wide, and AMPS uses Frequency Division Multiplexing (FDM) to separate the channels. The 832 channels can be divided into four categories:

- (a) *Control* (base to mobile) to manage the system,
- (b) *Paging* (base to mobile) to alert mobile users to calls for them,
- (c) *Access* (bidirectional) for call set up and channel assignment, and
- (d) *Data* (bidirectional) for voice, fax, or data.

The problem with AMPS is that in the 800 MHz band, radio waves are 40 cm long and travel in straight lines. Hence they are absorbed by trees and plants, and bounce off buildings, leading to a high level of echo and signal distortion. Hence, AMPS is slowly being replaced by various competing digital networks.

### **The Second Generation (2G)**

The first generation of mobile phones was analog; the second generation was **digital**. Just as there was no worldwide standardization during the first generation, there was none in the second either. Four 2G systems are in use now, namely, D-AMPS, GSM, CDMA, and PDC. The two of the more popular technologies: **GSM and CDMA**.

**Group System Mobile (GSM):** GSM was the first European digital standard, developed to establish cellular compatibility throughout Europe. It is the first digital cellular system to be used commercially, and its success has spread to all parts of the world, including countries in Asia, Middle East, Africa, North, Central and South America, and Australia. Over 80 GSM networks are now operational, making it the most widely deployed digital network in the world to date, used by millions of people in more than 200 countries.

**Table**  
**TECHNICAL SPECIFICATIONS OF STANDARD (GSM)**

Mobile Frequency Range	Rx: 925–960 MHz; Tx: 880–915 MHz
Multiple Access Method	TDMA/FDM
Duplex Method	FDD
Number of Channels	124 (8 users per channel)
Channel Spacing	200 kHz
Modulation	GMSK (0.3 Gaussian Filter)
Channel Bit Rate	270.833 kilobits

Communication using GSM is based on the **Time Division Multiple Access (TDMA)** digital standard. See Table 10.2. TDMA is a digital transport scheme, wherein multiple users are granted access to the same radio frequency source by limiting the subscribers' transmitted and received signals to time slots. GSM cell phones require SIM (Subscriber Identity Module) cards for their operation. The SIM is a smart card that identifies the user terminal. By inserting the SIM card into the terminal, the user can have access to all the subscribed services. Without the SIM card, the terminal is not operational. To connect to the specific service providers in these different countries, GSM users simply switch subscriber identification module (SIM) cards.

**Code Division Multiple Access (CDMA):** Over 35 countries have either commercial or trial activity ongoing in the field of CDMA. These include countries in the regions of North America, Caribbean, Africa, Latin America, Europe, and Russia. However, CDMA is most popular in the Asia Pacific region, with around 84,000,000 users. There are already 43 Wireless Local Loop

(WLL) systems in 22 countries using CDMA technology, and the number of global users of CDMA has surpassed 202 million. CDMA is an air link interface coding scheme, wherein multiple subscribers are granted access to the same radio frequency source by assigning subscribers' transmitted and received signals a spectrum-spreading code. Developed originally by QUALCOMM, CDMA is characterized by its high capacity and its small cell radius, and the fact that it employs spread spectrum technology and a special scheme. It was adopted by the Telecommunication Industry Association (TIA) in 1993. IS-95 is a standard for CDMA (Code Division Multiple Access) digital cellular.

**Table**

**TECHNICAL SPECIFICATIONS OF STANDARD CDMA OR IS-95**

Mobile Frequency Range	Rx: 869-894 MHz; Tx: 824-849 MHz
Multiple Access Method	CDMA/FDM
Duplex Method	FDD
Number of Channels	20 (798 users per channel)
Channel Spacing	1250 kHz
Modulation	QPSK/OQPSK
Channel Bit Rate	1.2288 megabits

CDMA normally operates in a band of 1.25 MHz (versus 200 kHz for GSM), but it supports many more users in that band than any of the other systems. In practice, the bandwidth available to each user is at least as good as GSM, if not better.

### ***The Third Generation (3G)***

The most recent generation of cellular radio systems for mobile telephony are referred to as third generation (3G) technologies, and generally refer to those that promise to provide very high transmission speeds and performance. The technical framework for 3G has been defined by the International Telecommunications Union (ITU) as part of its International Mobile Telecommunications 2000 (IMT-2000) program. The third generation will be the first cellular radio technology designed from the outset to support wideband data communications at the same level of its voice communications.

**CDMA 2000 and WCDMA:** The two 3G models of CDMA are Wideband CDMA (WCDMA) and CDMA 2000, and both use the direct spread spectrum type of modulation. WCDMA is a third-generation technology proposed by Ericsson, that increases data transmission rates in GSM systems using CDMA instead of TDMA. CDMA 2000 has been proposed by QUALCOMM. It is basically an extension of IS-95 and backward compatible with it.

With the onset of the third generation, an urgent need is being felt to have a common standard across the telecom spectrum, so that there are no compatibility problems and technical differences. Efforts are now being made towards this integration.

### ***The Fourth Generation Wireless (4G)***

4G is the short name for fourth-generation wireless, the stage of broadband mobile communications that will supercede the third generation (3G). Carriers that use orthogonal frequency division multiplexing (OFDM) instead of time division multiple access (TDMA) or code division multiple access (CDMA) are increasingly marketing their services as being 4G, even when their data speeds are not as fast as the International Telecommunication Union (ITU) specifies.

**TABLE**  
**SPECIFICATIONS FOR 3G AND 4G**

	<i>3G</i>	<i>4G</i>
Frequency	1.8–2.5 GHz	2–8 GHz
Bandwidth	5–20 MHz	5–20 MHz
Data Rate	Upto 2 Mbps	100 Mbps Mobile, 1 Gps Stationary
Access	W-CDMA	VSF-OFCDM and VSF-CDMA
Switching	Circuit/Packet	Packet

According to the ITU, a 4G network requires a mobile device to be able to exchange data at 100 Mbit/sec. A 3G network, on the other hand, can offer data speeds as slow as 3.84 Mbit/sec. 4G WiMax network can offer download speeds that are ten times faster than a 3G connection, with speeds that top out at 10 megabits per second. Verizon’s LTE network, meanwhile, can deliver speeds between 5 mbps and 12 mbps. Table shows basic list of the specifications of both technologies, 3G and 4G. The table compares and contrasts the two from technical standpoints.

### **Security Issues Pertaining to Cellular Technology**

With the advent of cellular services, it has become very important to look at the security aspect of these technologies. Security issues include eavesdropping or hacking into mobile conversations, denial of service, identity theft, data piracy and jamming. In general, the aim of a mobile phone security system would include:

- To make the radio path as secure as the fixed network, which implies anonymity and confidentiality to protect against eavesdropping;
- To have strong authentication to protect the operator against billing fraud;
- To prevent operators from compromising each others’ security, whether inadvertently
- Or because of competitive pressures.

On the other hand, a security process must not:

- Significantly add to the delay of the initial call set up or subsequent communication;
- Increase the bandwidth of the channel;
- Allow for increased error rates, or error propagation;
- Add excessive complexity to the rest of the system;
- Be-cost ineffective.

### **PORTALS FOR E-BUSINESS**

The term “Portal” means different things to different people. To many, a simple website aimed at employees is a portal. A portal may be defined as a point of access to and interaction with relevant information, applications and business processes, by select targeted audiences, in a highly personalized manner.

#### ***Different Types of Portals***

Portals can be broadly classified into different categories as shown in Figure.

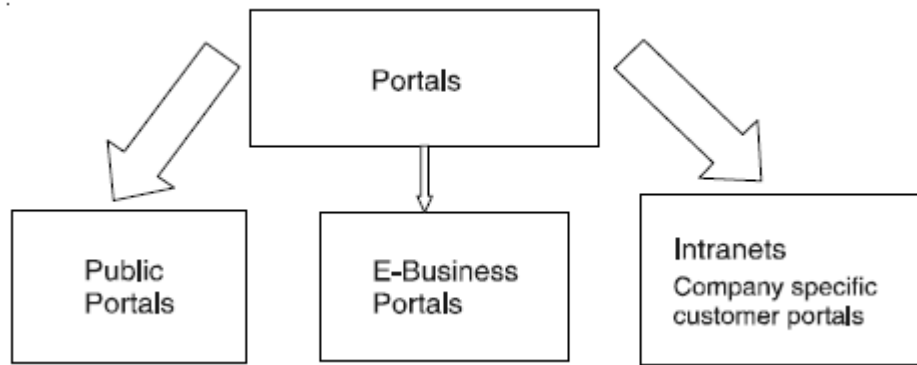


Figure Types of Portal

**1. Public portals.** Most internet users are aware of portals like Yahoo or Google. Indian Railways is another example.

**2. e-Business portals.** These portals support business transactions (i.e. buying, selling, order booking, payments, etc.) online. These can be classified into three categories:

**2(a) B2C portals.**

These portals extend the reach of the business to its customers for the purpose of ordering, billing, customer service, self-service, etc. Some of the successful B2C portals are: Amazon, eBay, Dell, etc. where people browse products, buy, order and pay online. Indian Rail site (IRCTC) is one of the successful B2C sites in India where thousands of people book train tickets and pay online daily.

**2(b) B2C.**

Those portals are quite popular for airline ticket booking, hotel booking, etc. The basic idea of such portals is to attract and keep the attention of buyers as well as to collect information about buyers that can be used to enhance and personalize the customer relationship and thus, drive future sales. More personalized relationships can result in increased customer loyalty.

**2(c) B2B portals.**

This extends the enterprise to its suppliers and partners. This helps to build better relationships between the company and its suppliers, customers and partners (via extranets) and this improved relationship can lead to increased trading partner loyalty. Generally, these portals are made by individual companies for their own suppliers and customers.

**3. Intranets.** These are normally portals aimed at customers of an organization. Employee portals, University portals, etc. are some of the examples.

**Portal Benefits**

Portals can bring benefits in a number of areas:

- Unify the enterprise.
- Give visibility for the enterprise all over the world.
- Reduce cost.
- Improve productivity.
- Reduce administration overhead.
- Increase revenue.
- Improve customer support and customer loyalty.
- Improve support for sales and marketing.

**Portal Features**

Surveys have shown that four factors constituting the elements of a good website encourage viewers to return to the site. These are:

- **High quality content.** Having the right information at the right place and right time.
- **Ease of use.** The structure of the site should not be overcomplicated or too big.
- **Quick to download.** Good sites also download quickly. Bad sites are cumbersome and slow. Visitors would not wait.

- **Frequently updated.** Good sites put up new information which is useful, relevant and timely for their audience, which takes money, time and energy to maintain.

Figure shows the customer interface elements that are needed in a website.

The Web gives the customer unlimited choice, with millions of sites to select from. In order to make the customer visit, stay and revisit your site, the site must have a unique proposition for the visitor. This is called an Internet Value Proposition (IVP).

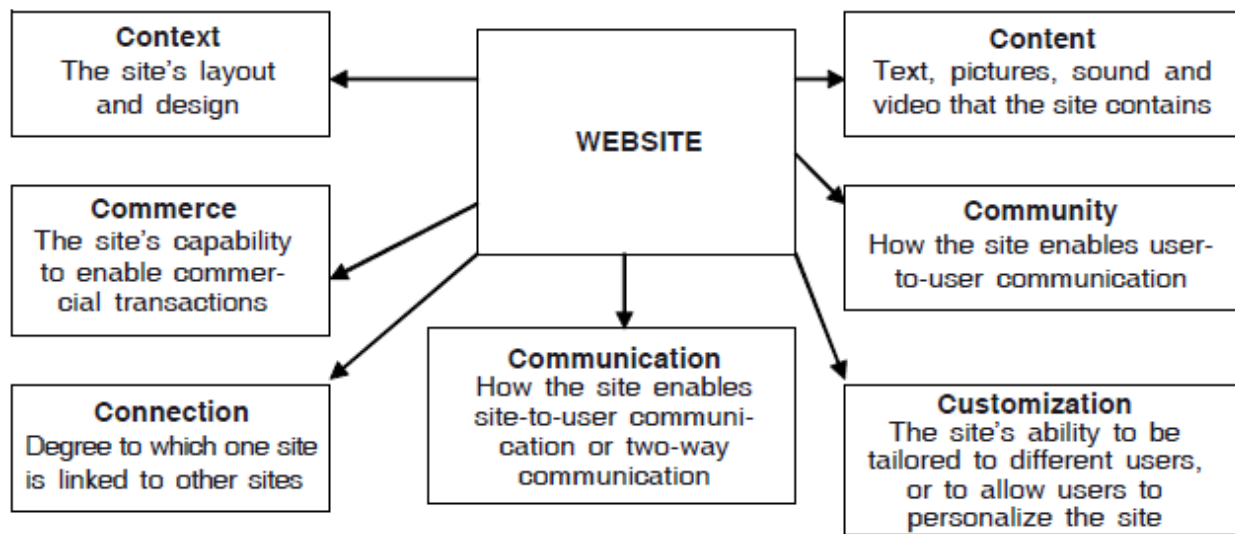


Figure Interface elements in a website

## Human Resource Management

The major goal of human resource management is to make best use of the available human resources in the organization. To attain this goal, the information necessary at various levels of management is as follows:

### (i) Strategic information

- Long range human resource requirements at different levels
- Policies on wages and incentives such as stock options
- Policies on human resource development and training
- Policies on personnel welfare and facilities.

### (ii) Tactical information

- Performance appraisal
- Demographic make-up of personnel and its impact on retirement
- Production incentives and relation to productivity
- Morale of personnel
- Absentee reduction
- Leave and overtime policies
- Personnel deployment policies.

### (iii) Operational information

- Routine assessment
- Skills inventory
- Loans/advances and recoveries
- Leave record.

Some corporate household names have more or less taken this approach: Microsoft Corp., Federal Express, Hewlett-Packard Co. and Netscape Communications Corp.

## Various HRIS Modules

Modules should reflect the way the users use the system. They should be based on the HR department structure and should be consistent with the way activities are performed within

the department. Since most HR Departments closely resemble one another, in most typical HRIS packages, the following modules are available:

**1. Basic personnel (employee information) module:**

This module contains basic employee information (name, date of birth, address, supervisor, status (part time, full time, leave), marital status, salary, job code, etc.) and is always one of the modules in an HRIS. It is the core of the system and is often the first module developed. Many of the data acquired in this module is used in other modules as well as Master Data. These data are collected as a part of the hiring process or during the first few days on the job and are updated through an employee's tenure. To ensure that the employee's personnel data have been entered correctly and are current, a turnaround document can be produced by the package. Similarly, status change documents can be used to update employee records.

**2. Applicant-tracking module:**

This module may be used to identify applicants who qualify for open jobs, to identify open jobs for which applicants can apply and to provide support for statutory compliance.

An applicant-tracking module is used to record the applicant information prior to their becoming employees. The basic employee-tracking module must include data elements not collected until hiring (e.g. starting salary). In addition it may contain data elements that will not be part of the employee's record. Some of the elements specific to this module include recruiting resource (where the applicant learnt about the job), status (e.g. passed interview) and reasons for rejection (e.g. unqualified). If recruiting and staffing are handled together there may be one applicant tracking/ recruiting module.

**3. Recruiting module:**

The recruitment module may overlap the applicant-tracking module. The recruiting module uses data elements collected during the applicant tracking process. However the recruiting module might also track recruiting costs (e.g. advertisement costs), include an analysis of recruiting source effectiveness and generate reports of recruiting trends over time.

**4. Performance management module:**

This module allows for the monitoring or tracking of employee performance and may facilitate the manager's job. Functional specialists from the HR department may also use the performance management module to evaluate the overall effectiveness of the performance appraisal system. Reports that show performance ratings by the manager, job type and department can identify trends. Are some departments too lenient? Are performance evaluation guidelines being followed? What is the relationship between pay increase, bonuses and performance ratings? For the line manager, a performance module could be used to generate lists of forthcoming performance reviews, to record key performance events and to report previously agreed upon employee goals.

**5. Career development/skills inventory module:**

As with the performance management module, the career development may be targeted to a HR sub-function and/or to line managers; it depends on the way the HR department operates. If there is a career development centre and well-defined career tracks and job skill requirements exist, then the centre to provide advice regarding career opportunities may use this module.

Alternatively, each manager may perform career-counselling duties. The manager might use work history information and job skill requirements as well as performance appraisal scores and career goals to suggest career development activities for employees. This module may overlap the human resource planning or succession-planning module. The identification of skills and career plans is critical for staff planning as well as individual career planning.

**6. Position control module:**

This module enables the organization to track positions for monitoring, budgeting, planning and control. Typically, each position will be assigned a code and position



characteristics (e.g. salary, skill requirements, level, location etc.) will be maintained. Position status can be monitored. Is a position vacant, filled, frozen, or planned? Position control reports may compare similar positions across departments, examine variances between authorized and actual staffing and/or compare previous, current and projected position budgets.

#### **7. Benefits module:**

Changes in demographics and legislative changes are making the benefits arena one of the most critical and complex areas of HR. An effective benefit module helps ensure compliance with statutory laws. The benefits module may also be used to administer programs and traditional employee benefits; to provide advice to employees about their benefit choices and to produce an annual employee benefits statement. Benefit analysis can be used to monitor benefits programs and to help control the rising costs of benefits to the organization.

#### **8. Compensation module:**

The functional specialists in the compensation group use this module. They use it to monitor compensation costs, policies and programs and to support future compensation decisions. The compensation modules can be used to help monitor compensation costs, policies and programs to support future compensation decisions. This module can be used to help monitor the executive compensation, bonus and profit sharing plans and to ensure compliance with law. In many systems the compensation module is used to help develop the salary structures.

Compensation analysts may correlate performance evaluation with pay increases and consider salary grade dispersion by departments. Compensation modules can be used to answer “what if” questions like: What if we give 10 per cent bonus? What if we switch to pay for performance system? What savings are accrued if we close a plant? Comparisons of compensations across jobs and with other companies provide information useful for facilitating internal and external pay equity.

#### **9. Payroll module:**

Sometimes considered as a part of the HRIS, payroll is treated as a module in some systems. When payroll is a part of HRIS, termed an integrated system, several tasks are facilitated. For example, to ensure compliance with the law, payroll data must be compiled. When this information is kept in separate systems, a great deal of manual effort may be required to create the necessary reports. Still, payroll’s relationship with HRIS varies with companies.

#### **10. Training module:**

This module typically includes information about the training experience of the employees, which may also be included under the career development/skills inventory module and about the training courses available to employees. In addition, training costs, enrolment figures and training evaluation data may be maintained.

A comprehensive training module would allow managers or employees to get information about course availability and appropriateness. It would also allow the training sub function to evaluate and improve course offerings. Reports and analyses could be cost effective popular courses and, based on course evaluations, could target those courses that need improvement. In addition, the recent changes in the tax law may require additional record keeping with regard to training. Some training courses may need to be considered as taxable income to the employee requiring a transfer of data from the training module to the payroll module.

#### **11. Human Resource Planning (HRP) module:**

The HRP module may provide information to help estimate future labour supply and demand by analyzing current staffing levels and skill mixes, turnover, promotions and other employee movements.

In an elaborate HRP system, strategic plans are considered to forecast sales and production growth or decline and converted to project future labour needs. By comparing projected labour needs (demands) with current and projected staffing levels (supply), surpluses or deficits can be identified. This information can be used to develop HR programs to balance labour supply and demands.

Some HR modules are designed to facilitate succession planning—a key element of HR planning. Succession plans are used to monitor the readiness of current employees to fill positions of increased responsibilities. On an individual level they are useful for targeting developmental plans to prepare employees for future responsibilities. On an organizational level, succession plans help identify critical positions for which there are no ready successors and can be used to identify patterns of weaknesses in terms of the overall skills and experience mix among current employees. Succession planning data can be maintained and summarized on the HRIS, but these data are usually very sensitive and often secretive. Extreme care must be taken to ensure the privacy of the information.

## UNIT II

### E-Commerce Enabling Technologies

#### Introduction

Electronic commerce allows businesses and consumers to purchase goods and services, and exchange information on business transactions online. The growth of the Internet as a viable business vehicle for conducting these transactions is one of the phenomena of modern information technology and has already had a significant impact on the business community, providing new methods of conducting business on a global basis (Jutla, Bodorik, Hajnal & Davis 1999).

Several technologies must be in place for electronic commerce to exist. The most obvious one is the Internet, which is revolutionizing the way commerce is performed. Beyond that system of interconnected networks, many other sophisticated software and hardware components are needed to provide the support structure: operating systems, distributed computing environments, middleware, user-interface technologies, server-side facilities and services, languages, software development methodologies, and of course the World Wide Web.

In general, requirements imposed on these basic technologies are numerous and result from the unique nature of electronic commerce, which is characterised by distributed, autonomous, and heterogeneous information sources, vast amounts of hypermedia data, a wide range of users' specialities and abilities, and the need to support a range of business transactions (Adam & Yesha 1998).

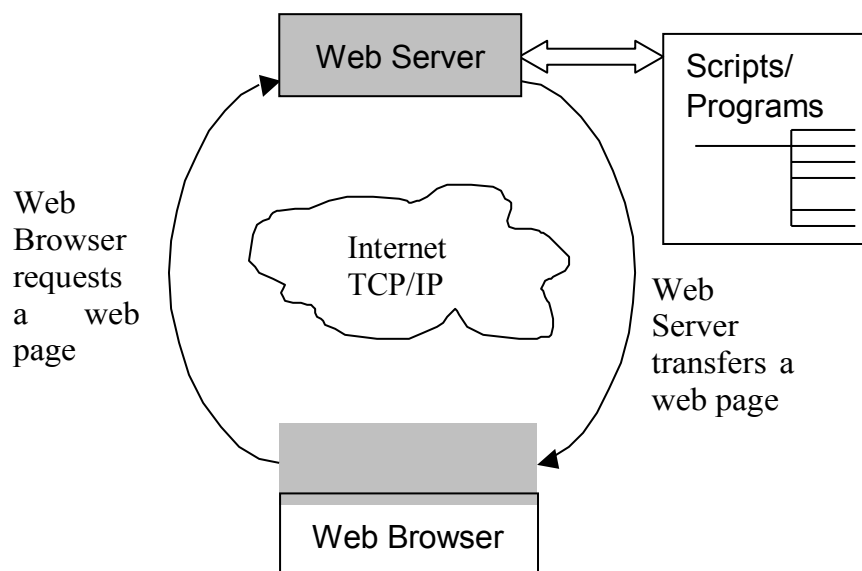
The rate of change is rapid for all elements that support electronic commerce. They evolve and change daily. The purpose of this paper is to briefly examine these various technologies and their inter-relationship, examine a conceptual model of e-commerce architecture and identify major technology research areas that will affect the growth or *nongrowth* of electronic commerce in the immediate future. Major research areas of interest are wireless technology, and autonomous agents.

#### Overview of Internet Technologies

In its simplest form the Internet exists to facilitate the reading of ordinary documents that are physically located on other people's computers. With the emergence of electronic commerce, the Internet has evolved into an infrastructure capable of supporting major commerce enabled applications. To understand this transition it is necessary to review the basic mechanics of the Internet and its major application, the World Wide Web (WWW).

### ***Static Web Content***

The set of protocols that underlie the basic operation of the Internet are the Transmission Control Protocol (TCP) and the Internet Protocol (IP). The common acronym TCP/IP refers to the two protocols. The Hypertext Transfer Protocol (HTTP) is the Internet protocol responsible for transferring and displaying Web pages. HTTP runs in the application layer of the TCP/IP model and employs a client/server architecture in which the user's web browser (the client) opens an HTTP session and sends a request for a web page to a web server (see figure 1). The format of the web page is controlled by the Hypertext Markup Language (HTML), a document production language that includes a set of tags that define the appearance and style of a document. This combination of technologies provides the fundamental mechanism for the retrieval and display of information on the Web (Schneider & Perry 2000).

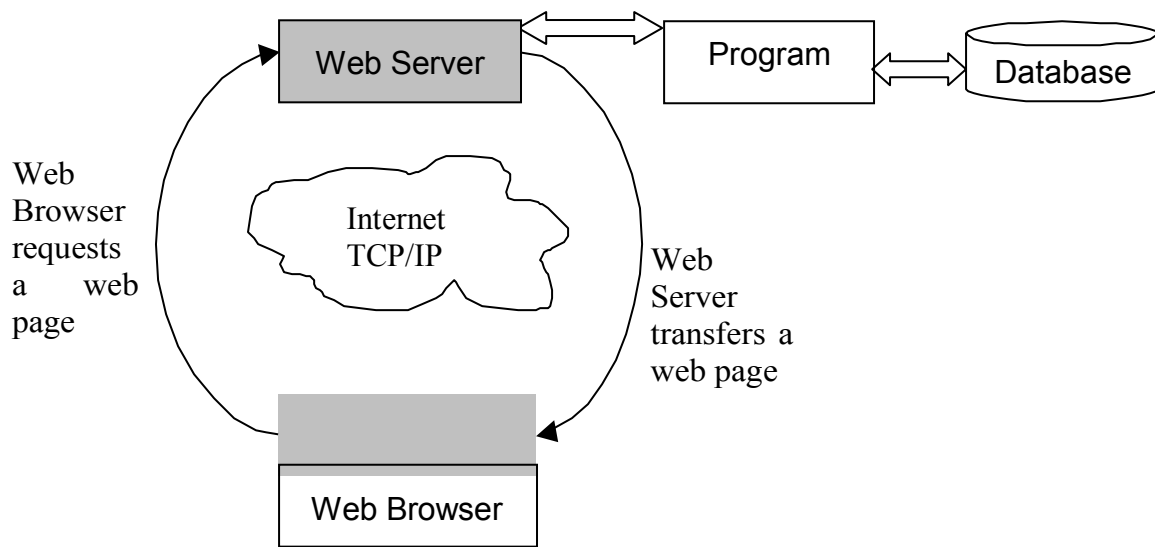


**Figure 1: Static Web Content**

### ***Dynamic Web Content***

The preceding description is concerned with static content, which is permanently stored on a web server. Static content does not have the ability to personalise the end-user's web experience. This experience is provided by server side applications which produce dynamically generated web content.

The primary technology that enabled the development of dynamic pages was the creation of HTML forms. These forms facilitate user input through a simple graphical user interface that web browsers render and process, based on specifications contained in the web pages. Forms themselves are not dynamic, but their ability to call and pass parameters to automated scripts or programs on the server make them an integral part of the solution for providing dynamic web pages (Micro Modelling Associates 1999). Typical web application architecture with dynamic content is shown in figure 2.



**Figure 2: Web application architecture with dynamic content**

The significant limitation with HTML is that it determines how a page will be displayed without specifying content and structure. The Extensible Markup Language (XML) represents an industry-wide effort to define which data are displayed on a web page (Roy & Ramanujan 2000). A non-proprietary specification, XML is a project of the World Wide Web Consortium (W3C). XML adds context and gives meaning to data and allows the creation of customised tags, called elements, for describing the documents structure. This facilitates the electronic transfer of structured business data from point to point (business to business), independent of the programming platform. It is possible using XML to integrate knowledge management systems into a myriad of e-business solutions (Usidin & Graham 1998; Ritter 1999; Shim, Pendyala, Sundaram & Gao 2000; Tiwana & Ramesh 2001).

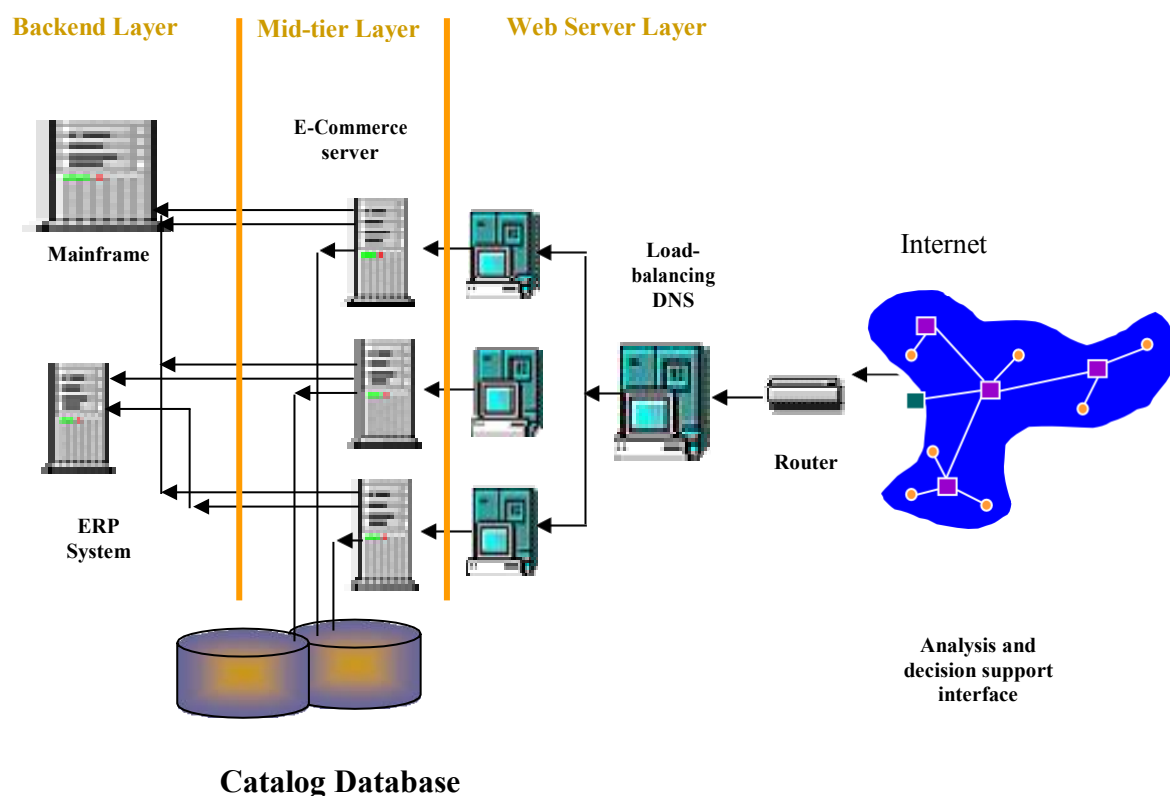
### *Web Client/Server Architecture*

The division of labour between web clients and web servers is quite distinct and is an example of a client/server architecture. This type of architecture allows the distribution of computing tasks between two or more computing resources. Essentially the client requests a service that is provided by the server. These clients can be browsers running on personal computers, network devices, personal digital assistants, cell phones, and other pervasive computing devices. The static web content system (see figure 1) is a basic two-tier system with all communications (using HTTP) occurring between the client and the web server.

In the case of dynamic web content (see figure 2), a three-tiered client/server architecture is used (see figure 3), consisting of a thin client layer (often, but not always a web browser), an application server layer and a data layer which holds the databases and data stores for the application. Interactions between the client and the server operate the same way as they do in a two-tier system. The third tier provides comprehensive data services, including database operations, enterprise resource planning software services, and any other services needed to support a robust electronic commerce server (Schneider & Perry 2000). This type of architecture holds many advantages over simple client/server architecture, including the easy deployment and maintenance of the thin client layer and the inherent scalability of the middle and data layers.

The application servers in the mid-tier are responsible for:

- **Process management**  
Running different application modules in different processes, passing data between them and distributing them across physical processors and machines. Good process management is key to a high performance, high throughput application.
- **Access and security**  
Authenticating users (or connecting processes) and customising the interface to application services according to the user's profile.
- **Transaction management**  
Grouping data updates in transactions and ensuring that they are properly committed to the data layer.
- **Session management**  
Web browsers and servers are essentially stateless, but if for example you want the user's shopping trolley to keep filling up as they select items to buy, then the state of the user session has to be maintained between mouse clicks in the browser.
- **Application Logic**  
The processing and logic that makes up the core of the application is executed in the mid-tier, isolated from the thin client and the data access layers.

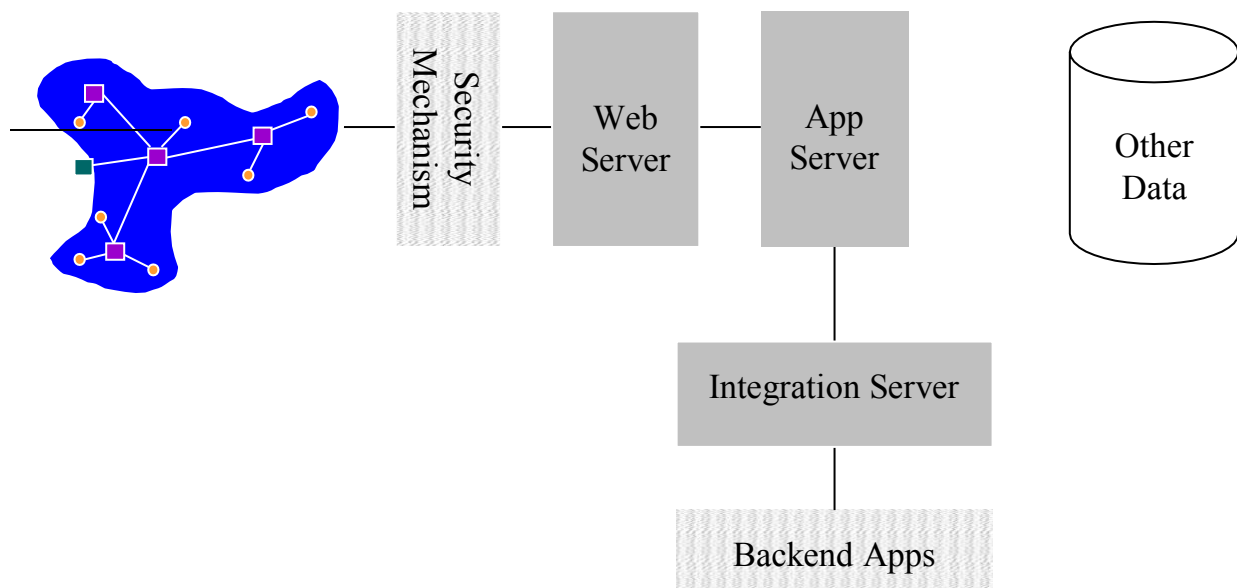


**Figure 3: Three-tiered architecture.**  
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Australia © 2000

The three-tiered model is being replaced with a multi-tiered model, where the third tier is modified to consist of an integration server and any number of specific back-end applications (see figure 4). This change results in a business web site with improved scalability and

robustness. The impetus behind multi-tiered architectures is the same one that popularised client-server development in the first place: the need to put specialized processing and applications within an appropriate computing and network environment. The major disadvantage associated with this type of system is the higher level of complexity, which requires a well-disciplined development and testing environment for effective implementation.

A multi-tiered, as opposed to a three-tiered architecture, splits the application layer into any number of separate tiers, which may be just a logical separation or may reflect a physical separation between processors or machines. Multi-tiered architectures are important for web-based applications generally, but even more so for applications involving XML. In XML applications, the XML processing can take place in the application server layers, rather than in the desktop browser.



**Figure 4: Multi-tiered architecture.**  
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### Conceptual Model of Electronic Commerce Technology Architecture

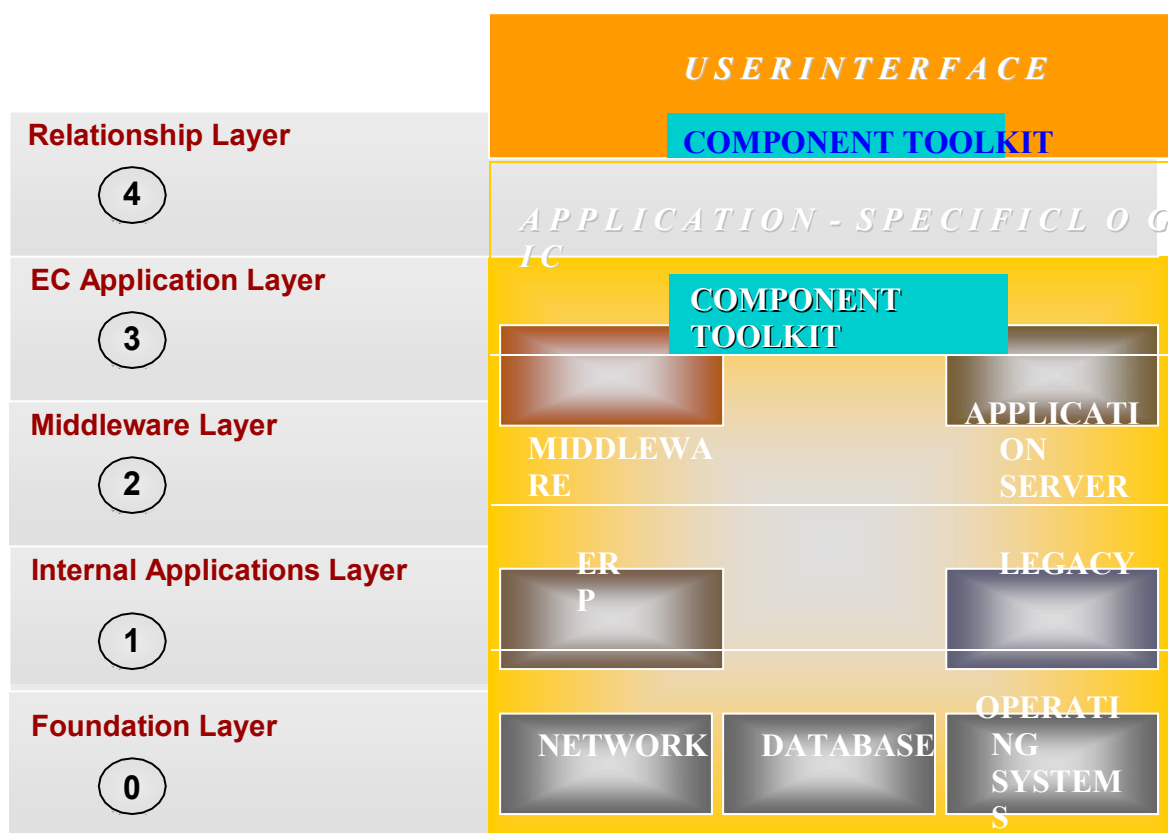
Electronic commerce architectures use web technologies to implement mission-critical e-business applications. These architectures use small-footprint clients to access services provided by resource managers that can be accessed across a strong and reliable network. The e-business architecture is more than just a collection of technologies and products. It consists of several architectural models and will adapt to changing business and technology requirements.

Koushik and Joodi (2000) identify the following key elements that influence e-business architecture:

- The organisation's overall business strategies;

- A range of business drivers;
- IT environment;
- IT vision, objectives and strategies;
- Organisational constraints; and
- New and emerging technologies.

The process of developing an effective strategy for implementing an operational system requires a clear understanding of both the systems requirements and constraints, and must be based on a conceptual model that provides a layout of the basic architectural components that deliver the services required to support e-business applications. The EC Technology Architecture, a five layered application model, developed by Techknowledge Australia provides such a basis (see figure 5).



**Figure 5: EC Technology Architecture™**  
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### *Layer 0 – Foundation Layer*

This forms the basic platform on which the e-business operational system is built. The foundation layer includes all of the infrastructure hardware and its associated hardware management equipment. Infrastructure hardware consists of, at least, the payments systems hardware (eg credit card reader), security hardware (eg proxy servers) and networking hardware (eg routers).

A range of software is also associated with this layer including the infrastructure software for the payment system and security system, operating systems software and any associated database management software.

### ***Layer 1 – Internal Applications Layer***

Provides an access interface to the various applications systems (eg data warehousing system, legacy systems requiring data translation) required to provide functionality to the e-business system. These interfaces often play the role of proxy for individual transactions within back-end legacy systems and shield other components from the proprietary technologies used by these systems.

Included in this level is the enterprise resource planing (ERP) applications used to provide management of the operational business processes (eg product planning, purchasing, inventory management).

### ***Layer 2 – Middleware Layer***

Middleware is a framework for building (typically distributed) application systems. Middleware frameworks provide common services, such as network communication primitives (eg RPC and distributed objects) naming and locating services and security support. Middleware is meant to abstract away the underlying environment from applications and present a homogeneous interface to application programmers and users (Milojicic 1999). Examples of middleware frameworks include OSF DCE, Microsoft DCOM, Java RMI, and OMG CORBA.

### ***Layer 3 – EC Application Layer***

Based at this level is the online e-business application. Software is required for two distinct purposes, the commerce server and the web server. The web server provides online access to the commerce server. The commerce server will require a range of software to implement and manage the actual storefront.

### ***Layer 4 – Relationship Layer***

The presentation mechanism such as a browser based front end to accept and process user input data. This layer interacts with visual components to handle presentation related tasks and with non-visual components to handle the interface with back-end applications.

## **Future Trends in Electronic Commerce Technology**

Electronic commerce applications are by definition dynamic and must be prepared to react and incorporate (if appropriate) new and emerging technologies. Mobile electronic commerce and the use of agent software are two such technologies.

### ***Mobile Electronic Commerce***

According to the Gartner Group, by 2004 at least 40% of business-to-consumer electronic commerce will come from smart phones using the wireless application protocol (WAP) (Haskin 1999). WAP focuses on applications tailored to the capabilities of cell phones and the needs of the user. WAP uses the Wireless Markup Language (WML) to display text and icons on the telephones screen (Goodman 2000). WAP thus creates an information web for cellular phones, distinct from the PC-centric web. WAP functions well in the low-data-rate low-power environment of the present cellular systems.

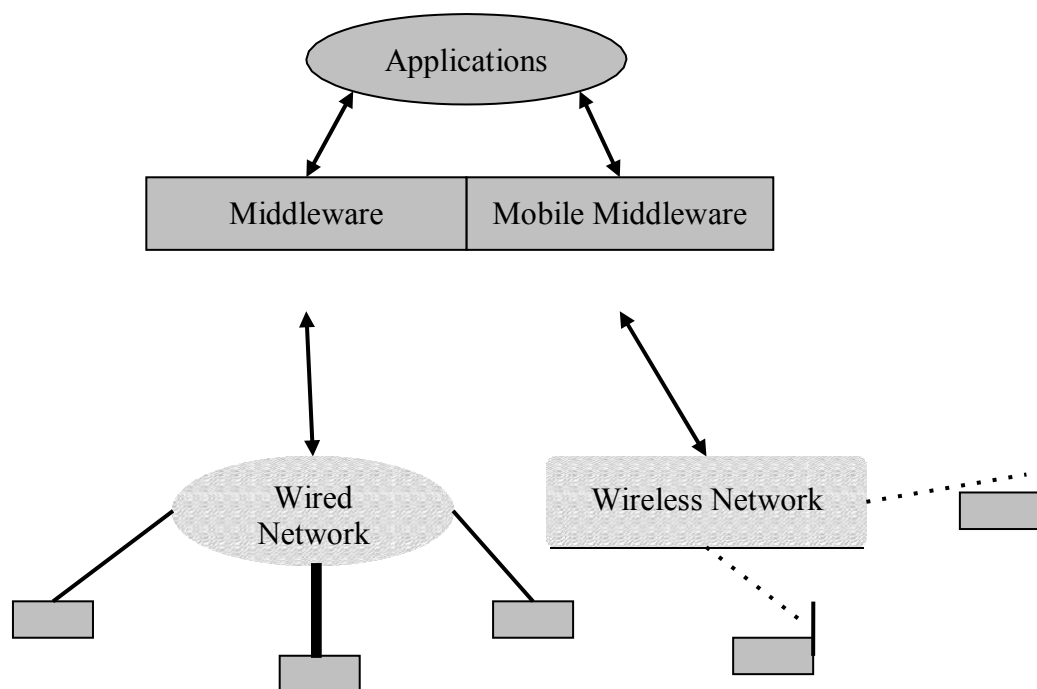


The major obstacle for the future development of WAP is its operating environment, which is under the full commercial control of the various cellular operating companies, and as such application development is limited. Varshney, Vetter and Kalakota (2000) identified four groups of potential mobile applications:

- **Mobile inventory management** that tracks the location of goods, services and possibly even people;
- **Product location** which allows consumers to find an item with certain specifications in a particular area;
- **Proactive service management** which collects information on user needs then signal vendors to provide services; and
- **Mobile auctions, entertainment and other services.**

Mobile computing is now seeing the development of mobile devices with sufficient memory, an appropriate display and communication functionalities. Several devices are now available including the PalmPilot, a personal digital assistant (PDA) with a wireless modem and the Nokia Communicator, a mobile phone with computing functions.

Electronic commerce applications make use of mobile middleware as an enabling layer of software (see figure 6) to connect with different mobile networks and operating systems without introducing mobility awareness (Varshney, Vetter & Kalakota 2000). ExpressQ from Nettech ([www.nettechRf.com](http://www.nettechRf.com)) is a mobile messaging middleware product.



**Figure 6: Mobile middleware for application and content adaption**

Recent evidence from both Japan and Scandinavia would indicate that the general public are taking advantage of digitally networked portable devices (Feldman 2000).

## **Agents**

Griss and Pour (2001) describe an agent as “a proactive software component that interacts with its environment and other agents as a surrogate for its user, and reacts to significant changes in the environment”. A software component (program) is considered to be an agent if it exhibits a combination or several of the following characteristics: autonomous, adaptable, knowledgeable, mobile, collaborative and persistent.

Examples of agents currently in use include:

- **shopbots and pricebots**, which monitor product availability and price, then negotiate and complete sales of goods and stocks to optimise business-to-business and business-to-consumer interactions (Huhns 2000);
- **personal agents** which interact directly with a user, presenting some personality or character, monitoring and adapting to the users ‘s activities (eg Microsoft Office Assistant) (Griss & Pour 2001); and
- **mobile agents** sent to visit remote sites and collect information (eg network management agents, Internet spiders) (Griss & Pour 2001).

### Internet Service Provider (ISP)

The US Government’s 1991 decision to end subsidizing the NSFNET backbone beginning in 1995, sparked a massive restructuring aimed at shaping the Internet into a faster and a more productive tool for the business. The InterNIC compilation of public access dial-up providers listed 80 vendors in December 1993. A year later, the list cited more than 1500 providers. Figure 3.12 illustrates how the providers work.

Commercialization of the Internet has taken place in two spheres: commercialization of users and commercialization of ISPs. At first, companies that accessed the Internet through the existing non-profit mid-level networks were offered a lower level of membership than the academic members. As restrictions were dismantled, commercial use of the Internet became more common. As soon as the commercialization was announced, ISPs came into existence to provide paid access to the various Internet applications and resources for both companies and individuals. Established telecommunications, cable and commercial online companies began to offer this service.

## **e-Marketing**

### **Traditional Marketing**

Marketing is a method of attracting potential customers to buy your [products](#) and services. The process of conventional marketing consists of various processes such as [planning](#), researching, promoting, and selling products. Traditionally, marketing has been part of the business since ages and every year the expenditure of companies on marketing has been increasing by leap and bounds.

Increasing competition in the [market](#) has increased the [importance of marketing](#) as ever before. Companies opt for various methods of marketing to promote their products to get an edge over their competitors. These methods can broadly be categorized into two main categories such as digital marketing and traditional marketing.

The term digital marketing is referred to all the methods of marketing which make the use of digital platforms to promote products and traditional marketing term is referred to all marketing methods which are used to promote products using traditional platforms. [Click here](#) to learn about the difference between digital marketing and traditional marketing.

In this article, you will learn about what is traditional marketing, why it is called traditional marketing, different traditional platforms used for promoting products, advantages, and disadvantages of traditional marketing.

### ***Why marketer use traditional marketing?***

There are several reasons why marketers use traditional media marketing. let us learn about them one by one.

#### 1) The ability to reach a wide audience

Digital marketing and social marketing is a suitable choice for promoting products to millennials or the [people](#) who use [technology](#) frequently. But traditional marketing has the ability to reach people who live in rural areas and does not use digital media frequently.

For example, elder people are not tech-savvy and they still rely on television, radio, and newspapers to learn about the happenings in the world. Therefore, these platforms are the best marketing medium to make such people aware of your products.

#### 2) Large eyeballs share

The second reason for using traditional media marketing is these platforms are placed in public places and people view advertisement unintentionally. For example, you will see television installed in all waiting rooms whether it is a waiting room at a railway station or it is a waiting room in a hospital.

In addition to this, companies advertise their products on life-size billboards on the sides of roads, so that products can be promoted to people even when they are traveling or driving home.

#### 3) Caters to people with special needs

Traditional marketing is a good style for promoting products to people with special [needs](#). For example, you can promote a [product](#) to blind people by promoting promotional ads on radio and in addition to this, such people can be targeted by meeting them face to face and making them aware of the benefits of the products that you want to sell to them.

### **Identifying Web Presence Goals**

When a business creates a physical space in which to conduct its activities, its managers focus on very specific objectives. Few of these objectives are image-driven. An ambitious businessman must find a location that will be convenient for customers to access, with sufficient floor space features to allow the selling activity to occur, and they must take into consideration, the room space to store inventory and provide working space for employees. An added feature is the interior decoration which could enhance the business ambience, and at the same time attract customers. The success of a business relies on fulfilling these objectives in a tangible, physical location. On the Web, businesses and other organizations have the advantage of creating a space of their own choice, design and other embellishments, good enough to make a distinctive presence. A website can have images, and can activate them by animation, thus making the customers feel and enjoy its presence. It can serve as a sales brochure, a product showroom, a financial report, an employment ad, or a customer contact point. Each entity that establishes a Web presence should decide which tasks the website must accomplish, and which tasks are most important and need to be included for promoting their business.

## Achieving Web Presence Goals

An effective site is the one that creates an attractive presence that meets the objectives of the business or the organization. These objectives include: 1. Attracting visitors to the website 2. Making the site interesting enough so that visitors stay and explore 3. Convincing visitors to follow the site's links to obtain information 4. Creating an impression consistent with the organization's desired image 5. Building a trusting relationship with visitors 6. Reinforcing positive images that the visitor might already have about the organization 7. Encouraging visitors to return to the site.

## The Uniqueness of the Web

When firms first started creating websites in the mid 1990s, they often built simple sites that conveyed basic information about their businesses. Few firms conducted any market research to see what kinds of things potential visitors might want to obtain from these websites, and even fewer considered what business infrastructure improvement would be needed to keep the site alive. For example, few firms had e-mail address links on their sites. Those firms that did include an e-mail link, often understaffed the department responsible for answering visitors' e-mail messages. Thus, many of the visitors' e-mails remained unanswered. The failure to understand how the Web is different from other presence-building media is one reason why so many businesses fail to achieve their Web objectives. The scenario has changed for the better in the recent times with the prominence of Internet technologies over others

## Online Marketing

### *What Does Online Marketing Mean?*

Online marketing is a set of tools and methodologies used for promoting products and services through the internet. Online marketing includes a wider range of marketing elements than traditional business marketing due to the extra channels and marketing mechanisms available on the internet.

Online marketing can deliver benefits such as:

- Growth in potential
- Reduced expenses
- Elegant communications
- Better control
- Improved customer service
- Competitive advantage

Online marketing is also known as internet marketing, web marketing, or digital marketing. It includes several branches such as social media marketing (SMM), search engine optimization (SEO), pay-per-click advertising (PPC), and search engine marketing (SEM).

Online marketing combines the internet's creative and technical tools, including design, development, sales and advertising, while focusing on the following primary business models:

- E-commerce.
- Lead-based websites.
- Affiliate marketing.

- Local search.
- Social media.

Online marketing has several advantages, including:

#### Low costs

Large audiences are reachable at a fraction of traditional advertising budgets, allowing businesses to create appealing consumer ads. Many advertising platforms also allow for scalable ads with different levels of reach that are proportioned to the advertising budget. Rather than committing a large amount of money to advertising, smaller companies can spend a small amount and still increase their reach.

#### Flexibility and convenience

Consumers may research and purchase products and services at their leisure. Business blogs can be used to let consumers and prospects conduct their own research on the business's products as well as provide their feedback and reviews

#### Analytics

Efficient statistical results are facilitated without extra costs. Many advertising tools include their own analytics platforms where all data can be neatly organized and observed. This facilitates business intelligence efforts and data-driven decision making.

#### Multiple options

Advertising tools include pay-per-click advertising, email marketing, interstitial ads and banners, social media advertising, and local search integration (like Google Maps). Digital marketing companies usually offer their services across various online advertising channels by tuning their offer to the individual client's needs.

#### Demographic targeting

Consumers can be demographically targeted much more effectively in an online rather than an offline process. Coupled with the increased analytics potential explained above, organizations can improve their targeting over time, have a clearer understanding of their customer base, and create specific offers that are shown only to certain demographics.

The main limitation of online marketing is the lack of tangibility, which means that consumers are unable to try out, or try on items they might wish to purchase. Generous return policies are the main way to circumvent such buyer apprehension.

Online marketing has outsold traditional advertising in recent years and continues to be a high-growth industry.

### **E-advertising**

Advertising is a \$500 billion worldwide industry that, until now, has been mainly a one-way street, with consumers passively absorbing advertising messages. Advertisers hoped that potential buyers would remember their slogan or jingle long enough to make a trip to the store and purchase the product.

This has changed with the advent of interactivity. The new concept of 'interactivity' has overpowered the traditional concept of advertising, by putting the buyer in the driver's seat. Interactivity allows consumers to increase their control over the buying process. We are all deluged with an overflow of data. We long for a sense of mastery over the information that

washes over us. Given the opportunity, we will be more selective about the kind of information we choose to receive. Interactivity gives us that option. Thus, the audience is not captive any more, and the marketers would have to work harder than before to entice them. The marketing efforts will have to be information-rich and user-friendly.

Web-based advertising has become an important part of a company's media mix. Numerous companies are committing large advertising budgets to the Internet.

Following are the reasons for the growing importance of e-advertisements:

1. People increasingly prefer to surf the Internet rather than watch TV.
2. The target audience goes to the advertisement, rather than the other way around.
3. Development of business search engines by companies such as C2B Technologies, which aim to link buyers with online bargain sites for over a million products for comparison-shopping purposes.
4. Yahoo! has a business unit which offers contests and prizes to online participants, which drive players to the websites of different clients. To play, participants must provide certain data, including their preference of advertisements and tastes, which presents a valuable database as to customer preferences.
5. The growth of e-business. Dell Computers, for example, estimates that by 2005, 85 per cent of its sales will be through the Internet.
6. The Internet is not geographically restricted. Amazon.com sells 20 per cent of its books to foreign destinations, whereas a physical book store serves an area of only a few square miles.<sup>2</sup>

## **Various Means of Advertising**

### **E-mail**

The advantages of e-mail are its low cost and its ability to reach a wide variety of targeted audiences. Most companies develop a customer database, to whom they send e-mails. E-mail is emerging as a marketing channel that affords cost-effective implementation and better, quicker response rates than other advertising channels. Marketers should be racing to embrace the medium. Sometimes, it may also happen that when every marketer starts inundating prospects and customers with e-mail, the consumers may react negatively.

### **Banners**

They make up 50 per cent of online ad revenues, but their effectiveness may be waning. When IBM kicked off banner ads in 1994 on tech site Hotwire, 30 per cent of the people who saw the ads clicked on them. Now the overall click-through rate for banner ads has dropped to a measly 0.3 per cent. But it is the most commonly used form of advertising on the Internet. As you surf your way through the information superhighway, banners are everywhere. The smaller the file

size, the quicker it gets loaded. Typically, a banner contains a short text or a graphical message to promote a product. A major advantage of using banners is the ability to customize them to the target audience. One can decide which market segment to focus on.

*Where does the use of Electronic advertising fit into the process of establishing e-commerce marketing?*

There are three primary steps that fit into the process of establishing e-commerce marketing;

- 1) Complete the digital content
- 2) Place the Electronic Advertising
- 3) Monitor your results

### **How does the use of Electronic advertising impact on e-commerce marketing?**

One precaution that should be taken regarding Electronic Advertising is that if it is done poorly it can severely damage the image of the company. Once something is published on the Internet it is near impossible to remove it therefore extra care must be taken to ensure that the advertisements are consistently monitored and controlled.

### **What specific terms are used when using Electronic advertising?**

Cookie: A cookie is a file on someone's computer that records specific information from their search history to help promote relevant ad rotation.

Web banner: A type of advertising that is intended to attract potential customers by promoting the company's website by an ad-server. It typically rolls across the screen or flashes.

Pop ups: A type of ad that 'pops up' usually in a small box on the user's screen that promotes a company's business.

### **E-Branding**

In today's net-savvy world, e-branding is an essential requirement for survival amongst the competition. Your brand is what your product is and what it stands for including your core values, competencies, attitudes, vision, mission, personality and appearance. Companies, as well as individuals, understand the importance of e-Branding, and the untapped potential of social networks which are quite essential for growth.

**Impeccable Advertising Asset** :- As our entire society is transferred to digital bits, your eBrand becomes a digital asset and an avatar for being a part of a great advertising new world

**Acknowledgment**: – E-Branding provides you a tag of Knowledgeable and technologically savvy company which marches ahead with the demand of the hour.

**Renounce and Reputation**:-E-Branding is growing exponentially, and both individuals and corporations who underestimate the power of their online reputation will suffer from arriving late to a venue that is already crowded with established brands. Thus, if you capture the golden opportunity of E-branding you will not only gain you renounce in the market and reputation amongst the customers.

**Familiarity and Loyalty:** – The Internet is transforming customer buying behavior, with major consequences for how the new breed of consumer develops familiarity with, and ultimately loyalty to, brand.

**Successful Marketing Strategy** :-E-branding is just recomposing marketeering traffic, build brand equity and capture customer loyalty in the Internet age with one of the most economical and specific audience-targeted way .

**Expand Customer Relationship:** – e brand will not only advertise or popularize your product or service but it will also expand your customer relationship. With the advantage of communicating to your customers you can also build a strong relationship and bond between them which would surely lure and attract them to your products and services.

**Deepen Market Penetration:** – your own e brand will bring you a deeper market penetration that is you would get much inside the roots of the marketing and advertising your product and ultimately achieving your goals of an established market standing.

**Lead Generation** :- In this 21st century it's the need of the hour for your company to be in the virtual field that is to have a e brand so that you are also the part of the grand global internet community where you can easily and feasibly showcase your product and can capture the tech savvy generation .

E-branding is one of the most integral parts of a marketing campaign for any organization. A well designed informative website is the only medium through which an organization can reach out to the world in a short span of time and give the potential customers a glimpse of the business an organization is into.

### UNIT III

#### E-Security

Security is an essential part of any transaction that takes place over the internet. Customers will lose his/her faith in e-business if its security is compromised. Following are the essential requirements for safe e-payments/transactions –

- **Confidentiality** – Information should not be accessible to an unauthorized person. It should not be intercepted during the transmission.
- **Integrity** – Information should not be altered during its transmission over the network.
- **Availability** – Information should be available wherever and whenever required within a time limit specified.
- **Authenticity** – There should be a mechanism to authenticate a user before giving him/her an access to the required information.
- **Non-Repudiability** – It is the protection against the denial of order or denial of payment. Once a sender sends a message, the sender should not be able to deny sending the message. Similarly, the recipient of message should not be able to deny the receipt.
- **Encryption** – Information should be encrypted and decrypted only by an authorized user.
- **Auditability** – Data should be recorded in such a way that it can be audited for integrity requirements.



## Measures to ensure Security

Major security measures are following –

- **Encryption** – It is a very effective and practical way to safeguard the data being transmitted over the network. Sender of the information encrypts the data using a secret code and only the specified receiver can decrypt the data using the same or a different secret code.
- **Digital Signature** – Digital signature ensures the authenticity of the information. A digital signature is an e-signature authenticated through encryption and password.
- **Security Certificates** – Security certificate is a unique digital id used to verify the identity of an individual website or user.

## Security Protocols in Internet

We will discuss here some of the popular protocols used over the internet to ensure secured online transactions.

### Secure Socket Layer (SSL)

It is the most commonly used protocol and is widely used across the industry. It meets following security requirements –

- Authentication
- Encryption
- Integrity
- Non-reputability

"https://" is to be used for HTTP urls with SSL, where as "http://" is to be used for HTTP urls without SSL.

### Secure Hypertext Transfer Protocol (SHTTP)

SHTTP extends the HTTP internet protocol with public key encryption, authentication, and digital signature over the internet. Secure HTTP supports multiple security mechanism, providing security to the end-users. SHTTP works by negotiating encryption scheme types used between the client and the server.

### Secure Electronic Transaction

It is a secure protocol developed by MasterCard and Visa in collaboration. Theoretically, it is the best security protocol. It has the following components –

- **Card Holder's Digital Wallet Software** – Digital Wallet allows the card holder to make secure purchases online via point and click interface.
- **Merchant Software** – This software helps merchants to communicate with potential customers and financial institutions in a secure manner.
- **Payment Gateway Server Software** – Payment gateway provides automatic and standard payment process. It supports the process for merchant's certificate request.

- **Certificate Authority Software** – This software is used by financial institutions to issue digital certificates to card holders and merchants, and to enable them to register their account agreements for secure electronic commerce.

### *E-mail Hacking*

Email hacking can be done in any of the following ways:

- Spam
- Virus
- Phishing

### **Spam**

E-mail spamming is an act of sending **Unsolicited Bulk E-mails (UBE)** which one has not asked for. Email spams are the junk mails sent by commercial companies as an advertisement of their products and services.

### **Virus**

Some emails may incorporate with files containing malicious script which when run on your computer may lead to destroy your important data.

### **Phishing**

Email phishing is an activity of sending emails to a user claiming to be a legitimate enterprise. Its main purpose is to steal sensitive information such as usernames, passwords, and credit card details.

Such emails contains link to websites that are infected with malware and direct the user to enter details at a fake website whose look and feels are same to legitimate one.

### ***E-mail Spamming and Junk Mails***

Email spamming is an act of sending Unsolicited Bulk E-mails (UBE) which one has not asked for. Email spams are the junk mails sent by commercial companies as an advertisement of their products and services.

Spams may cause the following problems:

- It floods your e-mail account with unwanted e-mails, which may result in loss of important e-mails if inbox is full.
- Time and energy is wasted in reviewing and deleting junk emails or spams.
- It consumes the bandwidth that slows the speed with which mails are delivered.
- Some unsolicited email may contain virus that can cause harm to your computer.

### **Blocking Spams**

Following ways will help you to reduce spams:

- While posting letters to newsgroups or mailing list, use a separate e-mail address than the one you used for your personal e-mails.
- Don't give your email address on the websites as it can easily be spammed.
- Avoid replying to emails which you have received from unknown persons.
- Never buy anything in response to a spam that advertises a product.

### ***E-mail Cleanup and Archiving***

In order to have light weighted Inbox, it's good to archive your inbox from time to time. Here I will discuss the steps to clean up and archive your Outlook inbox.

- Select **File** tab on the mail pane.
- Select **Cleanup Tools** button on account information screen.
- Select **Archive** from cleanup tools drop down menu.
- Select **Archive this folder and all subfolders** option and then click on the folder that you want to archive. Select the date from the **Archive items older than:** list. Click **Browse** to create new .pst file name and location. Click **OK**.

## **LEGAL AND ETHICAL ISSUES**

### **Cyberstalking**

Cyberstalking is a prime example of the use of computers and the Internet to facilitate a traditional, offline crime. Cyberstalking generally refers to the use of the Internet, e-mail, or other electronic communications devices to “stalk” another person—where “stalking” in the traditional sense means to engage in repeated harassing or threatening behaviour (such as following a person, appearing at a person's home or workplace, making harassing telephone calls, or leaving written messages or objects) that places the victim in reasonable fear of death or bodily injury. The Internet provides new avenues for would-be stalkers to pursue their victims.

**EXAMPLE 1:** In April 1999, a 50 year old former security guard pleaded guilty (under California law) to one count of stalking and three counts of solicitation of sexual assault for using the Internet to solicit the rape of a woman who rejected his romantic advances. The defendant impersonated the victim in various Internet chat rooms and online bulletin boards, where he posted, along with her telephone number and address, messages that she fantasized about being raped. On at least six occasions, sometimes in the middle of the night, men knocked on the victim's door saying they wanted to rape her. The defendant faces up to six years in prison.

**EXAMPLE 2:** A person was arrested by the New Delhi Police in India's first case of cyberstalking. He was stalking a lady by illegally chatting on the Web site MIRC using her name. He used obscene and obnoxious language, and distributed her residence telephone number, inviting people to chat with her on the phone. As a result of which, she kept getting obscene calls from everywhere, and people promptly talked dirty with her. In a state of shock, she called the Delhi police and reported the matter. For once, the police department did not waste time swinging into action, and a case has been registered under Section 509 of the Indian Penal Code for outraging the modesty of that lady.

**EXAMPLE 3:** A 23 year old Telecom engineer from Mumbai who posed as the famous hacker Dr Neuker and made several attempts to hack the Mumbai police Cyber Cell website.

**EXAMPLE 4:** A case which was registered under Section 65 of the IT Act, related to theft of computer source code. An engineer was sent by his employer to America to develop a software program for the company. He instead of working for the company, allegedly sold the source code of the programme to an American client of his employer person to which his employer suffered loss.

According to the U.S. federal law, known as the Anti-Cybersquatting Consumer Protection Act, cybersquatting is registering, trafficking in, or using a domain name with bad faith—intent to profit from the goodwill of a trademark belonging to someone else. The terms

derive from *squatting*, the practice of inhabiting someone else's property without their permission.

### **Privacy is at Risk in the Internet Age**

Privacy is not just about hiding things; it is about self-possession, autonomy, and integrity. But this right of privacy does not mean that it is the right of people to close their doors and pull down their window shades, perhaps because they want to engage in some sort of illicit or illegal activity. It is the right of people to control what details about their lives stay inside their own houses and what leaks to the outside.

To understand privacy, we need to rethink what privacy really means today:

- It is not about the man who wants to watch pornography in complete anonymity over the Internet. It is about the NGO who is afraid to use the Internet to organize their community against a proposed toxic dump—afraid because the dump's investors are sure to dig through their past if they becomes too much of a nuisance.
- It is not about people speeding on the nation's highways who get automatically generated tickets mailed to them thanks to a computerized speed trap. It is about lovers who will take less joy in walking around city streets or visiting stores because they know they are being photographed by surveillance cameras everywhere they step.
- It is not about the searches, metal detectors, and inquisitions that have become a routine part of our daily lives at airports. It is about a society that views law-abiding citizens as potential terrorists, yet does little to effectively protect its citizens from the real threats to their safety.

Today, more than ever before, we are witnessing the daily erosion of personal privacy and freedom. We are victims of a war on privacy that is being waged by government eavesdroppers, business marketers, and nosy neighbours.

Today's war on privacy is intimately related to the dramatic advances in technology that we've seen in recent years. Video cameras observe personal moments. Computers store personal facts. Communications networks make personal information widely available throughout the world. Although some special technology may be used to protect personal information and autonomy, the overwhelming tendency of advanced technology is to do the reverse.

Privacy is fundamentally about the power of the individual. In many ways, the story of technology's attack on privacy is really the story of how institutions and the people who run them use technology to gain control over the human spirit, for good and ill. That is because technology by itself does not violate our privacy or anything else, it is the people using this technology and the policies they carry out that create violations.

Many people today say that in order to enjoy the benefits of modern society, we must necessarily relinquish some degree of privacy. If we want the convenience of paying for a meal by credit card, then we must accept the routine collection of our purchases in a large database over which we have no control.

Privacy-invasive technology does not exist in a vacuum. That is because technology itself exists at a junction between science, the market, and society. People create technology to fill specific needs, real or otherwise. And technology is regulated, as people and society deem fit.

Few engineers set out to build systems designed to crush privacy and autonomy, and few businesses or consumers would willingly use or purchase these systems if they understood the consequences. What happens more often is that the privacy implications of a new technology go unnoticed. Or if the privacy implications are considered, they are misunderstood. Or if they are understood correctly, errors are made in implementation. In practice, just a few mistakes can turn a system designed to protect personal information into one that destroys our secrets.

## **Phishing**

Computer criminals used a relatively new method—phishing, which is becoming more and more popular amongst hackers. Recently many banks all over the world encountered a variety of frauds and scams committed by hackers, swindlers, and inside bank officials. But the most widespread crime against banks and especially accounts' owners is a so-called 'phishing scam'. This scam is always entailed by usual spam. Swindlers try to trick consumers into giving up credit card information by posing as mail from *regulations.gov*, the government website where citizens comment on federal rule-making.

The phishing e-mails typically have subject headings of 'Official information' or 'Urgent information to all credit card holders!' and claim that recent changes in the law require that Internet users identify themselves to the federal government to create a secure and safer Internet community.' Like other phishing scams, the e-mail includes a link to a bogus website, which in this case closely resembles *regulations.gov*. Once there, users are asked to enter private and personal financial information, including credit card numbers.

Phishing expeditions can be a financial windfall for attackers, since some analysts' estimates put the success rate of such bogus e-mails at about 1 in every 20 recipients. The most recent major outbreak of phishing attacks was between the summer of 2003 and January 2004, when Mmail and a host of copycats tried to trick users into giving up credit card information by masquerading as messages from PayPal, eBay, and other major companies and banks.

## **Application Fraud**

Application fraud is one specific version of what is broadly referred to as "identity theft." As the name implies, it essentially involves a criminal using someone else's name and credentials to fill out a credit card application without their permission. Often, the thief sets the stage for application fraud by stealing supporting documents from the victim, such as utility bills or bank statements, which are then used to substantiate the thief's fraudulent credit card application. If and when they are approved for a card in the victim's name, thieves face few restraints in the damage they are capable of inflicting. FICO scores and payment histories can be ruined in a heartbeat by determined thieves in possession of a fraudulently granted credit card.

## **Skimming**

An electronic method of capturing a victim's personal information used by identity thieves. The skimmer is a small device that scans a credit card and stores the information contained in the magnetic strip. Skimming can take place during a legitimate transaction at a business. Skimming can occur easily in a restaurant because your card is taken away when the bill is being settled. If your server is a skimming identity thief, he or she will, before giving the card back to you, scan the credit card with a hand-held electronic device, which takes only seconds. The electronically captured information is then used by the thief or sold to other criminals.

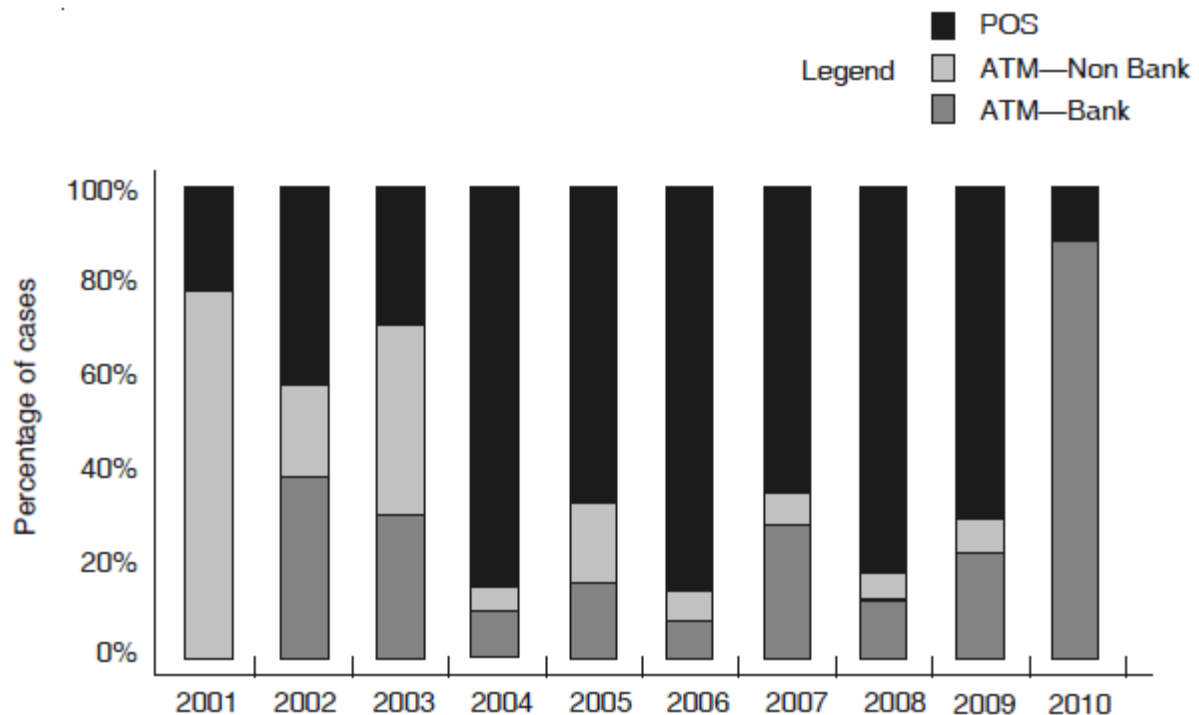


Figure Pin points of compromise 2001 through Q2 2010 FICO card alert services statistics.

ATM skimming is the practice of adding concealed technology to ATMs to capture bank account numbers, usernames and passwords. The point is to hijack bank accounts and clean them out before the customer is even aware of a problem.

ATM skimming has existed for years on a small scale. Skimmers attack both retail points-of-sale (POS) and ATMs, both bank-owned and non-bank. As the graphic below shows, the focus of these criminals has shifted recently. Notice that in the beginning in 2004, these criminals were working hard on POS fraud. Late in 2009, however, their focus began to shift to ATM machines and specifically bank-owned ATMs. According to Wall Street Journal, 80% of the credit card fraud during the first half of 2010 occurred on bank-owned ATMs.

### Copyright

In general terms, copyright provides an author with a tool to protect a work from being taken, used, and exploited by others without permission. The owner of a copyrighted work has the exclusive right to reproduce it, prepare derivative works based upon it, distribute copies by sale or other transfer of ownership, to perform and display it publicly, and to authorize others to do so.

For a company that depends upon intellectual property for its livelihood, such as a software company or an Internet-based publisher, copyright law provides a framework that ensures that the company can compete in the marketplace. The importance of copyright is illustrated by comparing what happens to an appliance company when a refrigerator is stolen with what happens to a software company when its source code is stolen. The refrigerator company will simply have one less item of merchandise to sell and a loss reflected by the refrigerator's price. The software company, however, will suddenly be faced with the prospect of a market flooded with exact copies of its product—sold or given away by another. Without the ability to prevent unauthorized copying, sale, and distribution of its product, the software company will not be able to survive.

Copyright law protects “original works of authorship”. Sheer hard work alone will not suffice—a modicum of creativity is required. The work does not have to be the first of its kind, or novel—it just has to be the independent product of the author, not copied from another

source. Copyright, in fact, does not protect against independent creation of similar or identical works.

Certain items are excluded from copyright protection. Registering a work with the Copyright Office is a critical step to be taken in protecting a work under copyright law. While time and money costs are involved, significant benefits are gained by completing the registration process in a timely manner. To protect a work from the date of first publication, it must be registered within three months of that time. The work may be registered by the owner or an exclusive licensee. There is a “mandatory” deposit requirement, but it is not a condition of copyright protection.

A copyright is infringed when one of the exclusive rights of the copyright holder is violated. These include the right to reproduce a copyrighted work, prepare derivative works based upon it, distribute copies by sale or other transfer of ownership, to perform and display it publicly, and to authorize others to do so.

### **Internet Gambling**

The Internet and other emerging technologies, such as interactive television, have made possible certain types of gambling that were not feasible a few years ago. For example, an Indian citizen can now, from his home at any hour of the day or night, participate in an interactive Internet poker game operated by a computer located in the Caribbean. Indeed, a tech-savvy gambler can route his bets through computers located in other countries throughout the world, thereby obscuring the fact that he is placing his bet from India.

Online gambling also makes it far more difficult to prevent minors from gambling. Gambling websites cannot look at their customers to assess their age and request photo identification as is possible in traditional physical casinos and off-track-betting parlours. Currently, Internet gambling businesses have no reliable way of confirming that the gamblers are not minors who have gained access to a credit card and are gambling on their website.

Although some companies are developing software to try to detect whether a player is old enough to gamble or whether that player is from a legal jurisdiction, such software has not been perfected and would, of course, be subject to the same types of flaws and vulnerabilities that could be exploited by hackers. Unlike on-site gambling, online gambling is readily available to all at all hours, and it permits the user to gamble, in many cases, anonymously. This presents a greater danger for compulsive gambling and can cause severe financial consequences for an unsuccessful player. Internet gambling, unlike many other forms of gambling activity, is a solitary activity, which makes it even more dangerous; people can gamble uninterrupted and undetected for unlimited periods of time. Indeed, the problems associated with pathological and problem gamblers, a

frighteningly large percentage of which are young people, are well-established and can be measured in the ruined lives of both the gamblers themselves and their families.

### **Threats to Children**

With the growing number of classrooms connected to the Internet and the rising number of personal computers used in the home, more and more children are now able to access the Internet. One of the greatest benefits of the Internet is that it provides children with access to such things as educational materials, subject matter experts, online friendships, and penpals.

Nevertheless, like many other pursuits that children engage in without adequate parental supervision, the Internet should also be approached with careful consideration of risks and benefits. One concern of course is that the Internet may allow children unrestricted access to inappropriate materials. Such materials may contain sexually explicit images or descriptions, advocate hate or bigotry, contain graphic violence, or promote drug use or other illegal activities. In the worst instances, children have become victims of physical molestation and

harassment by providing personal information about themselves over the Internet and making

contact with strangers.

To protect children from such risks, parents and teachers therefore need to empower themselves with the tools, knowledge, and resources to supervise and guide children's online experience and to teach children how to use the Internet responsibly.

## UNIT-IV

### E-PAYMENT SYSTEMS

E-PAYMENT SYSTEMS also known as **net-banking** or **online banking**, is an electronic payment system that enables the customer of a bank or a financial institution to make financial or non-financial transactions online via the internet. This service gives online access to almost every banking service, traditionally available through a local branch including fund transfers, deposits, and online bill payments to the customers.

E-PAYMENT SYSTEMS can be accessed by any individual who has registered for online banking at the bank, having an active bank account or any financial institution. After registering for online banking facilities, a customer need not visit the bank every time he/she wants to avail a banking service. It is not just convenient but also a secure method of banking. Net banking portals are secured by unique User/Customer IDs and passwords.

### MAIN CONCERNS IN INTERNET BANKING

In a survey conducted by the Online Banking Association, member institutions rated security as the most important issue of online banking. There is a dual requirement to protect customers' privacy and protect against fraud. Banking Securely: Online Banking via the World Wide Web provides an overview of Internet commerce and how one company handles secure banking for its financial institution clients and their customers. Some basic information on the transmission of confidential data is presented in Security and Encryption on the Web. A multi-layered security architecture comprising firewalls, filtering routers, encryption and digital certification ensures that your account information is protected from unauthorized access.

➤ Firewalls and filtering routers ensure that only the legitimate Internet users are allowed to access the system.

➤ Encryption techniques used by the bank (including the sophisticated public key encryption) would ensure that privacy of data flowing between the browser and the Infinity system is protected.

➤ Digital certification procedures provide the assurance that the data you receive is from the Infinity system.

The growth of e-commerce is dependent, among other factors, on the existence of secure, user-friendly and cost-effective payment systems. Handling payments is a costly process that has been a central part of bank business for the past century. However, it is now being transformed by technological developments, and in particular, the Internet. The importance of the payment function lies in the fact that it could encourage convergence between sectors with disparate objectives, since payment systems are the common denominator of all e-commerce transactions. Conceptually, the alternative means of payment available for e-commerce may be classified as either electronic money (e-money), or electronic access products. The difference between them is that whereas electronic access products basically provide Internet access to traditional products (credit card payments, bank transfers, and the like), e-money is a new concept, and in particular is considered to be "private money not depending on central bank reserves."



Consolidated methods of payment used for distance selling mostly at national level, such as cheque, cash-on-delivery and credit-transfer mechanisms, have proven easy to adapt to electronic transactions. The credit card system has to date been the usual payments instrument for goods ordered over the Internet. This is despite security concerns and relatively higher transaction cost. Nevertheless, the lack of a widely accepted e-payment system is not considered to be a major barrier for the gearing up of e-commerce. The most important factors are undoubtedly user trust and user confidence.

E-payment systems are becoming central to e-commerce 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. The current state of online 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, such as 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, such as promissory notes, bills of exchange, gold coins, and barter. 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 with regard to e-payment systems.

## **DIGITAL PAYMENT REQUIREMENTS:**

### **About Digital Payments**

The Government of India has been taking several measures to promote and encourage digital payments in the country. As part of the 'Digital India' campaign, the government aims to create a 'digitally empowered' economy that is 'Faceless, Paperless, Cashless'. There are various types and modes of digital payments. Some of these include the use of debit/credit cards, internet banking, mobile wallets, digital payment apps, Unified Payments Interface (UPI) service, Unstructured Supplementary Service Data (USSD), Bank prepaid cards, mobile banking, etc.

Digital payment methods are often easy to make, more convenient and provide customers the flexibility to make payments from anywhere and at anytime. These are a good alternative to traditional methods of payment and speeden up transaction cycles. Post demonetization, people slowly started embracing digital payments and even small time merchants and shop owners started accepting payments through the digital mode.

### **Digital Payment:**

A digital payment occurs when goods or services are purchased through the use of various electronic mediums. There is no use of cash or cheques in this type of payment method.

### **Cashless Economy**

In a cashless economy, all transactions are carried out using different types of payment methods and this does not involve the physical use of money for the purchase of various goods and services.

### **10 Types of Digital Payment Methods**

1. Banking cards
2. USSD
3. Aadhaar Enabled Payment System (AEPS)

4. UPI
5. Mobile Wallets
6. Bank pre-paid cards
7. Point of Sale (PoS)
8. Internet Banking
9. Mobile Banking
10. Bharat Interface for Money (BHIM) app

### **1. Banking cards:**

Cards are among the most widely used payment methods and come with various features and benefits such as security of payments, convenience, etc. The main advantage of debit/credit or prepaid banking cards is that they can be used to make other types of digital payments. For example, customers can store card information in digital payment apps or mobile wallets to make a cashless payment. Some of the most reputed and well-known card payment systems are Visa, Rupay and MasterCard, among others. Banking cards can be used for online purchases, in digital payment apps, PoS machines, online transactions, etc.

### **2. USSD:**

Another type of digital payment method, \*99#, can be used to carry out mobile transactions without downloading any app. These types of payments can also be made with no mobile data facility. This facility is backed by the USSD along with the National Payments Corporation of India (NPCI). The main aim of this type of digital payment service is to create an environment of inclusion among the underserved sections of society and integrate them into mainstream banking. This service can be used to initiate fund transfers, get a look at bank statements and make balance queries. Another advantage of this type of payment system is that it is also available in Hindi.

### **3. AEPS:**

Expanded as Aadhaar Enabled Payment System, AEPS, can be used for all banking transactions such as balance enquiry, cash withdrawal, cash deposit, payment transactions, Aadhaar to Aadhaar fund transfers, etc. All transactions are carried out through a banking correspondent based on Aadhaar verification. There is no need to physically visit a branch, provide debit or credit cards, or even make a signature on a document. This service can only be availed if your Aadhaar number is registered with the bank where you hold an account. This is another initiative taken by the NPCI to promote digital payments in the country.

### **4. UPI:**

UPI is a type of interoperable payment system through which any customer holding any bank account can send and receive money through a UPI-based app. The service allows a user to link more than one bank account on a UPI app on their smartphone to seamlessly initiate fund transfers and make collect requests on a 24/7 basis and on all 365 days a year. The main advantage of UPI is that it enables users to transfer money without a bank account or IFSC code. All you need is a Virtual Payment Address (VPA). There are many UPI apps in the market and it is available on both Android and iOS platforms. To use the service one should have a valid bank account and a registered mobile number, which is linked to the same bank account. There are no transaction charges for using UPI. Through this, a customer can send and receive money and make balance enquiries.

## **5. Mobile Wallets:**

A mobile wallet is a type of virtual wallet service that can be used by downloading an app. The digital or mobile wallet stores bank account or debit/credit card information or bank account information in an encoded format to allow secure payments. One can also add money to a mobile wallet and use the same to make payments and purchase goods and services. This eliminated the need to use credit/debit cards or remember the CVV or 4-digit pin. Many banks in the country have launched e-wallet services and apart from banks, there are also many private players. Some of the mobile wallet apps in the market are Paytm, Mobikwik, Freecharge, etc. The various services offered by mobile wallets include sending and receiving money, making payments to merchants, online purchases, etc.

## **6. PoS terminals:**

Traditionally, PoS terminals referred to those that were installed at all stores where purchases were made by customers using credit/debit cards. It is usually a hand held device that reads banking cards. However, with digitization the scope of PoS is expanding and this service is also available on mobile platforms and through internet browsers. There are different types of PoS terminals such as Physical PoS, Mobile PoS and Virtual PoS. Physical PoS terminals are the ones that are kept at shops and stores. On the other hand, mobile PoS terminals work through a tablet or smartphone. This is advantageous for small time business owners as they do not have to invest in expensive electronic registers. Virtual PoS systems use web-based applications to process payments.

## **7. Internet Banking:**

Internet banking refers to the process of carrying out banking transactions online. These may include many services such as transferring funds, opening a new fixed or recurring deposit, closing an account, etc. Internet banking is also referred to as e-banking or virtual banking. Internet banking is usually used to make online fund transfers via NEFT, RTGS or IMPS. Banks offer customers all types of banking services through their website and a customer can log into his/her account by using a username and password. Unlike visiting a physical bank, there are no time restrictions for internet banking services and they can be availed at any time and on all 365 days in a year. There is a wide scope for internet banking services.

## **8. Mobile Banking:**

Mobile banking is referred to the process of carrying out financial transactions/banking transactions through a smartphone. The scope of mobile banking is only expanding with the introduction of many mobile wallets, digital payment apps and other services like the UPI. Many banks have their own apps and customers can download the same to carry out banking transactions at the click of a button. Mobile banking is a wide term used for the extensive range or umbrella of services that can be availed under this.

## **9. Bharat Interface for Money (BHIM) app:**

The BHIM app allows users to make payments using the UPI application. This also works in collaboration with UPI and transactions can be carried out using a VPA. One can link his/her bank account with the BHIM interface easily. It is also possible to link multiple bank accounts. The BHIM app can be used by anyone who has a mobile number, debit card and a valid bank account. Money can be sent to different bank accounts, virtual addresses or to an Aadhaar number. There are also many banks that have collaborated with the NPCI and BHIM to allow customers to use this interface.

## **Digital Token-Based Electronic Payment Systems**

Electronic tokens are three types:

- 1. Cash or Real-time** • Transactions are settled with exchange of electronic currency.

- Ex: on-line currency exchange is electronic cash (e-cash).

**2. Debit or Prepaid** • Users pay in advance for the privilege of getting information. • Ex: prepaid payment mechanisms are stored in smart cards and electronic purses that store electronic money.

### **3. Credit or Postpaid**

- The server authenticates the customers and verifies with the bank that funds are adequate before purchase.

- Ex: postpaid mechanisms are credit/debit cards and electronic checks.

• Removes the amount of the charge from the cardholder's account and transfers it to the seller's bank. – Charge cards

- Such as one from American Express, carries no preset spending limit.

**Advantages:** – Payment cards provide fraud protection. – They have worldwide acceptance (nearly!). – They are good for online transactions.

**Disadvantages:** – Payment card service companies charge merchants per-transaction fees and monthly processing fees.

#### **Classification of new payment system:**

NPCI & RBI must be greatly appreciated for creating a robust and resilient payment systems backbone for making India, a true “Digital Economy” state. A decade earlier, the predominant mode of payments for individual/business, small/large value payments used to cash, card, cheque, ECS, NEFT & RTGS. However, in the recent years, introduction of IMPS, AEPS, UPI (BHIM & USSD), NETC, phasing out ECS with NACH, BBPS have spiked up geometrically the number of digital transactions, and more importantly more options to its customers.

The way RBI/NPCI classifies our payment systems/options is (a) Paper (b) Electronic (c) Card Based Payments.

**(a) Fast Payments & Retail:** These payment options are typically used by individuals to perform P2P payments (or payments-to-merchants) and most importantly low-ticket transactions. The settlement of these transactions happens instantaneously.

**(b) Clearing & Large value Payments:** These options are used by individuals or businesses to perform large value payments, and usually the money transfer across in a delayed fashion. Delayed here implies, that the settlement between the accounts/banks happen in at defined settlement timings. ACH & Cheque are a classic example of delayed settlements.

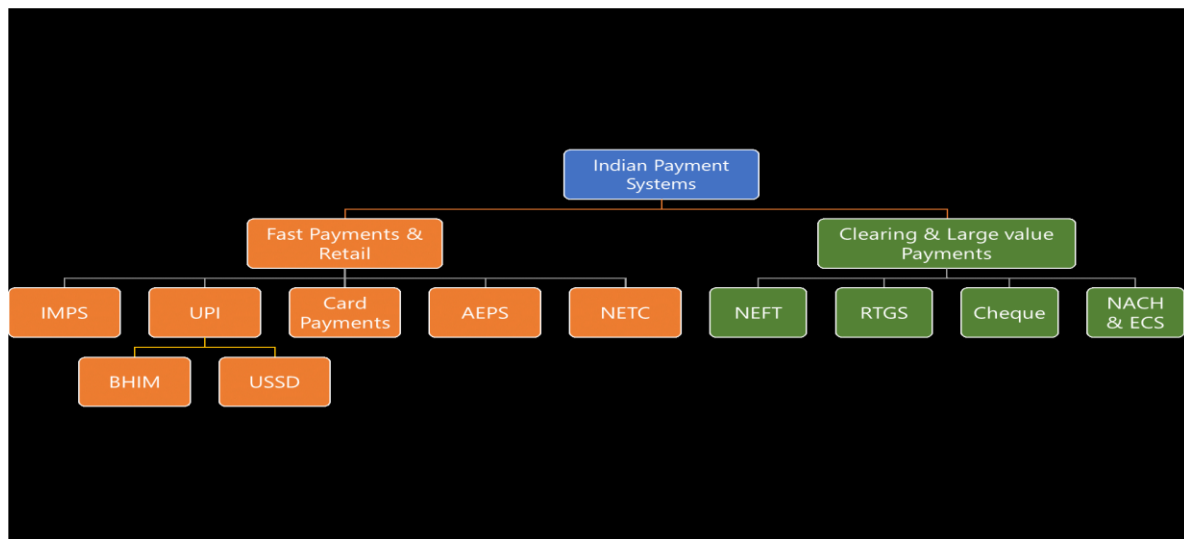


Figure payment system

### Properties of Electronic Cash:

- There are many ways that exist for implementing an e-cash system, all must incorporate a few common features.
- Specifically, e-cash must have the following four properties:
  1. Monetary value
  2. Interoperability
  3. Retrievability
  4. Security

### Electronic Cash in Action :

- Electronic Cash is based on cryptographic systems called —digital signatures||.
- This method involves a pair of numeric keys: one for locking (encoding) and the other for unlocking (decoding). (Through public key and private key).

### Purchasing E-cash from Currency Servers:

The purchase of e-cash from an on-line currency server (or bank) involves two steps: • Establishment of an account and Maintaining enough money in the account to bank the purchase. Some customers might prefer to purchase e-cash with paper currency, either to maintain anonymity or because they don't have a bank account. Using the Digital Currency

- Once the tokens are purchased, the e-cash software on the customer's PC stores digital money undersigned by a bank.
- The users can spend the digital money at any shop accepting e-cash, without having to open an account there or having to transmit credit card numbers.
- As soon as the customer wants to make a payment, the software collects the necessary amount from the stored tokens.

### Cheque Payment Systems on the Internet

- It is another form of electronic tokens.
- In the given model shown in fig, buyers must register with third-party account server before they are able to write electronic cheques

- The account server acts as a billing service.

- **The advantages are:**

1. They work in the same way as traditional cheques.
2. These are suited for clearing micropayments
3. They create float & availability of float is an important for commerce
4. Financial risk is assumed by the accounting server & may result in easier acceptance.

### **Credit Card-Based Electronic Payment Systems**

Payment cards are all types of plastic cards that consumers use to make purchases: – Credit cards

- Such as a Visa or a MasterCard, has a preset spending limit based on the user's credit limit. – Debit cards

### **Risks and E-payment Systems:**

#### **Risks in Electronic Payment systems**

- Customer's risks
  - Stolen credentials or password
  - Dishonest merchant
  - Disputes over transaction
  - Inappropriate use of transaction details
- Merchant's risk
  - Forged or copied instruments
  - Disputed charges
  - Insufficient funds in customer's account
  - Unauthorized redistribution of purchased items

### **Electronic payments Issues**

- Secure transfer across internet
- High reliability: no single failure point
- Atomic transactions
- Anonymity of buyer
- Economic and computational efficiency: allow micropayments
- Flexibility: across different methods

### **Designing e-Payment Systems**

Despite cost and efficiency gains, many hurdles need to be overcome for the spread of e-payment systems. These include several factors, mostly non-technical in nature that must be addressed before any new payment method is made successful.

They are as follows:

1. **Privacy.** A user expects trustworthiness of a secure system; just as the telephone is

a safe and a private medium, free of wiretaps and hackers, electronic communication must merit equal trust.

**2. Security.** A secure system verifies the identity of two-party transactions through “user authentication”, and reserves flexibility to restrict information/services through access control. Tomorrow’s bank robbers will need no getaway cars—just a computer terminal, the price of a telephone call, and a little ingenuity. Millions of dollars have been embezzled by computer fraud. No systems are yet foolproof, although designers are concentrating closely on security.

**3. Intuitive interfaces.** The payment interface must be as easy to use as a telephone. Generally speaking, users value convenience more than anything.

**4. Database integration.** With home banking, for example, a customer wants to play with all his accounts. Separate accounts are stored on separate databases. The challenge before banks is to tie these databases together and allow customers access to any of them while keeping the data up-to-date and error-free.

**5. Brokers.** A “network banker”—someone to broker goods and services, settle conflicts, and facilitate financial transactions electronically—must be in place.

**6. Pricing.** One fundamental issue is how to price payment system services. For example, should subsidies be used to encourage users to shift from one form of payment to another from cash to bank payments, from papers based to e-cash? The problem with subsidies is the potential waste of resources, as money may be invested in systems that will not be used. Thus, investment in systems not only might not be recovered, but also substantial ongoing operational subsidies will be necessary. On the other hand, it must be recorded that, without subsidies, it is difficult to fix up an affordable price to all services.

**7. Standards.** Without standards, the welding of different payment users into different networks and different systems is impossible. Standards enable interoperability, giving users the ability to buy and receive information, regardless of which bank is managing their money.

None of the above hurdles are insurmountable. Most of these will be overcome within the next few years. These technical problems, experts hope, will be solved as technology is improved and experience is gained.

## **Digital Signatures**

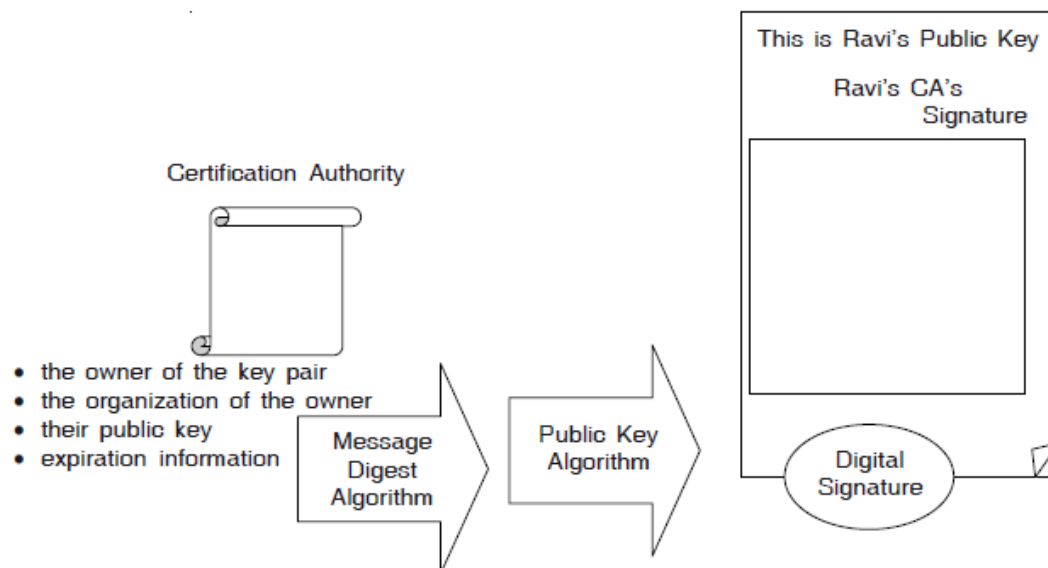
Digital signatures provide information regarding the sender of an electronic document. The technology has assumed huge importance recently, with the realization that it may be the remedy to one of the major barriers to growth of electronic commerce: *fear of lack of security*.

Digital signatures provide data integrity, thereby allowing the data to remain in the same state in which it was transmitted. The identity of the sender can also be authenticated by third parties.

The most widely used type of cryptography is public key cryptography, where the sender is assigned two keys—one public, one private. The original message is encrypted using the

public key while the recipient of the message requires the private key to decrypt the message. The recipient can then determine whether the data has been altered. However, although this system guarantees the integrity of the message, it does not guarantee the identity of the sender (public key owner). In order to remedy this, a Certificate Authority is required.

In Figure, Ravi (the sender) uses his private key to compute the digital signature. In order to compute the digital signature, a one-way hashing algorithm may be used to first calculate a message digest, as is done by RSA. The message digest is an efficient way to represent the message, as well as being a unique number that can only be calculated from the contents of the message. The sender's private key is used at this point to encrypt the message digest. The encrypted message digest is what is commonly called a digital signature.



A certification authority (CA) performs the task of managing key pairs, while the verification of the person or entity bound to that key pair is initially ascertained at the time of application by the registration authority. A certificate is issued by a CA and links an individual or entity to its public key, and in some cases to its private key. Certification authorities can offer different grades of certificates, depending upon the type of initial identification provided by the individual. From an information security viewpoint, these simple "electronic signatures" are distinct from the "digital signatures" and in the technical literature, although "digital signature" is sometimes used to mean any form of computer-based signature. These guidelines use "digital signature" only as it is used in information security terminology, as to mean the result of applying the technical processes.

Following is the list of certifying authorities in India

- SafeScrip (A Sify-Verisign venture) was the first CA in India.
- National Informatics Centre.
- Tata Consultancy Services.
- Institute of Development and Research in Banking Technology, Hyderabad (IDRBT), the technology arm of the Reserve Bank of India.
- Mahanagar Telephone Nigam Ltd (MTNL).
- ICICI Infotech, which has the contract for the supply and installation of the National



- Root Certification Authority, with an aim to bring uniformity amongst the different Certifying authorities in India.

Web-based banks figured their pitch was irresistible—by eliminating physical branches, tellers, and bankers' hours, they could slash costs and offer customers higher interest rates and more convenience. But in reality, customers want human contact, or at least an ATM. The multi channel strategy is what is important to people. They want to be able to use the Web. Online banks have also learned that convenience means more than just twenty-four-hour banking. In fact,

some aspects of the virtual banking model are flat-out inconvenient. For example, online banks require that deposits be made by cheque or money order, eliminating the cash option available at traditional banks. Adding physical infrastructure, though, adds to an on line bank's operating costs and may force it to lower interest rates paid on savings.

Online banks maintain that they still run more efficiently than traditional banks because of practices such as online account managers, loan officers, and so on. That allows them to manage a branch with a smaller staff than a traditional bank. Although a multichannel approach may appeal to customers, the strategy undermines the very premise of online—only institutions, and makes them less distinguishable from traditional banks that also offer Web-banking services. It is a lot easier and cheaper for an existing bank to roll out Internet services than it is for an Internet bank to buy enough ATMs or branches to compete on a national level.

### **Online financial services in India**

Online banking is also known as cyber banking, home banking, virtual banking, and includes various banking activities that can be conducted from anywhere instead of at a physical bank location. Consumers can use e-banking to pay bills online or to secure a loan electronically. Electronic banking saves a lot of time and money for users. For banks, it offers an inexpensive alternative to branch banking and a chance to enlist remote users. Many physical banks offer home banking services, and EC is used as a major competitive strategy. Online banking is growing in India.

### ***Features of e-Banking in India***

1. Can access current account balances at any time.
2. Can obtain charge and credit card statements.
3. Can pay bills online.
4. Can download account transactions.
5. Can transfer money between accounts.
6. Can keep a track of accounts online.
7. Can send e-mails to the bank.
8. Customers have a flexible schedule.
9. Can also use additional services like free phone banking, ATM withdrawals, bill paying.

International banking and the ability to handle trades in multiple currencies are critical for international trade. Although some international retail purchasing can be done with a credit card number, other transactions require international banking support. Many banks offer such services online.

## **Personal Finance Online**

Often electronic banking and portfolio management are combined with personal finance. However, specialized personal finance vendors offer more diversified services, with features like:

1. Bill tracking
2. Tracking of bank accounts, expenditures, and credit cards
3. Portfolio management, including reports and capital gain (losses) computations
4. Investment tracking and monitoring of securities
5. Stock quotes
6. Personal budget organization
7. Record keeping of cash flow, and profit and loss computations
8. Tax computations and preparations
9. Retirement goals, planning, and budgeting.

## **Online Billing and Bill Paying**

People prefer to pay monthly bills like telephone, utility, electricity etc., online. More so, the recipients of such payments are even more eager to receive money online, as the processing costs are lower! In India, banks like ICICI and SBI make it easier with a facility of paying bills from online accounts. ICICI provides this feature absolutely free of cost and offers customer to view the bill, status checks, and queries. For certain billers, one can see the bill online and pay immediately or schedule the payment of bills. Now there is no more hunting around for the right amount to be paid. Paying these Bills online will ensure that one does not miss any due dates. It acts as a reminder. SBI on the other hand also provides a feature called Autopay. One can set up AutoPay instructions with an upper limit to ensure that bills are paid automatically whenever they are due. The upper limit ensures that only bills within the specified limit are paid automatically, thereby providing the customer complete control over these payments.

## **Auxiliary Services**

ICICI offers a few auxiliary services online as part of their online services, apart from bill payment and e-banking.

**Online shopping:** using the Internet banking ID and transaction password, one can visit affiliated shopping sites online and make online transactions.

**Online Trading:** one of the most popular features of ICICI is their online trading feature. Their products and services offer the following features:

1. Trading in shares
2. Trade in derivatives
3. Investing in mutual funds
4. IPOs and bonds online
5. Personal finance and portfolio, risk management
6. Customer servicing

Some banks like SBI also offer other features like telephone and SMS alerts.

## **Mutual Funds Online**

Mutual funds online are very useful in providing financial assistance and predictions, offering services like the below.

1. Funds fact sheet
2. New launches of Public Offerings
3. Portfolio Trackers and Fund Monitors

These services are available online and provide useful advice on fund management and investments. While online services are useful and easy to handle, they are definitely not risk free.

There are repeated cases of fraud, carding cash, and liquidity risks, etc.

## **Online Stock Trading**

Buying and selling shares online with speeds comparable and at times better than NSE's NEAT Terminal. This speed and reliability comes only with perseverance of a pioneer backed by huge investment in technology! Intra-day price alerts that you can set, customize market watch screen, intra-day tick-by-tick time and price data with chart, for any number of scripts. Technical experts make live calls, the news desk supplying you with the fastest information updates. Even if you load CNX 500 with 500 scripts, it will appear with all live prices in a fraction of a second.

### ***Features Offered While Trading in Stocks Online***

Several features offered while trading in stocks are enumerated below:

#### ***1. View positions online.***

The customer can view the status of all his orders online. Every information as to whether the order has been executed or are waiting in the queue to be executed—can be viewed for their status.

#### ***2. View transaction history online.***

Transactions details for all the trades done are available online. The customer can also check his Account statements online. This account would be updated regularly on a quarterly basis.

#### ***3. Online quotes, streaming quotes and ticker.***

The customer gets free online quotes for all his favorite stocks. Quotes are real-time to make sure he receives the best quote for his trades. He can also access the Streaming Quotes, which would give him a feel of the online update of stock prices of his choice. A real-time ticker would run-on the screen for him to keep a watch on the stocks of his choice.

#### ***4. Online news analysis.***

This gets the latest news affecting the markets. ICICI direct research team will analyze the news and explain its impact on the market and stocks.

#### ***5. Follow the market.***

This gets the latest stock trends by accessing its market centre. Its research team will ensure that you are kept abreast of the latest market happenings. All news and events affecting markets and companies are analyzed and presented in a form which you can understand easily. It gets the complete picture behind the movement of the stocks.

#### ***6. IPO centre.***

It tells about all the latest IPOs (Initial Public Offerings) which are about to hit the market and our analysis on these. IPO Calendars, recent IPO listings, Prospectus/Offer Documents, and IPO analysis are few of the features which help the customer keep on top of the IPO markets.

The major online brokers have been getting better and better with improved services and programs. Most online brokers charge the average client, but most will give services

and access free to traders who trade actively and maintain above minimum account balances.

There are non-brokerage services that can be purchased or accessed for free on the Internet. Many provide information or tools that you cannot get from your broker.<sup>13</sup>

Some of the **major Indian players** in the Online Stock Trading business are:

- \_ ICICIDirect.com
- \_ IndiaInfoline.com
- \_ Fivepaisa.com
- \_ HDFCBank.com
- \_ MyIris.com
- \_ Sharekhan.com
- \_ Indiabulls.com

## UNIT 5

**Information system** can be defined as set of people, procedure and resources that collects, transforms & disseminates information in an organization. It is a system that accepts data resources as input & processes them into information products as outputs this supports an organization's business strategies, business processes & organizational structures & culture to increase the business value of the enterprise in a dynamic business environment.

Mobile Commerce, also known as m-commerce, is defined as the process of performing business transactions using handheld mobile devices which are connected through wireless networks. The business transactions may range from buying and selling goods, making mobile payments, downloading audio/video contents, playing online games, using numerous software applications or getting mobile tickets. The mobile devices include cellular phones, handheld computers such as palmtops or laptops, pagers, smartphones and Personal Digital Assistants (PDA). The mobile users can access internet through these devices without any wired connection or a computer. Powered with the emerging technology based on Wireless Application Protocol (WAP), mcommerce employs webready micro browsers in these mobile devices to surf through the internet anytime, anywhere on earth.

Mobile commerce provides instant connectivity between mobile users irrespective of their geographical location and time of the day. With enormous growth of wireless and mobile technology and rapid penetration of mobile phones in developing countries worldwide, the scope of m-commerce has increased manifold. With the advent of super-fast 3G access technology that ensures high speed data transfer rates of the order of 20 Mbps, m-commerce is opening up new vistas of digital media applications. 3G technology, equipped with WiMax and UMTS standards for high speed mobile broadband internet connectivity, supports mobile multimedia application delivery at far greater bandwidths. So, it is now possible for mobile users to watch their favourite TV programmes or download and view famous movies in their mobile devices while travelling.

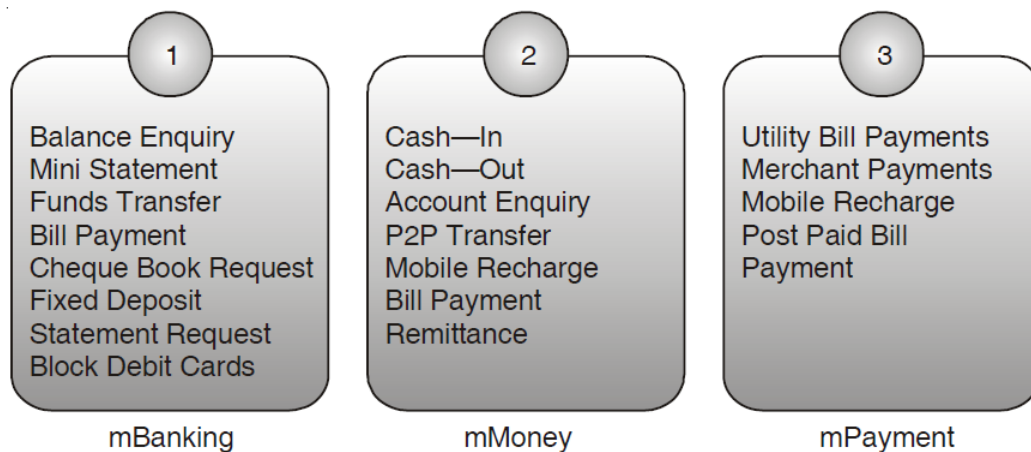
The scope of mobile commerce is all pervasive, and is gradually engulfing all aspects of lives of modern day citizens. Ranging from mobile banking, mobile browsing and mobile ticketing up to mobile marketing, mobile advertising and mobile computing, mobile commerce is gradually becoming an integral part of both corporate world and common people. With the prices of mobile phone decreasing exponentially and the number of different mobile applications increasing enormously, more and more people will indulge in m-commerce applications and soon it will become the preferred choice of the digital business world.

Mobile commerce (M-commerce) can be broadly divided into three categories. They are as follows

**1. Mobile banking:** It is the state-of-the-art process that has been introduced in the banks to make sure that the customers are better equipped with all the systems and process. This helps to carry out the transaction quickly and the account holders can check their account balance and the newly available schemes from the mobile website. Mobile banking can be accessed through mobile and people can use it for their benefit and they do not have to be physically present at the banks for checking the account balance. Mobile banking has made life a lot easier and this is a programme that is being used by the younger generation a lot more, but if you are a middle-aged or senior person, you can certainly avail it because it is genuinely user friendly.

**2. M-payment (mobile payment):** It is a point-of-sale payment made through a mobile device, such as a cellular telephone, a smartphone, or a personal digital assistant (PDA). Using m-payment, a person with a wireless device could pay for items in a store or settle a restaurant bill without interacting with any staff member.

**3. Mobile money** A facility that allows people to use their cell phones and other hand-held devices to handle financial transactions.



**Figure Components of M-commerce.**

## WIRELESS COMMUNICATION TECHNOLOGY

Mobile commerce is based on wireless communication technology. The wireless communication technology has emerged as the new choice of modern corporate world. The wireless networking has some distinct advantages over traditional wired networking that employs co-axial, twisted pair or fiber optic cables for physical connection between two or more computing devices. In wireless networking, the data transfer between computers is facilitated by microwaves, radio waves or infrared waves. It eliminates the cumbersome cabling process involving bulky cables with a significant reduction in labor and material cost as well as development time.

The wireless networking technology together with wireless application protocol provides the backbone of mobile commerce applications. In various vertical markets, such as retail, healthcare, manufacturing and warehousing, mobile commerce gained acceptance and provided increased productivity through the usage of mobile devices. The mobile handheld devices are used to transmit data in real time to centralized hosts through wireless networks. The mobile commerce that employs wireless technology, offers some extra advantage over the internet based e-commerce. In e-commerce, the internet provides information anytime of the day, while

in m-commerce, the information is available anytime, anywhere. In e-commerce, the information is available as long as the user is connected with the internet, i.e. connected with the wired network. If the user is involved with some other activities, i.e. travelling or doing some offline job, which forces him/her to become disconnected from the internet, the information becomes unavailable. M-commerce removes such uncertainties. Wireless networking allows the user to be connected with the wireless internet even if he/she is on the move. Thus, in m-commerce, it is possible to stay online anywhere on earth and anytime of the day. The user can access information instantly even if he/she is engaged in some other activities, such as travelling or shopping, with the help of the mobile device and the wireless network or internet. This helps the employees to make spot decisions, the customers to ask questions spontaneously and business owners to perform transactions anytime regardless of their geographical positions.

## **Cellular Network**

A cellular network is a radio network made up of a number of **radio cells** (or just **cells**) each served by a fixed transmitter, known as a cell site or base station. These cells are used to cover different areas in order to provide radio coverage over a wider area than the area of one cell. Cellular networks are inherently asymmetric with a set of fixed main transceivers each serving a cell and a set of distributed (generally, but not always, mobile) transceivers which provide services to the network's users.

Cellular networks offer a number of advantages over alternative solutions:

- increased capacity
- reduced power usage
- better coverage

The primary requirement for a network to be succeed as a cellular network is for it to have developed a standardized method for each distributed station to distinguish the signal emanating from its own transmitter from the signals received from other transmitters. Presently, there are two standardized solutions to this issue: frequency division multiple accesses (FDMA) and; code division multiple access (CDMA).

FDMA works by using varying frequencies for each neighboring cell. By tuning to the frequency of a chosen cell the distributed stations can avoid the signal from other cells. The principle of CDMA is more complex, but achieves the same result; the distributed transceivers can select one cell and listen to it. Other available methods of multiplexing such as polarization division multiple access (PDMA) and time division multiple access (TDMA) cannot be used to separate signals from one cell to the next since the effects of both vary with position and this would make signal separation practically impossible. Time division multiple access, however, is used in combination with either FDMA or CDMA in a number of systems to give multiple channels within the coverage area of a single cell.

### ***Broadcast Messages and Paging***

Practically every cellular system has some kind of broadcast mechanism. This can be used directly for distributing information to multiple mobiles, commonly, for example in mobile telephony systems, the most important use of broadcast information are to set up channels for one to one communication between the mobile transreceiver and the base station. This is called **paging**.

The details of the process of paging vary somewhat from network to network, but normally we know a limited number of cells where the phone is located (this group of cells is called a Location Area in the GSM or UMTS system, or Routing Area if a data packet session is involved). Paging takes place by sending the broadcast message to all of those cells. Paging messages can be used for information transfer. This happens in pagers, in

CDMA systems for sending SMS messages, and in the UMTS system where it allows for low downlink latency in packet-based connections.

### **Frequency Reuse**

The increased capacity in a cellular network, compared with a network with a single transmitter, comes from the fact that the same radio frequency can be reused in a different area for a completely different transmission. If there is a single plain transmitter, only one transmission

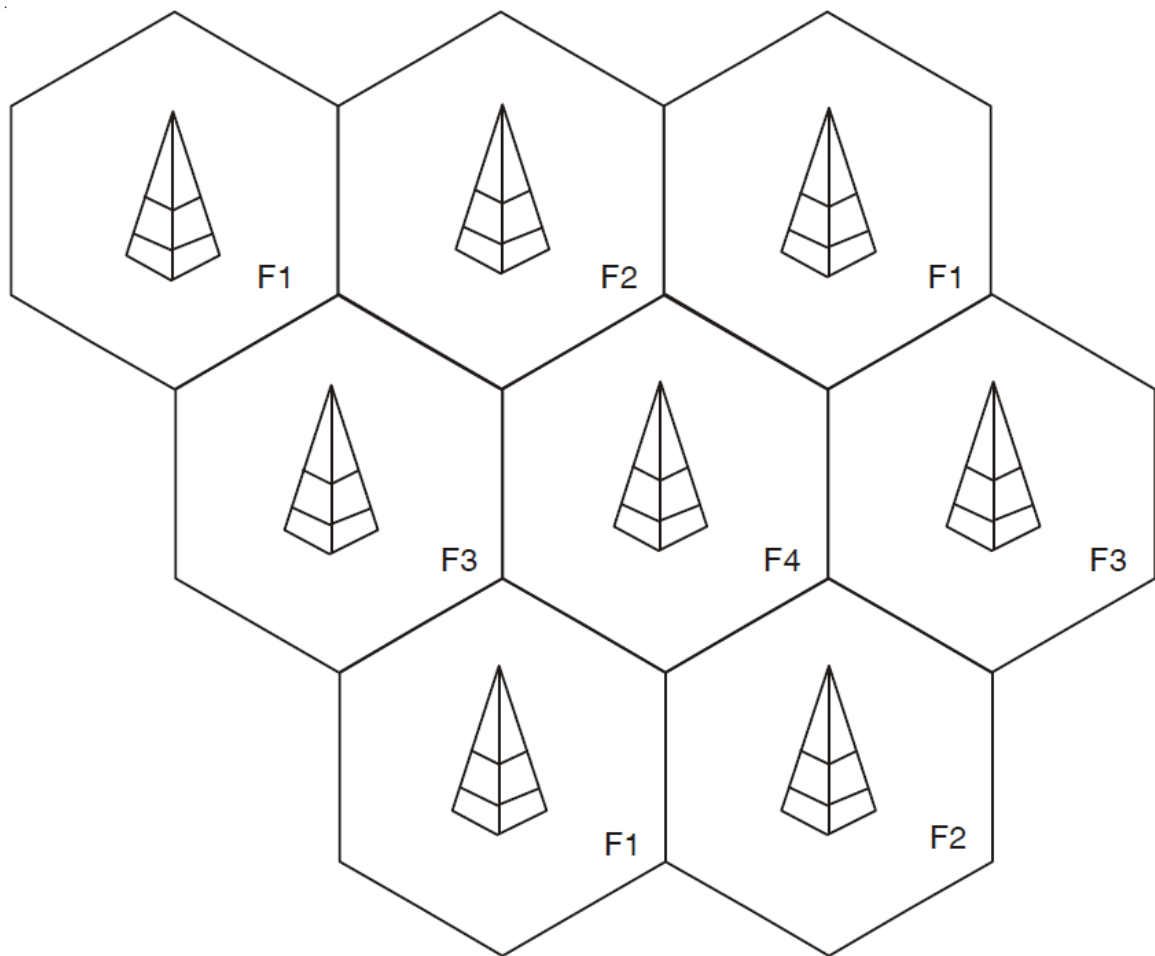


Figure Example of frequency reuse factor or pattern 1/4.

Can be used on any given frequency. Unfortunately, there is inevitably some level of interference

from the signal from the other cells which use the same frequency. This means that, in a standard FDMA system, there must be at least a one cell gap between cells which reuse the same frequency. The frequency reuse factor is the rate at which the same frequency can be used in the network. It is  $1/K$  where  $K$  is the number of cells which cannot use the same frequencies for transmission. Common values for the frequency reuse factor are  $1/3$ ,  $1/4$ ,  $1/7$ ,  $1/9$  and  $1/12$ . In case of  $N$  sector antennas on the same base station site, each with different direction, The base station site can serve  $N$  different cells.  $N$  is typically 3.

A **reuse pattern** of  $N/K$  denotes  $N$  sector antennas per site. Common reuse patterns are  $3/3$ ,  $3/9$  and  $3/12$ . If the total available bandwidth is  $B$ , each cell can only utilize a number of frequency channels corresponding to a bandwidth of  $B/K$ , and each base station site can use a

bandwidth of  $BN/K$ .

Code division multiple access-based systems use a wider frequency band to achieve the same rate of transmission as FDMA, but this is compensated for by the ability to use a frequency reuse factor of 1. In other words, every cell uses the same frequency and the different systems are separated by codes rather than frequencies.

If the total available bandwidth is  $B$ , each cell can only utilize a number of frequency channels corresponding to a bandwidth of  $B/K$ , and each base station site can use a bandwidth of  $BN/K$ . Code division multiple access-based systems use a wider frequency band to achieve the same rate of transmission as FDMA, but this is compensated for by the ability to use a frequency reuse factor of 1. In other words, every cell uses the same frequency and the different systems are separated by codes rather than frequencies.

### ***Movement from Cell to Cell and Handover***

The use of multiple cells means that, if the distributed transceivers are mobile and moving

from place to place, they also have to change from cell to cell. The mechanism for this differs depending on the type of network and the circumstances of the change. For example, if there is an ongoing continuous communication and we don't want to interrupt it, then great care must be taken to avoid interruption. In this case there must be clear coordination between the base station and the mobile station. Typically such systems use some kind of multiple access independently in each cell, so an early stage of such a handover (handoff) is to reserve a new channel for the mobile station on the new base station which will serve it. The mobile then move from the channel on its current base station to the new channel and from that point on communication takes place. The exact details of the mobile system's move from one basestation to the other vary considerably from system to system. For example, in all GSMhandovers and W-CDMA inter-frequency handovers the mobile station will measure the channel it is meant to start using before moving over. Once the channel is confirmed okay, the network will command the mobile station to move to the new channel and at the sometime start bi-directional communication there, meaning there is no break in communication.

In CDMA 2000 and W-CDMA same-frequency handovers, both channels will actually be in use at the same time (this is called a soft handover or soft handoff). In IS-95 inter-frequency handovers and older analog systems such as NMT it will typically be impossible to measure the target channel directly whilst communicating. In this case other techniques have to be used such as pilot beacons in IS-95. This means that there is almost always a brief break in the communication whilst searching for the new channel followed by the risk of an unexpected return to the old channel.

If there is no ongoing communication or the communication can be interrupted, it is possible for the mobile station to spontaneously move from one cell to another and then notify the network if needed.

The effect of frequency on cell coverage means that different frequencies serve better for different uses. Low frequencies, such as 450 MHz NMT, serve very well for countryside coverage. GSM 900 (900 MHz) is a suitable solution for light urban coverage. GSM 1800(1.8 GHz) starts to be limited by structural walls. This is a disadvantage when it comes to coverage, but it is a decided advantage when it comes to capacity. Pico cells, covering, e.g. one floor of a building, become possible, and the same frequency can be used for cells which are practically neighbors. UMTS, at 2.1 GHz is quite similar in coverage to GSM1800. At 5 GHz, 802.11a Wireless LANs already have very limited ability to penetrate walls and may be limited to a single room in some buildings. At the same time, 5 GHz can easily penetrate windows and goes through thin walls so corporate WLAN systems often give coverage to areas well beyond that which is intended. Moving beyond these ranges, network capacity generally increases (more bandwidth is available) but the coverage becomes limited to line of sight. Infra-red links have



been considered for cellular network usage, but as of 2004 they remain restricted to limited point-to-point applications.

Cell service area may also vary due to interference from transmitting systems, both within and around that cell. This is true especially in CDMA based systems. The receiver requires a certain signal-to-noise ratio. As the receiver moves away from the transmitter, the power transmitted is reduced. As the interference (noise) rises above the received power from the transmitter, and the power of the transmitter cannot be increased any more, the signal becomes corrupted and eventually unusable. In CDMA-based systems, the effect of interference from other mobile transmitters in the same cell on coverage area is very marked and has a special name, *cell breathing*.

### ***Cellular Telephony***

The most common example of a cellular network is a mobile phone (cell phone) network. A mobile phone is a portable telephone which receives or makes calls through a cell site (base station), or transmitting tower. Radio waves are used to transfer signals to and from the cell phone. Large geographic areas (representing the coverage range of a service provider) are split up into smaller cells to deal with line-of-sight signal loss and the large number of active phones in an area. In cities, each cell site has a range of up to approximately 1/2 mile, while in rural areas; the range is approximately 5 miles. Many times in clear open areas, a user may receive signal from a cell 25 miles away. Each cell overlaps other cell sites. All of the cell sites are connected to cellular telephone exchanges “switches”, which in turn connect to the public telephone network or another switch of the cellular company.



Figure Cell site.

As the phone user moves from one cell area to another, the switch automatically commands the handset and a cell site with a stronger signal (reported by the handset) to go to a new radio channel (frequency). When the handset responds through the new cell site, the exchange switches the connection to the new cell site.

With CDMA, multiple CDMA handsets share a specific radio channel; the signals are separated by using a pseudo noise code (PN code) specific to each phone. As the user moves from one cell to another, the handset sets up radio links with multiple cell sites (or sectors of the

same site) simultaneously. This is known as “soft handoff” because, unlike with traditional cellular technology, there is no one defined point where the phone switches to the new cell.

Modern mobile phones use cells because radio frequencies are a limited, shared resource. Cell sites and handsets change frequency under computer control and use low power transmitters so that a limited number of radio frequencies can be reused by many callers with less interference. CDMA handsets, in particular, must have strict power controls to avoid interference with each other. An incidental benefit is that the batteries in the handsets need less power.

Since almost all mobile phones use cellular technology, including GSM, CDMA, and AMPS (analog), the term “cell phone” is used interchangeably with “mobile phone”; however, an exception of mobile phones not using cellular technology is satellite phones. Old systems predating the cellular principle may still be in use in places. The most notable real hold-out is used by many amateur radio operators who maintain phone patches in their clubs’ VHF repeaters.

### **Wireless Spectrum**

The electromagnetic spectrum, or simply spectrum, is the entire range of energy waves over which communicating devices transmit. The electromagnetic spectrum is assigned common groupings of energy waves, commonly called *airwaves*, that make bands of the spectrum. Over the airwaves, TV, radio, cell phones, or any wireless Internet devices communicate with a transceiver. Each kind of transceiver uses dedicated frequency ranges that are measured in Hertz (Hz); 1 Hz is one cycle per second.

An interesting property of the spectrum is that higher frequencies travel shorter distances. They take more power to transmit. With enough power, they can be life-threatening. Higher frequencies can be modulated to carry more bits per second than longer waves, but they are subject to atmospheric interference. Broadcasters generally prefer owning a lower frequency because it costs less to transmit a signal, it carries farther, and it is generally “safer”. The US Federal Communications Commission (FCC) and similar agencies around the world break up the spectrum and assign bands for specific purposes. Bands are ranges of frequency with common names. Worldwide bodies such as the International Telecommunications Union (ITU) also make frequency agreements, so that devices will operate clearly worldwide. Regulating radio interference is necessary so that wireless devices do not interfere with one another. To prohibit interference from a neighboring transmitter, the FCC restricts bands of coverage.

### **GSM-900 and GSM-1800**

GSM-900 and GSM-1800 are used in most parts of the world: Europe, Middle East, and Africa and most of Asia. GSM-900 uses 890–915 MHz to send information from the Mobile Station to the Base Transceiver Station (uplink) and 935–960 MHz for the other direction (downlink), providing 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz.

Most of the GSM operators in India use the 900 MHz band. Operators like, Airtel, Idea, and some others, use 900 MHz in rural areas as well as in urban areas whereas Hutch uses 1800 MHz everywhere except in its BPL network.

### **GSM-850**

GSM-850 and GSM-1900 are used in the United States, Canada, and many other countries

in the Americas. GSM-850 is also sometimes erroneously called GSM-800. In Australia, GSM-850 is the frequency allocated to Telstra’s NextG Network which was switched on in October 2006. The NextG Network is a step up from the 3G Network and is available at faster speeds Australia wide compared to the 3G Network which is limited to only major population

centres. GSM-850 uses 824–849 MHz to send information from the Mobile Station to the Base Transceiver Station (uplink) and 869–894 MHz for the other direction (downlink). Channel numbers 128 to 251.

### ***Multi-band and Multi-mode Phones***

Today, most telephones support multiple frequencies used in different countries. These are

typically referred to as multi-band phones. Dual-band phones can cover GSM networks in pairs such as 900 and 1800 MHz frequencies (Europe, Asia, Australia and Brazil) or 850 and 1900 (North America). European tri-band phones typically cover the 900, 1800 and 1900 bands giving good coverage in Europe and allowing limited use in North America, while North American tri-band phones utilize 850, 1800 and 1900 for widespread North American service but limited worldwide use. A new addition has been the quad band phone, supporting all four major GSM frequency groups, allowing for widespread usage globally, including in North America.

There are also multi-mode phones which can operate on GSM systems as well as on mobile-phone systems using other technical standards. Often these phones use multiple frequency bands as well. For example, one version of the Nokia 6340i GAIT phone sold in North America can operate on GSM-1900, GSM-850 and legacy TDMA-1900, TDMA-800, and AMPS-800, making it both multi-mode and multi-band.

### **Technologies for Mobile Commerce**

**Wireless Spectrum:** The electromagnetic spectrum, or simply spectrum, is the entire range over which communicating devices transmit energy waves. The electromagnetic spectrum is assigned common groupings of energy waves, commonly called airwaves, that make bands of the spectrum. Over the airwaves, TV, radio, cell phones, or any wireless Internet devices communicate with a transceiver. Each kind of transceiver uses dedicated frequency ranges that are measured in hertz (Hz); 1 Hz is one cycle per second. An interesting property of the spectrum is that higher frequencies travel shorter distances. They take more power to transmit. With enough power, they can be life-threatening. Higher frequencies can be modulated to carry more bits per second than longer waves, but they are subject to atmospheric interference. Broadcasters generally prefer owning a lower frequency because it costs less to transmit a signal, it carries farther, and it is generally “safer”. The US Federal Communications Commission (FCC) and similar agencies around the world break up the spectrum and assign bands for specific purposes. Bands are ranges of frequency with common names. Worldwide bodies, such as the International Telecommunications Union (ITU), also make frequency agreements, so that devices will operate clearly worldwide. Regulating radio interference is necessary so that wireless devices do not interfere with one another. To prohibit interference from a neighboring transmitter, the FCC restricts bands of coverage. The owner of popular mobile cellular bands must obtain an FCC license, which guarantees the owner, exclusive use in a territory. Other parts of the spectrum go unlicensed, such as the Instrument Medical Scientific (ISM) at 2.4 GHz and Unlicensed National Information.

**Wireless Application Protocol (WAP):** Wireless Application Protocol (WAP) was invented and is driven by the WAP Forum—a group originally formed by Nokia, Ericsson, Motorola and Phone.com in 1997. WAP is an open specification that offers a standard method to access Internet-based content and services from wireless devices such as mobile phones and PDAs (Personal Digital Assistants). The WAP model is very similar to the traditional desktop Internet. The mobile device has an embedded browser, and the operator’s network that optimizes the transmission of the content software that connects to a WAP Gateway (software infrastructure residing in for the wireless network) and makes requests for information from Web servers in the normal form of a URL. The content for wireless devices can be stored on any Web server on

the Internet. Content must be formatted suitably for the mobile phone's small screen and low bandwidth/high latency connection. Content is written in a markup language called Wireless Markup Language (WML). WML script enables client side intelligence. The main benefits of WAP include: 1. Non-proprietary method to access Internet-based content and services 2. It is network independent 3. It has been adopted by 95 per cent of handset manufacturers and is being implemented by the majority of carriers 4. WAP browsers can be built on top of any operating system, including PalmOS, EPOC, Windows CE, FLEXOS, OS/9, JavaOS, etc. Origins of WAP While all the four companies that founded the WAP Forum had a hand in the currently available WAP technology set, its basis was a gift from Phone.com. The company incorporated in 1994 as Libris Inc., changed its name twice: first to Unwired Planet and then to Phone.com. By November 1995 the company hosted the first public demonstrations of its UP. Browser, a micro-web browser for cellular phones.

**WAP Step-by-Step:** Through a typical WAP transaction, so as to understand the steps involved in retrieving information from the Web server: A user requests a URL by entering it into a WAP device. (Alternately, an already running WAP program requests a URL on behalf of the user.) For the sake of argument, let us say the request is for `www.wmlserver.com/myweather.wml`. The WAP device encodes the request into an encrypted, compact binary format suitable for transmission over a wireless link, and sends it to the WAP gateway. The gateway examines the message, converts it into a valid HTTP-based URL request, and forwards it to `www.wmlserver.com`. When `wmlserver.com` receives the request, it fulfils it by returning the requested document back to the gate.

**WAP Architecture:** Figure shows the Wireless Application Protocol in a series of layers. This layered format mimics the International Standards Organization (ISO) Open Systems Interconnection (OSI) network model. The OSI Model defines a layered framework for generically describing and designing protocols. The OSI Model has seven layers. WAP uses six, but the approach is similar.

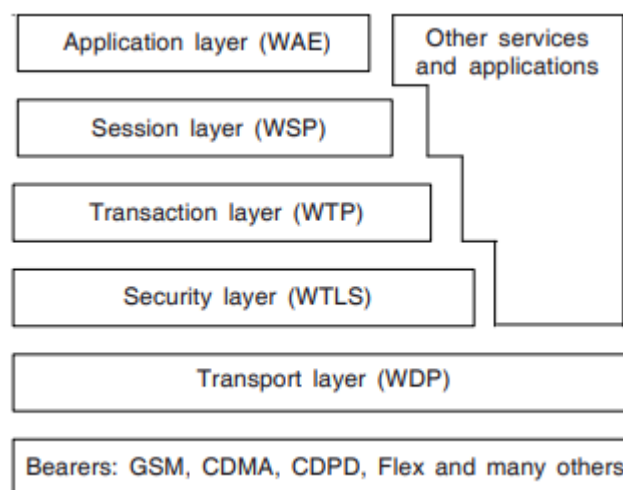


Figure The WAP architecture

The WAP stack can be configured in four different ways to provide four different types of services. Following are the four types of services offered by WAP:

1. Connectionless service: The WAP protocol stack used for this service consists of only WSP layer operating directly over WDP layer.
2. Connectionless service with security: This configuration is similar to connectionless service but provides security by having WTLS layer between WSP and WDP layers.
3. Connection oriented service: The configuration of protocol stack used for this service consists of WSP, WTP and WDP layers with ordering of the layers same as that shown in Figure

10.8. WTP and WDP layers together provide a connection oriented transport service in this configuration.

4. Connection oriented service with security: This configuration consists of all the layers of WAP stack as shown in the above figure. WAP protocols have been designed to operate transparently over data capable wireless networks supporting different data transport mechanisms (bearers), which include packet data networks, short message services and circuit-switched data networks.

Some of the bearers, which are currently supported by WAP, are GSM SMS, GSM USSD, CSD, IPv4, IPv6 and CDMA.

**WAP Application Environment (WAE):** The Wireless Application Environment layer is the one you are most likely concerned with if you are considering deploying WAP applications. It encompasses the devices, the content development languages you use (WML and WMLScript), the telephony APIs (WTA) for accessing telephony functionality from within WAE programs, and some well-defined content formats for phone book records, calendar information, and graphics.

**Wireless Session Protocol (WSP):** WSP layer provides a consistent interface to WAE for two types of session services: a connection mode, and a connectionless service. Without getting bogged down into the details, it is important to note the services this layer enables, such as the following: Creating and releasing a connection between the client and server. Exchanging data between the client and server using a coding scheme that is much more compact than traditional HTML text. Suspending and releasing sessions between the client and server.

**Wireless Transaction Protocol (WTP):** Now we are getting a bit more technical. WTP provides transaction services to WAP. It handles acknowledgements so that you can tell if a transaction succeeded. It also provides retransmission of transactions in case they are not successfully received, and removes duplicate transactions.

WTP manages different classes of transactions for WAP devices: unreliable one-way requests, reliable one-way requests, and reliable two-way requests. A reliable request means that acknowledgements are sent from the receiving device. An unreliable request from a WAP device means that no precautions are taken to guarantee that the request for information makes it to the server. You might think that this is a ludicrous transaction type. Why would anyone request something, but not care if it was actually fulfilled? One-way paging networks work in this fashion. If you page someone and the pager is off or out of range, that person does not receive the message.

**Wireless Transport Layer Security (WTLS):** WTLS provides services to protect your data, and includes data integrity, privacy, authentication, and denial-of-service protection. Data integrity guarantees that the data sent is the same as that received. WAP privacy services guarantee that all transactions between the WAP device and the gateway are encrypted. Authentication guarantees the authenticity of the client and the application server. Finally, denial-of-service protection detects and rejects data that come in the form of unverified requests.

**Wireless Datagram Protocol (WDP):** WDP provides a consistent interface to the higher layers of the WAP architecture so that they need not concern themselves with the exact type of wireless network the application is running on. Among other capabilities, WDP provides data error correction. WDP uses port numbers to address higher layer entities as in transport layer of the Internet protocol stack. WDP can be extended to support optional error reporting mechanism by adding Wireless Control Message Protocol (WCMP) functionality, which is similar to Internet Control Message Protocol (ICMP).

**Wireless Communications Networks (Bearers):** The bearers, or wireless communications networks, are at WAP's lowest level. WAP is designed to run on a variety of networks, including Short Message Services (SMS), circuit switched connections, and packet-switched

networks. Each type of network has pros and cons in terms of performance, delay, and errors.

## **Wireless Technologies**

### ***AMPS and European Analog Cellular***

Advanced Mobile Phone Service or AMPS, is the analog cellular transport used throughout North America and in other parts of the world, notably Central and South America, New Zealand, and Australia. It has the best coverage of all North American systems.

AMPS operate at 800 MHz. It is a voice-only analog transport. You can also use it with a cellular modem for circuit-switched data communications. AMPS is slowly being replaced with various competing digital networks. For the foreseeable future however, it will be the most readily available cellular network in North America.

At the same time AMPS systems were being built in the United States, a variety of incompatible analog systems were when being promoted in Europe and the rest of the world.

Although they all operated in the 900 MHz frequency range, the European systems did not work well with each other. These 900 MHz European analog systems, which we do not identify individually, are rapidly being phased out in favour of all-digital systems.

### ***TDMA***

Time Division Multiple Access (TDMA) is a digital transport that divides the frequency range allotted to it into a series of channels. Each channel is then divided into time slots. Each conversation within that channel gets a time slot; hence the term “division” in the name. TDMA has been in use for quite some time in Europe as the basis for the GSM (Global System for Mobile Communications). More recently, it is being adopted in North America, in some PCS systems. It is possible to overlay TDMA on top of an AMPS transport, converting an analog network to a hybrid analog/digital network. Some AMPS carriers in North America have been doing this to add security, capacity, and data capabilities to their older voice systems. This type of network has several names, such as Digital AMPS (D-AMPS) and North American TDMA (NA-TDMA).

### ***CDMA***

Code Division Multiple Access (CDMA) is a digital transport that has been in use by the US military since the 1940s. However, as a commercial wireless transport, it is the new kid on the block compared to TDMA and AMPS. Pioneered by US-based QUALCOMM, a CDMA transmitter assigns a unique code to each wireless connection and then broadcasts its data out on the channel simultaneously with all other connections. The receiver is able to decode each conversation by knowing the unique code assigned to each connection. CDMA is often described as a party in a room where everyone speaks a different language. If everyone speaks at approximately the same volume, you should be able to hear all the conversations. If you know the unique code (language) used by each speaker, you can hear and understand all the conversations. CDMA advocates the claim that it has some definite advantages over TDMA. First and foremost, CDMA enables simultaneous usage: approximately 10–20 times AMPS, and three times TDMA. It uses less power, giving you much better phone battery life. It is also more secure, because it hops from one frequency to another during a conversation, making it less prone to eavesdropping and phone fraud. Other benefits include fewer dropped calls and better voice quality. CDMA is being widely deployed in North America in new PCS systems, but less widely throughout the world. Like TDMA, it can also be overlaid on top of AMPS systems to create hybrid analog/digital networks.

### ***GSM***

In the late 1980s, noting the wide disparity of analog cellular systems in Europe, various European political, trade, and academic interests started collaborating on an all-digital cellular

communications network. Eventually called GSM, it has gone on to be the most widely deployed digital network in the world to date. It is used by millions of people in more than 200 countries.

Using an all-digital, TDMA-based network, every GSM phone has access to a variety of data functions at speeds limited to 9600 bps (the effective throughput is typically about half that speed). These services include direct-connect Internet access (both circuit-switched and packet data) without requiring a modem, mobile fax capabilities, and short message service.

GSM started operating in the 900 MHz frequency range in all European countries. Additional networks are being deployed in the 1800 MHz frequency range. An alternate name for GSM is PCN (Personal Communication Network), the European equivalent of PCS (Personal Communication Services).

## **Different Generations in Wireless Communication**

### ***The First Generation (1G)***

The first generation of cellular phones can be traced to the early eighties, and is marked by the use of **Analog** technology. The bandwidths used then were confined to a maximum of 30 kHz. The most widely used analog cellphone standard in this generation was the **Advanced Mobile Phone System (AMPS)**. In 1983, AMPS was approved by the FCC and first used in Chicago. AMPS is the analog cellular transport used throughout North America and other parts of the world, notably Central and South America, New Zealand, and Australia. The AMPS system uses 832 full-duplex channels, each consisting of a pair of simplex channels. AMPS uses a range of frequencies between 824 MHz and 894 MHz. Each simplex channel is 30 kHz wide, and AMPS uses Frequency Division Multiplexing (FDM) to separate the channels. The 832 channels can be divided into four categories:

- (a) *Control* (base to mobile) to manage the system,
- (b) *Paging* (base to mobile) to alert mobile users to calls for them,
- (c) *Access* (bidirectional) for call set up and channel assignment, and
- (d) *Data* (bidirectional) for voice, fax, or data.

The problem with AMPS is that in the 800 MHz band, radio waves are 40 cm long and travel in straight lines. Hence they are absorbed by trees and plants, and bounce off buildings, leading to a high level of echo and signal distortion. Hence, AMPS is slowly being replaced by various competing digital networks.

### ***The Second Generation (2G)***

The first generation of mobile phones was analog; the second generation was **digital**. Just as there was no worldwide standardization during the first generation, there was none in the second either. Four 2G systems are in use now, namely, D-AMPS, GSM, CDMA, and PDC. The two of the more popular technologies: **GSM and CDMA**.

**Group System Mobile (GSM):** GSM was the first European digital standard, developed to establish cellular compatibility throughout Europe. It is the first digital cellular system to be used commercially, and its success has spread to all parts of the world, including countries in Asia, Middle East, Africa, North, Central and South America, and Australia. Over 80 GSM networks are now operational, making it the most widely deployed digital network in the world to date, used by millions of people in more than 200 countries.

**Table**  
**TECHNICAL SPECIFICATIONS OF STANDARD (GSM)**

Mobile Frequency Range	Rx: 925–960 MHz; Tx: 880–915 MHz
Multiple Access Method	TDMA/FDM
Duplex Method	FDD
Number of Channels	124 (8 users per channel)
Channel Spacing	200 kHz
Modulation	GMSK (0.3 Gaussian Filter)
Channel Bit Rate	270.833 kilobits

Communication using GSM is based on the **Time Division Multiple Access (TDMA)** digital standard. See Table 10.2. TDMA is a digital transport scheme, wherein multiple users are granted access to the same radio frequency source by limiting the subscribers' transmitted and received signals to time slots. GSM cell phones require SIM (Subscriber Identity Module) cards for their operation. The SIM is a smart card that identifies the user terminal. By inserting the SIM card into the terminal, the user can have access to all the subscribed services. Without the SIM card, the terminal is not operational. To connect to the specific service providers in these different countries, GSM users simply switch subscriber identification module (SIM) cards.

**Code Division Multiple Access (CDMA):** Over 35 countries have either commercial or trial activity ongoing in the field of CDMA. These include countries in the regions of North America, Caribbean, Africa, Latin America, Europe, and Russia. However, CDMA is most popular in the Asia Pacific region, with around 84,000,000 users. There are already 43 Wireless Local Loop (WLL) systems in 22 countries using CDMA technology, and the number of global users of CDMA has surpassed 202 million. CDMA is an air link interface coding scheme, wherein multiple subscribers are granted access to the same radio frequency source by assigning subscribers' transmitted and received signals a spectrum-spreading code. Developed originally by QUALCOMM, CDMA is characterized by its high capacity and its small cell radius, and the fact that it employs spread spectrum technology and a special scheme. It was adopted by the Telecommunication Industry Association (TIA) in 1993. IS-95 is a standard for CDMA (Code Division Multiple Access) digital cellular.

**Table**  
**TECHNICAL SPECIFICATIONS OF STANDARD CDMA OR IS-95**

Mobile Frequency Range	Rx: 869-894 MHz; Tx: 824-849 MHz
Multiple Access Method	CDMA/FDM
Duplex Method	FDD
Number of Channels	20 (798 users per channel)
Channel Spacing	1250 kHz
Modulation	QPSK/OQPSK
Channel Bit Rate	1.2288 megabits

CDMA normally operates in a band of 1.25 MHz (versus 200 kHz for GSM), but it supports many more users in that band than any of the other systems. In practice, the bandwidth available to each user is at least as good as GSM, if not better.



### ***The Third Generation (3G)***

The most recent generation of cellular radio systems for mobile telephony are referred to as third generation (3G) technologies, and generally refer to those that promise to provide very high transmission speeds and performance. The technical framework for 3G has been defined by the International Telecommunications Union (ITU) as part of its International Mobile Telecommunications 2000 (IMT-2000) program. The third generation will be the first cellular radio technology designed from the outset to support wideband data communications at the same level of its voice communications.

**CDMA 2000 and WCDMA:** The two 3G models of CDMA are Wideband CDMA (WCDMA) and CDMA 2000, and both use the direct spread spectrum type of modulation. WCDMA is a third-generation technology proposed by Ericsson, that increases data transmission rates in GSM systems using CDMA instead of TDMA. CDMA 2000 has been proposed by QUALCOMM. It is basically an extension of IS-95 and backward compatible with it.

With the onset of the third generation, an urgent need is being felt to have a common standard across the telecom spectrum, so that there are no compatibility problems and technical differences. Efforts are now being made towards this integration.

### ***The Fourth Generation Wireless (4G)***

4G is the short name for fourth-generation wireless, the stage of broadband mobile communications that will supercede the third generation (3G). Carriers that use orthogonal frequency division multiplexing (OFDM) instead of time division multiple access (TDMA) or code division multiple access (CDMA) are increasingly marketing their services as being 4G, even when their data speeds are not as fast as the International Telecommunication Union (ITU) specifies.

**TABLE**  
**SPECIFICATIONS FOR 3G AND 4G**

	<i>3G</i>	<i>4G</i>
Frequency	1.8–2.5 GHz	2–8 GHz
Bandwidth	5–20 MHz	5–20 MHz
Data Rate	Upto 2 Mbps	100 Mbps Mobile, 1 Gps Stationary
Access	W-CDMA	VSF-OFCDM and VSF-CDMA
Switching	Circuit/Packet	Packet

According to the ITU, a 4G network requires a mobile device to be able to exchange data at 100 Mbit/sec. A 3G network, on the other hand, can offer data speeds as slow as 3.84 Mbit/sec. 4G WiMax network can offer download speeds that are ten times faster than a 3G connection, with speeds that top out at 10 megabits per second. Verizon's LTE network, meanwhile, can deliver speeds between 5 mbps and 12 mbps. Table shows basic list of the specifications of both technologies, 3G and 4G. The table compares and contrasts the two from technical standpoints.

### **Security Issues Pertaining to Cellular Technology**

With the advent of cellular services, it has become very important to look at the security aspect of these technologies. Security issues include eavesdropping or hacking into mobile conversations, denial of service, identity theft, data piracy and jamming. In general, the aim of a mobile phone security system would include:

- To make the radio path as secure as the fixed network, which implies anonymity and confidentiality to protect against eavesdropping;
- To have strong authentication to protect the operator against billing fraud;
- To prevent operators from compromising each others' security, whether inadvertently
- Or because of competitive pressures.

On the other hand, a security process must not:

- Significantly add to the delay of the initial call set up or subsequent communication;
- Increase the bandwidth of the channel;
- Allow for increased error rates, or error propagation;
- Add excessive complexity to the rest of the system;
- Be-cost ineffective.

## PORTALS FOR E-BUSINESS

The term “Portal” means different things to different people. To many, a simple website aimed at employees is a portal. A portal may be defined as a point of access to and interaction with relevant information, applications and business processes, by select targeted audiences, in a highly personalized manner.

### *Different Types of Portals*

Portals can be broadly classified into different categories as shown in Figure.

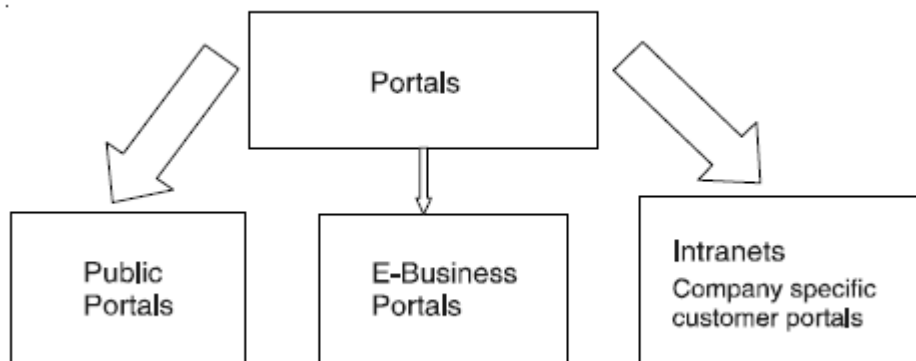


Figure Types of Portal

**1. Public portals.** Most internet users are aware of portals like Yahoo or Google. Indian Railways is another example.

**2. e-Business portals.** These portals support business transactions (i.e. buying, selling, order booking, payments, etc.) online. These can be classified into three categories:

#### **2(a) B2C portals.**

These portals extend the reach of the business to its customers for the purpose of ordering, billing, customer service, self-service, etc. Some of the successful B2C portals are: Amazon, eBay, Dell, etc. where people browse products, buy, order and pay online. Indian Rail site (IRCTC) is one of the successful B2C sites in India where thousands of people book train tickets and pay online daily.

#### **2(b) B2C.**

Those portals are quite popular for airline ticket booking, hotel booking, etc. The basic idea of such portals is to attract and keep the attention of buyers as well as to collect information about buyers that can be used to enhance and personalize the customer relationship and thus, drive future sales. More personalized relationships can result in increased customer loyalty.

## 2(c) B2B portals.

This extends the enterprise to its suppliers and partners. This helps to build better relationships between the company and its suppliers, customers and partners (via extranets) and this improved relationship can lead to increased trading partner loyalty. Generally, these portals are made by individual companies for their own suppliers and customers.

**3. Intranets.** These are normally portals aimed at customers of an organization. Employee portals, University portals, etc. are some of the examples.

### *Portal Benefits*

Portals can bring benefits in a number of areas:

- Unify the enterprise.
- Give visibility for the enterprise all over the world.
- Reduce cost.
- Improve productivity.
- Reduce administration overhead.
- Increase revenue.
- Improve customer support and customer loyalty.
- Improve support for sales and marketing.

### *Portal Features*

Surveys have shown that four factors constituting the elements of a good website encourage viewers to return to the site. These are:

- **High quality content.** Having the right information at the right place and right time.
- **Ease of use.** The structure of the site should not be overcomplicated or too big.
- **Quick to download.** Good sites also download quickly. Bad sites are cumbersome and slow. Visitors would not wait.
- **Frequently updated.** Good sites put up new information which is useful, relevant and timely for their audience, which takes money, time and energy to maintain.

Figure shows the customer interface elements that are needed in a website.

The Web gives the customer unlimited choice, with millions of sites to select from. In order to make the customer visit, stay and revisit your site, the site must have a unique proposition for the visitor. This is called an Internet Value Proposition (IVP).

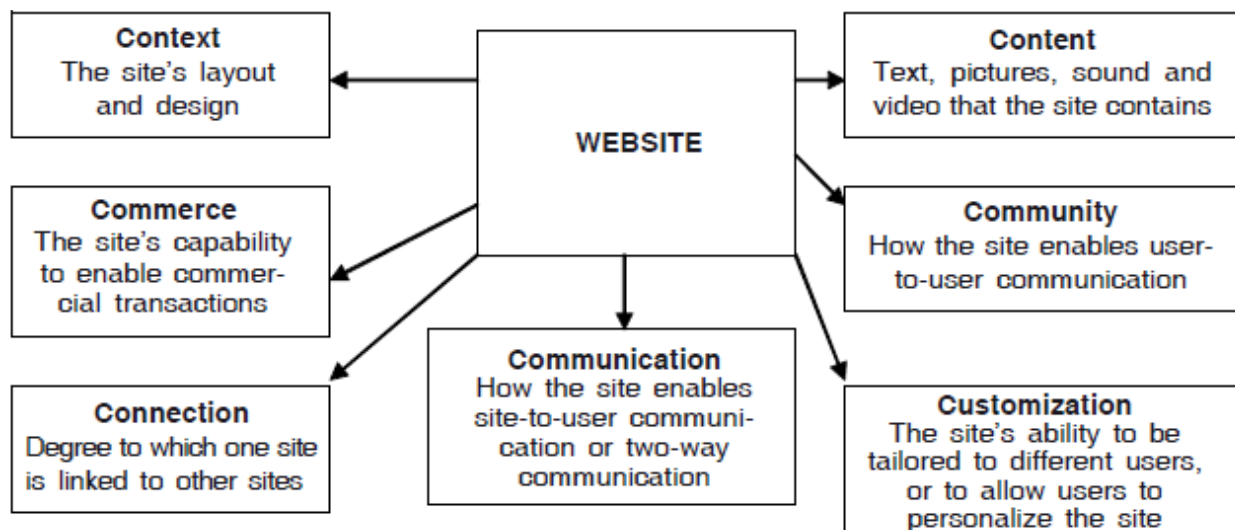


Figure Interface elements in a website

## **Human Resource Management**

The major goal of human resource management is to make best use of the available human resources in the organization. To attain this goal, the information necessary at various levels of management is as follows:

### **(i) Strategic information**

- Long range human resource requirements at different levels
- Policies on wages and incentives such as stock options
- Policies on human resource development and training
- Policies on personnel welfare and facilities.

### **(ii) Tactical information**

- Performance appraisal
- Demographic make-up of personnel and its impact on retirement
- Production incentives and relation to productivity
- Morale of personnel
- Absentee reduction
- Leave and overtime policies
- Personnel deployment policies.

### **(iii) Operational information**

- Routine assessment
- Skills inventory
- Loans/advances and recoveries
- Leave record.

Some corporate household names have more or less taken this approach: Microsoft Corp., Federal Express, Hewlett-Packard Co. and Netscape Communications Corp.

## **Various HRIS Modules**

Modules should reflect the way the users use the system. They should be based on the HR department structure and should be consistent with the way activities are performed within the department. Since most HR Departments closely resemble one another, in most typical HRIS packages, the following modules are available:

### **1. Basic personnel (employee information) module:**

This module contains basic employee information (name, date of birth, address, supervisor, status (part time, full time, leave), marital status, salary, job code, etc.) and is always one of the modules in an HRIS. It is the core of the system and is often the first module developed. Many of the data acquired in this module is used in other modules as well as Master Data. These data are collected as a part of the hiring process or during the first few days on the job and are updated through an employee's tenure. To ensure that the employee's personnel data have been entered correctly and are current, a turnaround document can be produced by the package. Similarly, status change documents can be used to update employee records.

### **2. Applicant-tracking module:**

This module may be used to identify applicants who qualify for open jobs, to identify open jobs for which applicants can apply and to provide support for statutory compliance.

An applicant-tracking module is used to record the applicant information prior to their becoming employees. The basic employee-tracking module must include data elements not collected until hiring (e.g. starting salary). In addition it may contain data elements that will not be part of the employee's record. Some of the elements specific to this module include recruiting resource (where the applicant learnt about the job), status (e.g. passed interview) and reasons for rejection (e.g. unqualified). If recruiting and staffing are handled together there may be one applicant tracking/ recruiting module.

### **3. Recruiting module:**

The recruitment module may overlap the applicant-tracking module. The recruiting module uses data elements collected during the applicant tracking process. However the recruiting module might also track recruiting costs (e.g. advertisement costs), include an analysis of recruiting source effectiveness and generate reports of recruiting trends over time.

### **4. Performance management module:**

This module allows for the monitoring or tracking of employee performance and may facilitate the manager's job. Functional specialists from the HR department may also use the performance management module to evaluate the overall effectiveness of the performance appraisal system. Reports that show performance ratings by the manager, job type and department can identify trends. Are some departments too lenient? Are performance evaluation guidelines being followed? What is the relationship between pay increase, bonuses and performance ratings? For the line manager, a performance module could be used to generate lists of forthcoming performance reviews, to record key performance events and to report previously agreed upon employee goals.

### **5. Career development/skills inventory module:**

As with the performance management module, the career development may be targeted to a HR sub-function and/or to line managers; it depends on the way the HR department operates. If there is a career development centre and well-defined career tracks and job skill requirements exist, then the centre to provide advice regarding career opportunities may use this module.

Alternatively, each manager may perform career-counselling duties. The manager might use work history information and job skill requirements as well as performance appraisal scores and career goals to suggest career development activities for employees. This module may overlap the human resource planning or succession-planning module. The identification of skills and career plans is critical for staff planning as well as individual career planning.

### **6. Position control module:**

This module enables the organization to track positions for monitoring, budgeting, planning and control. Typically, each position will be assigned a code and position characteristics (e.g. salary, skill requirements, level, location etc.) will be maintained. Position status can be monitored. Is a position vacant, filled, frozen, or planned? Position control reports may compare similar positions across departments, examine variances between authorized and actual staffing and/or compare previous, current and projected position budgets.

### **7. Benefits module:**

Changes in demographics and legislative changes are making the benefits arena one of the most critical and complex areas of HR. An effective benefit module helps ensure compliance with statutory laws. The benefits module may also be used to administer programs and traditional employee benefits; to provide advice to employees about their benefit choices and to produce an annual employee benefits statement. Benefit analysis can be used to monitor benefits programs and to help control the rising costs of benefits to the organization.

### **8. Compensation module:**

The functional specialists in the compensation group use this module. They use it to monitor compensation costs, policies and programs and to support future compensation decisions. The compensation modules can be used to help monitor compensation costs, policies and programs to support future compensation decisions. This module can be used to help monitor the executive compensation, bonus and profit sharing plans and to ensure compliance with law. In many systems the compensation module is used to help develop the salary structures.

Compensation analysts may correlate performance evaluation with pay increases and consider salary grade dispersion by departments. Compensation modules can be used to answer

“what if” questions like: What if we give 10 per cent bonus? What if we switch to pay for performance system? What savings are accrued if we close a plant? Comparisons of compensations across jobs and with other companies provide information useful for facilitating internal and external pay equity.

#### **9. Payroll module:**

Sometimes considered as a part of the HRIS, payroll is treated as a module in some systems. When payroll is a part of HRIS, termed an integrated system, several tasks are facilitated. For example, to ensure compliance with the law, payroll data must be compiled. When this information is kept in separate systems, a great deal of manual effort may be required to create the necessary reports. Still, payroll’s relationship with HRIS varies with companies.

#### **10. Training module:**

This module typically includes information about the training experience of the employees, which may also be included under the career development/skills inventory module and about the training courses available to employees. In addition, training costs, enrolment figures and training evaluation data may be maintained.

A comprehensive training module would allow managers or employees to get information about course availability and appropriateness. It would also allow the training sub function to evaluate and improve course offerings. Reports and analyses could be cost effective popular courses and, based on course evaluations, could target those courses that need improvement. In addition, the recent changes in the tax law may require additional record keeping with regard to training. Some training courses may need to be considered as taxable income to the employee requiring a transfer of data from the training module to the payroll module.

#### **11. Human Resource Planning (HRP) module:**

The HRP module may provide information to help estimate future labour supply and demand by analyzing current staffing levels and skill mixes, turnover, promotions and other employee movements.

In an elaborate HRP system, strategic plans are considered to forecast sales and production growth or decline and converted to project future labour needs. By comparing projected labour needs (demands) with current and projected staffing levels (supply), surpluses or deficits can be identified. This information can be used to develop HR programs to balance labour supply and demands.

Some HR modules are designed to facilitate succession planning—a key element of HR planning. Succession plans are used to monitor the readiness of current employees to fill positions of increased responsibilities. On an individual level they are useful for targeting developmental plans to prepare employees for future responsibilities. On an organizational level, succession plans help identify critical positions for which there are no ready successors and can be used to identify patterns of weaknesses in terms of the overall skills and experience mix among current employees. Succession planning data can be maintained and summarized on the HRIS, but these data are usually very sensitive and often secretive. Extreme care must be taken to ensure the privacy of the information.